EXHIBIT 1

2077811

State of California
Secretary of State

OFFICE OF THE SECRETARY OF STATE

I, DEBRA BOWEN, Secretary of State of the State of California, hereby certify:

That the attached transcript of 1 page(s) has been compared with the record on file in this office, of which it purports to be a copy, and that it is full, true and correct.

THE GREAT SEAL OF THE STATE OF CALIFORNIA
EUREKA

IN WITNESS WHEREOF, I execute this certificate and affix the Great Seal of the State of California this day of

APR 13 2007

Debra Bowen

DEBRA BOWEN
Secretary of State

2977811

ARTICLES OF INCORPORATION

ENDORSED - FILED
in the office of the Secretary of State
of the State of California

APR 13 2007

I

A. The name of this corporation is **PUBLIC.RESOURCE.ORG, INC.**

II

A. This corporation is a nonprofit **PUBLIC BENEFIT CORPORATION** and is not organized for the private gain of any person. It is organized under the **NONPROFIT PUBLIC BENEFIT CORPORATION LAW FOR PUBLIC AND CHARITABLE PURPOSES.**

B. The specific purpose of this corporation is to create, architect, design, implement, operate and maintain public works projects on the Internet for **EDUCATIONAL, CHARITABLE, AND SCIENTIFIC PURPOSES** to the benefit of the general public and the public interest; to increase and diffuse knowledge about the Internet in its broadest sense; to promote and facilitate the expansion, development, and growth of the public infrastructure of the Internet by any means consistent with the public interest through other activities, including, but not limited to, publications, meetings, conferences, training, educational seminars, and the issuance of grants and other financial support to educational institutions, foundations and other organizations exclusively for **EDUCATIONAL, CHARITABLE, AND SCIENTIFIC PURPOSES.**

III

A. The name and address in the State of California of this corporation's initial agent for service of process is:

Carl Malamud
Public.Resource.Org, Inc.
c/o O'Reilly Media
1005 Gravenstein Highway North
Sebastopol, CA 95472

IV

A. This corporation is organized and operated exclusively for **CHARITABLE PURPOSES** within the meaning of Section 501(c)(3), Internal Revenue Code.

B. **NO SUBSTANTIAL PART OF THE ACTIVITIES** of this corporation shall consist of carrying on propaganda, or otherwise attempting to influence legislation, and the corporation shall not participate or intervene in any political campaign (including the publishing or distribution of statements) on behalf of any candidate for public office.

V

A. The property of this corporation is **IRREVOCABLY DEDICATED TO CHARITABLE PURPOSES** and no part of the net income or assets of this corporation shall ever inure to the benefit of any director, officer or member thereof or to the benefit of any private person. Upon the dissolution or winding up of the corporation, its assets remaining after payment, or provision for payment, of all debts and liabilities of this corporation shall be distributed to a nonprofit fund, foundation or corporation which is organized and operated **EXCLUSIVELY FOR CHARITABLE PURPOSES** and which has established its tax exempt status under Section 501(c)(3), Internal Revenue Code.

OFFICE OF THE SECRETARY OF STATE

Carl Malamud, Incorporator

EXHIBIT 2

Table of Codes ↑

Public Safety Standards
United States (Federal Government)

In order to promote public education and public safety, equal justice for all, a better informed citizenry, the rule of law, world trade and world peace, this legal document is hereby made available on a noncommercial basis, as it is the right of all humans to know and speak the laws that govern them. (See also State and Local codes.)

STANDARD	YEAR	ORGANIZATION	TITLE	CFR AUTHORITY
3M 0222	1995	3M Corporation	Organochlorine Pesticides and PCBs in Wastewater Using Empore Disk	40 CFR 136.3(a) Table ID
AA CONSTRUCT	1971	Aluminum Association	Aluminum Construction Manual	24 CFR 200, Subpart S
AA	1967	Aluminum Association	Aluminum Construction Manual	24 CFR 200, Subpart S
AA DATA	1982	Aluminum Association	Aluminum Standards and Data, Seventh Edition	49 CFR 178.65(b)(2)
AAMA 101-IS2	1997	American Architectural Manufacturers Association	Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors	10 CFR 434.402.2.2.4
AAMA 605	1998	American Architectural Manufacturers Association	Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels	40 CFR 59.401
AAMA 1002.10	1993	American Architectural Manufacturers Association	Aluminum Insulating Products for Windows and Sliding Glass Doors	24 CFR 200.938
AAMA 1102.7	1989	American Architectural Manufacturers Association	Voluntary Specifications for Aluminum Storm Doors	10 CFR 440 Appendix A
AAMA 1503.1	1988	American Architectural Manufacturers Association	Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections	24 CFR 3280.508(e)
AAMA 1702.2	1995	American Architectural Manufacturers Association	Swinging Exterior Passage Doors Voluntary Standard for Utilization in Manufactured-Housing	24 CFR 3280.405(e)(2)
AAMA 1704	1985	American Architectural Manufacturers Association	Voluntary Standard Egress Window Systems for Utilization in Manufactured-Housing	24 CFR 3280.404(b)
AAMD	1973	American Association on Mental Deficiency	Classification in Mental Retardation	42 CFR 483.102(b)(3)(i)
AAMVA CDLIS.2.0	1998	American Association of Motor Vehicle Administrators	Commercial Driver License Information System (CDLIS) State Procedures	49 CFR 384.231(d)
AASHTO	1973	American Association of State Highway and Transportation Officials	Standard Specifications for Highway Bridges	24 CFR 200, Subpart S
AASHTO	2001	American Association	A Policy on Geometric Design of	23 CFR 625.4

		of State Highway and Transportation Officials	Highways and Streets	
AASHTO	2005	American Association of State Highway and Transportation Officials	A Guide for Accommodating Utilities Within Highway Right-of-Way	23 CFR 645.211
AATCC 118	1997	American Association of Textile Chemists and Colorists	Oil Repellency: Hydrocarbon Resistance Test	10 CFR 430 Subpart B, App. J1, 2.6.4.5.1
AATCC 124	1996	American Association of Textile Chemists and Colorists	Appearance of Durable Press Fabrics After Repeated Home Laundering	16 CFR 1615.32(a)(1)
ABYC A-01	1993	American Boat and Yacht Council	Marine Liquified Petroleum Gas Systems	46 CFR 184.240(a)
ABYC A-07	1973	American Boat and Yacht Council	Boat Heating Systems	46 CFR 184.200
ABYC A-16	1997	American Boat and Yacht Council	Electric Navigation Lights	46 CFR 25.10-3(a)(2)
ABYC A-22	1993	American Boat and Yacht Council	Marine Compressed Natural Gas Systems	46 CFR 184.240(b)
ABYC E-01	1973	American Boat and Yacht Council	Bonding of Direct Current Systems	46 CFR 28.345(b)
ABYC E-09	1990	American Boat and Yacht Council	Direct Current (DC) Electrical Systems on Boats	46 CFR 183.340(b)(4)
ABYC H-02	1989	American Boat and Yacht Council	Ventilation of Boats Using Gasoline	46 CFR 28.340(c)
ABYC H-22	1986	American Boat and Yacht Council	DC Electric Bilge Pumps Operating Under 50 Volts	46 CFR 182.500(b)
ABYC H-24	1993	American Boat and Yacht Council	Gasoline Fuel Systems	46 CFR 182.455(c)
ABYC H-25	1994	American Boat and Yacht Council	Portable Gasoline Fuel Systems for Flammable Liquids	46 CFR 182.130
ABYC H-32	1987	American Boat and Yacht Council	Ventilation of Boats Using Diesel Fuel	46 CFR 182.470(c)
ABYC H-33	1989	American Boat and Yacht Council	Diesel Fuel Systems	46 CFR 182.130
ABYC P-01	1993	American Boat and Yacht Council	Safe Installation of Exhaust Systems for Propulsion and Auxiliary Engines	46 CFR 182.130
ABYC P-04	1989	American Boat and Yacht Council	Marine Inboard Engines	46 CFR 182.420(b)
ACGIH	1987	American Conference of Governmental Industrial Hygienists	Guidelines for the Selection of Chemical Protective Clothing, Third Edition	46 CFR 153.933(a)
ACGIH	1998	American Conference of Governmental Industrial Hygienists	Industrial Ventilation Manual	40 CFR 63.2984(e)
ACI 318	1995	American Concrete Institute	Building Code Requirements for Reinforced Concrete	30 CFR 250.901(d)(1)
ACI	1980	American Concrete Institute	Manual of Concrete Practice, Part 1	24 CFR 200, Subpart S

ACRI 210-240	2003	Air Conditioning and Refrigeration Institute	Unitary Air-Conditioning and Air-Source Heat Pump Equipment	10 CFR 431.96
ACRI 310/380	2004	Air-Conditioning, Heating and Refrigeration Institute	Packaged Terminal Air-Conditioners and Heat Pumps	10 CFR 431.96, Table 1
ACRI 320	1998	Air-Conditioning, Heating, and Refrigeration Institute	Water Source Heat Pumps	10 CFR 434.403
ACRI 325	1998	Air-Conditioning, Heating, and Refrigeration Institute	Ground Water-Source Heat Pumps	10 CFR 434.403
ACRI 330	1998	Air-Conditioning, Heating, and Refrigeration Institute	Ground-Source Closed-Loop Heat Pumps	10 CFR 434.403
ACRI 340-360	2004	Air Conditioning and Refrigeration Institute	Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment	10 CFR 434.403
ACRI 365	1994	Air Conditioning and Refrigeration Institute	Commercial and Industrial Unitary Air-Conditioning Condensing Units	10 CFR 434.403
ACRI 1200	2006	Air Conditioning and Refrigeration Institute	Performance Rating of Commercial Refrigerated Display Merchandisers and Storage Cabinets	10 CFR 431.66(a)(3)
AERA	1999	American Educational Research Association	Standard for Educational and Psychological Testing	34 CFR 668.148(a)(2)(iv)
AFPA	2001	American Forest and Paper Association	National Design Specification for Wood Construction With Supplemental Design Values for Wood Construction	24 CFR 3280.304(b)(1)
AGA 3.1	1990	American Gas Association	Orifice Metering of Natural Gas and Other Related Hydrocarbon Fluids: Part 1	40 CFR 75, Appendix D
AGA	2001	American Gas Association	Purging Principles and Practices	49 CFR 193.2615
AHA A135.4	1995	American Hardboard Association	Basic Hardboard	24 CFR 3280.304(b)(1)
AHA A135.5	1995	American Hardboard Association	Prefinished Hardboard Paneling	24 CFR 3280.304(b)(1)
AHA A135.6	1998	American Hardboard Association	Hardboard Siding	24 CFR 3280.304(b)(1)
AHAM DW-1	1992	Association of Home Appliance Manufacturers	Household Electric Dishwashers	10 CFR 430 Subpart B
AHAM HLD-1	1974	Association of Home Appliance Manufacturers	Performance Evaluation Procedure for Household Tumble Type Clothes Dryers	10 CFR 430 Subpart B
AHAM HRF-1	1979	Association of Home Appliance Manufacturers	Household Refrigerators, Combination Refrigerator-Freezers, and Household Freezers	10 CFR 430 Subpart B
AHPA	1992	American Herbal Products Association	Herbs of Commerce	21 CFR 101.4(h)
AI MSI-1	1970	Asphalt Institute	Thickness Design--Full Depth	24 CFR 200, Subpart S

			Asphalt Pavement Structures for Highways and Streets	
AIHA	1994	American Industrial Hygiene Association	Laboratory Ventilation Workbook	42 CFR 52b.12(c)(10)
AIMM MS41	1996	Association for Information and Image Management	Dimensions of Unitized Microfilm Carriers and Apertures (Aperture, Camera, Copy and Image Cards)	36 CFR 1238.10(a)(1)
AIMM IT2.18	1996	Association for Information and Image Management	Photography--Density Measurements--Part 3: Spectral Conditions	36 CFR 1238.14(d)(2)
AIMM/PIMA IT9.2	1998	Association for Information and Image Management	Photographic Processed Films, Plates, and Papers--Filing Enclosures and Storage Containers	36 CFR 1238.10(a)(1)
AIMM/PIMA IT9.11	1998	Association for Information and Image Management	Imaging Materials--Processed Safety Photographic Film--Storage	36 CFR 1234.14(b)(1)
AIMM IT9.23	1996	Association for Information and Image Management	Imaging Materials--Polyester Based Magnetic Tape--Storage	36 CFR 1234.14(b)(2)
AIMM/PIMA IT9.25	1998	Association for Information and Image Management	Imaging Materials--Optical Disc Media--Storage	36 CFR 1234.14(b)(3)
AIMM MS1	1996	Association for Information and Image Management	Recommended Practice for Alphanumeric Computer-Output Microforms--Operational Practices for Inspection and Quality Control	36 CFR 1238.14(c)
AIMM MS5	1992	Association for Information and Image Management	Microfiche	36 CFR 1238.10(b)
AIMM MS14	1996	Association for Information and Image Management	Specifications for 16mm and 35mm Roll Microfilm	36 CFR 1238.10(a)(1)
AIMM MS19	1993	Association for Information and Image Management	Standard Recommended Practice--Identification of Microforms	36 CFR 1238.12(c)
AIMM MS23	1998	Association for Information and Image Management	Standard Recommended Practice--Production, Inspection, and Quality Assurance of First-Generation, Silver Microforms of Documents	36 CFR 1238.14(d)(2)
AIMM MS32	1996	Association for Information and Image Management	Microrecording of Engineering Source Documents on 35 mm Microfilm	36 CFR 1238.10(a)(1)
AIMM MS43	1998	Association for Information and Image Management	Standard Recommended Practice--Operational Procedures--Inspection and Quality Control of Microfilms and Documents	36 CFR 1238.14(d)(1)(i)
AIMM MS45	1990	Association for Information and Image Management	Recommended Practice for Inspection of Stored Silver-Gelatin Microforms for Evidence of Deterioration	36 CFR 1238.22(d)(1)
AIMM TR34	1996	Association for Information and Image	Sampling Procedures for Inspection by Attributes of Images in Electronic	36 CFR 1237.28(d)(2)

		Management	Image Management and Micrographic Systems	
ALCIDE 980342EA	1995	Alcide Corporation	Determination of Sodium Chlorite: 50 ppm to 1500 ppm concentration	21 CFR 173.325(g)
AMCA 210	1999	Air Movement and Control Association	Laboratory Methods of Testing Fans for Ratings	10 CFR 430 Subpart B, App. M
J-STD-102	2011	Alliance for Telecommunications Industry Solutions	Joint ATIS/TIA CMAS Federal Alert Gateway to CMSP Gateway Interface Text Specification	Warning, Alert and Response Network (WARN) Act of 2006
TELCO FAQ	1891	American Telephone and Telegraph	Practical Information for Telephonists	
ANSI A10.3	1970	American National Standards Institute	Safety Requirements for Powder Actuated Fastening Systems	29 CFR 1926
ANSI A10.4 (pdf) ANSI A10.4 (html)	1963	American National Standards Institute	Safety Requirements for Workmens Hoists	29 CFR 1926
ANSI A10.5 (pdf) ANSI A10.5 (html)	1969	American National Standards Institute	Safety Requirements for Material Joists	29 CFR 1926
ANSI A14.1 (pdf) ANSI A14.1 (html) ANSI A14.1 (svg)	1990	American National Standards Institute	Ladders--Wood--Safety Requirements	29 CFR 1917
ANSI A14.2 (pdf) ANSI A14.2 (html) ANSI A14.2 (svg)	1990	American National Standards Institute	Ladders--Portable Metal--Safety	29 CFR 1917
ANSI A92.2 (pdf) ANSI A92.2 (html)	1969	American National Standards Institute	Vehicle Mounted Elevating and Rotating Work Platforms	29 CFR 453
ANSI B7.1 (pdf) ANSI B7.1 (html)	1970	American National Standards Institute	Safety Code for the Use, Care, and Protection of Abrasive Wheels	29 CFR 1926
ANSI B20.1 (pdf) ANSI B20.1 (html) ANSI B20.1 (svg)	1957	American National Standards Institute	Safety Code for Conveyors, Cableways, and Related Equipment	29 CFR 1926
ANSI B30.6 (pdf) ANSI B30.6 (html) ANSI B30.6 (svg)	1969	American National Standards Institute	Safety Code for Derricks	29 CFR 1926
ANSI B36.19	1979	American National Standards Institute	Welded and Seamless Wrought Steel Pipe	24 CFR 3280.705(b)(1)
ANSI B56.1 (pdf) ANSI B56.1 (html) ANSI B56.1 (svg)	1969	American National Standards Institute	Safety Standard for Powered Industrial Trucks	29 CFR 1926
ANSI N14.1	2001	American National Standards Institute	Packaging of Uranium Hexafluoride for Transport	49 CFR 173.420(a)(1)
ANSI O1.1 (pdf) ANSI O1.1 (html)	1961	American National Standards Institute	Safety Code for Woodworking Machinery	29 CFR 1926
ANSI S1.4	1983	American National Standards Institute	Specifications for Sound Level Meters	7 CFR 1755.522(s)(3)(v)
ANSI S1.11	2004	American National Standards Institute	Specification for Octave, Half-Octave, and Third Octave Band Filter Sets	49 CFR 227
ANSI S1.25	1991	American National Standards Institute	Specification for Personal Noise Dosimeters	49 CFR 227.103(c)(2)(iii)
ANSI S1.40	1984	American National	Specification for Acoustical	49 CFR 229, Appendix I

		Standards Institute	Calibrators	
ANSI S1.43	1997	American National Standards Institute	Specifications for Integrating-Averaging Sound Level Meters	49 CFR 227.103(c)(2)(ii)
ANSI S3.22 (pdf) ANSI S3.22 (html)	2003	American National Standards Institute	Specification of Hearing Aid Characteristics	21 CFR 801
ANSI Z35.1 (pdf) ANSI Z35.1 (html) ANSI Z35.1 (svg)	1968	American National Standards Institute	Specifications for Accident Prevention Signs	29 CFR 1926
ANSI Z35.2 (pdf) ANSI Z35.2 (html) ANSI Z35.2 (svg)	1968	American National Standards Institute	Specifications for Accident Prevention Tags	29 CFR 1926
ANSI Z49.1 (pdf) ANSI Z49.1 (html)	1967	American National Standards Institute	Safety in Welding and Cutting	29 CFR 1926
ANSI Z87.1 (pdf) ANSI Z87.1 (html) ANSI Z87.1 (svg)	2003	American National Standards Institute	Practice for Occupational and Educational Eye and Face Protection	29 CFR 1910
ANSI Z88.2 (pdf) ANSI Z88.2 (html) ANSI Z88.2 (svg)	1992	American National Standards Institute	American National Standard for Respiratory Protection	30 CFR 250
ANSI Z89.1 (pdf) ANSI Z89.1 (html)	1969	American National Standards Institute	Safety Requirements for Industrial Head Protection	29 CFR 1926
ANSI Z89.2 (pdf) ANSI Z89.2 (html)	1971	American National Standards Institute	Industrial Protective Helmets for Electrical Workers	29 CFR 1926
ANSI Z90.4 (pdf) ANSI Z90.4 (html)	1984	American National Standards Institute	Protective Headgear for Bicyclists	16 CFR 1203
ANSI Z245.1 (pdf) ANSI Z245.1 (html) ANSI Z245.1 (svg)	1992	American National Standards Institute	Mobile Refuse Collection and Compaction--Safety Requirements	40 CFR 243
ANSI Z245.2 (pdf) ANSI Z245.2 (html)	1997	American National Standards Institute	Stationary Compactors--Safety Requirements	40 CFR 243
AOAC	1990	AOAC International	Official Methods of Analysis (Volume 1)	9 CFR 318.19(b)
AOAC	1980	AOAC International	Official Methods of Analysis, 1980	21 CFR 131.150(c)
APA 87-1	2001	American Pyrotechnics Association	Standard for Construction and Approval for Transportation of Fireworks and Novelties	49 CFR 173.56(j)(1)
APHA Method 2120 (pdf) APHA Method 2120 (html)	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 141.121
APHA Method 2130 (pdf) APHA Method 2130 (html)	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 141.121
APHA Method 2320 (pdf) APHA Method 2320 (html)	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 136.3(a)

APHA Method 2510 (pdf) APHA Method 2510 (html)	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 141.121
APHA Method 2550 (pdf) APHA Method 2550 (html)	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 141.121
APHA Method 2580	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 141.121
APHA Method 3111 (pdf) APHA Method 3111 (html)	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 444.12
APHA Method 3112 (pdf) APHA Method 3112 (html)	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 444.12
APHA Method 3113 (pdf) APHA Method 3113 (html)	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 444.12
APHA Method 3114	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 444.12
APHA Method 3120	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 444.12
APHA Method 3500-AS	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 444.12
APHA Method 3500-CA (pdf) APHA Method 3500-CA (html)	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 136.3(a)
APHA Method 3500-CD (pdf) APHA Method 3500-CD (html)	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 444.12
APHA Method 3500-CR	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 63.404(a)
APHA Method 3500-CU	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 444.12
APHA Method 3500-MG (pdf) APHA Method 3500-MG (html)	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 136.3(a)
APHA Method 3500-PB (pdf) APHA Method	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 444.12

3500-PB (html)				
APHA Method 3500-ZN (pdf) APHA Method 3500-ZN (html)	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 136.3(a)
APHA Method 4110 (pdf) APHA Method 4110 (html)	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 136.3(a)
APHA Method 4500-ClO2 (pdf) APHA Method 4500-ClO2 (html)	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	21 CFR 165.110(b)(4)(iii)(l)(7)(ii)
APHA Method 4500-CL	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	21 CFR 165.110(b)(4)
APHA Method 4500-CN	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 136.3(a)
APHA Method 4500-F	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 136.3(a)
APHA Method 4500-H	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 444.12
APHA Method 4500-NO2	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 136.3(a)
APHA Method 4500-NO3	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 136.3(a)
APHA Method 4500-O3	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 136.3(a)
APHA Method 4500-P	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 136.3(a)
APHA Method 4500-S2	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 136.3(a)
APHA Method 4500-SI	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 141.121
APHA Method 4500-SO42	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 136.3(a)
APHA Method 5540	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 141.121
APHA Method 6651	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 141.121

APHA Method 9215	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 141.121
APHA Method 9221	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 136.3(a)
APHA Method 9222	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 136.3(a)
APHA Method 9223	1992	American Public Health Association	Standard Methods for the Examination of Water and Wastewater	40 CFR 136.3(a)
API 2INT-MET	2007	American Petroleum Institute	Interim Guidance on Hurricane Conditions in the Gulf of Mexico	30 CFR 250.901(a)(6)
API 5L	2004	American Petroleum Institute	Specification for Line Pipe	49 CFR 192.113
API 5L1	2002	American Petroleum Institute	Recommended Practice for Railroad Transportation of Line Pipe	49 CFR 192.65(a)
API 6A	2004	American Petroleum Institute	Specification for Wellhead and Christmas Tree Equipment	30 CFR 250.806(a)(3)
API 6D	2008	American Petroleum Institute	Specification for Pipeline Valves	49 CFR 195.116(d)
API 12F	1994	American Petroleum Institute	Specification for Shop Welded Tanks for Storage of Production Liquids	49 CFR 195.264(b)(1)
API RP 14C	2001	American Petroleum Institute	Recommended Practice for Analysis, Design, Installation, and Testing of Basic Surface Safety Systems for Offshore Production Platforms	30 CFR 250.1628(c)
API RP 14F	2008	American Petroleum Institute	Recommended Practice for Design and Installation of Electrical Systems for Offshore Production Platforms	30 CFR 250.114(c)
API 17J	2008	American Petroleum Institute	Specification for Unbonded Flexible Pipe	30 CFR 250.1002(b)(4)
API 80	2000	American Petroleum Institute	Guidelines for the Definition of Onshore Gas Gathering Lines	49 CFR 192.8(a)
API 510	2006	American Petroleum Institute	Pressure Vessel Inspection Code	30 CFR 250.803(b)(1)
API 620	2002	American Petroleum Institute	Design and Construction of Large Welded Low Pressure Storage Tanks	49 CFR 195.264(e)(3)
API 650	2007	American Petroleum Institute	Welded Steel Tanks for Oil Storage	195.132(b)(3)
API 651	1997	American Petroleum Institute	Cathodic Protection of Aboveground Petroleum Storage Tanks	49 CFR 195.565
API 652	1997	American Petroleum Institute	Lining of Aboveground Petroleum Storage Tank Bottoms	49 CFR 195.579(d)
API 653	2003	American Petroleum Institute	Tank Inspection, Repair, Alteration, and Reconstruction	49 CFR 195.432(b)

API 1104	1999	American Petroleum Institute	Standard for Welding Pipelines and Related Facilities	49 CFR 195.214(a)
API 1130	2002	American Petroleum Institute	Computational Pipeline Monitoring	49 CFR 195.444
API 1162	2003	American Petroleum Institute	Public Awareness Programs for Pipeline Operators	49 CFR 192.616(a)
API 2000	1998	American Petroleum Institute	Venting Atmospheric and Low-Pressure Storage Tanks	49 CFR 195.264(e)(2)
API 2003	1998	American Petroleum Institute	Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents	49 CFR 195.405(a)
API 2350	2005	American Petroleum Institute	Overfill Protection for Storage Tanks in Petroleum Facilities	49 CFR 195.428(c)
API 2510	2001	American Petroleum Institute	Design and Construction of LPG Installations	49 CFR 195.205(b)(3)
API RP 14G	2007	American Petroleum Institute	Recommended Practice for Fire Prevention and Control on Open Type Offshore Production Platforms	30 CFR 250.803(b)(9)(v)
APLIC	1996	Avian Power Line Interaction Committee	Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996	7 CFR 1724.52(a)(1)(i)
APSP 16	2011	Association of Pool and Spa Professionals	Standard Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, and Hot Tubs	16 CFR 1450.3
ARMA	1984	Asphalt Roofing Manufacturers Association	Residential Asphalt Roofing Manual	24 CFR 200, Subpart S
ASHRAE 15	1994	American Society of Heating, Refrigerating and Air Conditioning Engineers	Safety Code for Mechanical Refrigeration	49 CFR 173.306(e)(1)(i)
ASHRAE	1993	American Society of Heating, Refrigerating and Air Conditioning Engineers	Fundamentals	10 CFR 434.402.2.2.5(a)
ASME B16.9	2003	American Society of Mechnical Engineers	Factory Made Wrought Steel Buttwelding Fittings	49 CFR 195.118(a)
ASME B30.2 (pdf) ASME B30.2 (html) ASME B30.2 (svg)	2005	American Society of Mechanical Engineers	Safety Requirements for Overhead and Gantry Cranes	29 CFR 1926
ASME B30.5 (pdf) ASME B30.5 (html)	2004	American Society of Mechanical Engineers	Safety Requirements for Mobile and Locomotive Cranes	29 CFR 1926
ASME B30.7 (pdf) ASME B30.7 (html)	2001	American Society of Mechanical Engineers	Safety Requirements for Base-Mounted Drum Hoists	29 CFR 1926
ASME B30.14 (pdf) ASME B30.14 (html)	2004	American Society of Mechanical Engineers	Safety Requirements for Side Boom Tractors	29 CFR 1926

ASME B30.14 (svg)				
ASME B31.4	2002	American Society of Mechnical Engineers	Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids	49 CFR 195.110(a)
ASME B31.8	2003	American Society of Mechnical Engineers	Gas Transmission and Distribution Piping Systems	49 CFR 192.619(a)(1)(i)
ASME B318S	2004	American Society of Mechanical Engineers	Managing System Integrity of Gas Pipelines	49 CFR 192.903(c)
ASME B31G	1991	American Society of Mechanical Engineers	Manual for Determining the Remaining Strength of Corroded Pipelines	49 CFR 192.485(c)
ASME UPV	1943	American Society of Mechanical Engineers	Code for Unfired Pressure Vessels	49 CFR 173.32(c)(4)
ASQC Q9001	1994	American Society for Quality Control	Quality Assurance in Design, Development, Production, Installation, and Servicing	33 CFR 96.430(a)(2)(ii)
ASQC Q9002	1994	American Society for Quality Control	Quality Systems -- Model for Quality Assurance in Production, Installation, and Servicing	24 CFR 200.935(d)(4)(ii)(A)(3)
ASQC Q9003	1994	American Society for Quality Control	Quality Systems - Model for Quality Assurance in Final Inspection and Test	24 CFR 200.935(d)(4)(ii)(A)(4)
ASQC Q9004-1	1994	American Society for Quality Control	Quality Management and Quality Systems Elements-Guidelines	24 CFR 200.935(d)(4)(ii)(A)(5)
ASSE 1001	1990	American Society of Sanitary Engineering	Performance Requirements for Pipe Applied Atmospheric Type Vacuum Breakers	24 CFR 3280.604(b)(2)
ASSE 1006 (pdf) ASSE 1006 (html)	1986	American Society of Sanitary Engineering	Plumbing Requirements for Residential Use (Household) Dishwashers	24 CFR 3280.604(b)(2)
ASSE 1007 (pdf) ASSE 1007 (html)	1986	American Society of Sanitary Engineering	Performance Requirements for Home Laundry Equipment	24 CFR 3280.604(b)(2)
ASSE 1008 (pdf) ASSE 1008 (html)	1986	American Society of Sanitary Engineering	Performance Requirements for Household Food Waste Disposer Units	24 CFR 3280.604(b)(2)
ASSE 1016	1988	American Society of Sanitary Engineering	Performance Requirements for Individual Thermostatic Pressure Balancing and Combination Control for Bathing Facilities	24 CFR 3280.604(b)(2)
ASSE 1023 (pdf) ASSE 1023 (html)	1979	American Society of Sanitary Engineering	Hot Water Dispensers, Household Storage Type, Electrical	24 CFR 3280.604(b)(2)
ASSE 1025	1978	American Society of Sanitary Engineering	Diverters for Plumbing Faucets with Hose Spray, Anti-Siphon Type, Residential Applications	24 CFR 3280.604(b)(2)
ASSE 1037 (pdf) ASSE 1037 (html)	1990	American Society of Sanitary Engineering	Performance Requirements for Pressurized Flushing Devices (Flushometers) for Plumbing Fixtures	24 CFR 3280.604(b)(2)
ASCE 7	2002	American Society of Civil Engineers	Minimum Design Loads for Buildings and Other Structures	49 CFR 193.2013

ASTM A36	1977	American Society for Testing and Materials	Standard Specification for Carbon Structural Steel	24 CFR Part 200
ASTM A36	1997	American Society for Testing and Materials	Standard Specification for Carbon Structural Steel	46 CFR 160.035-3(b)(2)
ASTM A47	1968	American Society for Testing and Materials	Standard Specification for Malleable Iron Castings	29 CFR 1910.111(b)(7)(vi)
ASTM A82	1979	American Society for Testing and Materials	Cold-Drawn Steel Wire for Concrete Reinforcement	24 CFR 200, Subpart S
ASTM A100	1969	American Society for Testing and Materials	Standard Specification for Ferrosilicon	40 CFR 60.261(s)
ASTM A106	2004	American Society for Testing and Materials	Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service	49 CFR 192.113
ASTM A134	1996	American Society for Testing and Materials	Standard Specification for Pipe, Steel, Electric Fusion (Arc)-Welded (Sizes NPS 16 and Over)	46 CFR 56.60-1(b)
ASTM A179	1990	American Society for Testing and Materials	Standard Specification for Seamless Cold-Drawn Low-Carbon Steel Heat-Exchanger and Condenser Tubes	46 CFR 56.60-1(b)
ASTM A184	1979	American Society for Testing and Materials	Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement	24 CFR 200, Subpart S
ASTM A185	1979	American Society for Testing and Materials	Steel Wire Fabric for Concrete Reinforcement	24 CFR 200, Subpart S
ASTM A203	1997	American Society for Testing and Materials	Standard Specification for Pressure Vessel Plates, Alloy Steel, Nickel	46 CFR 54.05-20(b)
ASTM A214	1996	American Society for Testing and Materials	Standard Specification for Electric-Resistance-Welded Carbon Steel Heat-Exchanger and Condenser Tubes	46 CFR 56.60-1(b)
ASTM A242	1979	American Society for Testing and Materials	Standard Specification for High-Strength Low-Alloy Structural Steel	24 CFR 200, Subpart S
ASTM A285	1978	American Society for Testing and Materials	Standard Specification for Pressure Vessel Plates, Carbon Steel, Low- and Intermediate-Tensile Strength	49 CFR 179.300-7(a)
ASTM A307	1978	American Society for Testing and Materials	Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength	46 CFR 56.25-20(b)
ASTM A325	1979	American Society for Testing and Materials	High-Strength Bolts for Structural Steel Joists	24 CFR 200, Subpart S
ASTM A333	1994	American Society for Testing and Materials	Standard Specification for Seamless and Welded Steel Pipe for Low-Temperature Service	46 CFR 56.50-105
ASTM A369	1992	American Society for Testing and Materials	Standard Specification for Carbon and Ferritic Alloy Steel Forged and Bored Pipe for High-Temperature Service	46 CFR 56.60-1(b)
ASTM A370	1977	American Society for Testing and Materials	Standard Test Method and Definitions for Mechanical Testing of Steel Products	49 CFR 179.102-1(a)(1)
ASTM A381	1996	American Society for	Standard Specification for Metal-Arc-	49 CFR 192.113

		Testing and Materials	Welded Steel Pipe for Use with High-Pressure Transmission Systems	
ASTM A391	1965	American Society for Testing and Materials	Standard Specification for Alloy Steel Chain	29 CFR 1910.184(e)(4)
ASTM A416	1974	American Society for Testing and Materials	Uncoated Seven-Wire Stress-Relieved Strand for Prestressed Concrete	24 CFR 200, Subpart S
ASTM A441	1979	American Society for Testing and Materials	High-Strength Low-Alloy Structural Manganese Vanadium Steel	24 CFR 200, Subpart S
ASTM A449	1978	American Society for Testing and Materials	Quenched and Tempered Steel Bolts and Studs	24 CFR 200, Subpart S
ASTM A475	1978	American Society for Testing and Materials	Standard Specification for Zinc-Coated Steel Wire Strand	7 CFR 1755.370(b)
ASTM A483	1964	American Society for Testing and Materials	Standard Specification for Silicomanganese	40 CFR 60.261(o)
ASTM A490	1979	American Society for Testing and Materials	Quenched and Tempered Alloy Steel Bolts for Structural Steel Joints	24 CFR 200, Subpart S
ASTM A496	1978	American Society for Testing and Materials	Deformed Steel Wire for Concrete Reinforcement	24 CFR 200, Subpart S
ASTM A497	1979	American Society for Testing and Materials	Welded Deformed Steel Wire, Fabric for Concrete Reinforcement	24 CFR 200, Subpart S
ASTM A500	1978	American Society for Testing and Materials	Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes	24 CFR 200, Subpart S
ASTM A501	1976	American Society for Testing and Materials	Hot-Formed Welded and Seamless Carbon Steel Structural Tubing	24 CFR 200, Subpart S
ASTM A502	1976	American Society for Testing and Materials	Steel Structural Rivets	24 CFR 200, Subpart S
ASTM A514	1977	American Society for Testing and Materials	High-Yield Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding	24 CFR 200, Subpart S
ASTM A516	1990	American Society for Testing and Materials	Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate and Lower-Temperature Service	49 CFR 178.337-2(b)(2)(i)
ASTM A522	1995	American Society for Testing and Materials	Forged or Rolled 8 and 9% Nickel Alloy Steel Flanges, Fittings, Valves, and Parts for Low-Temperature Service	46 CFR 56.50-105
ASTM A529	1972	American Society for Testing and Materials	Structural Steel with 42,000PSI (290 Mpa) Minimum Yield Point (1/2 in (12.7 mm) Maximum Thickness	24 CFR 200, Subpart S
ASTM A529	1975	American Society for Testing and Materials	Structural Steel with 42,000PSI (290 Mpa) Minimum Yield Point (1/2 in (12.7 mm) Maximum Thickness	24 CFR 200, Subpart S
ASTM A539	1990	American Society for Testing and Materials	Standard Specification for Electric-Resistance-Welded Coiled Steel Tubing for Gas and Fuel Oil Lines	24 CFR 3280.705(b)(4)
ASTM A570	1979	American Society for	Hot-Rolled Carbon Steel Sheet and	24 CFR 200, Subpart S

		Testing and Materials	Strip, Structural Quality	
ASTM A572	1979	American Society for Testing and Materials	High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality	24 CFR 200, Subpart S
ASTM A588	1979	American Society for Testing and Materials	High-Strength Low-Alloy Structural Steel with 50 ksi Minimum Yield Point to 4 inches Thick	24 CFR 200, Subpart S
ASTM A611	1972	American Society for Testing and Materials	Steel, Cold-rolled Sheet, Carbon, Structural	24 CFR 200, Subpart S
ASTM A615	1979	American Society for Testing and Materials	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement	24 CFR 200, Subpart S
ASTM A616	1979	American Society for Testing and Materials	Rail-Steel Deformed and Plain Bars for Concrete Reinforcement	24 CFR 200, Subpart S
ASTM A617	1979	American Society for Testing and Materials	Axle-Steel Deformed and Plain Bars for Concrete Reinforcement	24 CFR 200, Subpart S
ASTM A618	1974	American Society for Testing and Materials	Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing	24 CFR 200, Subpart S
ASTM A633	1979	American Society for Testing and Materials	Standard Specification for Normalized High-Strength Low Alloy Structural Steel	49 CFR 178.338-2(a)
ASTM A671	2004	American Society for Testing and Materials	Standard Specification for Electric-Fusion-Welded Steel Pipe for Atmospheric and Lower Temperatures	49 CFR 192.113
ASTM A672	1996	American Society for Testing and Materials	Standard Specification for Electric-Fusion-Welded Steel Pipe for High-Pressure Service at Moderate Temperatures	49 CFR 192.113
ASTM A691	1998	American Society for Testing and Materials	Standard Specification for Carbon and Alloy Steel Pipe, Electric-Fusion-Welded for High-Pressure Service at High Temperature	49 CFR 192.113
ASTM B16	1985	American Society for Testing and Materials	Standard Specification for Free-Cutting Brass Rod, Bar, and Shapes for Use in Screw Machines	46 CFR 56.60-2
ASTM B16	1992	American Society for Testing and Materials	Standard Specification for Free-Cutting Brass Rod, Bar, and Shapes for Use in Screw Machines	46 CFR 56.60-2
ASTM B21	1983	American Society for Testing and Materials	Standard Specification for Naval Brass Rod, Bar, and Shapes	46 CFR 56.60-2
ASTM B21	1996	American Society for Testing and Materials	Standard Specification for Naval Brass Rod, Bar, and Shapes	46 CFR 56.60-2
ASTM B42	1996	American Society for Testing and Materials	Standard Specification for Seamless Copper Pipe, Standard Sizes	46 CFR 56.60-1(b)
ASTM B68	1995	American Society for Testing and Materials	Standard Specification for Seamless Copper Tube, Bright Annealed	46 CFR 56.60-1(b)
ASTM B75	1997	American Society for Testing and Materials	Standard Specification for Seamless Copper Tube	46 CFR 56.60-1(b)
ASTM B85	1984	American Society for Testing and Materials	Standard Specification for Aluminum-Alloy Die Castings	46 CFR 56.60-2

ASTM B88	1996	American Society for Testing and Materials	Standard Specification for Seamless Copper Water Tube	46 CFR 56.60-1(b)
ASTM B96	1993	American Society for Testing and Materials	Standard Specification for Copper-Silicon Alloy Plate, Sheet, Strip, and Bolled Bar for General Purposes and Pressure Vessels	46 CFR 119.440
ASTM B111	1995	American Society for Testing and Materials	Copper and Copper-Alloy Seamless Condenser Tubes and Ferrule Stock	46 CFR 56.60-1(b)
ASTM B117	1973	American Society for Testing and Materials	Standard Practice for Operating Salt Spray (Fog) Apparatus	49 CFR 571.209 S5.2(a)
ASTM B122	1995	American Society for Testing and Materials	Standard Specification for Copper-Nickel-Tin Alloy, Copper-Nickel-Zinc Alloy (Nickel Silver), and Copper-Nickel Alloy Plate, Sheet, Strip and Rolled Bar	46 CFR 119.440
ASTM B124	1996	American Society for Testing and Materials	Standard Specification for Copper and Copper-Alloy Forging Rod, Bar, and Shapes	46 CFR 56.60-2
ASTM B152	1997	American Society for Testing and Materials	Standard Specification for Copper, Sheet, Strip, Plate, and Rolled Bar	46 CFR 58.50-5(a)(4)
ASTM B193	1987	American Society for Testing and Materials	Standard Test Method for Resistivity of Electrical Conductor Materials	7 CFR 1755.390(i)(5)(v)(A)
ASTM B209	1996	American Society for Testing and Materials	Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate	46 CFR 58.50-5, Table 58.50-5(a)
ASTM B224	1980	American Society for Testing and Materials	Standard Classification of Coppers	7 CFR 1755.890(i)(5)(vi)
ASTM B227	1970	American Society for Testing and Materials	Hard-Drawn Copper-Clad Steel Wire	24 CFR 200, Subpart S
ASTM B280	1997	American Society for Testing and Materials	Seamless Copper Tube for Air Conditioning and Refrigeration Field Service	46 CFR 56.60-1(b)
ASTM B283	1996	American Society for Testing and Materials	Standard Specification for Copper and Copper-Alloy Die Forgings (Hot-Pressed)	46 CFR 56.60-2
ASTM B315	1993	American Society for Testing and Materials	Seamless Copper Alloy Pipe Tube	46 CFR 56.60-1(b)
ASTM B557	1984	American Society for Testing and Materials	Tension Testing Wrought and Cast Aluminum and Magnesium-Alloy Products	49 CFR 178.46(i)(3)(i)
ASTM B580	1979	American Society for Testing and Materials	Standard Specification for Anodized Oxide Coatings on Aluminum	49 CFR 171.7
ASTM B694	1986	American Society for Testing and Materials	Standard Specification for Copper, Copper Alloy, and Copper-Clad Stainless Steel Sheet and Strip for Electrical Cable Shielding	7 CFR 1755.390(i)(5)(v)
ASTM B858	1995	American Society for Testing and Materials	Standard Test Method for Determination of Susceptibility to Stress Corrosion Cracking in Copper Alloys Using Ammonia Vapor Test	46 CFR 56.60-2

ASTM C4	1962	American Society for Testing and Materials	Standard Specification for Clay Drain Tile and Perforated Clay Drain Tile	24 CFR 200, Subpart S
ASTM C5	1979	American Society for Testing and Materials	Standard Specification for Quicklime for Structural Purposes	24 CFR 200, Subpart S
ASTM C32	1973	American Society for Testing and Materials	Standard Specification for Sewer and Manhole Brick	24 CFR 200, Subpart S
ASTM C34	1962	American Society for Testing and Materials	Standard Specification for Structural Clay Load-Bearing Wall Tile	24 CFR 200, Subpart S
ASTM C52	1954	American Society for Testing and Materials	Specification for Gypsum Partition Tile or Block	24 CFR 200, Subpart S
ASTM C56	1971	American Society for Testing and Materials	Standard Specification for Structural Clay Nonloadbearing Tile	24 CFR 200, Subpart S
ASTM C64	1972	American Society for Testing and Materials	Specification for Fireclay Brick Refractories for Heavy Duty Stationary Boiler Service	24 CFR 200, Subpart S
ASTM C90	1970	American Society for Testing and Materials	Standard Specification for Hollow Load-Bearing Concrete Masonry Units	49 CFR 223 Appendix A (b)(10)(ii)
ASTM C126	1971	American Society for Testing and Materials	Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units	24 CFR 200, Subpart S
ASTM C139	1973	American Society for Testing and Materials	Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes	24 CFR 200, Subpart S
ASTM C150	1917	American Society for Testing and Materials	Standard Specification for Portland Cement	49 CFR 571.108
ASTM C150	1999	American Society for Testing and Materials	Standard Specification for Portland Cement	30 CFR 250.198
ASTM C150	2007	American Society for Testing and Materials	Standard Specification for Portland Cement	30 CFR 250.901(d)(9)
ASTM C177	1997	American Society for Testing and Materials	Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot-Plate Apparatus	10 CFR 431.102
ASTM C177 (pdf) ASTM C177 (html)	2004	American Society for Testing and Materials	Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot-Plate Apparatus	16 CFR 460.5(a)
ASTM C236	1989	American Society for Testing and Materials	Standard Test Method for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box	10 CFR 434.402.1.2.1(a)
ASTM C330	1999	American Society for Testing and Materials	Standard Specification for Lightweight Aggregates for Structural Concrete	30 CFR 250.901(a)(18)
ASTM C476	1971	American Society for Testing and Materials	Standard Specification for Grout for Masonry	24 CFR 200, Subpart S

ASTM C509	1984	American Society for Testing and Materials	Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material	24 CFR 200, Subpart S
ASTM C516	1980	American Society for Testing and Materials	Standard Specification for Vermiculite Loose Fill Thermal Insulation	24 CFR 200, Subpart S
ASTM C518	1991	American Society for Testing and Materials	Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus	46 CFR 160.174-17(f)
ASTM C518	2004	American Society for Testing and Materials	Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus	16 CFR 460.5(a)
ASTM C549	1981	American Society for Testing and Materials	Standard Specification for Perlite Loose Fill Insulation	10 CFR 440 Appendix A
ASTM C564	1970	American Society for Testing and Materials	Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings	24 CFR 3280.611(d)(5)(iv)
ASTM C720	1989	American Society for Testing and Materials	Spray Applied Fibrous Insulation for Elevated Temperature	10 CFR 440 Appendix A
ASTM C1045	2001	American Society for Testing and Materials	Standard Practice for Calculating Thermal Transmission Properties from Steady-State Heat Flux Measurements	16 CFR 460.5(a)
ASTM C1114	2000	American Society for Testing and Materials	Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Thin-Heater Apparatus	16 CFR 460.5(a)
ASTM C1149	2002	American Society for Testing and Materials	Standard Specification for Self-Supported Spray Applied Cellulosic Thermal Insulation	16 CFR 460.5(a)(4)
ASTM C1224	2003	American Society for Testing and Materials	Standard Specification for Reflective Insulation for Building Applications	16 CFR 460.5(c)
ASTM C1371	2004	American Society for Testing and Materials	Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers	16 CFR 460.5(b)
ASTM C1374	2003	American Society for Testing and Materials	Standard Test Method for Determination of Installed Thickness of Pneumatically Applied Loose-Fill Building Insulation	16 CFR 460.5(a)(5)
ASTM D56	1970	American Society for Testing and Materials	Standard Test Method for Flash Point by Tag Closed Cup Tester	29 CFR 1910.106(a)(14)(i)
ASTM D86	2001	American Society for Testing and Materials	Standard Test Method for Distillation of Petroleum Products at Atmospheric Pressure	40 CFR 94.108(a)(1) Table B-5
ASTM D86	2004	American Society for Testing and Materials	Standard Test Method for Distillation of Petroleum Products at Atmospheric Pressure	40 CFR 1065.710

ASTM D86 (pdf) ASTM D86 (html)	2007	American Society for Testing and Materials	Standard Test Method for Distillation of Petroleum Products at Atmospheric Pressure	40 CFR 1065.710
ASTM D88	1956	American Society for Testing and Materials	Standard Test Method for Saybolt Viscosity	29 CFR 1910.106(a)(37)
ASTM D93	2002	American Society for Testing and Materials	Standard Test Method for Flash Point by Pensky-Martens Closed Cup Tester	40 CFR 94.108(a)(1) Table B-5
ASTM D129	1964	American Society for Testing and Materials	Standard Test Method for Sulfur in Petroleum Products (General Bomb Method)	40 CFR 60.106(j)(2)
ASTM D129	1995	American Society for Testing and Materials	Standard Test Method for Sulfur in Petroleum Products (General Bomb Method)	40 CFR 60.106(j)(2)
ASTM D129 (pdf) ASTM D129 (html)	2000	American Society for Testing and Materials	Standard Test Method for Sulfur in Petroleum Products (General Bomb Method)	40 CFR 60.335(b)(10)(i)
ASTM D257	1991	American Society for Testing and Materials	Standard Test Method for DC Resistance of Conductance of Insulating Materials	7 CFR 1755.860(e)(5)
ASTM D287	1992	American Society for Testing and Materials	Standard Test Method for API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method)	40 CFR 94.108(a)(1) Table B-5
ASTM D323	1958	American Society for Testing and Materials	Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method)	29 CFR 1910.106(a)(30)
ASTM D388	1998	American Society for Testing and Materials	Standard Classification of Coals by Rank	40 CFR 60.251(b)
ASTM D396	1998	American Society for Testing and Materials	Standard Specification for Fuel Oils	40 CFR 60.41b
ASTM D396 (pdf) ASTM D396 (html)	2002	American Society for Testing and Materials	Standard Specification for Fuel Oils	40 CFR 63.7575
ASTM D412	1968	American Society for Testing and Materials	Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension	21 CFR 801.410(d)(2)
ASTM D413	1982	American Society for Testing and Materials	Standard Test Method for Rubber Property--Adhesion to Flexible Substrate	46 CFR 160.055-3 Table 160-055-3(j)
ASTM D445	1965	American Society for Testing and Materials	Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids	29 CFR 1910.106(a)(37)
ASTM D445	1972	American Society for Testing and Materials	Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids	21 CFR 177.1430(c)(2)
ASTM D512	1989	American Society for Testing and Materials	Standard Test Methods for Chloride Ion In Water	40 CFR 136.3(a)
ASTM D611	1982	American Society for Testing and Materials	Standard Test Method for Aniline Point and Mixed Aniline Point of Petroleum Products and Hydrocarbon Solvents	21 CFR 177.1520(b)

ASTM D660	1944	American Society for Testing and Materials	Evaluating Degree of Resistant to Checking of Exterior Paints	24 CFR 200, Subpart S
ASTM D665	1998	American Society for Testing and Materials	Standard Test Method for Rust-Preventing Characteristics of Inhibited Mineral Oil in the Presence of Water	46 CFR 61.20-17(a)
ASTM D750	1968	American Society for Testing and Materials	Recommended Practice for Rubber Deterioration in Carbon-Arc or Weathering Apparatus	24 CFR 200, Subpart S
ASTM D756	1956	American Society for Testing and Materials	Standard Practice for Determination of Weight and Shape Changes of Plastics Under Accelerated Service Conditions	49 CFR 571.209 S5.2(b)
ASTM D781	1968	American Society for Testing and Materials	Standard Test Methods for Puncture and Stiffness of Paperboard and Corrugated and Solid Fiberboard	24 CFR 3280.304(b)(1)
ASTM D785	1965	American Society for Testing and Materials	Standard Method of Test for Rockwell Hardness of Plastics and Electrical Insulating Materials	16 CFR 1201.4
ASTM D814	1995	American Society for Testing and Materials	Standard Test Method for Rubber Property--Vapor Transmission of Volatile Liquids	40 CFR 1051.245(e)(1)
ASTM D975	1998	American Society for Testing and Materials	Standard Specification for Diesel Fuel Oils	46 CFR 160.176-13(r)
ASTM D975 (pdf) ASTM D975 (html)	2007	American Society for Testing and Materials	Standard Specification for Diesel Fuel Oils	40 CFR 1065.701
ASTM D976	1991	American Society for Testing and Materials	Standard Test Method for Calculated Cetane Index of Distillate Fuels	40 CFR 92.113
ASTM D1056	1973	American Society for Testing and Materials	Standard Specification for Flexible Cellular Materials Sponge or Expanded Rubber	49 CFR 571.213
ASTM D1060	1965	American Society for Testing and Materials	Standard Method of Core Sampling of Raw Wool Packages for Determination of Percentage of Clean Wool Fiber Present	7 CFR 31.204
ASTM D1067	2002	American Society for Testing and Materials	Standard Test Method for Acidity or Alkalinity of Water	40 CFR 141.21
ASTM D1068	2003	American Society for Testing and Materials	Standard Test Methods for Iron in Water	40 CFR 136.3(a)
ASTM D1072	1990	American Society for Testing and Materials	Standard Test Method for Total Sulfur in Fuel Gases	40 CFR 60.335(b)(10)(ii)
ASTM D1081	1960	American Society for Testing and Materials	Test for Evaluating Rubber Property--Sealing Pressure	24 CFR 200, Subpart S
ASTM D1126 (pdf) ASTM D1126 (html) ASTM D1126 (svg)	2002	American Society for Testing and Materials	Standard Test Method for Hardness in Water	40 CFR 136
ASTM D1193	1977	American Society for Testing and Materials	Standard Specification for Reagent Water	40 CFR 60, Appendix A-3

ASTM D1200	1970	American Society for Testing and Materials	Viscosity of Paints, Varnishes and Lacquers by Ford Viscosity Cup	49 CFR 171.8
ASTM D1217	1993	American Society for Testing and Materials	Standard Test Method for Density and Relative Density (Specific Gravity) of Liquids by Bingham Pycnometer	40 CFR 75, Appendix D
ASTM D1246	1995	American Society for Testing and Materials	Bromide - Titrimetric	40 CFR 136.3(a) Table IB
ASTM D1253	1986	American Society for Testing and Materials	Standard Test Method for Residual Chlorine in Water	21 CFR 165.110(b)(4)(iii)(I)(5)(i)
ASTM D1253 (pdf) ASTM D1253 (html)	2003	American Society for Testing and Materials	Standard Test Method for Residual Chlorine in Water	40 CFR 136.3(a) Table IB
ASTM D1266	1998	American Society for Testing and Materials	Standard Test Method for Sulfur in Petroleum Products (Lamp Method)	40 CFR 60.106(j)(2)
ASTM D1298	1999	American Society for Testing and Materials	Standard Practice for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products	40 CFR 75, Appendix D, Section 2.2.6
ASTM D1303	1955	American Society for Testing and Materials	Standard Method of Test for Total Chlorine in Vinyl Chloride Polymers and Copolymers	21 CFR 177.1610(a)
ASTM D1319 (pdf) ASTM D1319 (html)	2003	American Society for Testing and Materials	Standard Test Method for Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Adsorption	40 CFR 80.2(z)
ASTM D1331	1989	American Society for Testing and Materials	Standard Test Methods for Surface and Interfacial Tension of Solutions of Surface Active Agents	40 CFR 63, Appendix A
ASTM D1335	1967	American Society for Testing and Materials	Standard Test Method for Tuft Bind of Pile Floor Coverings	24 CFR 200.945(a)(1)(ii)
ASTM D1412	1993	American Society for Testing and Materials	Standard Test Method for Equilibrium Moisture of Coal at 96 to 97 Percent Relative Humidity and 30 Degrees Celsius	30 CFR 870.19
ASTM D1415	1968	American Society for Testing and Materials	Tentative Method of Test for International Hardness of Vulcanized Natural and Synthetic Rubbers	49 CFR 571.116 S7.4.1(b)
ASTM D1415	1988	American Society for Testing and Materials	Standard Practice for Rubber and Rubber Latices--Nomenclature	21 CFR 177.2600(c)(4)(i)
ASTM D1475	1960	American Society for Testing and Materials	Standard Test Method for Density of Paint, Varnish, Lacquer, and Related Products	40 CFR 60, Appendix A-7
ASTM D1480	1993	American Society for Testing and Materials	Standard Test Method for Density and Relative Density (Specific Gravity) of Viscous Materials by Bingham Pycnometer	40 CFR 75, Appendix D
ASTM D1481	1993	American Society for Testing and Materials	Standard Test Method for Density and Relative Density (Specific Gravity) of Viscous Materials by	40 CFR 136.3(a) Table IC

			Lipkin Bicapillary Pycnometer	
ASTM D1505	1968	American Society for Testing and Materials	Standard Test Method for Density of Plastics by the Density-Gradient Technique	21 CFR 177.2480
ASTM D1518	1985	American Society for Testing and Materials	Standard Test Method for Thermal Transmittance of Textile Materials	46 CFR 160.174-17(f)
ASTM D1535	1968	American Society for Testing and Materials	Specifying Color by the Munsell System	16 CFR 1402
ASTM D1535	1968	American Society for Testing and Materials	Specifying Color by the Munsell System	16 CFR 1402.4(a)(1)(i)(E)(2)
ASTM D1535	1989	American Society for Testing and Materials	Specifying Color by the Munsell System	7 CFR 1755.860(c)(3)
ASTM D1552	1995	American Society for Testing and Materials	Standard Test Method for Sulfur in Petroleum Products (High-Temperature Method)	40 CFR 60, Appendix A-7
ASTM D1564	1971	American Society for Testing and Materials	Standard Method of Testing Flexible Cellular Materials--Slab Urethane Foam	40 CFR 136.3(a)
ASTM D1687	1992	American Society for Testing and Materials	Standard Test Methods for Chromium in Water	40 CFR 444.12(b)(1)
ASTM D1688	1995	American Society for Testing and Materials	Standard Test Method for Copper in Water	40 CFR 141.23(k)(1)
ASTM D1692	1968	American Society for Testing and Materials	Test for Flammability of Plastic Sheeting and Cellular Plastics	29 CFR 1910.103(c)(1)(v)(D)
ASTM D1785	1986	American Society for Testing and Materials	Standard Specification for Poly (Vinyl Chloride)(PVC) Plastic Pipe, Schedules 40, 80, and 120	46 CFR 56.01-2
ASTM D1835	1997	American Society for Testing and Materials	Standard Specification for Liquefied Petroleum (LP) Gases	49 CFR 180.209(e)
ASTM D1890	1996	American Society for Testing and Materials	Standard Test Method for Beta Particle Radioactivity of Water	40 CFR 136.3(a)
ASTM D1943	1996	American Society for Testing and Materials	Standard Test Method for Alpha Particle Radioactivity of Water	40 CFR 136.3(a)
ASTM D1945	1996	American Society for Testing and Materials	Standard Test Method for Analysis of Natural Gas By Gas Chromatography	40 CFR 60.45(f)(5)(i)
ASTM D1946	1990	American Society for Testing and Materials	Standard Method for Analysis of Reformed Gas by Gas Chromatography	40 CFR 60.614(e)(4)
ASTM D1962	1967	American Society for Testing and Materials	Standard Test Method for Saponification Value of Drying Oils, Fatty Acids, and Polymerized Fatty Acids	21 CFR 178.2010(b)
ASTM D2013	1986	American Society for Testing and Materials	Standard Method of Preparing Coal Samples for Analysis	40 CFR 60, Appendix A-7
ASTM D2015	1996	American Society for Testing and Materials	Standard Test Method for Gross Calorific Value of Solid Fuel by the Adiabatic Bomb Calorimeter	40 CFR 60.45(f)(5)(ii)
ASTM D2036	1998	American Society for Testing and Materials	Standard Test Method for Cyanides in Water	40 CFR 136.3(a) Table IB

ASTM D2099	2000	American Society for Testing and Materials	Standard Test Method for Dynamic Water Resistance of Shoe Upper Maeser Water Penetration Tester	40 CFR 63.5350(b)
ASTM D2156	1965	American Society for Testing and Materials	Method of Tests for Smoke Density in Flue Gases from Distillate Fuels	10 CFR 430 Subpart B
ASTM D2161	1966	American Society for Testing and Materials	Standard Method of Conversion of Kinematic Viscosity to Saybolt Universal Viscosity or to Saybolt Furol Viscosity	29 CFR 1910.106(a)(37)
ASTM D2163	1991	American Society for Testing and Materials	Standard Test Method for Analysis of Liquefied Petroleum (LP) Gases and Propane Concentrates by Gas Chromatography	40 CFR 86.1313-94(f)(3)
ASTM D2216	1998	American Society for Testing and Materials	Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass	40 CFR 258.41(a)(4)(iii)(A)
ASTM D2234	1998	American Society for Testing and Materials	Standard Practice for Collection of a Gross Sample of Coal	40 CFR 60, Appendix A-7
ASTM D2236	1970	American Society for Testing and Materials	Standard Method of Test for Dynamic Mechanical Properties of Plastics by Means of a Torsional Pendulum	21 CFR 177.1810(c)(2)(i)
ASTM D2247	1968	American Society for Testing and Materials	Standard Practice for Testing Water Resistance of Coatings in 100 Percent Relative Humidity	24 CFR 200, Subpart S
ASTM D2267	1968	American Society for Testing and Materials	Standard Test Method for Aromatics in Light Naphthas and Aviation Gasoline by Gas Chromatography	40 CFR 61.67(h)(1)
ASTM D2460	1997	American Society for Testing and Materials	Standard Test Method for Alpha-Particle-Emitting Isotopes of Radium in Water	40 CFR 136.3(a) Table IE
ASTM D2502	1992	American Society for Testing and Materials	Standard Test Method for Estimation of Molecular Weight (Relative Molecular Mass) of Petroleum Oils from Viscosity Measurements	40 CFR 75, Appendix G
ASTM D2503	1992	American Society for Testing and Materials	Standard Method of Test for Molecular Weight of Hydrocarbons by Thermoelectric Measurement of Vapor Pressure	40 CFR 98.254
ASTM D2505	1988	American Society for Testing and Materials	Standard Test Method for Ethylene, Other Hydrocarbons, and Carbon Dioxide in High-Purity Ethylene by Gas Chromatography	40 CFR 98.7
ASTM D2515	1966	American Society for Testing and Materials	Standard Specification for Kinematic Glass Viscosity	49 CFR 571.116 S6.3.2(a)
ASTM D2565	1970	American Society for Testing and Materials	Standard Practice for Operating Xenon Arc-Type Light-Exposure Apparatus With or Without Water for Exposure of Plastics	16 CFR 1201.4(b)(3)(ii)
ASTM D2597	1994	American Society for Testing and Materials	Standard Test Method for Analysis of Demethanized Hydrocarbon Liquid Mixtures Containing Nitrogen	40 CFR 60.335(b)(9)(i)

			and Carbon Dioxide by Gas Chromatography	
ASTM D2622	1998	American Society for Testing and Materials	Standard Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-ray Fluorescence Spectrometry	40 CFR 80.46(a)(1)
ASTM D2724	1987	American Society for Testing and Materials	Standard Test Method for Bonded, Fused, and Laminated Apparel Fabrics	49 CFR 238 Appendix B(a)(1)(ii)
ASTM D2777	1998	American Society for Testing and Materials	Standard Practice for Determination of Precision and Bias of Applicable Test Methods of Committee D-19 on Water	46 CFR 162.050-15(f)(1)
ASTM D2857	1970	American Society for Testing and Materials	Standard Method of Test for Dilute Solution Viscosity of Polymers	21 CFR 177.2210(b)(3)
ASTM D2879	1997	American Society for Testing and Materials	Standard Test Method for Vapor Pressure--Temperature Relationship and Initial Decomposition Temperature of Liquids by Isoteniscope	40 CFR 60.116b(e)(3)(ii)
ASTM D2908	1974	American Society for Testing and Materials	Standard Practice for Measuring Volatile Organic Matter in Water by Aqueous-Injection Gas Chromatography	40 CFR 60.564(j)(1)
ASTM D2908	1991	American Society for Testing and Materials	Standard Practice for Measuring Volatile Organic Matter in Water by Aqueous-Injection Gas Chromatography	40 CFR 60.564(j)(1)
ASTM D2986	1995	American Society for Testing and Materials	Standard Method for Evaluation of Air, Assay Media by the Monodisperse DOP (Dioctyl Phthalate) Smoke Test	40 CFR 86.1310-2007(b)(7)(i)(A)
ASTM D3120	1996	American Society for Testing and Materials	Standard Test Method for Trace Quantities of Sulfur in Light Liquid Petroleum Hydrocarbons by Oxidative Microcoulometry	40 CFR 80.46(a)(3)(iii)
ASTM D3168	1973	American Society for Testing and Materials	Standard Recommended Practices for Qualitative Identification of Polymers in Emulsion Paints	21 CFR 200.946
ASTM D3173	1987	American Society for Testing and Materials	Standard Test Method for Moisture in the Analysis Sample of Coal and Coke	40 CFR 60, Appendix A-7
ASTM D3176	1989	American Society for Testing and Materials	Standard Practice for Ultimate Analysis of Coal and Coke	40 CFR 76.15(a)(1)
ASTM D3177	1989	American Society for Testing and Materials	Standard Test Method for Total Sulfur in the Analysis Sample of Coal and Coke	40 CFR 60, Appendix A-7
ASTM D3178	1989	American Society for Testing and Materials	Standard Test Method for Carbon and Hydrogen in the Analysis Sample of Coal and Coke	40 CFR 60.45(f)(5)(i)
ASTM D3236	1988	American Society for Testing and Materials	Standard Test Method for Apparent Viscosity of Hot Metal Adhesives and Coating Materials	21 CFR 177.1520(b)

ASTM D3246	1996	American Society for Testing and Materials	Standard Test Method for Sulfur in Petroleum Gas by Oxidative Microcoulometry	40 CFR 60.335(b)(10)(ii)
ASTM D3286	1996	American Society for Testing and Materials	Standard Test Method for Gross Calorific Value of Coal and Coke by the Isoperibol Bomb Calorimeter	40 CFR 60.17
ASTM D3371	1995	American Society for Testing and Materials	Standard Test Method for Nitriles in Aqueous Solution by Gas-Liquid Chromatography	40 CFR 136.3(a) Table IF
ASTM D3454	1997	American Society for Testing and Materials	Standard Test Method for Radium-226 in Water	40 CFR 136.3(a) Table IE
ASTM D3559 (pdf) ASTM D3559 (html)	2003	American Society for Testing and Materials	Standard Test Methods for Lead in Water	40 CFR 136
ASTM D3588	1998	American Society for Testing and Materials	Standard Practice for Calculating Heat Value, Compressibility Factor, and Relative Density (Specific Gravity) of Gaseous Fuels	40 CFR 75, Appendix F
ASTM D3695	1995	American Society for Testing and Materials	Standard Test Method for Volatile Alcohols in Water by Direct Aqueous-Injection Gas Chromatography	40 CFR 136.3(a) Table IF
ASTM D3697	1992	American Society for Testing and Materials	Standard Test Method for Antimony in Water	21 CFR 165.110(b)(4)(iii)(E)(1)(iv)
ASTM D4057	1995	American Society for Testing and Materials	Standard Practice for Manual Sampling of Petroleum and Petroleum Products	40 CFR 80.8(a)
ASTM D4084	1994	American Society for Testing and Materials	Standard Test Method for Analysis of Hydrogen Sulfide in Gaseous Fuels (Lead Acetate Reaction Rate Method)	40 CFR 60.334(h)(1)
ASTM D4177	1995	American Society for Testing and Materials	Standard Practice for Automatic Sampling of Petroleum and Petroleum Products	40 CFR 80.330(b)(2)
ASTM D4239	1997	American Society for Testing and Materials	Standard Test Methods for Sulfur in the Analysis Sample of Coal and Coke Using High Temperature Tube Furnace Combustion Methods	40 CFR 60, Appendix A-7
ASTM D4268	1993	American Society for Testing and Materials	Standard Test Method for Testing Fiber Ropes	33 CFR 164.74(a)(3)(i)
ASTM D4294	1998	American Society for Testing and Materials	Standard Test Method for Sulfur in Petroleum and Petroleum Products by Energy-Dispersive X-Ray Fluorescence Spectrometry	40 CFR 75, Appendix A, Section 2.1.1.1(c)
ASTM D4329	1999	American Society for Testing and Materials	Standard Practice for Fluorescent UV Exposure of Plastics	49 CFR 571.106
ASTM D4420	1994	American Society for Testing and Materials	Standard Test Method for Determination of Aromatics in Finished Gasoline by Gas Chromatography	40 CFR 61.67(h)(1)
ASTM D4442	1992	American Society for	Standard Test Method for Direct	40 CFR 60, Appendix A-

		Testing and Materials	Moisture Content Measurement of Wood and Wood-Based Materials	8
ASTM D4444	1992	American Society for Testing and Materials	Standard Test Method for Use and Calibration of Hand-Held Moisture Meters	40 CFR 60, Appendix A-8
ASTM D4763	1988	American Society for Testing and Materials	Standard Practice for Identification of Chemicals in Water by Fluorescence Spectroscopy	40 CFR 136.3(a) Table IF
ASTM D4809	1995	American Society for Testing and Materials	Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter (Precision Method)	40 CFR 61.245(e)(3)
ASTM D4891 (pdf) ASTM D4891 (html)	1989	American Society for Testing and Materials	Standard Test Method for Heating Value of Gases in Natural Gas Range by Stolchiometric Combustion	40 CFR 75, Appendix F, Section 5.5.2
ASTM D4986	1998	American Society for Testing and Materials	Standard Test Method for Horizontal Burning Characteristics of Cellular Polymeric Materials	46 CFR 32.57-10(d)(7–a)
ASTM D5257	1997	American Society for Testing and Materials	Standard Test Method for Dissolved Hexavalent Chromium in Water by Ion Chromatography	40 CFR 136.3(a)
ASTM D5373	1993	American Society for Testing and Materials	Standard Methods for Instrumental Determination of Carbon, Hydrogen, and Nitrogen in Laboratory Samples of Coal and Coke	40 CFR 75, Appendix G
ASTM D5392	1993	American Society for Testing and Materials	Standard Test Method for Isolation and Enumeration of Escherichia Coli in Water by the Two-Step Membrane Filter Procedure	40 CFR 136.3(a) Table IH
ASTM D5489	1996	American Society for Testing and Materials	Standard Guide for Care Symbols for Care Instructions on Textile Products	16 CFR 423.8(g)
ASTM D5673	1996	American Society for Testing and Materials	Standard Test Method for Elements in Water by Inductively Coupled Plasma	40 CFR 444.12(b)(1)
ASTM D5865	1998	American Society for Testing and Materials	Standard Test Method for Gross Calorific Value of Coal and Coke	40 CFR 60.45(f)(5)(ii)
ASTM D6216	1998	American Society for Testing and Materials	Standard Practice for Opacity Monitor Manufacturers to Certify Conformance with Design and Performance Specifications	40 CFR 60, Appendix B
ASTM D6228	1998	American Society for Testing and Materials	Standard Test Method for Determination of Sulfur Compounds in Natural Gas and Gaseous Fuels by Gas Chromatography and Flame Photometric Detection	40 CFR 60.334(h)(1)
ASTM D6420	1999	American Society for Testing and Materials	Standard Test Method for Determination of Gaseous Organic Compounds by Direct Interface Gas Chromatography-Mass Spectrometry	40 CFR 63.5850(e)(4)
ASTM D6503	1999	American Society for	Standard Test Method for	40 CFR 136.3(a) Table

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ASTM D6522	2000	American Society for Testing and Materials	Standard Test Method for Determination of Nitrogen Oxides, Carbon Monoxide, and Oxygen Concentrations in Emissions from Natural Gas-Fired Reciprocating Engines, Combustion Turbines, Boilers, and Process Heaters Using Portable Analyzers	40 CFR 60.335(a)(2)
ASTM E11	1970	American Society for Testing and Materials	Standard Specification for Wire Cloth and Sieves for Testing Purposes	33 CFR 159.4
ASTM E11	1995	American Society for Testing and Materials	Standard Specification for Wire Cloth and Sieves for Testing Purposes	33 CFR 159.125
ASTM E23	1982	American Society for Testing and Materials	Standard Test Methods for Notched Bar Impact Testing of Metallic Materials	46 CFR 56.50-105(a)(1)(ii)
ASTM E23	1993	American Society for Testing and Materials	Standard Test Method for Notched Bar Impact Testing of Metallic Materials	46 CFR 56.50-105(a)(1)(ii)
ASTM E29	1967	American Society for Testing and Materials	Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications	40 CFR 86.609-98
ASTM E29	1990	American Society for Testing and Materials	Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications	40 CFR 86.000-28(a)(4)(iii)
ASTM E29 (pdf) ASTM E29 (html)	2002	American Society for Testing and Materials	Standard Specification for Diesel Fuel Oils	40 CFR 1065.701 Table 1
ASTM E72	1980	American Society for Testing and Materials	Standard Test Methods of Conducting Strength Tests of Panels for Building Construction	30 CFR 75.333(e)(1)(i)
ASTM E84 (pdf) ASTM E84 (html)	2001	American Society for Testing and Materials	Standard Test Method for Surface Burning Characteristics of Building Materials	24 CFR 3280.203(a)
ASTM E96	1995	American Society for Testing and Materials	Standard Test Methods for Water Vapor Transmission of Materials	24 CFR 3280.504(a)
ASTM E119 (pdf) ASTM E119 (html)	2000	American Society for Testing and Materials	Standard Test Methods for Fire Tests of Building Construction and Materials	49 CFR 238 Appendix B(a)(1)(v)
ASTM E145	1994	American Society for Testing and Materials	Standard Specification for Gravity-Convection and Forced- Ventilation Ovens	40 CFR 63.14
ASTM E145	1994	American Society for Testing and Materials	Standard Specification for Gravity-Convection and Forced- Ventilation Ovens	40 CFR 63.4581
ASTM E154	1968	American Society for Testing and Materials	Materials for Use as Vapor Barriers Under Concrete Slabs and as Ground Cover in Crawl Spaces	24 CFR 200, Subpart S

ASTM E163	1963	American Society for Testing and Materials	Methods for Fire Tests of Window Assemblies	24 CFR 200, Subpart S
ASTM E168	1967	American Society for Testing and Materials	Standard Practices for General Techniques of Infrared Quantitative Analysis	40 CFR 60.485(d)(1)
ASTM E168	1988	American Society for Testing and Materials	Standard Practices for General Techniques of Infrared Quantitative Analysis	40 CFR 264.1063(d)(1)
ASTM E169	1987	American Society for Testing and Materials	Standard Practices for General Techniques of Ultraviolet-Visible Quantitative Analysis	40 CFR 264.1063(d)(1)
ASTM E185	1982	American Society for Testing and Materials	Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels	10 CFR 50 App. H, I
ASTM E258	1967	American Society for Testing and Materials	Standard Test Method for Total Nitrogen Inorganic Material by Modified Kjeldahl Method	40 CFR 761.71(b)(2)(vi)
ASTM E260	1996	American Society for Testing and Materials	Standard Practice for Packed Column Gas Chromatography	40 CFR 60.485(d)(1)
ASTM E283	1991	American Society for Testing and Materials	Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors	10 CFR 434.402.2
ASTM E298	1968	American Society for Testing and Materials	Standard Methods for Assay of Organic Peroxides	49 CFR 571.116 S6.11.3(a)
ASTM E408	1971	American Society for Testing and Materials	Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques	16 CFR 460.5(b)
ASTM E424	1971	American Society for Testing and Materials	Test for Solar Energy Transmittance and Reflectance (Terrestrial) of Sheet Materials	24 CFR 200, Subpart S
ASTM E606	1980	American Society for Testing and Materials	Standard Recommended Practice for Constant-Amplitude Low-Cycle Fatigue Testing	24 CFR 200.946
ASTM E681	1985	American Society for Testing and Materials	Standard Test Method for Concentration Limits of Flammability of Chemicals	49 CFR 173.115(a)(2)
ASTM E695	1979	American Society for Testing and Materials	Standard Method of Measuring Relative Resistance of Wall, Floor and Roof Construction to Impact Loading	24 CFR 200.946(a)(1)(viii)
ASTM E711	1987	American Society for Testing and Materials	Standard Test Method for Gross Calorific Value of Refuse-Derived Fuel by the Bomb Calorimeter	40 CFR 63, Subpart DDDDD, Table 6
ASTM E773	1997	American Society for Testing and Materials	Standard Test Method for Seal Durability of Sealed Insulating Glass Units	4 CFR 3280.403(d)(2)
ASTM E774	1997	American Society for Testing and Materials	Standard Specifications for Sealed Insulating Glass Units	24 CFR 3280.403(d)(2)
ASTM E775	1987	American Society for Testing and Materials	Standard Test Methods for Total Sulfur in the Analysis Sample of	40 CFR 49.123(e)

			Refuse-Derived Fuel	
ASTM E776	1987	American Society for Testing and Materials	Standard Test Method for Forms of Chlorine in Refuse-Derived Fuel	40 CFR 63, Subpart DDDDD, Table 6
ASTM E885	1988	American Society for Testing and Materials	Standard Test Method for Analyses of Metals in Refuse-Derived Fuel by Atomic Absorption Spectroscopy	40 CFR 63, Subpart DDDDD, Table 6
ASTM E1333	1996	American Society for Testing and Materials	Standard Test Method for Determining Formaldehyde Levels from Wood Products Under Defined Test Conditions Using a Large Chamber	24 CFR 3280.406(b)
ASTM E1337	1990	American Society for Testing and Materials	Standard Test Method for Determining Longitudinal Peak Braking Coefficient of Paved Surfaces Using Standard Reference Test Tire	49 CFR 571.105 S6.9.2(a)
ASTM E1590 (pdf) ASTM E1590 (html)	2001	American Society for Testing and Materials	Standard Test Method for Fire Testing of Mattresses	49 CFR 238 Appendix B(a)(1)(xi)
ASTM E1625	1994	American Society for Testing and Materials	Standard Test Method for Determining Biodegradability of Organic Chemicals in Semi-Continuous Activated Sludge	40 CFR 799.5085
ASTM E1719	1997	American Society for Testing and Materials	Standard Test Method for Vapor Pressure of Liquids by Ebulliometry	40 CFR 799.5085
ASTM F462	1979	American Society for Testing and Materials	Slip-Resistant Bathing Facilities	24 CFR 200, Subpart S
ASTM F476	1984	American Society for Testing and Materials	Standard Test Method for Security of Swinging Door Assemblies	24 CFR 200.949(a)(1)(ix)
ASTM F478	1992	American Society for Testing and Materials	Standard Specification for In-Service Care of Insulating Line Hose and Covers	29 CFR 1910.137(b)(2)(ix)
ASTM F631	1980	American Society for Testing and Materials	Standard Guide for Collecting Skimmer Performance Data in Controlled Environments	33 CFR 156.40
ASTM F631	1993	American Society for Testing and Materials	Standard Guide for Collecting Skimmer Performance Data in Controlled Environments	33 CFR 154 Appendix C
ASTM F682	1982	American Society for Testing and Materials	Standard Specification for Wrought Carbon Steel Sleeve-Type Pipe Couplings	46 CFR 56.01-2
ASTM F715	1981	American Society for Testing and Materials	Standard Test Methods for Coated Fabrics Used for Oil Spill Control and Storage	33 CFR 154.106
ASTM F715	1995	American Society for Testing and Materials	Standard Test Methods for Coated Fabrics Used for Oil Spill Control and Storage	33 CFR 155, Appendix B, 2.4
ASTM F722	1982	American Society for Testing and Materials	Standard Specification for Welded Joints for Shipboard Piping Systems	33 CFR 155.140
ASTM F808	1983	American Society for Testing and Materials	Guide for Collecting Skimmer Performance Data in Uncontrolled	33 CFR 154, Appendix C

			Environments	
ASTM F808	1983	American Society for Testing and Materials	Guide for Collecting Skimmer Performance Data in Uncontrolled Environments	33 CFR 154, Appendix C, 6.3.1
ASTM F1003	1986	American Society for Testing and Materials	Standard Specification for Searchlights on Motor Lifeboats	46 CFR 199.175(a)(28)(i)
ASTM F1006	1986	American Society for Testing and Materials	Standard Specification for Entrainment Separators for Use in Marine Piping Applications	46 CFR 56.60-1(b)
ASTM F1007	1986	American Society for Testing and Materials	Standard Specification for Pipe-Line Expansion Joints of the Packed Slip Type for Marine Application	46 CFR 56.60-1(b)
ASTM F1014	1992	American Society for Testing and Materials	Standard Specification for Flashlights on Vessels	46 CFR 35.30-20(c)(3)
ASTM F1020	1986	American Society for Testing and Materials	Standard Specification for Line-Blind Valves for Marine Applications	46 CFR 56.60-1(b)
ASTM F1120	1987	American Society for Testing and Materials	Standard Specification for Circular Metallic Bellows Type Expansion Joints for Piping Applications	46 CFR 56.60-1(b)
ASTM F1121	1987	American Society for Testing and Materials	Standard Specification for International Shore Connections for Marine Fire Applications	33 CFR 126.15(a)(5)
ASTM F1122	1987	American Society for Testing and Materials	Standard Specification for Quick Disconnect Couplings	33 CFR 154.500(d)(3)
ASTM F1123	1987	American Society for Testing and Materials	Standard Specification for Non-Metallic Expansion Joints	46 CFR 56.60-1(b)
ASTM F1139	1988	American Society for Testing and Materials	Standard Specification for Steam Traps and Drains	46 CFR 56.60-1(b)
ASTM F1155	1998	American Society for Testing and Materials	Standard Practice for Selection and Application of Piping System Materials	33 CFR 154
ASTM F1172	1988	American Society for Testing and Materials	Fuel Oil Meters of the Volumetric Positive Displacement Type	46 CFR 56.60-1(b)
ASTM F1173	1995	American Society for Testing and Materials	Standard Specification for Thermosetting Resin Fiberglass Pipe and Fittings to be Used for Marine Applications	46 CFR 56.60-1(b)
ASTM F1196	1994	American Society for Testing and Materials	Standard Specification for Sliding Watertight Door Assemblies	46 CFR 170.270(c)(1)
ASTM F1197	1989	American Society for Testing and Materials	Standard Specificatiion for Sliding Watertight Door Control Systems	46 CFR 174.100(e)(2)
ASTM F1199	1988	American Society for Testing and Materials	Cast (All Temperatures and Pressures) and Welded Pipe Line Strainers (150 psig and 150 Degrees F Maximum)	46 CFR 56.60-1(b)
ASTM F1200	1988	American Society for Testing and Materials	Standard Specification for Fabricated (Welded) Pipe Line Strainers (Above 150 psig and 150°F)	46 CFR 56.60-1(b)
ASTM F1201	1988	American Society for Testing and Materials	Standard Specification for Fluid Conditioner Fittings in Piping	46 CFR 56.60-1(b)

			Applications Above Zero Degrees F	
ASTM F1271	1990	American Society for Testing and Materials	Standard Specification for Spill Valves for Use in Marine Tank Liquid Overpressure Protection Applications	46 CFR 39.20-9(c)(1)
ASTM F1273	1991	American Society for Testing and Materials	Standard Specification for Tank Vent Flame Arresters	46 CFR 32.20-10
ASTM F1292	2004	American Society for Testing and Materials	Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment	36 CFR 1191, App B, 105.2.3
ASTM F1321	1992	American Society for Testing and Materials	Standard Guide for Conducting a Stability Test (Lightweight Survey and Inclining Experiment) to Determine Light Ship Displacement and Centers of Gravity of a Vessel	46 CFR 28.535(d)
ASTM F1323	1998	American Society for Testing and Materials	Standard Specification for Shipboard Incinerators	46 CFR 63.25-9
ASTM F1471	1993	American Society for Testing and Materials	Standard Test Method for Air Cleaning Performance of a High-Efficiency Particulate Air-Filter System	40 CFR 86.1310-2007(b)(1)(iv)(B)
ASTM F1546	1996	American Society for Testing and Materials	Standard Specification for Firehose Nozzles	46 CFR 162.027-3(a)
ASTM F1548	1994	American Society for Testing and Materials	Performance of Fittings for Use with Gasketed Mechanical Couplings Used in Piping Applications	46 CFR 56.30-35(a)
ASTM F1951	1999	American Society for Testing and Materials	Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment	36 CFR 1191, App B, 1008.2.6.1
ASTM F2412 (pdf) ASTM F2412 (html) ASTM F2412 (svg)	2005	American Society for Testing and Materials	Standard Test Methods for Foot Protection	29 CFR 1910
ASTM F2413 (pdf) ASTM F2413 (html)	2005	American Society for Testing and Materials	Performance Requirements for Protective Footware	29 CFR 1910
ASTM G21	1990	American Society for Testing and Materials	Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi	7 CFR 1755.910(d)(5)(iv)
ASTM G23	1969	American Society for Testing and Materials	Standard Practice for Operating Light Exposure Apparatus (Carbon Arc Type) With and Without Water for Exposure of Nonmetallic Materials	49 CFR 571.209 S5.1(e)
ASTM G26	1970	American Society for Testing and Materials	Standard Recommended Practice for Light- and Water-Exposure Apparatus (Xenon-Arc Type) for Exposure of Non-metallic Materials	16 CFR 1201.4(b)(3)(ii)

ASTM G151	1997	American Society for Testing and Materials	Standard Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources	49 CFR 571.106 S12.7(b)
ASTM G154	2000	American Society for Testing and Materials	Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials	49 CFR 571.106 S12.7(b)
ATAA 300	1996	Air Transport Association of America	Packaging of Airline Supplies, Revision 19	49 CFR 171.7
AWPA A1	1991	American Wood Preservers Association	Standard Methods for Analysis of Creosote and Oil-Type Preservatives	7 CFR 1728.201(i)(1)(i)
AWPA A2	1991	American Wood Preservers Association	Standard Methods for Analysis of Waterborne Preservatives and Fire-Retardant Formulations	7 CFR 1728.201(i)(1)(iii)(A)
AWPA A3	1991	American Wood Preservers Association	Standard Methods for Determining Penetration of Preservatives and Fire Retardants	7 CFR 1728.201(k)(3)
AWPA A5	1991	American Wood Preservers Association	Standard Methods for Analysis of Oil-Borne Preservatives	7 CFR 1728.202(g)(1)(v)(B)
AWPA A6	1989	American Wood Preservers Association	Method for the Determination of Oil-Type Preservatives and Water in Wood	7 CFR 1728.202(g)(1)(v)(A)
AWPA A7	1975	American Wood Preservers Association	Standard Wet Ashing Procedure for Preparing Wood for Chemical Analysis	7 CFR 1728.202(g)(1)(v)(D)
AWPA A9	1990	American Wood Preservers Association	Standard Method for Analysis of Treated Wood and Treating Solutions by X-ray Spectroscopy	7 CFR 1728.202(g)(1)(v)(C)
AWPA A11	1983	American Wood Preservers Association	Standard Method for Analysis of Treated Wood and Treating Solutions by Atomic Absorption Spectroscopy	7 CFR 1728.201(i)(1)(iii)(B)
AWPA M3	1981	American Wood Preservers Association	Standard Quality Control Procedures for Wood Preserving Plants	7 CFR 1728.202(f)(1)
AWPA P1	1991	American Wood Preservers Association	Standard for Coal Tar Creosote for Land and Fresh Water and Marine (Coastal) Water Use	7 CFR 1728.201(i)(1)(i)
AWPA P5	1991	American Wood Preservers Association	Standard for Waterborne Preservative	7 CFR 1728.201(i)(1)(iii)(A)
AWPA P8	1991	American Wood Preservers Association	Standard for Oil-Borne Preservatives	7 CFR 1728.201(i)(1)(iv)
AWPA P9	1991	American Wood Preservers Association	Standard for Solvents and Formulations for Organic Preservative Systems	7 CFR 1728.201(i)(1)(iv)
AWS B3.0	1977	American Welding Society	Standard Qualification Procedure	49 CFR 178.356-2(e)
AWS D1.1	2000	American Welding Society	Structural Welding Code--Steel	30 CFR 250.901(a)(20)
BHMA A156.10	1999	Builders Hardware Manufacturers	Power Operated Pedestrian Doors	36 CFR 1191, App B, 105.2.1

		Association		
BHMA A156.19	2002	Builders Hardware Manufacturers Association	Power Assist and Low Energy Power Operated Doors	36 CFR 1191, App B, 408.3.2.1
BOCA	1993	Building Officials and Code Administrators International	Mechanical Code	24 CFR 200.925c(a)(1)(i)
BOCA	1993	Building Officials and Code Administrators International	Plumbing Code	24 CFR 200.925c(a)(1)(i)
BSI EN-13000 (pdf) BSI EN-13000 (html)	2004	British Standards Institute	Cranes--Safety--Mobile Cranes	29 CFR 1926
BSI EN-14439 (pdf) BSI EN-14439 (html)	2006	British Standards Institute	Cranes--Safety--Tower Cranes	29 CFR 1926
CEC Test Method	2004	California Energy Commission	Calculating the Energy Efficiency of Single-Voltage External Ac-Dc and Ac-Ac Power Supplies	10 CFR 430 Subpart B
CABO	1992	Council of American Building Officials	One and Two Family Dwelling Code	24 CFR 200.926b(c)
CABO	1993	Council of American Building Officials	One and Two Family Dwelling Code with Errata Package and 1993 Amendments	24 CFR 200.926(d)(1)(ii)((B)(2)(ii)
CFTA	1977	Cosmetic, Toiletry, and Fragrance Association	Cosmetic Ingredient Dictionary	21 CFR 701.3(c)(2)(i)
CGA C-5	1991	Compressed Gas Association	Cylinder Service Life-Seamless Steel High Pressure Cylinders	49 CFR 173.302a(b)(3)(i)(A)
CGA C-8	1985	Compressed Gas Association	Standard for Requalification of DOT-3HT Cylinders	49 CFR 180.205(f)(1)
CGA C-11	2001	Compressed Gas Association	Recommended Practice for Inspection of Compressed Gas Cylinders at Time of Manufacture	49 CFR 178.35(g)
CGA C-12	1994	Compressed Gas Association	Qualification Procedure for Acetylene Cylinder Design	49 CFR 173.303(a)
CGA C-13	2000	Compressed Gas Association	Guidelines for Periodic Visual Inspection and Requalification of Acetylene Cylinders	49 CFR 173.303(e)
CGA G-1	2009	Compressed Gas Association	Acetylene	29 CFR 1910.102(a)
CGA G-2.2	1985	Compressed Gas Association	Guideline Method for Determining Minimum of 0.2% Water in Anhydrous Ammonia	49 CFR 173.315(l)(5)
CGA G-4.1	1985	Compressed Gas Association	Cleaning Equipment for Oxygen Service	49 CFR 178.338-15
CGA P-1	1965	Compressed Gas Association	Safe Handling of Compressed Gases	29 CFR 1910.101(b)
CGA P-20	2003	Compressed Gas Association	Standard for the Classification of Toxic Gas Mixtures	49 CFR 173.115

CGA S-1.1	2005	Compressed Gas Association	Pressure Relief Device Standards	49 CFR 173.301(c)
CGA S-1.2	1980	Compressed Gas Association	Safety Release Device Standard--Cargo and Portable Tanks for Compressed Gases	49 CFR 178.277(e)(4)(iv)
CGA S-7 (pdf) CGA S-7 (html)	2005	Compressed Gas Association	Method for Selecting Pressure Relief Devices for Compressed Gas Mixtures in Cylinders	49 CFR 173.301(c)
CGA TB-2	1980	Compressed Gas Association	Guidelines for Inspection and Repair of MC-330 and MC-331 Cargo Tanks	49 CFR 180.407(g)(3)
CGA TB-25	2008	Compressed Gas Association	Design Considerations for Tube Trailers	49 CFR 173.301
CGSB 43.147	2005	Canadian General Standards Board	Construction, Modification, Qualification, Maintenance, and Selection and Use of Means of Containment for the Handling, Offering for Transport, or Transportation of Dangerous Goods by Rail	49 CFR 171.12
CGSB 43.147	2005	Office des Normes Generales du Canada	Construction, Modification, Qualification, Entretien, Selection Et Utilisation Des Contenants Pour La Manutention, La Demande De Transport Ou La Transport Des Marchandises Dangereuses Par Chemin De Fer	49 CFR 171.12
CI 57	2009	Chlorine Institute	Emergency Shut-Off Systems for Bulk Transfer of Chlorine	49 CFR 177.840(u)
CI 101-7	1993	Chlorine Institute	Excess Flow Valve with Removable Seat	49 CFR 178.276(c)(7)(i)
CI 104-9	2002	Chlorine Institute	Standard Chlorine Angle Valve Assembly	49 CFR 178.337-9(b)(8)
CI 106-6	1993	Chlorine Institute	Excess Flow Valve with Removable Baskets	49 CFR 178.276(c)(7)(ii)
CI 166	2002	Chlorine Institute	Angle Valve Guidelines for Chlorine Bulk Transportation	49 CFR 178.337-9(b)(8)
CI H50155	1996	Chlorine Institute	Pressure Relief Device for Chlorine Service	49 CFR 173.315(i)(13)
CI H51970	1996	Chlorine Institute	Safety Valve for Chlorine Service	49 CFR 173.315(i)(13)
CI	2009	Chlorine Institute	Chlorine Institute Emergency Kit A for 100-lb. and 150-lb. Chlorine Cylinders	49 CFR 173.3(e)(1)
CI	2009	Chlorine Institute	Chlorine Institute Emergency Kit B for Chlorine Ton Containers	49 CFR 173.3(e)(1)
CIE 15	2004	International Commission on Illumination	Technical Report: Colorimetry, 3rd edition	10 CFR 430 Subpart B, App. R, 4.1.1
CIE 15A (xls)	2004	International Commission on Illumination	Supplementary Spectra	10 CFR 430 Subpart B, App. R, 4.1.1

CIE 15B (xls)	2004	International Commission on Illumination	Supplementary Tables	10 CFR 430 Subpart B, App. R, 4.1.1
CRA A-20	1986	Corn Refiners Association	Analysis for Starch in Corn	7 CFR 801.7(a)(2)
CSA C390	1993	Canadian Standards Association	Energy Efficiency Test Methods for Three-Phase Induction Motors	10 CFR 431.19(b)(4)
CTIOA R8-103-62	1969	Ceramic Tile Institute of America	Standard Specifications for the Installation of Tile Lined Shower Receptors	24 CFR 200, Subpart S
CSVA	2004	Commercial Vehicle Safety Alliance	North American Standard Out-of-Service Criteria and Level VI Inspection Procedures and Out-of-Service Criteria for Commercial Highway Vehicles	49 CFR 385.415(b)(1)
EI IP-501	2005	Energy Institute	Determination of aluminum, silicon, vanadium, nickel, iron, sodium, calcium, zinc and phosphorus in residual fuel oil	40 CFR 1065.705 Table 1
FGMA	1990	Flat Glass Marketing Association	Glazing Manual	24 CFR 200, Subpart S
GLI METHOD 2	2009	Great Lakes Instruments	Turbidity	40 CFR 141.74(a)(1)
GPA 2261	2000	Gas Producers Association	Analysis of Natural Gas and Similar Gaseous Mixtures by Gas Chromatography	40 CFR 75, Appendix F, Section 5.5.2
GPA 2261	2000	Gas Processors Association	Analysis of Natural Gas and Similar Gaseous Mixtures by Gas Chromatography	40 CFR 75, Appendix F
GPA 2377	1986	Gas Processors Association	Test for Hydrogen Sulfide and Carbon Dioxide in Natural Gas Using Length of Stain Tubes	40 CFR 60.334(h)(1)
GRI 02-0057	2002	Gas Research Institute	Internal Corrosion Direct Assessment of Gas Transmission Pipelines Methodology	49 CFR 192.927(c)(2)
HACH 8000	2007	Hach Chemical Company	Oxygen Demand, Chemical Using Reactor Digestion Method	40 CFR 136.3(a)
HACH 8008	2007	Hach Chemical Company	1, 10--Phenanthroline Method Using FerroVer Iron Reagent for Water	40 CFR 136.3(a)
HACH 8009	2007	Hach Chemical Company	Zincon Method for Zinc, Hatch Handbook of Water Analysis	40 CFR 444.12(b)(1)
HACH 8034	2007	Hach Chemical Company	Periodate Oxidation Method for Manganese	40 CFR 136.3(a)
HACH 8507	2007	Hach Chemical Company	Nitrogen Nitrite--Low Range, Diazotization Method for Water and Wastewater	40 CFR 136.3(a)
HI BTS-2000	2007	Hydronics Institute	Method to Determine Efficiency of Commercial Space Heating Boilers	10 CFR 431.86
HPMA HP-SG-96	1996	Hardwood Plywood Manufacturers Association	Structural Design Guide for Hardwood Plywood Wall Panels	24 CFR 3280.304(b)(1)

IAPMO PS-2	1989	International Association of Plumbing and Mechanical Officials	Material and Property Standard for Cast Brass and Tubing P-Traps	24 CFR 3280.604(b)(2)
IAPMO PS-5	1984	International Association of Plumbing and Mechanical Officials	Material and Property Standard for Special Cast Iron Fittings	24 CFR 3280.604(b)(2)
IAPMO PS-9	1984	International Association of Plumbing and Mechanical Officials	Material and Property Standard for Diversion Tees and Twin Waste Elbow	24 CFR 3280.604(b)(2)
IAPMO PS-14	1989	International Association of Plumbing and Mechanical Officials	Material and Property Standard for Flexible Metallic Water Connectors	24 CFR 3280.604(b)(2)
IAPMO PS-23	1989	International Association of Plumbing and Mechanical Officials	Material and Property Standard for Dishwasher Drain Airgaps	24 CFR 3280.604(b)(2)
IAPMO PS-31	1977	International Association of Plumbing and Mechanical Officials	Material and Property Standard for Backflow Prevention Devices	24 CFR 3280.604(b)(2)
ICAO 9284	2011	International Civil Aviation Organization	Technical Instructions for the Safe Transport of Dangerous Goods by Air	49 CFR 171.7
ICAO Annex 2	1990	International Civil Aviation Organization	Convention on International Civil Aviation, Rules of the Air	14 CFR 135.3(a)(2)
ICAO Annex 16	2008	International Civil Aviation Organization	Environmental Protection, Volume II -- Aircraft Engine Emissions	40 CFR 87.89
ICBO	1991	International Conference of Building Officials	Uniform Building Code (1991)	24 CFR 200.925c(a)(1)(iii)
ICBO	1991	International Conference of Building Officials	Uniform Mechanical Code (1991)	24 CFR 200.925c(c)(3)
ICEA S-87-640	2006	Insulated Cable Engineers Association	Standard for Optical Fiber Outside Plant Communications Cable	7 CFR 901(c)
ICEA S-110-717	2003	Insulated Cable Engineers Association	Standard for Optical Drop Cable	7 CFR 901(c)
ICS	1973	International Chamber of Shipping	Clean Seas Guide for Oil Tankers	33 CFR 157.23(b)
IEEE 45	2002	Institute of Electrical and Electronics Engineers	Recommended Practice for Electrical Installations on Shipboard	46 CFR 110.10-1
IEEE 112	2004	Institute of Electrical and Electronics Engineers	Test Procedure for Polyphase Induction Motors and Generators	10 CFR 431.15
IEEE 114	2010	Institute of Electrical and Electronics Engineers	IEEE Standard Test Procedure for Single-Phase Induction Motors	10 CFR 431

IEEE 1202 (pdf) IEEE 1202 (html)	1991	Institute of Electrical and Electronics Engineers	Standard for Flame Testing of Cables	46 CFR 111
IEEE C2	1997	Institute of Electrical and Electronics Engineers	National Electrical Safety Code	7 CFR 1755.503(d)(1)
IEEE C2	2007	Institute of Electrical and Electronics Engineers	National Electrical Safety Code (2007)	7 CFR 1755.901(b)
IEEE C37.14	2002	Institute of Electrical and Electronics Engineers	Standard for Low-Voltage AC Power Circuit Breakers Used in Enclosures	46 CFR 110.10-1
IEEE P730.1	1989	Institute of Electrical and Electronics Engineers	Standard for Software Quality Assurance Plans	7 CFR 1755.522(n)(2)
IESNA LM-45	2000	Illuminating Engineering Society of North America	Method for Electrical and Photometric Measurements of General Service Incandescent Filament Lamps	10 CFR 430 Subpart B
IME 22	2011	Institute of Makers of Explosives	Recommendations for the Safe Transportation of Detonators in a Vehicle with Certain Other Explosive Materials	30 CFR 57.6133(b)
IME	1940	Institute of Makers of Explosives	Safety in the Handling and Use of Explosives	29 CFR 1910.261(a)(4)(iii)
IMO IMDG.1	2006	International Maritime Organization	International Maritime Dangerous Goods Code (Volume 1)	49 CFR 172.519(f)
IMO IMDG.2	2006	International Maritime Organization	International Maritime Dangerous Goods Code (Volume 2)	49 CFR 172.519(f)
IMO ISPS	2003	International Maritime Organization	International Ship and Port Facility Security Code	33 CFR 101.410(a)
AG ENG	1965	Interstate Printers and Publishers, Inc.	Agriculture Engineering	29 CFR 570.71(b)
ISO 535	1991	International Organization for Standardization	Paper and Board--Determination of Water Absorptiveness--Cobb Method	49 CFR 178.516(b)(1)
ISO 1496-1	1990	International Organization for Standardization	Series 1 Freight Containers--Specification and Testing--Part 1, General Cargo Containers	49 CFR 173.411(b)(6)(iii)
ISO 1496-3	1995	International Organization for Standardization	Series 1 Freight Containers--Specification and Testing--Part 3, Tank containers for Liquids, Gases and Pressurized Dry Bulk	49 CFR 178.74(c)(5)(ii)
ISO 3807-2	2000	International Organization for Standardization	Cylinders for acetylene--Basic requirements--Part 2: Cylinders with fusible plugs	49 CFR 173.303(f)(1)
ISO 6406 (pdf) ISO 6406 (html)	2005	International Organization for Standardization	Seamless Steel Gas Cylinders--Inspection and Testing	49 CFR 180
ISO 7225	2005	International Organization for Standardization	Gas Cylinders--Precautionary Labels	49 CFR 178.71(r)(2)

ISO 7866	1999	International Organization for Standardization	Gas Cylinders--Refillable Seamless Aluminum Alloy Gas Cylinders--Design, Construction and Testing	49 CFR 178.71(h)
ISO 8115	1986	International Organization for Standardization	Cotton bales—Dimensions and density	49 CFR 171.7
ISO 9809-1	1999	International Organization for Standardization	Gas Cylinders--Refillable Seamless Steel Gas Cylinders--Design, Construction and Testing--Part 1: Quenched and Tempered Steel Cylinders with Tensile Strength less than 1 100 MPa	49 CFR 178.71(g)(1)
ISO 9809-2	2000	International Organization for Standardization	Gas Cylinders--Refillable Seamless Steel Gas Cylinders--Design, Construction and Testing--Part 2: Quenched and Tempered Steel Cylinders with Tensile Strength Greater than or Equal to 1 100 MPa	49 CFR 178.71(g)(2)
ISO 9809-3	2000	International Organization for Standardization	Gas Cylinders--Refillable Seamless Steel Gas Cylinders--Design, Construction and Testing--Part 3: Normalized Steel Cylinders	49 CFR 178.71(g)(3)
ISO 9978	1992	International Organization for Standardization	Sealed Radioactive Sources--Leak Test Methods	49 CFR 173.469(a)(4)(ii)
ISO 10297	1999	International Organization for Standardization	Gas cylinders--Refillable gas cylinder valves--Specification and type testing	49 CFR 173.301b(c)(1)
ISO 10461 (pdf) ISO 10461 (html)	2005	International Organization for Standardization	Seamless Aluminum Alloy Gas Cylinders--Inspection and Testing	49 CFR 180
ISO 10462 (pdf) ISO 10462 (html)	2005	International Organization for Standardization	Transportable Cylinders for Dissolved Acetylene	49 CFR 180
ISO 11114-1	1997	International Organization for Standardization	Transportable gas cylinders--Compatibility of cylinder and valve materials with gas contents--Part 1: Metallic materials	49 CFR 173.301b(a)(2)
ISO 11114-2	2000	International Organization for Standardization	Transportable gas cylinders--Compatibility of cylinder and valve materials with gas contents--Part 2: Non- metallic materials	49 CFR 173.301b(a)(2)
ISO 11117	1998	International Organization for Standardization	Gas cylinders--Valve protection caps and valve guards for industrial and medical gas cylinders--Design, construction and tests	49 CFR 173.301b(c)(2)(ii)
ISO 11118	1999	International Organization for Standardization	Gas cylinders--Non-refillable metallic gas cylinders--Specification and test methods	49 CFR 178.71(i)
ISO 11119-1	2002	International Organization for Standardization	Gas cylinders--Gas cylinders of composite construction--Specification and test methods--Part 1: Hoop-wrapped composite gas cylinders	49 CFR 171.7

ISO 11119-2	2002	International Organization for Standardization	Gas cylinders—Gas cylinders of composite construction—Specification and test methods—Part 2: Fully wrapped fibre reinforced composite gas cylinders with load-sharing metal liners	49 CFR 171.7
ISO 11119-3	2002	International Organization for Standardization	Gas cylinders of composite construction--Specification and test methods--Part 3: Fully wrapped fibre reinforced composite gas cylinders with non-load-sharing metallic or non-metallic liners	49 CFR 171.7
ISO 11120	1999	International Organization for Standardization	Gas cylinders--Refillable seamless steel tubes of water capacity between 150 L and 3000 L--Design, construction and testing	49 CFR 178.71(j)
ISO 11621	1997	International Organization for Standardization	Gas cylinders--Procedures for change of gas service	49 CFR 173.301b(a)(2)
ISO 11623 (pdf) ISO 11623 (html)	2002	International Organization for Standardization	Periodic Inspection and Testing of Composite Gas Cylinders	49 CFR 180
ISO 11660-1 (pdf) ISO 11660-1 (html)	2008	International Organization for Standardization	Cranes: Access, Guards and Restraints: General	29 CFR 1926
ISO 11660-2 (pdf) ISO 11660-2 (html)	1994	International Organization for Standardization	Cranes: Access, Guards and Restraints: Mobile Cranes	29 CFR 1926
ISO 11660-3 (pdf) ISO 11660-3 (html)	2008	International Organization for Standardization	Cranes: Access, Guards and Restraints: Tower Cranes	29 CFR 1926
ISO 14230-4	2000	International Organization for Standardization	Road Vehicles--Diagnostic Systems	40 CFR 1048.110(g)(2)
ISO 18902 (pdf) ISO 18902 (html)	2001	International Organization for Standardization	Photographic Processed Films, Plates, and Papers	36 CFR 1237
ISO 18906 (pdf) ISO 18906 (html)	2000	International Organization for Standardization	Photographic Films--Specifications for Safety Film	36 CFR 1237
ITU-R M-493-11	2004	International Telecommunication Union	Digital Selective-calling System for Use in the Maritime Mobile Service, with Annexes 1 and 2	47 CFR 80.1101(c)(2)(ii)
ITU-R M-541-8	1997	International Telecommunication Union	Operational Procedures for the Use of Digital Selective-Calling Equipment in the Maritime Mobile Service	47 CFR 80.1101(c)(4)(iii)
ITU-R M-541-9	2004	International Telecommunication Union	Operational Procedures for the Use of Digital Selective-Calling Equipment in the Maritime Mobile Service	47 CFR 80.1101(c)(2)(iii)
ITU-R M-628-3	1994	International Telecommunication	Technical Characteristics for Search and Rescue Radar Transponders	47 CFR 80.1101(c)(6)(ii)

		Union		
ITU-R M-632-3	1997	International Telecommunication Union	Transmission Characteristics of a Satellite Emergency Position Indicating Radio Beacon	47 CFR 80.1101(c)(11)(iii)
ITU-R M-633-3	2004	International Telecommunication Union	Transmission characteristics of a satellite emergency position-indicating radiobeacon system operating through a low polar-orbiting satellite system	47 CFR 80.1101(c)(5)(iii)
ITU-R M-1371-1	2001	International Telecommunication Union	Technical Characteristics for a Universal Shipborne Automatic Identification System Using Time Division Multiple Access	47 CFR 80.1101(c)(12)(i)
ITU-T E.161	2001	International Telecommunication Union	Arrangement of Digits, Letters and Symbols on Telephones and Other Devices that Can Be Used for Gaining Access to a Telephone Network	47 CFR 80.1101(b)(2)
ITU-T E.164.1	2008	International Telecommunication Union	Numbering Plan of the International Telephone Service	47 CFR 80.1101(b)(3)
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MSS SP-44	1996	Manufacturers Standardization Society	Steel Pipe Line Flanges	46 CFR 56.01-2
MSS SP-75	2004	Manufacturers Standardization Society	Specification for High-Test Wrought Butt Welding Fittings	49 CFR 118(a)
NACE RP-0502	2002	National Association of Corrosion Engineers	Pipeline External Corrosion Direct Assessment Methodology	49 CFR 192.925(b)(3)
NACM	2003	National Association of Chain Manufacturers	Welded Steel Chain Specifications	49 CFR 393.104(e)(2)
NAS	1972	National Academy of Sciences	Food Chemicals Codex (1972)	21 CFR 701.3(c)(2)(iv)
NAS	1996	National Academy of Sciences	Food Chemicals Codex (1996)	21 CFR 184
NAS	2011	National Academy of Sciences	Prudent Practices in the Laboratory: Handling and Disposal of Chemicals	42 CFR 52b.12(c)(6)
NCASI 98-01	1998	National Council of the Paper Industry for Air and Stream Improvements	Chilled Impinger Method For Use At Wood Products Mills to Measure Formaldehyde, Methanol, and Phenol	40 CFR 63, Subpart DDDD
NCASII 94-03	2002	National Council of the Paper Industry for Air and Stream Improvements	Methanol in Process Liquids by Gas Chromatography/Flame Ionization Detection	40 CFR 63.457(c)(3)(ii)
NCASI A105	2001	National Council of the Paper Industry for Air	Impinger Source Sampling Method for Selected Aldehydes, Ketones,	40 CFR 63, Subpart DDDD

		and Stream Improvements	and Polar Compounds	
NCASI 99-02	2002	National Council of the Paper Industry for Air and Stream Improvements	Impinger/Canister Source Sampling Method For Selected HAPs and Other Compounds at Wood Products Facilities	40 CFR 63, Subpart DDDD
NCCA	2011	National Cotton Council of America	Specifications for Cotton Bale Packaging Material	7 CFR 1427.5(b)(10)
UCC	2002	National Conference of Commissioners on Uniform State Laws	2002 Official Text and Comments, Sections 8–102 and 8-103	17 CFR 270.17f-4(c)(1)
UCC	2002	National Conference of Commissioners on Uniform State Laws	2002 Official Text and Comments, Sections 8–501 through 8–511	17 CFR 270.17f-4(c)(1)
NCUTLO	1969	National Committee on Uniform Traffic Laws and Ordinances	Uniform Vehicle Code and Model Ordinance	41 CFR 50-204.75
NFPA 10 (pdf) NFPA 10 (html) NFPA 10 (svg)	2002	National Fire Protection Association	Standard for Portable Fire Extinguishers	29 CFR 1915
NFPA 11 (pdf) NFPA 11 (html)	2005	National Fire Protection Association	Standard for Foam	29 CFR 1915
NFPA 12 (pdf) NFPA 12 (html)	2005	National Fire Protection Association	Standard for Carbon Dioxide Extinguishing Systems	29 CFR 1915
NFPA 13	2002	National Fire Protection Association	Standard for the Installation of Sprinkler Systems	36 CFR 1234.12(i)
NFPA 25 (pdf) NFPA 25 (html)	2002	National Fire Protection Association	Standard for Water-Based Fire Protection Systems	29 CFR 1915
NFPA 30 (pdf) NFPA 30 (html)	2003	National Fire Protection Association	Flammable and Combustible Liquids Code	49 CFR 192
NFPA 54 (pdf) NFPA 54 (html) NFPA 54 (svg)	2002	National Fire Protection Association	National Fuel and Gas Code	24 CFR 3280
NFPA 58 (pdf) NFPA 58 (html)	2001	National Fire Protection Association	Standard for Liquefied Petroleum Gases	49 CFR 173
NFPA 58	2004	National Fire Protection Association	Standard for the Storage and Handling of Liquefied Petroleum Gases	49 CFR 192.11(b)
NFPA 59	2004	National Fire Protection Association	Standard for the Storage and Handling of Liquefied Petroleum Gases at Utility Gas Plants	49 CFR 192.11(b)
NFPA 72 (pdf) NFPA 72 (html) NFPA 72 (svg)	2002	National Fire Protection Association	National Fire Alarm Code	29 CFR 1915
NFPA 99	2005	National Fire Protection Association	Standard for Health Care Facilities	38 CFR 51.200(b)(4)
NFPA 101 (pdf) NFPA 101 (html)	2000	National Fire Protection Association	Life Safety Code	59 CFR 130
NFPA 704	2007	National Fire Protection Association	Standard System for the Identification of the Hazards of Materials for Emergency Response	6 CFR 27.204(a)(2)

NFPA DUST	1957	National Fire Protection Association	Report of Important Dust Explosions	
NFPA HOST	1953	National Fire Protection Association	Handling Hose and Ladders	
NFPA 70	2005	National Fire Protection Association	National Electrical Code	49 CFR 192.189(c)
NACHA	2005	National Automated Clearing House Association	A Complete Guide to the Rules Governing the ACH Network	45 CFR 162.920
ISS-MCB	2011	International Space Station Multilateral Coordination Board	International Docking Standard	1 Code of Intergalactic Regulations 32
NCRP 33	1968	National Council on Radiation Protection and Measurement	Medical X-ray and Gamma-Ray Protection for Energies Up to 10 MeV--Equipment Design and Use	42 CFR 37.43
NCRP 48	1976	National Council on Radiation Protection and Measurement	Medical Radiation Protection for Medical and Allied Health Personnel	42 CFR 37.43
NCRP 49	1976	National Council on Radiation Protection and Measurement	Structural Shielding Design and Evaluation for Medical Use of X-Rays and Gamma-Rays up to 10 MeV	42 CFR 37.43
NEMA MG-1	2009	National Electrical Manufacturers Association	Motors and Generators	10 CFR 431
NSF 61 (pdf) NSF 61 (html)	2001	National Sanitation Foundation	Drinking Water System Components--Health Effects	24 CFR 3280
OECD 404	2002	Organization for Economic Cooperation and Development	Guideline for Testing of Chemicals, Acute Dermal Irritation/Corrosion	49 CFR 173.137
OECD C93	1974	Organization for Economic Cooperation and Development	Green List of Wastes	40 CFR 262.89(e)
OR REG	1975	State of Oregon	Oregon Grade Standards Hazelnuts in Shell	7 CFR 982.45(a)
ORION	1970	ORION Research Incorporated	Residual Chlorine Electrode Model 97-70	40 CFR 136.3(a) Table IB
PCI MNL-121	1977	Precast/Prestressed Concrete Institute	Manual for Structural Design of Architectural Precast Concrete	24 CFR 200, Subpart S
PCI MNL-117-77	1977	Precast/Prestressed Concrete Institute	Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products	24 CFR 200, Subpart S
PCSA 1	1968	Power Crane and Shovel Association	Mobile Crane and Excavator Standards	29 CFR 1926.602(b)(3)
PCSA 2	1968	Power Crane and Shovel Association	Mobile Hydraulic Crane Standards	29 CFR 1926.602(b)(3)
PCSA 3	1969	Power Crane and Shovel Association	Mobile Hydraulic Excavator Standards	29 CFR 1926.602(b)(3)
PPI TR-3	2004	Plastics Pipe Institute	Policies and Procedures for Developing Hydrostatic Design Bases (HDB), Pressure Design	49 CFR 192.121

			Bases (PDB), and Minimum Required Thermoplastic Piping Materials	
RTCM C071	1995	Radio Technical Commission for Maritime Services	Recommended Standards for Marine Radar Equipment Installed on Ships of Less Than 300 Tons Gross Tonnage	33 CFR 164.72(a)(1)(i)(B)
RTCM C191	1993	Radio Technical Commission for Maritime Services	Recommended Standards for Marine Radar Equipment Installed on Ships of 300 Tons Gross Tonnage and Upwards	33 CFR 164.72(a)(1)(iii)(B)
SAE Paper 770141	1977	Society of Automotive Engineers	Optimization of a Flame Ionization Detector for Determination of Hydrocarbon in Diluted Automotive Exhausts	40 CFR 1065.360(c)
SAE J4C	1965	Society of Automotive Engineers	Motor Vehicle Seat Belt Assembly	29 CFR 1928.51(b)(2)(ii)
SAE J30	1998	Society of Automotive Engineers	Fuel and Oil Hoses	40 CFR 1051.501(c)(2)
SAE J166	1971	Society for Automotive Engineering	Minimum Performance Criteria for Brake Systems for Off-Highway Trucks and Wagons	29 CFR 1926.602(a)(4)
SAE J166	1971	Society of Automotive Engineers	Minimum Performance Criteria for Brake Systems for Off-Highway Trucks and Wagons	29 CFR 1926.602(a)(4)
SAE J167	1970	Society for Automotive Engineering	Protective Frame with Overhead Protection	29 CFR 1926.1003(g)
SAE J167	1974	Society of Automotive Engineers	Protective Frame with Overhead Protection	30 CFR 77.403-1(d)(1)(v)
SAE J168	1970	Society for Automotive Engineering	Protective Enclosures--Test Procedures and Performance Requirements	29 CFR 1926.1002(a)(5)(i)
SAE J185	1988	Society of Automotive Engineers	Recommended Practice for Access Systems for Off-Road Machines	29 CFR 1910.266(f)(5)(i)
SAE J186A	1977	Society of Automotive Engineers	Supplemental High Mounted Stop and Rear Turn Signal Lamps	49 CFR 571.108
SAE J211-1 (pdf) SAE J211-1 (html)	1995	Society of Automotive Engineers	Instrumentation for Impact Test	49 CFR 571
SAE J211	1971	Society of Automotive Engineers	Instrumentation for Impact Tests	49 CFR 571.222 S6.6.2
SAE J222	1970	Society of Automotive Engineers	Parking Lamps (Position Lamps)	49 CFR 571.108 S5.1.1.6
SAE J231	1971	Society for Automotive Engineering	Minimum Performance Criteria for Falling Object Protective Structures (FOPS)	30 CFR 77.403(a)
SAE J231	1971	Society of Automotive Engineers	Minimum Performance Criteria for Falling Object Protective Structures (FOPS)	30 CFR 77.403(a)
SAE J231	1981	Society of Automotive Engineers	Minimum Performance Criteria for Falling Object Protective Structures	29 CFR 1910.266(f)(3)(iii)

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SAE J236	1971	Society for Automotive Engineering	Minimum Performance Criteria for Brake Systems for Rubber Tire Self-Propelled Graders	29 CFR 1926.602(a)(4)
SAE J237	1971	Society for Automotive Engineering	Minimum Performance Criteria for Brake Systems for Off-Highway Rubber-Tired Front End Loaders and Dozers	29 CFR 1926.602(a)(4)
SAE J244	1983	Society for Automotive Engineering	Recommend Practice for Measurement of Intake Air or Exhaust Gas Flow of Diesel Engines	40 CFR 92.108(a)(3)
SAE J319	1971	Society of Automotive Engineers	Minimum Performance Criteria for Brake Systems for Off-Highway Rubber-Tired Self-Propelled Scrapers	29 CFR 1926.602(a)(4)
SAE J320	1972	Society for Automotive Engineering	Minimum Performance Criteria for Roll-Over Protective Structures for Rubber-Tired Self-Propelled Scrapers	29 CFR 1926.1001(h)
SAE J320A	1969	Society of Automotive Engineers	Minimum Performance Criteria for Roll-Over Protective Structures for Rubber-Tired Self-Propelled Scrapers	30 CFR 77.403-1(d)(1)(i)
SAE J321	1970	Society of Automotive Engineers	Fenders for Pneumatic-Tired Earthmoving Haulage Equipment	29 CFR 1926.602(a)(5)
SAE J333	1970	Society for Automotive Engineering	Operation Protection for Wheel-Type Agricultural and Industry Tractors	29 CFR 1926.602(a)(2)
SAE J334	1968	Society of Automotive Engineers	Protective Frame Test Procedures and Performance Requirements	30 CFR 77.403-1(d)(1)(vi)
SAE J334	1970	Society for Automotive Engineering	Protective Frame Test Procedures and Performance Requirements	30 CFR 77.403-1(d)(1)(vi)
SAE J386	1969	Society of Automotive Engineers	Operator Restraint Systems for Off-Road Work Machines	29 CFR 1926.602(a)(2)
SAE J386	1985	Society for Automotive Engineering	Operator Restraint Systems for Off-Road Work Machines	30 CFR 56.14130(h)
SAE J386	1993	Society of Automotive Engineers	Operator Restraint Systems for Off-Road Work Machines	30 CFR 56.14130(h)
SAE J386	1997	Society of Automotive Engineers	Operator Restraint Systems for Off-Road Work Machines	30 CFR 57.14131(c)
SAE J387 (pdf) SAE J387 (html)	1987	Society of Automotive Engineers	Terminology: Motor Vehicle Lighting	49 CFR 571
SAE J394	1969	Society of Automotive Engineers	Minimum Performance Criteria for Roll-Over Protective Structures for Rubber-Tired Front End Loaders and Rubber-Tired Dozers	30 CFR 77.403-1(d)(1)(ii)
SAE J394	1972	Society of Automotive Engineers	Minimum Performance Criteria for Rollover Protective Structures for Wheeled Front-End Loaders and Wheeled Dozers	30 CFR 77.403-1(d)(1)(ii)
SAE J395	1969	Society of Automotive	Minimum Performance Criteria for	30 CFR 77.403-1(d)(1)

		Engineers	Roll-Over Protective Structures for Crawler Tractors and Crawler-Type Loaders	(iii)
SAE J396	1972	Society for Automotive Engineering	Minimum Performance Criteria for Roll-Over Protective Structures for Motor Graders	30 CFR 77.403-1(d)(1) (iv)
SAE J397	1969	Society of Automotive Engineers	Deflection Limiting Volume-Protective Structures Laboratory Evaluation	29 CFR 1926.1001(f)(1) (ii)
SAE J397	1988	Society of Automotive Engineers	Deflection Limiting Volume-Protective Structures Laboratory Evaluation	29 CFR 1910.266(f)(3) (iv)
SAE J429	1971	Society for Automotive Engineering	Mechanical and Quality Requirements for Externally Threaded Fasteners	30 CFR 77.403-1(d)(2) (iii)(B)
SAE J429	1983	Society of Automotive Engineers	Mechanical and Quality Requirements for Externally Threaded Fasteners	46 CFR 58.30-15(c)
SAE J429D	1967	Society of Automotive Engineers	Mechanical and Quality Requirements for Externally Threaded Fasteners	30 CFR 77.403-1(d)(2) (iii)(B)
SAE J449a	1963	Society of Automotive Engineers	Surface Texture Control	49 CFR 581.6(b)(1)
SAE J476a	1961	Society of Automotive Engineers	Dryseal Pipe Threads	49 CFR 393.67(c)(3)
SAE J527	1967	Society of Automotive Engineers	Brazed Double Wall Low Carbon Steel Tubing	49 CFR 571.116 S6.13.3(b)
SAE J533	1972	Society of Automotive Engineers	Flares for Tubing	24 CFR 3280.703
SAE J557	1968	Society of Automotive Engineers	High Tension Ignition Cable	33 CFR 183.440(a)
SAE J565	1969	Society of Automotive Engineers	Semi-Automatic Headlamp Beam Switching Devices	49 CFR 571.108 S5.5.1
SAE J566	1960	Society of Automotive Engineers	Headlamp Mountings	49 CFR 571.108
SAE J571	1976	Society of Automotive Engineers	Dimensional Specification for Sealed Beam Headlamp Units	49 CFR 571.108
SAE J573d (pdf) SAE J573d (html)	1968	Society of Automotive Engineers	Requirements for Lamp Bulbs and Sealed Units	49 CFR 571
SAE J575	1970	Society of Automotive Engineers	Test for Motor Vehicle Lighting Devices and Components	49 CFR 571.108 S6.1
SAE J575	1983	Society for Automotive Engineering	Test for Motor Vehicle Lighting Devices and Components	49 CFR 571.131 S6.2.3
SAE J575	1988	Society of Automotive Engineers	Test for Motor Vehicle Lighting Devices and Components	49 CFR 571.108 S7.5.8.3(e)
SAE J576	1970	Society of Automotive Engineers	Plastic Materials for Use in Optical Parts, such as Lenses and Reflectors, of Motor Vehicle Lighting Devices	49 CFR 571.108 S6.2
SAE J576 (pdf)	1991	Society of Automotive	Plastic Materials for Use in Optical	49 CFR 571

SAE J576 (html)		Engineers	Parts	
SAE J576B	1966	Society of Automotive Engineers	Plastic Materials for Use in Optical Parts, such as Lenses and Reflectors, of Motor Vehicle Lighting Devices	49 CFR 571.108 S6.2
SAE J578 (pdf) SAE J578 (html)	1995	Society of Automotive Engineers	Color Specifications for Electric Signal Lighting Devices	49 CFR 571.403
SAE J584	1964	Society of Automotive Engineers	Motorcycle and Motor Driven Cycle Headlamps	49 CFR 571.108 S7.9.1(a)
SAE J584 (pdf) SAE J584 (html)	1993	Society of Automotive Engineers	Requirements for Motorcycle Headlamps	49 CFR 571
SAE J585	1970	Society for Automotive Engineering	Tail Lamps (Rear Position Lamps) for Use on Motor Vehicles Less Than 2032 mm in Overall Width	49 CFR 571.108 S5.8.8
SAE J585	1977	Society for Automotive Engineering	Tail Lamps (Rear Position Lamps) for Use on Motor Vehicles Less Than 2032 mm in Overall Width	49 CFR 571.108 S5.1.1.6
SAE J585	2000	Society of Automotive Engineers	Tail Lamps (Rear Position Light)	49 CFR 571.108 S6.1
SAE J586	1970	Society of Automotive Engineers	Stop Lamps for Use on Motor Vehicles Less than 2032 mm in Overall Width	49 CFR 571.108 S5.8.3(b)
SAE J586	1984	Society for Automotive Engineering	Stop Lamps for Use on Motor Vehicles Less Than 2032 mm in Overall Width	49 CFR 571.108 S6.1
SAE J586	2000	Society of Automotive Engineers	Stop Lamps for Use on Motor Vehicles Less than 2032 mm in Overall Width	49 CFR 571.108 S6.1
SAE J586B	1966	Society of Automotive Engineers	Stop Lamps for Use on Motor Vehicles Less than 2032 mm in Overall Width	49 CFR 571.108 S5.8.3(a)
SAE J587 (pdf) SAE J587 (html)	1981	Society of Automotive Engineers	License Plate Lamps (Rear Registration Lamps)	49 CFR 571
SAE J588	1970	Society for Automotive Engineering	Turn Signal Lamps for Use on Motor Vehicles Less Than 2032 mm in Overall Width	49 CFR 571.108 S5.1.1.1
SAE J588	1970	Society of Automotive Engineers	Turn Signal Lamps for Use on Motor Vehicles Less Than 2032 mm in Overall Width	49 CFR 571.108 S5.8.4(b)
SAE J588 (pdf) SAE J588 (html)	1984	Society of Automotive Engineers	Requirements for Turn Signal Lamps	49 CFR 571
SAE J588	2000	Society of Automotive Engineers	Turn Signal Lamps for Use on Motor Vehicles Less Than 2032 mm in Overall Width	49 CFR 393.25(c)
SAE J588D	1966	Society of Automotive Engineers	Turn Signal Lamps for Use on Motor Vehicles Less Than 2032 mm in Overall Width	49 CFR 571.108 S5.8.4(a)
SAE J592	1972	Society of Automotive Engineers	Clearance, Side Marker and Identification Lamps	49 CFR 571.108 Table III
SAE J592 (pdf) SAE J592 (html)	1992	Society of Automotive Engineers	Clearance, Side Marker, and Identification Lamps	49 CFR 571

SAE J593C	1968	Society of Automotive Engineers	Back-up Lamps	49 CFR 571.108
SAE J594f (pdf) SAE J594f (html)	1977	Society of Automotive Engineers	Requirements for Reflex Reflectors	49 CFR 571
SAE J599	1997	Society of Automotive Engineers	Lighting Inspection Code	49 CFR 581.5(c)(1)
SAE J602 (pdf) SAE J602 (html)	1980	Society of Automotive Engineers	Mechanically Aimable Sealed Beam Headlamps	49 CFR 571
SAE J743A	1964	Society of Automotive Engineers	Tractor Mounted Side Boom	29 CFR 1926.550(a)(18)
SAE J759 (pdf) SAE J759 (html)	1995	Society of Automotive Engineers	Lighting Identification Code	49 CFR 571
SAE J800C	1973	Society of Automotive Engineers	Recommended Practice, Motor Vehicle Seat Belt Installations	49 CFR 571.209
SAE J826	1962	Society of Automotive Engineers	Devices for Use in Defining and Measuring Vehicle Seating Accommodations	49 CFR 571.3(b)
SAE J826	1980	Society for Automotive Engineering	Devices for Use in Defining and Measuring Vehicle Seating Accommodations	49 CFR 571.214 S12.1.3(b)(1)
SAE J826 (pdf) SAE J826 (html)	1995	Society of Automotive Engineers	Defining and Measuring Vehicle Seating Accommodation	49 CFR 571
SAE J839	1991	Society of Automotive Engineers	Passenger Car Side Door Latch System	49 CFR 571.206
SAE J839B	1965	Society of Automotive Engineers	Passenger Car Side Door Latch System	49 CFR 571.201
SAE J845	1997	Society of Automotive Engineers	Optical Warning Devices for Authorized Emergency, Maintenance and Service Vehicles	49 CFR 393.25(e)
SAE J887	1964	Society of Automotive Engineers	School Bus Red Signal Lamps	49 CFR 571.108
SAE J902A	1967	Society of Automotive Engineers	Passenger Car Windshield Defrosting Systems	49 CFR 571.103
SAE J934	1965	Society of Automotive Engineers	Recommended Practice for Vehicle Passenger Door Hinge Systems	49 CFR 571.206
SAE J942	1965	Society of Automotive Engineers	Passenger Car Windshield Washer System	49 CFR 571.104
SAE J944	1980	Society for Automotive Engineering	Steering Control System-Passenger Car-Laboratory Test Procedure	49 CFR 571.203 S5.1(a)
SAE J945	1966	Society of Automotive Engineers	Vehicular Hazard Warning Signal Flashers	49 CFR 571.108 Table I
SAE J959	1966	Society of Automotive Engineers	Lifting Crane Wire-Rope Strength Factors	29 CFR 1926.550(a)(7)(vi)
SAE J964	1984	Society for Automotive Engineering	Test Procedure for Determining Reflectivity of Rear View Mirrors	49 CFR 571.111
SAE J972	1966	Society of Automotive Engineers	Moving Barrier Collision Test	49 CFR 571.105
SAE J995	1967	Society of Automotive Engineers	Mechanical and Quality Requirements for Steel Nuts	30 CFR 77.403-1(d)(2)(iii)(B)

SAE J995	1971	Society of Automotive Engineers	Mechanical and Quality Requirements for Steel Nuts	30 CFR 77.403-1(d)(2)(iii)(B)
SAE J1040	1994	Society of Automotive Engineers	Performance Criteria for Rollover Protective Structures (ROPS) for Construction, Earthmoving, Forestry and Mining Machines	30 CFR 56.14130(b)(1)
SAE J1063	1993	Society of Automotive Engineers	Cantilevered Boom Crane Structures--Method of Test	29 CFR 1926.1433(c)
SAE J1100	1984	Society for Automotive Engineering	Motor Vehicle Dimensions	49 CFR 571.3(b)
SAE J1100 (pdf) SAE J1100 (html)	2001	Society of Automotive Engineers	Motor Vehicle Dimensions	49 CFR 571
SAE J1127	1980	Society for Automotive Engineering	Battery Cable	33 CFR 183.430(a)(2)(ii)
SAE J1128	1975	Society of Automotive Engineers	Low Tension Primary Cable	33 CFR 183.430(a)(2)(ii)
SAE J1133	1984	Society for Automotive Engineering	School Bus Stop Arm	49 CFR 571.131 S6.2.3
SAE J1151	1991	Society of Automotive Engineers	Methane Measurement Using Gas Chromatography	40 CFR 86.111-94(b)(3)(vii)
SAE J1194	1983	Society for Automotive Engineering	Roll-Over Protective Structures for Wheeled Agricultural Tractors	30 CFR 56.14130(h)
SAE J1194	1994	Society of Automotive Engineers	Roll-Over Protective Structures for Wheeled Agricultural Tractors	30 CFR 56.14130(h)
SAE J1194	1999	Society of Automotive Engineers	Roll-Over Protective Structures for Wheeled Agricultural Tractors	30 CFR 57.14130(h)
SAE J1228	1991	Society of Automotive Engineers	Small Craft-Marine Propulsion Engine and Systems-Power Measurements and Declarations	40 CFR 91.115(a)
SAE J1292	1981	Society of Automotive Engineers	Automobile, Truck, Truck-Tractor, Trailer, and Motor Coach Wiring	49 CFR 393.28
SAE J1318	1986	Society of Automotive Engineers	Gaseous Discharge Warning Lamp for Authorized Emergency, Maintenance, and Service Vehicles	49 CFR 393.25(e)
SAE J1383 (pdf) SAE J1383 (html)	1985	Society of Automotive Engineers	Performance Requirements for Motor Vehicle Headlamps	49 CFR 571
SAE J1395 (pdf) SAE J1395 (html)	1985	Society of Automotive Engineers	Turn Signal Lamps for Use on Motor Vehicles	49 CFR 571
SAE J1398 (pdf) SAE J1398 (html)	1985	Society of Automotive Engineers	Stop Lamps for Use on Motor Vehicles	49 CFR 571
SAE J1475	1984	Society for Automotive Engineering	Hydraulic Hose Fittings for Marine Applications	46 CFR 27.211(e)(2)(v)(B)
SAE J1527	1993	Society of Automotive Engineers	Marine Fuel Hoses	33 CFR 183.540(a)
SAE J1703	1983	Society for Automotive Engineering	Motor Vehicle Brake Fluid	49 CFR 571.116 S6.5.4.1
SAE J1703 (pdf) SAE J1703 (html)	1995	Society of Automotive Engineers	Motor Vehicle Brake Fluids	49 CFR 571
SAE J1733 (pdf)	1994	Society of Automotive	Sign Convention for Vehicle Crash	49 CFR 572

SAE J1733 (html)		Engineers	Testing	
SAE J1817	2001	Society of Automotive Engineers	Long Stroke Air Brake Actuator Marking	49 CFR 393.47(e)
SAE J1850	1995	Society of Automotive Engineers	Class B Data Communication Network Interface	40 CFR 86.099-17(h)(1)(i)
SAE J1850	2001	Society of Automotive Engineers	Class B Data Communication Network Interface	40 CFR 86.1806-05(h)(1)(i)
SAE J1877	1994	Society of Automotive Engineers	Recommended Practice for Bar-Coded Vehicle Identification Number Label	40 CFR 86.095-35(h)(2)(i)
SAE J1892	1993	Society of Automotive Engineers	Recommended Practice for Bar-Coded Vehicle Emission Configuration Label	40 CFR 86.095-35(h)(2)(i)
SAE J1930	1993	Society of Automotive Engineers	Electrical/Electronic Systems Diagnostic Terms, Definitions, Abbreviations, and Acronyms	40 CFR 1039.135(c)(8)
SAE J1930	2002	Society of Automotive Engineers	Electrical/Electronic Systems Diagnostic Terms, Definitions, Abbreviations, and Acronyms	40 CFR 86.1806-05(h)(1)(v)
SAE J1937	1989	Society of Automotive Engineers	Recommended Practice for Engine Testing with Low Temperature Charge Air Cooler Systems in a Dynamometer Test Cell	40 CFR 86.1330-90(b)(5)
SAE J1962	1995	Society of Automotive Engineers	Diagnostic Connector Equivalent to ISO/DIS	40 CFR 86.094-17(h)(4)
SAE J1962	2002	Society of Automotive Engineers	Diagnostic Connector Equivalent to ISO/DIS 15031	40 CFR 86.1806-05(h)(1)(iv)
SAE J1978	2002	Society of Automotive Engineers	OBD II Scan Tool Equivalent to ISO/DIS 15031-4	40 CFR 86.1806-05(h)(1)(vi)
SAE J1979	2002	Society of Automotive Engineers	E/E Diagnostic Test Modes	40 CFR 86.1806-05(h)(1)(ii)
SAE J2009 (pdf) SAE J2009 (html)	1993	Society of Automotive Engineers	Discharge Forward Lighting Systems	49 CFR 571
SAE J2012	2002	Society of Automotive Engineers	Diagnostic Trouble Code Definitions	40 CFR 86.1806-04(h)(1)(iii)
SAE J2040	2002	Society of Automotive Engineers	Tail Lamps (Rear Position Lamps) for Use on Vehicles 2032 mm or More in Overall Width	9 CFR 393.25(c)
SAE J2260	1996	Society of Automotive Engineers	Non-metallic Fuel System Tubing with One or More Layers	40 CFR 1048.105(a)(2)
SAE J2261	2002	Society of Automotive Engineers	Stop Lamps and Front- and Rear-Turn Signal Lamps for Use on Motor Vehicles 2032 mm or More in Overall Width	49 CFR 393.25(c)
SAE J2534	2002	Society of Automotive Engineers	Recommended Practice for Pass-Thru Vehicle Programming	40 CFR 86.096-38(g)(17)(iv)
SCTE 26	2010	Society of Cable Telecommunications Engineers	Home Digital Network Interface Specification with Copy Protection	47 CFR 76.640(b)(4)(iii)
SCTE 28	2007	Society of Cable	Host-POD Interface Standard	47 CFR 15.123(b)(4)

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SCTE 40	2004	Society of Cable Telecommunications Engineers	Digital Cable Network Interface Standard (2004)	47 CFR 15.123(b)(2)
SCTE 40	2011	Society of Cable Telecommunications Engineers	Digital Cable Network Interface Standard (2011)	47 CFR 15.123(b)(2)
SCTE 41	2011	Society of Cable Telecommunications Engineers	POD Copy Protection System	47 CFR 76.640(b)(2)(ii)
SCTE 54	2009	Society of Cable Telecommunications Engineers	Digital Video Service Multiplex and Transport System Standard for Cable Television	47 CFR 15.123(b)(3)
SCTE 65	2008	Society of Cable Telecommunications Engineers	Service Information Delivered Out-of-Band for Digital Cable Television	47 CFR 76.640(b)(1)(ii)
SEAC	1996	Structural Engineers Association of California	Recommended Lateral Force Requirements and Commentary including Errata	42 CFR 52b.12(c)(5)
SJI	1994	Steel Joist Institute	Standard Specification Load Tables and Weight Tables for Steel Joists and Joist Girders	24 CFR 3280.304(b)(1)
SMACCNA HVAC (pdf) SMACCNA HVAC (html) SMACCNA HVAC (svg)	1985	Sheet Metal and Air Conditioning Contractors National Association	SMACNA: HVAC Air Duct Leakage Test Manual	10 CFR 434.403.2.9.3
SMACCNA DUCT (pdf) SMACCNA DUCT (html) SMACCNA DUCT (svg)	1995	Sheet Metal and Air Conditioning Contractors National Association	SMACCNA: HVAC Duct Construction Standards -- Metal and Flexible (RS-34)	10 CFR 434.403.2.9.3
SMACCNA GLASS (pdf)	1992	Sheet Metal and Air Conditioning Contractors National Association	SMACCNA: Fibrous Glass Duct Construction Standards (RS-36)	10 CFR 434.403.2.9.3
SMACCNA AIR (pdf)	1978	Sheet Metal and Air Conditioning Contractors National Association	SMACCNA: Energy Recovery Equipment and Systems, Air-to-Air	10 CFR 440 Appendix A
NIST Handbook H-28	1942	Department of Commerce	Handbook of Screw-Thread Standards for Federal Service	49 CFR 178.45(f)(5)(ii)
DOD AFTO 11A-1-47	1988	Department of Defense	Explosive Hazard Classification Procedures	49 CFR 173.56(b)(2)(i)
FedSpec RR-C-901D	2003	Department of Transportation	Cylinders, Compressed Gas: High Pressure, Steel DOT 3AA, and Aluminum Applications	49 CFR 173.302(b)(3)
RTCA 23-63	1963	Radio Technical Commission for Aeronautics	Standard Adjustment Criteria for Airborne Localizer and Glide Slope Receivers	14 CFR 91 App. A, 3(a)(1)

SNELL B-90	1998	Snell Memorial Foundation	Standard for Protective Headgear for Use in Bicycling	16 CFR 1203.53(a)(4)
SNELL B-95	1998	Snell Memorial Foundation	Standard for Protective Headgear for Use in Bicycling	16 CFR 1203.53(a)(7)
SRCC OG-300	2008	Solar Rating and Certification Corporation	Operating Guidelines and Minimum Standards for Certifying Solar Water Heating Systems	24 CFR 200.950(a)(1)
TPI	1985	Truss Plate Institute	Design Specifications for Metal Plate Connected Wood Trusses	24 CFR 3280.304(b)(1)
TTMA RP-61	1998	Truck Trailer Manufacturers Association	Performance of Manhole and/or Fill Opening Assemblies	49 CFR 180.405(g)(2)(i)
TTMA RP-81	1997	Truck Trailer Manufacturers Association	Performance of Spring Loaded Pressure Relief Valves	49 CFR 178.345-10(b)(3)(i)
TTMA RP-107	1998	Truck Trailer Manufacturers Association	Procedure for Testing In-Service Unmarked and/or Uncertified MC 306 and Non-ASME MC 312 Type Cargo Tank Manhole	49 CFR 180.405(g)(2)(i)
UL 17	1988	Underwriters Laboratories	Vent or Chimney Connector Dampers for Oil-Fired Appliances	10 CFR 440 Appendix A
UL 38	1993	Underwriters Laboratories	Standard for Manually Actuated Signaling Boxes for Use with Fire-Protective Signaling Systems	46 CFR 161.002-4(b)(1)
UL 44	2002	Underwriters Laboratories	Standard for Thermoset-Insulated Wire and Cable	46 CFR 110.10-1
UL 50	1995	Underwriters Laboratories	Standard for Enclosures for Electrical Equipment	46 CFR 111.81-1(d)
UL 62	1997	Underwriters Laboratories	Standard for Flexible Cord and Fixture Wire	46 CFR 110.10-1
UL 127	1996	Underwriters Laboratories	Factory-Built Fireplaces	24 CFR 3280
UL 142 (pdf) UL 142 (html)	1968	Underwriters Laboratories	Steel Above Ground Tanks for Flammable and Combustible Liquids	49 CFR 1910
UL 174	1989	Underwriters Laboratories	Household Electric Storage Tank Water Heaters	46 CFR 63.25-3(a)
UL 217	1993	Underwriters Laboratories	Single and Multiple Station Smoke Detectors	46 CFR 181.450(a)(1)
UL 486A	1990	Underwriters Laboratories	Wire Connections and Soldering Lugs for Use With Copper Conductors	46 CFR 175.600
UL 521	1993	Underwriters Laboratories	Heat Detectors for Fire Protective Signaling Systems	46 CFR 161.002-4(b)(1)
UL 727	1994	Underwriters Laboratories	Oil-Fired Central Furnaces	10 CFR 431.76(c)(1)
UL 746C	1995	Underwriters Laboratories	Polymeric Material--Use in Electrical Equipment Evaluations	16 CFR 1211.10(e)(2)
UL 913	1988	Underwriters Laboratories	Intrinsically Safe Apparatus and Associated Apparatus for Use in	46 CFR 111.105-11(a)

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UL 991	1995	Underwriters Laboratories	Tests for Safety-Related Controls Employing Solid-State Devices	16 CFR 1211.4(c)
UL 1042	1995	Underwriters Laboratories	Electric Baseboard Heating Equipment	24 CFR 3280.703
UL 1072	1995	Underwriters Laboratories	Standard for Medium-Voltage Power Cables	46 CFR 111.60-1(e)
UL 1096	1986	Underwriters Laboratories	Electrical Central Air Heating Equipment	24 CFR 3280.703
UL 1104	1983	Underwriters Laboratories	Standard for Marine Navigation Lights	46 CFR 120.420
UL 1426	1986	Underwriters Laboratories	Cables for Boats	33 CFR 183.435(a)(4)
UL 1570	1995	Underwriters Laboratories	Fluorescent Lighting Fixtures	46 CFR 183.410(d)
UL 1571	1995	Underwriters Laboratories	Incandescent Lighting Fixtures	46 CFR 111.75-20(e)
UL 1572	1995	Underwriters Laboratories	High Intensity Discharge Lighting Fixtures	46 CFR 120.410(d)
UL 1574	1995	Underwriters Laboratories	Track Lighting Systems	46 CFR 111.75-20(e)
UL 1995	1995	Underwriters Laboratories	Heating and Cooling Equipment, Second Edition, with 1999 revisions	24 CFR 3280.4
UN ECE	1996	United Nations Economic Commission of Europe	Uniform Provisions Concerning the Approval of Vehicles with Regard to the Installation of Lighting and Light-Signaling Devices	49 CFR 571.108
UN ESC	2009	United Nations Economic and Social Council	Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria	49 CFR 173.128(c)(3)
UN ESC	2005	United Nations Economic and Social Council	Recommendations on the Transport of Dangerous Goods	49 CFR 173.40(d)(2)
FAO 4	1995	UN Food and Agriculture Organization	Requirements for the Establishment of Pest-free Areas	7 CFR 319.56
IAEA Circular 225	1999	International Atomic Energy Agency	Physical Protection of Nuclear Material and Nuclear Facilities	10 CFR 110.44(b)(1)
IAEA TS-R-1	2009	International Atomic Energy Agency	Regulations for the Safe Transport of Radioactive Material	49 CFR 171.23
IMO Resolution A.264	1960	International Maritime Organization	Amendment to Chapter VI of the International Convention for the Safety of Life at Sea	46 CFR 172.015(a)(2)
IMO Resolution A.265	1973	International Maritime Organization	Carriage of Grain	46 CFR 170.135(a)
IMO Resolution A.342	1975	International Maritime Organization	Recommendations on Performance Standards for Automatic Pilots	33 CFR 164.13(d)(1)
IMO Resolution A.414	1979	International Maritime Organization	Code for Construction and Equipment of Mobile Offshore	33 CFR 143.207(c)

			Drilling Units	
IMO Resolution A.520	1983	International Maritime Organization	Code of Practice for the Evaluation, Testing and Acceptance of Prototype Novel Life-Saving Appliances and Arrangements	46 CFR 108.105(c)(1)
IMO Resolution A.525	1983	International Maritime Organization	Performance Standards for Narrow-band Direct Printing Telegraph Equipment for the Reception of Navigational and Meteorological Warnings	47 CFR 80.1101(c)(1)(i)
IMO Resolution A.601	1987	International Maritime Organization	Provision and Display of Manoeuvering Information on Board Ships	33 CFR 157.450
IMO Resolution A.649	1991	International Maritime Organization	Code for the Construction and Equipment of Mobile Offshore Drilling Units (MODU Code)	46 CFR 108.503
IMO Resolution A.654	1989	International Maritime Organization	Graphical Symbols for Fire Control Plans	46 CFR 109.563(a)(6)
IMO Resolution A.657	1989	International Maritime Organization	Instructions for Action in Survival Craft	46 CFR 160.151-21(v)(3)
IMO Resolution A.658	1989	International Maritime Organization	Use and Fitting of Retro-Reflective Materials on Life-Saving Appliances	46 CFR 108.645(a)(4)
IMO Resolution A.662	1989	International Maritime Organization	Performance Standards for Float-Free Release and Activation Arrangements for Emergency Radio Equipment	47 CFR 80.1101(c)(11)(ii)
IMO Resolution A.664	1989	International Maritime Organization	Performance Standards for Enhanced Group Call Equipment	47 CFR 80.1101(c)(10)
IMO Resolution A.688	1991	International Maritime Organization	Fire Test Procedures for Ignitability of Bedding Components	46 CFR 116.405(j)(2)
IMO Resolution A.689	1996	International Maritime Organization	Recommendation on Testing Life-Saving Appliances	46 CFR 160.151-21(f)
IMO Resolution A.694	1991	International Maritime Organization	General Requirements for Shipborne Radio Equipment Forming Part of the Global Maritime Distress and Safety System and for Electronic Navigational Aids	47 CFR 80.1101(b)(1)
IMO Resolution A.700	1991	International Maritime Organization	Performance Standards for Narrow-band Direct-printing Telegraph Equipment for the Reception of Navigational and Meteorological Warnings and Urgent Information to Ships	47 CFR 80.1101(c)(4)(iv)
IMO Resolution A.739	1993	International Maritime Organization	Guidelines for the Authorization of Organizations Acting on Behalf of the Administration	33 CFR 96.440(a)(12)
IMO Resolution A.741	1993	International Maritime Organization	International Management Code for the Safe Operation of Ships and for Pollution Prevention	33 CFR 96.220(b)
IMO Resolution A.744	1993	International Maritime Organization	Guidelines on the Enhanced Program of Inspections During Surveys of Bulk Carriers and Oil	33 CFR 157.430(a)

			Tankers	
IMO Resolution A.751	1994	International Maritime Organization	Interim Standards for Ship Manoeuverability	33 CFR 157.445(a)
IMO Resolution A.753	1993	International Maritime Organization	Guidelines for the Application of Plastic Pipe on Ships	46 CFR 56.60-25(a)
IMO Resolution A.760	1993	International Maritime Organization	Symbols Related to Life-Saving Appliances and Arrangements	46 CFR 108.646(a)
IMO Resolution A.788	1995	International Maritime Organization	Guidelines on Implementation of the International Safety Management (ISM) Code by Administrations	33 CFR 96.320(c)(2)
IMO Resolution A.802	1995	International Maritime Organization	Performance Standards for Survival Craft Radar Transponders for Use in Search and Rescue Operations	47 CFR 80.1101(c)(6)(i)
IMO Resolution A.803	1995	International Maritime Organization	Performance Standards for Shipborne VHF Radio Installations Capable of Voice Communication and Digital Selective Calling	47 CFR 80.1101(c)(2)(i)
IMO Resolution A.804	1995	International Maritime Organization	Performance Standards for Shipborne MF Radio Installations Capable of Voice Communication and Digital Selective Calling	47 CFR 80.1101(c)(3)(i)
IMO Resolution A.806	1995	International Maritime Organization	Performance Standards for Shipborne MF/HF Radio Installations Capable of Voice Communication, Narrow-Band Direct Printing and Digital Selective Calling	47 CFR 80.1101(c)(4)(i)
IMO Resolution A.807	1995	International Maritime Organization	Performance Standards for INMARSAT Standard-C Ship Earth Stations Capable of Transmitting and Receiving Direct-Printing Communications	47 CFR 80.1101(c)(9)
IMO Resolution A.808	1995	International Maritime Organization	Performance Standards for Ship Earth Stations Capable of Two-Way Communications	47 CFR 80.1101(c)(8)
IMO Resolution A.809	1995	International Maritime Organization	Performance Standards for Survival Craft Two-Way VHF Radiotelephone Apparatus	47 CFR 80.1101(c)(7)(i)
IMO Resolution A.810	1995	International Maritime Organization	Performance Standards for Float-free Satellite Emergency Position-Indicating Radio Beacons (EPIRBs) Operating on 406 MHz	47 CFR 80.1101(c)(5)(i)
IMO Resolution A.812	1995	International Maritime Organization	Performance Standards for Float-Free Satellite EPIRBs Operating Through the Geostationary INMARSAT Satellite System on 1.6 GHz	47 CFR 80.1101(c)(11)(i)
USEC 651	1995	United States Enrichment Corporation	Good Handling Practices for Uranium Hexafluoride	49 CFR 173.417(a)(3)(i)
USPHS 934	1962	U.S. Public Health Service	Food Service Sanitation Ordinance and Code	29 CFR 1910.142(i)(1)

USPHS 956	1962	U.S. Public Health Service	Drinking Water Standards	46 CFR 160.026-4(a)
USPHS 934	1962	U.S. Public Health Service	Food Service Sanitation Ordinance and Code	29 CFR 1910.142(i)(1)
USPHS 9	2003	U.S. Public Health Service	The Ships Medicine Chest and Medical Aid at Sea	33 CFR 143.405(a)(15)
WCLIB R17	2004	West Coast Lumber Inspection Bureau	Grading Rules for West Coast Lumber	7 CFR 1728.201(f)(1)(i)
WHO	1973	World Health Organization	Laboratory Techniques in Rabies	9 CFR 113.209(d)(3)
WIPO ST.25	2001	World Intellectual Property Organization	Handbook on Industrial Property Information and Documentation	37 CFR 1.821(a)(1)
WQA S-100	1985	Water Quality Association	Water Softeners	24 CFR 200, Subpart S
WQA S-200	1988	Water Quality Association	Water Filters	24 CFR 200, Subpart S
WQA S-300	1984	Water Quality Association	Point-of-Use, Low Pressure Reverse Osmosis Drinking Water Systems	24 CFR 200, Subpart S
WQA S-400	1986	Water Quality Association	Point-of-Use Distillation Drinking Water Systems	24 CFR 200, Subpart S
WSTDA T-1	2005	Web Sling and Tiedown Association	Recommended Standard Specification for Synthetic Web Tiedowns	49 CFR 393.104(e)(3)

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EXHIBIT 3

PREAMBLE—NOT PART OF THE SPECIFICATION

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- This specification has been incorporated by reference into federal law by the Consumer Product Safety Commission as part of the Safety Standard for Toy Safety (15 USC 2056b).
- Public.Resource.Org has made no changes to this specification. Any errors in the transformation of this specification should be reported to Public.Resource.Org.
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- Users may wish to modify this file. In particular, the header section calls the MathJax library and users may wish to use native MathML instead. There are also two calls to Google Fonts and one to our own external style sheet.
- Internal IDs have been assigned to each clause and section (e.g., s3.1), figure ("f1"), table ("t1"), and equation ("eq1").
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END OF PREAMBLE—NOT PART OF THE SPECIFICATION

Designation: F963 - 11 An American National Standard

Standard Consumer Safety Specification for Toy Safety[1]

This standard is issued under the fixed designation F963; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

[1] This consumer safety specification is under the jurisdiction of ASTM Committee F15 on Consumer Products and is the direct responsibility of Subcommittee F15.22 on Toy Safety.

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INTRODUCTION

The purpose of this consumer safety specification is to establish nationally recognized safety requirements for toys. Although this specification will not eliminate the need for the exercise of parental responsibility in selecting toys appropriate to the age of a child, or parental supervision in situations in which children of various ages may have access to the same toys, its application will minimize accidents in the normal, intended use and reasonably foreseeable abuse of the toys covered by this specification. This specification was developed originally as a Voluntary Product Standard under the auspices of the National Bureau of Standards, Department of Commerce, and published in 1976 (PS 72-76). The present revision is intended to update the safety requirements to include the following by reference: published federal mandatory requirements, relevant voluntary standards, certain new requirements for addressing potential hazards, and several technical revisions based on producer experience with the original standard.

1. Scope

1.1 This specification[2] relates to possible hazards that may not be recognized readily by the public and that may be encountered in the normal use for which a toy is intended or after reasonably foreseeable abuse. It does not purport to cover every conceivable hazard of a particular toy. This specification does not cover product performance or quality, except as related to safety. Except for the labeling requirements pointing out the functional hazards and age range for which the toy is intended, this specification has no requirements for those aspects of a toy that present an inherent and recognized hazard as part of the function of the toy. Such an example is a sharp point necessary for the function of a needle. The needle is an inherent hazard that is well understood by the purchaser of a toy sewing kit, and this hazard is communicated to the user as part of the normal educational process.

[2] Toy Industry Association, Inc. (TIA) sometimes provides its interpretations of this specification through its counsel as a service to its members and others. The TIA's interpretations are not reviewed or

approved by ASTM and should be viewed as TIA's alone.

1.2 On the other hand, while a riding toy has inherent hazards associated with its use (for example, falling off onto the sidewalk), the possible hazards associated with its construction (sharp edges, exposed mechanisms, etc.) will be minimized by the application of this specification.

1.3 This specification covers requirements and contains test methods for toys intended for use by children under 14 years of age. Different age limits for various requirements will be found in this specification. These limits reflect the nature of the hazards and expected mental or physical ability, or both, of a child to cope with the hazards.

1.4 Articles not covered by this specification are as follows:

- Bicycles
- Tricycles
- Non-Powered Scooters (see Consumer Safety Specification F2264)
- Recreational Powered Scooters and Pocket Bikes (see Consumer Safety Specification F2641)
- Sling shots and sharp-pointed darts
- Playground equipment
- Non-powder guns
- Kites
- Hobby and craft items in which the finished item is not primarily of play value
- Model kits in which the finished item is not primarily of play value
- Crayons, paints, chalks, and other similar art materials in which the material itself or the finished item is not primarily of play value, except that all art materials, whether or not a component of a toy, must comply with LHAMA, in accordance with 4.29.1-4.29.3.
- Toy Chests
- Sporting goods, camping goods, athletic equipment, musical instruments, juvenile products, and furniture; however, toys that are their counterparts are covered. (It is recognized that there is often a

fine line between, for example, a musical instrument or a sporting item and its toy counterpart. The intention of the producer or distributor, as well as normal use and reasonably foreseeable abuse, determines whether the item is a toy counterpart.)

- Powered models of aircraft, rockets, boats, and land vehicles; however, toys that are their counterparts are covered.
- Constant air inflatables

1.5 General guidelines for age labeling toys and toy packaging are contained in Annex A1.

1.6 Information regarding packaging and shipping is contained in Annex A2.

1.7 This consumer safety specification includes the following sections:

[See Table of Contents]

1.8 The values stated first are to be regarded as the standard. The values given in parentheses are for information only.

1.9 The following precautionary statement pertains only to the test methods portion, Section 8, of this specification: *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:* [3]

- D374 Test Methods for Thickness of Solid Electrical Insulation
- D642 Test Method for Determining Compressive Resistance of Shipping Containers, Components, and Unit Loads
- D880 Test Method for Impact Testing for Shipping Containers and Systems
- D999 Test Methods for Vibration Testing of Shipping Containers
- D1193 Specification for Reagent Water
- D2240 Test Method for Rubber Property—Durometer Hardness

- D3421 Practice for Extraction and Determination of Plasticizer Mixtures from Vinyl Chloride Plastics4
- D4236 Practice for Labeling Art Materials for Chronic Health Hazards

- D5276 Test Method for Drop Test of Loaded Containers by Free Fall
- F404 Consumer Safety Specification for High Chairs
- F406 Consumer Safety Specification for Non-Full-Size Baby Cribs/Play Yards
- F834 Consumer Safety Specification for Toy Chests
- F1313 Specification for Volatile ***N***-Nitrosamine Levels in Rubber Nipples on Pacifiers
- F1148 Consumer Safety Performance Specification for Home Playground Equipment
- F2264 Consumer Safety Specification for Non-Powered Scooters
- F2641 Consumer Safety Specification for Recreational Powered Scooters and Pocket Bikes
- F2853 Test Method for Determination of Lead in Paint Layers and Similar Coatings or in Substrates and Homogenous Materials by Energy Dispersive X-Ray Fluorescence Spectrometry Using Multiple Monochromatic Excitation Beams
- F2923 Specification for Consumer Product Safety for Children's Jewelry

[3] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

Withdrawn. The last approved version of this historical standard is referenced on www.astm.org.

2.2 *ANSI Standards:*

- C18.1 American National Standard for Dry Cells and Batteries—Specifications
- S1.4 Specification for Sound Level Meters

Z315.1 Safety Requirements for Tricycles

Electronic copy available from American National Standards Institute website: www.ansi.org; hard copies from Global Engineering Documents, 15 Inverness Way East, Englewood, CO 80112.

2.3 *European Standards:*

- EN 71-1 Safety of toys - Part 1: Mechanical and physical properties
- EN 71-3 Safety of toys - Part 3: Migration of certain elements

Available from European Committee for Standardization (CEN), Avenue Marnix 17, B-1000, Brussels, Belgium, http://www.cen.eu.

2.4 *Federal Standards:*

- 15 CFR 1150 Marking of Toys, Look-Alike and Imitation Firearms
- 16 CFR 1303 Ban of Lead-Containing Paint and Certain Consumer Products Bearing Lead Containing Paint
- 16 CFR 1500 Hazardous Substances Act Regulations, including the following sections:
    - 16 CFR 1500.3 (c) (6) (vi) Definition of “flammable solid”
    - 16 CFR 1500.14 Products requiring special labeling under section 3(b) of the act
    - 16 CFR 1500.18 Banned toys and other banned articles intended for use by children
    - 16 CFR 1500.19 Misbranded toys and other articles intended for use by children
    - 16 CFR 1500.44 Method for determining extremely flammable and flammable solids
    - 16 CFR 1500.47 Method for determining the sound pressure level produced by toy caps
    - 16 CFR 1500.48 Technical requirements for determining a sharp point in toys and other articles intended for use by children under 8 years of age
    - 16 CFR 1500.49 Technical requirements for determining a sharp metal or glass edge in toys and other articles intended for use

by children under 8 years of age

- 16 CFR 1500.50-1500.53 Test method for simulating use and abuse of toys and other articles intended for use by children
- 16 CFR 1500.83 Exemptions for small packages, minor hazards, and special circumstances
- 16 CFR 1500.85 Exemptions from classification as banned hazardous substances
- 16 CFR 1500.86 Exemptions from classification as a banned toy or other banned article for use by children
- 16 CFR 1500.87 Children's products containing lead: inaccessible component parts
- 16 CFR 1500.88 Exemptions from lead limits under section 101 of the Consumer Product Safety Improvement Act for certain electronic devices
- 16 CFR 1500.91 Determinations regarding lead content for certain materials or products under section 101 of the Consumer Product Safety Improvement Act

- 16 CFR 1501 Method for Identifying Toys and Other Articles Intended for Use by Children Under 3 Years of Age which Present Choking, Aspiration, or Ingestion Hazards Because of Small Parts
- 16 CFR 1505 Requirements for Electrically Operated Toys or Other Electrically Operated Articles Intended for Use by Children
- 16 CFR 1510 Requirements for Rattles
- 16 CFR 1511 Requirements for Pacifiers
- 16 CFR 1610 Standard for Flammability of Clothing Textiles
- 21 CFR 110 Current Good Manufacturing Practice in Manufacturing, Processing, Packaging, or Holding Human Food
- 21 CFR 170-189 Food for Human Consumption
- 21 CFR 700-740 Requirements for Specific Cosmetic Products
- 21 CFR 73, 74, 81, 82 Color Additives
- 49 CFR 173.100, 109 Definition of Class C Explosives

- CPSC-CH-E1001-08.1 Standard Operating Procedure for Determining Total Lead (Pb) in Metal Children's Products (including Children's Metal Jewelry)
- CPSC-CH-E1002-08.1 Standard Operating Procedure for Determining Total Lead (Pb) in Non-Metal Children's Products
- CPSC-CH-E1003-09 Standard Operating Procedure for Determining Lead (Pb) in Paint and Other Similar Surface Coatings
- CPSC-CH-E1004-11 Standard Operating Procedure for Determining Cadmium (Cd) Extractability from Children's Metal Jewelry

- SS-T-312B Tile, Floor: Asphalt, Rubber, Vinyl, VinylAsbestos
- Voluntary Product Standard PS 72-76 Toy Safety[10]

Available from U.S. Consumer Product Safety Commission website: www.cpsc.gov or U.S. Government Printing Office, Superintendent of Documents; P.O. Box 371954, Pittsburgh, PA 15250-7954; website: www.gpo.gov

Available from U.S. Consumer Product Safety Commission (CPSC), 4330 East West Hwy., Bethesda, MD 20814, http://www.cpsc.gov.

Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, http:// www.access.gpo.gov.

[10] Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, http:// www.access.gpo.gov.

2.5 *ISO and IEC Standards:* [11]

- ISO 3696 Water for analytical laboratory use — Specification and test methods
- ISO 3746:1995 Acoustics—Determination of Sound Power Levels of Noise Sources Using Sound Pressure—Survey Method Using an Enveloping Measurement Surface Over a Reflecting Plane
- ISO 7779 Acoustics–Measurement of Airborne Noise Emitted by Computer and Business Equipment
- ISO 8124-1 Safety of toys – Part 1: Safety aspects related to mechanical and physical properties

- ISO 8124-3 Safety of toys – Part 3: Migration of certain elements
- ISO 11202 Acoustics—Noise Emitted by Machinery and Equipment—Measurement of Emission Sound Pressure Levels at a Work Station and at Other Specified Positions—Survey Method in situ
- ISO 11204 Acoustics—Noise Emitted by Machinery and Equipment—Measurement of Emission Sound Pressure Levels at a Work Station and at Other Specified Positions—Method Requiring Environmental Corrections
- IEC 60086–2 Primary Batteries: Physical and Electrical Specifications
- IEC 61672-1 Electroacoustics—Sound Level Meters—Part 1: Specifications
- IEC 61672-2 Electroacoustics—Sound Level Meters—Part 2: Pattern Evaluation Tests

[11] Available from International Organization for Standardization (ISO), 1 rue de Varembé, Case postale 56, CH-1211, Geneva 20, Switzerland, http://www.iso.ch.

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *A-weighted sound pressure level (L_{pA})*— the sound pressure level obtained by using standardized A-weighting.

Figure 1. Accessibility Probes This is an architectural diagram for the probe. It is in the shape of a cylinder with a handle on the right. There are two sets of dimensions. Probe A is for children 0-36 months. Probe B is for children 37-96 months. We start with probe A. The handle is (a) and has a spherical radius of 0.110 inches. The length of the handle is (e) and is 1.731 inches. The handle is marked in 3 equal lengths of .577 inches each marked (d). The Thickness of the handle is .220 inches and is (b). The diameter of the cylinder, the main part of the probe is (c) and is 1.020 inches. The bottom of the cylinder, where the handle connects, is called the collar. The overall length of the cylinder plus the handle is 24 inches typically. 4 inches up from the base of the cylinder (near the handle) is an embedded screw-like device with the label 3/8-16 NC - 2B THD (TYP). The distance from this point to the far end of the cylinder is g and is 18 9/32 inches. For Probe B, the same labels are used but the values are (a) .170 (b) .340 (c) 1.510 (d) .760 (e) 2.280 and (g) 17 25/32. The table of measures has a parameter (f) which is 1

for Probe A and 1 1/2 for Probe B, but there is no marking for (f) on the diagram. ~ 24 g d 4 (TYP) d d e c b f EXTENSION 3/8 - 16 NC-2B THD (TYP) (a) SPHERICALRADIUS COLLAR a b c d e f g 2.280 1.731 1 11/2 18 9/32 17 25/32 .577 .760 1.020 1.510 .220 .340 .110 .170 ALL DIMENSIONS IN INCHES PROBE A PROBE B (CHILDREN 0-36 MONTHS INCL) (" 37-96 " ")

FIG. 1 Accessibility Probes

3.1.2 *accessible*— (part or component) describing any area of the toy that can be contacted by any portion forward of the collar of the accessibility probe as described in 16 CFR 1500.48 and 16 CFR 1500.49. (See Fig. 1.)

NOTE 1 — Dimensions are provided in Fig. 1 for two probes corresponding to two age ranges of children.

3.1.3 *alkaline battery*— a non-rechargeable dry cell battery with an alkaline manganese electrochemistry.

3.1.4 *aquatic toy*— an article, whether inflatable or not, intended to bear the mass of a child and used as an instrument of play in shallow water. This does not include bath toys, beach balls, and United States Coast Guard-approved life saving devices.

3.1.5 *art material*— any substance marketed or represented by the producer or repackager as suitable for use in any phase of the creation of any work of visual or graphic art of any medium. This definition includes items that become a component of the work of art such as paint, canvas, inks, crayons, chalk, solder, brazing rods, flux, paper, clay, stone, thread, cloth, and photographic film. It also includes items that are associated closely with the creation of the final work of art such as brushes, brush cleaners, solvents, ceramic kilns, silk screens, molds, mold making material, and photographic developing chemicals.

3.1.6 *ball*— any spherical, ovoid, or ellipsoidal object that is designed or intended to be thrown, hit, kicked, rolled, dropped, or bounced. The term “ball” includes any spherical, ovoid, or ellipsoidal object that is attached to a toy or article by means of string, elastic cord, or similar tether. The term “ball” also includes any multisided object formed by connecting planes into a generally spherical ovoid, or ellipsoidal shape that is designated or intended to be used as a ball. The term “ball” does not include dice, or balls permanently enclosed inside pinball machines, mazes, or similar outer containers. A ball is permanently enclosed if, when tested in accordance with 16 CFR 1500.53, it is not removed from the outer container.

3.1.7 *base material*— material upon which coatings may be formed or deposited.

3.1.8 *battery-operated toy*— toy having at least one function dependent on electricity and powered by batteries.

3.1.9 *burr*— a roughness that may be found at an edge or joint of a toy or component if the material is not severed or finished cleanly.

3.1.10 *button cell battery*— a battery having a diameter greater than its height.

3.1.11 *C-weighted peak sound pressure level (L_{Cpeak})*— the peak sound pressure level obtained when using standardized C-weighting.

3.1.12 *close-to-the-ear toy*— a toy that is intended to be used close to the ear, that is, the sound emitting part of such a toy is normally put against the ear of a child (example—toy telephones that emit sounds from the earpiece).

3.1.13 *coating*— all layers of material formed or deposited on the base material or toy and includes paints, varnishes, lacquers, or other substances of a similar nature, whether they contain metallic particles or not, which can be removed by scraping with a sharp blade as defined under 16 CFR 1303, et seq.

3.1.14 *collapse*— sudden or unexpected folding of a structure.

3.1.15 *compression spring*— spring which essentially returns to its initial state after compression.

3.1.16 *constant air inflatables*— structure relying on a continuous supply of air pressure supplied from one or more electrical blowers to maintain its shape, typically made of flexible fabric and designed for children's use that may include but not be limited to the following activities: bounce, climb, slide, or interactive play.

3.1.17 *continuous sound*— any steady-state sound or group of variable sounds greater than one second in duration.

3.1.18 *cord*— a length of slender, flexible material including monofilaments, woven and twisted cord, rope, plastic textile tapes, ribbon, and those fibrous materials commonly called string.

3.1.19 *cosmetics*— any article intended or likely to be rubbed, sprinkled, or

sprayed on, introduced onto, or otherwise applied to the human body for cleansing, beautifying, promoting or enhancing attractiveness, or for altering appearance.

3.1.20 *crushing*— injury to part of the body resulting from compression between two rigid surfaces.

3.1.21 *curled edge*— an edge in which the portion of the sheet adjacent to the edge is bent into an arc and forms an angle of less than 90° with the base sheet, as shown in Fig. 2.

Figure 2. Curled Edge A line goes from the right to left. On the left, the line curls up and over to the right, forming a non-closed loop. A dotted line goes from the end of the loop down to the line, thus forming an angle, and it marked "Less than 90 degrees." LESS THAN 90°

FIG. 2 Curled Edge

3.1.22 *detection limit of a method*— three times the standard deviation of the blank value.

3.1.23 *discharge mechanism*— an inanimate system for releasing and propelling a projectile.

3.1.24 *driving mechanism*— assembly of linked parts or components (for example, gears, belts, winding mechanisms), at least one of which moves, powered by a source (for example, electrical or mechanical means) independent of the child.

3.1.25 *edge, hazardous*— an accessible edge that presents an unreasonable risk of injury during the normal use and reasonably foreseeable abuse of a toy. Metal and glass edges on toys intended for children under the age of eight years are defined as potentially hazardous if they fail the sharp edge test described in 16 CFR 1500.49. Edges other than metal and glass are defined as potentially hazardous if they are sharp to the touch under casual handling conditions.

3.1.26 *elastic*— material that will recover its former size and shape essentially and instantaneously after being elongated at least 10 % at a testing speed of not less than 20 in. (510 mm)/min.

3.1.27 *equivalent sound pressure level (L_{Aeq})*— the level of a steady-state sound which, in a stated time period and at a stated location, has the same A-weighted sound energy as the time-varying sound.

3.1.28 *explosive action*— the sudden release of energy characterized by the rapid expansion or bursting of a material.

3.1.29 *extension spring*— spring which essentially returns to its initial state after tension.

3.1.30 *fastener*— mechanical device which attaches two or more elements together (for example, screws, rivets, and staples).

3.1.31 *feathering*— the beveling of an edge (or decrease in thickness moving toward the edge) caused during the shearing or cutting of material.

3.1.32 *flash*— excess material that escapes between the mating parts of a mold assembly.

3.1.33 *folding mechanism*— an assembly of hinged, pivoted, folding, or sliding members that can produce a crushing, scissoring, pinching, or shearing action during operation.

3.1.34 *fuzz*— bits of fibrous-type material that can be readily removed from toys with a pile surface.

3.1.35 *hand-held toy*— a toy that is intended to be used or operated while being held in the hand. Examples include toy tools, small electronic games, stuffed animals, dolls, musical toys, and cap-firing toys.

3.1.36 *hazard*— any characteristic of a toy that presents an unreasonable risk of injury or illness during normal use or as a result of reasonably foreseeable abuse.

3.1.37 *hazardous magnet*— a magnet which has a flux index >50 (refer to test method in 8.24.1) and which is a small object (refer to 4.6 and Fig. 3).

Figure 3. Small Parts Cylinder Two perspectives of the hollow cylinder are shown. From the top, there is an inner diameter of 1.25 inches. From the side, there is an angled bottom. On the left side, the open part of cylinder goes down 1 inch. On the right side, it goes down 2.25 inches. 1.00 in25.4 mm 2.25 in57.1 mm 1.25 in31.7 mm A A

FIG. 3 Small Parts Cylinder

3.1.38 *hazardous magnet component*— any part of a toy that is a small object (refer to 4.6 and Fig. 3) and which contains an attached or imbedded magnet which has a flux index >50 as determined in accordance with the test method in 8.24.1.

3.1.39 *helical spring*— spring in the form of a coil.

3.1.40 *hemmed edge*— an edge in which the portion of the sheet adjacent to the edge is folded back on the sheet itself through an angle of approximately 180°, so that the portion of the sheet adjacent to the edge is approximately parallel to the main sheet, as shown in Fig. 4.

Figure 4. Hemmed Edge A line goes from left to right. On the left side, it curls in half-circle and then heads back a little ways towards the right. It resembles a hook.

FIG. 4 Hemmed Edge

3.1.41 *hinge-line clearance*— the distance between the stationary portion of a toy and the movable portion along, or adjacent to, a line projected through the axis of rotation, shown as Dimension A in Fig. 5.

Figure 5. Changing Clearance at Hinge Line This diagram shows 3 views of a hinge. The first is the back of a toy, which has a width with label 1. The hinge is narrower than 1, connecting the top to the bottom. The two other diagrams are the hinge mechanism closed and open. The top part of the hinge and the part of the toy that is connected to the top part of the toy are all labelled 2. The bottom part of the hinge and the bottom part of the toy are all labeled 3. Key 1 Hinge line2 Lid3 Box l = Hinge-line clearance 1 2 l l 3

FIG. 5 Changing Clearance at Hinge Line

3.1.42 *impulsive sound*— any sound that is characterized by a brief excursion of sound pressure significantly exceeding the ambient noise, typically less than one second in duration.

3.1.43 *juvenile products*— consumer products designed or intended primarily for use by children which are not used primarily for play. These include, but are not limited to, items such as bassinets/cradles, bath seats, infant bath tubs, carriages and strollers, changing tables, full size cribs, gates and enclosures, handheld infant carriers, high chairs, infant bouncers, infant swings, play yards/non-full size cribs, portable bed rails, portable hook-on chairs, soft infant carriers, stationary activity centers, toddler beds and walkers.

3.1.44 *lap joint*— a joint in which an edge overlaps a parallel surface but is not necessarily attached to it mechanically at all points along the length, as in the examples shown in Fig. 6.

Figure 6. Typical Lap Joints There are four diagrams of typical lap joints. The first is two lines that are parallel and overlap. The second is two lines that

are at an angle and overlap at the end. The third is a square with a line and the two overlap a bit at the top. The third is a loop that overlaps at the ends.

FIG. 6 Typical Lap Joints

3.1.45 *large and bulky toy*— toy that has a projected base area of more than 400 in.^{2} (0.26 m^2) or a volume of more than 3 ft^3 (0.08 m^3) calculated without regard to minor appendages.

NOTE 2 — The base area for toys having permanently attached legs is measured by calculating the area enclosed by straight lines connecting the outermost edge of each leg of the perimeter.

3.1.46 *latex balloon*— any toy or decorative item consisting of a latex bag that is designed to be inflated by air or gas. The term does not include inflatable children's toys that are used in aquatic activities such as rafts, water wings, swim rings, or other similar items.

3.1.47 *marble*— a sphere made of a hard material, such as glass, agate, marble, or plastic, that is used in various children's games, generally as a playing piece or marker. The term "marble" does not include a marble permanently enclosed in a toy or game. A marble is permanently enclosed if, when tested in accordance with 16 CFR 1500.53, it is not removed from the toy or game.

3.1.48 *materials intended to leave a trace*— graphite material in pencils, liquid in pens, and similar substances.

3.1.49 *maximum A-weighted sound pressure level (L_{AFmax})*— the maximum sound pressure level obtained when using standardized A-weighting and fast detector response (time-weighting).

3.1.50 *non-replaceable battery*— an electrochemical device that will not require user accessibility or user replacement for the expected life of the product or devices it is intended to power. Such batteries will not be accessible when tested in accordance with the normal use and, where appropriate, reasonably foreseeable abuse tests of 8.6 through 8.10.

3.1.51 *normal use*— play modes that conform to the instructions accompanying the toy, that have been established by tradition or custom, or that are evident from an examination of the toy.

3.1.52 *other materials, whether mass colored or not*— materials such as wood, leather, and other porous substances which may absorb coloring matter without forming a coating.

3.1.53 *packaging*— material accompanying the toy when purchased, but having no intended play function.

3.1.54 *peak sound pressure level (L_{Cpk})*— the greatest C-weighted instantaneous sound pressure level within the period of observation.

3.1.55 *pinching*— created when two moving or one moving and one fixed surface come together in such a way that they could entrap and compress flesh, usually resulting in a contusion or laceration.

3.1.56 *point, hazardous*— an accessible point that presents an unreasonable risk of injury during normal use or reasonably foreseeable abuse. Points on toys intended for children under the age of 8 years are potentially hazardous if they fail the sharp point test described in 16 CFR 1500.48.

3.1.57 *pompom*— lengths or strands of fiber, yarns, or threads clamped or secured and tied in the center, and brushed up to form a spherical shape. Also included are sphericalshaped attachments made of stuffed material.

3.1.58 *principal display panel*— the display panel for a retail package or container, bin, or vending machine that is most likely to be displayed, shown, presented, or examined under normal or customary conditions of display for retail sale.

3.1.59 *projectile*— an object propelled by means of a discharge mechanism capable of storing and releasing energy under the control of the operator.

3.1.60 *projection, hazardous*— a projection that, because of its material or configuration, or both, may present a puncture hazard if a child should fall onto it. Excluded from this definition are puncture hazards to the eyes or mouth, or both, because of the impossibility of eliminating puncture hazards to those areas of the body by product design.

3.1.61 *protective cap or cover*— a component that is attached to a potentially hazardous edge or projection to reduce the possibility of injury.

3.1.62 *protective tip*— a component that is attached to the impacting end of a projectile to minimize injury if it should impact on the body, and also to prevent damage to the projectile upon striking a target, provide a means of attaching the projectile to the target as in the case of suction cups, or prevent damage to inanimate objects.

3.1.63 *rattle*— a toy that is clearly designed to emit sound when shaken

typically intended for children under 18 months.

3.1.64 *reasonably foreseeable abuse*— conditions to which a child may subject a toy that are not normal use conditions, such as deliberate disassembly, dropping, or using the toy for a purpose for which it was not intended. Simulated use and abuse tests for toys are given in 16 CFR 1500.50-16 CFR 1500.53 (excluding the bite test, Paragraph (c), of each section).

3.1.65 *reference box*— a hypothetical surface which is the smallest rectangular parallelepiped that encloses the toy without regard to minor appendages.

3.1.66 *rigid*— any material having a hardness exceeding 70 Shore A scale durometer, as measured by the latest revision of Test Method D2240.

3.1.67 *rolled edge*— an edge in which the portion of the sheet adjacent to the edge is bent into an arc and forms an angle between 90 and 120° with the main sheet, as shown in Fig. 7.

Figure 7. Rolled Edge A line goes from right to left and at the left curls over to the right and down. A label indicates that the angle is 90 degrees to 120 degrees. 90° - 120°

FIG. 7 Rolled Edge

3.1.68 *scraping*— mechanical removal of coatings down to the base material without damaging the substrate material.

3.1.69 *simulated protective equipment*— toys designed to mimic products that infer some sort of physical protection to the wearer (for example, protective helmets and visors).

3.1.70 *soft-filled toy/stuffed toy*— toy, clothed or unclothed, with soft body surfaces and filled with soft materials, allowing compression of the torso readily with the hand.

3.1.71 *splinter*— sharp pointed fragment.

3.1.72 *spiral spring*— clockwork-type spring.

3.1.73 *squeeze toy*— a handheld pliable toy, intended for children under the age of 18 months, usually incorporating a noise-making feature activated by forcing air through an opening when flexed or squeezed, and which recovers to its original shape when released.

3.1.74 *steady-state sound (noise)*— noise in which there are negligibly small fluctuations of sound pressure level within the period of observation.

3.1.75 *strap*— a piece of flexible material in which the width is significantly greater than the thickness.

3.1.76 *substrate material*— all of the accessible materials present in toys, other than paint or similar surface coatings.

3.1.77 *tabletop, floor, and crib toy*— toys intended to be played with while attached to or resting on a table top, floor, or crib. Examples of such toys include, but are not limited to, toy vehicles, stacking toys, large and bulky toys, games, and activity toys that attach to crib rails.

3.1.78 *tangle or form a loop*— loops that are formed by reasonably foreseeable manipulation of the cord/strap/elastic. Loops that are formed by excessive or intricate manipulations, or both, of the cord/strap/elastic shall be considered as exempt.

3.1.79 *teether*— toy designed for oral use and intended primarily for symptomatic relief of teething discomfort.

3.1.80 *tool*— screwdriver, coin, or other object which may be used to operate a screw, clip, or similar fixing device.

3.1.81 *toy*— any object designed, manufactured, or marketed as a plaything for children under 14 years of age.

3.1.82 *toy chest*— toy boxes that are designed and marketed as storage containers for toys. The products subject to the requirements are those with a volume of 1.1 ft^3 (0.031 m^3) or more.

3.1.83 *toy seat*— a stationary toy product with a seat where the amusement of the child is a primary function of the product and the play pattern intends that the child be in a seated position.

3.1.83.1 *Discussion*— Play features may include, but are not limited to, sliding or rotating features, learning toys, manually actuated music etc. with which the seated child may interact. Children's furniture products without any interactive play features such as stools, chairs, patio sets, rocking chairs, picnic tables, storage units etc. are not considered toy seats. In addition, juvenile products such as bouncers, infant seats, stationary activity centers etc. are not considered toy seats.

3.1.84 *yo yo elastic tether toy*— a toy consisting of an elastic tether that usually contains a loop on one end to wear around the finger, and a flexible object on the other end intended to be thrown and returned to the hand.

4. Safety Requirements

4.1 *Material Quality*— Toys may be made from new or reprocessed materials and shall be visually clean and free from infestation. The materials shall be assessed visually by the unaided eye rather than under magnification. If reprocessed materials are used, they must be refined so that the level of hazardous substances conforms to the requirements of 4.3.1.

4.2 *Flammability*— Materials other than textiles (excluding paper) used in toys shall not be flammable, as defined under 3 (c) (6) (vi) under the Federal Hazardous Substances Act (FHSA) (see 16 CFR 1500). For testing purposes, any textile fabrics used in toys shall comply with 16 CFR 1610. A test procedure for testing flammability of toys, which is an interpretation of 16 CFR 1500.44, is contained in Annex A5. A procedure for testing the flammability of fabrics is contained in Annex A6.

4.3 Toxicology

4.3.1 *Hazardous Substances*— Toys or materials used in toys shall conform to the FHSA and to the regulations promulgated under that act. Exemptions to this act for certain types of toys are given in 16 CFR 1500.85. The regulations define limits for substances that are toxic, corrosive, an irritant, sensitizer or pressure generating, and radioactive, flammable, and combustible materials. Testing references for hazardous substance content are given in 8.2. It should be noted that specific states may have hazardous substances regulations that are more restrictive than the Federal regulations.

4.3.2 *Manufacturing and Packaging of Food*— All food products supplied with toys shall be manufactured and packaged in compliance with 21 CFR 110, which is concerned with the sanitation practices for the manufacture, processing, packaging, or holding of human food.

4.3.3 *Indirect Food Additives*— Toy components intended to be used in contact with food, such as toy cooking utensils, shall conform to the applicable requirements of the Food, Drug and Cosmetic Act (FDCA), specifically 21 CFR 170 through 189.

4.3.3.1 *Toys in Contact with Food*— Toys comprising components intended to be used in contact with food, such as toy cooking utensils and toy tableware

shall meet the requirements of 6.7 for instructional literature.

4.3.3.2 *Ceramicware, Lead, and Cadmium Contamination*— Ceramic toy components intended or likely to hold food, such as a porcelain tea set, shall conform to the applicable requirements of the FDCA, Section 402 (a) (2) (c), and FDA Compliance Policy Guides.

4.3.4 *Cosmetics*— Cosmetics shall conform to the requirements of the Federal FDCA as codified in 21 CFR. The regulations applicable to cosmetics are stated in 21 CFR 700 through 740. The color additive regulations applicable to cosmetics are found in 21 CFR 73, 74, 81, and 82.

4.3.4.1 In addition, cosmetics intended for use by children under 8 years of age shall meet all requirements of this specification and the FHSA regulations, notwithstanding the exclusions of 16 CFR 1500.81 and 16 CFR 1500.3 (b) (4) (ii).

4.3.4.2 The requirements from the Food and Drug Administration (FDA) will therefore be additive to those existing for children's products.

4.3.5 *Heavy Elements*:

4.3.5.1 *Paint and Similar Surface-Coating Materials*— Paint and other similar surface-coating materials applied to toys shall comply with the lead content provisions of 16 CFR 1303, issued under the Consumer Product Safety Act (CPSA), as amended by the Consumer Product Safety Improvement Act of 2008 (CPSIA).

1. This regulation prohibits the use of paints or similar surface-coating materials that contain lead or lead compounds and in which the lead content (calculated as lead metal [Pb]) is in excess of 0.009 % (90 ppm) of the weight of the total nonvolatile content of the paint or the weight of the dried paint film.

2. In addition, surface-coating materials shall not contain compounds of antimony, arsenic, barium, cadmium, chromium. lead, mercury. or selenium, of which the metal content of the soluble material is in excess of the levels by weight of the contained solids (including pigments, film solids, and driers) given in Table 1. The analytical results obtained should be adjusted in accordance with the test method in 8.3.4.3 prior to comparing them to the values in Table 1. To determine conformance, the soluble level shall be determined by dissolving the contained solids (dried film including pigments, film solids, and driers) as specified in 8.3.2.

4.3.5.2 *Toy Substrate Materials*— These requirements are designed to reduce children's exposure to heavy elements contained in accessible toy substrate materials. (For requirements for surface coating materials, see 4.3.5.1.)

1. *Scope*—This section specifies requirements and test methods for total lead and the migration of antimony, arsenic, lead, barium, cadmium, chromium, mercury and selenium in accessible substrate materials. Accessible glass, metal and ceramic toys or parts of toys, that are small parts (that is, that fit into the test fixture specified at 16 CFR 1501 (see Fig. 3), are also subject to this requirement.

    a. Accessibility of parts shall be determined as defined in 3.1.2 before and after use and abuse testing described in 8.4-8.9.

    b. Toys and parts of toys which, due to their inaccessibility, size, mass, function, or other characteristics, cannot be sucked, mouthed or ingested are not subject to this requirement.

        NOTE 3 —For the purposes of this requirement, the following criteria are considered reasonably appropriate for the classification of toys or parts likely to be sucked, mouthed or ingested: *(1)* All toy parts intended to be mouthed or contact food or drink, components of toys which are cosmetics, and components of writing instruments categorized as toys; *(2)* Toys intended for children less than 6 years of age, that is, all accessible parts and components where there is a probability that those parts and components may come into contact with the mouth.

    c. Packaging materials are not subject to these requirements unless they are intended to be retained as part of the toy or are intended to provide play value.

    d. This requirement is not intended to apply to children's jewelry, which is addressed by Specification F2923.

    e. In addition, materials now or in future listed in the most current revision of 16 CFR 1500.88 or 16 CFR 1500.91 as exempt from testing and certification requirements are excluded from this requirement for the purposes of determining compliance.

2. Requirements:

a. Accessible component parts of children's products (as defined in 3.1.2 and in 16 CFR 1500.87, before and after use and abuse testing described in 8.4-8.9 and in 16 CFR 1500.50-16 CFR 1500.53 and 16 CFR 1500.87) must not contain lead or lead compounds in which the lead content (calculated as lead metal [Pb]) is in excess of 100 ppm (300 ppm for products manufactured or imported prior to August 14, 2011) of the weight of the component, except as provided under 16 CFR 1500.88 and 16 CFR 1500.91.

b. The migration of elements from toys and parts of toys as specified in 4.3.5.2(1) shall not exceed the limits specified in Table 1 when tested in accordance with the methods set forth in 8.3. Modeling clays included as part of a toy shall not exceed the limits specified in Table 2 when tested in accordance with the methods set forth in 8.3. Please note that the limits in Table 2 apply only to these materials as a component of a toy; in addition, please also note that if the primary purpose of the material is to create a tangible work of art, it may in addition be subject to the requirements of 16 CFR 1500.14.

c. In addition, metallic toys or metallic toy components which are small parts may not exhibit extraction of more than 200 µg of cadmium when tested per 8.3.5.5(3). Compliance with all of the above requirements may be established by a screen of total element content as specified in 8.3.1.

4.3.6 *Cosmetics, Liquids, Pastes, Putties, Gels, and Powders*— The purpose of this requirement is to minimize the risk associated with the lack of cleanliness, shelf life, and contamination of cosmetics, liquids, pastes, putties, gels, and powders used in toys (excluding art materials). It sets standards for cleanliness and the ability to withstand extended shelf life or contamination, or both, during use without microbiological degradation.

4.3.6.1 Water used in the manufacturing and filling of toys shall be prepared according to the bacteriological standards for USP Purified Water. (**Warning**—The various methods for producing purified water each present different potentials for contaminating the final product. Purified water produced by distillation is sterile, provided that the production equipment is suitable and sterile. On the other hand, ion-exchange columns and reverse osmosis units require special attention in that they afford sites for microorganisms to foul the system and contaminate the effluent. Frequent monitoring may thus be

called for, particularly with the use of these units following periods of shutdown of more than a few hours.)

4.3.6.2 The formulations of these products used in toys shall be such that they are not subject to microbial degradation during shelf life or reasonably foreseeable use.

4.3.6.3 The cleanliness of these products used in toys and their ingredients shall be determined in accordance with 8.4.1. Formulations used to prevent microbial degradation shall be evaluated in accordance with 8.4.2.

4.3.6.4 Formulations of cosmetics shall be evaluated for potential microbiological degradation in accordance with 8.4.2.

4.3.7 *Stuffing Materials*— Loose fillers for stuffed toys shall be free of objectionable matter originating from insect, bird, rodent, or other animal infestation and of contaminants, such as splinters and metal chips to the extent possible in good manufacturing practice. The test methods that shall be used to determine objectionable material are in Chapter 16 of *Official Methods of Analysis of the Association of Official Analytical Chemists*.[12] In addition, fiber filling, whether natural or synthetic, should meet the requirements of Title 34, Chapter 47, Section 47.317, "Tolerances of the Commonwealth of Pennsylvania Regulation for Stuffed Toys."

[12]"Extraneous Materials: Isolation," *Official Methods of Analysis of the Association of Official Analytical Chemists*, 15 ed., Chapter 16, 1990.

TABLE 1 Maximum Soluble Migrated Element in ppm (mg/kg) for Surface Coatings and Substrates Other Than Modeling Clay Included as Part of a Toy

Antimony, (Sb)	Arsenic, (As)	Barium, (Ba)	Cadmium, (Cd)	Chromium, (Cr)	Lead, (Pb)	Mercury, (Hg)	Selenium, (Se)
60	25	1000	75	60	90	60	500

TABLE 2 Maximum Soluble Migrated Element in ppm (mg/kg) for Modeling Clays Included as Part of a Toy

Antimony, (Sb)	Arsenic, (As)	Barium, (Ba)	Cadmium, (Cd)	Chromium, (Cr)	Lead, (Pb)	Mercury, (Hg)	Selenium, (Se)
60	25	250	50	25	90	25	500

4.3.8 *DEHP (DOP)*— Pacifiers, rattles, and teethers shall not intentionally contain DI (2-ethylhexyl) phthalate (also known as dioctyl phthalate). To prevent trace amounts of DEHP (DOP) from affecting analysis, up to 3 % of total solid content will be accepted in the result, when tested in accordance with Practice D3421.

4.4 *Electrical/Thermal Energy*— Toys operating from nominal 120-V branch circuits shall conform to 16 CFR 1505, issued under the FHSA.

4.5 *Sound-Producing Toys*— These requirements are intended to minimize the possibility of hearing damage that might be caused by toys that are designed to produce sound. These requirements are applicable before and after testing in accordance with 8.5 through 8.10. These requirements do not apply to: (1) sounds produced by mouth-actuated toys where the sound pressure level is determined by the blowing action of the child; (2) child-actuated sounds such as those produced by xylophones, bells, drums, and squeeze toys where the sound pressure level is determined by the muscular action of the child. The continuous sound pressure requirements do not apply to rattles; however, rattles are covered by impulsive sound pressure requirements; (3) radios, tape players, CD players, and other similar electronic toys and toys where the sound output is dependent on the content of removable media (for example, game cartridge, flash cards, and so forth); (4) toys that are connected to or interfaced with external devices (for example, televisions, computers) where the sound pressure level is determined by the external device; and (5) sound emitted from earphones/headphones.

4.5.1 *Requirements*— When tested in accordance with 8.19, toys that are designed to emit sound shall conform to the following requirements:

4.5.1.1 The A-weighted equivalent sound pressure level, L_{Aeq}, of continuous sounds produced by close to the ear toys shall not exceed 65 dB.

4.5.1.2 The A-weighted equivalent sound pressure level, L_{Aeq}, of continuous sounds produced by all other toys except close-to-the-ear toys and push/pull toys shall not exceed 85 dB.

4.5.1.3 The C-weighted peak sound pressure level, L_{Cpeak}, of impulsive sounds produced by close to the ear toys shall not exceed 95 dB.

4.5.1.4 The C-weighted peak sound pressure level, L_{Cpeak}, of impulsive sounds produced by any type of toy excluding toys using explosive action (for example, percussion caps) shall not exceed 115 dB.

4.5.1.5 The C-weighted peak sound pressure level, L_{Cpeak}, of impulsive sounds produced by a toy using percussion caps or other explosive action shall not exceed 125 dB.

4.6 *Small Objects*— These requirements are intended to minimize the hazards from choking, ingestion, or inhalation to children under 36 months of age

created by small objects.

4.6.1 Toys that are intended for children under 36 months of age are subject to the requirements of 16 CFR 1501. Criteria for determining which toys are subject to these requirements are provided, in part, in 16 CFR 1500.50 and 1501 and also in Annex A1 of this specification. The requirements of 16 CFR 1501 state, in part, that no toy (including removable, liberated components, or fragments of toys) shall be small enough without being compressed to fit entirely within a cylinder of the specified dimensions as shown in Fig. 3. For the purposes of this specification, fragments of toys include, but are not limited to, pieces of flash, slivers of plastics, pieces of foam, or fine bits or shavings. Pieces of paper, fabric, yarn, fuzz, elastic, and string are excluded from this requirement.

4.6.1.1 The requirements are applicable before and after use and abuse testing in accordance with Section 8 to determine the accessibility of small objects such as small toys or components of toys including eyes, squeakers, or knobs, or pieces that break off or are removed from toys.

4.6.1.2 The following articles are exempt from the requirements: balloons; books and other paper articles; writing materials (crayons, chalk, pencils, and pens); phonograph records and compact discs (CDs); modeling clay and similar products; and fingerpaints, watercolors, and other paint sets. A listing of exempt articles is provided in 16 CFR 1501.3.

4.6.1.3 Toys that are intended to be assembled by an adult and contain potentially hazardous small objects in the unassembled state shall be labeled in accordance with 5.8.

4.6.2 *Mouth-Actuated Toys*— This requirement relates to toys, such as noisemakers, that are intended to be actuated repeatedly by blowing or sucking. Mouth-actuated toys that contain loose objects, such as spheres in a whistle, or inserts, such as reeds in a noisemaker, shall not release an object that will fit within the small parts test cylinder, as shown in Fig. 3, when air is alternately blown and sucked rapidly through the mouthpiece, according to the procedure described in 8.13. The procedure of 8.13 shall also be applied to the outlet if the air outlet is capable of being inserted into or covered by the mouth.

4.6.2.1 Small objects contained in an inflatable toy shall not be liberated during inflation or deflation.

4.6.3 Toys and games that are intended for use by children who are at least

three years old (36 months) but less than six years of age (72 months) are subject to the requirements of 16 CFR 1500.19. With the exception of products such as paper punch-out games and similar items, any toy or game that is intended for use by children who are at least three years old (36 months) but less than six years of age (72 months) and includes a small part is subject to the labeling requirements in accordance with 5.11.2.

4.7 *Accessible Edges*— Toys shall not have accessible, potentially hazardous sharp edges. Toys that are intended to be assembled by an adult, and may contain unprotected potentially hazardous sharp edges in the unassembled state, shall be labeled in accordance with 5.8.

4.7.1 Potentially hazardous sharp metal and glass edges are defined in 16 CFR 1500.49. Toys intended for use by children under 8 years of age are subject to this requirement before or after use and abuse testing, or both, as specified in 8.5-8.10. An illustration of a sharp edge tester is shown in Fig. 8.

Figure 8. Principle of Sharp Edge Test A rectangular block has a sharp handle (a mandrel) and attached to that is a flat device. The block is labelled "Any suitable device, protable or non-portable to apply known force and rotation to mandrel." During test, the mandrel rotates one full revolution. The test edge has a 90 degree plus or minue 0.5 degree relationship to the mandrel and is affixed with a single wrap of TFE tape. The angle can be varied to seek a worst case situation. 1.35 lbps is the max force applied normally to mandrel axis. 1.35 LBS (6.00 N) MAX FORCEAPPLIED NORMAL TO MANDREL AXIS ANY SUITABLE DEVICE, PORTABLE ORNON-PORTABLE TO APPLY KNOWNFORCE & ROTATION TO MANDREL DURING TEST, MANDREL ROTATESONE FULL REVOLUTION SINGLE WRAP OF TFE TAPE 90° ± 5° (TEST EDGE RELATIONSHIP TO MANDREL) VARY ANGLE TO SEEK"WORST CASE" SITUATION

FIG. 8 Principle of Sharp Edge Test

4.7.2 Toys containing potentially hazardous edges that are a necessary part of the function of a toy shall carry cautionary labeling as specified in 5.10 if the toy is intended for use by children from 48 to 96 months. Toys intended for children aged less than 48 months shall not have accessible hazardous functional sharp edges.

4.7.3 *Metal Toys*— Accessible metal edges, including holes and slots, shall be free of hazardous burrs and feathering, or shall be hemmed, rolled, or curled, or shall be covered with a permanently affixed device or finish.

NOTE 4 — Regardless of the manner in which edges are finished, they are subject to the sharp edge technical requirements as described in 4.7.1. If a device is used to protect an edge, it shall not become

detached after being tested in accordance with the appropriate procedures described in 8.5-8.10.

4.7.4 *Molded Toys*— Accessible edges, corners, or mold parting areas of molded toys should be free of hazardous edges produced by burrs and flash or so protected that hazardous edges are not exposed.

4.7.5 *Exposed Bolts or Threaded Rods*— If the ends of bolts or threaded rods are accessible, the thread shall be free of exposed, hazardous sharp edges and burrs, or the ends shall be covered by smooth finish caps so that hazardous sharp edges and burrs will not be exposed. Any caps that are used shall be subjected to the compression test noted in 8.10, regardless of whether the cap is accessible to flat-surface contact during the appropriate impact test(s) described in 8.7. Protective caps shall also be subjected to the tension test in 8.9 and the torque test in 8.8.

4.8 *Projections*— This requirement relates to potentially hazardous projections in all toys intended for use by children under 8 years of age. This requirement is intended to minimize possible puncture hazards to the skin that might be caused if a child were to fall on a rigid projection, such as unprotected ends of axles, actuating levers, and decorative features. Due to the extremely sensitive nature of the eyes and interior of the mouth, this requirement will not, nor is it intended to, provide protection to those areas of the body. If a projection appears to present a potential skin puncture hazard, the projection shall be protected by suitable means, such as by turning back the end of a wire or by affixing a smoothly finished protective cap or cover, which effectively increases the surface area for potential contact with the skin. Toys shall meet this requirement both before and after testing in accordance with 8.5-8.10. Toys intended to be repeatedly assembled and taken apart shall have the individual pieces and fully assembled articles, as shown on packaging graphics, instructions or other advertising, evaluated separately. The requirements for the assembled toy do not apply to toys where the assembling makes up a significant part of the play value of the toy. Since this requirement relates to hazards arising from a child falling onto a toy, only vertical or nearly vertical projections are required to be evaluated. The toy shall be tested in its most onerous position. Corners of structures are excluded from this requirement.

4.8.1 *Bath Toy Projections*— Rigid projections on toys designed primarily for use in the bath tub may pose a specific hazard that can result in serious penetration and impalement injuries. Additional design guidelines specifically for bath toy projections are provided in Annex A4 of this specification. As there are no objective means for determining conformance with these

guidelines, they are not to be used to judge compliance with this specification.

4.9 *Accessible Points*— Toys shall not have accessible, potentially hazardous sharp points that may occur because of the following: configuration of the toy; assembly devices such as wires, pins, nails, and staples that are fastened poorly; poorly sheared sheet metal; burrs on screws; and splintered wood. Toys that are intended to be assembled by an adult and may contain potentially hazardous sharp points in the unassembled state shall be labeled in accordance with 5.8.

4.9.1 Potentially hazardous sharp points are defined by 16 CFR 1500.48. Toys intended for use by children under 8 years of age are subject to this requirement before or after use and abuse testing, or both, as specified in 8.5-8.10. An illustration of a sharp-point tester is shown in Fig. 9.

Figure 9. Sharp Point Tester The sharp point tester is a cylinder with a test point at the end. There is a gaging slot of 0.40 x 0.45, a set of micrometer divisions and a sensing head, and the device is powered by a AAA dry cell. The device has a gap that is closed upon insertion of a sufficiently sharp point to pass through the gaging slot and depress the sensing head 0.005 inches, thereby completing an electrical circuit and illuminating the indicator test lamp lights. GAP IS CLOSED UPON INSERTIONOF SUFFICIENTLY SHARP POINT TOPASS THRU GAGING SLOT & DEPRESSSENSING HEAD .005. ELECTRICAL CIRCUIT IS THEREBYCOMPLETED & INDICATOR TEST LAMPLIGHTS - SHARP POINT TEST. AAA DRY CELL SECTION A - A AAA DRY CELL TEST POINT GAGINGSLOT(".040x".045) GAGING CAP & MICROMETER LOADING SPRING LOCK RING INDICATOR LAMP ASSYADAPTER-NUT ELECTRICALCONTACTSPRING BARREL CALIBRATION REFERENCE MARK MICROMETER DIVISIONS SENSING HEAD A A

FIG. 9 Sharp Point Tester

4.9.2 Toys in which an accessible, potentially hazardous sharp point is a necessary function of the toy, such as a needle in a sewing kit, shall carry cautionary labeling as specified in 5.10, if the toy is intended for children from 48 to 96 months old. Toys intended for children less than 48 months old shall not have accessible hazardous functional points.

4.9.3 *Wood*— The accessible surfaces and edges of wood used in toys shall be free of splinters, both before and after being tested in accordance with the appropriate procedures described in 8.5-8.10.

4.10 *Wires or Rods*— Wires or rods used in the interior of toys shall have their

ends finished to avoid potentially hazardous points and burrs, shall be turned back, or shall be covered with smoothly finished protective caps or covers, if they can become accessible after use or reasonably foreseeable abuse. Metal wires or other metal materials used for stiffening or for retention of form in toys shall not fracture to produce a hazardous point, edge, or projection hazard when tested in accordance with 8.12, if the component can be bent through a 60° arc by the applicable maximum force. When applied perpendicularly to the major axis of the component at a point 2 ± 0.05 in. (50 ± 1.3 mm) from the intersection of the component with the main body of the toy or at the end of the component if the component is less than 2 in. (50 mm) long, the maximum force shall be as follows (within a tolerance of 60.5 lb (60.02 kg)):

10 lbf (45 N)	toys intended for use by children 18 months of age or less
15 lbf (67 N)	toys intended for use by children over 18 but not over 96 months of age

The ends of spokes on toy umbrellas shall be protected. If the protection is removed when tested according to 8.9 (tension test) the ends of the spokes shall be free from sharp edges and sharp points when tested in accordance with 4.7.1 (sharp edge test) and 4.9.1 (sharp point test). Furthermore, if the protective components are removed by the tension test, the spokes shall have a minimum diameter of 0.08 in. (2 mm) and the ends shall be smooth, rounded, and approximately spherical with no burrs.

4.11 *Nails and Fasteners*— Nails and fasteners shall not present a point, edge, ingestion, or projection hazard. Points of nails or fasteners shall not protrude so as to be accessible. Additional requirements for nails and fasteners used as axles are given in 4.17.

4.12 *Plastic Film*— This requirement is intended to minimize the possibility of asphyxiation hazards that might be caused by thin plastic films. Flexible plastic film bags and flexible plastic sheets used as packaging materials for shelf packages or used with or as part of toys shall be at least 0.00150 in. (0.03810 mm) in average thickness, but the actual thickness of any individual measure shall never be less than 0.00125 in. (0.03175 mm). Alternatively, sheeting with an average thickness of less than 0.00150 in. (0.03810 mm) shall be perforated with defined holes so that a minimum of 1 % of the area has been removed over any area of 1.18 1.18 in. (30 30 mm). The thickness shall be determined using the test method in 8.21. This requirement does not apply to the following:

4.12.1 Shrink film in the form of an over wrap that would normally be destroyed when the package is opened by a consumer.

4.12.2 Bags or plastic film with a minor dimension of 3.94 in. (100 mm) or less. Bag dimensions shall be measured while in the form of a bag, not cut open into a single thickness sheet.

4.13 *Folding Mechanisms and Hinges*— These requirements are intended to eliminate possible crushing, laceration, or pinching hazards that might occur in folding mechanisms and hinges. Examples are the sudden collapse or unexpected motion of a folding mechanism or hinge that produces a scissor action; and the changing clearances at the hinge line between two hinged portions, such that the gap will admit fingers at any one position of the hinge but not at all positions. These requirements do not relate to the recognized and familiar hazards associated with the changing clearances around the edges of doors or pivoted or hinged sections in toy truck bodies, toy earth moving machinery, and similar toys. Toys shall meet the requirements specified in 4.13.1 and 4.13.2 after they are tested in accordance with 8.5-8.10. Requirements for toy chests are contained in Consumer Safety Specification F834.

4.13.1 *Folding Mechanisms*— Toy furniture and other toys in which a folding mechanism, arm, or bracing is intended or likely to support the weight of a child in normal use shall have a locking device or other means to prevent unexpected or sudden movement or collapse of the product, or have adequate clearance to provide protection for the fingers, hands, and toes from crushing, laceration or pinching hazards in the event of sudden movement or collapse of the product. Examples of products to which these requirements would apply include, but are not limited to, folding mechanisms in toy strollers a child can sit in, toy chairs a child can sit in, or a child sized ironing board. One way to determine if a child can sit in a product is to verify that the seat width would accommodate the hip breadth of a child in the age range for which the product is intended. Examples of products to which these requirements would not apply include, but are not limited to, a doll house sized chair, a doll house sized bed, or an expandable/ collapsible sphere.

4.13.1.1 Locking devices or other means to prevent unexpected or sudden movement or collapse of the product shall engage automatically when the product is placed in the manufacturer's recommended use position. During and upon completion of the testing in 8.25.1, the unit shall remain in its recommended use position. The test in 8.25.1 shall not apply to locking devices or other means where the direction of force of the occupant load opposes the direction of collapse of the mechanism.

4.13.1.2 Locking devices shall comply with either of the following:

1. Each single action device shall require a minimum force of 10 lbf (45 N) to activate the release mechanism when tested in accordance with 8.25.2.

2. Each double action locking device shall require two distinct and separate actions to release. There are no force requirements for double action locking devices.

4.13.2 *Hinge-Line Clearance*— Toys having a gap or clearance along the hinge line between a stationary portion and a moveable portion that weighs more than ½ lb (0.2 kg) shall be so constructed that, if the accessible gap at the hinge line will admit a 3/16-in. (5-mm) diameter rod, it will also admit a ½-in. (13-mm) diameter rod at all positions of the hinge.

4.14 *Cords, Straps, and Elastics*— These requirements are intended to minimize the potential entanglement and strangulation hazards that might be caused by accessible cords, straps, and elastics. These requirements are applicable before and after use and abuse testing in accordance with 8.5-8.10.

4.14.1 *Cords, Straps, and Elastics in Toys*— Cords or elastics included with or attached to toys intended for children less than 18 months of age (excluding pull toys, see 4.14.3) shall be less than 12 in. (300 mm) long when measured to the maximum length in a free state and under a load of 5 lb (2.25 kg). If cords/straps/elastics or multiple cords/straps/elastics can tangle or form a loop in connection with any part of the toy, including beads or other attachments on the ends of cords/ straps/elastics, the loop shall not permit the passage of the head probe (Fig. 10) when tested in accordance with 8.22. Specifically, the loop shall not allow the head probe to be inserted so deep that it admits the base of the probe. The configuration of the loop shall be determined by using all components that make up the loop. For example, the configuration of the loop for the product illustrated in Fig. 11 is comprised of Cord 1, Cord 2, and the toy part.

Figure 10. Head Probe for Cords and Elastics This is the end view. The probe is shaped like a stadium oval with an outer edge and an inner edge. The outer edge has a length of 5.0 inches and width of 3.9 inches. The rounded ends of the stadium oval have a radius of 1.95 inches to the outer edge and 1.45 inchdes to the inner edge. The flat part of the inner edge is 1.1 inchdes across. 1.95 in. (49.5mm) radius 0.5 in. (13 mm) 3.9 in. (99 mm) 5.0 in. (130 mm) 1.1 in. (28 mm) 1.45 in. (37 mm) radius

End View

Figure 10b. Head Probe for Cords and Elastics (Side View) The side view has a handle, below which is a rectangle, below which is a trapezoid. Per figure 10a, the over length is 5.0 inches. The length of the bottom part of the trapezois is 4.0 inches. The height of the rectangle is 1.0 inches and the overall hieght from the bottom of the trapezoid to the top of the rectangle is 4.0 inchdes. 1.0 in. (25 mm) 4.0 in. (100 mm) 4.0 in. (100 mm)
Side View

FIG. 10 Head Probe for Cords and Elastics

Figure 11. Loop Example A toy drum has a cord attached to each side. The left cord is Cord 1, the right is Cord 2. The two cords are tied together so the drum may be hung around the child's neck. The width of the drum from one side to the other is labelled Toy Part. Cord 1 Cord 2 Toy Part

FIG. 11 Loop Example

4.14.1.1 *Cords, Straps, and Elastics Containing a Breakaway Feature*— Cords, straps, and elastics on toys that have loops that admit the base of the head probe shall contain a functional breakaway feature that prevents entanglement by releasing at a force less than 5.0 lbf (22.2 N) when tested in accordance with 8.22.3. The free length of the individual released cord, strap, or elastic should not exceed a maximum length of 12 in. (300 mm). The breakaway feature shall be capable of being reattached without altering the characteristics of the attachment.

4.14.2 *Self Retracting Pull Cords*— Accessible cords used in cord-activated mechanisms in toys intended for use by children under 18 months of age, except monofilament-type cords 1/16 in. (2 mm) or less in diameter, shall not retract more than ¼ in. (6 mm) when a weight of 2 lb (0.9 kg) is attached to the fully extended cord with the cord held vertical and the toy held firmly in the most favorable position for retraction. Monofilament cords, 1/16 in. (2 mm) or less in diameter, shall not retract under a load of 1 lb (0.45 kg) when tested in the manner described above.

4.14.3 *Pull Toys*— Cords, straps, and elastics greater than 12 in. (300 mm) long for pull toys intended for children under 36 months of age shall not be provided with beads or other attachments that could tangle to form a loop.

4.14.4 *Strings and Lines for Flying Devices*— Kite strings and handheld lines over 6 ft (1.8 m) long, attached to flying devices intended for use as playthings, shall have an electric resistance of more than 108 V/cm when tested at a relative humidity of not less than 45 % and a temperature of not greater than 75°F (24°C), when measured by a high-voltage, resistance

breakdown meter.

4.14.5 *Cords on Toy Bags Intended for Children Up to 18 Months*— Toy bags made of impermeable material with an opening perimeter greater than 14 in. (360 mm) shall not have a drawstring or cord as a means of closing.

4.15 Stability and Over-Load Requirements

4.15.1 *Stability of Ride-On Toys and Toy Seats*— These requirements are intended to minimize unexpected hazards that could be caused by a toy that can tip easily. They take into account the use of the child's legs as stabilizing means and recognize that a child learns instinctively to compensate for inclined positions. The requirements listed in 4.15.2 and 4.15.3 shall apply to the following classes of toys intended for use by children aged 60 months or less: ride-on toys, with three or more load bearing wheels, such as wagons; ride-on, action-type toys such as hobby horses, rocking toys (for example, horses, cars); and toy seats. Ride-on toys of spherical, cylindrical, or other shape that do not normally have a stable base are not covered by these requirements. The toy shall conform to these requirements after it is tested in accordance with 8.5-8.10.

4.15.2 *Sideways Stability Requirements*— These requirements recognize two types of possible stability hazards: those associated with ride-on toys or toy seats in which the feet can provide stabilization, and those situations in which the feet are restricted by an enclosing structure.

4.15.2.1 *Sideways Stability, Feet Available for Stabilization*— There shall be no sideways stability test for those ride-on toys or toy seats in which the height of the seat from the ground is one third, or less than one third, of the height indicated in Table 3 at the lowest age of the age range for which the ride-on toy or toy seat is intended, and in which the legs of the child are unrestricted in their sideways motion and thus are available for stabilization. (The values given in Table 3 represent the lower of the following two numbers: (1) the fifth percentile group of boys at each age from 1 up to and including 5 years; and (2) the fifth percentile group of girls at each age from 1 up to and including 5 years.) For those ride-on toys, or toy seats in which the height of the seat from the ground is greater than one third of the height indicated in Table 3 at the lowest age of the age range for which the ride-on toy or toy seat is intended, and in which the legs of the child are unrestricted in their sideways motion and thus are available for stabilization, the toy shall not tip when tested in accordance with 8.15. When the lowest age of the intended age range falls between two ages listed in Table 3, the lower of the two shall be chosen.

4.15.2.2 *Sideways Stability, Feet Unavailable for Stabilization*— If the sideways motion of the feet or legs, or both, is restricted, such as by the enclosed sides of a toy automobile, the ride-on toy or toy seat shall not tip when tested as specified in 8.15, except that the surface shall be inclined 15° to the horizontal.

4.15.3 *Fore and Aft Stability*— This requirement relates to the stability of ride-on toys or toy seats in the forward direction with respect to the child's position, where the child cannot easily use his/her legs for stabilization, and in the backward direction with respect to the child regardless of whether his/her legs are available for stabilization. All ride-on toys or toy seats falling within the scope of 4.15 shall not tip forward or backward when the toy, which shall be loaded with a simulated child's weight, is tested both facing down and up the slope using the test method of 8.15, except that the surface shall be inclined 15° to the horizontal. The stability of ride-on toys is to be tested not only with the steering wheels in a forward position, but also at an angle of 45° to the left and to the right of the forward position.

TABLE 3 Height of Fifth Percentile Children (Values Given for Boys or Girls, Whichever is Lower)

Age, years	Height, in. (cm)
1	27 (69.8)
2	29 (74.4)
3	33 (85.1)
4	37 (93.8)
5	40 (100.5)

4.15.4 *Stability of Stationary Floor Toys*— This requirement is intended to minimize hazards that might be caused by a toy that tips when a door, drawer, or other movable portion is extended to its fullest travel. Stationary floor toys of greater than 30 in. (760 mm) in height and weighing more than 10 lb (4.5 kg) shall not tip when placed on a 10° incline with all movable portions extended to their fullest travel and facing in the direction of the downslope side. The toy shall conform to this requirement after it is tested in accordance with 8.5-8.10.

4.15.5 *Overload Requirements for Ride-On Toys and Toy Seats*— This requirement is intended to minimize unexpected hazards that could be caused by a toy that is not capable of withstanding an overload. All ride-on toys, toys intended for use as seats, or toys designed to support all or part of the weight of the child shall support a load applied to the seat, or to other

such intended load-bearing components, without collapsing to produce a hazardous condition when tested in accordance with 8.26. Examples of hazardous conditions if collapse occurs would include the following: exposure of hazardous edges, or points, projections, crushing or pinching hazards, and power-driven mechanisms. The toy shall conform to this requirement after being tested in accordance with 8.5 through 8.10.

4.15.6 *Wheeled Ride-on Toys*— Ride-on toys incorporating wheels intended for movement along the ground shall be tested in accordance with the Dynamic Strength Test for Wheeled Ride-ons in 8.20. Wheeled ride-on toys shall be tested after being tested in accordance with 8.5-8.10.

4.16 *Confined Spaces*— The purpose of these requirements is to minimize the possible entrapment of children in toys that form enclosures, such as toy refrigerators, and to prevent possible suffocation in head-enclosing toys such as space helmets. Toys shall meet the requirements listed in 4.16.1-4.16.3 after the toys are tested in accordance with 8.5-8.10. See Consumer Safety Specification F834 for requirements for toy chests.

4.16.1 *Ventilation*— The purpose of these requirements is to minimize the possible entrapment of children in toys that form enclosures, such as toy refrigerators, and to prevent possible suffocation in head-enclosing toys such as space helmets. Any toy made of impermeable material and having a door or lid, which encloses a continuous volume greater than 1.1 ft^3 (0.03 m^3) and in which all integral dimensions are 6 in. (150 mm) or more, shall provide one of the following unobstructed ventilation areas:

4.16.1.1 A minimum of two openings each having a total area of at least 1 $in.^2$ (650 mm^2) placed at least 6 in. (150 mm) apart (see Fig. 12(a)).

Figure 12. Openings Figure A shows two ciruclar holes, each of which is ≥ 1.0 $in.^2$ and they are separated by a distance of ≥ 6.0 inches. Diagram 12b is two ovals, also ≥ 1.0 $in.^2$ and also separated by a distance of ≥ 6.0 inches. ≥ 1.0 in.2(≥ 650 mm2) ≥ 1.0 in.2(≥ 650 mm2) ≥ 6.0 in.(≥ 150 mm) ≥ 1.0 in.2(≥ 650 mm2) ≥ 1.0 in.2(≥ 650 mm2) ≥ 6.0 in.(≥ 150 mm) (a) (b)

FIG. 12

4.16.1.2 One opening that is the equivalent of the two 1.0-$in.^2$ (650-mm^2) openings expanded to include the separation area provided this leaves opening areas of 1.0 $in.^2$ (650 mm) on either side of a 6-in. (150-mm) spacing (see Fig. 12(b)). The ventilation openings shall be unobstructed when the toy is placed on the floor in any position and adjacent to two vertical plane surfaces meeting at a 90° angle, so as to simulate the corner of a room. If a

permanent partition or bars (two or more), which effectively limit the continuous space by making the largest internal dimension less than 6 in. are used to subdivide a continuous space, the ventilation area shall not be required.

4.16.2 *Closures*— Closures (such as lids, covers, and doors) to enclosures falling within the scope of 4.16.1 shall not be fitted with automatic locking devices. Closures shall be of a type that can be opened with a force of 10 lbf (45 N) or less when treated as follows:

4.16.2.1 With the closure in a closed position, apply the force in an outward direction to the inside of the closure perpendicular to the plane of the closure and anywhere within 1 in. (25 mm) from the geometric center of the closure. The force measurement shall be made by means of a force gauge with a calibrated accuracy within 60.3 lb (0.1 kg) when measuring a force of 10 lb (45 N). The dial of the gauge shall be graduated with its finest division not exceeding 0.2 lb (0.9 N), and the full-scale range shall not exceed 30 lb (130 N).

4.16.3 *Toys that Enclose the Head*— Toys that enclose the head, such as space helmets, which are made of impermeable material, shall provide means for breathing by the incorporation of unobstructed ventilation areas. The ventilation areas shall consist of a minimum of two holes, with a total of at least 2 $in.^2$ (1300 mm^2) of ventilation and at least 6 in. (150 mm) between holes.

4.17 *Wheels, Tires, and Axles*— These requirements are intended to eliminate the possibility of ingestion hazards (as described in 4.6) that might be caused by small wheels or tires that separate during normal use or reasonably foreseeable abuse, as well as laceration or puncture hazards from projecting axles, either on the toy or on wheel assemblies that may be removed from the toy during abuse. The requirements shall apply to transportation wheels on both preassembled and knocked-down toys intended for children aged 96 months or less, except for ingestion hazards from small wheels and axles, which apply to toys intended for children under 36 months of age, as covered in 4.6. In the case of knocked-down toys, the toy shall be tested in the form that it would be assembled by the purchaser, using simple household tools or special tools provided by the manufacturer, if any, or both. After being subjected to the use and abuse tests of 8.5-8.11, wheels, tires, or axles shall not present a laceration, puncture, or ingestion hazard as defined in 3.1.60 and 4.6.1, respectively.

4.18 *Holes, Clearance, and Accessibility of Mechanisms*— These requirements

are intended to eliminate possible hazards that may be caused by changing clearances. Toys shall meet these requirements after they are tested in accordance with 8.5-8.10. The different pinch clearance requirements listed in 4.18.1-4.18.6 reflect the different modes of entrapment or pinching that may be encountered.

4.18.1 *Accessible Clearances for Moveable Segments*— This requirement concerns clearances between movable segments on toys intended for children under 96 months only, where the potential for pinching or crushing fingers or other appendages exists. It includes, but is not limited to, wheels and rigid-wheel wells, fenders, or the radial clearance between the wheels and chassis of ride-on toys, or the driven wheels and other parts of toys powered by electrical, spring, or inertial energy. If such accessible clearances admit a 3/16-in. (5-mm) diameter rod, they shall also admit a ½-in. (13-mm) diameter rod in order to prevent the trapping of fingers.

4.18.2 *Circular Holes in Rigid Materials*— This requirement is intended to prevent finger entrapment (which may cut off blood circulation) in accessible holes in sheet metal and other rigid material in toys intended for children aged 60 months or less. (Noncircular holes are believed to present no significant hazard of cutting off blood circulation in entrapped fingers.) If an accessible, circular hole in any rigid material less than 0.062 in. (1.58 mm) in thickness can admit a ¼-in. (6-mm) diameter rod to a depth of ⅜ in. (10 mm) or greater, it shall also admit a ½-in. (13-mm) diameter rod.

4.18.3 *Chains and Belts*— These requirements are to prevent finger crushing through entrapment between links of supporting chains or between chains and sprockets or pulleys and belts.

Figure 13. Clearance for Chain Links A single chain link is shown and the inside of the link is labelled possible entrapment point. A mark indicates that the clearance should not admit a 3/16 inchd diameter rod on unshielded chains. Clearance not admit 3/16 - in. (5 mm)diameter rod on unshielded chains Possible EntrapmentPoint

FIG. 13 Clearance for Chain Links

4.18.3.1 *Supporting Chains*— Chains in toys that support the weight of a child, such as hanging seats or similar indoor devices, intended for children 36 months or less in age, shall be shielded if the chain is accessible and if a 0.19-in. (5-mm) diameter rod can be inserted between two links, as in Fig. 13, with the chain in slack configuration.

4.18.3.2 *Chains or Belts for Ride-On Toys*— Power transmission chains and

belts in ride-on toys shall be shielded.

4.18.4 *Inaccessibility of Mechanisms*— Clockwork, batteryoperated, inertial, or other power-driven mechanisms in toys intended for children aged 60 months or less shall not have any accessible part of the mechanism present a pinch or laceration hazard. (For circular holes, also see the requirement under 4.18.2.)

4.18.5 *Winding Keys*— This requirement is to prevent the pinching or laceration of fingers by entrapment between the key and body of the toy. It applies to toys intended for children under 36 months of age that use winding keys that rotate as the mechanism unwinds. This requirement applies to keys with flat plates attached to the stem and that protrude from a rigid surface; the requirement does not apply to those circular knobs to which the torque is applied. If the clearance between the flukes of the key and body of the toy will admit a 0.25-in. (6-mm) diameter rod, it shall also admit a 0.5-in. (13-mm) diameter rod at all positions of the key. For keys covered by this requirement, there shall be no opening in the flukes of the key that can admit a 0.19-in. (5-mm) diameter rod.

4.18.6 *Coil Springs*— These requirements are intended to prevent the pinching or crushing of fingers or toes by toys containing springs. Coil springs (either compression or extension) that form part of a component that carries the weight of a child shall be shielded so as to prevent access during use or reasonably foreseeable abuse unless either of the following occurs:

4.18.6.1 A 0.12-in. (3-mm) diameter rod cannot be inserted freely; or

4.18.6.2 A 0.25-in. (6-mm) diameter rod can be inserted freely between the adjacent coils at all points in the action cycle when the spring is subjected first to a weight of 3 lb (1.4 kg) and then to a weight of 70 lb (32 kg).

4.19 *Simulated Protective Devices (such as helmets, hats, and goggles)*— These requirements are intended to minimize hazards that might be caused, for example, by goggles or space helmets if the material from which they are constructed fails; or by toys that simulate protective devices such as football helmets and pads, if the wearer uses the article as a real protective device rather than as a toy. The toy shall conform to the requirements listed in 4.19.1 and 4.19.2 after testing in accordance with 8.7.4 and 8.8 through 8.10.

4.19.1 *Eye Protection*— All rigid toys that cover the face, such as goggles, space helmets, or face shields, shall be constructed of impact-resistant

material that will not have sharp edges, sharp points, or loose parts that could enter the eye before or after being tested in accordance with 8.5-8.10. This applies to items with cutout eye holes as well as items that cover the eyes.

4.19.2 Toys that simulate safety protective devices (examples include, but are not limited to, construction helmets and sports helmets) and their packages shall be labeled clearly in accordance with 5.9 to warn the purchaser that they are not safety protective devices.

4.20 *Pacifiers*— Infant pacifiers shall conform to the safety requirements as specified in 16 CFR 1511. Illustrations of the pacifier test fixture are shown in Fig. 14.

Figure 14. Pacifier Test Fixture The pacifier test fixture is a flat device through the nipple of the pacifier is inserted. Diagram a is a top view and has a width of 76 mm and a length of 102 mm. The center opening is a trapezoid with the top part being wider and a width of 22.3mm and 45 degree angles . Below the trapezoid is a circle with a diameter of 42.7mm. Below that is another trapezoid, with the narrow part on top. The distance from the top of the opening is 3 inches. 22° 30° 1.68"42.7 mm 4"102 mm 45° 3"76 mm 1.5"38.1 mm 3.0"76.2 mm 2 LBSOR8.6 N A A CenterOpening Material:1/4" Polytetrafluoroethylene SectionA-A PACIFIER FORCE 0.3"76 mm Rod (b) (a)

FIG. 14 Pacifier Test Fixture

4.20.1 Pacifiers with rubber nipples shall conform to the nitrosamine levels as specified in Specification F1313. This specification states that a test sample of nipples, drawn from a standard production lot, shall not contain more than 10 ppb in each of three aliquots of any one nitrosamine. In addition, the total nitrosamines of the sample shall not exceed 20 ppb.

4.20.2 Toy pacifiers attached to, or sold with, toys intended for children under 36 months of age shall comply with the requirements outlined in 4.6.1 of this specification (small objects), and either conform to the requirements of 16 CFR 1511 or have a nipple length no longer than 0.63 in. (16 mm). This measurement shall be taken from the nipple side of the shield to the end of the nipple.

4.21 *Projectile Toys*— These requirements relate to certain, but not all, potential, unexpected hazards that might be caused by projectile firing toys and by the firing of improvised projectiles from such toys. Certain well-recognized hazards that are inherent in traditional toys such as slingshots and darts are not covered by these requirements. The discharge mechanism as

well as the projectile shall conform to the requirements specified in this section after testing in accordance with the appropriate test methods described in 8.5-8.10 and 8.14.

4.21.1 These requirements apply to toys that are intended to launch projectiles into free flight by means of a discharge mechanism in which the kinetic energy of the projectile is determined by the toy and not by the user.

4.21.1.1 No projectile intended to be fired from a toy shall have any sharp edges, sharp points, or small parts that would fit within the cylinder shown in Fig. 3.

4.21.1.2 No rigid projectile fired from a toy shall have a tip radius less than 0.08 in. (2 mm).

4.21.1.3 Any rigid projectile fired from a toy that has a kinetic energy that exceeds 0.08 J (as determined by 8.14.1) shall have an impact surface(s) of a resilient material.

4.21.1.4 Any protective tip shall either (1) not be detached from the projectile when subjected to the torque and tension tests described in 8.8 and 8.9, or (2) if the protective tip does become detached during the test at less than the specified torque or tension, or both, the projectile shall not be able to be launched from the provided launcher. Additionally, the protective tip shall not produce or reveal hazardous points or edges when fired into a solid object, in accordance with the test methods described in 8.14.4.

4.21.1.5 The aforementioned requirements shall not apply to any discharge mechanism incapable of storing energy independent of the user, or intended to propel a ground-based vehicular toy along a track or other surface, or when the projectile is inaccessible to a child when it leaves the discharge mechanism, for example, bagatelle or pinball machines.

4.21.2 *Discharge Mechanisms*— Discharge mechanisms shall be unable to discharge potentially hazardous improvised projectiles such as pencils or pebbles without modification by the user.

4.21.3 Any arrow shall have a protective tip that complies with 4.21.1.4.

4.22 *Teethers and Teething Toys*— These requirements are intended to address a potential impaction hazard associated with teethers. These requirements are applicable before and after use and abuse testing in accordance with Section 8.

4.22.1 Teethers and teething toys shall conform to the dimensional requirements for infant rattles as specified in 16 CFR 1510. Illustrations of a rattle test fixture are shown in Fig. 15. A teether shall meet this requirement when tested under the force only of its own weight and in a noncompressed state.

Figure 15. Rattle Test Fixture The fixture is a rectangular block with a stadium oval cavity centered within the fixture. The stadium oval is 1.968 inchdes by 1.378 inches and the circles have a radius of .689 inches. The rectangle around the oval is 2 9/16 inches by 1.968 inches. From the side, the device is 1.181 inches high and 3 1/8 inches long. CAVITY CENTERED WITHIN FIXTURE .689 in (17.5 mm)RADIUS (REF) 2 9/16 in(65 mm) 1.378 in(35 mm) 1.968 in(50 mm) 1.181 in(30 mm) 3 1/8 in(80 mm)

FIG. 15 Rattle Test Fixture

4.22.2 In addition, teethers and teething toys incorporating nearly spherical, hemispherical, or circular flared ends shall be designed so that such ends are not capable of entering and penetrating to the full depth of the cavity in the supplemental test fixture shown in Fig. 16. A teether shall meet this requirement when tested under the force only of its own weight and in a noncompressed state.

Figure 16. Supplemental Test Fixture for Rattles, Squeeze Toys and Teethers. The top diagram is a square of 2.86 inchdes per side with a circle inside of 1.68 inches in diameter. The side view shows the device is 1.18 inchdes high. 2.86 in(72.6 mm) 2.86 in(72.6 mm) 1.68 in(42.7 mm) 1.18 in(30.0 mm)

FIG. 16 Supplemental Test Fixture for Rattles, Squeeze Toys, and Teethers

4.22.3 *Exclusion*— The requirements of 4.22.1 and 4.22.2 shall not apply to the following:

1. Teething toys that are composed of liquid-filled beads that are attached to form a ring or beads that are threaded on a flexible cord or string.

2. Soft-filled (stuffed) teething toys or soft-filled parts or parts of fabric.

3. Rigid components having a major dimension equal to or less than 1.2 in. (30 mm) contained within soft-filled teething toys.

4.23 *Rattles*— Infant rattles shall conform to the safety requirements as specified in 16 CFR 1510. Illustrations of a rattle test fixture are shown in Fig. 15.

4.23.1 In addition to meeting the requirements of 16 CFR 1510, rigid rattles incorporating nearly spherical, hemispherical, or circular flared ends shall be designed so that such ends are not capable of entering and penetrating to the full depth of the cavity in the supplemental test fixture illustrated in Fig. 16. A rattle shall meet this requirement when tested under the force only of its own weight and in a noncompressed state. These requirements are applicable before and after use and abuse testing in accordance with Section 8.

4.23.2 *Exclusion*— The requirements of 4.23 and 4.23.1 shall not apply to the following:

1. Soft-filled (stuffed) rattles or soft-filled parts or parts of fabric.
2. Rigid components having a major dimension equal to or less than 1.2 in. (30 mm) contained within soft-filled rattles.

4.24 *Squeeze Toys*— These requirements are intended to address a potential impaction hazard associated with squeeze toys intended for children under the age of 18 months. These requirements are applicable before and after use and abuse testing in accordance with Section 8.

4.24.1 Squeeze toys shall conform to the dimensional requirements for rattles as specified in 16 CFR 1510. Illustrations of a rattle test fixture are presented in Fig. 15. A squeeze toy shall meet these requirements when tested under the force only of its own weight and in a noncompressed state.

4.24.2 In addition, squeeze toys incorporating nearly spherical, hemispherical, or circular flared ends shall be designed so that such ends are not capable of entering and penetrating to the full depth of the cavity in the supplemental test fixture shown in Fig. 16. A squeeze toy shall meet these requirements when tested under the force only of its own weight and in a noncompressed state.

4.24.3 *Exclusion*— The requirements of 4.24.1 and 4.24.2 shall not apply to the following:

1. Soft-filled (stuffed) squeeze toys or soft-filled parts or parts of fabric.
2. Rigid components having a major dimension equal to or less than 1.2 in. (30 mm) contained within soft-filled squeeze toys.

4.25 *Battery-Operated Toys*— These requirements are intended to address potential risks of injury associated with battery usage in toys intended for use by children (for example, battery overheating, leakage, explosion and fire,

and choking on or swallowing batteries). Both non-rechargeable and rechargeable batteries are subject to these requirements. Batteryoperated toys shall conform to the requirements specified in this section after testing in accordance with the appropriate test methods described in 8.5-8.12. For purposes of ensuring compliance with these requirements, fresh alkaline batteries that meet the dimensional requirements of the latest revision of ANSI C18.1 or the latest revision of IEC 60086-2 shall be selected for test purposes. If another battery chemistry is specifically required for use in the toy by the manufacturer, testing shall be repeated using that type of battery. When rechargeable batteries are specified by the manufacturer, fully recharged batteries shall be used for testing purposes.

4.25.1 The toy shall be marked permanently on the battery compartment or on the area immediately adjacent to the battery compartment to show the correct battery polarity using the polarity symbols “+” and “−”. Additional markings located on the toy or in the instructions must indicate the correct battery size and voltage. These markings are not required for nonreplaceable batteries or for rechargeable battery packs that, by design, can only be inserted in the correct orientation. Battery compartments for button cell batteries are not subject to this requirement.

NOTE 5 — The battery compartment door is considered part of the battery compartment.

4.25.1.1 Toys containing non-replaceable batteries shall be labeled in accordance with 5.15.

4.25.2 The maximum allowable direct current potential between any two accessible electrical points is 24 V nominal.

4.25.3 Battery-operated toys shall be designed so that it is not possible to charge any non-rechargeable battery. This can be achieved through physical design of the battery compartment or through the use of an appropriate electrical circuit design. This applies to situations in which a battery may be installed incorrectly (reversed) or in which a battery charger may be applied to a toy containing non-rechargeable batteries, or both. This section does not apply to circuits having one or two non-rechargeable batteries as the only source of power.

4.25.3.1 Toys having a circuit powered only by button cell type batteries are not subject to this requirement.

4.25.4 For toys intended for children less than 3 years old, all batteries shall not be accessible before or after testing in accordance with 8.5-8.10, without

the use of a coin, screwdriver, or other common household tool. Testing is performed using the recommended batteries installed.

4.25.5 For all toys, batteries that fit completely within the small parts test cylinder shown in Fig. 3 shall not be accessible, before or after testing in accordance with 8.5-8.10, without the use of a coin, screwdriver, or other common household tool. Testing is performed using the recommended batteries installed.

4.25.6 Batteries of different types or capacities shall not be mixed within any single electrical circuit. In applications requiring more than one type or capacity of battery to provide different functions or in applications requiring the combination of alternating current and non-rechargeable batteries, each circuit shall be isolated electrically to prevent current from flowing between the individual circuits.

4.25.7 The surfaces of the batteries shall not achieve temperatures exceeding 71°C.

4.25.7.1 This requirement is applicable for all batteryoperated toys during normal use conditions. In addition, battery-operated toys intended for children 96 months or less shall meet this requirement after reasonably foreseeable abuse.

4.25.7.2 If external moving parts of the toy that are mechanically linked to the motor can be stalled by the user, test for a stalled motor condition according to the procedures of 8.17 to determine conformance with the temperature limits.

4.25.8 No condition shall occur that would cause the toy to fail the temperature requirements of 4.25.7 or present a combustion hazard as described in 4.25.

4.25.9 Battery-operated toys shall meet the requirements of 6.5 for instructions on safe battery usage. Toys which use non-replaceable batteries as the only source of power are not subject to 6.5.

4.25.10 *Battery-Powered Ride-On Toys*— These requirements cover wheeled ride-on toys, not intended for streets or roadways, using a battery power source that is capable of delivering at least 8 amps into any variable resistor load for at least one minute.

4.25.10.1 The maximum temperature measured on the insulation of any conductor shall not exceed the temperature rating of the material (third

party test laboratory rating) when tested in accordance with 8.18.2.

4.25.10.2 Battery-powered ride-on toys shall not present a risk of fire when tested in accordance with the stalled motor test of 8.18.3.

4.25.10.3 A battery-powered ride-on toy designed with a wiring system that has a user replaceable device (fuse type) for the primary circuit protection or a wiring system with user resetable primary circuit protection (manual reset fuse) shall not actuate (open or trip) when tested in accordance with the nuisance tripping test of 8.18.4.

4.25.10.4 Switches used in battery-powered ride-on toys.

1. Polymeric materials in switches used in batterypowered ride-on toys that are used to support current-carrying parts shall carry a minimum flame rating of UL-94 V-0 or have a glow wire ignition rating of 750°C. Note: This requirement does not apply to switches used in low-power circuits. A low-power circuit is defined as one using an effective battery power source that is not capable of delivering at least 8 amps into any variable resistor load for at least one minute.

2. The switch body shall not result in a short-circuit condition when subjected to the switch endurance test and overload tests of 8.18.5.

3. The switch shall not fail in a mode that could cause the vehicle to run continuously (switch stuck in the “on” position) when subjected to the endurance test and the overload test in 8.18.5.

4.25.10.5 User replaceable circuit protection devices in battery-powered ride-on toys.

1. User replaceable circuit protection devices used in battery-powered ride-on toys shall be listed, recognized or certified by an independent laboratory.

2. All circuit protection devices used in battery-powered ride-on toys intended to be replaced by the user shall be replaceable only with the use of a tool or by a design which does not easily allow tampering such as a design requiring excessive force to open.

4.25.10.6 Batteries, as described in 4.25.10, and battery chargers.

1. Battery connectors must be constructed of material with a V-0 flame rating or have a glow wire ignition rating of 750°C.

2. The battery charging system shall not present a risk of fire due to a short-circuit condition applied to any point in the length of a charger/battery interconnecting cable when tested in accordance with 8.18.7.

3. During charging, battery-charging voltages shall not exceed the recommended charging voltages when tested in accordance with 8.18.6.

4. Battery chargers must be certified to the appropriate current national standard, for example UL, CSA, or equivalent standards body.

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4.25.10.7 Wiring connected to the main/motor battery shall be short-circuit protected and shall not present the risk of fire when tested in accordance with 8.18.7.

4.25.10.8 Strain relief shall be provided to prevent mechanical stress on wires entering a connector block during routine maintenance such as battery charging, and tested in accordance with 8.18.8.

4.25.10.9 Battery-powered ride-on toys shall comply with the requirements in 5.15.1 for safety labeling, 6.5.3 for additional instructional literature, and 7.2 for required producer's markings.

4.26 *Toys Intended to be Attached to a Crib or Playpen*— These requirements are intended to minimize entanglement or strangulation hazards that might be caused by toys intended to be attached to a crib or playpen (see also 4.14).

4.26.1 *Protrusions*— Toys attached to a crib or playpen in the manner prescribed by the manufacturer's instructions shall not have hazardous protrusions that could contribute to entanglement injury. This requirement is applicable before and after use and abuse testing in accordance with 8.5-8.10. Design guidelines are provided in Annex A3.

4.26.2 *Crib Mobiles*— Crib mobiles shall comply with the requirements listed in 5.6 for safety labeling and 6.3 for instructional literature.

4.26.3 *Crib Gyms*— Crib gyms, including crib exercisers and similar toys intended to be strung across a crib or playpen, shall comply with the requirements listed in 5.5 for safety labeling and 6.2 for instructional literature.

4.27 *Stuffed and Beanbag-Type Toys*— Stuffed and beanbagtype toys shall

meet the applicable requirements of this specification after being tested in accordance with 8.9.1.

4.28 *Stroller and Carriage Toys*— Stroller and carriage toys shall comply with the requirements for safety labeling in 5.7.

4.29 *Art Materials*— The purpose of this requirement is to minimize the potential risks associated with the use of art materials that present chronic health hazards.

4.29.1 Toys and components of toys that fall within the definition of art material as found in 16 CFR 1500.14 (b) (8) shall meet the requirements for toxicological review by a U.S. board-certified toxicologist. The protocol used to evaluate the art materials must be filed with the Consumer Product Safety Commission (CPSC), and the list of ingredients must also be filed with the commission if the material is or contains a chronically hazardous substance.

4.29.2 Toys and components of toys that are art materials and are determined to contain hazardous materials must have appropriate warnings as defined in the Federal regulations and as noted in 5.13 of this specification. Items that do not contain hazardous materials must also be labeled as to their conformity.

4.29.3 Toys and components of toys that have been determined to pose a chronic health hazard and require warnings are not suitable for use by children who are in pre-kindergarten, or grades one through six.

4.30 *Toy Gun Marking*— This requirement is intended to minimize the potential for a toy gun to be mistaken for a real firearm.

4.30.1 This requirement applies to all toy, look-alike, and imitation firearms which have the general appearance, shape, or configuration, or combination thereof, of a firearm. This includes, but is not limited to, nonfunctional guns, water guns, air soft guns, cap guns, light emitting guns, and guns with an opening to eject any nonmetallic projectile.

4.30.2 This requirement does not apply to the following types of guns:

4.30.2.1 Futuristic toy guns that do not have the general appearance, shape, or configuration, or combination thereof, of any firearm.

4.30.2.2 Nonfiring collector replica antique firearms that look authentic and may be a scale model but are not intended as toys.

4.30.2.3 Traditional B-B guns, paint ball guns, or pellet guns that expel a projectile through the force of compressed air, compressed gas, or mechanical spring action, or combination thereof.

4.30.2.4 Decorative, ornamental, and miniature objects having the appearance, shape, or configuration, or combination thereof, of a firearm provided that the objects measure no more than 1.50 in. (38 mm) in height by 2.75 in. (70 mm) in length, with the length measurement excluding any gun stock length measurement. This includes items intended to be displayed on a desk or worn on bracelets, necklaces, key chains, etc.

4.30.3 Items subject to this requirement must be marked or manufactured, or both, in any one of the following ways. The marking must be permanent and must remain in place after being tested in accordance with 8.5-8.10. The word “permanent” excludes the use of ordinary paint or labels for the purposes of this section. The “blaze orange” color referred to in 4.30.3.1 and 4.30.3.2 is Federal Standard 595a, Color 12199.

4.30.3.1 A blaze orange plug, or brighter orange colored plug, affixed into the muzzle end of the barrel as an integral part of the toy. The plug shall not be recessed more than 0.25 in. (6 mm) from the muzzle end of the barrel.

4.30.3.2 A blaze orange band, or brighter orange colored band, covering the circumference of the muzzle end of the barrel for a distance of at least 0.25 in. (6 mm).

4.30.3.3 Coloration of the entire exterior surface of the toy in white, bright red, bright orange, bright yellow, bright green, bright blue, bright pink, or bright purple, either individually or as the predominant color in combination with any other color in any pattern.

4.31 *Balloons*— Packages containing latex balloons and toys or games containing latex balloons shall comply with the labeling requirements of 16 CFR 1500.19. Labeling statements for balloons are contained in 5.11.5 of this specification.

4.32 *Certain Toys with Nearly Spherical Ends*— These requirements are intended to address a potential impaction hazard associated with nearly[13] spherical, hemispherical, circular flared or dome shaped ends on toys or components of toys.

[13] The term “nearly” is used here, consistent with the long standing and successful squeeze toy requirement.

4.32.1 Nearly spherical, hemispherical, circular flared, or dome-shaped ends of toys or components of toys must not be capable of penetrating the full depth of the cavity of the supplemental test fixture shown in Fig. 16 when tested under the force only of their own weight and in a noncompressed state. This requirement applies to toys if they meet all the following criteria:

4.32.1.1 The toy is intended for children up to the age of 18 months.

4.32.1.2 The toy or component containing the nearly spherical end weighs less than 1.1 lb (0.5 kg).

4.32.1.3 The nearly spherical, hemispherical, circular flared or dome shaped end adjoins a shaft, handle or support that has a smaller cross section.[14]

1. *Exclusion*—The requirement of 4.32.1 does not apply to softfilled (stuffed) toys or softfilled parts of toys or parts entirely of fabric.

[14] This sentence attempts to clarify that the requirements only apply to the nearly spherical end and not to nonspherical areas of the toy or component. In addition, the term “adjoins” replaces the term “attached” as the handle and spherical end may be all part of the same molded piece.

4.32.2 Nearly spherical, hemispherical, or dome-shaped ends of toy fasteners (for example, nails, bolts, screws, pegs) (see Fig. 17) must not be capable of penetrating the full depth of the cavity of the supplemental test fixture shown in Fig. 16 when tested under the force only of their own weight and in a noncompressed state. This requirement of 4.32.2 applies to toy fasteners if they meet all the following criteria:

4.32.2.1 They are intended for children aged at least 18 months but less than 48 months of age.

4.32.2.2 They have an overall length of 2.25 in. (57.1 mm) or greater.

Figure 17. Domed Ends 3 Domed ends are shown. One is a rod with a sphere on top. The second is a rod with a semi-sphere on top. The third is a rod with a small ring half-way up the rod and top of that is a cap that has a dome on the end.

Domed ends, with and without small flat in the center.

Figure 17b. Hemispherical Ends. Hemispherical ends are shaped like a nail with a slight curve to the top of the nail.

FIG. 17 Examples of Hemispherical and Domed Ends

4.32.2.3 Their nearly spherical, hemispherical or domed ends have a diameter equal to or greater than 0.6 in. (15 mm).

4.32.2.4 The distance from the apex of the fastener to the undercut is 1.75 in. (44.4 mm) or less as shown in Fig. 18.

1. *Exclusions*—The requirement of 4.32.2 does not apply to the following toy fasteners:
    a. Softfilled (stuffed) or fabric fasteners,
    b. Fasteners with nonrigid ends, and
    c. Fasteners tethered to a toy where the weight of the combined toy/fastener is more than 1.1 lb (0.5 kg) and the length of the tether is less than 12 in. (300 mm).

Figure 18. Undercut and Diameter A rod with with a domed end on top is shown. The domed end is wider than the rod. From one side of the cap (the domed end) is labelled "diameter of spherical or hemispherical or domed end." From the top of the cap to the bottom, where it attaches to the rod, is labelled "distance to undercut section from domed end." Diameter of spherical orhemispherical or domedend Distance to undercut sectionfrom domed end

FIG. 18 Undercut and Diameter

4.32.3 *Preschool Play Figures*— This requirement is intended to address the potential choking/obstruction hazard associated with certain preschool figures intended for children under three years of age. The characteristics that distinguish toy figures falling within the scope of this requirement include: (1) a round, spherical, or hemispherical end with tapered neck attached to a simple cylindrical shape without appendages, and (2) an overall length not exceeding 2.5 in. (64 mm) (see examples in Fig. 19). This includes figures with added or molded features such as hats or hair, which retain the rounded shape of the end.

Figure 19. Examples of Preschool Play Figures The diagram has three examples of playschool figures. One has a baseball cap, one is bald, one has hair.

FIG. 19 Examples of Preschool Play Figures

4.32.3.1 Preschool play figures intended for children under three years of age shall be designed so that their rounded ends are not capable of entering and penetrating to the full depth of the cavity in the supplemental test fixture

illustrated in Fig. 16. Test the play figure under the force of its own weight.

4.32.3.2 *Exclusion*— The requirement of 4.32.3.1 shall not apply to soft play figures made of textiles.

4.33 *Marbles*— Marbles shall comply with the labeling requirements of 16 CFR 1500.19. Labeling statements for marbles are contained in 5.11.4 of this specification.

4.33.1 Toys and games intended for children at least 3 years of age but less than 8 years of age that contain a marble shall comply with the labeling requirements 16 CFR 1500.19. Applicable labeling statements are contained in 5.11.4.1 of this specification.

4.34 Balls

4.34.1 Balls intended for children under 36 months of age are subject to the requirements of 16 CFR 1500.18 (a) (17). A loose ball in toys intended for children under 36 months of age shall not, under the influence of its own weight and without compression, pass entirely through the template shown in Fig. 20. A ball which does pass through the template is determined to be a "small ball."

Figure 20. Test Fixture for Small Balls The test fixture is a square of 2.86 inchdes per side with a 1.75 inch diameter circle inside. This is the top view. The size view indicates that the device is 0.25 inchdes high. 2.86 in.(72.6 mm) 2.86 in.(72.6 mm) 0.25 in.(6 mm) 1.75 in.(44.5 mm)

FIG. 20 Test Fixture for Small Balls

4.34.2 Toys intended for children at least 3 years old but less than 8 years of age that contain a loose small ball are subject to the requirements of 16 CFR 1500.19. Applicable labeling statements are contained in 5.11.3 of this specification.

4.35 *Pompoms*— These requirements are intended to address choking hazards associated with pompoms on toys intended for children under three years of age that detach during 8.16. Pompoms detached during 8.16 must not pass entirely through the 1.75-in. (44.5-mm) test fixture (see Fig. 20) under their own weight. Any components, pieces, or individual strands of the pompom that are liberated during the torque and tension tests should not be subject to this test. Test the pompoms by putting the free ends of fiber into the gauge.

4.36 *Hemispheric-Shaped Objects*— These requirements apply to toy cup-,

bowl-, or one-half egg-shaped objects having a nearly round, oval, or elliptical opening with the minor and major inner dimensions between 2.5 in. (64 mm) and 4.0 in. (102 mm), a volume of less than 6.0 oz (177 mL), a depth greater than 0.5 in. (13 mm), and intended for children under 3 years of age. The following are exempt from this requirement:

4.36.1 Objects intended for drinking (for example, tea cups).

4.36.2 Objects intended to hold liquids in products appropriate for children at least 2 years old (for example, pots and pans).

4.36.3 Containers that must be airtight so the contents can maintain their functional integrity (for example, modeling clay containers.)

4.36.4 Non-detachable (as determined by testing in accordance with 8.6-8.10 of this specification) components of larger products (for example, bowl-shaped smoke stack that is permanently attached to a toy train or a swimming pool that is molded into a larger toy playscape).

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4.36.5 Containers that are part of the retail package intended to be discarded once the toy is removed from the package.

4.36.6 *Performance Requirements*— Cup/bowl/one-half egg-shaped objects must have, as a minimum, one of the following characteristics (*a*, *b*, *c*, *d*, or *e*). For purposes of these requirements, unless otherwise specified, an opening is defined as a hole of any shape with a minor dimension of 0.080 in. (2 mm). These requirements apply before and after testing in accordance with 8.6-8.10 of this specification.

a. Have at least two openings that are a minimum of 0.5 in. (13 mm) from the rim as measured along the outside contour.

1. If the openings are placed in the base of the object, at least two of the openings must be a minimum of 0.5 in. (13 mm) apart. (See Fig. 21.)

2. If the openings are not placed in the base of the object, at least two of the openings must be placed at least 30° but not more than 150° apart. (See Fig. 22.)

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b. The plane of the open end of the cup shape shall be interrupted at the center by some type of divider that extends to 0.25 in. (6 mm) or less from the plane of the open end of the cup. (See Fig. 23 for an example.)

c. Have three openings that are at least 100° apart, located between 0.25 in. (6 mm) and 0.5 in. (13 mm) from the rim as measured along the outside contour.

d. Have a repeating scalloped edge pattern around the entire rim. The maximum distance between center lines of adjacent peaks shall be 1 in. (25 mm) and the minimum depth shall be 0.25 in. (6 mm). (See Fig. 24 for examples of scalloped edge patterns.)

e. Have an opening with a minor dimension of at least 0.66 in. (17 mm) located anywhere in the base or in the side wall of the object. If the opening is located in the sidewall of the object, the edge of the opening must be at least 0.5 in. (13 mm) from the rim as measured along the outside contour.

Figure 21. Openings in Base of Bowl On the left, a side view of a bowl shows two holes in the bottom. It is labelled "Section A-A". From the top, a circle is shown with the holes in the the bottom. Each hole is labelled A. There must be a minimum distance of 0.5 inchdes between the holes. SECTION A _ A 0 . 5 in. Min.(13 mm) A A

FIG. 21 Openings in Base of Bowl

Figure 22. Opening Placement There are two diagrams. On the left is a cirlce with two small holes. One is on the far right of the bowl near the edge. The other is on the left near the edge but up a bit from the center. Arrows indicate that these wholes are to be 150 degrees maximum and 30 degrees minimum in separation. The right diagram shows a bow and indicates that a hole must be 0.5 inchdes minimum from the top. 150° Max. to 30° Min. 0 . 5 in. Min.(13 mm)

FIG. 22 Opening Placement

Figure 23. Rib Through Cup Center. There are two diagrams. The left is a semi-circle representing a cup with a rib protruding from the botom. The rib must be 0.25 inchdes maximum from the top of the cup. The widest distance from one side to the other is labelled Section A-A. SECTION A - A 0 . 25 in. Max.(6 mm) A A

FIG. 23 Rib Through Cup Center

Figure 24. Scalloped Edge Pattern Three examples of half-spheres with scalloped edges are shown. One is gently undulating edges. The other is a sharp set of scallops. The third is a set of notches.

FIG. 24 Scalloped Edge Pattern

4.37 *Yo Yo Elastic Tether Toys*— These requirements are intended to address

potential strangulation hazards associated with yo yo elastic tether toys intended for children 36 months and over.

24 4.37.1 Toys with an end mass greater than 0.02 kg (0.044 lb) shall have a tether length less than 50 cm (20 in.) measured when the toy is rotating at any speed up to a maximum speed of 80 r/min. Testing shall be conducted in accordance with 8.23.

4.37.2 *Exemptions*:

1. Paddle balls.
2. Sports balls with wrist or ankle straps longer than 70 cm (27.6 in.) intended to be kicked or thrown and returned to the user. The length of the strap shall be measured when the product is placed on a horizontal surface with no load.

4.38 *Magnets*— This requirement is intended to address ingestion hazards associated with toys intended for children up to 14 years of age that contain a hazardous magnet. This requirement does not apply to magnets used in motors, relays, speakers, electrical components, and similar devices where the magnetic properties are not part of the play pattern of the toy.

25 4.38.1 Toys must not contain a loose as-received hazardous magnet or a loose as-received hazardous magnetic component.

4.38.2 Toys shall not liberate a hazardous magnet or a hazardous magnetic component after being tested in accordance with 8.8 and 8.9 and magnet use and abuse testing as specified in 8.24.

4.38.3 Hobby, craft, and science kit-type items intended for children over 8 years of age, where the finished product is primarily of play value, that contain a loose as-received hazardous magnet or a loose as-received hazardous magnetic component, or both, are exempt from the requirements of 4.38.1 and 4.38.2 provided they comply with the requirements for safety labeling described in 5.17.

4.39 Jaw Entrapment in Handles and Steering Wheels

4.39.1 These requirements are intended to address potential jaw entrapment in handles and steering wheels that are located such that they are accessible for teething in the following categories of toys intended for children under 18 months of age: activity tables intended to be played with by a standing child, large bulky toys, stationary floor toys, push toys intended to be pushed by a

child walking upright, and ride-on toys.

4.39.2 Handles that are connected to the toy with a hinge and handles made from a pliable material (for example, straps and ropes) are exempt from this requirement.

4.39.3 Openings in handles and steering wheels that allow a 0.75 by 0.75 by 1 in. (1.9 by 1.9 cm by 2.5 cm) test fixture to pass completely through must also allow a 1.5 by 2.5 by 1 in. (3.8 by 6.35 by 2.5 cm) test fixture to pass completely through (see Fig. 25). Test fixtures can be made of any rigid material. The test fixture shall be oriented such that the 0.75-in. (1.9-cm) dimension and the 2.5-in. (6.35-cm) dimension is parallel with the major dimension of the handle or steering wheel opening.

Figure 25. Jaw Entrapment A rectangular block with a an arch connected to the top is shown in two views. On the left view, a block that is 2.5 x 1.5 inches and 1 inch deep is being inserted through the arch. On the second diagram, the block is 0.75 x 0.75 inches and one inch deep.

FIG. 25 Jaw Entrapment

5. Labeling Requirements

5.1 *Federal Government Requirements*— All toys that fall within the definitions and requirements of the U.S. FHSA shall conform to the labeling requirement of that act. For specific requirements, reference 16 CFR 1500.3, 1500.14, 1500.19, 1500.82, 1500.83, 1500.86, 1500.121, 1500.122, 1500.123, 1500.125, 1500.126, 1500.127, 1500.128, 1500.130, 1505.3, and 1511.7. In addition, state labeling requirements may exist.

5.2 *Age Grading Labeling*— Toys that are subject to any of the requirements of this specification should be labeled to indicate the minimum age for intended use or have such labeling on any retail packaging. If the toy or toy package is not age labeled in a clear and conspicuous manner or, based on such factors as marketing practices and the customary patterns of usage of the toy by children, is inappropriately age labeled, the toy shall be subjected to the most stringent applicable requirements within this specification. (Examples: (1) a tensile force of 15 lbf (67 N) shall be required instead of 10 lbf (45 N) when testing in accordance with 8.9 if no limiting age range is specified; (2) the “highest age of the age range” in 4.15 would be 14 years, the maximum age addressed in the scope of this specification.)

5.2.1 For certain toys, such as costumes and riding toys, it may also be appropriate to label the toy or its package, or both, in terms of height or

weight limitations.

5.2.2 Guidelines for determining the appropriate age grade for toys are provided in Annex A1 of this specification.

5.3 *Safety Labeling Requirements*— Certain toys, and in some cases their packages, are required to carry safety labeling to comply with this specification.

5.3.1 Required safety labeling shall consist of an alert symbol (an exclamation mark within an equilateral triangle), a signal word (CAUTION or WARNING), and text that describes the hazard that is present. Additionally, safety labeling may contain text about what to do or not to do to avoid injury (for example, “Keep out of baby’s reach”). The signal word shall be in all upper case sans serif letters not less than ⅛ in. (3.2 mm) in height and shall be center or left aligned. The alert symbol shall directly precede the signal word. The height of the triangle shall be at least the same height as the signal word. The height of the exclamation point shall be at least half the height of the triangle and be centered vertically in the triangle. Text describing the hazard(s) and hazard avoidance behavior(s) shall appear in sans serif lettering and shall be either left aligned or center justified. Capital letters shall be no less than 1/16 in. (1.6 mm). Recognizing space constraints, it is recommended, that where possible, such text begin on the next line below the signal word, and that a new line be used for each subsequent statement or separate thought.

5.3.2 Sections 5.4, 5.5, 5.6, 5.7, 5.11, and 5.15 require the signal word WARNING. When no signal word is specified for safety labeling in accordance with 5.3, it is recommended that the signal word CAUTION be used to indicate a potentially hazardous situation which could result in minor or moderate injury, and that the signal word WARNING be used to indicate a potentially hazardous situation which could result in death or serious injury.

5.3.3 Sections 5.11 and 5.15 specify required text describing the hazard(s) and hazard avoidance behavior(s). When no required text is specified for safety labeling in accordance with 5.3, the text is left to the discretion of the manufacturer. Sections 5.4, 5.5, 5.6, 5.7, and 5.15.1.1 provide recommended text to describe the hazard(s) and hazard avoidance behavior(s).

5.3.4 The required safety labeling described throughout Section 5 shall be on the principal display panel.

5.3.5 For toy items packed as premiums in or on a package containing other

items, safety labeling shall be on the toy package, and similar labeling shall appear on the larger package.

5.3.6 All safety labeling shall be conspicuous and legible, shall be separated distinctively from any other wording or designs, and shall appear in the English language at a minimum. Such labeling shall be clearly visible to the intended audience and shall be in a color contrasting with the background on which it appears.

5.3.7 When safety labeling is printed onto the toy itself using a decoration process such as hot stamping, silk screening, or a similar process, it shall remain legible after normal use and reasonably foreseeable abuse when tested in accordance with 8.5-8.10.

5.3.8 When safety labeling is affixed to a toy in the form of an applied label, the label shall be applied so that it adheres firmly to the toy and none of its edges is lifted off the surface of the toy. Such label shall remain legible after normal use and reasonably foreseeable abuse when tested in accordance with 8.5-8.10.

5.4 *Aquatic Toys*— Aquatic toys and their packages shall carry safety labeling in accordance with 5.3, consisting of the signal word "WARNING" and contain, at a minimum, the following text or equivalent text which clearly conveys the same warning: *This is not a lifesaving device. Do not leave child unattended while device is in use.* In addition, no advertising copy or graphics shall state or imply that the child will be safe with such a toy if left unsupervised.

5.5 *Crib and Playpen Toys*— This requirement is applicable to toys intended to be strung across a crib or playpen by means of string, cord, elastic, or straps (including, but not limited to, crib exercisers, crib gyms, and activity toys).

5.5.1 *Age Grading*— Crib and playpen toys, as well as their packages, shall be labeled with the following text or equivalent information (text or graphic), which clearly conveys the age grade: *from birth to 5 months*.

5.5.2 *Safety Labeling*— Crib and playpen toys shall carry safety labeling, in accordance with 5.3, consisting of the signal word "WARNING" and contain, at a minimum, the following text or equivalent text which clearly conveys the same warning: *Possible entanglement or strangulation. Remove toy when baby begins to push up on hands and knees.*

5.6 *Mobiles*— This section addresses all mobiles intended to be attached to a crib, playpen, wall, or ceiling.

5.6.1 *Age Grading*— Mobiles intended to be attached to a crib or playpen, as well as their packages, shall be labeled with the following text or equivalent information (text or graphic), which clearly conveys the age grade: *from birth to 5 months*.

5.6.2 *Safety Labeling*:

5.6.2.1 Mobiles intended to be attached to a crib or playpen, and mobiles intended to be attached to a crib or playpen and later moved to a wall or ceiling, as well as their packages, shall carry safety labeling in accordance with 5.3. The labeling shall consist of the signal word "WARNING" and contain, at a minimum, the following text or equivalent text which clearly conveys the same warning: *Possible entanglement injury. Keep out of baby's reach. Remove mobile from crib or playpen when baby begins to push up on hands and knees.*

5.6.2.2 Mobiles intended to be attached only to a wall or ceiling, as well as their packages, shall carry safety labeling in accordance with 5.3. The labeling shall consist of the signal word "WARNING" and contain, at a minimum, the following text or equivalent text which clearly conveys the same warning: *Possible entanglement injury. Keep toy out of baby's reach*.

5.7 *Stroller and Carriage Toys*— Toys intended exclusively to be strung across strollers or carriages by means of string, cords, elastic, or straps shall carry safety labeling in accordance with 5.3. The labeling shall consist of the signal word "WARNING" and contain, at a minimum, the following text or equivalent text which clearly conveys the same warning: *Possible entanglement or strangulation injury when attached to crib or playpen. Do not attach to crib or playpen*.

5.8 *Toys Intended to be Assembled By an Adult*— Packages of toys that are intended to be assembled by an adult and that in their unassembled state contain potentially hazardous sharp edges or points, or small parts if the toy is intended for children under 3 years of age, shall carry safety labeling in accordance with 5.3 stating that the toy is to be assembled by an adult.

5.9 *Simulated Protective Devices*— Toys that simulate safety protective devices (examples include, but are not limited to, construction helmets and sports helmets), as well as their packages, shall carry safety labeling as defined in 5.3, stating that these toys are not safety protective devices.

5.10 *Toys with Functional Sharp Edges or Points*— Toys that are intended for

use by children between the ages of 48 and 96 months, which contain accessible potentially hazardous sharp edges or sharp points that are a necessary part of the function of the toy, shall carry safety labeling on their packages as defined in 5.3, stating that a sharp edge or sharp point, or both, exists.

5.11 Small Objects, Small Balls, Marbles, and Balloons

5.11.1 The packages of small balls, marbles, balloons, and certain toys and games, any descriptive material that accompanies them, and, if unpackaged and unlabeled, any retail display container provided by manufacturers or importers shall carry safety labeling in accordance with 16 CFR 1500.19(b).

5.11.1.1 In accordance with 16 CFR 1500.19(d), all labeling statements required by 5.11 shall appear at least in the English language on the principal display panel (except under 5.11.7) and shall be blocked together within a square or rectangular area, with or without a border. The label design, the use of vignettes, or the proximity of other labeling or lettering shall not obscure or render inconspicuous any labeling statement.

5.11.1.2 The statements required by 5.11 must appear on at least two lines and appear on a solid background and be separated from all other graphic material by a space no smaller than the minimum allowable height of the type size for "other cautionary material" (for example the phrase "Not for children under 3 yrs."). If not separated by that distance, the labeling statements must be surrounded by a border line.

5.11.1.3 All labeling statements required by 5.11 shall comply with the following type size requirements based on the computed area of the principal display panel. For these purposes, Signal Word means the word "Warning" and the words "Safety Warning"; Statement of Hazard means "Choking Hazard"; Other Material means all other remaining statements.

Area, in.²	0-2	+2-5	+5-10	+10-15	+15-30	+30-100	+100-400	+400
Type Size—Signal Word	3/64 in.	1/16 in.	3/32 in.	7/64 in.	1/8 in.	5/32 in.	1/4 in.	1/2 in.
Type Size—Statement of Hazard	3/64 in.	3/64 in.	1/16 in.	3/32 in.	3/32 in.	7/64 in.	5/32 in.	1/4 in.
Type Size—Other Material	1/32 in.	3/64 in.	1/16 in.	1/16 in.	5/64 in.	3/32 in.	7/64 in.	5/32 in.

5.11.1.4 An equilateral triangle with an exclamation point (shown in 5.11.2)

shall precede the signal word. The height of the triangle shall be equal to or exceed the height of the letters of the signal word "WARNING" and separated from it by a distance at least equal to the space occupied by the first letter of the signal word. The height of the exclamation point shall be at least half the height of the triangle, and be centered vertically in the triangle.

5.11.2 For toys and games intended for children at least 3 years old but less than 6 years of age, and which contain as-received small part(s), the labeling shall read:

WARNING:
CHOKING HAZARD—Small parts.
Not for children under 3 yrs.

5.11.3 For any small ball intended for children 3 years of age or older the labeling shall read:

WARNING:
CHOKING HAZARD—Toy contains a small ball.
Not for children under 3 yrs.

5.11.3.1 For any toy or game intended for children who are at least 3 years old but less than 8 years of age that contains a small ball the labeling shall read:

WARNING:
CHOKING HAZARD—Toy contains a small ball.
Not for children under 3 yrs.

5.11.4 For any marble intended for children 3 years of age or older the labeling shall read:

WARNING:
CHOKING HAZARD—This toy is a marble.
Not for children under 3 yrs.

5.11.4.1 For any toy or game intended for children who are at least 3 years of age but less than 8 years of age that contains a marble the labeling shall read:

WARNING:
CHOKING HAZARD—Toy contains a marble.
Not for children under 3 yrs.

5.11.5 For any latex balloon or any toy or game that contains a latex balloon, the labeling shall read:

WARNING:
CHOKING HAZARD—Children under 8 yrs. can choke or suffocate on uninflated or broken balloons.
Adult supervision required.

Keep uninflated balloons from children.
Discard broken balloons at once.

5.11.6 *Combination of Labeling Statements*— The labels of products that contain more than one item subject to the requirements of 5.11 may combine information, if the condensed statement contains all of the information necessary to describe the potential hazard associated with each product. For products that contain a balloon *and* a small ball, small object, or marble, only the signal word and statement of hazard may be combined.

5.11.7 *Alternative Labeling Statements for Items Subject to the Requirements of 5.11*— Labeling statements on small packages of toys or balloons that have a principal display panel of 15 $in.^2$ or less and that display cautionary statements in three or more languages may appear on a display panel other than the principal display panel if the principal display panel bears the appropriate statement below and bears an arrow or other indicator pointing toward or directing the purchaser's attention to the display panel on the package where the full labeling statement appears.

5.11.7.1 For a toy or game that is or contains a small object, small ball, or marble:

SAFETY WARNING

5.11.7.2 For a balloon or a toy or game that contains a balloon:

WARNING—Choking Hazard

5.12 *Toy Caps*— Refer to 16 CFR 1500.86 for required labeling.

5.13 *Art Materials*— Toys and components of toys that fall within the definition of art material as found in 16 CFR 1500.14 (b) (8) shall be labeled in accordance with the provisions of that section and Practice D4236.

5.14 *Electric Toys*— Refer to 16 CFR 1505.3 for required labeling.

5.15 *Battery-Operated Toys*— Toys with non-replaceable batteries that are accessible with the use of a coin, screwdriver, or other common household tool shall bear a statement that the battery is not replaceable. If the manufacturer determines that it is impractical to label the product, this

information shall be placed on the packaging or in the instructions.

5.15.1 *Battery-Powered Ride-on Toys*:

5.15.1.1 Battery powered ride-on toys shall carry safety labeling in accordance with 5.3, consisting of the signal word "WARNING" and contain, at a minimum, text which clearly conveys the following:

a. To reduce the risk of injury, adult supervision is required. Never use in roadways, near motor vehicles, on or near steep inclines or steps, swimming pools or other bodies of water; always wear shoes, and never allow more than ____ rider(s)

b. RISK OF FIRE. Do not bypass. Replace only with ____. (Note: This warning must be placed at the location of any user replaceable fuse or circuit protection device. Manufacturer should state the part number or equivalent.

5.15.1.2 The packaging or point-of-sale literature of batterypowered ride-on toys shall state the manufacturer's recommended user age or weight limitations for use of the toy, or both.

5.15.1.3 The packaging or point-of-sale literature of batterypowered ride-on toys shall bear the warnings as specified in 5.15.1.

5.16 *Promotional Materials*— Packaging, literature accompanying toys, and point-of-sale presentations shall not use words, statements, or graphics that are inconsistent in any way with the safety labeling instructions for use or assembly or age grading of the toy.

5.17 *Magnets*— The packaging and instructions of hobby and crafts items and science kit-type items for children over 8 years of age which contain a loose as-received hazardous magnet or a loose as-received hazardous magnetic component shall carry safety labeling in accordance with 5.3. The labeling shall consist of the signal word "WARNING" and contain, at a minimum, the following text or equivalent text which clearly conveys the same warning: *"This product contains (a) small magnets(s). Swallowed magnets can stick together across intestines causing serious infections and death. Seek immediate medical attention if magnet(s) are swallowed or inhaled."*

6. Instructional Literature

6.1 *Definition and Description*— Information and instructions that are provided

for the safe use or assembly, or both, of a toy, whether on the package or in leaflet form, shall be easy to read and understand by persons of the age level for whom the instructions and information are intended, including, if appropriate, children for whom the toy is intended. All such literature shall be shown in the English language at a minimum.

6.2 *Crib and Playpen Toys*— Toys intended to be strung across a crib or playpen by means of string, cords, elastic, or straps (including, but not limited to, crib exercisers, crib gyms, and activity toys) shall be provided with instructions for proper assembly, installation, and use to insure that the product does not present an entanglement or strangulation hazard. The instructions shall include at least the following information:

6.2.1 This toy is not intended to be “mouthed” by the baby and should be positioned clearly out of reach of the baby’s face and mouth.

6.2.2 On cribs with adjustable mattress levels, the highest position may allow the toy to be too close to the baby. The second or lower position is more appropriate.

6.2.3 The drop side of the crib should never be lowered with the toy in place and the baby left unattended.

6.2.4 Always attach all provided fasteners (strings, straps, clamps, etc.) tightly to a crib or playpen according to the instructions. Check frequently.

6.2.5 Do not add additional strings or straps to attach to a crib or playpen.

6.3 *Mobiles*— Mobiles intended to be mounted on a crib, playpen, or wall or ceiling nearby shall be provided with instructions for proper assembly, installation, and use to insure that the product does not present an entanglement hazard. The instructions shall include at least the following information:

6.3.1 A crib mobile is intended for visual stimulation and is not intended to be grasped by the child.

6.3.2 If attached to the crib or playpen, remove when baby begins to push up on hands and knees. If so designed, mount on wall or ceiling clearly out of a standing baby’s reach.

6.3.3 If mounted on a wall or ceiling, install the mobile clearly out of a standing baby’s reach.

6.3.4 Always attach all provided fasteners (strings, straps, clamps, etc.) tightly to a crib or playpen according to the instructions. Check frequently.

6.3.5 Do not add additional strings or straps to attach to a crib or playpen.

6.4 *Toys Intended to be Assembled By an Adult*— Assembly instructions that accompany toys that are intended to be assembled by an adult and that in their unassembled state contain potentially hazardous sharp edges or sharp points, or small parts if the toy is intended for children under 3 years of age, shall carry safety labeling as defined in 5.3 and also state that the toy is to be assembled by an adult.

6.5 *Battery-Operated Toys*— For toys that use more than one battery in one circuit, the instructions or the toy shall be marked with the following (or equivalent) information.

6.5.1 Do not mix old and new batteries.

6.5.2 Do not mix alkaline, standard (carbon-zinc), or rechargeable (nickel-cadmium) batteries.

6.5.3 Instructions supplied with battery-powered ride-on toys shall contain guidance for safe use and maintenance of the toy. The instructions shall include at least the following:

6.5.3.1 Maximum weight or age limitations, or both, for safe use of the toy,

6.5.3.2 The kinds of surfaces which are appropriate for safe use of the toy,

6.5.3.3 The warning statements contained in 5.15.1.1,

6.5.3.4 Only use the battery(ies) specified by the manufacturer, and

6.5.3.5 Only use the charger(s) specified by the manufacturer.

6.6 *Toys in Contact with Food*— The packages or instructions, or both, for toys and their components intended to be used in contact with food shall be labeled to alert caregivers to wash the product thoroughly before use.

7. Producer's Markings

7.1 Either a principal component of a toy or the package of a toy shall be marked with the name and address of the producer or the distributor. In the case of toys sold in bulk, such as jacks or marbles, only the container need be

marked. All of these markings shall be legible and so positioned as to be seen easily by the customer and shall resist normal use conditions. Toys may carry a code that will enable the producer to identify model changes except for toys comprising many loose components, in which case the container may be so coded.

7.2 *Battery-Powered Ride-on Toys*— Battery-powered ride-on toys shall bear a permanent label or marking identifying the manufacturer or distributor, place of business, the model numbers, and a date of manufacture or date code that will allow determination of, at a minimum, the month and year of manufacture.

8. Test Methods

8.1 *General*— The inspection and test procedures contained herein are to be used to determine the conformance of products to the requirements of this specification. All types of toys covered by this specification must undergo the normal use and abuse tests in accordance with 8.5-8.10. The remaining tests in this section apply to types of toys as specified within the requirements of Section 4. The relevant tests for a type of toy can be performed in any order except where specified. Each test may be conducted on a different toy unless otherwise specified. The tests can be considered as qualification tests and not necessarily as quality control tests. These tests shall also be conducted when there is a design or material change in the toy. Each producer or distributor who represents his products as conforming to this specification may use statistically based sampling plans that are appropriate, but he shall keep such essential records as are necessary to document with a high degree of assurance his claim that all of the requirements of this specification have been met. Any test methods that are made mandatory by the CPSC shall supersede any applicable test methods in this section.

8.2 *Testing for Hazardous Substance Content*— The applicable sections of 16 CFR, issued under the FHSA to be used for determining the presence of hazardous substances, are given in Table 4. The references in Table 4 refer to the regulations issued on Sept. 27, 1973.

NOTE 6 — The latest issue of the regulation shall be used to determine compliance of the toy with the requirements of this specification. The requirements of the FHSA are mandatory by law.

TABLE 4 Determination of Hazardous Substance Content

Hazardous Substance	Regulation (Title 16 CFR)

Toxic substance	1500.3(b)5, 1500.3(c)2, and 1500.40
Corrosive substance	1500.3(b)7, 1500.3(c)3, and 1500.41
Irritant substance	1500.3(b)8, 1500.3(c)4, 1500.41, and 1500.42
Strong sensitizer	1500.3(b)9, 1500.3(c)5, and 1500.13
Pressure-generating substance	1500.3(c)7
Radioactive substance	1500.3(b)11 and 1500.3(c)8
Flammability	1500.3(b)10, 1500.3(c)6, 1500.43, and 1610.

8.3 Test Methods for Determination of Heavy Element Content in Toys, Toy Components and Materials

8.3.1 *Total Element Content Screening*:

8.3.1.1 Toy material under test is to be digested per the appropriate CPSC Method:

1. CPSC-CH-E1001-08.1 (metal substrates)
2. CPSC-CH-E1002-08.1 (non-metal substrates)
3. CPSC-CH-E1003-09 (paint and similar surface-coating materials)

8.3.1.2 With the following modification: Concentrated HNO digestant is to be replaced with aqua regia (three parts concentrated HCl to one part concentrated HNO). Glass and ceramic components shall be digested using three parts HF to one part HNO . Certain polymeric materials such as PVC and CPVC may require use of three parts concentrated HNO to one part 30 % H O for complete digestion; in all cases, knowledge-based adjustments to the above digestant mixtures on a case-by-case basis may be necessary for products made from certain materials, and are allowable so long as complete digestion is achieved and avoidance of formation of insoluble metal salts is taken into consideration. In all cases, the use of concentrated H SO_4 is to be avoided to reduce the possibility of the formation of insoluble metal sulfates.

8.3.1.3 Resulting digested material is to be filtered and diluted as prescribed, then analyzed by atomic spectroscopy or other appropriate validated method for total content of all eight elements listed in Table 1 and Table 2; if results are below soluble limits for each element as prescribed in the appropriate table, the material can be considered to conform to requirements of 4.3.5 or 4.3.5.2, or both, without further testing. If soluble limits in the appropriate table are exceeded, additional testing per 8.3.2 (for paint and similar surface-coating materials) or 8.3.5 (substrate materials) will be required to confirm compliance. In addition, if the toy or toy component is a metallic small part, it is to be tested per 8.3.5.5(3). Composite samples of up to three

like materials (for example, three colors of polystyrene plastic) are acceptable (if performed in accordance with Annex A7) for total element screening, but not for soluble element testing if such is required.

NOTE 7 — With the exception of required total lead content testing (see 4.3.5.1), it may be elected to omit total element screening and perform only soluble element testing per 8.3.2-8.3.6.

8.3.2 *Method to Dissolve Soluble Matter for Surface Coatings*— Soluble elements are extracted from toys under conditions that simulate the situation in which the materials stay 4 h in the alimentary tract after swallowing. The content of soluble elements in the extract is determined.

8.3.2.1 *Apparatus*— Normal laboratory apparatus and the following:

1. *Metal Sieve*, plain weave wire mesh stainless steel metal sieve with a nominal opening of 0.5 mm and the following specifications: *(a)* Nominal wire diameter: 0.315 µm; *(b)* Maximum size deviation for an individual opening: ±0.090 µm; *(c)* Tolerance for average opening: ±0.018 mm; and *(d)* 6 % or fewer of the openings to exceed the nominal plus 0.054 mm.
2. *pH*, a means of measuring pH with a minimum accuracy of 0.2 pH units.
3. *Membrane Filter*, with a pore size of 0.45 µm.
4. *Centrifuge*, capable of centrifuging at 5000 ± 500 x *g* RCF (*g* = 9.80665 m/s^2)
5. A means to constantly agitate the mixture at a temperature of 37 ± 2°C.
6. Container, of gross volume between 1.6 and 5.0 times that of the volume of HCL extractant.

8.3.2.2 *Reagents*— Use only reagents of recognized analytical grade during the analysis.

1. Hydrochloric acid (HCl) solution; concentration = (0.07 ± 0.005) mol/l.
2. Hydrochloric acid (HCl) solution; concentration = (0.14 ± 0.010) mol/l.
3. Hydrochloric acid (HCl) solution; concentration = approximately 1 mol/l.

4. Hydrochloric acid (HCl) solution; concentration = 2 mol/l.

5. Hydrochloric acid (HCl) solution; concentration = approximately 6 mol/l.

6. n-heptane, ($C H_{16}$); 99 %.

7. Water, of at least grade 3 purity in accordance with Specification D1193 or ISO 3696.

8.3.3 *Preparation of Test Samples*— A laboratory sample for testing shall consist of a toy in the form in which it is marketed, excluding the package and packaging components.

8.3.3.1 The test sample shall be taken from the accessible portions of a single toy sample.

8.3.3.2 Identical materials in the sample may be combined and treated as a single sample. A single sample may not consist of more than one material or color (that is, composite testing is not allowed).

8.3.3.3 The test sample can alternatively be taken from materials in a form such that they are representative of the relevant material specified above.

8.3.3.4 When a toy is intended to be taken apart or can be taken apart without the use of tools, each piece shall be considered separately.

8.3.3.5 For reference purposes, the sample may be taken from the raw material rather than scraped from the sample.

8.3.3.6 Scrape the coating off the test sample, and grind it through the sieve. Obtain a portion of not less than 100 mg of the resulting material.

1. Where there is only between 10 and 100 mg of uniformly ground material available, test that quantity and calculate the results as if 100 mg of the sample had been available. The report should note this procedure and the actual sample amount.

2. If there is less than 10 mg of sample available, the test is not performed.

3. In the case of coatings that by their nature cannot be ground (for example, elastic, rubber, or plastic paint), test the sample as it was removed from the toy.

NOTE 8 — The methods and exclusions given in 8.3.3.1 do not apply to surface coatings being tested for total lead content as required by 16 CFR 1303. Total lead determination under CPSC requirements at 16 CFR 1303 applies to any coating that can be scraped off, regardless of the amount, with results calculated based on the actual sample weight.

8.3.4 *Test Procedures*:

8.3.4.1 Prepare a test portion in accordance with 8.3.3.

8.3.4.2 Mix the test portion so prepared with 50 times its mass of an aqueous solution of 0.07 mol/L hydrochloric acid at 37 ± 2°C. In the case of a test portion of less than 100 mg, mix the test portion with 5.0 mL of this solution at the given temperature. Shake for 1 min.

1. Check the acidity of the mixture. If the pH is greater than 1.5, add dropwise while shaking an aqueous solution of 2 mol/L (7.3 % m/m) hydrochloric acid until the pH is between 1.0 and 1.5. Protect the mixture from light. Shake the mixture efficiently for 1 h continuously, and then allow the mixture to stand for 1 h at 37 ± 2°C.

2. Without delay, separate the solids from the mixture by filtration through a membrane filter with a pore size of 0.45 µm. If necessary, centrifuge at 5000 g for no longer than 10 min. Analyze the solution by atomic spectroscopy or other appropriate validated method to determine the concentration of the elements identified in 4.3.5.1. If it is not possible to examine the sample within one working day, stabilize by the addition of hydrochloric acid so that the resulting solution HCl concentration is approximately 1 mol/L.

NOTE 9 — It has been shown that the extraction of soluble cadmium can reveal a two-fold to five-fold increase when extraction is conducted in the light rather than the dark.

8.3.4.3 The analytical results as determined in 8.3.4.2 shall be adjusted by subtracting the analytical correction factor in the following table using the following method. This is necessary to make statistical correction for interlaboratory error.

Analytical Correction

Element	Sb	As	Ba	Cd	Cr	Pb	Hg	Se
Analytical correction, %	60	60	30	30	30	30	50	60

1. Example of Calculations Using the Table:

Example 1—The analytical result for lead is 120 mg/kg; the correction factor from the table is 30 % (0.30). Adjusted analytical results = 120 – (120 0.30) = 120 – 36 = 84 mg/kg.

The result does not exceed the allowed value for lead in the table and is therefore acceptable.

Example 2—The analytical result for chromium is 90 ug/kg: the correction factor from the table is 30 % (0.30). Adjusted analytical results = 90 – (90 0.30) = 90 – 27 = 63 mg/kg.

The result exceeds the allowed value for chromium in the table and is therefore not acceptable.

8.3.5 *Soluble Element Test Method for Substrate Materials*— Soluble elements are extracted from toy materials under conditions which simulate the material remaining in contact with stomach acid for a period of time after swallowing. The concentrations of the soluble elements are determined quantitatively.

NOTE 10 — Optional, alternate test methods are permitted, as described in 8.3.6.

8.3.5.1 *Apparatus*—As described in 8.3.2.1.

8.3.5.2 *Reagents*— As described in 8.3.2.2.

8.3.5.3 *Selection of Test Portions*:

1. A laboratory sample for testing shall consist of a toy either in the form in which it is marketed, or in the form in which it is intended to be marketed. Test portions shall be taken from accessible parts of a single toy sample, that is, identical materials in the toy may be combined and treated as a single test portion but additional toy samples shall not be used. Test portions are only permitted to be composed of more than one material or color where physical separation (for example, dot printing), patterned textiles or mass limitation reasons, precludes the formation of discrete specimens.

2. Test portions where less than 10 mg of material available are not tested.

NOTE 11 — The requirement does not preclude that test portions can be taken from materials in a form such that they are representative of the

relevant material specified above and the substrate upon which they are deposited.

8.3.5.4 Polymeric and similar materials including laminates, whether reinforced textile or not, but excluding other textiles.

1. Sample Removal/Preparation Procedure:

   a. Obtain a test portion of not less than 100 mg of the polymeric or similar materials, avoiding heating of the materials, according to the following directions.

   b. Cut out test portions from the areas having the thinnest material cross section in order to ensure a surface area of the test pieces as large as possible in proportion to their mass. Each test piece shall in the uncompressed condition have no dimension greater than 6 mm.

   c. If the laboratory sample is not uniform in its material, a test portion shall be obtained from each different material present in a mass greater than 10 mg. In the case where there is between 10 and 100 mg of uniform material the mass of the test portion shall be reported in the test report and the quantity of the appropriate elements shall be calculated and reported as if 100 mg of the test portion had been used.

2. *Test Procedure*—As described in 8.3.4.2 and 8.3.4.3.

8.3.5.5 *Glass/Ceramic/Metallic Materials*:

1. *Sample Removal/Preparation Procedure*—Toys and components shall be first subjected to the relevant tests in accordance with Section 8. If any accessible glass, ceramic or metallic materials of the toy fits entirely within the small parts cylinder (see Fig. 3) before or after use and abuse testing, it shall be tested in accordance with 8.3.5.5(2) after removal of any coating in accordance with CPSC method CPSC-CH-E1003-09 ; metallic materials are also to be tested in accordance with 8.3.5.5(3) after removal of any coating in accordance with CPSC method CPSC-CH-E1003-09 .

   NOTE 12 — Toys and components that have no accessible glass, ceramic or metallic materials are not tested according to 8.3.5.5. If a toy or component that is subject to testing per 8.3.5.5 consists of a combination of metallic and non-metallic materials (for example, a steel nut with a nylon locking insert), the non-

metallic material is to be mechanically separated from the metallic material prior to the test, and only the metallic component is subjected to testing per 8.3.5.5; the non-metallic component is to be tested per the section of this standard applicable to the material type.

2. Test Procedure – Standard Soluble Elements:

a. Place the toy or component in a 50 mL glass container with nominal dimensions: height 60 mm, diameter 40 mm. Add a sufficient volume of an aqueous solution of 0.07 M HCl at 37 ± 2°C to just cover the toy or component. Cover the container, protect the contents from light and allow the contents to stand for 2 h at 37 ± 2°C.

NOTE 13 — This type of container will accommodate all components/ toys that fit inside the small parts cylinder.

b. Without delay, efficiently separate the solids from the solution, firstly by decantation followed by filtration using a membrane filter, and if necessary, by centrifuging at up to 5000 g.

c. Separation shall be completed as soon as possible after the completion of the standing time; centrifuging shall take no longer than 10 min and shall be reported in the test report. If the resulting solutions are to kept for more than 24 h prior to analysis they shall be stabilized by addition of hydrochloric acid so that the HCl concentration of the stored solution is approximately 1.0 M.

d. Analyze the solution for element content using atomic spectroscopy or other validated test methods.

3. Test Procedure-Special Soluble Cadmium (apply to metallic small parts only):

a. Metal toys and toy components which, either before or after use-and-abuse testing per Section 8, fit entirely within the small parts cylinder (see Fig. 3) shall be tested per CPSC test method CPSC-CH-E1004-11 . At the conclusion of the prescribed 24-h extraction test, efficiently separate, without delay, the solids from the solution, firstly by decantation followed by filtration using a membrane filter, and if necessary, by centrifuging at up to 5000 g. Separation shall be

completed as soon as possible after the completion of the extraction time; centrifuging shall take no longer than 10 min and shall be reported in the test report. If the resulting solutions are to be kept for more than 24 h prior to analysis they shall be stabilized by addition of hydrochloric acid so that the HCl concentration of the stored solution is approximately 1.0 M. Stored solutions shall be protected from light to the extent practicable.

b. Analyze the solution for cadmium content using atomic spectroscopy or other validated test methods.

8.3.5.6 *Other Materials, Whether Mass Colored or Not*:

1. Sample Removal/Preparation Procedures:

a. Obtain a test portion of not less than 100 mg of the material according to 8.3.5.3 or 8.3.5.4, whichever is more appropriate.

b. If the laboratory sample is not uniform in its material, a test portion shall be obtained from each different material present in a mass greater than 10 mg. Where there is between 10 and 100 mg of uniform material, the mass of the test portion shall be reported in the test report, and the quantity of the appropriate elements shall be calculated and reported as if 100 mg of the test portion had been used.

c. If the material to be tested is coated with paint, varnish, lacquer, printing ink or similar material, remove this material per in accordance with CPSC method CPSC-CH-E1003-09 prior to testing per 8.3.5.6(2).

2. *Test Procedures*—The materials shall be tested by the most appropriate method under 8.3. The method used shall be reported in the test report.

8.3.5.7 *Materials Intended to Leave a Trace*:

1. Sample Removal/Preparation Procedure for Materials in Solid Form:

a. Obtain a test portion of not less than 100 mg of the material by cutting into test pieces, which in the uncompressed condition shall have no dimensions greater than 6 mm.

b. A test portion shall be obtained from each different material

intended to leave a trace, present in the laboratory sample in a mass greater than 10 mg. Where there is between 10 and 100 mg of material, the mass of the test portion shall be reported in the test report and the quantity of the appropriate elements shall be calculated and reported as if 100 mg of the test portion had been used. If the material contains any grease, oil, wax or similar material, the test portion shall be enclosed in hardened filter-paper and these ingredients shall be removed with n-heptane using solvent extraction.

2. Sample Removal/Preparation Procedure for Materials in Liquid Form:

   a. Obtain a test portion of not less than 100 mg of the material from the laboratory sample. The use of an appropriate solvent to facilitate the obtaining of a test portion is permitted.

   b. A test portion shall be obtained from each different material intended to leave a trace, present in the laboratory sample in a mass greater than 10 mg. Where there is between 10 and 100 mg of material, the mass of the test portion shall be reported in the test report and the quantity of the appropriate elements shall be calculated and reported as if 100 mg of the test portion had been used. If the material is intended to solidify in normal use and contains grease, oil, wax or similar material, the test portion shall be allowed to solidify under normal use conditions and the resulting material shall be enclosed in hardened filter-paper and the grease, oil, wax or similar material shall be removed with n-heptane by using solvent extraction.

3. Test Procedure for Samples not Containing Grease, Oil, Wax or Similar Material:

   a. Using the appropriately sized container, mix the test portion so prepared with 50 times its mass of an aqueous solution at 37 ± 2°C of 0.07 M HCl (see 8.3.2.2). For a test portion mass of between 10 and 100 mg, mix the test portion with 5.0 mL of this solution at 37 ± 2°C. Shake for 1 min. Check the acidity of the mixture.

   b. If the ph of the resulting solution is greater than 1.5, adjust the pH to between 1.0 and 1.5. If the pH is 2.5 or less, add dropwise, while shaking the mixture, 2 M HCl until the pH is between 1.0 and 1.5; if the pH is greater than 2.5, add dropwise, while shaking the mixture, 6M HCl until the pH is

between 2.50 and 1.5, then add dropwise, while shaking the mixture, 2 M HCl until the pH is between 1.0 and 1.5. The amount of hydrochloric acid used in relation to the amount of solution shall be reported in the test report.

c. Protect the mixture from light. Agitate the mixture at 37 ± 2°C (see 8.3.4.2) for 1 h continuously and then allow to stand for 1 h at 37 ± 2°C.

d. Without delay, efficiently separate the solids from the solution, firstly by filtration using a membrane filter and, if necessary, by centrifuging at up to 5000 g. Separation shall be completed as soon as possible after the completion of the standing time; centrifuging shall take no longer than 10 min and shall be noted in the test report.

e. If the resulting solutions are to be kept for more than the working day prior to analysis they shall be stabilized by addition of hydrochloric acid so that the concentration of the stored solution is approximately 1.0M HCl.

f. Analyze the solution for element content using atomic spectroscopy or other validated test methods.

4. Test Procedure for Samples Containing Grease, Oil, Waxor Similar Material:

a. With the test portion remaining in the hardened filterpaper, macerate the test portion so prepared with 25 times the mass of the original material with water at 37 ± 2°C so that the resulting mixture is homogeneous. Quantitatively transfer the mixture to the appropriate sized container. Add to the mixture an aqueous solution of 0.14 M HCl at 37 ± 2°C in the proportion of 25 times the mass of the original test portion. In the case of a test portion mass between 10 and 100 mg macerate the test portion with 2.5 mL of water. Quantitatively transfer the mixture to the appropriate sized container. Add 2.5 ml of 0.14 M HCl at 37 ± 2°C to the mixture. Shake for 1 min.

b. Check the acidity of the mixture. The amount of hydrochloric acid used in relation to the amount of solution shall be reported in the test report. Protect the mixture from light. Agitate the mixture at 37 ± 2°C for 1 h continuously and then allow to stand for 1 h at 37 ± 2°C.

NOTE 14 — The volume of the solution 0.07 M HCl or 0.14 M HCl , as the case may be, is calculated based on the mass of the test portion prior to de-waxing.

c. Without delay, efficiently separate the solids from the solution, firstly by filtration using a membrane filter and, if necessary, by centrifuging at up to 5000 g. Separation shall be completed as soon as possible after the completion of the standing time; centrifuging shall take no longer than 10 min and shall be noted in the test report.

d. If the resulting solutions are to be kept for more than the working day prior to analysis they shall be stabilized by addition of hydrochloric acid so that the concentration of the stored solution is approximately 1.0 M HCl.

e. Analyze the solution for element content using atomic spectroscopy or other validated test methods.

8.3.6 *Alternative Methods*— For purposes of determining compliance with the requirements contained in 4.3.5, "reasonable and representative tests" shall be used. Reasonable and representative tests could be either the tests contained in 8.3.1, 8.3.2, or 8.3.3, or alternate tests which utilize apparatus or procedures, or both, other than those in 8.3. The following paragraphs set forth the conditions under which alternate tests with apparatus or procedures other than those described in 8.3, inclusive, will be considered reasonable and representative.

8.3.6.1 Persons and firms determining the compliance of materials subject to the requirements contained in 4.3.5 may base those determinations on any alternate test utilizing apparatus or procedures other than those in 8.3, inclusive, if such alternate test is as stringent as, or more stringent than, the tests in 8.3, inclusive. An alternate test is considered to be "as stringent as, or more stringent than" a test in 8.3 if, when testing identical specimens, the alternate test yields failing results as often as, or more often than, the test in 8.3, inclusive. Any person using such an alternate test must have data or information to demonstrate that the alternate test is as stringent as, or more stringent than, the test in 8.3, inclusive. For example XRF screening in accordance with Test Method F2853 protocol could be used if determined to be a more stringent test method to the extent applicable for the material tested.

8.3.6.2 The data or information required by paragraph 8.3.6.1 to demonstrate

equivalent or greater stringency of any alternate test using apparatus or procedures other than those in 8.3, inclusive, must be in the possession of the person or firm desiring to use such alternate test before the alternate test may be used to support a determination of compliance against the requirements contained in 4.3.5.

8.3.6.3 The data or information required by paragraph 8.3.6.1 to demonstrate equivalent or greater stringency of any alternate test using apparatus or procedures other than those in 8.3, inclusive, must be retained for as long as that alternate test is used to support determinations of compliance against the requirements contained in 4.3.5, and for one year thereafter.

1. Alternate method acceptability requires rigorous statistical analysis of limits of acceptability to show consistency of results of alternate methods to prescribed method results. This analysis must be performed separately for each substrate type and heavy element (for example, results for cadmium in metal may not be automatically assumed to apply to barium in plastic, etc.). Alternate methods, once validated, should be submitted to ASTM for inclusion in the standard to avoid inconsistency of results.

8.4 Tests for Cleanliness and Preservative Effectiveness

8.4.1 *Cleanliness of Materials*— The cleanliness of cosmetics, liquids, pastes, putties, gels, and powders used in toys (excluding art materials) shall be determined using the methods in USP 24 <61> Microbial Limits Tests or the most current edition of the U.S. Pharmacopeia.[15] Another method may be substituted provided it has been properly validated as giving equivalent or better results, as specified in USP 24 <61> or the most current edition of the U.S. Pharmacopeia. In conjunction with the chosen test method, the limits for determining the cleanliness of materials will consist of the most current guidelines for cosmetics set forth by the Cosmetic, Toiletry, and Fragrance Association (CTFA).

[15] *Reagent Chemicals, American Chemical Society Specifications* , American Chemical Society, Washington, DC. For Suggestions on the testing of reagents not listed by the American Chemical Society, see *Analar Standards for Laboratory Chemicals,* BDH Ltd., Poole, Dorset, U.K., and the *United States Pharmacopeia and National Formulary,* U.S. Pharmacopeial Convention, Inc. (USPC), Rockville, MD.

8.4.2 *Preservative Effectiveness*— The formulations of cosmetics used in toys shall be evaluated for the potential microbiological degradation, or they shall be tested for microbial control and preservative effectiveness using the

methods and limits in USP 24 <51> Antimicrobial Effectiveness Testing or the most current edition of the U.S. Pharmacopeia.

8.5 *Normal Use Testing*— These tests are intended to simulate normal use conditions so as to ensure that hazards are not generated through normal wear and deterioration. The object of these tests shall be to simulate the normal play mode of the toy, and the tests are therefore unrelated to the reasonably foreseeable abuse tests of 8.6-8.13. The tests are intended to uncover hazards rather than to demonstrate the reliability of the toy. The fact that a mechanism or material of a toy fails during testing is relevant only if the failure creates a potential hazard. Toys shall be subject to appropriate tests to simulate the expected mode of use of the particular toy. For example, levers, wheels, catches, triggers, strings, wires, chains, and so on, that are intended to be actuated by a child shall be operated repeatedly. Spring or power-operated devices shall be tested similarly. The tests shall be conducted in an expected use environment. For example, toys intended for use in the bathtub shall be tested in soapy water, and toys intended for use in the sandbox shall be exposed to sand during testing. It is recognized that no specific requirements are defined here; it would not be possible in view of the wide range of toys covered by this specification. However, the manufacturer or distributor must do enough testing to satisfy himself that normal use during the estimated lifetime of the toy is being simulated. The toy shall be inspected after such tests, and hazards such as points, sharp edges, and release of small parts shall be evaluated in accordance with the relevant requirements listed in Section 4.

8.5.1 *Washable Toys*— Toys described as machine washable on the toy, package, or instructions shall be subjected to six machine washing and tumble drying cycles, as described in 8.5.1.1, unless a different drying method is specified by the toy manufacturer by means of a permanent label. They shall then be inspected for compliance with this specification.

8.5.1.1 *Conditions for Machine Washing and Tumble Drying*— Any commercially available top-loading washer, dryer, or laundry detergent intended for use in the home may be used for this test. The weight of each toy is determined prior to the beginning of the test. The toys, plus a dummy load of clothes sufficient to bring the total dry weight to a minimum 4 lb (1.8 kg), are washed in an automatic washing machine using the warm water setting and a 12-min wash cycle at the normal setting. The toys and dummy load shall then be tumble dried in an automatic clothes dryer using the warm setting, or air dried, until the load is dried. The toy shall be deemed dry when the final weight does not exceed the original dry weight by more than 10 %.

8.6 *Abuse Testing*— The tests described in 8.7-8.13 are to simulate the exposure of a toy to mechanical damage through dropping, throwing, and other actions likely to be performed by a child, which are characterized as reasonably foreseeable abuse. After testing, the toy shall be examined for mechanical hazards, such as hazardous sharp edges and points, and ingestion hazards, such as small liberated components, chips, or fragments. The severity of the abuse tests described in 8.7, 8.8, 8.9, 8.10, and 8.12 shall be determined according to the age group for which the toy is intended. If the toy is intended for an age group that spans more than one age group according to Table 5, the toy shall be subjected to the most severe test. Unless otherwise specified, none of the abuse testing described in 8.7-8.12 applies to toys intended for children over 96 months of age. Toys reasonably intended to be assembled by an adult, and not intended to be taken apart by a child, shall be tested only in the assembled state if the shelf package and assembly instructions indicate prominently that the article is to be assembled by an adult. Individual parts of toys that are intended to be assembled by children shall be tested as well as the fully assembled toy; however, the assembled toy shall be made of components that have not been subjected to the abuse testing.

8.7 *Impact Tests*— These tests are intended to simulate situations in which possible damage can occur to a toy by reason of its falling from a crib, table, or counter top, or other impact situations that may occur as a result of reasonably foreseeable abuse. After undergoing the appropriate test, the toy shall be examined for possible hazards, such as points, edges, or ingestible objects, in accordance with the relevant requirement of Section 4.

8.7.1 *Drop Test*— Except for toys covered in 8.7.2, toys falling below the weight limit given below shall be dropped onto a specified impact area. The number of times the toy will be dropped, and the height from which it is dropped, is to be determined from Table 5. The toy shall be dropped in random orientation. The test sample shall be allowed to come to rest after each drop and shall be examined and evaluated before continuing. The impact medium shall consist of a ⅛-in. (3-mm) nominal thickness of Type IV vinyl composition tile, composition 1-asbestos free, as specified in Federal Specification SS-T-312B over at least a 2.5-in. (64-mm) thickness of concrete. The impact area shall be at least 3 ft^2 (0.3 m^2). The recommended batteries shall be in place during the drop test for battery-operated toys. If no specific type of battery is recommended, the heaviest battery that is generally available shall be used.

Age Group	Weight Criteria, lb (kg)

18 months or less	less than 3 ± 0.01 (1.4)
over 18 months, not over 36 months	less than 4 ± 0.01 (1.8)
over 36 months, not over 96 months	less than 10 ± 0.01 (4.5)

8.7.2 *Tipover Test for Large, Bulky Toys*— Large, bulky toys shall not be subjected to the drop test of 8.7.1, but they shall be tipped over according to the following procedure:

TABLE 5 Test Parameters for Use and Abuse Tests

Test	Age Category of Intended User, months	Numerical Value	
		Stated by the Voluntary Standard	Recommended for Toy Manufacturers
Drop test	0 to 18	10 4.5 ft ± 0.5 in. (137 cm)	4 ft, 6.5 in. (1.38 m)
	over 18 to 36	4 3.0 ft ± 0.5 in. (91 cm)	3 ft, 0.5 in. (0.93 m)
	over 36 to 96	4 3.0 ft ± 0.5 in. (91 cm)	3 ft, 0.5 in. (0.93 m)
Torque test	0 to 18	2 ± 0.2 in.·lbf (0.23 N·m)	2.2 in.·lbf (0.25 N·m)
	over 18 to 36	3 ± 0.2 in.·lbf (0.34 N·m)	3.2 in.·lbf (0.36 N·m)
	over 36 to 96	4 ± 0.2 in.·lbf (0.45 N·m)	4.2 in.·lbf (0.47 N·m)
Tension test	0 to 18	10 ± 0.5 lbf (44.5 N)	10.5 lbf (46.7 N)
	over 18 to 36	15 ± 0.5 lbf (66.8 N)	15.5 lbf (69.0 N)
	over 36 to 96	15 ± 0.5 lbf (66.8 N)	15.5 lbf (69.0 N)
Compression test	0 to 18	20 ± 0.5 lbf (89.0 N)	20.5 lbf (91.2 N)
	over 18 to 36	25 ± 0.5 lbf (111.3 N)	25.5 lbf (113.5 N)
	over 36 to 96	30 ± 0.5 lbf (133.5 N)	30.5 lbf (135.7 N)
Flexure test	0 to 18	10 ± 0.5 lbf (44.5 N)	10.5 lbf (46.7 N)
	over 18 to 36	15 ± 0.5 lbf (66.8 N)	15.5 lbf (69.0 N)
	over 36 to 96	15 ± 0.5 lbf (66.8 N)	15.5 lbf (69.0 N)

8.7.2.1 *Tipover Test for Large, Bulky Toys*— Large, bulky toys shall be tested for impact by tipping over three times, one of which is in the worst attitude by pushing the sample slowly past its center of balance onto the impact medium described in 8.7.1.

8.7.3 *Tumble Test for Wheeled Toys*— Wheeled toys weighing more than 3 lb (1.4 kg) but not more than 10 lb (4.5 kg) shall be tumbled down a flight of six steps with risers not less than 7 in. (180 mm) high (see Fig. 26). The treads may be wood, cement, or metal. The toy, including accessories, where applicable, shall be caused to fall down the steps two times in each of four attitudes: tumbling forwardly end-over-end and tumbling rearwardly end-over-end from each side. The toy shall be pushed slowly over the edge of the top step in the appropriate attitude and released as soon as it begins to fall

of its own weight. The test shall be considered complete for an attitude even if the toy does not reach the bottom of the flight of steps.

Figure 26. Illustration of Step Construction. This is a diagram of a set of steps. The width of the steps is A and shall be not less than 3 feet. The riser, the elevation of the step, is B and shall be not less than 7 inchdes. The step itself is C and shall be not more than 9 inches. A PLATFORM C B RISER

Dimensions

"A" shall be not less than 3 ft (914 mm)

"B" shall be not less than 7 in. (180 mm)

"C" shall be not more than 9 in. (230 mm)

FIG. 26 Illustration of Step Construction

8.7.4 *Impact Test for Toys that Cover the Face*— The toy shall be held firmly in a suitable clamp with that portion that covers or surrounds the eyes (in the case of cutout eye holes) in a horizontal plane. Drop a ⅝-in. (16-mm) diameter steel ball weighing 0.56 oz. (15.8 g) (with a tolerance of +0.03 (0.8 g, −0 oz) from a height of 50 in. (1.3 m) upon the horizontal upper surface of the toy in the area that would cover the eyes in normal use. In the case of toys with cutout eye holes, impact the area that would be directly adjacent to the eyes in normal use. The ball may be guided, but not restricted, in its fall by being dropped through a perforated tube extending to within approximately 4 in. (100 mm) of the toy.

8.8 *Torque Tests for Removal of Components*— Any toy with a projection, part, or assembly that a child can grasp with at least the thumb and forefinger or the teeth shall be subject to this test. The amount of torque shall be determined from Table 5, according to the age group for which the toy is intended. The loading device used in the test shall be a torque gauge, torque wrench, or other appropriate device having an accuracy of 60.2 in.·lbf (60.02 N·m). A clamp capable of holding the test component firmly and transmitting a torsional force shall be used. The clamp is fastened to the test object or component with the toy fastened rigidly in any reasonable test position. The torque shall be applied evenly within a period of 5 s in a clockwise direction until either (1) a rotation of 180° from the original position has been attained, or (2) the required torque is exceeded. The maximum rotation or required torque shall be maintained for an additional 10 s. The torque shall then be removed and the test component permitted to return to a relaxed condition. This procedure shall then be repeated in a counterclockwise direction. Projections, parts, or assemblies that are mounted rigidly on an accessible rod or shaft designed to rotate along with the projections, parts, or assemblies shall be tested with the rod or shaft

clamped to prevent rotation. If a component that is attached by a screw thread that has been assembled by the manufacturer, or that has been assembled to the manufacturer's instructions, becomes loosened during application of the required torque, continue to apply the torque until either (1) the required torque is exceeded, or (2) the part disassembles. The test should be terminated if it becomes obvious that the part under test will continue to rotate at less than the required torque limit and will not disassemble.

8.8.1 If the part disassembles, evaluate it for compliance with the appropriate requirements. If the disassembly exposes an accessible component that can be grasped as noted above, repeat the torque test on that component.

8.9 *Tension Test for Removal of Components*— Any projection of a toy that a child can grasp with at least the thumb and forefinger or the teeth shall be subjected to this test. The tension test shall be performed on the same components of the toy subjected to the torque test described in 8.8. The amount of force used shall be determined from Table 5, according to the age group for which the toy is intended. A clamp capable of applying a tension load to the test component shall be applied in a manner that will not affect the structural integrity of the attachment between the component and the toy. The loading device shall be a self-indicating gauge or other appropriate means having an accuracy of 60.5 lb (62 N). With the test sample fastened in a convenient position, an appropriate clamp shall be attached to the test object or component. The required tensile force shall be applied evenly, within a period of 5 s, parallel to the major axis of the test component, and maintained for an additional 10 s. The tension clamp shall then be removed, and a second clamp suitable for applying a tension load perpendicularly to the major axis of the test component shall be attached to the test object component. The required tensile force shall be applied evenly, within a period of 5 s, perpendicularly to the major axis of the test component and maintained for an additional 10 s.

8.9.1 *Tension Test for Seams in Stuffed Toys and Beanbag-Type Toys*— A stuffed toy or beanbag constructed of pliable material having seams (including, but not limited to, seams that are stitched, glued, heat sealed, or ultrasonic welded) shall have the seams subjected to a separate tension test in any direction using the forces specified in 8.9 and determined from Table 5 according to the age group for which the toy is intended.

8.9.1.1 The clamps used to grip the material on either side of the seam to be tested shall have jaws to which are attached ¾-in. (19-mm) diameter washers (see Fig. 27). The clamps shall be attached to the cover material of a

completely assembled stuffed toy in a manner such that the outside diameter of the ¾-in. (19-mm) washers at a point nearest the seam shall be close to, but no closer than, ½ in. (13 mm) from the edge of the seam stitching thread. This seam test shall not be performed if the material adjacent to the seam cannot be grasped between the thumb and forefinger of the test personnel sufficient for full clamping by the ¾-in. (19-mm) diameter washer jaws. If such is the case, a torque and tension test shall be performed on an arm, leg, or other appendage of the toy instead of the seam test.

Figure 27. Seam Clamp The diagram shows a set of pliers. The pliers are labelled Lever Wrench, Mod L-B Leverage Tools, Inc., Glenvil, Nebraska, 66941. To the inside jaws of the pliers at the tips are attached Braze 3/4 inch diameter plain steel washers. BRAZE 3/4 Dia PLAIN S11 WASHERTO JAW TIPS LEVER WRENCH Mod L-8LEVERAGE TOOLS, Inc.GLENVIL, NEB - 66941

FIG. 27 Seam Clamp

8.9.1.2 In performing a seam test, the force appropriate for the age category into which the toy falls (see Table 5) shall be applied evenly within 5 s and maintained for an additional 10 s.

8.10 *Compression Test*— Any area on the surface of a toy that is accessible to a child and inaccessible to flat surface contact during the impact test shall be subject to this test. The compression force shall be determined from Table 5 according to the age group for which the toy is intended.

8.10.1 The loading device shall be a rigid metal disk 1.125 ± 0.015 in. (0.380 mm) in diameter and 0.375 in. (9.52 mm) in thickness. The perimeter of the disk shall be rounded to a radius of 1/32 in. (0.8 mm) to eliminate irregular edge. The disk shall be attached to an appropriate compression scale having an accuracy of 60.5 lb (2 N). The disk shall be positioned so that the flat contact surface is parallel to the surface under test. The required force shall be applied evenly within 5 s through the disk. This load shall be maintained for an additional 10 s. The toy is to rest on a flat, hard surface in any convenient position during the test.

8.11 *Tests for Tire Removal and Snap-in Wheel and Axle Assembly Removal*— These tests relate to the requirements of 4.17.

8.11.1 *Removal of Tires*— The toy shall be clamped so that the wheel axle is vertical. A wire hook shaped as shown in Fig. 28 shall be positioned on the lower tire and attached to a dead weight of 10 ± 0.5 lb (4.5 kg) if the tire is on a toy intended for children aged 18 months or less, or to a dead weight of 15 ± 0.5 lb (6.8 kg) if the tire is on a toy intended for children aged over 18

months but not over 36 months. The load shall be applied gradually over a period of 5 s and maintained for 10 s.

Figure 28. Hook for Tire Removal A hook with a wire diameter of 1/16 inches (10-pound lead) or 1/18 inches (15-pound lead) and a 75 degree included angle is laying on top of a tire, which is in turn connected to a hube and axle. INCLUDED ANGLE 75° WIRE DIAMETER 1/16 in. [10-pound load]1/8 in. [15-pound load] TO LOAD TIRE HUB LENGTH TO BE ADJUSTED TO TIRE SIZE

FIG. 28 Hook for Tire Removal

8.11.2 *Toys Assembled With Snap-in Axles*— A15 ± 0.5-lb (6.8-kg) dead weight shall be applied perpendicularly to the axle and in the least favorable direction, adjacent to a bearing (but between the two bearings), for 10 s, using a hook and string for attachment to the toy. The toy shall be held horizontally in a test-convenient fixture, and the load shall be applied gradually over a 5-s period and then shall be maintained for 10 s. The toy shall be held horizontally if the axle cannot be hooked as described above, and a 10 ± 0.5-lb (4.5-kg) dead weight shall be attached to one wheel by means of a hook or clamp that acts perpendicular to the axle in the least favorable direction. The load shall be applied gradually over a 5-s period and then be maintained for 10 s.

8.11.3 *Compression Test for Snap-in Wheel and Axle Assemblies*— This test is for determining compliance with 4.17 if the axle and wheel are removed by the procedure described in 8.11.2. The wheel and axle assembly shall be positioned with the axle vertical over a hole in a rigid plate, as shown in Fig. 29. The hole shall be large enough in diameter to permit the axle to pass through. A load of 20 ± 0.5 lb (89 N) is applied to the upper wheel, using a suitable circular adaptor to prevent interference with the axle. The load shall be applied gradually over a 5-s period and then shall be maintained for 10 s. When applying the load, the upper wheel shall be guided, if necessary, in order to maintain the axle in a vertical position, but it shall not be restrained from moving downward. The axle shall not form a hazardous point or projection in those cases in which it is forced through either wheel.

Figure 29. Compression Test for Wheel Assemblies A board with a gap is shown. A wheel and axle assembly is lying on the board, with the wheel straddling the gap of the board and the end of the axle in the gap. A load is applied to a circular adaptor placed on the top wheel with the force pointing down. LOAD APPLIED TO ACIRCULAR ADAPTOR WHEEL AND AXLEASSEMBLY RIGID PLATE

FIG. 29 Compression Test for Wheel Assemblies

8.12 *Flexure Test*— This test is for determining compliance with 4.10, for wires or rods used as flexible skeletons. The toy shall be secured in a vise equipped with vise shields that are fabricated from 13-gauge thick cold-rolled steel or other similar material and that have a 0.375-in. (9.5-mm) inside radius as shown in Fig. 30. The component shall then be bent through a 60° arc by a force applied perpendicularly to the major axis of the component at a point 2 ± 0.05 in. (50 mm) from the intersection of the component with the main body of the toy or applied at the end of the component if the component is less than 2 in. (50 mm) long. The force shall be determined from Table 5. The component shall then be bent in the reverse direction through a 120° arc. This process shall be repeated for 30 cycles at a rate of 1 cycle/2 s, with a 60-s rest period occurring after each 10 cycles. Two 120° arc bends shall constitute one cycle.

Figure 30. Fixture Tester The diagram is a set of jaws, which are constructed of 12 gauage 0.0897 CR steel and each jaw is 60 degrees off from vertical, making the total angle 120 degrees. The rounded ends of the jaws have a radius of 0.375 inches. 120° 60° JAWS 13 Gauge 0.0897 in.(2.278 mm) C.R. Steel 0.375 in. Rad(9.52 mm)

FIG. 30 Flexure Tester

8.13 *Test for Mouth-Actuated Toys*— A piston pump capable of discharging and taking in more than 18 in^3 (295 cm^3) of air in less than 3 s shall be connected to the mouthpiece of the toy. A relief valve shall be so arranged that the pump will not generate a positive or negative pressure of more than 2 psig. The toy shall be subjected to 10 alternating blowing-andsucking cycles of at least 18 in^3 (295 cm^3) of air, including that volume that may be discharged through the relief valve. Any objects released as a result of this test shall be inspected for conformance with 4.6. The above procedure shall also be applied to the outlet if the air outlet of the toy is accessible as described in 4.6.2.

8.14 Projectiles

8.14.1 *Kinetic Energy Determination*— The kinetic energy of a projectile as defined in 3.1.51 shall be determined from the following equation:

$$\text{kinetic energy} = 1/2\,mv^2 \quad (1)$$

where:

m = mass of projectile, kg, and

v = velocity of the projectile, m/s.

8.14.2 The mass of a projectile, *m*, shall be determined by weighing a sample on a laboratory balance. The velocity of a projectile, *v*, shall be determined by firing a sample from the discharge mechanism of the toy across ballistic screens placed a known distance apart (*s*, metres) and recording the time (*t*, seconds) to travel that distance. The velocity of the projectile shall be calculated from the expression $v = s/t$ m/s.

8.14.3 When performing the test to measure the velocity of a projectile, the second screen shall be placed a distance no more than 1 ft (300 mm) plus one projectile length from the point at which the entire projectile enters free flight (see Fig. 31). Due to the flight characteristics of certain projectiles and other factors that may influence the accuracy of the measurement of projectile velocity, the value of *v* in the equation for kinetic energy shall be the average of five measurements.

Figure 31. Diagram of Layout to Determine Projectile Velocity A launcher on the left has a projectile connected to it on the right edge. The projectile has a label that says Length of Projectile. From the end of the projectile going right towards a vertical line is an indicator of 12 inchdes. The line on the right is labelled 2nd ballistic screen. 2nd Ballistic Screen 12" Length ofProjectile Projectile Launcher End ofLauncher

NOTE 1 — First ballistic screen to be located between end of launcher and second screen.

FIG. 31 Diagram of Layout to Determine Projectile Velocity

8.14.4 *Impact Test for Projectiles*— Projectiles, as defined in 3.1.59, shall be propelled by their discharge mechanism three times into a concrete block wall (or equivalent surface) located at a distance 1 ft (300 mm) plus the length of the projectile from the front end of the launcher. The discharge mechanism shall be aimed perpendicular to the wall.

8.15 *Test for Stability of Ride-On Toys or Toy Seats*— These tests relate to the requirements of 4.15.

8.15.1 Place the ride-on toy or toy seat across the slope of a smooth surface inclined 10° to the horizontal plane. (Some tests require a 15° slope; refer to 4.15.2.2 and 4.15.3.)

8.15.2 Turn the steering mechanism, if any, to a position at which the ride-on toy or toy seat is most likely to tip.

8.15.3 Chock any wheels to restrict rolling, but allow casters to assume their natural position before chocks are applied.

8.15.4 Apply to the seat a static load equal to the weight indicated in Table 6 at the highest age of the age range for which the ride-on toy or toy seat is intended, but not exceeding 60 months. When the highest age of the intended age range falls between two ages listed in Table 6, the higher of the two shall be chosen.

8.15.5 The load shall be applied so that the major axis is perpendicular to the true horizontal while the ride-on toy or toy seat is on the incline specified.

8.15.6 The load shall be designed so that the height of its center of gravity is 8.7 ± 0.5 in. (220 ± 13 mm).

8.15.7 The center of gravity of the load for the sideways stability test shall be secured to the geometric center of the designated seating area.

NOTE 15 — Separate tests for each side.

8.15.8 If there is no designated seating area or if there is no designated sideways orientation, the load shall be placed 1.7 in. (43 mm) inward towards the geometric center of the ride-on toy or toy seat from the least favorable position that it is reasonable to anticipate that the child will choose to sit (note separate tests for each side).

TABLE 6 Weight of 95th Percentile Children (Values Given for Boys or Girls, Whichever is Higher)

Age, years	Weight, lb (kg)
1	28 (12.6)
2	29 (13.2)
3	42 (18.9)
4	43 (19.7)
5	50 (22.6)
6	59 (26.6)
7	69 (31.2)
8	81 (37.0)
9	89 (40.4)
10	105 (47.9)
11	121 (55.0)
12	120 (54.7)
13	140 (63.6)

14	153 (69.6)

NOTE 16 — Separate tests for each side.

8.15.9 The center of gravity of the load for the fore and aft stability test shall be secured both 1.7 in. (43 mm) rearward of the front-most portion of the designated seating area and 1.7 in. (43 mm) forward of the rear-most portion of the designated seating area.

NOTE 17 — Two separate tests.

8.15.10 If there is no designated seating area or if there is no designated fore and aft orientation, the load shall be placed 1.7 in. (43 mm) inward towards the geometric center of the ride-on toy or toy seat from the least favorable position that it is reasonable to anticipate that the child will choose to sit.

NOTE 18 — Two separate tests.

8.16 Pompoms are subjected to the torque test as described in 8.8 and 8.8.1 and the tension test as described herein. The clamps used to grip the material to be tested shall have jaws to which ¾-in. (19-mm) diameter washers are attached (see Fig. 27). One clamp shall be attached to the pompom and a second clamp used to grip the base material. A force of 15 lbf (67 N) shall be applied evenly within 5 s and maintained for an additional 10 s.

8.17 Stalled Motor Test for Battery-Operated Toys

8.17.1 The test shall be conducted using a new toy. Each motor shall be tested separately using fresh alkaline batteries. If another battery chemistry is specifically recommended for use in the toy by the manufacturer, repeat the test using the batteries specified by the manufacturer. If the toy will not operate using alkaline batteries, test with the type of battery recommended by the manufacturer at the specified voltage. The test is to be carried out in a draft-free location at an ambient temperature of 20 ± 5°C.

8.17.2 Operate the toy with moving parts that are mechanically linked to a motor locked in a fixed position. Only lock moving parts which can be stalled external to the toy. Do not disable any mechanical or electrical protective device such as clutches or fuses. Monitor the temperatures with the toy fully assembled. If normal use allows the motor to run unattended or if the toy has a non-recessed switch allowing it to be kept in the “on” position, operate the toy continuously and record the maximum temperatures. The test may be discontinued 60 min after the peak temperature of each component being

tested is recorded. If the toy shuts off automatically or must be kept "on" by hand or foot, monitor temperatures for 30 s, resetting the toy as many times as necessary to complete the 30 s of operation. If the toy shuts off automatically after an operating time of greater than 30 s, continue the test until the toy shuts off. At the conclusion of the test, the stalled motor condition shall not cause temperatures to exceed the limits of 4.25.7, or cause battery leakage, an explosion, or a fire.

8.18 Tests for Battery-Powered Ride-on Toys

8.18.1 Components tested in accordance with the following sections are to be installed and operated in the toy, as they would be during normal use unless otherwise specified. Testing is to be conducted using fully charged batteries.[16]

[16] Testing is to be conducted while the vehicle is operated on a hard level surface covered with 3M #610 General Purpose Safety Walk tape or equivalent surface with a coefficient of friction between 1.27 and 1.32 when measured in accordance with MIL-D-17951. Cheesecloth referenced in the following tests is #60 cotton gauze with a thread count of 32 by 28 threads per inch.

8.18.2 *Maximum Temperature Test*:

8.18.2.1 Mechanically precondition all electrical pressure connections used for charging or discharging the battery(ies). If a main harness connector is provided, the main harness connection must be connected and disconnected 600 times before the Maximum Temperature Test is performed. If a user replaceable fuse is provided, remove and insert the fuse 25 times before the Maximum Temperature test is performed.

8.18.2.2 Power the test sample using a fully charged battery as specified by the manufacturer. Operate the vehicle in the mode that results in the maximum continuous current draw. Determine the maximum continuous current draw by testing the vehicle on any intended surface as specified by the manufacturer, and by adjusting the weight, up to the manufacturer specified maximum. Several trials on different surfaces and with different weights may be necessary to determine the maximum continuous current draw.

8.18.2.3 Physically load the vehicle in any way necessary to obtain the maximum continuous current draw. Operate the vehicle continuously until the battery is exhausted or until thermal equilibrium is reached. If thermal

equilibrium is not reached, replace the battery with a fully charged battery and continue the test.

8.18.3 *Stalled Motor Test for Battery-Powered Ride-on Toys*— Mechanically lock any accessible motor driven parts. For toys having more than one motor, each motor shall be tested individually. For toys having more than one operating mode, a different toy shall be tested in each mode. The toy shall be entirely draped with a double layer of cheesecloth during the test. For motors or other electrical components that are accessible, the cheesecloth shall also be draped over the component.

8.18.3.1 Operate the toy, under the stalled condition, until a circuit protection device interrupts the current or until the battery is depleted.

8.18.3.2 If the circuit protection device interrupts the circuit, immediately reset the circuit protection device or replace it in the case of a fuse and repeat the test three more times. If the circuit protection device automatically resets, continue the stalled motor test until the battery is exhausted.

8.18.3.3 The test shall not result in ignition of the cheesecloth.

8.18.4 *Nuisance Tripping Test*— Conduct the tests on a level surface as specified in 8.18.1, loading the vehicle with the maximum weight specified by the manufacturer.

8.18.4.1 *Start/Stop Condition*— Start and stop the toy in 1-s cycles for 30 repetitions (0.5 s start followed by 0.5 s stop) in the mode that draws the greatest current.

8.18.4.2 *Forward/Reverse*— If the toy has a reverse direction feature, cycle the toy in the forward and reverse directions in 1-s cycles for 30 repetitions (0.5 s forward followed by 0.5 s reverse) in the mode that draws the greatest current.

8.18.5 *Switch Endurance and Overload Tests*— Precondition switches at 95 % relative humidity between 20°C and 32°C for 48 h. Conduct the Switch Endurance and Overload Tests at 40°C. A switch is to be operated by means of its actuating member either manually or by mechanical means making and breaking the test current. If a fuse or protective device operates (opens or trips) the device must be replaced or reset as many times as necessary to complete the required number of cycles. The test may be concluded at less than the prescribed number of cycles if the switch fails safe (switch stuck in the “off” position and no short-circuit condition results). Test 3 samples. All

samples must pass.

8.18.5.1 *Switch Endurance Test*— If a switch is relied upon for starting and stopping of the vehicle, conduct the endurance test for 100 000 cycles. Cycle (minimum 1 s on time and at least 6 cycles per minute) a switch in the toy using the maximum continuous current load as determined in the Maximum Temperature Test or in an equivalent simulated motor load circuit including the inrush and inductive characteristics. All other switches are to be subjected to 6000 cycles of endurance testing. Cycle (minimum 1 s on time and at least 6 cycles per minute) a switch in the toy using the maximum continuous current load as determined in the Maximum Temperature Test or in an equivalent simulated motor load circuit including the inrush and inductive characteristics.

8.18.5.2 *Switch Overload Test*— The overload test is to be conducted on a switch that is relied upon for starting and stopping of the vehicle. Stall the motor(s) of the toy. Operate the switch for 50 cycles of operation at a rate of 6 cycles per minute with 1 s on and 9 s off.

8.18.6 *Battery Overcharge Test*— Each battery shall be charged with its intended charger continuously for 336 h. The test shall not result in the release of electrolyte, or cause explosion or fire.

8.18.6.1 If the battery can be charged in the vehicle, place the battery in the vehicle and connect it to the charging circuit. Drape the charger, cable, and battery with a double layer of cheesecloth. The test shall not result in ignition of the cheesecloth or in the release of electrolyte.

8.18.7 *Short-Circuit Protection Test*— Entirely drape the toy with a double layer of cheesecloth. Short-circuit parts of opposite polarity. Any possible short-circuit condition shall not result in ignition of the cheesecloth.

8.18.8 *Strain Relief Test*— The electrical connections of the cord or harness are to be disconnected. Apply a 20 lbf (90 N) to the cord so that the strain relief will be stressed from any angle permitted by the construction of the toy. Maintain the specified force for 1 min. There shall be no movement of the cord to indicate stress on the connections.

8.19 Tests for Toys Which Produce Noise

8.19.1 *Installation and Mounting Conditions*:

8.19.1.1 *General*— Carry out the measurements on a new toy not already

subjected to testing. Test battery toys using new primary batteries or fully charged secondary batteries. External power supplies should not be used as they will, in many cases, affect the performance of the toy.

8.19.1.2 *Test Environment*— Any environment that meets the qualification requirements of ISO 3746, Annex A.

NOTE 19 — In practice, this means that most normally furnished rooms with a volume exceeding 30 m^3 will qualify at measurement distances of 50 cm provided that the largest dimension of the toy does not exceed 50 cm.

8.19.1.3 *Mounting*— Test rigs used for the mounting of toys and/or the operator of the toy shall not affect the sound emission of the toy under test nor cause sound reflections which will increase the sound pressure levels at the measuring points.

1. Mount close to the ear toys and hand-held toys in a proper test rig at least 100 cm above the reflecting plane or have them operated by an adult operator with the arm outstretched.

2. Place stationary table top, floor, and crib toys on a standard test table as described in ISO 11202. A table with a wooden top with a thickness of 4 cm or larger and leg construction providing a stable test surface is considered sufficient. The table top should be large enough such that, with the toy resting on and fully over the table top, the side of the measurement box from which the measurement is being made is also above the table top (see 8.19.2.3(5)).

3. Mount self propelled table top and floor toys on the standard test table described above in a test rig so that they can be operated with full power, but preventing them from moving around.

4. Place pull and push toys on the reflecting plane (for example, concrete, tile, or other hard surface) and fix them in a test rig which enables them to be moved with varying speed along a direct line which passes the measuring microphones (“passing by” test). Make sure that the friction of the reflecting plane prevents wheels from skidding.

5. Place hand-actuated wind-up toys, with the wind-up spring fully loaded, on the reflecting plane (for example, concrete, tile, or other hard surface) so that the front of the toy is 40 ± 1 cm along the *x*-axis from the microphones of the “passing by” test (see Fig. 32).

6. Mount other types of toys in the most appropriate way using the principles described in previous paragraphs.

Figure 32. Microphone Positions for Measurements of Pull and Push Toys and for Hand-Actuated Spring-Propelled Toys ("Pass-by" Test) A square platform is shown. The toy is on the top of the platform. Going forward is direction x, going sideways is direction y, going up is direction z. The microphone begins at 40 (no units are mentioned in the diagram, but they are centimeters) in direction x, and then 40 plus width of toy (w) divided by 2 to the left of direction y. It has a height of 30. The microphone moves 20 in direction x away from the toy. z y 1 1 2 x 40+w/2 40+w/2 40 30 30 20 NOTE— Key: 2—End of measurement 1—Microphone w—width of toy

NOTE —

Key:

1—Microphone

2—End of measurement

w—width of toy

FIG. 32 Microphone Positions for Measurements of Pull and Push Toys and for Hand-Actuated Spring-Propelled Toys (“Pass-by” Test)

8.19.1.4 *Operating Conditions*— Operate the toy under test in that mode of its intended or foreseeable use that produces the highest sound pressure level to the microphone position, where the maximum noise level is observed. In particular:

1. Operate a hand-actuated toy manually, excluding pull and push toys, by applying the force at the point and direction of its intended or foreseeable use giving the maximum sound pressure level. For a toy intended to be shaken, shake at a rate of three times per second. One cycle shall consist of an initial 15 cm stroke followed by a return to the starting point.

2. Operate a rattle by grasping it where it is meant to be held or, if in doubt, where the longest lever between the hand and the sound emitting part of the rattle can be obtained. Make sure that the radiated sound is not affected by the grip of the hand. Strike downwards ten times with hard lashes in a slow tempo. Use the wrist and keep the forearm essentially horizontal. Endeavour to achieve the highest possible sound level. Stand side-face with the microphone and keep the rattle at the same height as the microphone at a distance of 50 cm.

3. Operate a pull and push toy at a speed that yields the maximum sound

pressure level. Do not exceed 2 m/s.

4. Operate a cap-firing toy using percussion caps recommended by the manufacturer and which are available on the market.

8.19.2 *Measurement Procedure*:

8.19.2.1 *Basic International Standards to be Used*— The minimum requirement is to determine sound pressure levels at the specified positions around the toy in accordance with ISO 11202 or ISO 11204.

Figure 33. Microphone Positions for Measurement of Sound Pressure Levels of Cap Firing Toys A toy is suspended in space inside of two circles, each at a 90 degree angle from the other. There are thus two points of intersection. The microphone positions are two points of intersection, plus the points 90 degrees away from those points on each circle. In other words, there are four points marked on each circle, and since the circles intersect, two of those points are in common, so there are 6 microphone positions. Each microphone is 50 cm from the center of the toy. z y x 1 1 1 1 1 1 50 50 50 50 50 50 NOTE— Key: 1—Microphone

FIG. 33 Microphone Positions for Measurement of Sound Pressure Levels of Cap Firing Toys

8.19.2.2 *Instrumentation*— The instrumentation system, including the microphone and cable, shall meet the requirements of a class 1 or class 2 instrument specified in IEC 61672-1 and IEC 61672-2. When measuring high peak sound pressure levels, for example, from toys using percussion caps, the microphone and the entire instrumentation system shall have the capability of handling linear peak levels exceeding the C-weighted peak levels by at least 10 dB.

8.19.2.3 *Microphone Positions— General*—Several microphone positions shall be used. In practice, this often means that one microphone is moved from position to position. Whenever it is practicable, it is always an alternative to rotate the test object instead. Attention must be paid to maintaining the correct measuring distance.

1. *Close-to-the-Ear Toys*—To measure continuous sounds, face the earpiece of the toy at the microphone with the microphone 50 ± 0.5 cm from the earpiece. To measure continuous sounds on toys without earpieces, locate the microphone 50 ± 0.5 cm from the surface of the toy where the main sound source exists such that the sound pressure level at the microphone is maximized. To measure impulsive sounds, locate the microphone 50 ± 0.5 cm from the surface of the toy where

the main sound source exists such that the sound pressure level at the microphone is maximized.

2. *Cap-Firing Toys*—Use six microphone positions around the toy. Place the main sound emitting part of the toy at the origin of the measuring coordinate system in its normal operating orientation in such a way that the main axes of the toy coincide with the axes of the measuring coordinate system (see Fig. 33). If the length of the toy exceeds 50 cm, rotate the toy in the *xy*-plane 45° around the *z*-axis without changing the microphone positions. Select two microphone positions along each axis at a distance of 50 ± 1 cm to both directions from the origin as shown in Fig. 33.

3. *Rattles*—Mount the microphone 1.2 m above the floor and at a distance of 0.5 m from the sound source.

4. *Other Hand-Held Toys*—Select six microphone positions on a box-shaped measurement surface at the measuring distance of 50 cm from the reference box of the toy, as defined in ISO 3746, as specified in Fig. 34. The positions are at the centers of the sides of the measurement surface at the distance 50 cm from the reference box.

5. *Stationary and Self-Propelled Table-Top, Floor, and Crib Toys*—Select five, or if the length or width of the toy is larger than 100 cm, nine microphone positions on a box-shaped measurement surface at the measuring distance of 50 cm from the reference box of the toy as specified in Fig. 35. The sides of the measurement box with height *H* are always 50 cm from the sides of the reference box, except for the bottom of the boxes, which lie in the same plane. All microphone positions are on the measurement box.

6. *Pull and Push Toys and Hand-Activated Spring-Propelled Toys*—For toys with a width (*w*) of 25 cm or less, use two microphones at distances (*d*) 50 cm from the *x*-axis of the measuring coordinate system as shown in Fig. 32. For toys with a width (*w*) of more than 25 cm, use two microphone at distances (*d*) 40 cm plus half the width of the toy from the *x*-axis (40 + *w*/2) as shown in Fig. 32. Place the toy on a test rig or on the reflecting plane in its normal operating orientation in such a way that movement of the toy is possible along the *x*-axis passing the microphone positions.

Figure 34. Microphone Positions for All Other Hand-Held Toys A toy in the shape of a cube (the reference box) is inside a large cube, the measurement box. The clearance between the edges of the boxes is 50 centimeters. One

microphone is placed on a point in the center of each of the facets of the measurement box, so there are six points of measurement. 50 cm 1 2 NOTE— Key: 1—Measurement box 2—Reference box

FIG. 34 Microphone Positions for All Other Hand-Held Toys

Figure 35. Microphone Positions for Measurement of Stationary and Self-Propelled Table-Top, Floor, and Crib Toys This diagram is identical to Figure 34, however, in this case the inner box is labelled H/2 and the outer measurement box is labelled H. 1 2 H/2 H NOTE— Key: 1—Measurement box 2—Reference box

FIG. 35 Microphone Positions for Measurement of Stationary and Self-Propelled Table-Top, Floor, and Crib Toys

8.19.2.4 *Measurements*:

1. *General*—Normal operating mode(s) shall be reached before the tests are performed.

2. *Measurements of Continuous Sounds*—If the toy under test has a clearly defined operating cycle, measure the equivalent sound pressure level in each microphone position during at least one whole cycle. Quiet periods longer than 15 s shall be excluded from the measurement period. Perform a total of three measurements. If the toy under test does not have a clearly defined operating cycle, measure the equivalent sound pressure level in each microphone position for at least 15 s during the operational mode where the noise level is highest. Perform a total of three measurements.

3. *Measurements of Impulsive Sounds*—Measure the C-weighted peak sound pressure level, L_{Cpeak}, of impulsive sounds in each microphone position. Perform a total of three measurements. For pass-by tests, measure the C-weighted peak sound pressure level. Measure twice on each side.

4. *Measurement for Rattles*— Measure the C-weighted peak sound pressure level, L_{Cpeak}, for ten cycles. Perform a total of three measurements.

5. *Measurement Results*—Sound measurement results shall be given as: (*a*) A-weighted equivalent sound pressure level at the specified position, L_{Aeq}, in decibels; (*b*) C-weighted peak sound pressure level at the specified position, L_{Cpeak}, in decibels.

6. The highest value of the applicable measurements (L_{Aeq} and L_{Cpeak}) at any of the microphone positions is the measurement result.

8.20 *Dynamic Strength Test for Wheeled Ride-on Toys*— Load the toy for 5 min in the most onerous position with the appropriate mass in accordance with Table 6 on its standing or sitting surface. Secure the load to the toy in a position corresponding to the normal use of the toy. Drive the toy three times at a speed of 6.6 ft/s (2 m/s) ± 0.7 ft/s (0.2 m/s) into a nonresilient step with a height of 2 in. (50 mm). If the toy is intended to bear the mass of more than one child at a time, test each sitting or standing area simultaneously. Determine whether the toy continues to conform to the relevant requirements of this specification.

8.21 *Plastic Film Thickness*— Use a measuring device (dialtype thickness gauge or equivalent) capable of measuring thickness to an accuracy of 4 µm. Measurements shall be taken at 10 equidistant points across the diagonal of any 3.94 by 3.94-in. (100 by 100-mm) area. For plastic bags, prepare by cutting the sides, without stretching, into two single sheets.

8.22 Test for Loops and Cords

8.22.1 Anchor or secure the toy. Place the head probe (Fig. 10) in the loop/opening formed by the cord/s, tapered end first, with the plane of its base parallel to the plane of the opening. Rotate the probe to any orientation about its own axis while keeping its base parallel to the plane of the opening; apply 10 lbf (45 N) while attempting to push the probe through the opening.

8.22.2 Elastic materials or loops that are smaller than the tapered diameter of the head probe shall be stretched before applying the head probe test fixture using the hook test fixture illustrated in Fig. 36. To begin the evaluation, the elastic material is first looped around the left bottom hook, then hooking the elastic material with the hook attachment of the force gauge, pull the elastic material to the right bottom hook without exceeding a force of 5.0 lbf (22.2 N). The elastic material is then pulled to the left upper hook without exceeding a force of 5.0 lbf (22.2 N). Pull the elastic material to the right side so that the hook of the force gauge is adjacent to the left upper hook and parallel to the right bottom hook without exceeding a force of 5.0 lbf (22.2 N). The hook of the force gauge should remain in this position during testing. If the elastic material cannot be stretched and held in this position or if the force needed to stretch the elastic material exceeds 5.0 lbf (22.2 N), the elastic material complies with this requirement. The testing sequence is illustrated in Fig. 36 (a) through (e). If the body of the toy forms part of the loop, position the body of the toy so that it is on the open, right-hand side of

the hook test fixture. Apply the head probe in accordance with 8.22.1.

Figure 36. Hook Test Fixture for Cords and Loops There are 3 views, labeled top, front, and side. The scale is 1/1 inch and tere is a notation that the base is any suitable material and the height of all hooks shall be equal. From the top view, a rectangle with rounded corders is shown, there is a hook embeded with the base on the left of the rectangle and the hook protruding in. From the side view, there is a rounded rectangle with a hook screwed into the bottom. From the front view, two blocks form a 90 degree angle, with the vertical block on the left. There is one hook protruding out of that block a distance x. There are two hooks on the bottom block. The left-hook is at a distance of X from the left edge. The distance from the top of that hook to the hook embedded in the vertical block is 3. The distance between the two bottom hooks is 4.3. The hooks are not labelled but are used in subsequent diagrams, so we assign A as the hook on the vertical part, B as the leftmost bottom hook and C as the rightmost bottom hook. SCALE: 1/1 in. HEIGHT OF ALL HOOKS SHALL BE EQUAL BASE - ANY SUITABLE MATERIAL TOP VIEW FRONT VIEW SIDE VIEW 3.0 4.3 X X

FIG. 36 Hook Test Fixture for Cords and Loops

Figure 36a. Test Procedure for Cords and Loops, Step 1 (continued) A force gauge is connected to elastic material in the form of a loop. The loop is attached to the bottom hook on the left (B) of the fixture. FORCEGAUGE FRONT VIEW ELASTIC MATERIAL FORCE GAUGE KEY

FIG. 36 (a) Test Procedure for Cords and Loops, Step 1 *(continued)*

Figure 36b Test Procedure for Cords and Loops, Step 2 (continued) A force gauge is connected to elastic material in the form of a loop. The loop is hooked to both of the bottom hooks (B and C). The force gauge is pulling towards the right, away from C. FORCEGAUGE FRONT VIEW ELASTIC MATERIAL FORCE GAUGE KEY

FIG. 36 (b) Test Procedure for Cords and Loops, Step 2 *(continued)*

Figure 36c. Test Procedure for Cords and Loops, Step 3 (continued) A force gauge is connected to elastic material in the form of a loop. The loop is hooked to both of the bottom hooks (B and C) as well as the top hook (A). The force gauge is positioned above hook A, pulling up. FORCEGAUGE FRONT VIEW ELASTIC MATERIAL FORCE GAUGE KEY

FIG. 36 (c) Test Procedure for Cords and Loops, Step 3 *(continued)*

Figure 36d. Test Procedure for Cords and Loops, Step 4 (continued) A force gauge is connected to elastic material in the form of a loop. The loop is hooked to both of the bottom hooks (B and C) as well as the top hook (A). The force gauge is positioned to the right of hook A and directly above Hook

C, forming a rectangle, and the gauge is pulling the rectangle out. FORCEGAUGE FRONT VIEW ELASTIC MATERIAL FORCE GAUGE KEY

FIG. 36 (d) Test Procedure for Cords and Loops, Step 4 *(continued)*

Figure 36e. Test Procedure for Cords and Loops, Step 5 (continued) This diagram is identical to Figure 36d, with the elastic material in the form of rectangle. Inside this rectangle is a notation that says Insert Probe Here. FORCEGAUGE FRONT VIEW ELASTIC MATERIAL FORCE GAUGE KEY INSERT PROBEHERE

FIG. 36 (e) Test Procedure for Cords and Loops, Step 5 *(continued)*

8.22.3 For cords, straps, and elastics that form loops and have a perimeter larger than the base diameter of the head probe and contain a breakaway feature, the following test is applied to determine release force. With the cord secured in a vertical fashion so that the breakaway feature is essentially in the center of the two clamping devices, apply a downward force and determine if the breakaway feature releases at a force less than 5.0 lbf (22.2 N).

8.23 Yo Yo Elastic Tether Toy Test Methods

8.23.1 The yo yo elastic tether toy is tested in its most onerous foreseeable use configuration. Hold the yo yo elastic tether toy by whatever holding means is supplied, typically a small loop. Rotate the toy in a horizontal or near-horizontal plane using any convenient means to achieve a constant rotational speed of 80 r/min or the maximum achievable speed up to 80 r/min.

NOTE 20 — The plane of rotation may not be horizontal given the physical characteristics of the toy, for example the size and mass of the object at the end of the tether.

NOTE 21 — Where a tether has no distinct holding means, such as a finger loop, the unloaded length of the tether that is held should be the minimal length required to prevent release of the tether during rotation.

8.23.1.1 A variable speed drill is one method of achieving a constant rotational speed. If such a drill is used, attach the holding means to a rigid cam as shown in Fig. 37. Use a cam of 3 cm (1.18 in.) in length as measured from the center of rotation to the edge of the clamping mechanism furthest from the center of rotation (see Fig. 38). If necessary, manually start the product rotating. A typical test set up is shown in Fig. 37.

Figure 37. Example of a Typical Setup This figure is two photographs. On the

left is a device that resembles a power drill affixed to a test set-up. To the right is a cluttered scene of a workshop with no labels or descriptions.

FIG. 37 Example of Typical Test Set-Up

Figure 38. Close-Up of Clamp This photograph shows the end of what is presumably a power drill. At the end is a notation that says Center of Rotation. Connected to this end is a verticalbar that has a clamping mechanism affixed to it. A label says Edge of Clamping Mechanism.

FIG. 38 Close-Up of Clamp

8.23.2 Measure the length of the tether when the tether is fully extended during rotation. There is no requirement to measure the exact length of a tether if its fully extended length during rotation is well below or well beyond 50 cm (20 in.) (for example, less than 40 cm (16 in.) or greater than 60 cm (24 in.)). The tether length does not include the length of the mass at the end, the holding means (if present), or the cam (if used).

8.23.2.1 To facilitate length measurement of the tether during rotation, if helpful, mark two points along its length when it is under no load: (1) the point where it joins the mass at the end and (2) the point where it joins the holding means, as shown in Fig. 39.

Figure 39. Marking Unloaded Tether A ball is connected to a chord. At the other end of the cord is a circle with a hole in it. The point where the ball meets the cord is labelled 2.

FIG. 39 Marking Unloaded Tether

8.24 Magnet Test Methods

8.24.1 *Flux Density Measurement.*:

8.24.1.1 *Test Equipment*— dc field gauss meter with a resolution of 5 gauss (G) and an axial type probe.

1. An active area diameter of 0.76 ± 0.13 mm.
2. A distance between the active area and probe tip of 0.38 ± 0.13 mm.

8.24.1.2 *Test Method*:

1. Place the probe's tip in contact with the pole surface of the magnet. For a magnetic component (where the magnet is fully or partially imbedded in part of the toy), place the probe's tip in contact with the surface of the component.

2. Keep the gauss meter's probe perpendicular to the surface.

3. Move the probe across the surface to locate the maximum absolute flux density.

4. Record the maximum absolute flux density measurement.

8.24.2 *Area Measurement of the Pole Surface*:

8.24.2.1 *Test Equipment*—

Calipers or similar device with a resolution of 0.1 mm.

8.24.2.2 *Test Method*— If the magnet is imbedded/attached as part of a magnetic component, extract the magnet from the component. If the pole surface of the magnet is flat, calculate the area using the appropriate geometric formula. If the pole is not flat (for example, hemispherical), the pole surface area is the maximum cross section of the magnet perpendicular to an axis through the magnet poles (see Fig. 40).

NOTE 22 — On multi-pole magnets use the area of the largest single pole, which can be determined using magnetic field viewing film or equivalent.

Figure 40. Illustration of Pole Surface on a Magnet with Rounded Ends A cylinder with rounded ends is shown. A circle indicates the maximum cross-section perpendicular to axis. A line that is perpendicular through the center of that cross section is labelled axis through magnet poles. Maximumcross-sectionperpendicularto axis Axis throughmagnet poles

FIG. 40 Illustration of Pole Surface on a Magnet with Rounded Ends

8.24.3 *Calculation*— The flux index (kG^2 mm^2) is calculated by multiplying the area of the pole surface (mm^2) of the magnet by the square of the maximum flux density (kG^2).

8.24.4 *Magnet Use and Abuse Testing*— Each unique component shall be tested per this section. A new toy shall be used that has not been subjected to other use and abuse testing. All the testing in this section must be performed in series on each unique component (that is, testing must follow 8.24.4.1-8.24.4.5 in sequential order).

8.24.4.1 *Cycling as Received*— One thousand (1000) cycles of intended use shall be performed on the as-received magnetic parts or magnetic

assemblies. The magnetic parts shall be brought together to a distance that initiates magnetic attraction, released, and then pulled apart to the distance where magnetic attraction ceases. Each attachment and detachment shall count as 1 cycle. If no other magnets or magnetic parts are provided with the toy, then the mating metal part or surface, according to the toy's intended play pattern, should be used for cycling purposes. The testing may be automated or performed manually.

8.24.4.2 *Impact Test*— Place the magnetic part or magnetic component in an orientation that is most likely to result in breakage on a plane horizontal steel surface and drop a metallic weight with a mass of 2.2 lb (1.0 kg) distributed over an area with a diameter of 3.1 in. (78.7 mm) through a distance of 4.0 in. (101.6 mm) on to it. Determine if a hazardous magnet or a hazardous magnetic component is generated.

8.24.4.3 *Torque Test*— Test according to 8.8.

8.24.4.4 *Tension Test*— Test according to 8.9.

8.24.4.5 *Cycling – After Abuse Test*— Repeat the testing described in 8.24.4.1.

8.25 Test Methods for Locking Mechanisms or Other Means

8.25.1 *Locking Mechanisms or Other Means*:

8.25.1.1 Erect the product in accordance with the manufacturer's instructions.

8.25.1.2 Secure the product so that the normal folding motion is not impeded.

8.25.1.3 Apply a force of 45 lbf (200 N) to the product, but not to the mechanism itself, in the direction normally associated with folding. Apply the force gradually over a 5 s period and maintain for an additional 10 s before releasing the force.

8.25.1.4 Perform this procedure five times within a 2 min period.

8.25.2 *Locking Test Method*— With the product in the manufacturer's recommended use position, gradually apply a force of 10 lbf (45 N) to the locking mechanism in the direction tending to unlock it. The locking mechanism shall not unlock until a minimum force of 10 lbf (45 N) has been achieved.

8.26 Test for Overload of Ride-On Toys and Toy Seats

8.26.1 Place the toy on a horizontal plane.

8.26.2 The test load(s) shall be three times the weight indicated in Table 6 at the highest age of the age range for which the toy is intended. The test for overload requirements shall be conducted so that it will be consistent with the advertised weight capacity if that figure is higher than the minimum weight capacity in accordance with Table 6. When the highest age of the intended age range falls between two ages listed in Table 6, the higher of the two shall be chosen.

8.26.3 Where the toy is intended to bear the weight of more than one child at a time, test each sitting or standing area (33 the weight tested separately in each location).

8.26.4 Apply a static load(s) that is equal to the weight as determined by the criteria above. The load(s) shall be applied so that it is as close as possible to the geometric center of the designated seating or standing area(s). If there is no designated seating or standing area(s), the load shall be placed at the least favorable position that it is reasonable to anticipate that the child will choose to sit or stand.

8.26.5 Observe whether the toy collapses within 1 min after application of the static load(s).

9. Identification

9.1 So that purchasers may identify products conforming to all of the requirements of this specification on toy safety, producers, importers, and distributors may include a statement of compliance in conjunction with their name and address on product labels, invoices, and sales literature.

9.1.1 The following statements are suggested:

1. Conforms to the requirements of ASTM Standard Consumer Safety Specification on Toy Safety, F963 (name and address of producer, importer, or distributor).

2. Conforms to the safety requirements of Specification F963 (name and address of producer, importer, or distributor).

10. Keywords

battery-operated toys; children; safety labeling; safety testing; toy safety

requirements

ANNEXES
(Mandatory Information)

A1. AGE GRADING GUIDELINES +

A1.1 Purpose and Scope

A1.1.1 Good age-grading practices are important to ensure that a toy is appropriate and safe at particular stages of physical and mental development.

A1.1.2 Age labeling is intended to provide point-of-sale guidance to consumers for the selection of appropriate toys for children with respect to average abilities, interests of various age groups, and safety aspects of the toys themselves.

A1.1.3 This guideline is intended to provide thoughts and considerations necessary to establish meaningful age recommendations for toy products.

A1.1.4 "Guidelines for Relating Children's Ages to Toy Characteristics (1985)" is available from the Consumer Product Safety Commission, Washington, DC 20207.

A1.2 Criteria for Establishing Age Grades

A1.2.1 The following criteria should be considered when establishing age grading for a toy. While all of these should be considered in total, each one may be weighted individually to arrive at the appropriate age grading.

A1.2.1.1 The physical ability of a child to manipulate and play with the specific features of a toy. This necessitates an understanding of the physical coordination, fine and gross motor capabilities, size, and strength generally available at a given age.

A1.2.1.2 The mental ability of a child to understand how to use the toy (that is, understand instructions, sequences of operations, objective of the toy). Consideration of the mental skills at a given age is important in order to provide a concept that will challenge abilities and stimulate further development, yet not frustrate. Accomplishment should be neither too easy nor too difficult to be satisfying to the child.

A1.2.1.3 The toy must meet play needs and interests at different levels of development. Understanding developmental levels and identifying play

materials and play environments to enhance each developmental stage is important for assigning appropriate age grades. Play interests and toy preferences change rapidly; there should be careful attention to a child's preference or aversion to specific toy subjects at certain stages. In order for a toy to enhance play, it obviously must be appealing to its user. In short, it must be fun.

A1.3 Tools

A1.3.1 Use of the following tools can help guide the establishment of meaningful age grading for a toy. These tools are not arranged in a particular order of importance; all of them should be considered during the age grading process.

A1.3.1.1 Prior experience with the toy or a similar toy in the marketplace indicating suitability for a specific age group.

A1.3.1.2 Reference materials on comparative body measurements and human factors elements.

A1.3.1.3 Reference resources on child development norms to establish developmental mileposts.

A1.3.1.4 Identification of developmental features to be enhanced/stimulated within certain age spans.

A1.3.1.5 Expertise of outside consultants, child development specialists, physicians, and psychologists.

A1.3.1.6 Testing of models or prototypes with children.

A1.3.1.7 Observing skill levels in children at play.

A1.3.1.8 Seeking opinions of parents.

A1.3.1.9 Interacting with children and asking questions.

A1.4 Safety Considerations of Age Grading

A1.4.1 The toy must be safe for the intended user. Once the skill level has been determined, the design must be tailored to satisfy the requirements of this specification associated with that age level.

A1.4.2 Age grades are indicators of average development, which does not

necessarily reflect suitability for the exceptional child. A parent remains the best judge of whether the child is at the appropriate development stage for safe play with a particular toy.

A1.4.3 A primary consideration should be potential choking and aspiration hazards associated with small parts. Children under the age of three are more prone to placing objects in their mouths. However, the propensity to put nonfood objects in the mouth does not disappear at the chronological age of three years. The following toys are appropriate for children under three years of age and are cited specifically as subject to the safety requirements of 16 CFR 1501 for small parts regulations:

A1.4.3.1 Squeeze toys, teethers, crib exercisers, crib gyms, crib mobiles, toys intended to be affixed to a crib, stroller, playpen, or baby carriage, pull and push toys, pounding toys, blocks and stacking sets, bathtub, wading pool and sand toys, rocking, spring, and stick horses and other figures, chime and musical balls and carousels, jack-in-the-boxes, stuffed, plush, and flocked animals and other figures, and those preschool toys, games and puzzles, riding toys, dolls and animal figures, cars, trucks, and other vehicles that are intended for use by children under the age of three years.

A1.4.4 Some of the characteristics of toys that describe those preschool toys that are appropriate for children under the age of three years are listed below by class of toy:

A1.4.4.1 *Dolls*— Soft-bodied baby dolls or character dolls that are for holding or cuddling, stuffed or “bean bag” dolls, rag or cloth dolls with simple features (including accessories), and lightweight plastic dolls with simple features and limited articulation at the limb joints.

A1.4.4.2 *Infant Toys*— Toys intended to be used in a crib or playpen, to be held easily by small hands, shaken, grasped, rattled, or cuddled.

A1.4.4.3 *Toy Vehicles*— Cars, trucks, boats, and trains of simple chunky shape, decorated in primary colors without extensive descriptive detail or representation of a particular make or model of vehicle and that require simple actions such as rolling, dumping, pushing, and releasing.

A1.4.4.4 *Action Toys*— Simple action toys for the identification of sounds or pictures and surprise action toys.

A1.4.4.5 *Early Learning Toys*— Toys, books, and puzzles for learning basics such as letters or numbers or shapes, and simple physical motions such as turning wheels or knobs, pulling and letting go, or sorting by size, etc.

A1.4.4.6 *Blocks and Stacking Toys*— Toys that do not require finger dexterity or fitting together of small intricate pieces.

A1.4.4.7 *Soft Balls and Similar Items*— Soft, lightweight balls or other shapes for squeezing, shaking, rolling, or tossing.

A1.4.5 Toys that should not be considered appropriate for very young children, and therefore not be age labeled as such, have the following characteristics:

A1.4.5.1 Toys that require intricate finger movements or controlled adjustments, fitting intricate pieces together.

A1.4.5.2 Toys, for example, games that require or incorporate elements of reading ability beyond the ABCs or 123s.

A1.4.5.3 Toys that simulate adult figures or characters and their associated accessories.

A1.4.5.4 Collecting sets (for example, figures and vehicles).

A1.4.5.5 Projectile-type toys, launched vehicles, planes, etc.

A1.4.5.6 Makeup sets.

A1.4.6 Another major development cutoff has been cited at approximately eight years of age, at which time reading ability has progressed so that a child can, on his own, read, understand, and heed instructions, caution statements, etc. Because the instructions and caution statements are necessary for the safe use of the product in some cases, those products should be labeled for use by children over the age of eight. Products that fall into this category include the following:

A1.4.6.1 Science and environmental kits or sets containing breakable glass components and complex instructions.

A1.4.6.2 Complex model and craft sets requiring precision assembly and finger dexterity or incorporating sharp tools or components.

A1.4.6.3 Electrically operated toys incorporating heating elements.

A1.4.6.4 Certain chemistry sets, fueled model vehicles, and rockets, etc. that contain chemicals that may be hazardous, cannot generally be handled safely by children unable to read and understand instructions and cautionary

statements. The minimum age for which any such product should be recommended is eight years and then *only* with adult supervision.

A1.5 Descriptive Age Labeling

A1.5.1 Manufacturers can assist parents and other purchasers in the appropriate selection of toys by incorporating descriptive labeling to identify potential safety concerns if the toy is accessible to children outside the recommended age group.

A1.5.2 For example, if a toy contains small play pieces and is labeled for older children, such as an action figure set, the manufacturer should consider including a statement on the retail packaging that the toy contains small pieces.

A1.5.3 Factors to consider would include the appeal of the toy to young children, market experience, the design or construction of the toy, and whether the packaging provides visual indication of any small play pieces. In addition, a manufacturer should consider the probability that a purchaser may overestimate a child's physical or mental abilities and the child's understanding of a potential hazard related to the toy.

A2. PACKAGING AND SHIPPING

A2.1 Packaging

A2.1.1 Packages that are intended to be opened by adult purchasers should be constructed as to avoid hazards during the opening process from metal fasteners, particularly staples, and should not contain common pins used to position the toy within the package.

A2.2 Shipping

A2.2.1 Packaged and unpackaged toys can be subjected to a wide variety of tests designed to test the ability of toys to withstand the destructive forces encountered in the distribution cycle. The tests used most widely include drop, vibration, compression, and incline impact. Limited testing may be sufficient for many toys, especially those that are of light weight and constructed of resilient materials, such as dolls and stuffed toys. Others, however, such as large plastic or heavy metal toys, may be damaged during shipment and should be subjected to appropriate tests. Guidance for useful tests can be obtained from the following ASTM sources: Test Methods D642, D5276, D880, and D999.

A3. DESIGN GUIDELINES FOR TOYS ATTACHED TO CRIBS OR PLAYPENS

A3.1 Purpose and Scope

A3.1.1 This annex provides guidance for design practices intended to encourage the careful examination of product characteristics and configurations with respect to safety. As there are no objective means for determining conformance with these design guidelines, they are not to be used to judge compliance with this specification.

A3.2 Guidelines

A3.2.1 Designs for all products intended to be attached to cribs or playpens should be accomplished in a manner that minimizes the potential for strings, ribbons, elastic, or parts of clothing to become caught on the product, such that an infant is placed in a dangerous predicament in which possible strangulation could occur.

A3.2.2 Examples of the implementation of good design practices for crib and playpen environments include the following:

1. Rounded corners with the use of generous radii wherever possible.
2. Smooth contours that minimize abrupt changes in shape that could easily become a catch point for strings, ribbons, elastic, or loose clothing.
3. Isolation of fastening hardware using recesses, counterbores, or other similar methods.
4. Reduction of the potential for any mismatch of surfaces where a catch point could develop.

A4. DESIGN GUIDELINES FOR BATH TOY PROJECTIONS

A4.1 Purpose and Scope

A4.1.1 This annex provides guidance for design practices intended to result in bath toy projection characteristics and configurations that will minimize the risk of injury to the genital and anorectal area if a child were to sit or fall onto the bath toy projection while in an unclothed or minimally clothed state. Some examples of these potentially hazardous projections include but are not limited to rigid fins of fish, rigid hulls, funnels, and masts of boats.

A4.2 Guidelines

A4.2.1 It is important that the design of a bath toy be developed with consideration of the shapes, dimensions and materials of any projections on the toy such that penetration and impalement hazards are minimized.

A4.2.2 Examples of good design practices include:

A4.2.2.1 *Non-Vertical Projections*— It is preferable to have projections designed such that they are always non-vertical when the toy is evaluated in all stable positions including consideration of the potential positions the toy can rest on the bottom of a bath tub, with or without water present in the bath tub, to produce a vertical or nearly vertical projection.

A4.2.2.2 *Stability*— If a toy topples over when force is applied to the end of the vertical projection, both when the bath toy is empty and filled with water, then the vertical projection is unlikely to be hazardous.

A4.2.2.3 *Accessibility*— Vertical projections can be protected by suitable means to minimize possible injury. A protected projection is one that has adequate adjacent structure (ribs, housings, or other permanent components) to render the projection unlikely to cause penetration or impalement hazards.

A4.2.2.4 *Flexibility*— Vertical projections can be designed to be flexible to minimize possible injury. This can be done through the choice of materials, a design which bends or compresses or the dimensions of the projection.

A4.2.2.5 *Diameter*— The diameter (or cross-sectional projected area) of a vertical projection can be sized large enough to minimize possible injury.

A5. FLAMMABILITY TESTING PROCEDURE FOR SOLIDS AND SOFT TOYS

A5.1 Purpose

A5.1.1 This annex establishes the protocol and general criteria for flammability testing of solids, and soft toys in conformance with the requirements of 16 CFR 1500.3(c)(6)(vi).

A5.2 Definitions

A5.2.1 *major axis*— a straight line through the longest dimension of the product connecting the most distant parts or ends of the product. A product

can have more than one major axis (see Fig. A5.1), but they must be equal in length. For toys that pose or transform, position the product so that its major axis is the longest possible dimension.

Figure A5.1. Illustration for Determining Major Axis Two diagrams are shown. Each has 3 lines that intersect. Two of the lines are long and intersect at an angle. A vertical line which is shorter intersects at the same point. In one diagram the point of intersection is in the middle of the lines, in another, it is much higher up. Lines A-A and B-B are the long ones, C-C is the shorter one. A A C C B B A A C C B B

NOTE — Lines A-A and B-B are both major axes. Line C-C is *not* a major axis.

FIG. A5.1 Illustration for Determining Major Axis

A5.2.2 *soft toy*— any stuffed or plush toy, that may or may not be parts or components of other toys.

A5.2.3 *solids*— toys or toy parts constructed of rigid, flexible, or pliable solids.

A5.2.4 *accessories*— an item intended to be removed to enhance the play pattern.

A5.2.5 *strings*— long slender flexible material usually consisting of several strands (as of thread or yarn) woven or twisted together, usually used to bind, fasten, tether, or tie. This does not include string when used, for example, for hair on a doll.

A5.2.6 *paper*— a thin, flat, single layer of material produced by the compression of fibers. The fibers are usually composed of cellulose. Examples of paper products are traditional playing cards, newspaper, magazines, and construction paper. Examples of products that are not paper are cardboard, and paperboard (multiple layers of paper bonded together).

A5.3 Exemptions

A5.3.1 Strings, paper, and ping-pong balls. A5.3.2 Accessible components having a major dimension of 1 in. (25 mm) or less.

A5.3.3 Textile fabrics intended to be removed shall be tested separately and meet the requirements of A6.1. Fabrics not intended to be removed shall become subject to the test to the extent that it becomes a part of the test surface.

A5.3.4 Sleeping bags.

A5.3.5 Packaging materials intended to be discarded by the consumer. Components of packaging that are likely to be incorporated into the play pattern of the toy are not exempt.

A5.4 Sample Preparation for Solids and Soft Toys

A5.4.1 Test product completely assembled as per manufacturer's instructions. If disassembly is required for storage purposes only, test when fully assembled as per manufacturer's instructions. If assembly or disassembly, or both, is part of the play pattern (that is, accessories, puzzles, construction toys, etc.) test each component separately.

A5.4.2 Remove all string or paper from the product as deemed necessary.

A5.5 Procedure for Solids and Soft Toys

A5.5.1 Place the prepared sample in a draft-free area that can be ventilated and cleared after each test. The temperature of the sample at the time of testing shall be between 68 and 86°F (20 and 30°C) at a relative humidity of 20 to 70 %.

A5.5.2 The test fixture shall be corrected to a clean condition prior to the start of each test.

A5.5.3 Measure the dimensions of the sample, and support it by means of the test fixture (see Fig. A5.2) or equivalent, so that the ends of the major axis are oriented horizontally. Placing a scale along the major axis is a sufficient means for gauging the burn distance.

Figure A5.2. Suggested Flammability Test Fixture This is a square board which is 10 inches on each side. Nails are 1.25 inches apart in a grid, with the nails on the outside perimeter 0.62 inches in with the edge, thus 64 places. Number 10-32 tap screws are placed 0.31 inchdes in from each corner and in the middle of the board (thus 4.69 inches between the outer screws and the one in the middle of each edge. The nails protrude 2.4 inchdes out. The screws are item 1, the nailes are item 2, the board is item 3 and is made of stainless steel, the board underneath it is labelled 4 and is also stainles steel. .13 4.69 TYP .31 TYP .10 REF. 2.40 REF. .25 4.69 TYP .31 1.25 TYP .62 TYP 10.00 # 10-32 TAPTYP. 18) PLCS. Ø . 109 REF ...002 S.F.FOR NAILS TYP (64) PLCS. .62 TYP 1.25 TYP .10.00 2 3 4 1

NOTE 1 — Tolerances (unless otherwise specified):
3 Place DIMS ± 0.005

2 Place DIMS ± 0.015
Angles ± 1°

NOTE 2 — Break all sharp edges and screw to suit unless otherwise specified.

FIG. A5.2 Suggested Flammability Test Fixture

A5.5.3.1 *Orientation and Locations for Ignition of Specimens*— When orienting specimens, provide support over the entire length of the major axis without sagging, making sure the supporting device does not retard the spread of flame materially. Optional: for samples with long hair, it may be necessary to add fine wire (24 AWG or higher) between some nails to provide sufficient support for the hair. The addition of support for hair is not necessary unless the hair hangs down vertically while lying on the test fixture.

NOTE A5.1— The CPSC does not test hair separately but rather tests hair as a normal part of the toy. The toy might be tested in a face-down position, with the hair in a horizontal position on top of the toy. The toy could also be tested lying on its back, with the hair lying beneath the toy. Hair that hangs vertically would not be used to calculate the burn rate.

1. A sample that is so large that it becomes impractical to support its entire length must be arranged in such a manner that support at the end of a major axis is provided by the test fixture.

2. One or more specimens shall be ignited at one end of the major axis, and when practical, one or more specimens shall be ignited at the opposite end of the major axis. Specimens shall be positioned in the worst case position, as dictated by experience.

A5.5.4 Trim the candle and wick as necessary to maintain a flame height of ⅝ to 1 in. (16 to 25 mm).

A5.5.4.1 Hold a burning paraffin candle whose diameter is at least 1 in. (25 mm) so that the flame is a minimum of ⅝ in. (16 mm) high, with the tip of the inner cone of the flame in contact with the surface of the sample at the end of the major axis for 5 s. Maintain contact of the candle with the sample for 5 s or until ignition occurs. If the sample melts away from the flame, move the candle and maintain contact for the full 5 s or until the sample ignites. If the ignition occurs immediately, hold the candle steady and allow the ignited flame to move away.

Item	Required	Description	Material
1	9	# 10-32 0.38 LG.	S.H.C.S.
2	64	# 8d 2.50 LG.	Common Nail
3	1	0.13 10.00 LG. 10.00	Stainless Steel
4	1	0.25 10.00 LG. 10.00	Stainless Steel

A5.5.5 Remove the candle and allow the sample to burn for an additional 55 s (total burn time including ignition time is 60 s) or until the flames reach the opposite end of the major axis. Determine the time of combustion by means of a stop watch. Do not allow the total test time to exceed 60 s with a self-sustaining flame.

A5.5.6 Extinguish the flame with a CO or similar nondestructive extinguisher, if necessary, after the 60 s. The experienced application of water is an acceptable method for extinguishing the flame.

NOTE A5.2— Extinguishing the flame must be accomplished in a manner that preserves the accuracy of the burned distance.

A5.5.7 Measure the length of the burned area, and calculate the rate of burning along the major axis of the sample.

A5.5.8 Products that do not ignite are considered acceptable. No burn rate is calculated for these samples. The burn rate for products that self-extinguish in less than 60 s shall be computed by using the actual burning time as the denominator when calculating the burn rate. For example, ignited product burns 3 in. (76 mm) in 20 s and self-extinguishes. The burn rate is calculated as follows:

$$\frac{3\text{in.}}{20\text{s.}} = 0.15\text{in./}s \qquad \text{(A5.1)}$$

A5.5.8.1 Burn-rate calculations for a product that selfextinguishes must be approached cautiously to avoid the introduction of measurement error since small measurement errors can become a significant portion of final calculations when the burn distance is short.

NOTE A5.3— It is unlikely that the CPSC would pursue an enforcement action that includes a burn rate calculation higher than 0.10 in. per second and yet consistently self-extinguishes during the test. However, the CPSC reserves the right to proceed with an action if such a burn rate may result in the product's causing substantial personal injury or substantial illness.

1. When the product does not self-extinguish, the flame shall be allowed to continue for a total time of 60 s. Calculate the rate of burning using the actual distance of flame spread during the full 60 s. For example, the product ignites and burns 9 in. (229 mm) in 60 s. The burn rate is calculated as follows:

$$\frac{9\text{in.}}{60\text{s.}} = 0.15\text{in./}s(\text{a flammable solid}) \quad \text{(A5.2)}$$

NOTE A5.4— While testing, samples shall not be extinguished prematurely if such action will affect the burn rate. For example, if a stuffed rabbit is ignited at the tip of one ear and the flame is extinguished when the flame reaches the base of the ear, this may produce an inflated burn rate if the ear material burns at a faster rate than the rest of the product. Therefore, allow the sample to burn the full 60 s taking into account both the ear and the rest of the product.

2. There may be scenarios where the flame may need to be extinguished prematurely prior to reaching the full 60 s. For example, the major axis of a product is 6 in. in length. The product ignites and burns the total length of the major axis (6 in.) in 40 s but continues to flame. Once the flame travels the full length of the major axis, extinguish the flame immediately regardless of whether or not the full 60 s has been reached. The burn rate is calculated as follows:

$$\frac{6\text{in.}}{40\text{s.}} = 0.15\text{in./}s \quad \text{(A5.3)}$$

A5.6 Requirements

A5.6.1 A toy shall be considered a flammable solid if it ignites and burns with a self-sustaining flame at a rate greater than 0.1 in./s (2.5 mm/s) along its major axis.

A5.6.2 If the burn rate of a composite product (that is, solid/fabric combined) exceeds 0.10 in./s in part due to the presence of a permanently attached fabric, then a secondary test shall be performed to determine compliance. The secondary test shall consist of removing the permanently attached fabric from the solid and retesting the solid component separately. When sold as part of a toy such that the permanently attached fabric cannot be removed without causing damage to the toy and the fabric (that is, fabric covered book, stuffed dolls/animals, etc.) or if the toy is an enclosure that a child can enter, the fabric shall become subject to the solids test to the extent that it becomes a part of the major axis.

NOTE A5.5— The permanently attached fabric that was removed from the sample must now be subject to meeting the requirements of Annex A6.

A5.6.3 *Criteria for Acceptance*:

A5.6.3.1 Sample size = four, whenever practical.

A5.6.3.2 A burn rate is not calculated for samples that do not ignite.

A5.6.3.3 Calculate the burn rate to two significant figures (to the nearest hundredth using conventional rounding rules, that is, for 5 or higher, round up).

A5.6.3.4 Round the burn rate to the nearest tenth (that is, round 0.15 up to 0.2).

A5.6.3.5 Level of acceptance = 0.1 in./s (2.5 mm/s), maximum, along the major axis.

A5.6.3.6 *Additional Guidance for Manufacturers*— Manufacturers' decisions on the performance of an item should be based on a minimum of four samples. This provides a reasonable opportunity for detecting undesirable variations in the product. Proceed as follows:

1. If the burn rate of all samples is less than 0.1 in./s (2.5 mm/s), accept.
2. If the burn rate of all samples is greater than 0.1 in./s (2.5 mm/s) but less than 0.15 in./s (3.75 mm/s), accept and consider further investigation for action to improve performance.
3. If the burn rate of one of the samples is 0.15 in./s (3.75 mm/s) or greater, reject and repeat the test with four additional samples (one time only). If the burn rate of any of the retested samples is 0.15 in./s. or greater, reject.
4. If the burn rate of more than one of the initial 4 samples is 0.15 in./s (3.75 mm/s) or greater, reject.

NOTE A5.6— CPSC makes its decision on whether a product is a flammable solid based on the burn rate of each individual sample. It then determines whether the product may cause substantial personal injury or substantial illness during or as a proximate result of any customary or

reasonably foreseeable handling or use. CPSC has no objection to other laboratories rounding off to the nearest 0.1 in./s. It will calculate burn rates to two decimal places but does not envision enforcement action where the burn rate is greater than 0.10 in./s and less than 0.15 in./s. However, CPSC reserves the right to proceed if such burn rate may result in the product's causing substantial personal injury or substantial illness.

A6. FLAMMABILITY TESTING PROCEDURE FOR FABRICS

A6.1 Purpose

A6.1.1 This annex establishes the protocol and general criteria for flammability testing of fabrics in conformance with the requirements of 16 CFR 1500.3(c)(6)(vi).

A6.2 Definitions

A6.2.1 *fabric*— any coated or uncoated material (except film and fabrics having a nitro-cellulose fiber, finish or coating) that is woven, knitted, felted, or otherwise produced from any natural or manmade fiber, or substitute therefore, or combination thereof.

A6.2.2 *plain surface fabric*— any textile fabric which does not have an intentionally raised fiber or yarn surface such as pile, nap, or tuft, but shall include those fabrics having fancy woven, knitted or flock printed surfaces.

A6.2.3 *raised surface fabric*— any textile fabric which has an intentionally raised fiber or yarn surface such as a pile, nap or tufting.

A6.3 Exemptions

A6.3.1 Fabrics where a contiguous 2 by 6 in. piece cannot be extracted.

NOTE A6.1— If a contiguous 2 by 6 in. piece of fabric cannot be obtained, but due to the existence of other fabrics adjacent to it a composite 2 by 6 in. sample can be obtained, and the fabrics in question are permanently attached to a common substrate, then it shall be tested. An example of this would be a doll's hula skirt made of thin strips of fabric 6 in. in length. Each individual strip is joined at the top by a common substrate (that is, plastic waistband) and when combined with the other strips immediately adjacent to it, a 2 by 6 in. sample can be extracted.

A6.3.2 Fabrics that are permanently attached to a solid must initially be

tested with the solid per Annex A5.

A6.4 Sample Preparation

A6.4.1 Precondition all fabrics in a horizontal position for a minimum of 30 min at a temperature of 221 ± 10°F.

A6.4.2 Fabrics intended to be washed shall be subjected to AATCC Home Laundering Fabrics Prior to Flammability Testing to Differentiate Between Durable and Non-Durable Finishes - 2007.

A6.4.3 A total of 5 samples, whenever practical, shall be cut for each location. Samples may be obtained from more than one toy.

A6.4.4 Samples shall be tested in the manner in which they appear on the toy (that is, exposed side face-up).

A6.4.5 Use the most onerous orientation (for example, warp or fill).

A6.4.6 If it is necessary to use a sample that consists of more than one type of fabric, then take the sample from the most onerous location.

A6.4.7 If fabric is layered and the layers are permanently secured to one another (for example, stitched together) at any point, cut through as many materials necessary to obtain the sample and include all layers in a single sample. Orient layers in the sample holder in the same manner they appear on the toy. (See Fig. A6.1.)

Figure A6.1. Layered Fabric Sample This is a poor drawing of a doll with lots of hair and dress consisting of several layers.

FIG. A6.1 Layered Fabric Sample

A6.4.8 For fabrics with finished ends made of a different material (that is, lace, ribbons, etc.) test the finished ends separately.

A6.4.9 If the finished ends consist of the same material as the sample being tested (that is, hemmed, folded, etc.) then attempt to exclude this from the 2 by 6 sample. In addition, if the fabric contains any seams or stitching, attempt to exclude them from the sample. If a sample cannot be extracted by excluding the finished ends or seams/stitching, then include them in the sample during testing, however, orient the sample in the fixture so that the finished ends or seams/stitching are at the top or side of the fixture to minimize any effect it may have on the burn rate.

A6.4.10 If the fabric requires support in order to be held in the fixture, then the use of thin gauge wire (24 AWG or higher) strung across the plate opening at equidistant points from each other is acceptable. (See Fig. A6.2.)

Figure A6.2. Fabric Requiring Support A rectangle is shown with a weave pattern and a set of diagonal lines that are thicker, which are presumably the support.

FIG. A6.2 Fabric Requiring Support

A6.4.11 Regardless of sample size, if the fabric has nonfabric components permanently attached to it (that is, buttons, sequins, beads, etc.) remove these components only if removal will not cause permanent damage to the fabric or to the non-fabric component. Then test each component separately as applicable. If permanent damage cannot be avoided during removal, then test with non-fabric components attached.

A6.5 Test Procedure

A6.5.1 Test fabrics per the test method specified in 16 CFR 1610.4(g).

A6.5.2 Use the equipment as specified in 16 CFR 1610.4(b).

A6.6 Requirements

A6.6.1 *Plain Surface Fabrics*:

A6.6.1.1 Specimens are acceptable if:

1. All specimens either did not ignite, ignited but selfextinguished, or any combination thereof.
2. Average burn time is 3.5 s or greater.

A6.6.1.2 If only 1 of 5 specimens ignites and burns the stop cord with a time of 3.5 s or more, samples are acceptable.

A6.6.1.3 If only 1 of 5 specimens ignites and burns the stop cord in less than 3.5 seconds, test another set of 5 specimens. Compute the average time of flame spread for all 10 specimens. If 2 or more of these specimens ignite and burn the stop cord, average the results from those specimens. If only 1 of the 10 specimens ignites and burns the stop cord, samples are acceptable.

A6.6.2 *Raised Surface Fabrics*:

A6.6.2.1 Specimens are acceptable if:

1. All specimens either did not ignite, ignited but selfextinguished, or any combination thereof.
2. Average burn time is 4 s or greater.
3. Average burn time is less than 4 s and all specimens burn with a surface flash where the intensity of the surface flame is insufficient to ignite, char, or melt the base fabric.
4. Only 1 of 5 specimens ignites and burns in less than 4 s and the base fabric does not ignite or fuse, the sample is acceptable.
5. Only 1 of 5 specimens ignites or burns in more than 4 s, regardless of whether the base fabric ignites or fuses, the sample is acceptable.

A6.6.2.2 To compute the average time of flame spread for each set of 5 specimens, at least 2 of the specimens must ignite and burn the stop cord.

A6.6.2.3 If only 1 of 5 specimens ignites and burns in less than 4 s where the base fabric ignites or fuses, test another set of 5 specimens. Compute the average time of flame spread for all 10 specimens. If 2 or more of the 10 specimens ignite and burn the stop cord, average the results from those specimens. If only 1 of the 10 specimens ignites and burns the stop cord, samples are acceptable.

A7. COMPOSITING PROCEDURE FOR TOTAL HEAVY METAL ANALYSIS

A7.1 Purpose

A7.1.1 Composite testing for a total digestion analysis may be conducted to potentially reduce the number of tests conducted. Combining different but like materials into a composite analysis must be done with adequate care and understanding of the limitations and potential propagations of error in measurement or the test may fail to detect excessive metals in one of the individual materials.

A7.2 Definitions

A7.2.1 *Composite Testing – Different Materials*— Combining different but similar materials to reduce the number of digestions and instrumental metal analyses performed.

A7.2.2 *Similar or Like Materials*— Materials that have similar characteristics

may be combined into one composite sample. Glass may be composited together; and plastics composited together; however glass and plastic may not be composited together as they require different digestant mixtures to achieve complete digestion. Coatings on metal substrates should not be composited with coatings on non-metal substrates.

A7.3 Exclusions

A7.3.1 Metal substrates with different compositions should not be composited together as one may interfere in the digestion process and cause re-precipitation or incomplete digestion, therefore affecting the actual result.

A7.4 Sample Preparation

A7.4.1 Each individual component must be weighed individually with sufficient precision and sufficient safety factors to assure that no false negatives are reported.

A7.4.2 Sufficient materials must be used for each of the components giving proper consideration for the weighing capabilities of the balance used and the detection limits and necessary dilution for the subsequent instrumental analysis.

A7.4.3 The combined materials are digested according to the appropriate procedure, depending on the material, before analysis by atomic spectroscopy or other appropriate validated method.

A7.4.4 Appropriate weights of each of the individual materials composited depend on final dilution volumes, weighing accuracy, and detection limits.

A7.4.5 Equal weights (to the extent achievable by good laboratory practice) of each of the similar or like materials must be used in the composite sample.

A7.5 Calculation

A7.5.1 As an example, results for the Arsenic (As) content are calculated and reported as follows:

$$\textit{Total As concentration: \%As (wt./wt.)} = 0.10\ cd/w \qquad \text{(A7.1)}$$

where:

c = concentration of arsenic detected (µg/ml)

d = dilution volume (mL)

w = weight of aliquot digested (mg)

A7.5.1.1 One example of composite testing of different plastics would be as follows, and considers the case of weighing to the nearest 0.01 mg, digesting in acid, diluting to a final volume of 10 or 20 mL, and testing on an ICP-OES with an MDL of 0.04 µg/mL. A sample comprising red, green, and orange plastics is tested as a composite using 15.0 mg of red plastic, 16.0 mg of green plastic, and 17.0 mg of orange plastic. The resulting 48.0 mg of composite plastic from this example is digested in acid and diluted to 10 ml, and then the diluted digest is found to contain 0.0008 % arsenic. The combined 3 aliquots of plastic would have contributed to a total of 0.40 µg of arsenic for the composite sample. Although the average concentration in this case would be 8 ppm, the individual contributions are not known, and one must calculate the arsenic concentration of each plastic as if all of the arsenic originated from it. Thus, the red plastic could contain up to 0.4 µg / 0.0015 g = 27 ppm (µg/g), with similarly calculated results of 25 ppm and 24 ppm for the green and orange plastics. See Table A7.1.

A7.5.2 As another similar example, results for the arsenic (As) content are calculated and reported in Table A7.2. All of individual plastics (11 ppm, 11 ppm, 12 ppm) in the above composite do not exceed 0.0020 % (20 ppm) for arsenic (80 % of 0.0025 % arsenic limit). The composite passes and so do the individual plastics. Therefore the plastics do not need to be tested individually.

A7.5.3 Composite analysis by ICP-MS or another validated method of equivalent sensitivity or the use of a larger sample weight may be necessary when an element has a low regulatory limit and high detection limit (reporting limit), such as with arsenic.

A7.6 Rationale

A7.6.1 Composite heavy element testing of several samples of slightly differing but essentially similar materials (for example, several colors of polyethylene plastic) is desirable to reduce testing cost if this can be accomplished without compromising in any way the achievement of the same attribute (that is, pass/fail) result which would have been reached had the samples been tested individually. Annex A7 outlines detailed procedures for accomplishing this end by specifying the conditions under which compositing is allowable, when a composite result may be relied upon without further testing, and when testing of individual samples must subsequently be performed. Composite testing has been limited to total digestion (vis-a-vis soluble) analyses primarily in order to align with the European Union

harmonized standard EN 71-3, which specifically forbids compositing for its required (soluble) analyses.

TABLE A7.1 Total Arsenic (As) Analysis – Composite Testing

Item	(c) Analytical Results As (µg/ml)	(d) Dilution Volume (ml)	Total As (µg)	(w) Sample wt (mg)	Potential As (%) per Component	As (%) Composite
Red Plastic	0.04[A]	10	0.4[A]	15.0	0.0027	
Green Plastic	0.04[A]	10	0.4[A]	16.0	0.0025	
Orange Plastic	0.04[A]	10	0.4[A]	17.0	0.0024	
Total Composite	0.04[A]	10	0.4[A]	48.0		0.0008[B]

[A] In a composite of different plastics, the analytical result for the total composite would be applied to each component part as if all the arsenic was in that component plastic.

[B] In this example, the arsenic concentration of the combined plastics is 0.0008 %, which is below the 0.002 % arsenic acceptable limit (80 % of the 0.0025 % arsenic limit), however any individual component having a result based on it's sample weight that is greater than 80 % of the heavy metal limit should be retested individually. For example, all of individual plastics in the above composite exceed 0.0020 % for arsenic (80 % of 0.0025 % arsenic limit) so all of the plastics should be tested individually. This calculation and data interpretation would be applied to the remaining heavy metals.

A8. RATIONALE FOR 2007 REVISIONS

A8.1 Definitions[17]

[17] This rationale pertains only to those changes made in the 2007 edition of Consumer Safety Specification F963. Rationales for previous editions may be obtained from ASTM International Headquarters by requesting Research Report RR:F15-1000.

A8.1.1 *Section 3*— New definitions for terms used in this version of Consumer Safety Specification F963:

- hazardous magnet
- hazardous magnetic component

- impulsive sound
- maximum A-weighted sound pressure level
- rattle
- reference
- strap
- tangle or form a loop
- yo-yo elastic tether toy

A8.2 Sound Producing Toys

A8.2.1 *Sections 4.5 and 8.19*— These sections have been totally replace by a new set of requirements and a new test procedure.

A8.2.1.1 These requirements have been developed after extensive review of known research on noise-related injury to hearing and existing published recommendations for noise limits. They are intended to reduce the risk of damage to hearing due to high continuous and impulse noise levels. They apply only to toys that are designed to emit sound, i.e., toys that have sound producing features such as electric or electronic devices, percussion caps, rattling components, etc.

A8.2.1.2 The requirements in 4.5.1.1 and 4.5.1.2 are intended to address those hazards presented by continuous sounds (e.g., speech, music). These hazards are chronic and typically manifest themselves after years of exposure. The Occupational Safety and Health Administration (OSHA) has set acceptable limits at 85 dB(A) for 8 h of exposure. An independent audiologist consulted by the ASTM work group recommended a similar exposure level. His recommendations for an 8 h exposure level, Leq, 8h, were 85 dB(A) for continuous sound, and 82 dB(A) for the continuous sound emitted from toys that produce both continuous and impulsive sound.

A8.2.1.3 Exposure to noise from toys is intermittent and integrated with other daily noises. It is unlikely that a toy would present 8 h continuous exposure to sound. These assumptions are consistent with the findings of European research conducted by ISVR Consultancy Services in Southampton U.K. and published as "Noise from Toys and its Effect on Hearing." Based on that study, the probable duration of play with a sound producing toy was determined by the ISVR to be 1.5 h per day.

A8.2.1.4 Using the recommended exposure levels from the audiologist, the

ISVR study's conclusion on the duration of play, and a 3 dB exchange rate, the equivalent recommended values are 92.3 dB(A) and 89.3 dB(A), respectively. Rounding each value to the nearest 5 dB(A) yields 90 dB(A) for both. The ISVR study referenced above also concluded that 25 cm was an average use distance for toys. However, a 50 cm distance is superior for measurement purposes. Therefore, the 25 cm, 90 dB(A) requirement was converted to its 50 cm equivalent. The 50 cm free-field equivalent of 90 dB(A) at 25 cm is 84 dB(A). This was rounded to 85 dB(A) to arrive at the final requirement.

A8.2.1.5 The ISVR study uses a distance for close-to-theear toys of 2.5 cm. Using the same reasoning applied above, the 50 cm free-field equivalent of 2.5 cm, 90 dB(A) is 64 dB(A). This was rounded to 65 dB(A) to arrive at the final close-to-the-ear-toy requirement.

A8.2.1.6 The requirements in 4.5.1.3-4.5.1.5 are intended to address those hazards presented by impulsive sounds (e.g., percussion caps), which can be especially hazardous. Permanent damage to hearing may occur after only one exposure to high impulsive sound levels.

A8.2.1.7 A technically accurate impulsive sound requirement would involve a combination of decibel levels and number of repetitions per day of the sound and also determining the potential for misuse (actuating close to the ear). This alternative would result in some subjective determinations regarding repetitions/day and the likelihood for actuating close to the ear. Therefore, a conservative approach was adopted that limits impulsive sounds to 120 dB (C-weighted peak). This requirement protects against misuse and allows up to 10 000 repetitions per day according to OHSA guidelines. The 50 cm free-field equivalent of 25 cm, 120 dB(C) is 114 dB(C). This was rounded to 115 dB(C) to arrive at the final requirement. This requirement only applies to impulsive sounds created by non-explosive means (e.g., two masses colliding).

A8.2.1.8 Impulsive sound level requirements for toys that produce sound from explosion (e.g., caps) have been treated separately. A higher decibel level (125 dB(C)) is allowed for these types of toys because of the human ear's inability to respond to waveforms with such rapid rise-times such as these.

TABLE A7.2 Total Arsenic (As) Analysis – Composite Testing

Item	(c) Analytical Results As (µg/ml)	(d) Dilution Volume (ml)	Total As (µg)	(w) Sample wt (mg)	Potential As (%) per Component	As (%) Composite
Red Plastic	0.04	20	0.8	72.0	0.0011	

Green Plastic	0.04	20	0.8	70.0	0.0011	
Orange Plastic	0.04	20	0.8	66.0	0.0012	
Total Composite	0.04	20	0.8	208.0		0.0004

A8.3 Yo Yo Elastic Tether Toys

A8.3.1 *Sections 4.37 and 8.23*— The task group concluded that the mass on the end of the tether was significant in creating the strangulation potential of a yo yo elastic tether toy. That is why these yo yo products have been associated with near strangulations, and similar products with little mass on the end such as a "sticky" hand have no similar data. The mass was determined by weighing product known to be associated with wrapping around neck. Yo yo elastic tether samples evaluated weighed 0.1 kg (0.2 lb), 0.07 kg (.15 lb), and 0.07 kg (0 .15 lb). Estimated weight of sticky hand (hand portion only) is 0.0045 kg (0.01 lb). The appropriate value for the mass at the end of the tether was chosen to be between these two values, 0.02 kg (0.04 lb).

A8.3.1.1 The cord length is based on two times the neck circumference of a 5th-percentile 3-year-old from Childata, or 2 24.0 cm = 48 cm (18.9 in.). The age of 3 years was chosen based on the age of children involved in the incident data.

A8.3.1.2 The rotational speed of 80 RPM was determined by testing adults and determining the maximum RPM they can achieve rotating a product above their heads. The range of adult speed was 80 – 108 RPM, the average was 90 RPM and the standard deviation was 7 based on a sample size of 14. This was reduced to 80 RPM as an estimate for the speed children 3 to 6 years old can achieve. The incident data indicated that children 3 to 6 years old are most often involved in yo yo elastic tether incidents.

A8.4 Magnets in Toys

A8.4.1 *Section 4.38*— These requirements address the recent incidents of magnet ingestion resulting in serious injury or death by identifying magnets or magnetic components that can be readily swallowed. It requires these hazardous magnets and hazardous magnetic components to be reliably contained in a product, or carry a warning. Hazardous magnets and hazardous magnetic components are identified by describing both a magnetic strength of concern, along with a size and shape that can be swallowed.

A8.4.1.1 The following areas were considered:

a. Data indicate that powerful magnets have been involved in all known ingestion incidents to date. The data also suggest that magnet ingestion was not a problem in toys until powerful magnets (such as NIB magnets) became cost effective and commonplace several years ago. Ceramic, rubberized, and ferrite magnets have substantially lower attractive forces and therefore must be made larger to provide sufficient magnetism, which makes them less likely to be swallowed.

b. The magnets/magnetic components involved in the ingestion incidents were small objects (see 4.6 and Fig. 3). Therefore, the requirements have indicated that hazardous magnets or hazardous magnetic components must not be small objects.

c. The exemptions represent magnets which are used in applications that are not obvious to the consumer. These are very common magnet uses and there are no data associated with these magnets.

d. Products intended for children under three are already subject to the small parts requirement which would include these magnets or magnetic components.

A8.4.2 *Section 5.17*— The warning specifically explains the hazard as "sticking across intestines." Studies of warnings show that when the audience can "picture it," even when there is no picture, then compliance with the warning increases. In the final analysis, the "intestines" statement makes this warning more effective than it would be without it.

A8.4.3 *Section 8.24*— If the play pattern of the toy includes repeated attaching and detaching of the magnet(s), the magnet(s) shall be subjected to repeated attachment and detachment that is expected over the life of the toy. Furthermore, if it is likely that other components included in the toy can attach to the magnet(s), then the magnet(s) and the other components shall be dropped/impacted together during use/abuse testing.

A8.5 Hemispheric Shaped Objects

A8.5.1 *Section 4.36*— Data analysis of the "cupped" shaped objects involved in the fatal and non-fatal incidents, indicated that the wall thickness of the objects involved in the incidents ranged from approximately 0.04 in. (1 mm) to 0.12 in. (3 mm). Based on this data, it was believed that wall thickness was not a concern. It is also important to note that, wall thickness is not a relevant factor for objects with diameters at the upper end of the requirements as these sized objects may fit around/under the chin.

A8.5.1.1 However, since publication of this requirement, questions have been raised in the United States and Europe regarding objects with "thick" walls or rims—what is the appropriate measurement for these objects, inner or outer diameter? The work group has discussed the intent of the requirement and has concluded that the inner diameter measurement is the critical element in determining whether or not a "cupped" shaped object has the potential to fit a child's face and create a vacuum. Therefore, a change from outer diameter to inner diameter is recommended.

A8.5.2 *Section 4.36.6(e)*— The new option for a single large opening in the base includes the area that is defined by the original two small opening minimum dimensions (0.080 in./2 mm) and the minimum space in between these openings (0.5 in./13 mm). The 0.66 in./17 mm dimension is calculated as 0.080/2 mm + 0.080/2 mm + 0.5/13 mm. This approach is consistent with the option for ventilation in 4.16.1.1. Similarly, placement of this opening at least 0.5 in. (13 mm) from the rim of the object should ensure that facial features such as the nose or chin, or flesh, will not completely block the opening.

A8.6 Miscellaneous Technical Issues

A8.6.1 *Section 4.12*— The purpose of this section is to minimize the potential of asphyxiation hazards that may be caused by thin packaging film, including sheets and bags. Plastic sheeting/bags may adhere to a child's mouth and nose making it impossible to breathe. Since the most frequent pattern of death is the covering of the face, the exemption is based on the size of the face and not whether the plastic is a bag or a sheet. CPSC anthropometry data for the face of a 4 to 6-month-old indicates a minimum head height of 125 mm (4.9 in.) and minimum face width of 85 mm (3.3 in.). This is the basis for the exemption, which is a minor dimension of <3.9 in. (100 mm). Plastic sheets or bags with a minor dimension less than 3.9 in. (100 mm) will not entirely cover the face of a 4 to 6-month-old infant.

A8.6.1.1 Both ISO 8124 and EN 71 allow for perforations of the sheeting if it does not meet the thickness requirements. There is no injury data from the EU to indicate that perforated film presents a hazard. The 1 % area for perforations is considered to be sufficient to sustain an air flow and prevent the adhering of the film to the face.

A8.6.2 *Section 4.14:*

A8.6.2.1 *Section 3.1.75*— Definition of strap added to clarify and expound test method verbiage in 4.14. Children under the age of 18 months have

developed certain gross motor skills (e.g., can grasp and pick up objects). However, they lack fine motor skills such as those required to insert the end of cords/straps/elastics though a small opening or to wrap a cord/elastic multiple times around a wheel.

A8.6.2.2 *Section 4.14.1.1*— Details requirements for breakaway features on cords, straps, and elastics.

A8.6.2.3 *Section 4.14.2*— Clarifies scope of test method by adding "strap" as an additional type of cord/elastic covered by the requirement.

A8.6.2.4 *Section 8.22.2*— This section provides an additional testing method and supplemental diagrams (with details for additional equipment) that should be used for materials that have a loop perimeter smaller than the tapered end of the head probe.

A8.6.2.5 *Section 8.22.3*— Details testing method for determining the release force required for breakaway features on cords, straps, and elastics.

A8.7 Miscellaneous Editorial Changes

A8.7.1 *Section 4.6*— The word "choking" has been added to the test to be consistent with the language of 16 CFR 1501.

A8.7.2 *Section 4.15.6*— This section references the dynamic strength test in 8.20. This reference had been omitted in the previous version of Consumer Safety Specification F963.

A8.7.3 *Section 4.17*— Reference to the wrong definition has been corrected to 3.1.60.

A8.7.4 *Section 4.25*— Abuse testing in 8.6-8.10 of the standard is not applied to toys intended for children over 96 months (this is laid out in Table 5). Therefore, it is redundant and unnecessary to break down the age group in this way in the requirement section.

A8.7.4.1 *Section 4.25.10.6(2)*— Corrected reference to test procedure to 8.18.7.

A8.7.5 *Section 8.6*— Explicitly states the age requirements as they pertain to abuse testing (for clarification). Also, the word "test" has been corrected to "toy" in the third sentence.

A8.7.6 *Section 8.18.6.1*— The text has been changed to correct errors in the

procedure contained in the previous version of this section.

A9. RATIONALE FOR 2008 REVISIONS

A9.1 Jaw Entrapment

A9.1.1 *Section 4.39*— There have been product recalls in past years to address incidents of jaw entrapment. There have been additional incidents of jaw entrapment in toy products that did not rise to the level of a recall. All but one incident involved entrapment in a handle or steering wheel. When a child's jaw becomes entrapped in a product, there is potential for damage to teeth and gums, long term orthodontic consequences and impairment of normal speech development. Most cases of jaw entrapment involve children less than 18 months of age. (See Fig. A9.1 and Table A9.1, and Table A9.2.) There is no incident data indicating handles that are connected to the toy with a hinge and handles made from a pliable material (for example, straps and ropes) pose a risk of jaw entrapment.

Figure A9.1. Facial Measurements (Figure 1) A man's face is shown from the side profile. Distances A, H, G, F, E, and R are marked. A is from eyebrow to back of head. E is nasion to base of nose. R is the depth of the nose. F is nasion to samion. G is nasion to depression in chin. H is nasion to bottom of chin. A H G F E R

Figure 1 (of A9.1). Locations of head and face measurements established by anatomical landmarks (side view).

Figure A9.1b. Facial Measurements (Figure 2) Distances B, I, J, K, L, M, N, D, and C are shown on this front view of a male head.B is the length across of the head (not counting ears). I is from the inner points of each eye. J and K are unmarked but are points on each side of the nose. L is the length across from the nose and is longer than J and K. M is the normal lip length, N is the extended lip length. D is not labelled but appears to be the length from the outside of each eye. C is the distance from the edge of the face where the ear is across to the other inner part of the ear. D C B I J K L M N

Figure 1 (of A9.1). Locations of head and face measurements established by anatomical landmarks (front view).

NOTE —

F. Nasion-Stomion Distance: The distance between the nasal root depression and the point of upper and lower lip intersection.
H: Nasion-Menton: This measurement, taken from the nasal root depression to the lower point on the chin, defines total face height.
M: Lip length, normal: A bilateral measurement (bichelion diameter) of distance between the external corners of the mouth. This measurement

is taken with all facial muscles relaxed.

N: Lip length, extended: A bilateral measurement (bichelion diameter) of maximum distance between the corners of the mouth in a condition of voluntary extension using muscles of facial expression.

FIG. A9.1 Facial Measurements

A9.1.2 *Anthropometric Data*— The April 1966 study titled "Selected Facial Measurements of Children for Oxygen-Mask Design"[18] provides very useful anthropometric data.

[18] Young, J. W., "Selected facial measurements of children for oxygen-mask design," AM 66-9, AM Rep., 1966, Apr: 1-11.

A9.1.2.1 To provide protection for children up to the age of 18 months:

Width—Using the maximum estimated stomion-menton dimension and rounding up, indicates the gauge should be 3.8 cm (1.5 inches) in width.

Length—The 95th percentile mouth breadth for 2 to 3.5 year olds (the youngest age available) is 3.8 cm (1.5 inches) from Childata (see Table A9.3 and Table A9.4). One inch was added resulting in the 2.5 inch length. A safety factor of 2.54 cm (1 inch) was used for mouth breath since the anthropometric data is based on a mouth at rest, and a mouth can be expected to stretch significantly from this position. Alternately, the lip length dimensions above can be used to arrive at the same estimate, rounding up, of 6.35 cm (2.5 inches).

A9.1.2.2 To provide protection against the youngest user becoming entrapped:

Width—A gauge width of 1.9 cm (0.75 inches) was chosen based on the minimum stomion menton distance for a 1 month old.

Length—The small jaw breadth of 1.9 cm (0.75 inches) is based on the 5th percentile 2 year old mouth breadth which is 2.54 cm (1.0 inch), so to be conservative 75 % of that was used.

A9.1.2.3 The task group considered adding a requirement as suggested at the meeting that the scope only cover handles and steering wheels that are able to be placed in the mouth, or would be teethable. The task group considered this suggestion and determined that this modification would not be made since incident data demonstrated that some products created jaw entrapment without the need for the child to place the product in his/her mouth (for example, the child's jaw was entrapped without the need for the

child to introduce the handle end of the push toy into the mouth).

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TABLE A9.1 Facial Measurements (in Inches)

Age	# children[A]	Mean Nasion-menton distance[B]	Range Nasion-menton distance	Mean Nasion-stomion istance[C]	Range Nasion-stomion distance	Estimated mean stomion-menton distance	Estimated minimum stomion-menton distance	Estimated maximum stomion-menton distance
1 mo	20	2.36	2.28-2.72	1.58	1.46-1.69	0.78	0.82	1.03
6 mo	20	2.77	2.56-2.95	1.61	1.54-1.73	1.16	1.02	1.22
1 yr	20	2.85	2.68-3.03	1.76	1.69-2.13	1.09	0.99	0.90
2 yr	20	3.14	3.03-3.27	1.98	1.81-2.17	1.16	1.22	1.10
3 yr	20	3.37	3.15-3.66	2.05	1.89-2.20	1.32	1.26	1.46
4 yr	20	3.41	3.19-3.58	2.08	1.57-2.20	1.33	1.62	1.38
5 yr	31	3.49	3.23-3.78	2.16	2.05-2.40	1.33	1.18	1.38
6 yr	91	3.6	3.11-3.98	2.23	2.01-2.56	1.37	1.10	1.42

[A] Per the author, sex distribution was reasonably constant across age groups; no sex distinction was made in groups 1 month through 4 years.

[B] From nasal root depression to the lower point on the chin (a measure of face height).

[C] From nasal root depression to the intersection of the lips.

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A9.1.2.4 The task group considered adding simulated teeth to the gauge. The task group concluded that the addition of teeth was not advisable because the incidents being addressed involved entrapment of the child's jaw. The teeth of the child may have influenced the resulting entrapment, however, the proposed requirement accounts for the presence of the teeth. Also, for a very young child the dimensions of the teeth are variable, since the teeth are just erupting.

A9.1.2.5 The task group added a depth of greater than 1.3 cm (½ inch) to both gauges to clarify that this is a three dimensional test. The depth of 1.3 cm (½ inch) was chosen based on dimensions of products known to be associated with jaw entrapment and the need for only a small portion of the child's jaw to be introduced into the space of the incident products.

TABLE A9.2 Lip Length, in Inches

Age	# children[A]	Lip Length, Normal		Lip Length, Extended, extrapolated base on percentage increase in lip length for older children, or 50 % increase over largest normal lip length
		Mean	Range	Maximum
1 mo	20	1.08	0.98-1.26	1.89

6 mo	20	1.09	0.95-1.34	2.01
1 yr	20	1.28	1.14-1.5	2.25
2 yr	20	1.18	0.98-1.5	2.25
3 yr	20	1.38	1.22-1.57	2.35
4 yr	20	1.49	1.26-1.69	2.54

[A] Per the author, sex distribution was reasonably constant across age groups; no sex distinction was made in groups 1 month through 4 years.

TABLE A9.3 Mouth Breadth[A]

Age	Sex	N	Mean (cm)	Sd	5th%ile cm (inch)	95th%ile cm (inch)
2-3.5	Mf	75	3.30	.40	2.70 (1.0)	3.80 (1.5)
3.5-4.5		71	3.40	.40	2.80 (1.1)	3.90 (1.5)

[A] From Appendix B, Childata, The Handbook of Child Measurements and Capabilities Data for Design Safety Department of Trade and Industry.

TABLE A9.4 Mouth Opening[A]

Age	Sex	N	Mean (mm)	Sd	Min	max
3	M	49	36.0	5.39	22	47
4	M	67	37.3	5.47	22	52
5	M	56	39.9	4.02	27	47

[A] From Appendix B, Childata, The Handbook of Child Measurements and Capabilities Data for Design Safety Department of Trade and Industry.

A9.2 Folding Mechanisms and Hinges

A9.2.1 *Section 4.13*— The scope of this section has been modified such that the requirement is not limited to toys intended to support the weight of a child. Hinges can present potential pinch hazards regardless of whether the toy is intended to support the weight of a child. Examples and exclusions were reinstated from the previous version of this standard.

A9.3 Locking Mechanisms

A9.3.1 *Sections 8.25.1 and 8.25.2*— The requirements for single- or double-action locking mechanisms are based on Consumer Safety Specification F406. This requirement is intended to ensure that children will not be able to unlock a locking device on their own—a caregiver will be required to unlock

the locking device. The requirement for a 45-lbf test on the locking mechanism is based on Consumer Safety Specification F404. An exemption for the 45-lbf test was added for products where the direction of the sitting load works against the direction of collapse of the folding mechanism. The requirement has also been modified to require that locking mechanisms or other means engage automatically to protect children who set up the product on their own. Reference to safety stops has been deleted because safety stop was not defined.

A9.4 Yo Yo Elastic Tether Toys

A9.4.1 *Section 4.37.2*— Sports balls are exempt from the Yo Yo Ball requirements, since these requirements were not intended to address this type of product. The work group agreed it will clarify the standard if we specifically exempt them.

A9.5 Impaction Hazards

A9.5.1 *Section 4.32.2:*

A9.5.1.1 This section has been developed to address products intended for children under 48 months of age that meet specific dimension criteria such that they produce a fall-on impaction hazard. This revision is based on incident data provided by the CPSC involving objects that are long enough to be pushed into the mouth, probably past the uvula in a fall-on incident, and large enough to prevent or inhibit removal, even by an adult caregiver. Products less than 2.25 in. (the length of the small parts cylinder) in length are excluded as are products less than 15 mm in diameter. These exemptions are based on the dimensions of products in the incident data. Flexible items are exempt because the flexible end assures they will not create a fall-on impaction hazard.

A9.5.1.2 The impaction hazard addressed by 4.32.2 is different from the hazard associated with preschool play figures addressed in 4.32.3. The preschool play figures were associated with seven deaths by choking and one incident resulting in serious injury. The incidents involved children under the age of 2 with one exception which involved a developmentally delayed child. In addition there were other choking incidents with the preschool play figures that did not result in significant injury.

A9.5.1.3 The distance to the undercut is based on the dimensions of the small ball test fixture.

A9.5.1.4 The age grade of the product associated with the 2 most recent fatalities was 3+, so this requirement applies to products intended for children under 48 months of age to address the known incident data (ages of victims: 7 mo., 9 mo., 13 mo., 13 mo., 19 mo., 22 mo., 2 yr., 2 yr., 4 yr with severe developmental delay).

A9.5.1.5 There is no force associated with this test because the test is not intended to simulate an actual impaction incident. Rather, it is designed to identify the size and shape of products associated with these incidents.

A9.5.1.6 The supplemental gauge is used to identify the size and shape of objects associated with incident data and is not related to the size of the child for these incidents. Similarly, the 1.1 lb exemption is related to the weight of objects associated with this type of hazard, not the strength capabilities of children.

A9.6 Sound Producing Toys

A9.6.1 *Section 4.5.1.2*— This section contains acoustic requirements that are being interpreted by some laboratories is such a way to fail safe push/pull toys. The requirement needs to be changed for the following reasons:

1. The standard states in 4.5 that the requirements apply to “toys that are designed to produce sound.” Further to this, the intent of the section is to apply the sound pressure level requirements to those features of the toy designed to produce sound. During the pass-by test for push/pull toys, the contact between the wheels of the product and the test surface will produce a continuous sound that will significantly contribute to the overall sound pressure measurement. The tester will be unable to distinguish between the contributions to the overall sound level made by the wheels versus those made by the mechanism designed to produce sound. Therefore, a true measurement of the intended continuous sound producing mechanism cannot be achieved by the methodology given in the standard.

2. Among other factors, the levels in the standard are based a use distance of 25 cm (do not confuse this with the measurement distances specified in the standard). The distance from the noise producing mechanism to the ear of the child on the push/pull toys discussed here would be much greater than 25 cm. Because the relationship between sound pressure level and distance follows the inverse square law, an increase in the distance from the sound mechanism to the ear of the child would reduce the sound pressure

level at the ear of the child dramatically. The risk of hearing loss would be reduced to such an extent as to make it insignificant.

3. It is implausible that a child could sustain the maximum speed at which the push/pull toy is tested (2 m/s). The speed represents a "worst-case" condition that would only be achievable momentarily at best. This supports regulating against immediate, acute hazards such as impulsive sounds versus chronic hazards that are presented by exposure to long-term, excessively loud continuous sounds.

A9.6.2 In addition, the proposed change would further harmonization between this standard and the European toy standard EN 71-1.

A9.7 Magnets

A9.7.1 *Sections 4.38, 5.17, and 8.24*— These sections were revised to account for the incidents (ingestions) due to magnetic components that were small parts and to reflect the age of the children involved with the incidents. It also introduces the special use and abuse requirements to avoid magnets from detaching from magnetic components during play.

A9.8 Toy Chests

A9.8.1 *Deletion of Sections 4.27, 6.2, 7.2, and 8.14*— Toy chests are considered as children's furniture and have their own set of safety requirements that are already covered in Consumer Safety Specification F834.

NOTE A9.1— The section numbers above refer to the previous version of the standard; the subsequent sections have been renumbered in the current version.

A10. RATIONALE FOR 2011 REVISIONS

A10.1 Certain Toys with Nearly Spherical Ends

A10.1.1 *Section 4.32:*

A10.1.1.1 The requirements of 4.32.2 do not apply to tethered components as specified in the exclusions because it is highly unlikely a child will have an impaction injury associated with such a tethered component given the weight of the product and the length of the tether. Also, there is no incident data associated with the tethered components being excluded.

A10.1.1.2 Following are examples provided and suggested interpretation as to whether these shapes fall within the scope of 4.32.2 of Consumer Safety Specification F963. These interpretations assume that the dimensions of the part and age grade of the product are such that it falls within the scope of 4.32.2.

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Figure p65a. Domed Pegs This is a photograph of domed pegs, some in a pile and some in a peg board.

Requirements of 4.32.2 apply to this domed peg, even if the very center of the head is flat or has a through hole.

Figure p65b. Drum This is a photograph of a a mallet is hitting a drum.

Requirements of 4.32.2 do not apply to this mallet since it is not a nail, screw, peg, or bolt.

Figure p65c. A peg. A photograph of a peg with a domed cap.

The requirements of 4.32.2 do apply to this item because the end is domed.

Figure p65d Three photographs of plastic screws. One is apparently a torx, one has a slotted end, the third is perhaps a Phillips.

Requirements of 4.32.2 do not apply to these toy fasteners because the end is not spherical, hemispherical or domed. The end is flat across the top.

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Figure p66 This is a diagram of two toy bolts with domed caps.

The requirements of 4.32.2 do apply. These are toy bolts with domed tops.

A10.2 Test for Stability of Ride-On Toys or Toy Seats

A10.2.1 *Subsection 8.15.4*— To distinguish between the load placement for fore and aft stability and sideways stability. With the current test methodology, some laboratories and auditors have mistakenly taken the requirements in this subsection to mean both fore and aft stability and also sideways stability. Subsection 8.15.4 states, “The center of gravity of the load for all ride-ons shall be secured both 1.7 in. (43 mm) rearward of the front-most portion of the designated seating area and 1.7 in. (43 mm) forward of the rearmost portion of the designated seating area (note: two separate tests). If there is no designated seating area, the load shall be placed at the least favorable position that it is reasonable to anticipate that the child will choose to sit.”

A10.2.1.1 As you can see, 8.15.4 only addresses fore and aft stability. Additional rationale can be found in the original test methods from the

Voluntary Product Standard PS 72-76. In Section 4.15.1.1 (d) it states, "The load shall be applied so that its center of gravity lies in a true vertical 6 inches above the center of the seat." In Section 4.15.2 it states, "The load shall be applied in the least favorable position on the seat for each direction."

A10.3 Abuse Testing

A10.3.1 *Table 5*— Table 5 is specifically written to address the drop test, which is a subsection of impact testing. Table 5 is written to address the drop test. This is a technical correction to the table.

A10.4 Test for Overload of Ride-On Toys and Toy Seats

A10.4.1 *Section 8.26*— There is no test method currently specified for overload therefore this test method is being proposed and it is consistent with the way independent test labs have been performing the test.

A10.5 Stability and Over-Load Requirements

A10.5.1 *Section 4.15*— Wherever "seat" appears in this section, it has been changed to "toy seat" and a definition for toy seats has been developed. The issue is that furniture is exempt from Consumer Safety Specification F963, however, toys that are their counterparts are covered. It can be difficult to discern between a toy seat and a piece of children's furniture. Therefore, these changes are proposed to clarify that the scope of this standard only applies to toy counterparts of furniture and juvenile products.

A10.6 Plastic Film

A10.6.1 *Section 4.12*— This section applies to "flexible plastic film bags and flexible plastic sheets used as packaging materials for shelf packages or used with toys." The title refers to packaging film but the requirement refers to plastic film used with toys. The wording was changed to clarify the scope of the requirement. Also deleted part of the test method section, which is already covered by the requirement section.

A10.7 Teethers and Teething Toys, Rattles, and Squeeze Toys

A10.7.1 *Sections 4.22, 4.23, and 4.24*— The change to exempt soft-filled (stuffed) toys from the rattles, squeeze toys and teethers sections is being made to be consistent with exemptions found in: 16 CFR 1510, Rattles; EN-71, Clause 5.8, Shape and Size of Certain Toys; and with Consumer Safety Specification F963, Section 4.32, Certain Toys with Nearly Spherical Ends.

However, if a stuffed toy contains an internal rigid component (rigid is defined in Consumer Safety Specification F963 as material with a hardness >70 Shore A scale durometer) then the gauges would be applied. If the rigid internal component does not penetrate the full depth of the gauge(s), the toy would PASS. If the rigid internal component does penetrate the full depth of the gauge(s) the toy would FAIL if the major dimension of the rigid component is >1.2 in. (30 mm) or would PASS if the major dimension of the rigid component is <1.2 in. (30 mm). The rigid internal component requirements harmonize with the requirements of EN-71, Clause 5.8.

A10.8 Jaw Entrapment in Handles and Steering Wheels

A10.8.1 *Section 4.39*— There have been product recalls in past years to address incidents of jaw entrapment. There have been additional incidents of jaw entrapment in toy products that did not rise to the level of a recall. All but one incident involved entrapment in a handle or steering wheel. When a child's jaw becomes entrapped in a product, there is potential for damage to teeth and gums, long term orthodontic consequences and impairment of normal speech development. Most cases of jaw entrapment involve children less than 18 months of age. (See Fig. A9.1, Table A9.1, and Table A9.2.) There is no incident data indicating handles that are connected to the toy with a hinge and handles made from a pliable material (for example, straps and ropes) pose a risk of jaw entrapment.

A10.8.2 *Anthropometric Data*— The April 1966 study titled "Selected Facial Measurements of Children for Oxygen-Mask Design"[18] provides very useful anthropometric data.

A10.8.2.1 To provide protection for children up to the age of 18 months:

Width—Using the maximum estimated stomion-menton dimension and rounding up, indicates the gauge should be 3.8 cm (1.5 in.) in width.

Length—The 95th percentile mouth breadth for 2 to 3.5 year olds (the youngest age available) is 3.8 cm (1.5 in.) from Childata (see Table A9.3 and Table A9.4). One inch was added resulting in the 2.5 in. length. A safety factor of 2.54 cm (1 in.) was used for mouth breath since the anthropometric data is based on a mouth at rest, and a mouth can be expected to stretch significantly from this position. Alternately, the lip length dimensions above can be used to arrive at the same estimate, rounding up, of 6.35 cm (2.5 in.).

A10.8.2.2 To provide protection against the youngest user becoming entrapped:

Width—A gauge width of 1.9 cm (0.75 in.) was chosen based on the minimum stomion menton distance for a 1 month old.

Length—The small jaw breadth of 1.9 cm (0.75 in.) is based on the 5th percentile 2 year old mouth breadth which is 2.54 cm (1.0 in.), so to be conservative 75 % of that was used.

A10.8.2.3 The task group considered adding a requirement as suggested at the meeting that the scope only cover handles and steering wheels that are able to be placed in the mouth, or would be teethable. The task group considered this suggestion and determined that this modification would not be made since incident data demonstrated that some products created jaw entrapment without the need for the child to place the product in his/her mouth (for example, the child's jaw was entrapped without the need for the child to introduce the handle end of the push toy into the mouth).

A10.8.2.4 The task group considered adding simulated teeth to the gauge. The task group concluded that the addition of teeth was not advisable because the incidents being addressed involved entrapment of the child's jaw. The teeth of the child may have influenced the resulting entrapment, however, the proposed requirement accounts for the presence of the teeth. Also, for a very young child the dimensions of the teeth are variable, since the teeth are just erupting.

A10.8.2.5 The requirement was modified to clarify the gauges must pass completely through the opening. The gauge depth was modified from the original requirement of greater than ½ in. to the present requirement of 1 in. When passing the gauge through the opening, a depth must be specified to assure the test results are consistent.

A10.9 Strings and Lines for Flying Devices

A10.9.1 *Subsection 4.14.4*— EN 71-1 (Clause 4.13) and ISO 8124-1 (Clause 4.11.7) both use "resistance" instead of "resistivity." Resistance = resistivity length/area, therefore, this change is being made for consistency. Also, the units have been corrected to ohms per centimetre (V/cm).

A10.10 Heavy Elements

A10.10.1 *Subsections 4.3.5 and 8.3:*

A10.10.1.1 The soluble approach for determination of heavy elements in toys and toy components has been selected over total element limits as this has been demonstrated to be more closely correlated with the amount of

element which is bioavailable, and therefore with risk of toxicity.These requirements (and test methods) and this rationale have been based on requirements from European toy safety requirements found in EN 71-3 (and ISO 8124-3).

A10.10.1.2 The scope is intended to indicate an approach to the decision of what toys, or toy components are excluded from the standard because of characteristics that render them unlikely to present a risk of injury by the ingestion of materials containing the toxic elements.

A10.10.1.3 Toys and toy components that are accessible to the child during play are subject to these requirements unless otherwise indicated. Some materials such as metal, glass, and ceramic are exempted if they are not small parts.

A10.10.1.4 Unless included in a toy, modeling clays, which are covered in the EN 71-3 requirements for heavy metals are not covered in these heavy metals requirements because they are already exempt from Consumer Safety Specification F963 as indicated in 1.4 and subject to the federal requirements of LHAMA.

A10.10.1.5 The list of excluded materials is based on the regulatory exclusions provided by the U.S. Consumer Product Safety Commission (CPSC), specified at 16 CFR 1500.91, in implementation of the requirements for lead and lead paint under Section 101 of the Consumer Product Safety Improvement Act (CPSIA) of 2008. While EN 71-3 includes test methods for Paper and paperboard and Textiles (natural and synthetic), given the exemption for these products test methods for them have not been included here.

A10.10.1.6 Sections 8.3.2-8.3.6 provide a test procedure and manner of interpretation of results for solubility testing.

A10.10.1.7 As in EN 71, solubility testing is called for in the proposed ASTM standard. However, note that as described in 8.3.6, an alternative approach may be used if validated per specified requirements.

A10.10.1.8 Component parts and materials may be separately tested and certified.

A10.11 Yo Yo Elastic Tether Toys

A10.11.1 *Sections 4.37 and 8.23*— The task group concluded that the mass on the end of the tether was significant in creating the strangulation potential of a yo yo elastic tether toy. The risk of strangulation appears much lower for

products with very light ends compared to the yo-yo type balls as seen on the market in 2003 with end weights of 65 to 85 g (0.14 to 0.19 lb). The lightweight end results in very slow rotational speed when swung overhead and there is much less recoil capacity of the tether due to significantly lower loading during rotation. Additionally, the lightweight “sticky hand” variety of yo-yo elastic tether toy had market presence, prior to 2003, with no reports of near-miss strangulation or other similar incident. The mass was determined by weighing product known to be associated with wrapping around the neck incidents. Yo yo elastic tether toy samples evaluated weighed 0.10 kg (0.2 lb), 0.07 kg (0.15 lb), and 0.07 kg (0.15 lb). The weight of four “sticky hand” variety of yo-yo elastic tether toys (hand portion only) was 0.005 kg (0.01 lb) 0.008 kg (0.02 lb), 0.009 kg (0.02 lb) and 0.012 kg (0.03 lb). The appropriate value for the mass at the end of the tether was chosen to be between these values, 0.02 kg (0.04 lb).

A10.11.1.1 The cord length is based on two times the neck circumference of a 5th-percentile 3-year-old from Childata, or 2 24.0 cm = 48 cm (18.9 in.). The age of 36 months and over was chosen based on the age of children involved in the incident data.

A10.11.1.2 The rotational speed of 80 RPM was determined by testing adults and determining the maximum RPM they can achieve rotating a product above their heads. The range of adult speed was 80 – 108 RPM, the average was 90 RPM and the standard deviation was 7 based on a sample size of 14. This was reduced to 80 RPM as an estimate for the speed children 36 months and over but under 72 months of age can achieve. The incident data indicated that children 36 months and over but under 72 months of age are most often involved in yo yo elastic tether toy incidents.

A10.11.1.3 The use of a cam with a variable speed drill assists in spinning the toy in the air. Specification of a cam length is required in order to achieve consistent results across laboratories, given that the length affects the load on the tether during rotation. The objective was to employ as short a length as possible, but one that would facilitate clamping and rotation of the toy. A 3 cm (1.18 in.) cam length was identified as one that adequately met both objectives.

A10.12 Miscellaneous

A10.12.1 *Sections 1.4 and 3*— For clarification, juvenile products, constant air inflatables, powered and no-powered scooters have been added to the list of products which are not covered by the toy standard. Definitions for juvenile products and constant air inflatables have been added to the terminology

section.

ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

EXHIBIT 4
(FILED UNDER SEAL)

EXHIBIT 5

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

AMERICAN SOCIETY FOR TESTING
AND MATERIALS d/b/a ASTM
INTERNATIONAL; NATIONAL FIRE
PROTECTION ASSOCIATION, INC.,;
and AMERICAN SOCIETY OF HEATING,
REFRIGERATING, AND AIR-CONDITIONING
ENGINEERS, INC.
Plaintiffs, CIVIL ACTION FILE
vs. NO. 1:13-CV-01215-EGS
PUBLIC.RESOURCE.ORG, INC.,
Defendant.

30(b)(6) VIDEOTAPED DEPOSITION OF
STEVEN COMSTOCK
March 5, 2015
10:20 a.m.
1075 Peachtree Street
Suite 3625
Atlanta, Georgia 30309
Lee Ann Barnes, CCR-1852, RPR, CRR

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A. Yeah, about 12 years ago I had one taken.
Q. Is that the only deposition?
A. That's the only one.
Q. What kind of case did that involve?
A. That was a personnel matter for our organization.
Q. Did you testify at trial?
A. No, I did not.
Q. Did you have a chance to meet with Mr. Lewis or other counsel before this deposition to prepare for the deposition?
A. Yes, I did.
Q. I'll ask you to look at Exhibit 1076 --
(Defendant's Exhibit 1076 was marked for identification.)
Q. (By Mr. Bridges) -- which is Defendant's Notice of 30(b)(6) deposition of ASHRAE. Please take a look at it, Mr. Comstock.
Do you understand that you are here today testifying as a representative of ASHRAE on Topics 4, 5, 7, 8, 9, 10, 12, 13, 14, 18, 23, 24, 30, and 31?
A. Yes, that's my understanding.
Q. When did ASHRAE start providing a reading room for public access to ASHRAE's standards?
A. We made selected standards available for

read-only access, and I believe that was about 15 years ago. I don't have the exact date. It was in that -- that range of time.
Q. How did ASHRAE select what standards to make available?
A. These are our -- our most popular standards, the ones for which there was the greatest demand.
Q. How many standards -- strike that.
How many current standards does ASHRAE publish?
A. I don't have the exact number. My recollection would be in the neighborhood of -- of 75.
Q. How many of those standards are on ASHRAE's reading room available to the public now?
A. At the current time, I believe there are 10 of those standards available.
Q. Does ASHRAE also make available through its reading room earlier versions of those 10 standards?
A. We provide -- we provide the current versions of those standards.
Q. But not the earlier versions?
A. I believe that's the case.
Q. Do you know why ASHRAE began providing

public access to some of its standards?
A. We were actually hoping to increase our sales of those standards. It would be to the -- to allow somebody to view those standards, but not be able to download those standards or print those standards. So that would drive demand for those -- for those standards.
Q. What was ASHRAE's experience in that regard?
A. It was -- our experience was that it was relatively flat. It didn't have -- seem to have much of a positive impact, nor in -- in that case did it seem to have a negative impact.
Q. Does ASHRAE have information about how many persons have accessed the standards in its reading room?
A. We did. We changed the -- the -- the software platform from which they were made available for viewing. We originally used -- we originally used a RealRead vendor-supplied system and then we went -- they went out of business, I believe, and then we switched to iWrapper.
But I -- I know for certain when we were with RealRead, we would track the views. There was no registration so we wouldn't know who those people

were, but we did track views.
I think we do so with iWrapper, as well, now, but I know for certain it was done with RealRead.
Q. Do you recall any statistics regarding the number of accesses of various standards?
A. I -- the -- the -- the most prominent of those standards was 90.1, and I think if my recollection is correct, I believe maybe 40-, 45,000 views of the 2010 version of that -- that -- that standard over the course of the time it was made available.
Q. And was it ASHRAE's experience that the effect of the public access to the 90.1 standard was somewhere between nothing and minimal?
A. That's --
MR. LEWIS: Object to the form.
Q. (By Mr. Bridges) You can answer.
A. I didn't see much of an impact one way or the other.
Q. Does ASHRAE still sell earlier versions of its current standards?
A. Yes.
Q. How much -- strike that.
Roughly how much revenue per year does

there's a relationship between sales or licenses of a standard and incorporation of that standard into law --

MR. LEWIS: Objection.

Q. (By Mr. Bridges) -- or regulation?

A. No. We don't -- that's -- that's not a metric that we use at all. I mean, I imagine, you know, perhaps you -- you look at where sales are from, but we don't do that. That's not part of our business.

And I would think that the -- there's people who do work in our industry do work across states, across municipalities, but that's not a metric that we -- we keep as part of our business operation.

Q. Apart from keeping a metric, do you have any, let's say, anecdotal experience observing that incorporation of a particular ASHRAE standard leads to a jump in sales of that standard?

MR. LEWIS: Objection.

THE WITNESS: Really, no. I have -- I mean, there'll be times when somebody will say to me, "Steve, how do I find an older version of a standard in our bookstore," because we're -- we -- we have to put on education, training

related to that standard.

So I have anecdotal questions that are asked or comments that are made to me along those lines, but nothing that's -- that -- that would, you know, trigger that back to specific sales totals.

Q. (By Mr. Bridges) Is there anything that can tie it to a general trend of sales, in your view?

MR. LEWIS: Objection.

THE WITNESS: I don't believe so. I mean, I -- we sell -- when a new standard -- a -- a new version of a standard is -- is published, there's interest in the market to buy that standard, and if stan- -- if older versions of standards are still relevant, we sell those standards and continue to sell those.

Q. (By Mr. Bridges) In what circumstances would an older version of an ASHRAE standard be relevant in the marketplace?

A. I assume that would be because it's -- it's referenced in -- in legislation or regulation or -- or codes. I think it would probably depend upon what the owners of the -- the -- the -- the owner of a building may have in their specifications.

Q. When ASHRAE revises a standard and the

standard before the revision has been on the reading room -- strike that.

Is "reading room" a term that you use at ASHRAE?

A. We do not.

Q. What do you use -- what term do you use for the facility by which the public can view ASHRAE standards for free?

A. I believe we call it free viewing.

Q. Free viewing?

A. Free viewing.

Q. When ASHRAE revises a standard and the standard before that revision has been available for free viewing, does ASHRAE replace the older version of the standard with the newer version of the standard for free viewing as soon as ASHRAE issues the standard?

A. Yes, we do.

Q. And does ASHRAE then take the older version of the standard out of the free viewing facility when that happens?

A. Yes, we do.

Q. Is there a reason why ASHRAE removes the older standard from the free viewing?

A. That's been our process going back to when

we first started the free viewing, which is the -- 15 years ago or so.

And the -- the -- the reason for that is -- is we always wish to have the most current application of the technology used. So the -- the -- the notion is that as a standard is revised, it's a -- it's a better application of the technology that's current at the time.

So we -- it -- it -- it's always been our -- our preference to -- to have -- to -- to move the market towards the more current version of the standard because of the application of technology.

Q. Now, I think you mentioned a few minutes ago -- and please correct me if I'm wrong because I don't want to misquote you -- that there are some times when people want older standards but they aren't in stock and so there has to be a new print order for those; is that correct?

MR. LEWIS: Objection.

THE WITNESS: Actually, our objective is to never have them out of -- out of stock. It's -- usually, I will be asked a question, "Steve, do we have these in stock," and I will say, "Yes."

And we go through a process where we have a -- a trigger -- this is what we do for all of

Washington.
Q. Who is ASHRAE's principal contact there?
A. Riaz Ahmed.
Q. R-I-A-Z A-H-M-E-D?
A. Yes. That's the first name and last name.
Q. Who at ASHRAE supervises the relationship with iENGINEERING?
A. Well, at the -- approving the payment of invoices and approving the initiation of work, it is me, and -- and then there's a -- a gentleman in my group who actually then works on a day-to-day basis with vendor relationships. David Soltis is his name.
Q. How do you spell Soltis?
A. S-O-L-T-I-S.
Q. If a member of the public wanted to write an article about the evolution of the 90.1 standard over the last 20 years by showing a comparison through, let's say, a redline, an electronic comparison -- let me back up.
Do you understand what a redline is?
A. I do.
Q. If a member of the public wanted to write an article about the evolution of the 90.1 standard over the last 20 years by providing a redline of the various changes from version to version, is there

a -- what would the -- I'm going to start the question again. Let me strike that.
If a member of the public wanted to write an article about the evolution of the 90.1 standard over the last 20 years by providing a redline of various changes from version to version, what steps would that person need to go through in order to generate a comparison document?
MR. LEWIS: Objection.
THE WITNESS: We currently offer for the current version of Standard 90.1 -- .1 a redline version that's available for sale. That's something we only initiated a year ago, year and a half. So we would not be able to provide that document, if that's a -- if that's -- if that's the question.
If they wish to reuse our content, then we have a process that we follow for reprint permission or request for -- for -- for use.
Q. (By Mr. Bridges) Leaving aside the permissions process, how, from a technical standpoint, would one be able to generate that redline? Would one have access to earlier versions in an electronic format that would be suitable for applying a comparison tool to?

MR. LEWIS: Objection.
THE WITNESS: Yes.
Q. (By Mr. Bridges) And what would the earlier versions be?
A. PDFs.
MR. LEWIS: Objection.
Q. (By Mr. Bridges) PDF.
And if one wanted to trace the evolution across four versions to produce one document with annotations showing, for example, when each provision entered into the standard and when various provisions disappeared from the standard, would the person need to get permissions to reuse each of the four versions, according to ASHRAE's practices?
A. If they were doing this for their personal use, then no, because that would be allowed for in their purchase of the standards.
The permission would require -- would be required for the extent to which that person would want to make information available more widely other than for personal use, and then there would be considerations that would be given for amount of content, so on.
Q. Well, what -- what if somebody wanted to write an article criticizing the evolution and saying

that it had gotten off track and wanting to illustrate the arguments by quoting substantial bits, let's say two pages at a time for five different instances.
According to ASHRAE's practices, what would be required for the person -- for that person to be able to do this?
MR. LEWIS: Objection.
THE WITNESS: Whether the article is critical or not isn't part of our process of granting permission for use of content.
Q. (By Mr. Bridges) Leaving that part aside, then, what would the person need to do, according to ASHRAE's practices, to get permission to provide, let's say, four two-page excerpts showing the changes?
MR. LEWIS: Objection.
THE WITNESS: They would need to specify what content from the standard they wished to use, what -- how much content, what type of content, and what the use would be, say an article.
We do not ask what that article is going to say, nor do we review that article before it is used. That's not part of our process.

So they would have to specify the amount of content that they wish to use, what content, and how and what that use would be.
Q. (By Mr. Bridges) Would ASHRAE give that permission without charge?
A. We always use a balance in -- in -- in how we approach reprint requests.
If I do not feel there's going to be a negative impact on the sales of -- of a standard, typically I will grant reprint permission use, because I think it also promotes awareness of a standard.
I should say that we also have an on-line system that we use, as well, RightsLink. You can go to our website and you can see that. But that hasn't worked very well. That was my attempt at trying to remove a little bit of the care and hand- -- well, the time that has to go in with processing requests.
In -- in that system, it was a cookie cutter, a certain amount of money for a certain -- for a certain number of figures and so on. But that's really not a very practical system and it's just about -- we -- I think we still have the link there, but it's really -- doesn't have very good functionality.

Q. And it sounds to me as though the reason for that is that it wasn't flexible enough to accommodate different use cases?
A. That -- that's correct. And -- and it's hard to keep it up to date. We publish many articles, we publish many standards, and so to try to keep that database of permission -- so when somebody goes in and they identify the -- the source of the content, it was as much work for us to keep the database up to date as it was to handle the permissions personally.
Q. Do you have a dedicated permission staff?
A. My administrative assistant is the focal point for permissions.
Q. What is your assistant's name?
A. Julie Harr, H-A-R-R.
MR. BRIDGES: If it's all right with you, I ask that we take a break. We've gone just a little bit over an hour. Normally I'd like to go longer, but I'm working on sleep deprivation. I'll try and keep the breaks short, but I may need them every hour.
VIDEOGRAPHER: This is the end of Video 1. We're going off the record at 11:26 a.m.
(Thereupon, there was an interruption in

the proceedings.)
VIDEOGRAPHER: This is the beginning of Video 2. We are going on the record at 11:46 a.m.
Q. (By Mr. Bridges) Do you know roughly what percentage of publications income comes from government sources for ASHRAE?
A. I do not.
Q. Do you know what government support ASHRAE gets in the development or revision of standard -- standards?
A. I am not aware of any funding received by ASHRAE for development or the revision of -- of standards.
Q. You're aware that government employees participate in the standard development process?
A. I do. And -- well, I -- what I am aware of is that there -- there may be individuals with the government who purchase copies of -- of standards. I'm not exactly sure of their role on project committees, but -- but they are -- would be included in the -- the customer base for standards.
Q. And you're aware that -- does the U.S. government enter into any contracts with ASHRAE for the sale or availability of standards?

A. We have had -- in -- in recent -- this is in recent years, we've had three contracts I've been engaged with related to the distribution of standards, specifically 90.1.
Q. What were the contracts for?
A. Three -- first contract was for making 90.1 -- and I believe that was the 2010 version of the standard -- available to ASHRAE members for -- well, I -- available from the ASHRAE website for free download.
And then there were two subsequent contracts that were done in conjunction with the International Code Council where actually they did the -- the distribution, but inclu- -- which -- which the distribution included one of their documents, the -- what is called the IECC, International Energy Conservation Code.
So -- so that -- that document was provided -- distributed by ICC and included in that package ASHRAE Standard 90.1 2010.
And then the third contract added 90.1 2007 distribution, and that was to a distribution list provided to ICC from, in this case, Pacific Northwest Laboratories, which was a -- a laboratory under contract at the Department of Energy.

Q. I'd like to go back to the beginning of your answer, because I -- I didn't quite understand it.

The first contract was for making the 2010 version of the standard available in some fashion and I think first you said available to ASHRAE members and then I think you said available from the ASHRAE website for free download.

Is -- did you mean available not specifically to ASHRAE members, but available from the ASHRAE website for download?

MR. LEWIS: Objection.

THE WITNESS: I meant to say was available for free download from the ASHRAE website.

Q. (By Mr. Bridges) Who -- and under that contract, who had access to the free downloads?

A. Anyone who logged into our website and clicked on the option to complete that download.

Q. Oh, any person --

A. Anybody could --

Q. -- any person, country?

A. That's correct. Actually, in the world.

Q. In the world.

A. That's my -- as I say that, that's my recollection, is it was not rest- -- I know it was

A. So that was how we did the -- knew when it ended.

Q. How could you distinguish, let's say, between a download and a simple view of the document from ASHRAE's website?

A. There was no viewing associated with this particular functionality. You just clicked on a box that said "Download."

Q. Got it.

With what government agency was the contract?

A. Our contract was with PNL, Pacific Northwest Laboratory, which is a laboratory of the U.S. Department of Energy.

Q. Did ASHRAE ever come to have an understanding as to why Pacific Northwest Laboratory wished to have that facility available?

A. This was part of the -- the time frame is 2011, and I believe this was part of the -- the Recovery Acts, the National Recovery Acts that were in place at that time.

And I was approached by somebody from PNL as a -- to do that. I do not know what their -- their motivations were except to make the standard available.

not restricted to members -- I misspoke at first -- and I think it was open to -- to anyone.

Q. And that's what I was trying to figure out.

A. Yeah.

Q. Okay. So the first contract -- just to summarize again, the first contract was for ASHRAE to make 90.1 available for free to the public by download; correct?

A. That is correct.

Q. Was that contract for a limited period of time or was it for -- what were the terms of that contract?

A. There was a contract that had a -- a dollar amount associated with it, and so there was a fee that every -- every time a download was made, a fee for that unit was charged. So once that total contract amount was met, then the downloads stopped.

Q. Do you recall what the per-download fee was?

A. I believe it was $15 a -- a document.

Q. Do you know how ASHRAE knew when a download occurred?

A. Yes, because we had a -- a system that would click -- keep track of the downloads.

Q. How --

Q. Do you know how many downloads occurred under that contract?

A. I do not, but if -- if it was the 15 per download and the contract was $322,000, it would be that division.

(Defendant's Exhibit 1077 was marked for identification.)

Q. (By Mr. Bridges) My brain is sitting next to me and my brain hands me important things from time to time.

Mr. Comstock, I ask you to look at Exhibit 1077.

Could you identify it, please?

A. This appears to be the -- the proposal that I just -- I just spoke of. I think I did say 2010. This document says 2000 -- 2007 version of that -- oh, no, I'm sorry. Yeah, it says --

MR. LEWIS: I'll just note for the record that the document is two sided.

Q. (By Mr. Bridges) Yes, always. I think all of our documents will be.

A. So it's the 2007 version, yes.

Q. Okay. Was this free download facility something that ASHRAE proposed?

A. No. The -- we -- we were approached by

PNL, to my -- to my knowledge.
Q. The -- just the format, it's in response to an RFP or request for proposals.
Do you know what the RFP No. 140008 specified?
A. I -- I do not.
Q. The proposal envisioned that ASHRAE would promote the free download program through targeted e-mails to members of ASHRAE; correct? I'm looking rough- -- just above the midpoint in that exhibit.
A. Correct.
Q. Do you know to what extent ASHRAE promoted the free download program to the broader public, apart from members of ASHRAE?
A. I -- we put notices on our website to -- is my recollection. I believe we did news releases, but I am -- that's an assumption on my part.
Q. And then you said there were two other contracts; is that correct?
A. That's correct. Both of those also involved versions of Standard 90.1 and then also included a document, the -- the IECC that I referenced.
Q. Were they on roughly the same terms as the terms in Exhibit 1077?

Now, the first agreement I believe was $188,000, in that neighborhood. The second agreement was $230,000. The -- the -- but the second agreement, I think -- so the first one, it would be dividing the 45,000 into that -- $45 into that total amount. The second agreement actually included two versions of 90.1, if I recall, and two different versions of the IECC, so it could have been that cost was $90 total in- -- $90 per unit into that $230,000 number.
Q. And just to clarify one thing.
In the last couple of answers, you referred to the first contract and the second contract. If we put them in the context of the other contract, that would make these the second and third contracts?
A. That's correct.
Q. Okay. In your answer just now, when you were saying first and second, in the broader scope, you were referring to the second and third contracts; is that correct?
A. That is correct.
Q. As a result of these contracts, did ASHRAE observe any effect on its other sales or licenses of the 90.1 standard?
A. These -- these three contracts all involve

A. No. That -- that was a -- a different arrangement. For that process, the documents were sent in hard copy form to recipients who were provided to us from the -- from PNL. And the distribution was made by ICC, which is the publisher of the IECC. ICC is International Code Council.
Q. Were the second and third contracts contracts between PNL and ICC?
A. No. I believe they were contracts between PNL and ASHRAE and then ICC was engaged to fulfill the agreement.
Q. Do you recall the expected audience, recipients, of the hard-copy publications in the second and third contracts?
A. I believe the targeted audience for that was code officials at state and municipalities.
Q. Do you recall quantities and financial terms for the second and third contracts?
A. The -- the -- the -- the purchase price for the 90.1 inclusion was the same as this, $15, if I recall, and then there was a -- I believe ICC charge for distribution of the IECC was also $15 and then there was a $15 charge by ICC for printing, mailing, inventory, distribution. So that was a total per unit, that I recall, of $45.

distribution of not the current version of the ASHRAE standard, but the previous version.
Did we see any noticeable change in the distribution or the sales of the -- the current version? Nothing seemed to jump out.
Q. Did ASHRAE observe any noticeable effect on the distribution, even of the earlier versions, apart from -- from these contracts?
A. Intuitively, I would think there would have been some impact, but I can't say -- we didn't monitor that, so I have no evidence one way or the other.
Q. So you don't know one way or the other whether these contracts cannibalized other types of sales of the same versions?
A. Yeah, I have no -- no evidence one way or the other.
Q. Has ASHRAE entered into any other agreements for public access or distribu- -- public access to or distribution of its -- strike that.
Has ASHRAE en- -- entered into any other agreements for broad public access to or distribution of its standards, either for free or for reduced price?
MR. LEWIS: Objection.

THE WITNESS: Was your question by -- repeat the question, please?
Q. (By Mr. Bridges) Sure.
Has ASHRAE entered into any other agreements to provide broad public access to or distribution of its standards either for free or for a reduced price?
A. At -- at times over the past -- not for 90.1, but for some other standards, a company may pay a license fee to make a standard available if it relates specifically to their products. That would be a license agreement.
And that's very rare. I mean, it's -- it's -- perhaps one standard every three to five years would -- would be the case. But nothing with government like was done here.
Q. Okay. What proportion of ASHRAE's yearly revenues comes from the monetization of its publications? Do you understand that term?
A. When you say "publications," do you include periodicals?
Q. Good point, so I'm going to withdraw my question.
But I just want to make sure -- I think you understand my -- my word "monetization" in this

context. You nodded, but the court reporter can't take nods down.
Do you understand, broadly speaking, monetization of publications through revenue sources like purchasing and licensing and the like?
A. Yes.
Q. And royalties?
A. Yes.
Q. What proportion of ASHRAE's yearly revenues comes from the monetization of its standards as publications?
A. I'm making sure I'm doing the math right.
Q. That's fair. That's fair.
A. Let's see. It would be -- directly attributable to standards would be approximately 10 percent.
Q. How else does ASHRAE earn revenue, other than through the monetization of its standards?
A. Membership dues, conference registrations, advertising, subscription sales, educational course registrations, certification, exposition income.
And when you said "publications," if -- so in addition to publications, we have books. So books, if -- if -- if -- if that's -- if you distinguish between standards in your questions, then

there would be books. And I believe that -- that -- that covers it.
Q. Roughly what percentage of ASHRAE's expenses pertain to the organization and supervision of the standards development process and the costs of publication and the costs of administering the permissions and distributions and the like?
MR. LEWIS: Objection.
THE WITNESS: I can speak to the side of that process that deals with the -- the -- the publications part. I do not know what the -- the costs would be to support the development of the product. My role begins when we push that standard out to the -- to -- to the marketplace.
What would be -- I -- I'd probably say there are staff salaries that would be attributable to standards activities from the publication side of things, production, so on. If you add portions of people's time together, we're probably speaking of four people from the publications side.
And then the -- the cost of the infrastructure for the book- -- for the bookstore, the on-line process, and warehousing, and finally the -- the -- the work that may be

involved in -- in -- in managing that on-line bookstore.
Q. (By Mr. Bridges) Are you able to estimate a percentage of ASHRAE's expenses involved in what you've just described?
A. Boy, and I -- and I -- I left -- the easiest numbers, the printing costs, I just left out.
Q. Right.
A. The cost to print --
Q. Right.
A. -- a unit would be included.
You know, if -- if we have a hundred -- I'm just guessing now. If you have a -- I said those -- those individuals, you know, we have a hundred employees, so -- with various activities.
So I'd say 5 percent of labor and then you figure the -- the cost of that infrastructure, standards amounts to a large portion of it. And permissions, a lot of that is attributed to standards. That's maybe -- that part, $200,000.
Q. 200,000 to the --
A. For the -- just the expenses of doing those things. The bookstore, I mean, you know, processing orders, apart from the -- the -- the labor.
Q. So you're saying 5 -- 5 percent of the

staff count plus about 200,000 in expenses?
A. That's correct, for the portion of the standards work that is involved in what we do, which is the distribution of those to the -- to the marketplace.
I -- probably in terms of context, our bookstore is actually -- we do that in partnership with an outside group, so that is a -- we pay fees associated with -- any time orders are taken through our bookstore. So there are -- are costs that we have through the -- through the vendor for operation of our bookstore.
Q. And just to be clear, I think you either said this or started to say it. I think I didn't hear it completely.
The expenses you just described were from that point in the process where your part of the organization takes over and pushes the standards out to the public. These numbers did not include the costs and expenses and staffing that ASHRAE invests in the creation and revision of the standards themselves; correct?
MR. LEWIS: Objection.
THE WITNESS: That is correct.
Q. (By Mr. Bridges) Has -- do you understand

what a subvention is of a publication?
A. I do not.
Q. Has ASHRAE ever received any grants to support the publication of any particular standards?
A. I have no knowledge of ASHRAE receiving funds for that.
Q. Is ASHRAE aware of any monetary losses that it has suffered as a consequence of the defendant's conduct in this case?
A. I can't speak to any -- any tracking of -- of losses. And anecdotally, people say if -- they've asked me if a standard is available on the Internet, is that -- is that allowed, is that permissible, so we -- in those cases, we will seek to remove them.
But we don't -- we -- I don't have any record of tracking such loss of -- of revenue.
Q. Apart from tracking it, does ASHRAE have any information regarding monetary losses it has suffered as a consequence of defendant's conduct?
A. I -- I do recall there was one message we got from somebody who refer- -- I think it was somebody with Carrier Corporation, if I recall, who referred to -- who referred to that. I don't know if they had intended to purchase or not, but that was one specific case I do recall.

Q. Is that David Hollman?
A. It was somebody with Carrier, Carrier Corporation.
Q. Carrier UTC?
A. Yes. Yeah, yeah.
Q. Does the name David Hollman ring a bell to you?
A. I -- I think so.
Q. Do you know whether he's an ASHRAE member?
A. I do not know. Carrier's -- there are many employees with -- with -- from -- of Carrier who are members of ASHRAE.
Q. Do you recall any other information ASHRAE has regarding any potential monetary loss as a consequence of defendant's conduct?
A. I have no firsthand knowledge of -- of that.
Q. Do you have any other information that you might have acquired secondhand?
A. With regard to --
Q. Monetary losses.
A. -- this -- this -- in this case?
Q. Caused by defendants, yes.
A. No, I do not have any -- any other knowledge of that.

Q. Are you aware of any persons being misled as to a relationship between the defendants and ASHRAE?
A. I'm not aware of that.
Q. Are you aware of anybody being confused in any way as a consequence -- strike that.
Are you aware of anyone being deceived in any way by defendant?
A. I am not aware --
MR. LEWIS: Objection.
THE WITNESS: -- of that.
Q. (By Mr. Bridges) Are you aware of anyone being confused in any way by any conduct of the defendant?
MR. LEWIS: Objection.
THE WITNESS: If I recall, I think that was -- the fellow from Carrier was asking me a question of whether that was an authorized use, perhaps. I can't remember the exact wording, but there was a -- a question that I was asked of that -- of that person.
Q. (By Mr. Bridges) Are you aware of any other instances of anyone being confused in any way by any conduct of the defendant?
MR. LEWIS: Objection.

ASHRAE.
Q. What newspaper were you working for?
A. Bergen News.
Q. Bergen County, New Jersey?
A. Bergen County, New Jersey, yes.
Q. And you mentioned you graduated from a school that had a very strong engineering program.
Which one was that?
A. Lehigh University in Bethlehem, Pennsylvania.
Q. So you had come to -- you came to ASHRAE from a publishing and -- from a publishing background with a technology slant in the publishing?
A. With a familiarity, to some degree, of engineering, but it was mainly with an editorial background.
Q. To what extent -- strike that.
Earlier today when we were talking about revenues, I think you were distinguishing between revenues that ASHRAE receives directly from the sale or licensing of publications and other revenues that may in some way involve the publications, such as training programs where a copy of a standard would be furnished.
Do you recall that?

MR. LEWIS: Objection.
THE WITNESS: Yes, I do.
Q. (By Mr. Bridges) I'd like to explore for a little bit what activities ASHRAE engages in that may touch upon standards, apart from the sale or licensing of standards.
So education is one; right?
A. Correct.
Q. What types of education offerings does ASHRAE provide?
A. We -- we offer a -- a varied program. We really take seriously trying to help with the application of the standard, ensure the standards are applied properly.
And so that consists of instructor-led training that we will provide, either -- typically, three-hour or six-hour courses for which there are registration fees, and we also will have web-based learning programs that are available, which would be e-learning experiences that are available on demand.
And many of those courses deal with applications of -- of standards, and specifically there's -- there's quite a few courses that would deal with topics related to 90.1.
And -- and we also offer a -- a -- a

five -- a total of five days of training, which is a -- an intensive HVAC design training program, and much of that content deals with Standard 90.1 content, Standard 62.1 content.
Q. What other revenue-generating activities does ASHRAE engage in, apart from the publication sales and licensing and the education offerings you just mentioned?
A. Do you mean with a direct or indirect tie to standards, for example?
Q. Yes.
A. The -- the magazine will -- our -- our principal magazine, which is a -- a trade publication, B-to-B publication, ASHRAE journal will -- will have -- will be quite often articles about ASHRAE standards there.
So that -- that is always -- when we have topics related to standards, those are often articles that we will promote to our -- to our advertising base.
Q. What other activities does -- strike that.
What other revenue-generating activities does ASHRAE engage in relating to --
A. We have --
Q. -- standards?

A. We have some electronic products, for example, that are based on ASHRAE standards that -- that -- apps that are based on content and ASHRAE standards specifically. So we offer those types of products for sale.
Q. What are some of the apps?
A. For -- related to 62.1, there would be a -- a ventilation rate effectiveness app that we have available, a duct-fitting app and a duct-fitting database. However, that probably relates more to our hand- -- that relates more to our handbook than to standards.
Right now, we're developing an app for 90.1 compliance.
Q. Anything else in terms of standards relating to revenue-generating activities?
A. Users manuals.
Q. How are they organized? In other words, is there a user's manual for each standard?
A. Not for all the standards, but the more popular standards, the more complex standards, we have users manuals to assist with their appropriate and proper application.
Q. I assume there's a user's manual for 90.1?
A. There is.

Q. What other rev- -- revenue-generating activities does ASHRAE engage in pertaining to standards?
A. We've covered royalties. We've covered the sales of the documents. We've covered the articles that would impact the advertising, the courses, the ancillary support documents.
I could imagine at one -- at -- some extension of that could be either sessions that are presented at our conferences that would deal with 90.1, for which -- for which there would be attendance interests that would be generated for that.
I believe that -- I believe that would cover the -- the -- the potential for -- for revenue.
Q. Does the sale of -- strike that.
Does the sale and licensing of standards subsidize other ASHRAE activities apart from standards development --
MR. LEWIS: Objection.
Q. (By Mr. Bridges) -- and publication?
A. All of the revenue flows into a single -- single source. There's some standards that are -- are very low-selling standards, so there are -- so it would be fair to say that some -- if a standard

generates more revenue, that helps support those activities that don't have revenue streams that would cover them.
Q. There's no requirement that each activity fully self-support itself?
MR. LEWIS: Objection.
THE WITNESS: Our -- our obligation's to advance the technology. We -- we -- there are some items that are needed, but they have a difficult time finding the financial support to carry them forward.
Q. (By Mr. Bridges) And in your last statement, you said, "Our obligation is to advance the technology."
Is that a summary or a reference to ASHRAE's mission?
A. In our bylaws, ASHRAE's organized to advance the arts and sciences of heating, refrigeration, air-conditioning, ventilation, and their allied arts and sciences.
Q. How does ASHRAE's development and publication of its standards advance the technology?
A. Because it sets a -- a standard for practice. It incorporates through user experiences those solutions to technical applications that are --

that are -- are -- are deemed by peers to have been successful. They're developed by people who are recognized by their peer -- peers as being knowledgeable in their respective fields.
So it provides standards. And especially the -- the ASHRAE handbook really provide -- they provide solutions. They -- they -- they incorporate new technology that's available in products and equipment and assist designers as to what new design options may be available because of new products in the marketplace.
Q. You use terminology that I hear frequently. I often push back at it a little bit wherever I hear it, so don't take this personally.
But I've never quite understood what "solutions" means, because it's often a very vague term. Sometimes it's a liquid in a bottle; okay? That's not what you meant here.
How else would you describe what you're referring to as solutions here?
MR. LEWIS: Objection.
THE WITNESS: One of the things that I've noticed in the industry as an editorial person is that there's so many different technologies that can be provided that are available to

maintain air in a building, whether it be conditioned air at a particular temperature or air that's free of contaminants. There's many, many different methods of applying technology, different types of technology, to provide a -- an air-conditioning -- HVAC system in a building or a refrigeration system.
And so designers have more choices available to them than ever before, so part of the role that ASHRAE provides in offering solutions is to help guide those engineers to -- to provide the appropriate -- the -- the appropriate application of technology which best solves the design problem that they face.
Q. (By Mr. Bridges) Thank you for that explanation.
I spoke with ASHRAE counsel during a break about your testimony earlier today about the reading room.
Did you have any clarifications that you wanted to make about the functionality of the reading room? I'm sorry, about the functionality of the free viewing facility.
A. Yes. I -- in -- in -- in checking that point, I understand now that there's search

CERTIFICATE

STATE OF GEORGIA:

COUNTY OF FULTON:

I hereby certify that the foregoing transcript was taken down, as stated in the caption, and the questions and answers thereto were reduced to typewriting under my direction; that the foregoing pages represent a true, complete, and correct transcript of the evidence given upon said hearing, and I further certify that I am not of kin or counsel to the parties in the case; am not in the regular employ of counsel for any of said parties; nor am I in anywise interested in the result of said case.

Lee Ann Barnes

LEE ANN BARNES, CCR B-1852, RPR, CRR

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DEPOSITION ERRATA SHEET

Our Assignment No. 2023730
Case Caption: AMERICAN SOCIETY FOR TESTING AND MATERIALS d/b/a ASTM INTERNATIONAL, et al. vs. PUBLIC.RESOURCE.ORG, INC.

DECLARATION UNDER PENALTY OF PERJURY

I declare under penalty of perjury that I have read the entire transcript of my Deposition taken in the captioned matter or the same has been read to me, and the same is true and accurate, save and except for changes and/or corrections, if any, as indicated by me on the DEPOSITION ERRATA SHEET hereof, with the understanding that I offer these changes as if still under oath.

Signed on the _____ day of _____, 20___.

_____

STEVEN COMSTOCK

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EXHIBIT 6

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

AMERICAN SOCIETY FOR TESTING AND MATERIALS, d/b/a ASTM INTERNATIONAL; NATIONAL FIRE PROTECTION ASSOCIATION, INC.; and AMERICAN SOCIETY OF HEATING, REFRIGERATION AND AIR CONDITIONING ENGINEERS, Plaintiffs and Counter-Defendants, vs. PUBLIC.RESOURCE.ORG,INC., Defendant and Counter-Plaintiff.	) Civil Action No. 1:13-cv-01215-TSC

VIDEOTAPED 30(b)(6) DEPOSITION OF NATIONAL FIRE PROTECTION ASSOCIATION, INC., BY CHRISTIAN DUBAY, before Jeanette N. Maracas, Registered Professional Reporter and Notary Public in and for the Commonwealth of Massachusetts, at 42 Chauncy Street, Boston, Massachusetts, on Wednesday, April 1, 2015, commencing at 10:00 a.m.

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Q. In what forums do you speak as NFPA's primary technical spokesman? 10:09:00 10:09:12
A. One example is media interviews. 10:09:15
Q. How else? 10:09:25
A. Another example is public forums around our technical topics of expertise, our standards. 10:09:26 10:09:32
Q. What type of public forums do you mean? 10:09:36
A. One example is speaking at the conferences and training seminars and such. 10:09:40 10:09:47
Q. What types of conferences do you speak at for NFPA? 10:09:49 10:09:52
A. In my current role primarily, I guess that's a standards role, technically it could involve the topic at hand. It could be a trade event or an association of, say, an association of manufacturers or constituents or government, like fire marshals. 10:09:52 10:09:57 10:09:59 10:10:01 10:10:08 10:10:11
Q. On what topics do you typically speak at those conferences? 10:10:18 10:10:23
A. As broad as our scope of NFPA. 10:10:25
Q. And how broad is that scope? 10:10:34
A. We -- our mission is based upon safety and improving safety and reducing loss. And that covers approximately 300 codes and standards on a multitude of topics. 10:10:36 10:10:42 10:10:44 10:10:49

committee volunteers. 10:13:04
Q. Is it the technical committee of volunteers who determine what constitutes the best minimum level of safety? 10:13:15 10:13:22 10:13:24
MR. REHN: Objection as to form. 10:13:26
A. It's a combination of -- our technical committee members determine the final technical requirements, however, that's balanced with extensive public review and comment. 10:13:29 10:13:32 10:13:34 10:13:37 10:13:39
Q. I'll come back to that in a minute. How else do you -- in what other forums do you speak as primary technical spokesman for NFPA? You mentioned media interviews, certain public forums. You mentioned conferences and training seminars. Are there any other ways in which you serve as the primary technical spokesman for NFPA? 10:13:49 10:14:14 10:14:17 10:14:24 10:14:27 10:14:29 10:14:32 10:14:34
A. I often give presentations relating to awareness of our process and awareness of how to get involved and how to be part of this public codes and standards process. 10:14:35 10:14:39 10:14:42 10:14:46
Q. To whom do you make those presentations? 10:14:51
A. Various affected parties. Again, really depends on the breadth of topics. So it 10:14:55 10:14:59

Q. How do codes and standards improve safety and reduce loss? 10:11:01 10:11:03
A. Codes and standards are designed -- part of them is to learn from losses, learn from incidents as such to ensure what protection needs to be in place to account for that. That's one of the ways. 10:11:05 10:11:13 10:11:17 10:11:20 10:11:23
Q. How else do codes and standards improve safety and reduce losses? 10:11:27 10:11:30
MR. REHN: I'll just object that these questions are outside the scope of the topics for which this witness was designated, but you can answer. 10:11:35 10:11:36 10:11:38 10:11:41
MR. BRIDGES: I disagree, but we don't need to argue it. 10:11:42 10:11:44
A. Codes and standards, at least the NFPA process, brings together a multitude of interested parties which can determine, through the consensus process, a best minimum level of safety. 10:11:46 10:11:48 10:11:51 10:11:53 10:11:58
Q. Who determines what the best minimum level of safety is in that process? 10:12:14 10:12:50
MR. REHN: Objection as to form. 10:12:55
Q. You may answer. 10:12:58
A. At NFPA our process relies upon our technical 10:12:59

varies. 10:15:04
Q. What are some examples of groups to which you make these presentations? 10:15:04 10:15:08
A. For example, if there's an emerging technical topic of safety or concern to the association, I may meet with fire marshals or local safety officials in a given jurisdiction or state to present what we know at that time. 10:15:09 10:15:13 10:15:16 10:15:19 10:15:22 10:15:26
Q. To your knowledge, what use do they make of the information that you present to them? 10:15:30 10:15:42
MR. REHN: Objection as to form. Calls for speculation. 10:15:45 10:15:47
A. It would really depend on the group. 10:15:49
Q. Let's say fire marshals. 10:15:56
MR. REHN: Same objection. 10:15:58
A. They often utilize that information as information to make safety decisions within their various jurisdictions or with the situations that they're facing. 10:16:01 10:16:05 10:16:07 10:16:11
Q. What kind of safety decisions are you referring to? 10:16:12 10:16:14
A. It could be, for example, how to understand a new technology or a new application of safety, a new safety standard, a new adoption 10:16:19 10:16:27 10:16:34

meetings are open to anyone who wishes to attend. 10:30:44 10:30:46
Q. Anything else? 10:30:46
A. No. I think that covers it. 10:30:49
Q. What do you mean by call the meeting, NFPA calls the meeting? 10:30:55 10:31:06
A. We provide advance public notice when we call the meeting, including on our website, social media announcements to the committee members to make not only the committee but the public aware of the next meeting date, location, et cetera. 10:31:08 10:31:12 10:31:16 10:31:20 10:31:22 10:31:26
Q. How does NFPA book the meeting? 10:31:29
A. We have a meetings department whose responsibility is to book all of our meetings. 10:31:34 10:31:38 10:31:41
Q. Does that mean to arrange the logistics, like the hotels and conferences rooms and things like that? 10:31:42 10:31:47 10:31:50
A. The meetings department is responsible -- 10:31:52
MR. REHN: Objection to form. 10:31:51
A. The meetings department is responsible for taking care of finding a proper hotel, large enough meeting rooms, things like that. Whatever the size of the logistics, they 10:31:56 10:32:02 10:32:04 10:32:07

handle all the logistics around that meeting space and any required hotels. 10:32:09 10:32:12
Q. How does NFPA host the meeting? 10:32:14
MR. REHN: Object to the form. 10:32:20
Q. I should say how does NFPA host the meetings? 10:32:24
MR. REHN: Same objection. 10:32:28
A. I think the best approach is that because it's an NFPA meeting, so it's -- we're calling -- when I say we're calling the meeting, so it's our committee meeting as an example. 10:32:29 10:32:31 10:32:36 10:32:37 10:32:41
So NFPA staff is there, technical staff is there facilitating and running the meeting along with the actual volunteer technical committee chair. So I think that should clarify what I'm implying by "hosting." 10:32:41 10:32:46 10:32:48 10:32:50 10:32:54 10:32:56
Q. How does the NFPA staff facilitate and run the meetings along with the technical committee chairs? 10:32:57 10:33:15 10:33:17
A. Again, just to clarify, just focusing on technical committee meetings? 10:33:20 10:33:23
Q. Yes. 10:33:24
A. Okay. We have a technical staff liaison who's assigned to each of our standards and a 10:33:25 10:33:30

portion of their job is to attend the technical committee meetings. 10:33:33 10:33:36
Q. What do the liaisons do at those meetings when they attend them? 10:33:39 10:33:45
MR. REHN: Object to the form. 10:33:45
A. Their primary responsibility is to capture all of the technical changes that the committee is making to the document they're working on or standard they're working on. 10:33:46 10:33:51 10:33:54 10:33:57
Q. What do you mean by technical changes in that context? 10:34:02 10:34:24
A. Our technical committees are responsible for developing changes to our codes and standards. And one of the primary responsibilities of the technical staff liaison is to capture those changes. 10:34:27 10:34:31 10:34:34 10:34:37 10:34:39
Q. In what respect are those changes technical changes? 10:34:46 10:34:50
A. Those changes are specific, technical being scientific or wording changes to our codes and standards which are technical documents. 10:34:53 10:34:57 10:35:01
Q. How do you distinguish between scientific changes and wording changes to the technical documents? 10:35:08 10:35:11 10:35:17
MR. REHN: Object to the form. 10:35:18

Lacks foundation. Mischaracterizes the testimony. 10:35:19 10:35:22
A. A technical change, in my view, would be changing a specific requirement. A wording change may be a change the committee could do if they have determined that the requirement is confusing or not clear what the specific requirement is, so they may adjust the wording to make it easier to interpret or understand what that actual technical requirement is. 10:35:22 10:35:28 10:35:32 10:35:34 10:35:36 10:35:40 10:35:41 10:35:45 10:35:46
Q. Who determines what wording changes are appropriate in the technical committees? 10:35:48 10:35:52
MR. REHN: Object to the form. 10:35:55
Ambiguous. 10:35:56
A. It's a combination of extensive public review and comment, the committee's review of that and their expertise and with the help of our technical staff to land on the final wording, which is ultimately decided by the technical committee. 10:35:58 10:36:02 10:36:05 10:36:09 10:36:13 10:36:15
Q. What criteria do the members of the technical committee use in choosing the wording of a code or standard? 10:36:23 10:36:32 10:36:38
MR. REHN: Object to the form. 10:36:39

Q. Is there anything about the development of standards that the regulations do not cover? 11:16:19 11:16:21
A. Our regulations cover the specific accredited rules and hence, its regulations. We also have our committee officers guide which provides guidance to our technical committee members as well as our chairs and our manual style. 11:16:27 11:16:33 11:16:35 11:16:37 11:16:41 11:16:46
Q. What other documents govern or regulate the development of standards within NFPA? 11:16:46 11:17:44
A. Off the top of my head I can't think of anything else. 11:17:56 11:17:59
Q. Who participates in -- strike that. 11:18:09
Who are the members, generally speaking, the category of NFPA's technical committees? 11:18:17 11:18:20 11:18:26
A. Just for clarification, the representation or are they members of NFPA? We have categories -- we have interest categories of our committee members. 11:18:29 11:18:36 11:18:39 11:18:43
Q. Who -- what persons are entitled to be members of NFPA's technical committees? 11:18:43 11:18:48
MR. REHN: Objection as to form. 11:18:51
A. Anyone can apply to be a member of an NFPA technical committee, and based upon their 11:18:55 11:18:59

expertise and their background, they're evaluated through a process that ultimately involves standards council appointing them to, or not appointing, depending on their credentials, to the various technical committees. 11:19:01 11:19:04 11:19:07 11:19:10 11:19:12 11:19:14
Q. So the standards council determines who gains admission to membership in the technical committees? 11:19:17 11:19:21 11:19:23
A. That's correct. 11:19:24
Q. What criteria does the standards council apply in determining who should gain membership to the technical committees? 11:19:27 11:19:35 11:19:39
MR. REHN: Objection as to form. 11:19:42
A. It's a multipart criteria. First is technical expertise within that subject matter. Second is balance; is the committee an appropriate balance. And third is the ability to participate. 11:19:46 11:19:51 11:19:54 11:20:01 11:20:02
Q. What do you mean by balance? 11:20:06
A. By our regulations, NFPA technical committees are required to have a balance of interest categories to ensure that no one party or one interest category can dominate the process. 11:20:12 11:20:16 11:20:18 11:20:21
Q. What are the interest categories? 11:20:24

A. There are, I believe, nine interest categories, including -- one example is research and testing is an example. Another example is enforcer, which includes government officials, both, sometimes federal but state and local jurisdictions, as well as special expert, which is consultants as an example. 11:20:27 11:20:31 11:20:37 11:20:40 11:20:44 11:20:48 11:20:52 11:20:56
Users, installer maintainers which are those who install the systems, consumers, and that's all I can think of. I'm not sure if I said it, but consumer is another one that can represent a special -- have a specific slot. Oh, I'm sorry, one other slot is labor, is another slot. 11:20:56 11:21:02 11:21:13 11:21:30 11:21:34 11:21:35 11:21:38
Q. Thank you. Are all NFPA employees members of the technical committees? 11:21:51 11:22:16
MR. REHN: Objection as to form. 11:22:20
A. NFPA employees are not -- cannot be members of our technical committees. However, as I stated previously, it's important -- there's an important role that NFPA staff plays in guiding, advising the committee, coordinating the activities and providing their technical expertise, especially technical staff liaison 11:22:23 11:22:27 11:22:30 11:22:32 11:22:35 11:22:37 11:22:40

into this committee process. But they do not have -- they're not members of the committee, and they do not carry a vote in the decisions of the committees. 11:22:43 11:22:46 11:22:48 11:22:51
Q. Who constitutes by category of employment is -- strike that. 11:23:01 11:23:08
By category of employment, who constitutes the members of the standards council? 11:23:09 11:23:11 11:23:15
MR. REHN: Objection as to form. 11:23:15
It's vague. 11:23:17
A. I'd like to provide just a quick comment to help you clarify the question from my understanding. Oftentimes our council members and our committee members are not appointed based upon employment. It's based upon the interest category they represent. 11:23:19 11:23:26 11:23:27 11:23:29 11:23:31 11:23:33
Q. Thank you, yes. By interest category -- strike that. 11:23:37 11:23:43
You mentioned interest categories for technical committee membership, correct? 11:23:44 11:23:47
A. Yes. 11:23:49
Q. Do the same interest categories apply for appointments or election to -- strike that. 11:23:49 11:23:53
How is the standards council -- strike that. 11:23:58

How are persons chosen to serve on 11:24:06
the standards council? 11:24:08
MR. REHN: Object to the form. 11:24:12
A. Because the standards council is the 11:24:15
overarching body over our entire standards 11:24:18
development process, they are appointed 11:24:21
through a process that involves the NFPA 11:24:24
president making recommendations to the NFPA 11:24:27
board of directors. Ultimately the standards 11:24:29
council members are appointed by our board of 11:24:33
directors. 11:24:35
Q. Are any NFPA employees members of the 11:24:40
standards council? 11:24:43
MR. REHN: Objection as to form. 11:24:45
A. Specifically, no. However, similar to the 11:24:49
technical committees, there is staff assigned 11:24:51
to support the standards council, their 11:24:55
activities and their decisions. 11:24:58
Q. I'd like to go back for a moment to the 11:25:11
process after the technical committee has 11:25:19
decided on changes to a standard. 11:25:26
And you say that a staff 11:25:31
representative, NFPA staff representative 11:25:38
will capture those changes from the technical 11:25:41
committee, correct? 11:25:44

MR. REHN: Object to the form. 11:25:48
A. The NFPA technical staff that serves as, the 11:25:50
term we use is a staff liaison to a technical 11:25:54
committee, they do more than just capture the 11:25:56
specific wordings. 11:26:00
What they do is they are each 11:26:01
technical experts in their field and they not 11:26:03
only capture or record those changes, but 11:26:06
they provide their expertise to the 11:26:09
committee, their field experience, what they 11:26:11
have, the information that they're bringing 11:26:14
in through questions on the standards and 11:26:16
such. 11:26:18
And they provide that technical 11:26:19
expertise to the committee so the committee 11:26:21
can utilize that, a complete combination with 11:26:24
all the public input or comments, to land on 11:26:27
a final set of proposed language. In 11:26:32
summary, it's more than just recording. 11:26:37
They're not really recording secretaries, per 11:26:39
se. 11:26:43
Q. But who ultimately determines the language of 11:26:43
the technical committee's proposed changes to 11:26:47
a code or standard? 11:26:51
MR. REHN: Objection as to form. 11:26:53

It's ambiguous. 11:26:54
A. The final decision is accomplished through 11:26:56
that ballot of the technical committee, but 11:26:58
the wording itself is that combination of the 11:27:01
technical staff and the committee working to 11:27:05
capture the requirement and get it worded 11:27:07
properly in the right context, in the right 11:27:09
order within a document so that when the 11:27:12
final specific words are balloted, the 11:27:14
committee has it in context of the whole 11:27:18
standards and they can make that decision, 11:27:20
seeing it within the body of the standard. 11:27:22
Q. When the text is balloted, is there any 11:27:24
indication to the members of the committee 11:27:27
what variations have occurred as a 11:27:32
consequence of staff input from the text that 11:27:38
the committee itself was proposing? 11:27:43
MR. REHN: Objection as to form. 11:27:47
Vague. Lacks foundation. Assumes facts not 11:27:48
in evidence. 11:27:51
A. There are really two types of changes the 11:27:53
committee is balloted on. One is the -- a 11:27:57
plain first revision or second revision, 11:28:01
which may have been edited to comply with our 11:28:04
manual style, get the wording right. That is 11:28:07

connected directly to the work of the 11:28:09
committee. The second is a revision that's 11:28:11
tied to a pure editorial change. 11:28:15
Q. Do either of these sets of revisions get 11:28:19
identified to technical committee members so 11:28:24
that they can understand what input or 11:28:28
changes, if any, the technical committee 11:28:31
staff contributed? 11:28:35
MR. REHN: Objection as to form. 11:28:41
A. Yes, they all do. All changes are indicated 11:28:44
to the technical committees for balloting. 11:28:48
And if there is, in the sense of an editorial 11:28:50
revision, it's indicated that this was 11:28:54
identified by staff as a potential editorial 11:28:57
revision. The committee can then, in their 11:29:01
voting, decide whether that change moves 11:29:05
forward or not. 11:29:10
Q. Where in the records of the development of 11:29:10
each standard does one find the indications 11:29:12
of those changes? 11:29:17
MR. REHN: Objection to the form. 11:29:21
A. They are part of the first draft report or, 11:29:25
and/or, depending, the second draft report. 11:29:29
Both those reports consolidate the whole 11:29:33
record. 11:29:35

go -- strike that. 11:40:50
If you needed to identify the 11:40:53
language that NFPA employees contributed to 11:40:55
NFPA codes and standards, how would you 11:41:05
determine that language? 11:41:07
MR. REHN: Objection as to form. 11:41:10
It's vague and compound. 11:41:11
A. What we could determine is the language the 11:41:15
technical committee at the end of the day 11:41:19
approved. Into -- each individual word and 11:41:21
such would be difficult, if not impossible, 11:41:25
because of ultimately the technical staff 11:41:30
provides that content to the committee which 11:41:33
then approves those words. 11:41:35
Q. You said the technical staff provides the 11:41:37
content to the committee? The technical 11:41:44
staff doesn't draft the standards, correct? 11:41:47
MR. REHN: Objection as to form. 11:41:51
Mischaracterizes. 11:41:53
A. In many cases the technical staff in the room 11:41:59
is drafting the text. 11:42:02
Q. Is proposing new text? 11:42:04
A. In some cases yes, to accomplish what the 11:42:10
committee is trying to accomplish. The 11:42:13
technical staff of NFPA are experts in their 11:42:15

field, and the committee may want to 11:42:20
establish a requirement for X and the 11:42:23
technical staff is there saying, well, we can 11:42:24
word it this way and that way, does this meet 11:42:27
your intent, how about we do this, I can 11:42:29
research some information, get back to you at 11:42:30
the next meeting. 11:42:32
The technical staff provides a vital 11:42:33
role in helping the technical committee 11:42:35
accomplish their mission of developing those 11:42:38
words that become ultimately the final words 11:42:40
of the standard. 11:42:43
Q. Who makes the decision about the words in a 11:42:44
standard? 11:42:46
MR. REHN: Objection as to form. 11:42:46
Ambiguous. 11:42:48
A. The final decision is -- and to summarize, 11:42:49
it's a two-part decision. A committee 11:42:54
ballots on it, the ballot's on the final 11:42:55
word, the committee approves it. At the 11:42:58
end of the day our standards council issues 11:43:00
that document, but the committee ballot 11:43:03
establishes the position of the type of 11:43:03
committee at that time. 11:43:07
Q. And how does the text evolve up to the point 11:43:07

that the text of the technical committee is 11:43:16
balloted? 11:43:19
MR. REHN: Objection as to form. 11:43:20
Ambiguous. Compound. 11:43:22
A. The text can evolve and by evolve, you mean 11:43:25
created and included? Is that what you're 11:43:28
saying? 11:43:31
Q. I think so. 11:43:32
A. So in a few ways. One is it can be submitted 11:43:33
through a proposal form or public input form 11:43:37
or a public comment form. The language can 11:43:45
come from that. It can come from the 11:43:49
expertise of the technical committee members 11:43:53
who are sitting on the committee, or it can 11:43:55
come from technical staff providing that to 11:43:58
the committee as their work progresses along. 11:44:01
Ultimately that evolution is the 11:44:06
staff liaison synthesizes all that with the 11:44:08
direction of the committee to land on the 11:44:13
final technical language that is balloted. 11:44:15
Q. With the direction of the committee, meaning 11:44:18
with the approval of the committee members? 11:44:29
MR. REHN: Objection as to form. 11:44:31
Mischaracterizes the testimony. 11:44:34
Q. What do you mean by with the direction of the 11:44:36

committee? 11:44:38
A. So a committee could want to establish a 11:44:40
requirement again for X for something and 11:44:45
they may say, we want the requirement to read 11:44:48
12 and the staff liaison would have to put 11:44:51
text around that to get it to read in context 11:44:55
of the document. Or they may say we want to 11:44:57
have a draft chapter on something, technical 11:45:00
staff can you do research, pull together 11:45:03
drafting of documents to present to the 11:45:12
committee to consider. 11:45:14
In the end the committee will agree 11:45:16
through a meeting vote what text is going to 11:45:19
move forward towards ballot. Then the 11:45:21
staff's job is to turn that into a ballot and 11:45:24
make sure it fits to our manual style and 11:45:28
ballot with the technical committee on the 11:45:28
final language. 11:45:31
Q. What criteria do technical committees use 11:45:31
to determine what text moves forward to a 11:45:34
ballot? 11:45:37
MR. REHN: Objection as to form. 11:45:38
A. It's their expertise. It's their 11:45:42
professional opinion in a balanced way 11:45:46
through a meeting vote of what they believe 11:45:48

will move forward. There's motions we 11:45:50
follow, Robert's Rules of Order, and when 11:45:53
there's a motion and it carries by a meeting 11:45:55
vote, which is 50 percent plus one, that 11:45:57
proposed change is then approved to move 11:46:00
forward to ballot, to letter ballot, excuse 11:46:02
me. 11:46:08
Q. Your answer focused on the process. I'm 11:46:08
asking what criteria the technical committee 11:46:10
members use to decide what text to move 11:46:15
forward to a ballot. 11:46:18
MR. REHN: Objection as to form. 11:46:20
A. I would think the criteria would depend on 11:46:24
each individual member of the technical 11:46:26
committee and their expertise and what bar 11:46:28
they believe needs to be crossed or what 11:46:31
things they need to have answered 11:46:32
professionally to make a decision to modify 11:46:34
the standard. 11:46:36
Q. What criteria in your role as the person in 11:46:36
charge of standards development at NFPA -- 11:46:42
strike that. 11:46:46
In your role as the person in charge 11:46:46
of standards development at NFPA, what do you 11:46:49
understand the most typical criteria to be by 11:46:52

which technical committees determine what 11:46:59
text to move forward to a ballot? 11:47:02
MR. REHN: Objection as to form. 11:47:04
It's vague. 11:47:06
A. I don't think there's a single answer to 11:47:09
that, and that's why we rely on a consensus 11:47:11
ballot that requires two-thirds of our 11:47:15
technical committee to move anything forward. 11:47:16
That's part of the open consensus process in 11:47:20
that you need two-thirds of a balanced 11:47:22
committee to agree on a technical change to 11:47:26
move it forward. 11:47:28
Each party is going to have a 11:47:29
different motivation for how they want to 11:47:31
vote or how they want things to go forward or 11:47:32
not. 11:47:35
Q. Tell me and enumerate for me some of the 11:47:35
criteria that you understand them to apply in 11:47:38
determining what text to move forward to a 11:47:42
ballot. 11:47:44
MR. REHN: Same objection. 11:47:44
A. Some criteria could include what's the loss 11:47:49
data associated with this issue that we're 11:47:54
facing, fire loss data, injuries, deaths and 11:47:57
such. Some can include economic gain. It's 11:48:00

cheaper, easier to accomplish things, 11:48:04
accomplishes a higher level of safety. Those 11:48:07
are a few examples. 11:48:10
Q. Please give me more examples of criteria that 11:48:12
technical committee members would use in 11:48:16
deciding what text to move forward to ballot. 11:48:18
MR. REHN: Same objection. 11:48:20
A. Other the examples could include research, 11:48:23
data. Such things -- another example could 11:48:30
be loss reports. For example, there's been a 11:48:37
large fire somewhere, a large chemical hazard 11:48:41
or something. There's often an investigative 11:48:43
report that NTSB or CSB or local fire marshal 11:48:45
has done. And the committee would look at 11:48:50
that and say we may have a safety issue that 11:48:52
needs to be addressed. 11:48:54
Q. So you've mentioned information that they 11:48:56
may -- that may motivate them, but I think 11:48:59
your answers are focusing less on what 11:49:06
criteria they apply to determining what text 11:49:09
would move forward. 11:49:11
I'd like for you to tell me the 11:49:12
different criteria that technical committee 11:49:14
members apply, to your knowledge, in deciding 11:49:17
what text to move forward to a ballot. 11:49:20

MR. REHN: Same objection. 11:49:23
A. Again, I think it would be difficult, without 11:49:25
speculating, I'm not sure what each person 11:49:29
would use for criteria, and that's why my 11:49:31
answer previously focused on having a 11:49:34
balanced committee of different experts, 11:49:36
topical experts in that area, will each bring 11:49:39
a different set of personal criteria, 11:49:39
personal decisionmaking that will decide 11:49:43
what's going to move forward. 11:49:45
Q. I'd like for you to tell me what some of 11:49:47
those personal criteria are that you were 11:49:49
aware of, based on your interactions with 11:49:52
technical committee members at NFPA. 11:49:55
MR. REHN: Objection as to form. 11:50:00
A. I think many of those things I stated, like 11:50:01
data, research reports, information combined 11:50:03
is one of the main reasons, information is 11:50:09
one of the main things, data, facts are 11:50:11
important criteria for our committee members. 11:50:14
I think the other thing that's very 11:50:17
important to our committee members and to our 11:50:18
process is their extensive experience in the 11:50:20
field and seeing results of different 11:50:24
approaches. 11:50:27

Q. Let me rephrase it differently because I'm not sure you're responding to my question about criteria. What are the different reasons, not what background information are they acting on, but what are the different goals that, to your knowledge, technical committee members have in deciding whether to progress certain text to a ballot? 11:50:27 11:50:29 11:50:31 11:50:34 11:50:38 11:50:40 11:50:45 11:50:49

MR. REHN: Objection as to form. 11:50:54

A. I think the biggest overarching goal is the accomplishment of the NFPA mission. They want to ultimately reduce life loss, injury, property loss, economic loss due to fire and other related hazards. 11:50:55 11:51:03 11:51:04 11:51:09 11:51:11

Q. How do decisions regarding progressing certain text to a ballot touch upon that mission? 11:51:13 11:51:17 11:51:24

MR. REHN: Objection as to form. 11:51:26

A. Fundamentally does it progress towards accomplishing that mission? Does the institution of a new technology or a new requirement or modifying an existing requirement lead to better life safety, better fire protection, better electrical safety, better protection of our nation's 11:51:30 11:51:33 11:51:37 11:51:39 11:51:42 11:51:46 11:51:48

first responders? Does it accomplish the mission? So that's the best way. 11:51:51 11:51:53

Q. Does it -- would you say that a general question that technical committees address in deciding whether to progress certain text to a ballot is whether the proposed change will improve outcomes? 11:51:59 11:52:05 11:52:18 11:52:22 11:52:29

MR. REHN: Object to the form of the question. 11:52:34 11:52:37

A. I would speculate that each decision would be in guidance or in alignment with improving safety. And those would be the outcomes, improving safety, reducing loss, preventing incidents from happening again that resulted in life loss injuries, property loss, et cetera. 11:52:41 11:52:47 11:52:53 11:52:53 11:52:57 11:52:59 11:53:04

Q. Who pays for members of the technical committees to participate in their work? 11:53:11 11:53:15

A. Again, a lot of my answers are it depends. In this case, you have everything from companies to people's own time, people taking vacation time and in some cases, NFPA reimburses participation through our enforcer fund to get public safety officials like fire marshals, electrical inspectors, and other, 11:53:23 11:53:26 11:53:30 11:53:34 11:53:37 11:53:41 11:53:44

we call them enforcers, to attend our committee meetings. 11:53:46 11:53:48

Q. Do any -- does NFPA pay any persons for their time in participation in the technical committee work? 11:53:50 11:53:57 11:54:02

A. NFPA does not pay for time, but what we do for public sector officials who we classify as enforcers, we have an enforcer fund which we pay 80 percent of their associated travel to a committee meeting, including hotel, airfare, et cetera. 11:54:06 11:54:09 11:54:12 11:54:15 11:54:15 11:54:20

Q. What is the motivation of persons, as you understand it, to participate in technical committees? 11:54:20 11:54:23 11:54:28

MR. REHN: Object to the form. 11:54:29

A. I think there's lots of motivations. I think overwhelmingly the number one motivation, in my opinion and my years of service, is the overarching mission of NFPA. Our mission of safety is very attractive to many people. 11:54:32 11:54:35 11:54:37 11:54:40 11:54:44

Many of our volunteers not only volunteer to participate in the NFPA process but also volunteer their time to do so, and that's a strong indication to me that that's the primary motivation. 11:54:47 11:54:49 11:54:51 11:54:54 11:54:56

Q. Are you aware of any person whose primary motivation is to receive some financial reward for participation in the technical committee process? 11:55:02 11:55:05 11:55:10 11:55:13

A. I'm not aware of an individual, per se, but I would speculate that these people are experts in their fields, and there's professional recognition and acknowledgment for being on an NFPA technical committee. 11:55:21 11:55:26 11:55:28 11:55:32 11:55:36

MR. BRIDGES: Why don't we take a break. We've been going for a while. What time is it? 11:55:46 11:55:47 11:55:51

VIDEOGRAPHER: 11:55. 11:55:51

MR. BRIDGES: We'll keep going. 11:55:52

VIDEOGRAPHER: There's another 15 minutes on the tape. 11:55:54 11:55:55

MR. BRIDGES: We'll keep going another 15 minutes. 11:55:56 11:55:58

Q. How can the public gain access without payment to NFPA's codes and standards? 11:56:15 11:56:33

A. NFPA provides free read-only access to all of our codes and standards to ensure that anyone, public or private sector or citizen consumer, has the ability to read and understand the requirements of any of our 11:56:37 11:56:42 11:56:46 11:56:49 11:56:52

electrical style manual, which applies to our electrical documents.

Q. Do the terms "annex" and "appendix" coexist in NFPA's forms today?

MR. REHN: Object to the form. Lacks foundation.

A. We updated our manual style in, I believe it was year 2000, and we changed the term "appendix" to "annex" at that time to be consistent with other standards developers terminology.

And so it's my opinion that most, if not all, of our documents, many of our documents have gone through the process of a full revision where that is changed from appendix to annex.

Q. You said NFPA made the change to be consistent with other standards development organizations' terminology; is that correct?

A. That's correct.

Q. Is there a general style manual for standards developers terminology?

A. Not that I'm aware of.

Q. Do the different standards developers tend to converge around using words in similar

fashion?

MR. REHN: Object to the form.

A. In my opinion I would say standard developers converge around terminology and format that works for their constituents that utilize their standards.

Q. Does that lead to some convergence among the practices of various standards development organizations?

MR. REHN: Object to the form. May call for speculation.

A. I would -- from my personal opinion, I view it as a usability and we want to make it as easy and as possible for users to understand the structure of the standard and the requirements and the layout of the documents, so often those changes may end up in a common format to make it easier to understand.

Q. A common format with some other standards developers organizations?

MR. REHN: Object to the form. Vague.

A. In my view, yes. For example, a given set chapter where all the definitions are contained is a good example.

Q. Another example is changing the word appendix to annex, correct?

A. To the best of my recollection, that's an example that I could think of why we shifted there, but the best example I can give you is a single chapter where all the definitions are included.

Q. Then you mentioned that there were updates to disclaimers and copyright releases; is that correct?

A. That is correct. Over my 20 years, I'm aware that updates were added to the forms or just to the forms on a -- not on a specific basis, but as needed.

Q. What updates were needed to the disclaimers and copyright releases?

MR. REHN: Object to the form. May call for a legal opinion. Ambiguous with respect to the terms used in the question.

A. From my perspective, my team's perspective, we never got into the details of those. It was often our legal team would ask us to update our forms, and we would accomplish that through our process.

Q. What were some of the changes to the forms

that you recall as part of those updates?

MR. REHN: Objection. Documents speak for themselves.

A. I think some of the major changes are consistent format. If you notice historically, there was lots of different formattings and layouts. Having consistent format, consistent titles, consistent look and feel is probably the biggest ones that I was -- that I'm aware of and was involved in.

Q. My question was specifically to the updates of disclaimers and copyright releases. What updates do you recall to the text of the disclaimers and copyright releases?

MR. REHN: Object to the form.

A. That was not, again, not part of my responsibility. Oftentimes we were given a set of text to insert as that part of the form and we didn't do a line by line comparison. That was -- our job was to implement the appropriate disclaimers, which was legal's responsibility to provide to us and ensure that it got in there.

Q. What are some of the changes that you recall?

MR. REHN: Objection. Asked and

Electrical Code; is that correct? 03:04:18
MR. REHN: Objection as to form. 03:04:21
A. It appears based on Line Item 1A that the 03:04:26
document the person was submitting it on was 03:04:29
to the National Electrical Code. 03:04:32
Q. There was normally -- didn't you say there 03:04:34
was normally a different type of form for 03:04:36
submissions for the National Electrical Code? 03:04:39
A. If we look at some of the forms you've 03:04:45
submitted to me, some of them had the title. 03:04:47
The title was different, said form for the X 03:04:49
edition of the National Electrical Code, and 03:04:51
so we didn't prohibit you from using any 03:04:53
standard form. 03:04:57
(Exhibit 1248 marked for 03:05:30
identification.) 03:06:03
(Pause) 03:06:05
Q. Do you recognize Exhibit 1248 as a form for 03:06:05
proposal that NFPA has maintained in the 03:06:44
ordinary course of business as part of its 03:06:47
standards development process? 03:06:50
A. Yes, Exhibit 1248 does look typical. 03:06:53
(Exhibit 1249 marked for 03:07:33
identification.) 03:07:41
Q. Do you recognize Exhibit 1249 as a form for 03:07:41

proposal that NFPA has maintained in the 03:07:53
ordinary course of business in its standards 03:07:58
development process? 03:08:04
A. Yes, Exhibit 1249 does look typical. 03:08:13
Q. And some persons might suggest proposals with 03:08:21
attachments where they can't fit the text of 03:08:27
the proposal in the lines on the form. And 03:08:33
this exhibit reflects an attachment on the 03:08:36
reverse page of Exhibit 1249; is that 03:08:42
correct? 03:08:45
A. Based upon my review of the statement of 03:08:47
Item 4 and the proposed text on the back, it 03:09:02
appears to be consistent that the two pages 03:09:06
were copied correctly. 03:09:08
(Exhibit 1250 marked for 03:09:26
identification.) 03:09:41
Q. I've handed you Exhibit 1250. Do you 03:09:46
recognize this as a form for proposals that 03:10:01
NFPA has maintained in the ordinary course of 03:10:09
business in its standards development 03:10:13
process? 03:10:17
A. (Witness examines document) Based upon my 03:10:18
review, it appears that this is typical. 03:10:33
Q. So that's a yes? 03:10:36
A. That's a yes. It appears to be typical, 03:10:37

Exhibit 1250. 03:10:40
Q. Do you know Mr. Belke, James C. Belke? 03:10:41
A. No, sir. 03:10:46
Q. Do you know whether he's a member of any 03:10:46
technical committee? 03:10:50
A. Not off the top of my head. 03:10:55
Q. Do you know what the annotations in 03:10:56
handwriting various places in the form 03:11:05
indicate? There's a checkmark in several 03:11:14
different places. There's some asterisks, 03:11:21
there's a pound sign A, pound sign B, pound 03:11:32
sign C. 03:11:36
MR. REHN: Is that the question? 03:11:46
MR. BRIDGES: Yes. 03:11:48
MR. REHN: Objection that it's 03:11:49
compound. 03:11:50
A. So let me first answer the first part and we 03:11:57
can follow up if we need to. Each change 03:12:00
that came in was processed, again, by 03:12:03
full-time staff to verify signatures and 03:12:06
copyright concerns. And if you notice on 03:12:09
the first page under Proposals, not original 03:12:11
material, there's supporting material which 03:12:15
has an attached CSB report. 03:12:16
And it appears that someone wrote 03:12:26

down that it was not being submitted as 03:12:29
change but as supporting material to support 03:12:31
a change. 03:12:35
Q. Go ahead. 03:12:41
A. The checkmarks, each of these changes had to 03:12:42
be keyed manually by the staff who verified 03:12:45
all the text, editorial and production staff, 03:12:47
and oftentimes they would check the forms as 03:12:51
they worked through them to ensure they had 03:12:53
captured everything. That -- in this case it 03:12:55
would be speculation on my part that that's 03:12:57
what those checkmarks are there for. 03:12:59
(Exhibit 1251 marked for 03:13:22
identification.) 03:13:30
Q. Does Exhibit -- strike that. 03:13:30
Do you recognize 1251 as a document 03:13:46
that NFPA maintains in the ordinary course of 03:13:49
business in the standards development 03:13:52
process? 03:13:53
A. Exhibit 1251 does look typical for a proposal 03:13:54
form. 03:13:58
Q. So the answer is yes? 03:13:59
MR. REHN: Object to the form. 03:14:01
A. Yes, Exhibit 1251 does look typical. 03:14:05
03:14:30

MR. REHN: Object to the form. 06:01:45
Argumentative. Question has been asked and 06:01:46
answered. 06:01:49
A. And my response remains the same that I can't 06:01:50
speculate specifically to that level of 06:01:52
detail of their day-to-day tasks. 06:01:54
Q. You can speculate as to specific detail about 06:01:57
other tasks, but not about these tasks? 06:02:00
MR. REHN: Objection. 06:02:02
Argumentative. Mischaracterizes the 06:02:03
testimony. 06:02:05
Q. Why are you not answering the question I've 06:02:05
asked, which is, what's your best estimate of 06:02:07
the time, of the percentage of time those 06:02:10
persons spent on checking for signatures and 06:02:12
copyright information in the submissions? 06:02:17
MR. REHN: Objection. 06:02:20
Argumentative. Asked and answered. 06:02:21
A. I can speculate on their total workload, 06:02:24
their tasks they took -- 06:02:27
Q. That wasn't my question. My question is, 06:02:29
what percentage applied to checking for 06:02:30
signatures and copyright information? That's 06:02:33
my question. Is it clear? 06:02:37
MR. REHN: Objection. 06:02:39

Argumentative. 06:02:39
Q. Is the question clear? 06:02:41
A. No. 06:02:43
Q. What's unclear about it? Do you understand 06:02:44
what checking for signatures means in looking 06:02:47
at the assignment for copyright forms? Do 06:02:51
you understand? 06:02:58
MR. REHN: Objection. 06:02:58
Argumentative. 06:02:59
A. I understand that we have a policy that each 06:03:00
and every proposal and comment is checked for 06:03:02
copyright and any associated submitted 06:03:04
material is also checked. I have a team, a 06:03:07
full-time staff that that is one of their 06:03:09
primary tasks to do each and every day. 06:03:11
Q. Great. I'm glad to know about the policy. 06:03:14
Now my question is, what percentage of their 06:03:18
time do you estimate, your best estimate, 06:03:23
that they spend carrying out that policy? 06:03:27
MR. REHN: Objection. Asked and 06:03:30
answered. 06:03:31
A. I would restate that, due to all the 06:03:34
variables and the amount of variations that 06:03:37
happen each year, I cannot speculate on that 06:03:39
specific singular task. 06:03:42

Q. You can't give any estimate at all? 06:03:44
A. No. 06:03:46
Q. Were you ever aware of how much time they 06:03:46
spent on the task? 06:03:54
A. I'm aware of the full-time resources that it 06:03:57
takes to accomplish our process of supporting 06:04:00
our technical committees. 06:04:03
Q. But you're unaware of how much time they 06:04:08
spend carrying out the policy that you 06:04:10
described? 06:04:14
MR. REHN: Objection. 06:04:14
Argumentative. 06:04:14
A. I believe I've answered your question. 06:04:17
Q. What verification -- strike that. 06:04:19
What efforts did NFPA make to obtain 06:04:34
assignments from the companies that employed 06:04:38
individuals who submitted proposals or 06:04:48
comments for NFPA's codes and standards? 06:04:53
MR. REHN: Object to the form. It's 06:04:58
ambiguous. It assumes facts. There's some 06:05:00
embedded legal conclusions. 06:05:04
A. NFPA verifies through our policy the 06:05:07
submission from the individual. We do not go 06:05:11
to their companies to verify authority of 06:05:16
their signature. 06:05:18

Q. And how does NFPA verify submissions from the 06:05:20
individuals? 06:05:30
MR. REHN: Objection. I think this 06:05:36
topic has been extensively asked and answered 06:05:38
at this point. 06:05:40
A. Several ways, one of which includes verifying 06:05:43
that the submitter has signed the release 06:05:46
form indicating it is their right or their 06:05:48
authority to release it. 06:05:53
Q. What else does NFPA do to verify the 06:05:54
submission from the individual? 06:06:06
MR. REHN: Same objection. 06:06:08
A. Another example is if we review the material 06:06:10
and there's an obvious copyright statement 06:06:14
that is not of that individual who submitted 06:06:18
it, we then contact them and if possible, we 06:06:21
contact the owner of the copyright of the 06:06:24
statement that's within that attached 06:06:27
material. 06:06:28
Q. What else does NFPA do to verify the 06:06:31
submission from the individual? 06:06:35
MR. REHN: Same objection. 06:06:37
A. That's -- to the best of my recollection, 06:06:44
that's the direct way we do it to the person 06:06:48
who submitted it. 06:06:50

Q. Yes. 06:51:42
A. Top left-hand paragraph below the bold 06:51:52
discusses what we used to indicate changes 06:51:57
including shaded or bulleting, like a dot. 06:51:59
Q. It says, "Changes other than editorial are 06:52:07
highlighted with gray shading." Do you see 06:52:13
that? 06:52:15
A. Yes. 06:52:15
Q. What's an example of some editorial changes 06:52:16
that would have occurred between editions of 06:52:19
the NEC? 06:52:22
A. Sample could be a spelling error. 06:52:23
Q. Anything else? 06:52:34
A. The only thing I can think of is occasionally 06:52:36
documents, paragraphs roll into each other, 06:52:46
so spacing, things like that. 06:52:50
Q. The document contains lists of persons 06:52:52
starting at Page 17547 up through Page 17558, 06:53:07
correct? 06:53:18
MR. FEE: Could you repeat that. 06:53:25
What was the question? 06:53:30
Q. The document contains lists of persons 06:53:31
starting at Page 17547 up through Page 17558, 06:53:34
correct? 06:53:39
A. Just to make sure I understand your question, 06:53:41

you just indicated there is a list of 06:53:49
persons? 06:53:50
Q. Right. 06:53:51
A. Those pages appear to contain lists of 06:53:54
technical committee members as well as NFPA 06:53:57
staff, where appropriate. 06:54:00
Q. And I think you testified earlier but just 06:54:02
for the sake of clarification, committees 06:54:04
that are called technical committees for 06:54:09
other codes and standards are called 06:54:11
code-making panels when it comes to the 06:54:13
National Electrical Code; is that correct? 06:54:15
A. That is partially correct. There are two 06:54:18
ways we address the National Electrical Code. 06:54:21
There are code-making panels and their work 06:54:24
is overseen by a technical correlating 06:54:26
committee. 06:54:30
Q. What is the work of the technical correlating 06:54:31
committee? 06:54:35
A. The technical correlating committee is 06:54:37
responsible for correlation across the entire 06:54:42
document to ensure that the code-making 06:54:45
panels are aware of potential conflicting 06:54:49
requirements between their portions of the 06:54:52
document and also consistency. It's 06:54:53

correlation across the entire standard 06:54:56
itself. 06:54:59
Q. And these pages identify various code-making 06:55:05
panels and then they indicate which portions 06:55:12
of the National Electrical Code they were 06:55:16
responsible for; is that correct? 06:55:18
MR. REHN: Object to the form of the 06:55:25
question. 06:55:26
A. That is my understanding. 06:55:27
Q. And it indicates the -- and this list 06:55:29
indicates both the names and the affiliations 06:55:34
of those persons who participated in the work 06:55:41
that's reflected in this edition; is that 06:55:45
correct? 06:55:50
MR. REHN: Object to the form. 06:55:50
A. Our committee lists indicate the name of the 06:55:51
individual who holds the seat, whether 06:55:56
they're a principal or alternate, what 06:55:59
company they work for and, if any, 06:56:01
representation if they do have a 06:56:03
representation. 06:56:05
Q. So let's say in the case of Page 17551 -- 06:56:08
A. 551. 06:56:20
Q. There's a reference to John Ray of Duke 06:56:22
Energy Corporation and it says, "Rep, 06:56:28

Electric Light and Power Group." What does 06:56:29
that mean? 06:56:33
A. Before I answer the question, I'm just having 06:56:38
trouble finding John's name. Is he on the 06:56:41
one on Code-Making Panel 7? 06:56:43
Q. Panel 7, left column, four from the bottom. 06:56:46
A. So in that case it appears Mr. Ray, the 06:56:55
company he works for is Duke Engineering 06:57:00
Corporation. He represents a utility, and 06:57:02
his representation of the committee is 06:57:04
Electrical Light and Power Group, EEI. 06:57:06
Q. And the letters in brackets after the names, 06:57:13
employers and states indicate the -- what do 06:57:23
you call it? Not the interest group. The 06:57:29
interest section? 06:57:32
A. It's the interest category. 06:57:34
Q. The interest category. So the letters within 06:57:37
brackets at the end of the line on which the 06:57:39
names of the individuals are found is a code 06:57:43
for the interest category; is that correct? 06:57:45
A. That is correct. 06:57:47
Q. M is manufacturer; is that right? M stands 06:57:48
for manufacturer? 06:58:00
A. Yes, M is for manufacturer. 06:58:00
Q. E stands for enforcer; is that correct? 06:58:02

A. Correct. The Es could represent federal government, state and local government as well as state fire officials, local fire officials. 06:58:05 06:58:14 06:58:17 06:58:20

Q. I notice on the front page of this there's a section near the bottom right of the page that says "Order redline PDF." Do you see that? 06:58:21 06:58:42 06:58:45 06:58:48

A. Yes. 06:58:48

Q. That redline PDF is a different document. This is not the redline, correct? 06:58:49 06:58:52

A. Based upon my review here, it appears to be the, quote, unquote, normal version with the shading to track changes and not a full track changes redline version. 06:58:57 06:59:01 06:59:04 06:59:07

Q. And if one orders the redline PDF, does that show the text that was deleted which might not appear in this version? 06:59:08 06:59:11 06:59:14

A. That is my understanding, but I have not seen the redline version of this document. 06:59:17 06:59:21

Q. Let me ask you to turn to Page 17538. 06:59:23

A. 17538. 06:59:53

Q. Does the language on that page appear correct, to your knowledge? 06:59:57 07:00:02

MR. REHN: You're referring to the 07:00:11

whole language on the page? 07:00:13

MR. BRIDGES: Right. 07:00:15

MR. REHN: Objection as to form. 07:00:15

A. To the best of my knowledge, it appears like our opening issuing statement, our history and development of the National Electrical Code as well as our copyright statements, to the best of my knowledge. 07:00:21 07:00:23 07:00:27 07:00:29 07:00:34

Q. So it's correct, to the best of your knowledge? 07:00:34 07:00:37

A. It appears correct. 07:00:37

Q. What about the language on Page 17536? 07:00:40

A. 536. 07:00:45

MR. REHN: Object to the form and to the extent the question calls for the witness to render a legal opinion. 07:00:52 07:00:53 07:00:55

MR. BRIDGES: I'm just asking if it's correct to the best of his knowledge. 07:01:01 07:01:03

A. To the best of my knowledge, this appears correct and typical of our front matter within our standards. 07:01:08 07:01:11 07:01:14

Q. A couple broad questions: Has the standards development process changed in any material way since you arrived at NFPA? 07:01:20 07:01:23 07:01:25

MR. REHN: Object to the form. 07:01:33

Vague and ambiguous. 07:01:33

A. Yes. We had a major rewrite of our regulations in approximately 2007, 2008 time frame we started that process. 07:01:36 07:01:40 07:01:48

Q. Has there been any significant change since -- strike that. 07:01:50 07:01:53

You said that's when the process started. When did that process end? 07:01:54 07:01:56

A. The rewrite to our regulations ended, to the best of my knowledge, in approximately 2009, 2010. 07:01:57 07:02:06 07:02:09

Q. Have there been any other, in your mind, significant changes to the standards development process since 2010? 07:02:13 07:02:16 07:02:18

A. No. 07:02:22

Q. Do you, in preparing and overseeing the development of codes and standards, strive to make them suitable for governments to adopt for purposes of enforcement? 07:02:22 07:02:48 07:02:53 07:02:59

MR. REHN: Object to the form. It's vague. May call for a legal opinion. 07:03:05 07:03:07

A. Part of our committee officers guide is a guidance document that is to address usability, adoptability and enforceability. It's guidance to our committees to 07:03:15 07:03:19 07:03:22 07:03:27

ensure that they write clear and not vague requirements that are understandable and concise. 07:03:29 07:03:31 07:03:33

Q. You said usability, adoptability and enforceability; is that right? 07:03:34 07:03:38

A. Yes. 07:03:40

Q. Does adoptability include within that concept the ease of adoption by governments of codes as enforceable law? 07:03:41 07:03:50 07:04:01

MR. REHN: Object to the form. May call for a legal opinion. 07:04:03 07:04:07

A. I can't comment on the ease of the adoption. What I can comment on is my view of that is that our standards need to contain, for example, mandatory language if they're going to be a standard and enforceable and, I would assume, adoptable. 07:04:11 07:04:15 07:04:19 07:04:22 07:04:26 07:04:29

Q. That makes -- the mandatory language makes them suitable for a government to adopt the codes and standards as law? 07:04:31 07:04:34 07:04:35

MR. REHN: Object to the form. Assumes facts. May call for a legal opinion. 07:04:37 07:04:40

A. That's partly my understanding but also the mandatory language ensures that private entities, private organizations can also 07:04:45 07:04:50 07:04:52

utilize them in their facilities and applications. 07:04:54 07:04:57

VIDEOGRAPHER: We've reached the seven hours. 07:04:59 07:05:01

MR. BRIDGES: Thank you very much. 07:05:01

CROSS EXAMINATION 07:05:01

BY MR. REHN: 07:05:01

Q. Mr. Dubay, I have a couple of questions for you just to clear up some issues that arose earlier I think in response to my own perhaps confusing instruction. 07:05:05 07:05:07 07:05:10 07:05:14

Do you recall being asked whether you reviewed any documents in preparation for this deposition? 07:05:17 07:05:18 07:05:20

A. Yes. 07:05:21

Q. Do you recall that before you answered that question, I instructed you to answer to the extent you remembered any specific documents? 07:05:21 07:05:24 07:05:26 07:05:27

A. Yes. 07:05:29

Q. And do you recall that your answer to that question was "no" after I've given you that instruction? 07:05:29 07:05:31 07:05:35

A. Yes. 07:05:35

Q. So I'd like to just ask that question again. 07:05:35

In preparation for this deposition, did you review any documents, excluding identifying any specific documents, but did you review any documents in preparation for today? 07:05:38 07:05:40 07:05:43 07:05:45 07:05:45

A. The only documents I reviewed were the several that I reviewed with counsel. 07:05:47 07:05:49

Q. Thank you. 07:05:53

MR. REHN: No further questions. 07:05:53

MR. BRIDGES: I have a follow-up. 07:05:55

What were the documents -- 07:05:55

MR. FEE: Hold on. I have no questions. 07:05:55 07:05:59

REDIRECT EXAMINATION 07:05:59

BY MR. BRIDGES: 07:05:59

Q. What were the documents that you reviewed with counsel? 07:05:59 07:06:00

MR. REHN: I will instruct the witness not to answer that question on the ground of attorney-client privilege. 07:06:01 07:06:02 07:06:04

Q. And do you intend to follow your counsel's instruction? 07:06:17 07:06:24

A. Yes. 07:06:27

Q. Okay. 07:06:29

VIDEOGRAPHER: The time is 7:06. 07:06:31

This is the end of Tape No. 4 as well as the deposition, and we are now off the record. 07:06:35 07:06:37 07:06:39

(Whereupon the deposition was concluded at 7:06 p.m.) 07:06:39

I declare under penalty of perjury under the laws that the foregoing is true and correct.

Executed on _____ , 20___, at _____, _____.

_____

Christian Dubay

COMMONWEALTH OF MASSACHUSETTS)
SUFFOLK, SS.)

I, Jeanette Maracas, Registered Professional Reporter and Notary Public in and for the Commonwealth of Massachusetts, do hereby certify that there came before me on the 1st day of April, 2015, at 10:00 a.m., the person hereinbefore named, who was by me duly sworn to testify to the truth and nothing but the truth of his knowledge touching and concerning the matters in controversy in this cause; that he was thereupon examined upon his oath, and his examination reduced to typewriting under my direction; and that the deposition is a true record of the testimony given by the witness.

I further certify that I am neither attorney or counsel for, nor related to or employed by, any attorney or counsel employed by the parties hereto or financially interested in the action.

In witness whereof, I have hereunto set my hand this 8th day of April, 2015.

Notary Public
My commission expires 8/14/20

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EXHIBIT 7

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

AMERICAN SOCIETY FOR
TESTING AND MATERIALS,
d/b/a ASTM INTERNATIONAL;
NATIONAL FIRE PROTECTION
ASSOCIATION, INC.; and
AMERICAN SOCIETY OF
HEATING, REFRIGERATION AND
AIR CONDITIONING ENGINEERS,

Plaintiffs and
Counter-Defendants,

v. Civil Action No.
1:13-cv-01215-TSC

PUBLIC.RESOURCE.ORG, INC.,

Defendant and
Counter-Plaintiff. PAGES 1 - 264

_____/

Videotaped Deposition of: JAMES FRUCHTERMAN

DATE: Friday, July 31, 2015

TIME: 9:34 a.m.

LOCATION: Morgan, Lewis & Brockius, LLP
Two Palo Alto Square, Suite 700
Palo Alto, California

REPORTED BY: Kelli Combs
Certified Shorthand Reporter
License 7705.

CONFIDENTIAL - PURSUANT TO PROTECTIVE ORDER

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THE WITNESS: Yes.
BY MS. RUBEL:
Q Have there been issues with technology providers disabling access to eBooks for people with print disabilities?
MR. KAPLAN: Objection; vague, calls for speculation.
THE WITNESS: There have been issues with technology providers providing the ability to disable access and that capability being utilized. Yes.
BY MS. RUBEL:
Q What's your understanding of why the technology providers were making it possible to disable access to the eBooks for people with print disabilities?
A Public statements by different stakeholders have mentioned concerns over rights. Did they have the right to provide that, piracy, as it's labeled by some, making of unauthorized copies? Probably the top two issues that I've heard discussed.
Q Who do you mean by the "making of unauthorized copies"?
A I guess that's kind of a legal conclusion

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whether it's authorized or not, but the Authors Guild, for example, or authors would like to get control of the making of copies. That's, I think, my understanding of what copyright is; the ability to control who makes copies.
Q So was there some concern that providing access to eBooks for people with print disabilities was somehow letting go of control over who was going to be able to make copies of the material?
MR. KAPLAN: Objection; vague, lacks foundation and calls for speculation, argumentative.
THE WITNESS: I would say that the interests of people with disabilities was not the primary reason for disabling or making it hard to make copies of material. I think the interests of disabled people was a secondary issue or...
BY MS. RUBEL:
Q So what were the primary issues?
MR. KAPLAN: Objection; lacks foundation, calls for speculation, vague.
THE WITNESS: I think that authors and publishers want to make it difficult for a consumer to make copies to give away to other people.
BY MS. RUBEL:
Q Do you think that's a valid concern?

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MR. KAPLAN: Objection; vague.
THE WITNESS: In my opinion, I think it's not a -- I don't think it's in their interests.
BY MS. RUBEL:
Q You don't think what is in their interests?
A I think that the technical protection mechanisms make their product less attractive to consumers.
Q Well, let me take a step back.
A Uh-huh.
Q My question was: Do you think it's a valid concern for publishers to be worried that consumers may make copies to give away to other people? So I want to understand how your response is responsive to my question.
MR. KAPLAN: Is there a question, Counsel?
BY MS. RUBEL:
Q Do you think it's a valid concern for publishers that -- to want to prevent consumers from making copies to give away?
MR. KAPLAN: Objection; vague.
THE WITNESS: I think that the way that publishers try to prevent making of copies is not in their interest; so no, I don't think it's a valid

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concern because I think they -- their interests would be better served if they didn't use those technologies.
BY MS. RUBEL:
Q Why do you think the use of those technology -- technological mechanisms is not in their interests?
MR. KAPLAN: Objection; vague.
THE WITNESS: To pick one particular example, publishers who have taken off technical protection mechanisms on titles sold more copies of the books that didn't have those mechanisms on them than the ones that did. So the interpretation in the industry is from people who advocate TPM-free books is that it's in their interest because they will sell more books.
BY MS. RUBEL:
Q What publisher took off the technical protections and sold more copies of the books after making -- after taking that step?
MR. KAPLAN: Objection; argumentative.
THE WITNESS: I'm familiar that O'Reilley Media, Baen, B-A-E-N, Books, and I'm also familiar that this year all but one of Germany's major publishers have all gone technical protection

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BY MS. RUBEL:
Q I'll give you an opportunity to take a look at this and see if that refreshes your recollection of how many total standards you reviewed in the process of drafting your report.
A NFPA 101-2000, ASHRAE 90.1-2010, five other ASHRAE standards as outlined on page 12 of my expert report, ASTM standard B57-84e1 of that standard, as in Edward 1, ASTM A20, like Apple, 20A, like Apple, 20M, like Mary, -93a, like Apple. And I also --
MR. KAPLAN: I believe, for the court reporter, the ASTM standard is B557, not B57.
THE WITNESS: Correct. I misread the number. In addition, I accessed the 2012 version of the NPFA standards -- or NFPA standards. It's NFPA, right?
MR. REHN: NFPA.
THE WITNESS: Yeah. So there's an error where I flipped the letters there. Now I'm cross-referenced whether the ASHRAE standard is the same one that I looked at here. Let's see. Yeah, that looks like the same one. So I wasn't keeping a running count, but I think that's the complete list. So it's in -- three, plus five, plus one, plus

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another version of the same thing, so on the order of 10.
BY MS. RUBEL:
Q Do you know how many standards the Plaintiffs have alleged that Public Resource has infringed in this litigation?
A No.
Q If you'd turn to page 5 of your report, the beginning of the last paragraph on page 5, you indicated that:
"...approaches for 'free access' that make it impossible to copy text generally make it impossible for the assistive technology used by people with print disabilities, especially blind people, to read the text aloud."
Is that correct?
A Yes.
Q You included the word "generally" there. So I'd like to understand, are there ways to make it impossible to copy text that do not make it impossible for the assistive technology used by people with print disabilities to operate?

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MR. KAPLAN: Objection; vague.
THE WITNESS: Not in practice.
BY MS. RUBEL:
Q Can you explain what you mean by that?
A I could imagine a blind person trying to take a picture of the screen, uploading that picture into an OCR device and trying to see the text they can't see on the screen. That's really difficult to do, but it's imaginable.
Q So theoretically it could be possible for a copyright owner to protect the text against copying while also making it possible for someone with a print disability to review the material; is that what you were explaining?
MR. KAPLAN: Objection; misstates the testimony, incomplete hypothetical, vague, argumentative.
THE WITNESS: I believe that technology that makes it impossible to access text as text but instead presents a picture of the text is, for all intents and purposes, inaccessible to a blind person.
BY MS. RUBEL:
Q Is there another way, other than presenting the material as a picture, that a

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copyright owner could provide -- could protect their work against copying but at the same time still make it available to be accessed by people with print disabilities?
MR. KAPLAN: Objection; incomplete hypothetical, vague, argumentative and calls for a legal conclusion.
THE WITNESS: Yeah. I don't know of a technology solution that makes it impossible to access the text by nondisabled people that doesn't also make it impossible for disabled people to access the text. I don't think the technology is smart enough to distinguish between those two different groups.
BY MS. RUBEL:
Q And you indicated in that same sentence on page 5 that it's especially blind people who don't have access to the material because of restrictions on copying text.
Can you explain why is it especially blind people?
MR. KAPLAN: Objection; misstates the document, misleading, vague.
THE WITNESS: Elsewhere in my expert report, I indicate that making material accessible

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to certify the people and then represent that to us. And so if a physician looks at someone's disability and says, "I think they meet the standards of the Chafee Amendment," we take that.
BY MS. RUBEL:
Q You focus in your report on whether the standards that you considered were accessible specifically through use of a screen reader; is that right?
A Yes. That was the primary mechanism I used.
Q Why did you select that as the primary mechanism?
A Because I outlined in my report, I looked at the disability challenges of a blind person as the most difficult to solve, and a screen reader is the number one technology a blind person uses to access online content, content on their personal computer.
Q What other types of tools do they use?
MR. KAPLAN: Objection; vague.
THE WITNESS: Common tools used by blind people around accessibility include Braille displays, as I mentioned before, screen readers, screen enlargers for people with low vision, eBook

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readers, audio cassette tape players, apps that operate on tablets and smartphones. I think most other software applications that take inaccessible material or digital material and make it talk or larger or tactile. Those are pretty much the ways people do it.
BY MS. RUBEL:
Q And did you consider for the purpose of this -- of your report whether the Plaintiffs' standards were accessible by blind people using any of those other tools, other than the screen reader?
MR. KAPLAN: Objection; vague.
THE WITNESS: I believe that the problems that they would run into with a screen reader were similar to those that they would run into with other technologies, if they could get the material. I think that's an accurate answer.
BY MS. RUBEL:
Q So it's your belief that if they wouldn't be able to access it through a screen reader, they also wouldn't be able to access it through a Braille display?
MR. KAPLAN: Objection; misstates the testimony.
THE WITNESS: Yes. A screen reader can

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both talk what's on the screen as well as send it to a Braille display so you can feel the same characters. And so the Braille display requires, for online content, to have a screen reader or a book reading program, but kind of most roads lead through a screen reader unless you're handed the digital file in an accessible format or someone converts it for you.
BY MS. RUBEL:
Q What about a screen enlarger; did you consider whether any of the Plaintiffs' standards that you reviewed, whether a person would be able to use a screen enlarger on those standards?
A I did not consider the use of a screen enlarger.
Q We'll talk a little more about your -- the conclusions that you drew about screen readers, but is it correct to summarize your opinion that the versions of the Plaintiffs' standards on the free -- on the free access sections of their websites were not accessible by screen readers?
MR. KAPLAN: Objection; misstates testimony, vague.
THE WITNESS: Yes.

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BY MS. RUBEL:
Q Would it be possible for a blind person who wanted access to those standards to have someone read those standards aloud to them?
MR. KAPLAN: Objection; incomplete hypothetical.
THE WITNESS: Yes.
BY MS. RUBEL:
Q So there's some way that a blind person would be able to know the content of those standards, correct?
MR. KAPLAN: Objection; incomplete hypothetical, vague, argumentative.
THE WITNESS: Yes. As I mentioned earlier, if they had someone else help them, they could -- they could access the standards through a variety of mechanisms.
BY MS. RUBEL:
Q How else would having somebody else's assistance -- sorry. Strike that.
You mentioned that it would be possible if the person was handed a digital copy to access the content of the standards. In what other ways, if they had assistance, would a blind person be able to access copies of the Plaintiffs' standards?

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usage, only their accessibility.
Q Do you know of any person who has ever used any of the 10 standards that you reviewed?
MR. KAPLAN: Objection; vague.
THE WITNESS: I don't personally know of a person who has shared with me that they've used these standards.
BY MS. RUBEL:
Q What percentage of people in the United States are completely blind?
A Less than 1 percent.
Q What percentage of the population in the United States has print disability?
A We do not have a precise number, but our estimate is in the 2 to 3 percent range that would meet our qualifications.
Q And that's including the 1 percent that's blind?
A Yeah. All people with print disabilities are in that range.
Q Are you -- excuse me.
Are you aware of any individual who works in the field of fire protection who's blind?
MR. KAPLAN: Objection; vague.
THE WITNESS: No.

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BY MS. RUBEL:
Q Are you aware of anyone who works in the field of heating, air conditioning or refrigeration who's blind?
MR. KAPLAN: Objection; vague.
THE WITNESS: No.
BY MS. RUBEL:
Q Are you aware of any mechanical engineer who is blind?
MR. KAPLAN: Objection; vague.
THE WITNESS: I don't think so.
BY MS. RUBEL:
Q How about a civil engineer who's blind?
MR. KAPLAN: Objection; vague.
THE WITNESS: Nope.
BY MS. RUBEL:
Q Are you aware of any other type of engineer who's blind?
A Yes.
MR. KAPLAN: Objection; vague.
BY MS. RUBEL:
Q What type of engineer?
A Computer software engineers is one professional category that I'm aware of personally, knowing people who are blind who are in those

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professions.
Q Do any of the standards from Plaintiffs that you reviewed relate to computer software engineering?
A No.
Q Has anyone ever informed you that they wanted to be able to access a standard that was available on one of Plaintiffs' websites, but they were unable to do so because of a print disability?
A Nobody has personally asked me about the accessibility of a document on one of the Plaintiffs' sites.
Q Are you aware that anyone with a print disability has asked anyone else about the ability to access a standard from one of the Plaintiffs' websites?
A Yes.
MR. KAPLAN: You got to let me object.
THE WITNESS: Sorry.
MR. KAPLAN: It's okay.
BY MS. RUBEL:
Q How many people are you aware of who have indicated that they were unable to access a standard from one of the Plaintiffs' websites because of a print disability?

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MR. KAPLAN: Objection; misstates testimony, misleading, vague.
THE WITNESS: I don't know the number of people who have requested the standards. I simply know that some of the standards have been requested by print-disabled people.
BY MS. RUBEL:
Q What standards have been requested by print-disabled people?
A I don't know the precise numbers, but at least a couple from NFPA.
Q And how do you know that?
A They are in the Bookshare collection, and the metadata associated with them is correlated with a student request for that title.
Q What NF -- do you know --
MR. KAPLAN: Before we go any farther, just in case, I'm going to designate the transcript as provisionally confidential under the protective order.
THE WITNESS: Okay.
BY MS. RUBEL:
Q Do you know what NFPA standards are included in the Bookshare collection?
A Not the one that I examined in this expert

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priority based on our funding structure of which titles we will do. If it's for an educational purpose by an American student, we're funded by the Department Of Education to produce those.

If someone didn't have a school reason, we could put it on a -- what we call a wish list, and volunteers could produce the book or the person with disability could cause it to be created themselves and submit it to us to add to our library.

BY MS. RUBEL:

Q Other than those several NFPA standards on the Bookshare collection, are you aware of any other standards of the Plaintiffs that anyone with a print disability has indicated they were not able to access because of their print disability?

MR. KAPLAN: Objection; vague.

THE WITNESS: I have no knowledge of that.

BY MS. RUBEL:

Q The 10 specific standards that you reviewed, are you aware of any person with a print disability who attempted to access those standards on the Plaintiffs' websites and was unable to do so?

MR. KAPLAN: Objection; vague.

THE WITNESS: No. Sorry, I thought you were finished.

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MR. KAPLAN: Yeah. No. No.

BY MS. RUBEL:

Q Do you have any reason to believe that if an individual approached any of the Plaintiffs to request access of a standard due to their print disability, that the Plaintiffs would not have provided them access?

A I'm having a hard time parsing the question. Can you ask it just a little bit more simply.

Q Sure.

Do you have any reason to believe that the Plaintiffs would have said "no" if anybody said, "I want to access one of your standards, but I can't because I have a print disability"?

MR. KAPLAN: Objection; incomplete hypothetical, vague.

THE WITNESS: I'm not aware either way.

BY MS. RUBEL:

Q Did you ever investigate this?

A The scope of my expert report was to investigate the accessibility of the documents on the Plaintiffs' site and not to investigate other aspects of those questions.

Q So you didn't investigate whether somebody could have called the Plaintiffs, for example, and asked for an electronic copy of the standard that they would have been able to use to make it print -- accessible to someone with a print disability?

MR. KAPLAN: Objection; incomplete hypothetical, vague.

THE WITNESS: Outside the scope of my expert engagement.

BY MS. RUBEL:

Q My question is: Did you ever investigate it? So the answer may be "no" --

A Okay. No.

Q Okay.

I'm just going to ask another short series of questions, and then we can take another break.

A Okay. Sounds good.

Q On page 7 of your report --

A Yes.

Q -- it's the first full -- the first complete sentence on page 7, you indicated that it's your opinion that people with other print disabilities, such as vision impairment, dyslexia, brain injury and physical disabilities, would find the standards accessible with screen readers on Public Resource's website but that the standards on

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the free reading portions of the Plaintiffs' websites would not be accessible to the great majority of people with these types of disabilities; is that correct?

A Correct.

MR. KAPLAN: Objection; misstates the document.

BY MS. RUBEL:

Q What's the basis of your conclusion that the great majority of people with these types of print disabilities would not be able to access the standards from Plaintiffs' free websites?

A Because the great majority of people in that class rely on assistive technology to make things accessible, and the free reading portions basically interfere with almost all of those assistive technology.

I felt that some people with low vision might find it usable, and I base that on other digital content like eBook readers.

Q So some people with low vision would be able to accessible -- sorry -- would be able to access the standards from the free reading portions of the Plaintiffs' websites?

MR. KAPLAN: Objection; misstates

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A I think we focused on the website that didn't have an accessible sign-up process, and I'm happy to find out which one of the three standards bodies had that problem, just so I correctly testify to that.
Q Sure.
A So I'm looking at my expert report. So we focused our efforts on NFPA when we did our in-person evaluation.
Q Is Rob Turner blind?
A Yes.
Q What is his background?
MR. KAPLAN: Objection; vague.
THE WITNESS: He's a blind engineer for my nonprofit organization.
BY MS. RUBEL:
Q What -- what is his role --
Is he employed by Benetech?
A Yes, he's employed by Benetech as a -- as a Quality Assurance Engineer.
Q So what does he do in that role?
A He tests the quality of our products, including our websites, evaluates accessibility, but his focus is on our products.
Q Why did you seek Rob Turner's assistance?

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A He's one of our blind employees who happens to be in the office regularly as opposed to being located in other locations; so I could go down and talk to him.
Q So you asked --
You asked Rob to try to access standards from NFPA's website and see if he was able to do so?
MR. KAPLAN: Objection; vague.
Go ahead.
THE WITNESS: Correct. First, I asked him to look at the sign-up process to see if he could sign up for a free reading account without needing assistance from a sighted person, and he wasn't able to do that.
BY MS. RUBEL:
Q Was there anything else you asked him to do?
A After I pushed the "I Agree" button and got him through that, that roadblock, I also asked him to try to read the standard in question.
Q Did you ask Rob to try to access any of the Plaintiffs' standards that are posted on Public Resource's website?
A No, I did not.
Q What are the Web content accessibility guidelines?

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A They're the primary Web accessibility standard promulgated by the World Wide Web Consortium, which is the main standards body in Web technology.
Q Does Benetech participate in the World Wide Web Consortium's standards development process?
MR. KAPLAN: Objection; vague.
THE WITNESS: Benetech staff have participated in W3C standards efforts.
BY MS. RUBEL:
Q In what capacity?
A As a stakeholder with technical expertise in the area. So our focus is on accessibility aspects of W3C standards.
Q During what time period did Benetech participate in the standards development process for this organization?
A In one form or another, we have participated in the W3C standards process for roughly 20 years.
Q And does Benetech currently participate in the standards development process?
A I'm not aware of a current process that we're actively involved with today, but we might

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be -- we've been involved in the last couple of years on an issue that may still be open.
Q Did participants pay fees in order to participate in the standard development process with this Consortium?
A I believe that there are people who are members of the W3C and pay fees and people who do not.
Q How much do members pay?
A I am not aware of that number.
Q Do you have a ballpark?
A No. I wouldn't speculate.
Q Are you familiar with the license that the Consortium uses with respect to the standards that it develops?
MR. KAPLAN: Objection; argumentative, vague, calls for a legal conclusion.
THE WITNESS: Is the question about the W3C? I don't recall having read their license in many years, if I ever have.
BY MS. RUBEL:
Q Did you attach a copy of their license as an exhibit to your report?
A I specified the W3C standard that I used and counsel attached the actual standard.

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right?
A Yes.
Q Was this the entire screen that you saw or just a portion of the screen?
A A portion, but I'd say that, you know, you can see the scroll bar, that there are multiple scroll bars that I could access to scan down and see more of it or to go forward.
Q So you were able to scroll down to see what was the entire page 1 on the screen of the ASTM's Reading Room?
A As a sighted person, I believe that I could see all of page 1, yes.
Q And you could click through -- and the arrows, using the arrows to see page 2; is that correct?
A As a sighted person, yes, I believe I can.
Q And all the way through up to page 11; is that right?
A I believe that I doubt that I actually went page by page all the way to page 11.
Q Was there an option on the ASTM's Reading Room to make the text larger?
A I didn't look for that feature.
Q Did you believe that was relevant; that an

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option to make the text larger would be relevant to evaluating whether the standard is accessible to people with print disabilities?
MR. KAPLAN: Objection; argumentative, vague.
THE WITNESS: As we discussed before, low-vision people, a chunk of low-vision people, would be able to access a visually-presented standard, and they could be using their own screen magnifier, they could be using built-in browser controls to make the text larger, they can -- sometimes people in the websites implement an enlargement button to make the text larger, which is an alternate way of accomplishing the same thing.
And so on the base website, I just assumed those things would work because I don't feel like on a text-based website I need to test them; they work.
The image-based window, I am less certain about how easy it would be to make larger, because I did not actually test it directly with a screen magnifier.
BY MS. RUBEL:
Q And, in fact, you didn't see if ASTM actually provided any options within the Reading Room that would help somebody make the text larger;

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is that right?
MR. KAPLAN: Objection; asked and answered, argumentative, vague.
THE WITNESS: Though I don't recall ASTM particularly, a zoom function is quite common in an image viewer, so I probably just assumed it was there even though I didn't specifically look for it.
BY MS. RUBEL:
Q If you look at the screenshot on page 14 in the top right-hand corner of where the -- of the window in which the standard is shown, do you see the icon that's all the way to the right?
A The plus icon.
Q Yes. What -- what does that indicate to you?
A It's probably the zoom function that I just referred to.
Q And do you recall pushing that button and --
Do you recall pushing that button?
A Usually when these windows first come up, the standards are illegible, so yeah, usually I probably push the magnification button to make it readable. So it's quite typical in an image-based window to have a zoom function, especially because

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you have no idea how big a screen the person is viewing this on.
Q Do you know how much zoom capability the ASTM's website provides a user with, how much larger it can make the text?
MR. KAPLAN: Objection; vague.
THE WITNESS: No. But I think I pretty much already said earlier that I think that people who are low vision can generally see these standards, and so my testing really focused on screen reader users and blind people as opposed to getting in deeper to gradations of accessibility for visually impaired people who I felt -- figured many of which would already be able to access this standard.
BY MS. RUBEL:
Q Were you able to locate a text searching function on ASTM's -- on the version of ASTM's standard B557-84 in the Reading Room?
A I was not.
Q Do you know whether people without print disabilities are able to search for the -- search through the text of standards on ASTM's Reading Room?
A I assume because I wasn't able to locate a

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text searching function, that's because it isn't there unless it's well hidden. Also, the page looks like a picture of a standards page as opposed to a text version. So the fact that it was a picture of the page, generally that means that text searching tends to be unavailable unless they've done something extra.
Q In addition to ASTM standard B557, you also evaluated one other ASTM standard. What standard was that?
A ASTM A20/A20M, like Mary, -93a, like Apple.
Q Why did you evaluate that standard? Why did you choose that standard?
A Because it was the first one listed, and I just wanted to see, gee, the other standard's presenting the same image-based interface. Yes, looks like it, and I think I had tested five of them on another standards website, and so after you've tested them, you got to say, "Well, gee, looks like they're all presenting this image-based interface," but obviously I did not comprehensively go through every standard to confirm that they all presented the same inaccessible interface.
Q Do you know if ASTM standard A20 is at

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issue in this litigation?
A No, I do not.
Q Did you review Public Resource's website in connection with this expert report?
A Yes.
Q Is the general public able to access Public Resource's website?
A Yes. Sorry.
Q Is there any mechanism within Public Resource's website that allows only people with print impairments to view copies of any of the material on that website?
MR. KAPLAN: Objection; vague.
THE WITNESS: Not that I'm aware of.
BY MS. RUBEL:
Q So Public Resource has not published the standard -- the Plaintiffs' standards in a manner that is exclusively available to people with print disabilities, correct?
MR. KAPLAN: Objection; misstates testimony, calls for speculation.
THE WITNESS: The standards that are on the Public Resource website seem to work for people with disabilities, and as a member of the general public, I was able to look at the same standards. I

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didn't have to sign up for anything.
BY MS. RUBEL:
Q So Public Resource is not providing access to Plaintiffs' standards exclusively to people with print disabilities, correct?
MR. KAPLAN: Objection; vague, calls for a legal conclusion.
THE WITNESS: Yes.
BY MS. RUBEL:
Q Does the material that Public Resource posted on its website bear any notice that further reproduction of the material could be an infringement?
MR. KAPLAN: Objection; vague, lacks foundation.
THE WITNESS: No. At least it's been long enough that -- let me reread the question.
MR. KAPLAN: Can you restate the question.
(Record read as follows:
"Q Does the material that Public Resource posted on its website bear any notice that further reproduction of the material could be an infringement?")

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MR. KAPLAN: And I'll make the same objections.
THE WITNESS: Yeah. No, not to my knowledge, based on the parts that I examined.
BY MS. RUBEL:
Q In what formats does Public Resource's website provide Plaintiffs' standards in?
MR. KAPLAN: Objection; lacks foundation.
THE WITNESS: I believe multiple standards. The two formats that I particularly examined were HTML and PDF.
BY MS. RUBEL:
Q Do you know how many of Plaintiffs' standards Public Resource has posted in HTML format?
A No.
Q Do you have a ballpark estimate?
A No.
Q Do you know how many standards that are at issue in this case Public Resource has posted in HTML format?
A No.
Q How can a screen reader --
How does a screen reader read the text of content that is in HTML format?
MR. KAPLAN: Objection; incomplete

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documents, which is a different Adobe product that -- yes.
Q Are you aware that NFPA sells PDF versions of its standards on its website?
A Let's see if it has a Buy Now button on my screenshot. I see a cart on there, so I assume that you guys sell things. I -- I probably didn't check to see whether you sell PDF versions of the standard.
Q Did anybody ask you to check whether any of the Plaintiffs in this case sold PDF standards?
MR. KAPLAN: Objection; calls for privileged communications.
You can answer to the extent that you don't divulge privileged communications.
THE WITNESS: No.
BY MR. REHN:
Q When you were asked to render an opinion about the accessibility of Plaintiffs' standards, did it occur to you to check whether those standards were available in a PDF version or any other electronic version?
MR. KAPLAN: Objection; misleading, misstates testimony, vague, argumentative.
THE WITNESS: Privileged conversation.

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BY MR. REHN:
Q I'm asking what occurred to you, outside of conversations you had with attorneys about this project.
Did it ever occur to you that that was something that might be necessary to check?
MR. KAPLAN: Objection; vague.
THE WITNESS: Go ahead. I -- I -- I think I stated my opinion. I was asked to evaluate the accessibility --
MR. KAPLAN: Let's not get into privileged communications.
THE WITNESS: Okay. All right.
BY MR. REHN:
Q If you would turn to page 1 of your expert report --
A Yes.
Q -- it says:
"I have been retained by Public.Resource.Org to evaluate the accessibility of certain online content available on the websites of the Plaintiffs and the Defendant in this case."
Is that correct?

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A Yes.
Q When you were retained to evaluate the accessibility of content available on the websites of the Plaintiffs, did you consider whether you should check to see if there were PDF versions available from the Plaintiffs?
MR. KAPLAN: You can go ahead and answer.
THE WITNESS: No.
BY MR. REHN:
Q You just didn't think --
That didn't occur to you that that might be a possibility?
MR. KAPLAN: Objection; asked and answered, argumentative.
THE WITNESS: I'll just go back to my expert report and that sentence. I was asked to evaluate the accessibility of certain online content.
BY MR. REHN:
Q Now, if I can ask you to turn to page 5 of your report, where you say -- it says "Overview and Summary of Opinions."
A Uh-huh.
Q If you could just read the first sentence there, the first full sentence under that heading.

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A (Reading):
"Having reviewed the accessibility of the same standards content rendered by Public.Resource.Org and those of the free access options provided by the NFPA, ASHRAE and ASTM, it is my opinion that Public.Resource.Org currently provides the only accessible option for people/citizens with print disabilities to access these standards."
Q And in forming that opinion, you compared the standards that were available on Public.Resource.Org's website with the free access options provided by Plaintiffs in forming that opinion; is that correct?
A Correct.
Q Did you evaluate any PDFs being sold by NFPA in forming that opinion?
A No.
Q Did you evaluate any PDFs being sold by ASHRAE in forming that opinion?
A No.

BY MR. REHN:
Q Did you make any image-based PDFs of documents from any of Plaintiffs' websites?
A I didn't make any documents from Plaintiffs' websites. I downloaded whatever document -- no, I downloaded -- I viewed the document, yes. So, no.
Q After you sent him a document, it would have been one from Public Resource's website?
A That's correct. Thank you.
Q And if I could direct you to the last sentence of the first paragraph of his e-mail, would you read that sentence, please?
A The one "I don't think..."?
Q Yes.
A Yes.
"I don't think this type of document can be considered to be accessible."
Q So based on your prior testimony, is it your understanding that he is saying that the image-based PDF from Public Resource's website that you sent to Mr. Turner, in his opinion, cannot be considered to be accessible?
MR. KAPLAN: Objection; misleading,

argumentative, vague.
THE WITNESS: I think Rob Turner doesn't believe it meets our accessibility standards, which is what his job is to primarily work on our library for the blind. We would not post an image-based PDF and call it accessible.
BY MR. REHN:
Q And do you agree with Mr. Turner's assessment that this type of document cannot be considered to be accessible?
A I think it's less accessible than many of the other documents and more than others, as I wrote in my expert report. I can probably quote from the report.
Q There's no question pending. So...
A Okay. I would direct you to my last sentence of my report --
MR. KAPLAN: Jim, there's no question pending.
THE WITNESS: All right.
MR. REHN: I have no further questions. And I believe that concludes Plaintiffs' questioning of this witness.
MR. KAPLAN: I have no questions at this time.

THE VIDEOGRAPHER: This concludes today's deposition. We're going off the record at 7:09.
(Time noted: 7:09 p.m.)
(Signature waived.)

CERTIFICATION OF DEPOSITION OFFICER

I, the undersigned, a Certified Shorthand Reporter of the State of California, do hereby certify:

That the foregoing proceedings were taken before me at the time and place herein set forth; that any witnesses in the foregoing proceedings, prior to testifying, were administered an oath; that a record of the proceedings was made by me using machine shorthand which was thereafter transcribed under my direction; that the foregoing transcript is a true record of the testimony given.

Further, that the foregoing pertains to the original transcript of a deposition in a Federal Case, before completion of the proceedings, a review of the transcript [ ] was [X] was not requested.

I further certify I am neither financially interested in the action nor a relative or employee of any attorney or any party to this action.

_____
KELLI COMBS
CSR No. 7705

EXHIBIT 8

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

AMERICAN SOCIETY FOR TESTING AND MATERIALS d/b/a ASTM INTERNATIONAL; NATIONAL FIRE PROTECTION ASSOCIATION, INC.; and AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR-CONDITIONING ENGINEERS, INC., Plaintiffs, vs. PUBLIC.RESOURCE.ORG, INC., Defendant. AND RELATED COUNTERCLAIMS.	Case No. 1:13-cv-01215-EGS

RULE 30(B)(6) VIDEOTAPED DEPOSITION OF AMERICAN STANDARDS SOCIETY FOR TESTING AND MATERIALS, BY AND THROUGH ITS DESIGNEE,
JEFFREY GROVE
WASHINGTON, D.C.
WEDNESDAY, MARCH 4, 2015

Reported by:
NANCY J. MARTIN, CSR No. 9504, RMR
Job No. 2010158
PAGES 1 - 284

Nancy Martin, please swear in the witness, and we can begin. 09:22:25 09:22:27

JEFFREY GROVE, 09:22:36
having been first duly sworn, 09:22:40
and testified as follows: 09:22:40
09:22:40

EXAMINATION 09:22:40

BY MR. BRIDGES: 09:22:40

Q. Good morning, Mr. Grove. 09:22:40

A. Good morning. 09:22:41

Q. Have you ever been deposed before? 09:22:45

A. I have not. 09:22:46

Q. Have you had a chance to meet with ASTM attorneys to prepare you for this deposition? 09:22:49 09:22:51

A. I did. 09:22:57

Q. When did you meet with them? 09:22:57

A. I met with our attorneys over a period of three days. The last two days, and once in December. A total of 15 hours. 09:22:58 09:23:01 09:23:06

Q. With whom did you meet? 09:23:12

A. I met with Kevin Fee and with Jordana Rubel, and with our corporate attorney, Tom O'Brien. 09:23:13 09:23:19

Q. You understand that you are testifying today as a representative of ASTM? 09:23:32 09:23:34

A. Yes. 09:23:38

Q. And you understand that you are testifying as a representative of ASTM with respect to certain subject matters? 09:23:40 09:23:46 09:23:48

A. Yes. 09:23:49

Q. What did you do to educate yourself about those subjects? 09:23:49 09:23:52

A. In addition to the meetings, I reviewed a lot of documents. 09:23:53 09:23:56

Q. And when did you review the documents? 09:24:01

A. Over the last few days and in my own personal time before then. 09:24:03 09:24:07

Q. How much time did you spend reviewing documents outside of meetings with attorneys? 09:24:11 09:24:13

A. Probably 8 to 10 hours. 09:24:16

Q. Did you select those documents, or did the lawyers select the documents? 09:24:23 09:24:25

A. Personal knowledge, I selected them. 09:24:26

Q. What determined which documents you selected to review? 09:24:38 09:24:41

MR. FEE: Objection. To the extent that legal counsel or their guidance provided any basis for your determination, I'm going to instruct you not to disclose that. If you have some independent review criteria that you can share with the other side, that's fine. 09:24:42 09:24:43 09:24:48 09:24:50 09:24:53 09:24:55

THE WITNESS: I don't have any criteria. Just I thought it would be a good idea to review annual reports and that type of publicly available information about ASTM. 09:24:56 09:24:58 09:25:02 09:25:04

BY MR. BRIDGES: 09:25:08

Q. What else did you review among the documents? 09:25:08

MR. FEE: Objection. Are you asking about the ones he selected on his own or the ones -- 09:25:11 09:25:12

MR. BRIDGES: No -- 09:25:14

MR. FEE: Well, I'm going to instruct you not to disclose the documents that you reviewed at the request or direction of counsel. You can disclose any other documents you reviewed. 09:25:14 09:25:16 09:25:18 09:25:21

MR. BRIDGES: I think I'm entitled to know what documents he reviewed to prepare for the deposition. It might reveal attorney work product if he told us what documents were discussed with counsel, but I'm entitled to know which documents he reviewed in general. 09:25:22 09:25:23 09:25:27 09:25:31 09:25:36 09:25:39

MR. FEE: I disagree. 09:25:41

You should follow my instruction. 09:25:43

THE WITNESS: I have no other documents that I can recall to disclose. 09:25:44 09:25:46

BY MR. BRIDGES: 09:25:47

Q. So you're saying that all the documents -- of all the documents you reviewed, only annual reports are those that you thought to review on your own? 09:25:47 09:25:52 09:25:55

A. Right. I think the exception to that would be standardization news. I contributed some articles that I thought I should refresh my memory with. 09:25:56 09:26:01 09:26:03

Q. What did those articles concern? 09:26:08

A. Discussed generally ASTM's mission and work we do to promote ASTM's mission and its important role in protecting everyday citizens due to the development of standards that protect the environment, health, and safety. 09:26:13 09:26:20 09:26:24 09:26:26 09:26:31

MR. BRIDGES: One thing occurred to me. We may need a short break. I forgot, you know, I was supposed to have real time. Can we get real time? 09:26:35 09:26:37 09:26:39

REPORTER MARTIN: Yes, sir. I'm working on it right now. 09:26:43 09:26:43

MR. BRIDGES: Thanks. 09:26:43

MR. BECKER: We also have an email from Thane stating he'd like to listen in. So perhaps we should take a break and set up real-time. 09:26:48 09:26:49 09:26:51

MR. BRIDGES: I think we've got a separate bridge. I think Carl dialed in directly. So we're going to have to drop him and set up a bridge. 09:26:55 09:26:57 09:26:59

Sorry about this, but let's go off the record for a few minutes. 09:27:01 09:27:03

THE VIDEOGRAPHER: We're now going off the record at 9:26. 09:27:05
(A recess was taken from 9:26 a.m. to 9:37 a.m.) 09:34:30
THE VIDEOGRAPHER: And we're back on the record at 9:37. 09:38:33
BY MR. BRIDGES: 09:38:48
Q. Do you recall any other documents that you reviewed on your own initiative apart from annual reports and standardization news? 09:38:48
A. I do not. 09:38:59
Q. Apart from conversations specifically with attorneys, did you discuss the topics of today's conversation -- of today's deposition with anyone else in preparation for your deposition today? 09:39:01
A. I made a phone call to our vice president of sales and publications. 09:39:18
Q. Who is that? 09:39:24
A. John Pace. 09:39:28
Q. What did you discuss with him? 09:39:31
A. Wanted to review ASTM's financials and revenues so I was prepared. 09:39:31
Q. What did you learn from him? 09:39:38
A. Not much. To be honest, I think I have a good understanding. 09:39:42 09:39:46 09:39:47 09:39:52

Q. What did you ask him about? 09:39:55
A. I wanted to review with him what I knew about sources of ASTM's revenue from the sale publications. 09:39:59 09:40:07
Q. What else did you ask him about? 09:40:12
A. That's all I recall. 09:40:15
Q. Did you review -- did you discuss with him any changes in revenue to ASTM from publications? 09:40:20 09:40:25
MR. FEE: Objection. Form. 09:40:30
THE WITNESS: Not that I recall. 09:40:34
BY MR. BRIDGES: 09:40:37
Q. And did you discuss with him any trends with respect to revenue that ASTM gains from publications? 09:40:37 09:40:42
MR. FEE: Objection to form. 09:40:45
Go ahead. 09:40:47
THE WITNESS: I did ask -- I wanted to learn over the last couple of years, roughly, what increase in sales we've been experiencing. 09:40:48 09:40:53 09:40:56
BY MR. BRIDGES: 09:41:01
Q. What else? 09:41:01
A. That's all I recall. 09:41:02
Q. What did you learn about the increase in sales that ASTM has been experiencing? 09:41:05 09:41:07
A. That there has been a very slight 2 to 3 to 5 percent increase over the last two to three years. Revenue from sales of publications. 09:41:10 09:41:15 09:41:18

Q. Did you attach any significance to that figure? 09:41:21 09:41:23
MR. FEE: Objection. Vague. 09:41:25
THE WITNESS: No. 09:41:28
BY MR. BRIDGES: 09:41:30
Q. Did it strike you as unusual or unexpected in any -- 09:41:30 09:41:33
MR. FEE: Objection. Vague and compound. 09:41:34
THE WITNESS: It did not. 09:41:40
BY MR. BRIDGES: 09:41:43
Q. Did those figures he gave you accord with your expectations? 09:41:43 09:41:45
A. Generally, yes. 09:41:51
Q. Did that revenue trend -- strike that. 09:41:56
Was that revenue trend consistent with revenue trends over previous years? 09:42:03 09:42:05
MR. FEE: Objection. Vague. 09:42:09
THE WITNESS: I don't know. 09:42:14
BY MR. BRIDGES: 09:42:15
Q. Do you know anything about revenue trends before three years ago? 09:42:15 09:42:17
MR. FEE: Same objection. 09:42:19
THE WITNESS: Not that I can produce or recall. 09:42:26 09:42:27
BY MR. BRIDGES: 09:42:32

Q. What else did you discuss with Mr. Pace? 09:42:32
A. That's all I recall. 09:42:39
Q. Did you have conversations with anyone else to prepare for your testimony today? 09:42:40 09:42:43
MR. FEE: I assume you're excluding conversations with counsel for purposes -- 09:42:49 09:42:50
MR. BRIDGES: Yes. 09:42:52
MR. FEE: -- of that question? 09:42:52
MR. BRIDGES: Yes. 09:42:54
THE WITNESS: Not that I recall. 09:42:55
BY MR. BRIDGES: 09:43:04
Q. How long have you worked for ASTM? 09:43:04
A. Just over 10 years. 09:43:07
Q. What have your job titles been? 09:43:11
A. My original job title was Washington representative. My second title was director of government and industry affairs, and my current title is vice president of global policy and industry affairs. 09:43:13 09:43:15 09:43:21 09:43:25 09:43:29
Q. In that job title, what does the word "industry" refer to? 09:43:39 09:43:41
MR. FEE: Objection. Vague. 09:43:43
THE WITNESS: Well, the majority of ASTM members under our system of private sector led public/private collaboration come from industry. So I 09:43:48 09:43:51 09:43:56

something that I would speak about. 12:06:06
BY MR. BRIDGES: 12:06:08
Q. So what factors should government agencies 12:06:08
take into consideration when examining industry 12:06:08
standards for regulatory purposes? 12:06:10
A. Well, one of the most important factors that 12:06:13
we believe is important to maintain the robust, viable 12:06:15
system of standardization that we have in the U.S. is 12:06:24
looking to see if standards development organizations 12:06:26
meet the world trade organizations, technical barriers 12:06:28
to trade agreement principles for international 12:06:31
standardization. It's a message that we believe 12:06:34
strongly in at ASTM, we've invested heavily in, and we 12:06:37
promote it as widely as possible. 12:06:41
Q. What regulatory purposes do you anticipate 12:06:49
government agencies have that causes them to examine 12:06:54
industry standards? 12:07:01
MR. FEE: Read that back, please. 12:07:03
(Record read.) 12:07:13
MR. FEE: Objection. Calls for speculation. 12:07:14
It's beyond the scope of his designation. 12:07:15
THE WITNESS: I don't have an answer for 12:07:23
that. I think you could assume that government 12:07:24
participants in the standardization process bring 12:07:30
knowledge of regulatory agendas and regulatory needs 12:07:32

of agencies to the voluntary consensus standards 12:07:37
community of which ASTM is one member amongst 225 12:07:40
others. 12:07:45
BY MR. BRIDGES: 12:07:50
Q. This agenda item referred to government 12:07:50
agencies examining industry standards for regulatory 12:07:52
purposes. 12:07:56
MR. FEE: Objection. Vague. What agenda -- 12:07:57
I'm unclear as to what agenda you're referring. 12:08:00
There's no agenda in front of him. 12:08:04
MR. BRIDGES: That's all right. It's so 12:08:07
short, I can read it to him. 12:08:08
Q. So my question is what regulatory purposes do 12:08:10
you understand government agencies to have when they 12:08:16
examine industry standards? 12:08:20
MR. FEE: Objection. He's not been 12:08:22
designated as to speculation as to government 12:08:24
regulatory motivations, but to the extent you have an 12:08:26
understanding individually, you can try to answer 12:08:31
that. 12:08:34
THE WITNESS: Sure. And I'm not an attorney, 12:08:35
but my understanding is the National Technology 12:08:36
Transfer and Advancement Act of 1995 combined with the 12:08:38
OMB circular A119 lays out criteria or further 12:08:41
guidance for federal agencies for them to consider 12:08:50

when they're looking at participating in standards 12:08:53
development activities and utilizing voluntary 12:08:57
consensus standards in support of their agency's 12:09:01
mission. 12:09:03
BY MR. BRIDGES: 12:09:11
Q. So my question is what are the regulatory 12:09:11
purposes that in your interactions with government on 12:09:16
behalf of ASTM, you believe government agencies have 12:09:20
when they examine industry standards? So I'm asking 12:09:25
what do you think the regulatory purposes are. 12:09:29
MR. FEE: Same objections, plus compound. 12:09:31
THE WITNESS: Yeah. And I don't believe 12:09:33
there's any one answer to that. Each agency that 12:09:34
we're aware of that we interact with or that 12:09:38
participate in our committees have different needs and 12:09:40
different expectations and different motivations for 12:09:42
participating in our process. 12:09:46
BY MR. BRIDGES: 12:09:48
Q. So beyond that, you can't give your testimony 12:09:48
as to what you think the government regulatory 12:09:51
purposes are on a general basis? 12:09:54
MR. FEE: Same objections. 12:09:57
BY MR. BRIDGES: 12:10:00
Q. In using or in examining ASTM's standards. 12:10:00
MR. FEE: Same objections. 12:10:05

THE WITNESS: Yeah. I think we discussed 12:10:09
earlier federal agencies do incorporate, by reference, 12:10:11
standards from voluntary consensus standards bodies 12:10:16
like ASTM. So that could be one potential -- one 12:10:19
potential factor. 12:10:24
BY MR. BRIDGES: 12:10:28
Q. Do you understand what regulatory purposes 12:10:28
federal agencies may have in incorporating ASTM 12:10:33
standards by reference into CFR? 12:10:36
MR. FEE: Objection. Calls for speculation. 12:10:41
It's also beyond the scope of his designation. 12:10:42
You can answer if you know. 12:10:44
THE WITNESS: Generally, I believe the EPA 12:10:46
would look to -- has a mission of helping to keep the 12:10:48
air we breathe, the water we drink and the ground that 12:10:53
we habitate on as safe and as clean and sustainable as 12:10:56
possible. So they might look to organizations like 12:11:02
ASTM and many others to see what work we're doing in 12:11:05
many of these areas and ensure that their employees 12:11:08
are participating in our standards development process 12:11:10
to reflect the agency's mission. 12:11:12
BY MR. BRIDGES: 12:11:17
Q. How would the government employees affect -- 12:11:17
strike that. 12:11:22
What effect does the presence of government 12:11:26

employees have in the standards development process at 12:11:30
ASTM? 12:11:36
MR. FEE: Objection. Vague. 12:11:37
THE WITNESS: In my experience, federal 12:11:43
government participation in standards development 12:11:45
helps to make a more effective public/private 12:11:47
collaboration in our process. 12:11:50
BY MR. BRIDGES: 12:11:51
Q. How does it help in the drafting of 12:11:52
standards? 12:11:53
MR. FEE: Objection. Lack of foundation. 12:11:54
THE WITNESS: In the area of drafting 12:11:58
standards, I wouldn't have specific knowledge. 12:11:59
BY MR. BRIDGES: 12:12:03
Q. Who would? 12:12:03
MR. FEE: Objection. Calls for speculation. 12:12:04
THE WITNESS: Right. We have 140 different 12:12:07
technical committees and over 1,000 individual 12:12:09
subcommittees. So each agency's participation and 12:12:12
what role they play in the drafting of standards, I 12:12:15
believe was your term, that would vary significantly. 12:12:20
BY MR. BRIDGES: 12:12:23
Q. Who are two or three people at ASTM you think 12:12:23
would be in a best position to answer the question of 12:12:25
what effect the presence of government employees has 12:12:32

in the creation of standards? 12:12:38
MR. FEE: Objection. Calls for speculation. 12:12:43
Vague. 12:12:44
THE WITNESS: Well, other than me, I would 12:12:49
say I'm one. Beyond that, you know, ASTM, it's a 12:12:50
decentralized process. So it would really vary again 12:13:01
by the individual committees and the actions by the 12:13:05
committee officers. So if I had to give you another 12:13:08
name, I would say probably Katherine Morgan, who 12:13:14
formerly led our Technical Committee Operations. 12:13:17
BY MR. BRIDGES: 12:13:23
Q. What is her current post? 12:13:23
A. She's the executive vice president. 12:13:25
Q. What are her duties? 12:13:27
MR. FEE: Objection. Calls for speculation. 12:13:28
Beyond the scope of his designation. 12:13:31
THE WITNESS: Actually, I'm not certain what 12:13:35
her new duties are. She just assumed them in 12:13:36
February. But I would assume she's serving as our -- 12:13:39
she'll be serving as our president within the next two 12:13:48
to three years. So she's broad supervisory 12:13:51
responsibility. 12:13:54
(Deposition Exhibit 1038 was marked for 12:14:54
identification.) 12:14:54
BY MR. BRIDGES: 12:14:55

Q. Have you seen Exhibit 1038 before? 12:14:55
(The witness reviewed Exhibit 1038.) 12:15:20
THE WITNESS: Yes, I have. 12:15:20
BY MR. BRIDGES: 12:15:21
Q. Is this an organizational chart as of 12:15:22
July 21, 2014? 12:15:23
A. I believe it is, yes. 12:15:25
Q. Have you seen a more recent organizational 12:15:27
chart of ASTM? 12:15:29
A. I have not, but I believe that this is just 12:15:31
slightly out of date. 12:15:35
Q. What changes are necessary to make it 12:15:36
current? 12:15:40
A. Under the direct line from Jim Thomas, that 12:15:46
would be a new box that would say, "Kathie Morgan, 12:15:51
Executive Vice President," and then a number of 12:15:57
departments would be reporting up through Kathie. 12:16:01
This is as of just a few weeks ago. 12:16:04
Q. I see that she is almost directly under 12:16:10
Mr. Thomas in what looks like a direct report as vice 12:16:11
president of Technical Committee Operations. Would 12:16:16
that be simply changing the title in that box? 12:16:18
A. It would be expanding her responsibilities. 12:16:23
For instance, now I report to Kathie Morgan, as does 12:16:25
Phil Lively, as does Teresa Cendrowska, as does Tim 12:16:30

Brooke, and a new box would need to be created -- or 12:16:38
in the old box that said Kathie Morgan, I would put 12:16:48
Daniel G. Smith. 12:16:51
Q. That's on Page 5 of 11 of the document? 12:16:53
A. Page 6 of 11. So Kathie has been promoted, 12:16:56
and Dan has taken Kathie's old job, if that helps. 12:17:12
Q. All right. In the standards development but 12:17:16
not Technical Committee Operations? Page 5 of 11 is 12:17:17
Technical Committee Operations. Page 6 of 11 is 12:17:24
standards development? 12:17:29
A. Yeah. I actually wouldn't be able to explain 12:17:30
the difference between Technical Committee Operations 12:17:32
and standards development, and in fact -- I would be 12:17:34
able to tell you why we have it displayed that way. 12:17:48
We think of them together. 12:17:48
Q. Where is Ms. Morgan's office? 12:17:57
A. Kathie is based at our corporate headquarters 12:17:59
in Conshohocken, Pennsylvania. 12:18:02
Q. What offices does ASTM have apart from the 12:18:11
Pennsylvania office you just referred to and 12:18:14
Washington, D.C.? 12:18:18
A. Well, we have an office in Ottawa, Canada, 12:18:24
but I believe the person that works for us there is a 12:18:26
contractor. 12:18:32
Q. Any other offices? 12:18:33

BY MR. BRIDGES: 12:48:17
Q. How many ASTM standards do you understand are 12:48:17
listed at that location? 12:48:21
MR. FEE: Objection. Vague as to time. 12:48:23
THE WITNESS: So there's -- if I'm answering 12:48:34
your question exactly as you phrased it to me, how 12:48:35
many standards, I believe there's 885 or so ASTM 12:48:38
standards that are incorporated in the NIST database. 12:48:41
BY MR. BRIDGES: 12:48:50
Q. How many of those standards are currently 12:48:50
available at ASTM's reading room? 12:48:52
A. Well, if it's in the NIST database, we built 12:48:55
the ASTM reading room using the NIST database as a 12:49:02
baseline, and we added in other versions of those same 12:49:06
885 ASTM standards that have been also incorporated by 12:49:10
reference, just an agency, for instance, might 12:49:17
reference the same ASTM standard but reference two 12:49:21
different versions of the standard. 12:49:25
So we counted them in the reading room as 12:49:27
well, and I believe our reading room has a volume of 12:49:30
13- to 1,400 ASTM standards that are available to the 12:49:32
public at no cost on our website for their review. 12:49:36
Q. Are every one of the 885 standards from the 12:49:41
NIST database available in the reading room? 12:49:45
A. I wouldn't be able to answer that 12:49:51

specifically. Using the NIST database as a guideline, 12:49:53
we've incorporated, you know, as much of that as 12:50:02
possible in the reading room. At times I believe we 12:50:04
also tried to add a little bit more intelligence to it 12:50:06
to determine if an agency was undertaking a subsequent 12:50:09
rule-making, and we became aware that the agency had 12:50:18
published a new final rule which either changed the 12:50:24
reference to an ASTM standard that we had placed in 12:50:27
the reading room or added a new ASTM standard to the 12:50:31
reading room. 12:50:38
Then we took steps to add that to the reading 12:50:39
room. It's not an exact science. We don't pay a 12:50:42
vendor to perform the service for us. We rely either 12:50:48
exclusively on the NIST database or we -- it's based 12:50:55
on intelligence that we've gathered about new 12:50:58
rulemakings. 12:51:01
Q. How do you gather intelligence about 12:51:03
incorporations of ASTM standards by reference? 12:51:08
A. Well, as much as possible we read the federal 12:51:14
register. I'd like to think we read it on a regular 12:51:17
basis, but sometimes it's more infrequent than that. 12:51:20
So we will search key terms in the federal register to 12:51:24
see if it's mentioning ASTM and if there's a rule that 12:51:30
has resulted in the publication of standards. And 12:51:34
sometimes we're ahead of it because ASTM has a policy 12:51:38

of working with agencies during the notice of proposed 12:51:41
rule-making process. 12:51:45
Any agency that comes to us and asks us to 12:51:46
put a standard up for public review during the public 12:51:50
review period of a rule, we work with them to make 12:51:53
that possible. So at times we know that a certain 12:51:57
number of ASTM standards have been in a notice to 12:52:01
proposed rulemaking and that the new rule's expected 12:52:04
to come out, so we can look for it. 12:52:08
Q. Does ASTM provide assistance to the 12:52:16
government in any way when the government is 12:52:18
considering whether to incorporate an ASTM standard by 12:52:20
reference? 12:52:23
MR. FEE: Objection. Vague. 12:52:24
THE WITNESS: So we do -- I'm familiar with a 12:52:29
couple things that either I do or a member of my staff 12:52:31
does. We look to see -- when we're aware that an ASTM 12:52:34
standard is going to be used and incorporated by 12:52:39
reference in some type of an action, we look to see 12:52:43
what version of the standard and what designation of 12:52:46
the standard is being used, and I believe on occasion 12:52:50
if they're using -- proposing to use an outdated 12:52:54
version of a standard, or, quite frankly, we've seen 12:52:59
errors where they've attempted to use an ASTM biofuel 12:53:02
standard, and rather than referencing D6751 they've 12:53:06

referenced D56571, gotten the numbers wrong, we will 12:53:09
engage with an agency and either make them aware 12:53:14
there's a more recent version or make them aware that 12:53:16
what they are trying to reference doesn't make a lot 12:53:20
of sense. 12:53:22
BY MR. BRIDGES: 12:53:23
Q. Does ASTM bring standards to the attention of 12:53:26
the federal government with some sort of 12:53:36
recommendation that the federal government incorporate 12:53:38
the standard by reference? 12:53:41
MR. FEE: Objection. Vague. 12:53:43
THE WITNESS: That's not part of what we call 12:53:45
engaging federal agencies in Congress. What we will 12:53:49
do is work with agencies and work with Congress to 12:53:53
make them aware of the voluntary consensus standards 12:53:56
that we're developing in any given area that they 12:53:59
might have an interest. But the ultimate decision of 12:54:02
whether or not to utilize and reference those 12:54:07
standards we rarely take positions on, and I can't 12:54:08
give you a specific example of a time that we have 12:54:14
taken an example on -- taken a position on. 12:54:17
BY MR. BRIDGES: 12:54:23
Q. Do any state governments or municipal 12:54:23
governments incorporate ASTM standards by reference? 12:54:26
MR. FEE: Objection to form. 12:54:30

won't disclose privileged communications. 14:24:48
THE WITNESS: I mean, once again, I'm not in 14:24:52
this communication chain between Jim and the executive 14:24:52
committee, and it's not a government relations issue 14:24:56
I'm working on. 14:24:59
BY MR. BRIDGES: 14:25:00
Q. So you did not interpret the ASTM strategy 14:25:00
that's mentioned in that E-mail to be a government 14:25:03
relations strategy? 14:25:06
MR. FEE: Objection. Calls for speculation. 14:25:08
THE WITNESS: I don't. 14:25:10
(Deposition Exhibit 1046 was marked for 14:25:58
identification.) 14:25:58
MR. BRIDGES: I'll show you Exhibit 1046. 14:25:59
Q. Have you seen this document before? 14:26:03
(The witness reviewed Exhibit 1046.) 14:26:25
THE WITNESS: So the world justice project, 14:26:25
the origination of the E-mail, which I received, yes, 14:26:27
I believe I reviewed that document. But from beyond 14:26:30
that point in the E-mail chain, I do not have 14:26:35
recollection of being involved in this. 14:26:38
BY MR. BRIDGES: 14:26:41
Q. Did you review this document in preparation 14:26:41
to testify today? 14:26:44
A. I did not. 14:26:50

Q. Who at ASTM would have the most knowledge 14:26:53
about the content on the front page of Exhibit 1046? 14:26:56
MR. FEE: Objection. Vague. Calls for 14:27:01
speculation. 14:27:04
THE WITNESS: Well, my understanding is that 14:27:13
this mentions litigation and copyright. I would think 14:27:15
it would be legal counsel, Tom O'Brien. 14:27:19
BY MR. BRIDGES: 14:27:26
Q. Who is the Steele, S-t-e-e-l-e, that the 14:27:26
first line refers to? 14:27:30
MR. FEE: Objection. Calls for speculation. 14:27:32
THE WITNESS: I would speculate that it would 14:27:35
be Rob Steele, who's the secretary general of ISO at 14:27:37
this time. 14:27:42
BY MR. BRIDGES: 14:27:50
Q. On the third line of Mr. Thomas' E-mail is 14:27:50
the sentence, "To date, all of Carl's posting have not 14:27:54
had a measurable impact on our finances." Do you see 14:27:58
that? 14:28:04
A. I do see that. 14:28:04
Q. Was that your understanding at the time? 14:28:05
A. January 2013. I'm not aware that we did an 14:28:14
analysis that I would be able to comment on based at 14:28:20
that point of time. 14:28:26
Q. What do you understand to have been the basis 14:28:30

of Mr. Thomas' statement in that sentence? 14:28:32
MR. FEE: Objection. Calls for speculation. 14:28:35
THE WITNESS: I understand that there's been 14:28:37
an impact and a drag on ASTM's revenues due to 14:28:39
confusion in business execution issues due to the fact 14:28:44
that some of our standards are now available outside 14:28:49
of our licensed distributors and outside of being 14:28:53
directly available from ASTM. 14:28:58
Q. So Mr. Thomas was lying in that statement? 14:29:02
MR. FEE: Objection. Mischaracterizes his 14:29:07
testimony. 14:29:07
MR. BRIDGES: I'll withdraw it. 14:29:08
Q. You didn't answer my question, Mr. Grove. 14:29:08
A. Okay. 14:29:10
Q. My question is what do you understand to have 14:29:11
been the basis of Mr. Thomas' statement in that 14:29:14
sentence? 14:29:17
MR. FEE: Objection. Calls for speculation. 14:29:17
THE WITNESS: I wouldn't be able to answer 14:29:20
that. I apologize. 14:29:20
BY MR. BRIDGES: 14:29:24
Q. When did ASTM first notice a measurable 14:29:24
impact on its finances from the activities of 14:29:27
Mr. Malamud and Public Resource? 14:29:30
MR. FEE: Objection. Vague. 14:29:32

THE WITNESS: Again, I don't have direct 14:29:39
knowledge of such impact. 14:29:42
BY MR. BRIDGES: 14:29:48
Q. What other knowledge do you have other than 14:29:48
direct knowledge? 14:29:51
MR. FEE: Same objection. 14:29:52
THE WITNESS: So to date, I'm aware, based on 14:29:53
conversations with our vice president for sales and 14:29:57
publications, that the act of putting our standards 14:29:59
into the public domain has caused a drag on revenue 14:30:04
for ASTM, which has complicated business execution, 14:30:08
which has produced some harm to ASTM. 14:30:14
BY MR. BRIDGES: 14:30:25
Q. The vice president of sales and publications 14:30:25
is John Pace; is that correct? 14:30:26
A. That's correct. 14:30:28
Q. Tell me everything you remember about those 14:30:28
conversations. When did you have those conversations? 14:30:31
A. Yesterday. 14:30:37
Q. Did you have any conversations before 14:30:43
yesterday on that topic? 14:30:45
A. Not that I recall. 14:30:49
Q. When is the first time you learned of a drag 14:30:54
on revenue for ASTM caused by either Mr. Malamud or a 14:30:58
Public Resource? Was it yesterday? 14:31:05

THE WITNESS: I don't have anything additional. 14:36:33 14:36:35
BY MR. BRIDGES: 14:36:36
Q. And you're here as a corporate representative of ASTM to provide the information available to ASTM on that topic; correct? 14:36:36 14:36:37 14:36:37
MR. FEE: Objection. He's here to provide testimony regarding all the topics we identified earlier today. Of course, we'll have expert testimony on this subject as well. 14:36:39 14:36:42 14:36:42 14:36:45
You can answer. 14:36:47
THE WITNESS: Yes. 14:36:50
BY MR. BRIDGES: 14:36:55
Q. So I need to know every other fact you're aware of that pertains to harms that ASTM has suffered from the defendants. So, please, I'll take as much time as we need. Tell me every other fact that you're aware of that pertains to the harm that ASTM has suffered as a consequence of the defendants. 14:36:55 14:36:57 14:37:06 14:37:08 14:37:11 14:37:15
MR. FEE: Objection to form. Objection. Calls for expert testimony. Objection to the extent it calls for a narrative. Objection as to vague. 14:37:18 14:37:19 14:37:21
Now, we're talking about harms as opposed to financial harms? That's how I understand the question. 14:37:28 14:37:30
Can you read that back just to make sure I 14:37:34

don't miss anything? 14:37:34
(Record read.) 14:37:34
MR. BRIDGES: I'm sorry. Why do we need to -- just if you got objections, go ahead and state them. 14:38:01 14:38:02 14:38:02
MR. FEE: Oh, I don't want to hear the objections. 14:38:02 14:38:02
(Record read.) 14:38:02
MR. FEE: I think that's it. Okay. 14:38:02
THE WITNESS: Well, ASTM is known globally for the quality and technical excellence of its documents because we have a very robust standards development and quality control process. My understanding, and based on my direct knowledge of viewing certain documents that have been put in the public domain, these documents contain errors. I've seen standards where tables have been upside down. I've seen tables and columns and rows that don't align properly. 14:38:03 14:38:05 14:38:08 14:38:14 14:38:19 14:38:21 14:38:22 14:38:29 14:38:34 14:38:39
So if there's a real risk to ASTM's reputation and to ASTM's standing in the global economy, if customers or the public or other stakeholders utilize these documents with the expectation and understanding that these were the official ASTM documents, and products and materials 14:38:41 14:38:44 14:38:48 14:38:52 14:38:58 14:39:00

failed to perform the way that they expected them to. 14:39:04
BY MR. BRIDGES: 14:39:12
Q. What other harms? 14:39:12
MR. FEE: Same objections. 14:39:15
THE WITNESS: Well, I would be concerned -- I know the important role our standards play in health, life, and safety. I would certainly be concerned if some of these documents that contain factual and other errors contributed in any way to property damage, injury or loss of life because of the sensitive, important role that our standards play in protecting people in society. 14:39:19 14:39:21 14:39:23 14:39:25 14:39:30 14:39:33 14:39:37 14:39:40
BY MR. BRIDGES: 14:39:45
Q. What other harms to ASTM? 14:39:45
MR. FEE: Same objections. 14:39:47
THE WITNESS: I can't think of additional harms at this time. 14:39:58 14:40:00
BY MR. BRIDGES: 14:40:05
Q. Has ASTM heard from any customers that said, "I didn't buy the standard I was planning to buy because I could find it for free on the Internet from Public Resource or the Internet archive"? 14:40:05 14:40:08 14:40:10 14:40:13
MR. FEE: Objection to form. 14:40:16
THE WITNESS: I don't have knowledge of that. 14:40:20
BY MR. BRIDGES: 14:40:22

Q. Does anybody at ASTM have knowledge of that type of communication? 14:40:22 14:40:24
MR. FEE: Objection. Calls for speculation. 14:40:27
MR. BRIDGES: I'm asking him as a corporate representative. 14:40:31 14:40:32
MR. FEE: Same objection. 14:40:34
THE WITNESS: So based on my conversations with John Pace, he -- it's my understanding that there is this confusion with certain customers and certain members of the public that has caused this inability to execute sales on a timely basis. 14:40:35 14:40:36 14:40:43 14:40:47 14:40:51
BY MR. BRIDGES: 14:40:54
Q. Well, what customers? 14:40:54
A. I'm not able to answer that at this time. 14:40:59
Q. What members of the public? 14:41:06
A. I'm not able to answer that at this time. 14:41:09
Q. Did Mr. Pace put a dollar amount on his estimate of lost revenues to ASTM as a consequence of the defendants' actions? 14:41:17 14:41:19 14:41:23
MR. FEE: Objection to the extent that calls for expert testimony. 14:41:25 14:41:26
THE WITNESS: In my communications with him, no. 14:41:29 14:41:31
BY MR. BRIDGES: 14:41:33
Q. As a representative of ASTM at this 14:41:33

deposition, does ASTM have any estimate of the dollar amount of lost revenues to it as a consequence of the defendants' actions? 14:41:37 14:41:42 14:41:45

MR. FEE: Objection. Calls for expert testimony. Let me see if that's really a topic that he's been designated on. 14:41:46 14:41:48 14:41:52

MR. BRIDGES: He may answer. 14:41:59

MR. FEE: Hold on. I'm waiting to see if that's actually a topic he's been designated on. 14:42:00 14:42:01

MR. BRIDGES: Make the objections, and if it's superfluous and he hasn't been designated on. I'd like to go ahead and get an answer. 14:42:08 14:42:11 14:42:11

MR. FEE: No. If you want to take off the prelude to your question there, then I'm happy to have his answer without the prelude, but if you're going to have -- 14:42:12 14:42:14 14:42:16 14:42:16

MR. BRIDGES: Okay. Sure. 14:42:16

Q. Does ASTM have any estimate of the dollar amount of lost revenues to it as a consequence of defendants' actions? 14:42:17 14:42:20 14:42:23

MR. FEE: Objection. Calls for expert testimony. 14:42:25 14:42:26

THE WITNESS: Not to my knowledge. 14:42:27

BY MR. BRIDGES: 14:42:30

Q. Does ASTM have any facts in its possession 14:42:30

that suggest to ASTM that it has lost money as a consequence of defendants' actions? 14:42:39 14:42:46

MR. FEE: Objection. Asked and answered. Calls for expert testimony. Vague. 14:42:50 14:42:51

THE WITNESS: Not that I'm aware of. 14:42:57

BY MR. BRIDGES: 14:43:05

Q. Is ASTM aware of any property damage, injury, or loss of life that has occurred because of the defendants' actions? 14:43:05 14:43:10 14:43:15

MR. FEE: Objection. Calls for expert testimony and speculation. 14:43:17 14:43:19

THE WITNESS: Fortunately, not at this time. 14:43:22

BY MR. BRIDGES: 14:43:26

Q. When did you first -- sorry. 14:43:26

When did ASTM first become aware of any errors in connection with the posting of ASTM standards by the defendant? 14:43:27 14:43:31 14:43:36

A. I'm just not able to give you a time line. I'm not certain. 14:43:51 14:43:53

Q. How long ago was it, to your best estimate? 14:43:55

MR. FEE: Objection. Asked and answered. Calls for speculation. 14:43:57 14:43:58

THE WITNESS: I'm not certain. 14:44:00

BY MR. BRIDGES: 14:44:02

Q. Was it more than a year ago? 14:44:02

MR. FEE: Same objections. 14:44:04

THE WITNESS: I'm not sure. 14:44:08

MR. FEE: It's beyond the scope his designation as well. 14:44:08 14:44:10

Go ahead. 14:44:11

THE WITNESS: I'm not sure, no. 14:44:12

BY MR. BRIDGES: 14:44:13

Q. Was it more than three years ago? 14:44:13

MR. FEE: Same objections. 14:44:16

THE WITNESS: I'm not sure. 14:44:17

BY MR. BRIDGES: 14:44:18

Q. Was it more than two weeks ago? 14:44:18

MR. FEE: Same objection. 14:44:21

THE WITNESS: I'm not sure. 14:44:22

BY MR. BRIDGES: 14:44:23

Q. Do you know whether ASTM had any knowledge of errors in connection with defendants posting of ASTM standards more than a week ago? 14:44:23 14:44:26 14:44:31

MR. FEE: Same objection -- objections, I should say. 14:44:35 14:44:36

THE WITNESS: More than a week ago, I believe so, yes. 14:44:38 14:44:39

BY MR. BRIDGES: 14:44:40

Q. When did you first learn of any errors in defendants' posting of ASTM standards? 14:44:40 14:44:46

A. I first learned of it by hearing of it in the last year. I first viewed it yesterday. 14:44:51 14:44:53

Q. How many standards posted by defendants contain errors? 14:44:56 14:45:00

MR. FEE: Objection. Beyond the scope of his designation. Calls for speculation. 14:45:01 14:45:03

THE WITNESS: My understanding is that it would be extremely difficult to do a complete analysis, but based on quick analysis, we found significant errors. 14:45:08 14:45:10 14:45:14 14:45:21

BY MR. BRIDGES: 14:45:28

Q. What are the significant ones? 14:45:28

A. To industries that rely on quality information, yes, I would say so. 14:45:30 14:45:32

Q. Tell me some of the most significant ones. 14:45:34

A. Well, if a table and a chart don't align correctly, the variables, it is displaying false information. That seems like that could be an error. 14:45:38 14:45:42 14:45:44

Q. What other errors are really significant in your mind? 14:45:49 14:45:52

A. I'm not certain. 14:45:53

Q. Can you think of any other significant errors in defendants posting of standards? 14:45:54 14:45:56

MR. FEE: Objection. This is beyond the scope of his designation. 14:45:58 14:45:59

more than one error in the ASTM standards? 14:50:24
MR. FEE: Same objections. 14:50:28
THE WITNESS: I'd be speculating. 14:50:31
BY MR. BRIDGES: 14:50:34
Q. Well, you have testified as to what would 14:50:34
surprise you. I'd like to know what would surprise 14:50:34
you. 14:50:35
MR. FEE: Same objections. 14:50:37
THE WITNESS: I'm aware of ASTM's rigorous 14:50:37
quality control process and the value of bringing 14:50:40
people together under an open, transparent process and 14:50:42
the important role that ASTM staff plays in helping to 14:50:47
ensure the quality of our documents. And I would be 14:50:49
skeptical that that could be replicated if any steps 14:50:54
were bypassed. So -- 14:50:59
BY MR. BRIDGES: 14:51:03
Q. Would it surprise you for an ASTM standard to 14:51:03
have three or more errors in it? 14:51:05
MR. FEE: Same objections. 14:51:08
THE WITNESS: Would it surprise me? Yes. 14:51:13
BY MR. BRIDGES: 14:51:16
Q. Are you aware of any ASTM standards with 14:51:16
three or more errors? 14:51:19
MR. FEE: Same objections. Just give me a 14:51:21
second to object. 14:51:23

THE WITNESS: I'm not personally, no. 14:51:25
BY MR. BRIDGES: 14:51:27
Q. Are you aware of how ASTM standards are 14:51:27
proofread? 14:51:44
MR. FEE: Objection. Vague. 14:51:47
THE WITNESS: Yes, generally. 14:51:51
BY MR. BRIDGES: 14:51:53
Q. How? 14:51:53
A. There's a rigorous process under which at 14:51:54
every point in the standards development process 14:51:58
there's peer review of the standard and of the 14:52:00
document, and as it goes through the process, as it 14:52:05
works through the ASTM process, which involves many 14:52:09
steps, at the end there's an editor, an ASTM staff 14:52:13
that reviews the standard and insures that the 14:52:21
document purports to be what the committee intended it 14:52:26
for -- for it to be. 14:52:29
Q. And do ASTM editors catch every mistake? 14:52:32
MR. FEE: Objection. Calls for speculation. 14:52:36
THE WITNESS: I'm not aware of errors, but it 14:52:44
wouldn't surprise me if there were some. 14:52:47
BY MR. BRIDGES: 14:52:49
Q. Does ASTM ever issue errata to its standards? 14:52:49
MR. FEE: Objection. Vague. I think that's 14:52:55
also beyond the scope of his designation. 14:52:59

THE WITNESS: I'm not familiar with the term 14:53:06
"errata." 14:53:07
BY MR. BRIDGES: 14:53:08
Q. Does ASTM ever issue corrigenda to its 14:53:08
standards? 14:53:13
MR. FEE: Objection. Vague. Beyond the 14:53:14
scope of his designation. 14:53:15
THE WITNESS: I'm not certain. 14:53:20
BY MR. BRIDGES: 14:53:21
Q. Does ASTM ever issue a notice of errors in 14:53:21
any of its standards? 14:53:28
MR. FEE: Same objections. 14:53:31
THE WITNESS: I'm not certain. 14:53:32
BY MR. BRIDGES: 14:53:34
Q. What happens if ASTM publishes and 14:53:34
distributes a standard that's widely held by persons 14:53:37
and then discovers that there is a mistake in the 14:53:40
standard? How does ASTM notify the public? 14:53:42
MR. FEE: Objection. Calls for speculation. 14:53:45
It's beyond the scope of his designation, and 14:53:47
compound. 14:53:50
THE WITNESS: I'm not able to explain that 14:53:52
process. 14:53:53
BY MR. BRIDGES: 14:53:55
Q. Would it harm ASTM's reputation to issue a 14:53:55

standard with mistakes? 14:53:58
MR. FEE: Objection. Calls for expert 14:53:59
testimony. It's beyond the scope of his designation. 14:54:01
THE WITNESS: I'm not certain. 14:54:07
BY MR. BRIDGES: 14:54:09
Q. How has ASTM's reputation suffered from the 14:54:09
activities of the defendants? 14:54:15
MR. FEE: Objection. Calls for expert 14:54:24
testimony. 14:54:25
THE WITNESS: I'm not certain. 14:54:28
BY MR. BRIDGES: 14:54:29
Q. Have you noticed an effect on ASTM's 14:54:29
reputation as a consequence of the defendants' 14:54:32
activities? 14:54:35
A. I have not. 14:54:37
Q. What instances is ASTM aware of, of people 14:54:44
being confused about the relationship between ASTM and 14:54:50
the defendant? 14:54:57
MR. FEE: Objection. Vague. Asked and 14:54:59
answered. 14:55:02
THE WITNESS: Based on communications with 14:55:04
our sales and publications vice president. 14:55:06
BY MR. BRIDGES: 14:55:09
Q. What did those communications convey to you? 14:55:09
A. That there was some level of confusion in the 14:55:14

by reference? 15:01:47
MR. FEE: Objection. Vague as to whether or 15:01:48
not that older version is authentic. 15:01:51
THE WITNESS: Yeah. I'm sorry. Could you 15:01:54
just repeat that? 15:01:55
BY MR. BRIDGES: 15:01:57
Q. Is it misleading, in your view, to have the 15:01:57
ASTM logo on an older version of an ASTM standard 15:02:01
where the older version has been incorporated by 15:02:07
reference? 15:02:09
MR. FEE: Same objection as to the vagueness. 15:02:11
THE WITNESS: My concern would be that to get 15:02:16
the most recent version of any document, you more than 15:02:19
likely need to come to ASTM or one of our licensed 15:02:27
distributors. 15:02:31
BY MR. BRIDGES: 15:02:32
Q. But if somebody is interested in, let's say, 15:02:32
a 2008 standard because the 2008 standard has been 15:02:39
incorporated by reference but a more recent standard 15:02:42
has not been, what is the harm to ASTM from the 15:02:44
inclusion of the ASTM logo on that 2008 standard 15:02:49
posted by Public Resource? 15:02:55
MR. FEE: Objection. Calls for speculation. 15:02:58
THE WITNESS: Since I'm not an attorney and 15:03:01
I'm not familiar with the regulatory -- the connection 15:03:04

between regulations and law, I will share my 15:03:09
observation -- 15:03:12
BY MR. BRIDGES: 15:03:14
Q. Please do. 15:03:14
A. -- that just because a version of a standard 15:03:15
that's in the law might be outdated, that doesn't seem 15:03:18
to stop industry from wanting to use the most recent 15:03:26
version of the standard. 15:03:30
Q. And is it ASTM's view that it's misleading to 15:03:35
have the ASTM logo on anything that's currently 15:03:39
available -- strike that. 15:03:43
Is it ASTM's view that it is misleading to 15:03:48
display the ASTM logo on standards currently available 15:03:54
on the Internet when the standards are not the most 15:04:03
recent versions? 15:04:09
MR. FEE: Objection. To the extent you're 15:04:11
using "misleading" as a legal term, I object on that 15:04:13
ground. I also object to the vagueness of that 15:04:15
because it's not clear whether or not the standards 15:04:18
you're referencing are authentic or not. 15:04:21
MR. BRIDGES: That's coaching the witness, 15:04:23
Mr. Fee. 15:04:24
THE WITNESS: Well, that's exactly the point 15:04:25
I thought I was making. I don't -- it's the 15:04:26
authenticity of the standard as much as the -- more 15:04:31

than the dated issue. 15:04:36
BY MR. BRIDGES: 15:04:38
Q. The authenticity of the standard didn't come 15:04:38
into your answer until you heard counsel's objection. 15:04:41
MR. FEE: That's absolutely false. You 15:04:41
should read the transcript when you get done with 15:04:43
this. 15:04:47
BY MR. BRIDGES: 15:04:49
Q. Would it harm ASTM less if defendant took the 15:04:49
ASTM logo off the standards that it -- sorry, that it 15:04:53
posts? 15:04:58
MR. FEE: Objection. Calls for speculation, 15:04:59
and a hypothetical. 15:05:01
MR. BRIDGES: I'd like to know what ASTM -- 15:05:05
MR. FEE: Calls for an expert opinion, 15:05:08
perhaps, as well. 15:05:09
THE WITNESS: I'm not able to answer that 15:05:10
question. 15:05:12
BY MR. BRIDGES: 15:05:14
Q. Would ASTM -- well, would you find it 15:05:14
problematic -- I'm just curious. Which would you find 15:05:18
to be more of a problem to ASTM, for Public Resource 15:05:21
to public -- strike that. 15:05:27
What would ASTM, in your view, find to be 15:05:37
more of a problem, for Public Resource to post the 15:05:41

ASTM standards it posts with the ASTM logo or for 15:05:49
Public Resource to publish them without the ASTM logo? 15:05:56
MR. FEE: Objection. To the extent that 15:06:02
you're asking for what would be more problematic from 15:06:03
a legal perspective -- 15:06:06
MR. BRIDGES: Just please state the basis for 15:06:08
your objection instead of -- 15:06:10
MR. FEE: Andrew, do you forget how your 15:06:11
deposition objections went? Do you remember your 15:06:12
deposition objections the other day? They were much 15:06:14
more talkative than this. 15:06:16
MR. BRIDGES: Not so. 15:06:18
MR. FEE: I'm going to make my objections. 15:06:19
To the extent you're asking for a legal 15:06:21
conclusion with respect to "problematic," I object on 15:06:22
that basis. I object because it calls for 15:06:25
speculation, and it's a hypothetical question. 15:06:28
BY MR. BRIDGES: 15:06:35
Q. You may answer. 15:06:35
MR. FEE: Hold on. I'm not done objecting 15:06:36
yet. And objection to form. 15:06:38
THE WITNESS: And I'm not able to answer that 15:06:49
question. 15:06:50
BY MR. BRIDGES: 15:06:53
Q. In your position at ASTM, does it make a 15:06:53

THE WITNESS: It's a little out of context. 16:32:42
BY MR. BRIDGES: 16:32:45
Q. What would be necessary to add to that 16:32:45
statement in order to supply the context? 16:32:50
MR. FEE: Same objections. 16:32:55
THE WITNESS: Looking at standards on an 16:33:12
individual basis devalues the real value that ASTM 16:33:14
standards have as a collection of a whole. 16:33:14
BY MR. BRIDGES: 16:33:17
Q. What is the real value that ASTM standards 16:33:17
have as a collection? 16:33:19
A. Customers in the public benefit from getting 16:33:25
a collection of standards at a very affordable price 16:33:27
point, which allows them to access numerous standards 16:33:32
rather than looking at them as individual standards 16:33:39
purchased separately. 16:33:42
Q. Is there anything else about the context -- 16:33:48
sorry. Anything else necessary to supply an 16:33:52
appropriate context for that statement? 16:33:54
MR. FEE: Objection. Lack of foundation. 16:33:56
Calls for speculation. It's beyond the scope of his 16:33:59
designation. 16:34:01
THE WITNESS: No. 16:34:14
(Deposition Exhibit 1056 was marked for 16:34:40
identification.) 16:34:40

BY MR. BRIDGES: 16:34:41
Q. Exhibit 1056 consists of a series of E-mails 16:34:41
in which you and John Pace were either authors or 16:34:54
recipients; correct? 16:35:04
(The witness reviewed Exhibit 1056.) 16:35:28
THE WITNESS: Yes, that's correct. 16:35:28
BY MR. BRIDGES: 16:35:29
Q. What did you understand Mr. Pace to mean in 16:35:29
the first sentence about "sticking to our guns and 16:35:34
doing the reading room exactly as how we have all 16:35:39
agreed to date"? 16:35:43
A. I'd be speculating. 16:35:48
Q. Well, you were a recipient -- the sole 16:35:52
recipient of that E-mail. So please tell me what your 16:35:56
understanding was. 16:35:58
MR. FEE: Objection. Lack of foundation. 16:35:59
Beyond the scope of his designation as well. 16:36:07
THE WITNESS: I'd infer from this that John 16:36:10
Pace was raising concerns that we had already 16:36:12
committed to building a reading room and committed 16:36:15
extensive resources of his employees' time to help in 16:36:21
compiling the reading room, and now I was suggesting 16:36:26
that, in addition to the reading room, we might want 16:36:28
to consider other things as well. 16:36:32
BY MR. BRIDGES: 16:36:38

Q. What were you suggesting in addition to a 16:36:38
reading room? 16:36:40
A. I see that I was recommending that we 16:36:41
consider beefing up -- excuse me -- making our 16:36:42
summaries, which the abstracts which we provide to our 16:36:47
standards, considering whether those abstracts could 16:36:53
be converted to something that's more of a summary. 16:36:57
Q. Was that in addition to doing a reading room 16:37:08
or instead of doing a reading room? 16:37:10
A. Obviously, John was thinking I was suggesting 16:37:20
it as an addition, and I'm not sure if I was or not. 16:37:21
I was explaining I'm not the IT guy. So I didn't know 16:37:40
how difficult this task would be. 16:37:45
Q. Did you have in mind providing summaries as 16:37:48
opposed to the standards themselves in the reading 16:37:53
room? 16:37:55
MR. FEE: Objection. Are you asking him his 16:37:56
personal opinion in this question? 16:37:59
MR. BRIDGES: I'm asking him what his state 16:38:02
of mind was at the time. 16:38:03
MR. FEE: It's beyond the scope of his 16:38:04
designation. 16:38:06
But you can answer. 16:38:07
THE WITNESS: In our efforts to strike the 16:38:08
right balance between providing the public with public 16:38:10

access to standards incorporated by reference and 16:38:12
maintaining our viability of our standards development 16:38:14
enterprise, I was recommending that we review a lot of 16:38:18
options. One of which was this summaries idea. 16:38:22
BY MR. BRIDGES: 16:38:26
Q. Was it the idea of providing summaries as 16:38:26
opposed to the text of the standards themselves? 16:38:29
MR. FEE: Same objection. 16:38:33
THE WITNESS: I don't recall. 16:38:36
BY MR. BRIDGES: 16:38:41
Q. Does someone -- are you familiar with the 16:38:41
operation of the reading room for ASTM today? 16:38:44
A. Yes. 16:38:47
Q. Does one have to register to gain access to 16:38:47
the reading room? 16:38:50
A. Yes. 16:38:51
Q. What does one have to do to register to get 16:38:52
access to the reading room? 16:38:55
A. Enter a name and E-mail address. 16:38:56
Q. What's the purpose of that? 16:39:00
A. Well, to ensure that it wasn't -- again, I'm 16:39:02
not an IT person, but I believe there's some concerns 16:39:08
that bots and other types of automatic -- that perhaps 16:39:10
machines could access our system and pull information 16:39:19
in ways that perhaps we weren't intending by providing 16:39:22

that they must be -- they have to be referred to as 17:24:32
"musts," and this would have the voluntary consensus 17:24:35
standards process. This isn't the intention when 17:24:39
people come together to work in a voluntary consensus 17:24:43
standard environment. They want the words to mean 17:24:47
what they carefully craft them to mean in the process, 17:24:49
and when -- so I believe that's what I was referring 17:24:52
to in this. 17:24:55
BY MR. BRIDGES: 17:25:00
Q. Well, Mr. Miller was not saying that the 17:25:00
government was changing the standard. The government 17:25:02
was proposing to change the law; correct? 17:25:07
MR. FEE: Objection. The document speaks for 17:25:11
itself. Calls for speculation. 17:25:13
THE WITNESS: I guess I would be speculating, 17:25:22
but that was my interpretation of what this means. 17:25:24
BY MR. BRIDGES: 17:25:29
Q. That the government would be changing the law 17:25:29
as the law interprets the standard? 17:25:31
MR. FEE: Same objections. And vague. 17:25:36
THE WITNESS: Yeah. That the government was 17:25:41
interpreting a standard in a way that the voluntary 17:25:43
consensus standard group didn't necessarily intend it 17:25:46
to without coming back to the organization and working 17:25:50
with them. 17:25:57

stakeholders because the government is a very 17:29:07
important member. 17:29:09
BY MR. BRIDGES: 17:29:11
Q. So is the answer to my question "yes"? 17:29:11
MR. FEE: Objection. 17:29:13
You can answer it however you'd like. 17:29:14
MR. BRIDGES: He already has. 17:29:17
Q. I'm now asking him is the answer to my 17:29:18
question "yes." 17:29:20
MR. FEE: Same objection. Asked and 17:29:21
answered. 17:29:22
THE WITNESS: Speaking for Jeff Grove, yes. 17:29:23
BY MR. BRIDGES: 17:29:26
Q. What about speaking for ASTM? 17:29:26
MR. FEE: Objection. Asked and answered. 17:29:28
THE WITNESS: I don't believe ASTM would have 17:29:29
an official position. 17:29:31
BY MR. BRIDGES: 17:29:35
Q. You don't think that ASTM has a view as to 17:29:35
whether it is pleased when governments incorporate its 17:29:39
standards by reference? 17:29:43
MR. FEE: Objection. Vague and asked and 17:29:44
answered. 17:29:46
THE WITNESS: It's never been a performance 17:29:49
metric for me. So no. 17:29:50

BY MR. BRIDGES: 17:27:38
Q. Mr. Grove, does ASTM encourage any 17:27:38
governments to incorporate its standards by reference? 17:27:46
MR. FEE: Objection. Vague. 17:27:49
THE WITNESS: As a matter of policy, we make 17:27:54
organizations -- sorry -- governments aware of our 17:27:58
standards and point out and connect with agency 17:28:04
missions. But in the end, we respect that agencies 17:28:07
should be the ones that determine whether or not our 17:28:09
standards are incorporated or not. 17:28:12
BY MR. BRIDGES: 17:28:13
Q. Is ASTM generally pleased when governments 17:28:13
incorporate its standards by reference? 17:28:20
MR. FEE: Objection. Vague. 17:28:22
THE WITNESS: So I think it speaks to the 17:28:28
significance of ASTM and to the breadth of ASTM when 17:28:29
you see ASTM standards become incorporated by 17:28:34
reference because it does signify that they are widely 17:28:37
respected for their technical excellence. I believe 17:28:42
that it signifies that the government -- it couldn't 17:28:46
do what we've done with the same effectiveness. So 17:28:52
they're looking to a voluntary consensus standards 17:28:54
group in utilizing those standards. 17:28:57
So in some ways I might take pride in the 17:29:00
fact that ASTM standards are relied upon by all of our 17:29:04

BY MR. BRIDGES: 17:29:58
Q. Does ASTM have views about things that are 17:29:58
not performance metrics? 17:30:01
MR. FEE: Objection. Beyond the scope of his 17:30:05
designation. Vague. 17:30:06
THE WITNESS: It could. 17:30:11
BY MR. BRIDGES: 17:30:14
Q. What performance metrics do you have? 17:30:14
MR. FEE: Objection. Beyond the scope of his 17:30:16
designation. 17:30:20
THE WITNESS: Generally, my performance is 17:30:23
based on the job I've done in removing worldwide 17:30:24
barriers to the acceptance and use of ASTM standards. 17:30:27
BY MR. BRIDGES: 17:30:36
Q. Is your -- do your performance reviews ever 17:30:36
mention the degree of adoption of ASTM standards by 17:30:39
reference -- strike that. 17:30:44
Do your performance reviews ever mention the 17:30:46
degree of incorporation of ASTM standards by 17:30:48
reference? 17:30:50
MR. FEE: Objection. Beyond the scope of his 17:30:51
designation. 17:30:55
THE WITNESS: I believe over the years I 17:30:56
might have pointed out to my superiors that a standard 17:30:57
has become incorporated as something significant. 17:31:00

A. Kathe Hooper is responsible for permissions at ASTM. 18:16:38 18:16:47
Q. Who is Joe Koury? 18:16:49
A. Joe Koury is a staff manager that works with technical committees. 18:16:51 18:16:53
(Deposition Exhibit 1070 was marked for identification.) 18:17:06 18:17:06
MR. BRIDGES: I'm showing you Exhibit 1070. 18:17:06
Q. This is an E-mail from Ms. Hooper responding to a permission request; is that correct? 18:17:12 18:17:17
(The witness reviewed Exhibit 1070.) 18:17:58
THE WITNESS: Yes. 18:17:59
(Deposition Exhibit 1071 was marked for identification.) 18:18:11 18:18:11
BY MR. BRIDGES: 18:18:12
Q. Exhibit 1071 is an E-mail from Sarah Petre to you and others; is that correct? 18:18:12 18:18:16
(The witness reviewed Exhibit 1071.) 18:18:26
MR. FEE: Objection. Lack of foundation -- strike that. No objection. 18:18:26 18:18:27
THE WITNESS: So it's an E-mail between ASTM and Congressional staff and then ASTM staff, correct. 18:18:42 18:18:44
BY MR. BRIDGES: 18:18:48
Q. And within the ASTM -- 18:18:48
A. Correct. 18:18:51

Q. And it's discussing Congressional legislation; is that correct? 18:18:51 18:18:54
MR. FEE: Objection. The document speaks for itself. 18:18:56 18:18:57
THE WITNESS: Legislation passed the House and now it's being referred to the Senate, and Sarah Petre recognized that there's references to ASTM standards which are out of date, and she wanted to contact the staffer to make him aware of that fact. 18:19:10 18:19:11 18:19:16 18:19:18 18:19:22
BY MR. BRIDGES: 18:19:26
Q. Was this a discussion about incorporation by reference? 18:19:26 18:19:28
MR. FEE: Same objection. 18:19:29
THE WITNESS: It's a discussion about Congressional intent to use the most recent standard, I believe. 18:19:35 18:19:37 18:19:40
BY MR. BRIDGES: 18:19:41
Q. Is that for Congress's use in making an incorporation by reference into a federal law of an ASTM standard? 18:19:41 18:19:48 18:19:52
MR. FEE: Same objection. 18:19:54
THE WITNESS: It appears, yes. 18:19:55
BY MR. BRIDGES: 18:20:01
Q. Does ASTM have a view as to which versions of its standard Congress should include in its 18:20:01 18:20:07

legislation that causes an incorporation by reference? 18:20:11
MR. FEE: Can you read that back to me, please. 18:20:19 18:20:20
(Record read.) 18:20:38
MR. FEE: Objection to form. Beyond the scope of his designation. Calls for speculation. 18:20:39 18:20:40
BY MR. BRIDGES: 18:20:48
Q. You may answer. 18:20:48
MR. FEE: Hold on. 18:20:49
Lack of foundation. 18:20:53
Go ahead. 18:20:55
THE WITNESS: Yeah. So I think we think -- we want to make sure that Congress is aware of the fact there may be a more recent version because oftentimes it may be unintended that they're not using the most recent version. 18:20:55 18:20:59 18:21:02 18:21:05 18:21:08
BY MR. BRIDGES: 18:21:12
Q. Ms. Petre asked you whether ASTM should request that Congress use the language. Does ASTM ever request Congress to use particular language regarding ASTM standards? 18:21:12 18:21:17 18:21:21 18:21:25
MR. FEE: Objection. Beyond the scope of his designation. 18:21:32 18:21:36
You can answer. 18:21:36
THE WITNESS: Okay. I can think of instances like this where Congress -- what's happening here is this is incorporation by reference by Congress and not by an agency, and the concern that's expressed at times by our committee members is if Congress acts to designate a specific standard in legislation that freezes that piece of -- that reference in statute for years to come and agencies -- since it's something that Congress said, agencies will simply say, "Hey, talk to Congress, not to agencies about it." 18:21:38 18:21:40 18:21:45 18:21:48 18:21:52 18:21:57 18:22:02 18:22:06 18:22:12 18:22:16
So that's a concern that I'm familiar with, and I can't tell if that -- I don't recall the circumstances of this here, but that's the most current version language. That's why we're interested in making sure Congress is aware as a more current version. 18:22:19 18:22:21 18:22:26 18:22:29 18:22:32 18:22:36
BY MR. BRIDGES: 18:22:38
Q. Mr. Grove, again, you didn't answer my question. My question is does ASTM ever request Congress to use particular language regarding ASTM standards? 18:22:38 18:22:40 18:22:43 18:22:46
MR. FEE: Same objections. Plus asked and answered. 18:22:47 18:22:50
THE WITNESS: Yes. 18:22:52
BY MR. BRIDGES: 18:22:55
Q. To your knowledge, has ASTM ever asked 18:22:55

Congress or a federal agency not to incorporate any of its standards by reference? 18:23:00 18:23:04
MR. FEE: Objection. Beyond the scope of his designation. 18:23:07 18:23:09
THE WITNESS: To my knowledge, no. I believe it's possible that there's been reasons why committees haven't wanted to see standards incorporated by reference, but I can't recall an instance. 18:23:15 18:23:21 18:23:24 18:23:26
BY MR. BRIDGES: 18:23:31
Q. Has ASTM ever imposed conditions on whether the federal government may incorporate its standards by reference? 18:23:31 18:23:37 18:23:42
MR. FEE: Same objection. Vague as well. 18:23:44
THE WITNESS: I don't have direct knowledge. It was before my time at ASTM, but I understand at one point in time there was a concern that Congress was perhaps taking ASTM -- taking key content from an ASTM standard and placing it in a piece of legislation and that ASTM would be concerned about that. 18:23:52 18:23:54 18:23:58 18:24:03 18:24:09 18:24:13
BY MR. BRIDGES: 18:24:16
Q. Why would ASTM be concerned about that? 18:24:16
MR. FEE: Objection. Beyond the scope of his designation. Calls for speculation. Lack of foundation. 18:24:20 18:24:22 18:24:24
THE WITNESS: It would be taking the standard 18:24:26

out of context from what the voluntary consensus process encompassed in ASTM standards development enterprises wanted to see represented in the standard. 18:24:27 18:24:31 18:24:35
BY MR. BRIDGES: 18:24:43
Q. Has ASTM ever asked an agency to use specific language in a regulation? 18:24:43 18:24:47
MR. FEE: Objection. Beyond the scope of his designation. 18:24:50 18:24:52
THE WITNESS: It's possible that we have. 18:24:54
BY MR. BRIDGES: 18:24:55
Q. Do you recall a particular -- any instance? 18:24:55
MR. FEE: Same objection. 18:24:57
THE WITNESS: I don't recall a particular time. 18:24:59 18:24:59
BY MR. BRIDGES: 18:25:01
Q. Do you have an estimate as to the number of times it's occurred? 18:25:01 18:25:06
MR. FEE: Objection. Lack of foundation. Beyond the scope of his designation. Calls for speculation. 18:25:08 18:25:09 18:25:11
THE WITNESS: It's -- there's a process that our committees would have to follow. They would have to -- the executive committee of a committee would have to reach a consensus that they want to see an ASTM standard included in a regulation. And so I 18:25:13 18:25:17 18:25:19 18:25:24 18:25:28

don't think it happens very often, but I believe it has happened in the last 10 years since I've been at ASTM. 18:25:33 18:25:35 18:25:38
BY MR. BRIDGES: 18:25:40
Q. Are you saying that there has to be a consensus process in order to cooperate with a federal government in incorporating standards by reference? 18:25:40 18:25:42 18:25:46
MR. FEE: Objection. Mischaracterizes his testimony. Vague. 18:25:52 18:25:54
You can answer. 18:25:58
THE WITNESS: No, that's not what I'm saying. 18:26:00
BY MR. BRIDGES: 18:26:14
Q. Do you know whether any federal official has taken advantage of the reading room that ASTM provides the public? 18:26:14 18:26:17 18:26:22
MR. FEE: Objection. Vague. 18:26:23
THE WITNESS: I don't know specifically whether they have. I do know I've received accolades from federal agencies, the fact that it exists. So I would presume that they have. 18:26:30 18:26:31 18:26:34 18:26:40
BY MR. BRIDGES: 18:26:44
Q. How much money has ASTM received from the federal government in each of the last five years? 18:26:44 18:26:49
MR. FEE: Objection. Vague. 18:26:58
THE WITNESS: Well, I believe we've received 18:27:00

anywhere from $650,000 to $900,000 per year over the last five years from the federal government. 18:27:04 18:27:11
BY MR. BRIDGES: 18:27:17
Q. Were some of that money provided by the federal government in order to facilitate the standards development process? 18:27:17 18:27:22 18:27:25
MR. FEE: Objection. Calls for speculation. Vague. 18:27:27 18:27:29
THE WITNESS: To my knowledge, none of it was. 18:27:31 18:27:32
BY MR. BRIDGES: 18:27:37
Q. What were the main categories of payments by the federal government to ASTM over the last five years? 18:27:37 18:27:41 18:27:46
MR. FEE: Objection. Vague. 18:27:47
BY MR. BRIDGES: 18:27:48
Q. In other words, what were the payments for ASTM to do? 18:27:48 18:27:50
MR. FEE: Same objection, plus form. 18:27:52
THE WITNESS: I can think of -- that we would sell standards to federal agencies. That would be one source of revenue. 18:27:53 18:27:56 18:28:00
BY MR. BRIDGES: 18:28:01
Q. What other sources of revenue? 18:28:01
A. I believe that we have a number of federal 18:28:03

employees that participate in ASTM as full voting members. So they would pay a $75-per-year fee to be a member of ASTM. 18:28:06 18:28:09 18:28:14

Q. And you're counting that in the figures that you gave me earlier? 18:28:16 18:28:18

A. Yes. 18:28:19

Q. What other sources of funds from the federal government have there been for ASTM? 18:28:20 18:28:23

A. Right. That's all I'm aware of. That's all I'm aware of. We also have certification and training programs, which I don't believe the federal government is too involved in, but we receive a small stipend from the U.S. Department of Agriculture to assist them in running a -- the U.S. bio preferred program. 18:28:27 18:28:33 18:28:41 18:28:44 18:28:49 18:28:53

Q. Anything else? 18:29:00

A. We run a proficiency testing program, which the U.S. Department of Defense participates in. So it's not related to standards, but it's another source of revenue from the federal government. 18:29:06 18:29:08 18:29:14 18:29:18

Q. Does ASTM have any means of identifying who the originator was of any particular language in its standards? 18:29:22 18:29:26 18:29:33

MR. FEE: Objection. Vague. Compound. To the extent it calls for a legal conclusion, I'd also object on that basis. 18:29:34 18:29:43 18:29:46

Go ahead. 18:29:47

THE WITNESS: To the extent those are legal terms, I'm aware of an ASTM standards development process. I'm not aware of a way to trace origins back to a specific individual. 18:29:51 18:29:52 18:29:56 18:30:02

BY MR. BRIDGES: 18:30:06

Q. Is there any -- strike that. 18:30:06

How many individuals provide language or edits to the ASTM standards that have been incorporated by reference? 18:30:11 18:30:19 18:30:24

MR. FEE: Objection. Vague. Compound. 18:30:25

THE WITNESS: That would be very difficult to calculate. I need to ask are you referring to standards that have already been incorporated by reference? 18:30:37 18:30:39 18:30:41 18:30:43

BY MR. BRIDGES: 18:30:44

Q. Yes. 18:30:44

A. Presumably, if those standards are being revised by ASTM or re-approved for use, it will have to go through a technical committee. It has to. That's the process for re-approving or revising standards at ASTM. So it would depend on how many people are on that committee and what percentage voted. 18:30:47 18:30:49 18:30:55 18:30:58 18:31:01 18:31:05 18:31:07

Q. How many individuals have provided language or edits to any version of ASTM standards where the current ASTM standards have been incorporated by reference? 18:31:11 18:31:13 18:31:25 18:31:33

MR. FEE: Objection. It's beyond the scope of his designation. Compound. Vague. 18:31:34 18:31:35

THE WITNESS: Because of the openness and transparency and iterative innovative process that ASTM encapsulates, I wouldn't know how to answer that question, give you a number. 18:31:45 18:31:49 18:31:53 18:31:56

MR. BRIDGES: There's one more exhibit I want to find. 18:32:08 18:32:10

(Deposition Exhibit 1072 was marked for identification.) 18:32:35 18:32:35

MR. BRIDGES: Mr. Grove, I've handed you Exhibit 1072. 18:32:35 18:32:37

Q. What is this document? 18:32:39

A. It appears as if this is the ASTM form and style book for how ASTM standards are displayed. 18:32:53 18:32:57

Q. Does that create standards that persons must follow in participating in the drafting and revision process of ASTM standards? 18:33:07 18:33:15 18:33:18

MR. FEE: Objection. Vague. Compound. 18:33:22

THE WITNESS: No. 18:33:31

BY MR. BRIDGES: 18:33:34

Q. Does that provide rules that persons must follow in participating in the drafting and revision process of ASTM standards? 18:33:34 18:33:38 18:33:40

MR. FEE: Objection. Vague. 18:33:42

THE WITNESS: Generally, yes. 18:33:44

MR. BRIDGES: Where are we on time? 18:34:06

THE VIDEOGRAPHER: 18 minutes left. 18:34:10

MR. BRIDGES: 18 minutes left. 18:34:13

(Deposition Exhibit 1073 was marked for identification.) 18:35:00 18:35:00

BY MR. BRIDGES: 18:35:00

Q. Mr. Grove, do you recognize Exhibit 1073? 18:35:00

A. I do. 18:35:13

Q. Does it represent the views of both ASTM and ANSI? 18:35:16 18:35:20

MR. FEE: Objection. Compound. Calls for speculation. Beyond the scope of his designation. 18:35:23 18:35:25

THE WITNESS: I believe this is an error. No. I'm not familiar why this page would be stapled to a presentation. This is a speaker that came before me on a panel followed by -- who probably didn't provide a written presentation, which happens to be stapled to a presentation which begins with the title page on a presentation that I gave. 18:35:30 18:35:32 18:35:36 18:35:39 18:35:44 18:35:47 18:35:51

BY MR. BRIDGES: 18:35:54

Q. Okay. So starting -- okay. So there's a 18:35:54

general workshop. That's reflected on the first page. 18:35:56
And then there's a listing of Scott Cooper. Then 18:36:00
there's your name, and then what follows in the 18:36:03
exhibit is a presentation solely by you and not by 18:36:03
Mr. Cooper; is that correct? 18:36:11
A. That would be my recollection of events, yes. 18:36:13
Q. And then does that remaining portion starting 18:36:17
after your name reflect the views of ASTM at the time 18:36:20
of your presentation? 18:36:22
MR. FEE: Objection. Calls for speculation. 18:36:24
Beyond the scope of his designation. Compound as 18:36:26
well. 18:36:29
You should read the whole thing if he's 18:36:38
asking you to verify all the use of ASTM. 18:36:39
(The witness reviewed Exhibit 1073.) 18:37:01
THE WITNESS: Yes. I believe this, to the 18:37:01
best of my recollection, was the general views that 18:37:05
ASTM would have on this issue at the time of this 18:37:07
presentation. 18:37:09
(Deposition Exhibit 1074 was marked for 18:38:01
identification.) 18:38:01
BY MR. BRIDGES: 18:38:01
Q. Mr. Grove, Exhibit 1074 is a series of 18:38:01
E-mails among you and Katherine Morgan, Len Morrissey 18:38:07
and John Pace; is that correct? 18:38:15

MR. BRIDGES: I will check, but if we don't 18:41:09
have them, we expect to get them. 18:41:10
Q. Can you please explain to me what the purpose 18:41:16
was or what you understood to be the purpose of the 18:41:20
page with the Bates number ending in -3315? 18:41:23
MR. FEE: Objection. It's beyond the scope 18:41:33
of the designation. Calls for speculation. 18:41:34
THE WITNESS: This represents a project that 18:41:39
ASTM staff is undertaking throughout the course of 18:41:42
2015 and -- I'm sorry. 2014 and 2015. These would be 18:41:47
the items that are contained in the project. 18:41:53
BY MR. BRIDGES: 18:41:58
Q. Has the project been approved? 18:41:58
MR. FEE: Objection. Vague. Beyond the 18:41:59
scope of his designation. 18:42:03
THE WITNESS: Project been approved? 18:42:06
MR. BRIDGES: Strike that. 18:42:08
Q. Is the project underway? 18:42:09
MR. FEE: Objection. Beyond the scope of his 18:42:11
designation. 18:42:13
THE WITNESS: So some of these activities may 18:42:16
be underway, but we don't believe that we are actively 18:42:18
pursuing all of them. 18:42:21
BY MR. BRIDGES: 18:42:23
Q. Which ones is ASTM not actively pursuing? 18:42:26

A. Yes, it is. 18:38:26
MR. FEE: While I'm thinking of it, I'm going 18:39:08
to reserve the right to read and sign. 18:39:12
(Deposition Exhibit 1075 was marked for 18:39:29
identification.) 18:39:29
MR. BRIDGES: I'm handing you an exhibit 18:39:29
marked 1075 that consists of pages ASTM003314 to 18:39:31
ASTM003315. 18:39:37
(The witness reviewed Exhibit 1075.) 18:40:02
BY MR. BRIDGES: 18:40:02
Q. Do you recognize this document? 18:40:02
A. I do, yes. 18:40:22
Q. This is an E-mail from Maureen Houck to a 18:40:29
number of senior staff at ASTM; is that correct? 18:40:32
A. It is correct. 18:40:37
Q. What does ITC -- sorry. "ITMC" mean? 18:40:39
A. I believe it's short for the Information 18:40:45
Technology Management Committee. 18:40:50
Q. And -- 18:40:54
MR. FEE: I'm going to object. This appears 18:40:56
to be just one of many attachments to Exhibit 1075. 18:40:58
MR. BRIDGES: You know, I'm glad you 18:41:01
mentioned that because I don't think we got the other 18:41:02
attachments, and I'd like to get them, please. 18:41:04
MR. FEE: I don't know if that's true or not. 18:41:06

MR. FEE: Same objection. 18:42:31
THE WITNESS: Well, we're taking an 18:42:38
inventory. We don't have great information about the 18:42:40
full extent of government participation. So we're 18:42:45
taking an inventory of how many government reps are 18:42:50
participating in ASTM technical committees and where. 18:42:52
We're trying to find out more about how federal 18:42:56
agencies use ASTM standards. 18:42:58
MR. FEE: Can you read the question back. 18:43:03
MR. BRIDGES: Not when he's in the middle of 18:43:10
his answer, please. Afterwards, you can do that. 18:43:12
MR. FEE: He's answering the wrong question. 18:43:14
MR. BRIDGES: Well, let him finish. 18:43:16
MR. FEE: Read the question back. 18:43:19
MR. BRIDGES: No. No. 18:43:21
MR. FEE: Yes. 18:43:21
MR. BRIDGES: You stopped your witness from 18:43:22
speaking. That's ridiculous. That's improper. 18:43:24
MR. FEE: Wait until she reads the question 18:43:28
back. 18:43:30
(Record read.) 18:43:48
THE WITNESS: It's really hard to say because 18:43:48
we're very early in the process of working on this, 18:43:49
but I can tell you it's been scaled back. This is a 18:43:53
pretty ambitious activity. I believe the last two 18:43:55

THE VIDEOGRAPHER: This is the end of the deposition of Mr. Jeffrey Grove. We are off the record at 18:52. 18:53:06 18:53:08 18:53:13

(Witness excused.) 18:53:16

(Deposition concluded at 6:52 p.m.) 18:53:16

C E R T I F I C A T E

I do hereby certify that the aforesaid testimony was taken before me, pursuant to notice, at the time and place indicated; that said deponent was by me duly sworn to tell the truth, the whole truth, and nothing but the truth; that the testimony of said deponent was correctly recorded in machine shorthand by me and thereafter transcribed under my supervision with computer-aided transcription; that the deposition is a true and correct record of the testimony given by the witness; and that I am neither of counsel nor kin to any party in said action, nor interested in the outcome thereof.

<%signature%>

Nancy J. Martin, RMR, CSR

Dated: March 18, 2015

ACKNOWLEDGMENT OF DEPONENT

I, JEFFREY GROVE, do hereby certify that I have read the foregoing pages, _____ to _____, and that the same is a correct transcription of the answers given by me to the questions therein propounded, except for the corrections or changes in form or substance, if any, noted in the attached Errata Sheet.

_____

DATE SIGNATURE

EXHIBIT 9

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

AMERICAN SOCIETY FOR TESTING AND MATERIALS d/b/a ASTM INTERNATIONAL; NATIONAL FIRE PROTECTION ASSOCIATION, INC.; and AMERICAN SOCIETY OF HEATING, REFRIGERATION, AND AIR CONDITIONING ENGINEERS, Plaintiffs	: NO. 1:13-cv-01215-TSC-DAR
vs.	
PUBLIC.RESOURCE.ORG, INC., Defendant	

Videotaped deposition of JOHN C. JAROSZ taken at the law offices of Veritext Legal Solutions, 1250 I Street NW, Washington, DC, commencing at 10:09 a.m. THURSDAY, AUGUST 27, 2015, before Debbie Leonard, Registered Diplomate Reporter, Certified Realtime Reporter.

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consulting career.
BY MR. BRIDGES:
Q. In what context?
A. There have been several matters I've had, litigations, that have involved standard setting organizations and the outputs from those organizations.
Q. What organizations?
A. Well, some that come to mind are ETSI, IEEE, the Blu-ray Association, MPEG, MPEG L.A., the Philips 6C and Philips 3C organizations. Those are among the ones that come to mind.
Q. And what types of litigation did your work relating to those standard setting organizations involve?
MR. FEE: Objection to form.
THE WITNESS: It was almost all intellectual property litigation, with probably the bulk of the analyses undertaken with regard to patent rights.
BY MR. BRIDGES:
Q. Do you recall --
A. I guess I should -- there were

probably some breach of contract matters as well.
Q. Did you work on any matters involving copyright law where you became familiar with the work and outputs of standards setting organizations before this case?
A. Probably, but I cannot say that with absolute certainty. I've been involved in several matters over a course of many years.
Q. Can you name any copyright matter involving a standards development organization that you recall?
A. Not now, without going back and looking at my records.
Q. Would they be listed in the cases attached to Exhibit 1?
A. That would summarize some of my records. The cases that are embodied in my tab 1 are those that led to deposition or trial testimony. I've been involved in many matters beyond those.
Q. But sitting here, you cannot recall any copyright case involving a

standards development organization that you've worked on?
A. Again, I'd have to go back and look at my records. I can't right now recite any, but there very well could be one or more.
Q. Did you review any of your work in -- from earlier copyright cases involving standards development organizations in connection with your work in this case?
A. Not to the best of my memory, no.
Q. What background do you have in the creation of standards by standard development organizations?
MR. FEE: Objection to form.
THE WITNESS: In the context of some of my consulting assignments, I have examined processes undertaken by SDOs.
BY MR. BRIDGES:
Q. Anything else?
A. Nothing else comes to mind. I've certainly looked at the output associated with those processes, but there's

nothing else that comes to mind.
Q. What processes undertaken by standards development organizations did you examine?
MR. FEE: Objection. Are you asking prior to the report still?
MR. BRIDGES: Yes.
MR. FEE: Okay.
THE WITNESS: I'm not quite --
MR. BRIDGES: Or other than in this case.
MR. FEE: Okay.
THE WITNESS: I'm not quite sure what you're asking. I've seen discussion of the some of the processes of various organizations. I'm not -- I'm not quite sure what you're asking. Perhaps you could ask it somewhat differently.
BY MR. BRIDGES:
Q. Well, no. You said, quote, "I have examined processes undertaken by SDOs."
So my question is, what processes undertaken by standards development organizations did you examine?

A. It sounds like the same question to me.
Q. Specifically, what processes did you examine?
A. That still sounds like the same question, but let me try to answer it by saying I've looked, for instance, at the mechanisms that ETSI undertook in developing standards. So I am familiar generally with the processes that it follows. Similarly with regard to other standard setting organizations.
Q. What other standard setting organizations?
A. Well, I think I identified those a few moments ago. Do you want me to repeat those?
Q. Well, if -- are you saying that, for all of those organizations, you examined their processes?
A. In some dimension, probably for most of the organizations, I had at least some knowledge of the process. I can't say that I investigated in depth all of the processes for all of the organizations that

have been involved in my consulting assignments that are standards oriented.
Q. What do you recall about your investigation of the processes by which standards development organizations create their standards?
A. I should say I -- SDO is probably not the right term to use. I should probably say standards setting organizations. There may be a distinction between an SSO and an SDO.
But, generally, each SSO has a process that's unique to its organization. Some solicit input from a wide range of constituents; some from a more narrow range.
The ones that I have examined have all been fairly careful in the work that they've done, seeking input at many steps along the way.
Some organizations, like SDOs at issue here, seek a broader array of inputs than do others.
Some organizations, standards setting organizations, include primarily or only manufacturers and sometimes large

manufacturers only. Others include a wider array of companies.
In all instances, though, the companies are trying to -- the standards setting organizations are trying to develop at least some form of consensus -- sometimes it's very broad consensus; sometimes it's more narrow consensus -- about what would be good for that standards setting organization.
Sometimes the SSOs are interested in what's best for the manufacturers and the ability for them to supply in an interoperable environment. In some cases, the SSOs are very alert to the needs of consumers and users of products and services that comply with standards.
Q. You've distinguished between standards setting organizations and standard development organizations. What is the distinction that you -- that you identify between the two?
A. I think I said I didn't know if there is for sure a distinction, but I think an SSO is perhaps a broader concept than an SDO, but I might be wrong on that.

I know the companies -- I -- the plaintiffs here are SDOs. The associations are, among other things, in the business of creating and developing standards.
There could be other SSOs that have different constituents that are of interest to them. I don't know for sure that an SSO is a broader concept than an SDO, but it could be.
Q. What do you understand to be the constituents of the plaintiffs in this case?
MR. FEE: Objection to form.
THE WITNESS: I laid that out in my report. In summary, I believe they try to include in the process both those -- both supply-side entities and demand-side entities.
BY MR. BRIDGES:
Q. Who else are plaintiffs' constituents?
MR. FEE: Same objection.
THE WITNESS: I can't think of anything that doesn't fall within

any harms that the plaintiffs have actually suffered to date as a consequence of the defendant's activities?
MR. FEE: Objection to form.
THE WITNESS: To the extent I have, it's embodied in my report. You'll see there's a little bit of evidence of actual tangible harm to date, and there's certainly more discussion of harm. The tangible evidence I have is reflected in my report.
BY MR. BRIDGES:
Q. And what do you understand that evidence to be?
A. I believe the number of downloads from the Public Resource dissemination have been fairly substantial. I believe that the purchase of publications has declined some at the plaintiffs -- at the various plaintiffs. It certainly has not risen. Those are among the things that come to mind.
I think I discuss the topic in more depth in paragraph, among other thing --

among other places, in paragraph 133 of my report.
Q. Have you been able to quantify any financial losses to plaintiffs as a consequence of defendant's activities?
A. No.
Q. Why not?
A. Not with any great certainty.
Q. Why not?
A. Well, I don't have the records that would allow me to do that. Moreover, I am not sure that the impact from the past will be close to the impact that will occur in the future if the Court finds that there has been no copyright or trademark infringement.
Q. Why do you make the statement you just did? What's your basis for it?
MR. FEE: Objection to form.
THE WITNESS: I think there were a few things in my statement. Which would you like me to expound on?
BY MR. BRIDGES:
Q. Just that sentence. I'd like to know what the basis is for the sentence

you just said, quote, "I am not sure that the impact from the past would be close to the impact that will occur in the future if the Court finds that there has been no copyright or trademark infringement."
A. It's everything laid out in my report. I -- it's really the -- at the heart of what I did.
Q. And please summarize for me what data you base that statement on.
A. That's identified in my report.
Q. Okay. Show me, please, in the report.
A. It's all of what's in Exhibit 1.
Q. No, I want -- I want the basis for your statement that the impact from conduct to date -- strike that -- that you're not sure that the impact from the conduct to date would be close to the impact that will occur in the future if the Court find -- makes a certain finding, right?
A. Correct.
Q. So please identify for me something specific that forms the basis of

that statement.
MR. FEE: Objection. Asked and answered.
THE WITNESS: Among other things, paragraphs 112 through 155.
BY MR. BRIDGES:
Q. So these are the "Costs of Losing Copyright Protection"; is that correct?
A. That's the title of this section, and then there's some discussion of trademark protection as well.
Q. And those would be the harms that you identify that would flow from a decision by the Court that the plaintiffs cannot enforce their copyrights against the defendant, correct?
MR. FEE: Objection to form.
THE WITNESS: What I can say -- I'm sorry.
MR. FEE: I just objected to form.
THE WITNESS: What I can say with a reasonable degree of certainty.
BY MR. BRIDGES:

that I've cited, and some of those talk about the standard development process and why participants are active in the process. So in that regard, I've considered incentives.
BY MR. BRIDGES:
Q. What do you understand the incentives to be?
A. Well, for the supply side constituents, they're interested in effective manufacturing and selling of products that will -- and services that will be well received in the marketplace; and on the demand side, the constituents are interested in products and services that address certain quality and compatibility issues or problems and help resolve those.
Q. Do you know who actually creates the text of the standards?
MR. FEE: Objection to form.
THE WITNESS: Are you talking about who actually types in the words?
BY MR. BRIDGES:
Q. No.
A. Because I don't know what you

mean by "creates the text."
Q. Who actually suggests the words?
A. I think a number of constituents do, typically.
Q. What types of constituents suggest the words of the standards?
MR. FEE: Objection to form.
THE WITNESS: I think it's sometimes SDO employees. I think, more times than not, it's industry participants, often supply-side people, sometimes demand-side people. Frequently those people are working from preexisting standards or similar standards and revising those as appropriate.
So I think a number of people have input to the words.
BY MR. BRIDGES:
Q. Do you actually know of instances where SDO employees have proposed text as opposed to editing text?
A. I can't --
MR. FEE: Objection --

THE WITNESS: -- point to --
MR. FEE: -- form.
THE WITNESS: -- any particular instances as I sit here now.
BY MR. BRIDGES:
Q. Can you think of any other motivations that the participants in the standards writing process have?
A. I'm sorry. Other than what?
Q. Other than the incentives you referred to earlier of the supply-side constituents and the demand-side constituents.
A. Nothing else comes to mind, although I'm certainly open to the fact that I haven't thought of or expressed all the incentives.
Q. Well, what other incentives can you think of as you sit here?
A. As I just said, nothing else comes to mind.
Q. What incentives do you understand the plaintiffs to have in developing standards?
MR. FEE: Objection to form.

THE WITNESS: I think, generally, they want consensus among interested parties in how to address a particular issue or problem that those constituents face.
They are each non-profit organizations, so they're not intending to profit off their activities, but they're certainly intending to fund their activities going forward.
BY MR. BRIDGES:
Q. What do you understand the activities of the standards development organizations to be in creating the standards at issue in this case?
MR. FEE: Objection to form.
THE WITNESS: At the very least, they facilitate the process through arranging logistics. They do other things, including participate in discussions, and -- as I understand it, and create versions of proposed standards.
They also serve as a

Web sites we gathered ourselves, and I think the reports and articles, with the exception of the Bremer articles, we gathered ourselves.
Q. Do you know why you got no documents from NFPA, no Bates range documents from NFPA?
MR. REHN: Object to form --
THE WITNESS: I don't know why we did not receive Bates documents --
THE REPORTER: Wait.
MR. REHN: Sorry. Object to the form. Lacks foundation.
THE WITNESS: I don't know for sure that we didn't receive Bates-stamped documents, but I believe some of the documents we received were NFPA documents.
BY MR. BRIDGES:
Q. Do you recall seeing any NFPA documents that -- in which NFPA personnel stated that they could not show any harm from the defendant's activities?
A. Received any documents that said that?

Q. Uh-huh.
A. Perhaps you would have something that would refresh my memory. I don't recall, sitting here right now, but it's possible.
Are you talking about historical -- historically no harm, or are you talking about prospectively?
Q. Either one. Did you -- do you recall seeing any internal NFPA documents that call into question where NF -- whether NFPA has suffered any harm from the defendant's activities?
A. I don't recall documents on it. There may have been some deposition testimony about past activities, but I don't know if it was activities prior to Public Resource actions here or after.
Q. Do you recall learning about any litigation that NFPA had engaged in pertaining to standards and copyright?
A. I think I heard that there's some overseas litigation involving Public Resource. Whether that involves NFPA, I don't know.

Q. What did you hear about overseas litigation involving Public Resource?
A. I think I heard that there was a German -- or a suit in Germany, but I'm not sure that I learned much more than that. I don't recall what status that suit -- what the status of that suit is.
Q. Do you recall anyone disclosing to you litigation involving NFPA in the United States that pertained to standards and copyright?
A. It's possible, but I don't recall any, sitting here right now.
Q. Do you recall inquiring about public statements of fact that NFPA has made regarding copyright and standards in litigation other than this litigation in the United States?
MR. FEE: Objection to form.
THE WITNESS: I do not.
BY MR. BRIDGES:
Q. Are you familiar with a case called Veeck, V-E-E-C-K?
A. I'm familiar with an opinion in

the Veeck case.
Q. What do you know about that opinion?
MR. FEE: Objection.
I would instruct you not to disclose anything you know about that opinion that was a result of communications with counsel and that did not form the basis of any of the opinions in your report or any of the assumptions that you relied upon in reaching your conclusions.
THE WITNESS: I did talk with counsel about that case, and that case didn't form any basis for any of my observations or conclusions here.
BY MR. BRIDGES:
Q. Why did the Veeck case not form any basis for any of your observations or conclusions here?
A. I don't know how to answer that question. I -- it didn't present any facts that were specific to this case, as far as I recall.
Q. What do you recall of the facts

answered.
THE WITNESS: Again, I read the case. I didn't do any analysis beyond that of that particular case.
BY MR. BRIDGES:
Q. What steps did you take to ascertain what public harms flowed from the Court's decision in the Veeck case?
A. Other than reading the case, the opinion in the case, I didn't do anything beyond that to understand the implications of that holding.
Q. You didn't do any investigation as to the economic consequences to any entity, industry, or person as a consequence of the decision in the Veeck case, correct?
MR. FEE: Objection to form.
THE WITNESS: I think that's correct, yes.
BY MR. BRIDGES:
Q. How has the process of standards development changed in the last 100 years, to your knowledge?
A. I don't know the specifics, and I don't know that there is one standards

development process. I think there are a variety of processes pursued by a number of SSOs or SDOs. I'm sure that there have been changes on the margin. There may have been larger changes. I just don't know. I have not studied the trend in the standard development process over time.
Q. What changes are you aware of in the standards development process of NFPA over the past 100 years?
A. I don't know. I've not studied that topic.
Q. What changes are you aware of in the standards development process of the ASHRAE 90.1 standard?
A. I don't know. I've not studied that.
Q. How did ASHRAE come to develop the 90.1 standard?
A. I think, generally, a need was identified and a group of constituents convened to derive a standard, but I don't know the specifics beyond that.
Q. Do you know who identified the need?

A. Not sitting here right now, I don't.
Q. Do you know whether ASHRAE took over development of what became standard 90.1 from any other group or entity?
A. No, I do not.
Q. Have you ever quantified the value of the contributions made by the volunteers of the various organizations to the standards at issue in this case?
MR. FEE: Objection to form.
THE WITNESS: Not other than having some sense of hours or a limited sense of dollars, but not beyond that, no.
BY MR. BRIDGES:
Q. Can you put a rough dollar value on the time and expenses of the volunteers with respect to any of the standards in this case?
MR. FEE: Objection to form.
THE WITNESS: Not sitting here right now. That would entail a little bit of a study. I have not done that.
BY MR. BRIDGES:

Q. What -- what would be required?
A. To understand basically the out-of-pocket expenses incurred and the opportunity costs incurred. So among other things, one would want to look at time records, have an understanding of compensation, have an understanding of the activities of those individuals. Those are -- would be among the inputs.
Q. What changes are you aware of in the distribution of standards in the past 100 years by the plaintiffs?
MR. FEE: Objection to form.
THE WITNESS: I haven't investigated that particular issue, but I understand that some of the standards today are distributed through the Internet that certainly didn't exist 100 years ago.
Some of the standards are distributed for free with limitations. I don't know if that was true 100 years ago, but it might have been.
I would expect some of the copying and dissemination capabilities

are much greater today than they were in 1915, but I don't know that the general methods of -- I don't know how the general methods of distribution have changed.
BY MR. BRIDGES:
Q. What changes are you aware of in sales trends over the past 20 years?
MR. FEE: Objection to form.
THE WITNESS: I don't have data going back as far as 20 years ago. I have some information on publication sales, for instance, in tabs 3, 4, and 5. They only -- that information only goes back a few years, however.
BY MR. BRIDGES:
Q. Did you review any information earlier than the dates shown in the documents at tabs 3, 4, and 5?
MR. FEE: Objection. Vague.
THE WITNESS: It's possible that some of the source documents had earlier information, but I don't recall that. I would need to look at those source documents.

BY MR. BRIDGES:
Q. And those source documents would be within the Bates ranges identified in tab 2 of your report?
A. Within the Bates ranges or identified elsewhere in tab 2. For instance, the AS team -- ASTM audited -- audited consolidated financial statements, I think, may not all be Bates-stamped. I could be wrong on that. But I would look in that set of financial documents.
Q. What do you know about what you said -- strike that.
You said earlier that some standards are distributed for free with some limitations; is that correct?
A. Yes, that's my understanding.
Q. What do you know about that?
MR. FEE: Objection. Vague.
THE WITNESS: I've written about that in my report. I believe that each one of the plaintiffs has provided what is sometimes called a "reading room" so that people can look at those standards but are not given

the right to reproduce, copy, or disseminate those standards but can look at them online.
BY MR. BRIDGES:
Q. Have you used the reading rooms of any of the plaintiffs?
A. No, I have not.
Q. Have you reviewed the interface that the -- have you reviewed the interfaces that the plaintiffs offer to persons wishing to view materials for free online?
A. No, I don't think so.
Q. Do you know what effect, if any, the presence of those free materials on the plaintiffs' Web sites has had on the plaintiffs' revenues?
MR. FEE: Objection to form.
THE WITNESS: No, I don't.
BY MR. BRIDGES:
Q. Have you -- have you investigated that?
MR. FEE: Same objection.
THE WITNESS: I've been opening -- I've been open to learning about that, but I haven't learned that

there's a direct or indirect effect. There might be, but I haven't seen evidence of that.
BY MR. BRIDGES:
Q. My question was, have you investigated that?
MR. FEE: Same objection.
THE WITNESS: Perhaps you could read back my answer.
BY MR. BRIDGES:
Q. I've heard the answer. It was not responsive to my question. The -- you said you did not know what effect, if any, the presence of those free materials on the plaintiffs' Web sites has had on the plaintiffs' revenues.
And my question is, have you investigated that?
MR. FEE: Same objection.
THE WITNESS: No, I've not undertaken a separate investigation. I've been alert to that topic, but I haven't assigned myself that investigation.
BY MR. BRIDGES:

counsel. And then we finalized the report, submitting it to counsel on June 5th, 2015.
Q. Do you know how many standards of each plaintiff are at issue in this case?
A. How many -- I'm sorry -- standards are at issue?
Q. Yes.
A. I have that number written down. It's in the hundreds, and I forget, as I sit here right now, precisely the number. I will look it up. And I was giving you an answer that was a cumulation across the three plaintiffs.
I am not seeing that number right now. I'll keep looking.
Q. Do you know what --
A. You may be able to point me quicker than I recall where it was.
Q. Do you -- do you know what proportion of plaintiffs -- of each plaintiffs' standards is at issue in this case?
A. Are you asking me the ratio of the standards at issue versus the total standards developed by the organizations?

Q. Yes.
A. I think it's less than a majority for each organization. I'm fairly certain of that with regard to ASTM. I think that's true with regard to NFPA. I think it's true with regard to ASHRAE.
Q. Do you have any better information than less than a majority --
A. Well, I --
Q. -- for each of them?
A. The precise numbers are in the report. Let's see here. One can figure that out. You may remember where I summarized the number of standards. I just don't remember. It's easy to determine because the data are all here.
Q. Have you analyzed differences in sales trends between standards that are at issue in this case and plaintiffs' other standards?
A. No, I don't think I have those data at my disposal.
Q. Did you ever ask for those data?
A. I don't recall.

Q. Have you analyzed any differences in sales trends between those of plaintiffs' standards that have been incorporated into law and those of plaintiffs' standards that have not been incorporated into law?
A. I don't think so. I don't think I have those data, and I'm not sure that each plaintiff knows precisely how many have been incorporated into law.
Q. Did you ask for any data regarding the distinction between standards incorporated by reference and standards not incorporated by reference in the law?
A. I don't --
MR. FEE: Objection to form.
THE WITNESS: I'm sorry. I don't recall.
BY MR. BRIDGES:
Q. You made observations about sales trends earlier in your deposition. I think you said that there's been a reduction in sales of certain of plaintiffs' standards; is that correct?
A. I'm not quite sure what the

earlier testimony was, but I think I was pointing you to paragraph 133 with regard to downloads of -- and other measures of activity, as I had at my disposal.
Q. Well, I'm trying to find out what changes you have studied in plaintiffs' economics that you attribute to defendant's activities.
A. I'm not quite sure what your question is.
Q. Well, I'm trying to find out what information you have studied to determine what changes in the finances of each of the plaintiffs have occurred as a consequence of the defendant's activities.
MR. FEE: Objection to form.
THE WITNESS: I'm still not sure that I'm hearing a question. But to the extent that I had information on changes in activity level, I summarized that in paragraph 133.
BY MR. BRIDGES:
Q. My question is, what information did you study to determine any changes in finances of each of the

plaintiffs?
MR. FEE: Same objection.
THE WITNESS: It's reflected in paragraph 133 and in the tabs, particularly 3, 4, and 5. But the tabs are not at the granular level that I think are of interest to you.
BY MR. BRIDGES:
Q. What do you mean by the "granular level" that would be of interest to me?
A. I don't think it breaks out publications by standard, for instance.
Q. Does it break out publications by whether a standard has been incorporated by reference or not?
A. I don't think so.
Q. Does it break out by whether a standard has been publicly made available by defendant or not?
A. I don't think so. Not in tabs 3, 4, and 5.
Q. How do you establish causation between defendant's activities and any of the data that you provide in section -- in

paragraph 133?
MR. FEE: Objection. Calls for a legal conclusion. Form.
THE WITNESS: One can and should look at all evidence available, including circumstantial evidence. I don't have direct information about the precise impact of defendant's activities, but I have important information that bears on that issue, including information that's in deposition transcripts.
BY MR. BRIDGES:
Q. So my question is, how do you -- do you -- strike that.
Are your conclusion -- are you making conclusions in paragraph 133 about the cause of changes in sales of the plaintiffs' products?
MR. FEE: Objection to form.
THE WITNESS: Not definitively. I have observations about the magnitude and trend of the downloads of -- through defendant's sites. I have some information on the downloads

of certain of the standards. I've presented that.
I don't have direct evidence of the precise impact historically of defendant's activities on plaintiffs' financials.
BY MR. BRIDGES:
Q. What evidence of any kind do you have of any kind of impact historically of the defendant's activities on plaintiffs' financials?
MR. FEE: Objection to form.
THE WITNESS: That which is reported in paragraph 133, that of which is contained in deposition testimony, and that of which I summarized in other parts of the report.
BY MR. BRIDGES:
Q. So when you're referring to deposition testimony, you're referring to the citations to the footnotes in paragraph 133?
A. No, I don't think it's just limited to that. I think there's some other deposition transcripts that talk about the

impact or potential impact of defendant's activities on each one of the plaintiffs.
Q. Did you make any independent assessment of causation of any financial effects on plaintiffs by the defendant's activities?
MR. FEE: Objection to form. Calls for a legal conclusion.
THE WITNESS: What do you mean by the term of "independent assessment of causation"?
BY MR. BRIDGES:
Q. You, as an expert, not relying just on what other people have said or speculated or thought.
MR. FEE: Same objections. Plus compound.
THE WITNESS: We experts rely on other information to draw the conclusions that we do, and then we bring our training to it. So our observations shouldn't be in a vacuum.
BY MR. BRIDGES:
Q. But they should be objective, correct?

A. Yes.
Q. And that means perhaps not relying upon the views of the parties to the lawsuit alone, but doing independent analysis and research, correct?
MR. FEE: Objection to form.
THE WITNESS: I think one can and should evaluate and consider the views of the parties, but not limited investigation to that.
BY MR. BRIDGES:
Q. So what independent analysis and research did you do other than reviewing the views and statements of the parties in this case?
MR. FEE: Objection. Vague.
THE WITNESS: I reviewed and summarized the data, as you see in 133, that I had at my disposal. I reviewed writings about the impacts.
And I took important information from the fact that the plaintiffs have brought this lawsuit. The plaintiffs don't want this activity to continue. That is

A. I took all the data --
MR. FEE: Objection. Form. Objection to form.
THE WITNESS: I took all this data into account. That's why I reported it here.
BY MR. BRIDGES:
Q. And the data that you identified in the footnotes in paragraph 134 -- sorry -- 133?
A. Yes, I considered that information.
Q. Do you know in what year the defendant posted the 2008 version of the National Electrical Code on its Web site?
A. I don't know with absolute certainty. I do know a number of the alleged activities occurred in late 2012. I don't know if it's specific to that code or not.
Q. Does it matter to your analysis exactly when the defendant posted the 2008 National Electrical Code on its Web site or to Internet Archive?
A. I would --
MR. FEE: Objection to form.

revealed preference information that's quite important.
BY MR. BRIDGES:
Q. Tell me about what you mean by repealed -- sorry. Strike that.
Tell me what you mean by "revealed preference."
A. What people do often provides information on what their preferences are.
Q. And so the fact that plaintiffs brought this lawsuit has revealed to you that they prefer to bring the lawsuit, correct?
MR. FEE: Objection. Vague.
THE WITNESS: Given the cost, they prefer to bring the lawsuit rather than not bring it, yes.
BY MR. BRIDGES:
Q. What else -- strike that.
What are the data you're referring to in page -- strike that.
What are the data you're referring to in paragraph 133 that you took into account in discussing or analyzing effects of defendant's activities on plaintiffs?

THE WITNESS: I would consider that information if I had it, but I don't have any reason to think that it would change any of the conclusions that I drew.
BY MR. BRIDGES:
Q. The timing of when the defendant posted certain matters wouldn't change your conclusions?
A. Not based on what I know right now. My understanding is that much of the activity occurred in 2012, the later half of 2012, and I still have the whole body of evidence that I have considered. So I'm not sure if the precise timing would change, but I certainly would consider that.
Q. Do you know in what year Public.Resource.Org posted the 2011 version of the National Electrical Code?
A. Same answer to the question that you had with regard to the 2008 code.
Q. Can you look at the data in your -- the tables attached to your report and see if that helps refresh your memory as to when the defendant posted NEC 2008 and

A. I can't be any more specific than that.
Q. What aspect of your training regarding aspects of industrial organization have you brought to bear on this case?
A. I can't be any more specific than that.
Q. But you did bring the theory of reveal -- revealed preferences to bear on this case, correct?
A. Yes.
Q. What other economic theories do you recall bringing to bear on this case?
MR. FEE: Objection. Asked and answered.
THE WITNESS: Everything that I've --
MR. FEE: And vague.
Go ahead.
THE WITNESS: -- I've learned in my training, both educational training and career training.
BY MR. BRIDGES:
Q. Can you be more specific than that?

A. No.
* * *
(Jarosz Exhibit 4 marked for identification.)
* * *
BY MR. BRIDGES:
Q. Mr. Jarosz, do you recognize Exhibit 4 as a document that you produced in response to a subpoena in this case?
A. Yes.
Q. What is this document?
A. It appears to be a summary over the years 2009 through 2013 of dollars and quantity of NFPA standards that were sold in the marketplace.
Q. Based upon the trends that you see in this exhibit, can you estimate when you believe it is most likely that the defendant first published -- strike that.
Based upon the trends that you see in this Exhibit 4, can you estimate when you believe it is most likely that the defendant first posted each of the standards identified here?
A. I don't think so, not based

just on this information.
Q. What else would you need?
A. I don't know, because I think it's probably a very easy factual question to determine when the downloading first occurred, so I don't know why one would need to back into it.
Q. Well, when -- would one be able to use sales trends as a way of identifying likely effects of a posting of each standard by the defendant?
MR. FEE: Objection. Vague. Compound.
THE WITNESS: Maybe; maybe not.
BY MR. BRIDGES:
Q. Why do you say "maybe; maybe not"?
A. I just wouldn't think to do it that way, so I don't know what you exactly have in mind.
Q. Do you associate the posting of standards by defendant with changes in sales volume of the standards that the defendant has posted?
MR. FEE: Objection to form.

THE WITNESS: I don't know what you mean by that question.
BY MR. BRIDGES:
Q. You don't understand the question?
A. I do not.
Q. Can you correlate the posting of standards by defendant with any changes in sales volumes of the standards that the defendant has posted?
MR. FEE: Objection to form.
THE WITNESS: I don't think I've attempted to compute the correlation coefficient here associated with postings.
BY MR. BRIDGES:
Q. I'm not asking for a specific correlation coefficient. I'm just asking, generally, can you correlate the posting of standards by defendant with any changes in sales volumes of the standards that defendants has -- that the defendant has posted with reference to Exhibit 4?
A. I don't know --
MR. FEE: Objection. Form.

THE WITNESS: I don't recall attempting to do that. And I wouldn't necessarily think that the historical impact would -- is the end of the story as to the harm here.
BY MR. BRIDGES:
Q. Is historical impact part of the story as to the harm here?
A. Yes.
Q. What -- what can you say by looking at Exhibit 4 about the historical impact of the posting of the defendant -- of the plaintiffs' standards by the defendant?
A. I don't know that I can say much, because I believe the postings largely occurred in late 2012, and I only have one period after that.
Q. If it turns out that defendant's postings were well before 2012, would that affect your analysis of the trends in sales data of the plaintiffs' publications?
MR. FEE: Objection to form. Compound. Vague.
THE WITNESS: Maybe. I would

consider that information in conjunction with these data if you wanted me to.
BY MR. BRIDGES:
Q. How -- what -- what would change?
A. I don't know. I haven't done that analysis.
Q. Have you verified the dates on which plaintiffs -- strike that.
Have you verified the dates at which defendant posted the various standards to its Web site or to Internet Archive?
A. I don't --
MR. FEE: Objection. Vague.
THE WITNESS: I don't recall verifying it.
And are you asking did I separately go out and determine what that date is and see if that was the same as what was represented in the Complaint, for instance?
BY MR. BRIDGES:
Q. Yes.
A. No, I don't recall doing that.

Q. Have you determined in any way the dates at which defendant posted various standards to its Web site or to the Internet Archive?
A. I don't recall doing a separate analysis of that, no.
Q. How did you learn about the dates at which defendant posted various standards to its Web site or to Internet Archive?
A. I had conversations with counsel on that topic, and I may have seen that information contained in certain documents like the Complaint, but I don't recall.
Q. Did you rely upon information regarding those dates from conversations with counsel?
MR. FEE: In arriving at his opinions, you're asking?
MR. BRIDGES: Arriving at his understanding of the facts.
THE WITNESS: I don't know that I did, because I don't recall reporting those specific dates

anywhere in my report.
BY MR. BRIDGES:
Q. Do you recall taking specific dates into account in analyzing the effect of defendant's actions?
MR. FEE: Objection to form. Vague.
THE WITNESS: I don't recall one way or the other.
BY MR. BRIDGES:
Q. Do you know how -- strike that.
Do you know how much revenue each plaintiff derives from the standards at issue in this case?
A. I don't think I know that precise number.
Q. Did you -- did you ever know that number?
A. I don't think so.
Q. Did you ever know how much revenue each plaintiff derives from standards that have been incorporated into law?
A. As opposed to those that have not been incorporated? Is that --
Q. Well, I'm -- I'm asking about

those standards that have been incorporated in the law. I'm asking if you know how much revenue each plaintiffs derives -- each plaintiff derives from those standards.
A. I don't --
MR. FEE: Objection. Form.
THE WITNESS: -- think I know that number, and I'm not sure the plaintiffs know that number.
BY MR. BRIDGES:
Q. Do you know the percentage of revenue that each plaintiff derives from standards that have been incorporated into law?
MR. FEE: Objection to form.
THE WITNESS: I don't think I do, and I don't believe the plaintiffs do.
BY MR. BRIDGES:
Q. Are you aware of any difference in profitability to plaintiffs between those standards that have been incorporated into law and those standards that have not been incorporated into law?
MR. FEE: Objection to form.

THE WITNESS: I don't believe so.
BY MR. BRIDGES:
Q. Do you know -- strike that.
Are you aware of any difference in profitability to plaintiffs between those standards that defendant has posted to the Internet and those standards that defendant has not posted to the Internet?
MR. FEE: Objection to form.
THE WITNESS: I don't believe so. And as with the previous question, I don't think the plaintiffs have that information at their disposal.
BY MR. BRIDGES:
Q. For each plaintiff, what do you understand to be the percentage of gross revenue from the sale of standards?
MR. FEE: Objection to form.
THE WITNESS: I -- I've reported that in my report. My memory is that it's something on the order of 66 percent for ASTM and for NFPA. And if you add in memberships, it's

something just north of 50 percent for ASHRAE.
BY MR. BRIDGES:
Q. What do you mean by "if you add in memberships"?
A. I'm not -- I'm not quite sure what you're asking me to define.
Q. I'm asking you to explain the phrase that you just used, "if you add in memberships." What did that mean?
A. I talked about that in my report. Membership fees are a fairly good recollect -- a fairly good reflection of amount that would have been paid for publications. In other words, publication fees -- it -- let me start this over again.
It makes about as much sense to become a member of ASHRAE as it is to buy some of the individual publications. As a result, many people choose to become members rather than just buying the publication, as I understand it.
Q. How did you learn that?
A. Having knowledge of the -- of the price difference and through discussions

with people at ASHRAE.
Q. How did you learn about the price difference?
A. I don't recall how I learned it, but I report it in my report based on certain documents I've seen. Perhaps I learned it from their Web site.
Q. Did you do any surveys of ASHRAE members to validate that assumption?
A. I'm sorry. Validate what assumption?
Q. About purchase of a membership instead of buying the publication.
A. I'm not sure that there's an assumption in there. My understanding is that ASHRAE people are of the belief that many people buy membership rather than individual publications.
Q. And in your work, did you assume that?
A. I didn't assume that. I worked on that -- under that understanding.
Q. Oh, it's an understanding, but not an assumption?
A. Yes.

A. I don't think I know that number.
Q. What percentage of plaintiffs' operating expenses do you associate with the plaintiffs' development of standards generally?
A. I don't think I know that number.
Q. Do you have any estimates of any of those numbers that you just said you don't think you know?
MR. FEE: Objection to form.
THE WITNESS: Not sitting here right now.
BY MR. BRIDGES:
Q. Did you at one point ever determine those numbers?
A. Not that I recall.
Q. Do you know what percentage of the staff or employees of each plaintiff has worked on the development of standards at issue in this case?
MR. FEE: Objection to form.
THE WITNESS: I don't think I know that number.

BY MR. BRIDGES:
Q. Do you know what percentage -- do you have an estimate?
A. No.
MR. FEE: Objection to form.
THE WITNESS: Not as I sit here, no.
BY MR. BRIDGES:
Q. Do you know what percentage of the staff or employees of each plaintiff has worked on the development of standards incorporated into law?
MR. FEE: Objection to form.
THE WITNESS: Not as I sit here right now.
BY MR. BRIDGES:
Q. Do you have an estimate?
A. Not as I sit here right now.
Q. Do you know what percentage of the staff or employees of each plaintiff has worked on the development of standards in general?
A. Not as I sit here right now.
Q. Do you have an estimate?
A. Not as I sit here right now.

Q. Have you ever had access to any information that I've asked in the last several questions?
MR. FEE: Objection to form.
THE WITNESS: I don't believe so.
BY MR. BRIDGES:
Q. Do you know whether plaintiffs prepare standards through joint sponsorship with any other organizations?
MR. FEE: Objection. Vague.
THE WITNESS: I think I may have seen a reference to that. I don't know the extent to which it occurs, but I wouldn't be surprised to be reminded that it does occur.
BY MR. BRIDGES:
Q. Are you aware of any, as you sit here?
A. Not as I sit here right now, but I think I'm aware that it has occurred.
Q. Do you know whether plaintiffs receive grants, revenue, or stipends from governments that use, reference, or adopt their standards?

MR. FEE: Objection to form.
THE WITNESS: There are grant monies that go to NFPA. I don't know the source of those grants. I don't see a line for grant revenues for the other two organizations.
BY MR. BRIDGES:
Q. Did you ask any of the plaintiffs about the revenues or expenses they have specifically attributable to the standards that defendant has posted to the Internet?
MR. FEE: Objection to form.
THE WITNESS: We generally talked about that topic with each plaintiff, and I don't think the plaintiffs know that amount. They undertake activities that are standards oriented. They don't know which of those standards will be incorporated by reference.
BY MR. BRIDGES:
Q. Did you --
A. Or which have been. I don't think they systematically track those.

foundation.
THE WITNESS: I would like to understand the facts that you're positing right now.
BY MR. BRIDGES:
Q. Well, we're not going to take time to go look at a Web site right now, so I'm asking you based on what you know.
Do you have an explanation as to why the resource cited in footnote 95 actually shows that 44 state -- the 44 states adopted the International Energy Conservation Code?
MR. FEE: Objection. Lack of foundation.
THE WITNESS: I don't know if your factual representation is accurate or not, and I don't recall investigating that particular issue.
BY MR. BRIDGES:
Q. Have you made any effort to determine what resources were expended, incurred, or contributed by parties other than ASHRAE in the development of standard 90.1?

MR. FEE: Objection to form.
THE WITNESS: I generally understand that there were many members who participated in that. I think I reported earlier in the report the number of hours and other indications of activity undertaken by members.
BY MR. BRIDGES:
Q. My question is, have you made any effort to determine what resources were expended, incurred, or contributed by parties other than ASHRAE and ASHRAE members in the development of standard 90.1?
MR. FEE: Same objection.
THE WITNESS: I didn't realize that you had in your original question "and other than ASHRAE members."
BY MR. BRIDGES:
Q. I didn't. Now I -- now my question does.
A. Beyond that, I don't recall undertaking that investigation, meaning beyond ASHRAE and its members.
Q. Have -- are you aware of any

change in membership sales by ASHRAE over the past ten years?
A. I don't think I have data that goes as far as ten years ago. I do have information on ASHRAE membership revenue back to 2012. That's summarized in tab 5.
Q. And that membership figure has risen each year since 2012, correct?
A. Yes. Slightly each year, it has risen.
Q. Do you draw any conclusions with respect to this case from that trend?
A. I don't think so.
Q. Have you calculated the effects -- the financial effect on the plaintiffs of the incorporation into law of their standards?
MR. FEE: Objection to form.
THE WITNESS: No, I don't think I've independently -- I don't think I've separately done that.
BY MR. BRIDGES:
Q. Are you aware of any data regarding the financial effect on the plaintiffs of the incorporation into law of

their standards?
MR. FEE: Same objection.
THE WITNESS: I'm aware that the plaintiffs benefit greatly by incorporation by reference, but I don't know that I've seen a quantitative study of that topic.
BY MR. BRIDGES:
Q. What do you understand about the benefits that accrue to plaintiffs by incorporation by reference?
A. Some of those are laid out in my report on pages 19 through 26. I have a particular section called "Benefits of Incorporation" that starts at page 20.
Q. Well, I'm asking you, what benefits accrue to the plaintiffs from incorporation by reference?
A. Generally, it allows each one to satisfy its mandate of providing services to the entirety of the industry that it focuses its attention on. And so it allows for the collection and then dissemination of standards that allow and achieve outcomes that are good for the industry.

Q. What other benefits do plaintiffs gain from incorporation by reference of their standards?
A. I think that generally covers it. I may be forgetting things that are laid out in my report, but that's what covers it, to the best of my memory right now.
Are we at a good point for a break?
Q. If you want. Sure.
A. Thanks.
THE VIDEOGRAPHER: Off the record at 3:12. This is the end of media unit number 2.
* * *
(Recess from 3:12 p.m. to 3:41 p.m.)
* * *
THE VIDEOGRAPHER: On the record at 3:41. This is the beginning of media unit number 3 in the deposition of John Jarosz.
* * *
(Jarosz Exhibit 5 marked for identification.)

* * *
BY MR. BRIDGES:
Q. Mr. Jarosz, I've handed you Exhibit 5. This is an article that you cited in your report, correct?
A. Yes, I believe so.
Q. Do you recall how this article came to your attention?
A. I do not.
Q. Is this an article that you understand to have been published by plaintiff ASHRAE in its journal?
A. Yes, that's my understanding.
Q. And this is an article you relied upon with respect to the development of standard 90, which became standard 90.1, correct?
A. Yes.
Q. In paragraph 133 of your report, you talk about a number of downloads -- strike that -- you talk about a number of documents accessed through Public Resource's Web site. Do you see that?
A. I talk about the number of ASTM documents that are -- that were accessed over

a particular period.
Q. And then you do the same for NFPA documents, correct?
A. Yes.
Q. What do you calculate as the dollar value of harm to the -- to ASTM from the accesses and downloads that you refer to in paragraph 133?
A. I haven't calculated that harm.
Q. Why not?
A. I'm not sure if I can at this stage. One estimate would be those number of downloads times the -- well, actually, no, let me take that back. I just don't know how to do it.
Q. Can you be certain that these accesses or down -- and downloads referred to in paragraph 133, in fact, resulted in economic loss to ASTM?
MR. FEE: Objection to form.
THE WITNESS: Not with absolute certainty, but with reasonable certainty I can say some -- in some number of these instances, it's likely the case that the -- that the

information would have been obtained from ASHRAE in -- or ASTM, rather, in -- through legal means.
BY MR. BRIDGES:
Q. Would that -- in those instances where you say that the information would have been obtained from ASTM through legal means, can you put a dollar value on -- or even an estimate of the increased revenue that ASTM would have gotten from those instances where people obtained the information from ASHRAE -- sorry -- from AST --
MR. FEE: Object --
BY MR. BRIDGES:
Q. -- from ASTM?
MR. FEE: Objection to form.
THE WITNESS: No, not based on the information I have. I don't think I have any indication of who was doing the downloading and why.
BY MR. BRIDGES:
Q. And do you know what alternatives persons who were doing the downloading may have had for obtaining the

information?
A. Not with certainty, because I don't know who those persons were, but I would expect one alternative would be to obtain it properly, directly from ASTM.
Q. Would that have resulted in more revenue to ASTM?
A. It may have. If they're materials that were taken improperly that would have been paid for, then that would represent a loss of revenue to ASTM.
Q. Do you know whether any of the persons who obtained this information from defendant would have paid for the information from ASTM?
A. No, not with certainty, because I don't know the identity of the downloaders or the reasons for their downloading.
Q. Moreover, those persons might have accessed the standards from ASTM's reading room for free and with no revenue to ASTM, correct?
A. You mean in a but-for world? Had they not done what they actually did, alternatively they could have gone to the

free reading room?
Q. Right.
A. That's a possibility, yes.
Q. Do you have an understanding as to why persons would want to download a file of a standard instead of viewing it at one of the plaintiffs' reading rooms?
A. Not with absolute certainty, but I would imagine downloading would allow more flexibility in referring to the standard and using it and sharing that information with others, whereas reading it in -- through an Internet site is somewhat less flexible, provides less flexibility for the use of that information.
Q. What did -- what do you understand to be the difference in flexibility between possession of a download and access to a standard through a reading room?
A. Well, I think that a download typically has a document that's in hard-copy form. Copies can made -- be made of that and distributed. Reading things just online doesn't allow for the wide distribution and

more extended use of that document.
Q. Do you have any evidence about wide distribution of plaintiffs' standards as a consequence of defendant's actions?
A. I do not.
Q. Have you reviewed any studies that would allow you to establish any connection between the number of accesses or downloads that Public Resource made possible and any financial harms to the plaintiffs?
MR. FEE: Objection to form.
THE WITNESS: I don't think I've seen any study on that, no.
BY MR. BRIDGES:
Q. Have you conducted any studies that would have allowed you to establish any connection between the number of accesses or downloads that Public Resource made possible and any financial harms to the plaintiffs?
MR. FEE: Objection to form.
THE WITNESS: Not other than what's contained in my report.
BY MR. BRIDGES:
Q. Please turn to page 45, paragraph 107, which spills into page 108.

MR. FEE: Page 108?
THE WITNESS: I'm sorry. Page 108 or paragraph?
BY MR. BRIDGES:
Q. I'm sorry. Paragraph -- strike that.
Let me ask you to turn paragraph 107 on pages 45 to 46.
A. Okay. I'm there.
Q. I just want to make sure I understand your language correctly at the bottom of page 45 and the top of page 46.
Is it your opinion that the copyright that the plaintiffs assert in their standards drives sales of other publications other than the standards themselves?
MR. FEE: Objection. Form. Vague.
THE WITNESS: I think they're important for driving sales of publications that embody those standards. I don't know that I've drawn a conclusion that it drives the sale of other products, but that makes some sense.

BY MR. BRIDGES:
Q. Well, doesn't that sentence at the bottom of 45 and going on to 46 say that copyright on plaintiffs' standards drive sales of "handbooks that provide commentary on the standards by referring to them"?
A. You haven't read --
MR. FEE: Objection. Mischaracterizes the document.
THE WITNESS: You haven't read the whole sentence. I see that sentence to which you refer.
BY MR. BRIDGES:
Q. Right. I know I haven't read the whole sentence, but didn't I fairly capture one part of it, which is the sales of -- strike that -- that copyright on plaintiffs' standards drives sales of, among other things, "handbooks that provide commentary on standards by referring to them"?
MR. FEE: Same objection.
THE WITNESS: I think you have generally paraphrased it accurately, yes.

BY MR. BRIDGES:
Q. And that plaintiffs' copyright protection -- this is the top of -- strike that.
And turning to the top of page 46, plaintiffs' copyright protection on their standards provides plaintiff with a competitive advantage with respect to what you call value-added publications, correct?
A. You've read part of a sentence, but I do see that sentence, yes.
Q. And I've fairly paraphrased it correctly, correct?
MR. FEE: Objection to form.
THE WITNESS: I think, generally, yes.
BY MR. BRIDGES:
Q. Do plaintiffs, to your understanding, have separate copyrights in those value-added publications, such as commentaries and handbooks?
A. I don't know.
Q. You don't know?
A. Correct. I do not know.
Q. Is it important to you to know

whether plaintiffs have copyright in -- rights in their value-added publications?
MR. FEE: Objection. Vague.
THE WITNESS: I would be curious to know that, but I'm not sure of the significance. I don't think it would change my conclusions, but I would be curious to know that.
BY MR. BRIDGES:
Q. Do you know whether incorporation into law drives -- strike that.
Do you know whether incorporation into law of plaintiffs' standards drives sales of plaintiffs' standards?
MR. FEE: Objection to form. Vague.
THE WITNESS: I don't know with absolute certainty, but it would make some sense to me.
BY MR. BRIDGES:
Q. Is it your understanding that it does?
MR. FEE: Same objection.
THE WITNESS: It would make

some sense to me, yes.
BY MR. BRIDGES:
Q. Are you aware that, in some instances, at least one plaintiff uses the legal status of its code to promote the sale of handbooks?
MR. FEE: Objection to form.
THE WITNESS: I don't know one way or the other. I don't have reason to dispute it, but there's not a particular instance that comes to mind right now. Maybe you have something to refresh my memory.
BY MR. BRIDGES:
Q. Can you provide a dollar value benefit that plaintiffs receive economically from the incorporation of their standards by reference?
MR. FEE: Objection. Vague. Form.
THE WITNESS: I want to make sure that I'm understanding. Could you read that back, please?
BY MR. BRIDGES:
Q. I'll restate it.

Can you provide a -- can you put a dollar value, even an estimate, on the economic benefit that plaintiffs receive from incorporation of their standards into law?
MR. FEE: Objection to form.
THE WITNESS: I have not. And I'm not sure how one would do that, subject to thinking more about it.
BY MR. BRIDGES:
Q. At the top of page 46, you say, "The Plaintiffs' copyright protection on their privately-developed standards provides a competitive advantage with regard to the sale of these value-added publications as the copyright protection limits the ability of others to sell those publications unless they are unwilling [sic] to compensate the Plaintiffs for such use."
MR. FEE: Objection.
Mischaracterizes the statement.
BY MR. BRIDGES:
Q. Is there something unfair about my characterization of that statement?
A. I think you read it wrong. You read "willing" to read "unwilling" for some

reason.
Q. Oh, I'm sorry. Thank you. I'll restate the sentence.
"In particular, the Plaintiffs' copyright protection on their privately-developed standards provides a competitive advantage with regard to the sale of these value-added publications as the copyright protection limits the ability of others to sell those publications unless they are willing to compensate the Plaintiffs for such use."
Do you see that statement?
A. I do, yes.
Q. And the competitive advantage you've identified there, whom do you understand to be the competition?
A. Other potential providers of these so-called value-added publications.
Q. And what -- when you say "value-added publications," please give me more examples of what types of things fall into that category, as you use the term.
A. Examples would be handbooks that provide commentary on the standards.

Q. What else?
A. That's what comes to mind.
Q. Anything else?
A. Not this moment, no. I guess, potentially, when I think some more about it, training and seminars, for instance.
Q. Providers of training and seminars?
A. Yes. So that's broader than value-added publications, but there are potentially alternative providers of training and seminars.
Q. In paragraph 109, you say, "In addition to direct sales of copyrighted materials, the Plaintiffs' materials associated with their privately-developed standards provide a competitive advantage with regard to the sale of downstream ancillary/complementary services and products."
Do you see that?
A. Yes. That's what I had in mind.
Q. And who are the competitors you have in mind in paragraph 109?

A. I don't know particular names, but -- at least I don't recall any sitting right now -- sitting here right now, but I think there are other providers of these downstream services and products.
Q. And please give me examples of what you're calling "downstream services and products."
A. Again, seminars and training, for instance.
Q. Anything else?
A. That's what comes to mind right now.
Q. Turning to paragraph 110, you state, "I understand that the ability to control these downstream products and services is particularly important to the Plaintiffs here because the barriers to entry in the marketplace for downstream products, such as training and user manuals, are relatively low. For example, according to Mr. Comstock of ASHRAE, it is relatively easy for unauthorized instructors to read a standard and become (or think that they have become) qualified to provide training or

guidance on that standard."
Do you see that?
A. I do, yes.
Q. What do you understand -- what did you mean by "unauthorized instructors"?
A. People that have provided or trying to provide services to the marketplace that have not been explicitly approved by, for instance, ASHRAE.
Q. What do you understand the -- the nature of -- strike that.
You called them "instructors," correct?
A. Yes.
Q. Does that mean that you envision that these persons are providing some kind of instruction?
A. Yes.
Q. What instruction do you understand -- what instruction did you have in mind when you referred to "unauthorized instructors"?
A. Generally, how best to implement standards or provisions of certain standards.

Q. What else?
A. Nothing else comes to mind right now.
Q. Would your understanding of "unauthorized instructors" include persons who were instructing the public as to what the standards require?
MR. FEE: Objection to form. Vague.
THE WITNESS: I didn't have that in mind. I guess that's a possibility.
BY MR. BRIDGES:
Q. And would it be relatively easy for unauthorized persons like that to read a standard and think that they have become qualified to provide training or guidance on that standard?
MR. FEE: Objection. Vague.
BY MR. BRIDGES:
Q. Is that your understanding?
A. According to Mr. Comstock, I believe that's correct.
Q. What do you believe?
A. I have no reason to doubt him.

Q. You're just parroting what Mr. Comstock said, or did you have an independent view?
A. No, I heard what he said, and it made sense to me.
Q. So you put it in your report?
A. Yes.
Q. What independent thought or investigation did you do before you put that in your report?
MR. FEE: Objection. Vague. Compound.
THE WITNESS: I can't point to anything in particular.
BY MR. BRIDGES:
Q. Would a law-school course on the law and regulation of building construction provide instruction to law students?
MR. FEE: Objection. Vague. Calls for speculation.
THE WITNESS: I guess it could. I have a hard time imagining there would be much demand for such a course, but I'm in general agreement

that that, in concept, could occur.
BY MR. BRIDGES:
Q. Would it be possible to envision that, in the course of such teaching, a teacher may wish to analyze some of plaintiffs' standards that have been incorporated into law as law and as regulation?
MR. FEE: Objection. Calls for speculation. Vague. Form.
THE WITNESS: I guess that's possible, but I would expect a law professor would be talking about legal implications, not the technical aspects of a standard. I think they might talk about the implication in a business that's different from a vendor business.
BY MR. BRIDGES:
Q. Well, what about the legal implications of a code for contractors?
MR. FEE: Objection.
BY MR. BRIDGES:
Q. Is that -- is that fair ground for a law professor to discuss with law

likely?
A. I haven't quantified that, but I would expect that it's -- more than 5 percent would be a reasonable definition of "expected."
Q. More than 10 percent?
A. I don't know. I've not quantified that number.
Q. And what amount of an effect on plaintiffs' revenues have you identified as "material"?
A. I haven't --
MR. FEE: Objection to form.
THE WITNESS: -- been able to quantify the specific effects, so I don't know the amount.
BY MR. BRIDGES:
Q. Well, what -- I'm not asking for your quantification of a specific effect, but how large would an effect have to be for to you consider it "a material adverse effect on Plaintiffs' remedies"?
MR. FEE: Objection to form.
THE WITNESS: I don't know that I have a particular quantitative

guideline in mind.
BY MR. BRIDGES:
Q. Have you ever -- are you familiar with audit inquiry letters regarding litigation?
A. Generally, yes.
Q. And you're familiar with the fact that auditors will often specify to those they send the letters to what amounts would be material for purposes of the audit response?
A. Yes.
Q. So you understand the concept of certain amounts being material to certain companies or entities?
A. Yes, for certain purposes.
Q. So I'd like to know what amount you have identified as being material as an adverse effect on plaintiffs' revenues for each of the three plaintiffs, please.
MR. FEE: Objection. Compound. Asked and answered.
THE WITNESS: I have not considered a particular amount.
BY MR. BRIDGES:

Q. Do you consider $100,000 to be material as an adverse effect on plaintiffs' revenues?
MR. FEE: Objection to form. Compound.
THE WITNESS: I haven't considered that question. I don't know the answer to it.
BY MR. BRIDGES:
Q. Have you considered whether 50,000 is a material amount as an adverse effect on plaintiffs' revenues?
MR. FEE: Same objections.
THE WITNESS: Same answer.
BY MR. BRIDGES:
Q. Starting at page -- sorry. Strike that.
Starting at paragraph 139, you make several references to Mr. Malamud's theory.
A. I'm sorry. To -- I missed a word that you said. References to his what?
Q. To Mr. Malamud's theory --
A. Okay.
Q. -- T-H-E-O-R-Y. You refer to

it in paragraph 139; 140; 144, with the word "theorized"; 145, "theory"; 146, "theory."
What facts do you have that have disproved the theory in paragraph 139?
A. Perhaps most important is the revealed preference information. If the plaintiffs believed they were better off by lack of copyright protection, they would have pursued such a model.
They don't believe they're better off. Moreover, they're expending tremendous resources in bringing and pursuing this litigation to halt the activity at issue.
Q. What other facts, if any, do you have that have disproved Mr. Malamud's theory in paragraph 139?
A. That's what comes to mind right now.
Q. What facts do you have or are you aware of that have disproved Mr. Malamud's theory as you refer to it in paragraph 140?
A. That's the same theory that's being referenced in 139, so there's nothing

new in terms of a theory.
Q. Do you have the same answer with respect to -- strike that.
What facts do you have -- strike that.
What facts are you aware of to disprove -- to disprove Mr. Malamud's theory that you refer to in paragraph 144?
A. Again, it's the same theory that's being referenced, but there's additional facts; and that is, the downstream products and services aren't particularly substantial to these plaintiffs and don't appear to be enhanced by a lack of copyright protection; that is, the plaintiffs have had copyright protection and have said -- had some downstream products and services. It's hard to imagine that elimination of that copyright protection will enhance that business.
Q. It's hard to imagine, but are you aware of any studies to disprove Mr. Malamud's theory?
A. No.
MR. FEE: Objection. Vague.

THE WITNESS: I'm sorry.
BY MR. BRIDGES:
Q. Have you conducted any studies to disprove Mr. Malamud's theory?
MR. FEE: Same objection.
THE WITNESS: Not other than what's reflected here in Exhibit 1.
BY MR. BRIDGES:
Q. What academic literature have you relied upon to criticize Mr. Malamud's theory in paragraph 144?
A. Nothing specific comes to mind.
Q. In paragraph 145, you state that, "Mr. Malamud's suggestion that the sale of downstream products and services represents an untapped and undeveloped opportunity for the Plaintiffs is incorrect."
Do you see that?
A. Yes, I do.
Q. And then you go on and make some statements for the rest of the paragraph, correct?
A. Yes.
Q. What studies did you engage in to determine the facts that you stated in the

rest of that paragraph?
MR. FEE: Objection. Vague.
THE WITNESS: I looked at the financial information, and I talked to people at the various plaintiffs.
BY MR. BRIDGES:
Q. You talked to people at the various plaintiffs?
A. Yes.
Q. What did you do to verify the truth and accuracy of the things that various plaintiffs said to you in their conversations?
MR. FEE: Objection to form.
THE WITNESS: I looked at the financial information, and I kept my eyes and mind open to the information in the rest of the record to determine if it conflicted with what I learned from the company personnel.
BY MR. BRIDGES:
Q. Whose financial information did you look at?
A. All three of the plaintiffs. It's summarized in tabs 3, 4, and 5.

Q. Did you look at the financial information of any entities other than the plaintiffs?
A. I looked at Public Resource financial information.
Q. Apart from Public Resource and the plaintiffs, did you look at the financial information of any other entities in making the assertions that you made in paragraph 145?
A. Not in undertaking my assignment here.
Q. Did you consider the business models of any entities other than the plaintiffs and the defendant in making the statements criticizing Mr. Malamud's theory in paragraph 145?
A. Nothing in particular comes to mind. I understand that there are front-loaded business models, but -- at DIN, for instance, but I don't recall undertaking an investigation of the downstream activities that they have.
Q. Did you undertake any investigation of downstream activities of

A. Yes. It's a different entity than the SDOs here; but for its purposes, it would appear that it's of the belief that that's the optimal path to follow.
MR. BRIDGES: I think -- I think we may pause things now and reserve the remainder of our time.
Just a second. Oh, yes.
BY MR. BRIDGES:
Q. Do you believe that the plaintiffs are harmed when the defendant posts a standard that has been incorporated by reference -- let me strike that.
Do you believe that plaintiffs suffer harm from defendant posting a standard that is not the latest version of the standard?
MR. FEE: Objection. Form. Compound.
THE WITNESS: Potentially, it could cause confusion in the marketplace as to what's the latest standard, and there may be some entities out there that are interested in obtaining an earlier standard that

would be obtaining it free rather than through the legal routes established by the plaintiffs.
BY MR. BRIDGES:
Q. Have you done any studies to determine what confusion may be likely in the marketplace in that regard?
MR. FEE: Objection to form.
THE WITNESS: I have not done a likelihood of confusion study, no.
BY MR. BRIDGES:
Q. What research have you done as to whether -- strike that.
What information do you have about what market there is for earlier versions of standards when there is a newer version in the market?
MR. FEE: Objection to form.
THE WITNESS: I don't recall undertaking specific research on that topic.
BY MR. BRIDGES:
Q. What harm do you understand plaintiffs would suffer if defendants post a standard that is out of print?

MR. FEE: Objection. Lack of foundation. Vague.
THE WITNESS: I'm not -- I'm not sure that I understand the concept of a standard being out of print, so maybe you could help me with that.
BY MR. BRIDGES:
Q. Do you know the term "out of print"?
A. Generally, I do, yes.
Q. What do you understand it to mean?
A. That it's no longer provided in print form.
Q. All right. So what harm do you understand plaintiffs would suffer if defendants posted a standard that is out of print?
MR. FEE: Objection to form.
THE WITNESS: Potentially, it could be the harm similar to outdated standards.
BY MR. BRIDGES:
Q. In other words, confusion in the marketplace?

A. Potential confusion in the marketplace and potentially providing -- yes, that -- that would be one form of it.
Q. What other harms do -- would you identify from the defendants posting a standard that is out of print?
A. Nothing else comes to mind this moment, but there could be other things that -- that I'm not thinking of right now.
Q. What harms do you understand plaintiffs would suffer if a condition of a standard being incorporated into law is that plaintiffs could not forbid other entities from making that law available widely and freely to the public?
MR. FEE: Objection to form. Incomplete hypothetical. Compound. Calls for speculation.
THE WITNESS: I don't know. I've not undertaken that assignment. I've not given that particular question any thought.
It seems economically to be quite similar to the actions that have occurred here, but I don't know. I've

not thought about that particular topic.

MR. BRIDGES: Okay. I think we'll pause here and reserve the rest of the time for a later visit with you, Mr. Jarosz.

Kevin, this is in reliance on an exchange of correspondence between Matt and you, I believe. If, for some reason -- well, no. I think that's all.

Anything else?

MR. FEE: Well, I don't have any questions.

Do you guys have any questions?

MR. REHN: Not at this time.

MR. CUNNINGHAM: No.

MR. BRIDGES: Great. Thank you.

THE WITNESS: Thank you.

THE VIDEOGRAPHER: All right. Off the record at 4:31. This ends media unit number 3 and ends testimony for August 27th, 2015.

* * *

(Witness excused.)

* * *

(Off the record at 4:31 p.m.)

* * *

CERTIFICATE

I do hereby certify that I am a Notary Public in good standing, that the aforesaid testimony was taken before me, pursuant to notice, at the time and place indicated; that said deponent was by me duly sworn to tell the truth, the whole truth, and nothing but the truth; that the testimony of said deponent was correctly recorded in machine shorthand by me and thereafter transcribed under my supervision with computer-aided transcription; that the deposition is a true and correct record of the testimony given by the witness; and that I am neither of counsel nor kin to any party in said action, nor interested in the outcome thereof.

WITNESS my hand and official seal this 11th day of September, 2015.

<%signature%>

Debbie Leonard, RDR, CRR

Notary Public

EXHIBIT 10

UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF COLUMBIA

AMERICAN SOCIETY FOR TESTING AND MATERIALS dba ASTM INTERNATIONAL, NATIONAL FIRE PROTECTION ASSOCIATION, INC., and AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR CONDITIONING ENGINEERS, Plaintiffs/ Counter-Defendants,	
v.	No. 1:13-cv-01215-EGS
PUBLIC.RESOURCE.ORG, Defendant/ Counter-Plaintiff.	

Coos Bay, Oregon

Thursday, November 13, 2014

39(b)(6) DEPOSITION OF:

REBECCA MALAMUD,
PUBLIC.RESOURCE.ORG,

taken pursuant to notice, by counsel for Plaintiffs/ Counter-Defendants at Red Lion Inn, 1313 North Bayshore Drive, Coos Bay, Oregon, before Jan R. Duiven, CSR, FCRR, CCP, Certified Shorthand Reporter in and for the State of Oregon, beginning at 9:00 a.m., when were present on behalf of the respective parties:

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of any other entities that employ Carl Malamud?
A. No.
Q. Besides Public.Resource, are you aware of any entities on which Mr. Malamud sits on the board?
A. No.
Q. Besides Public.Resource, are you aware of any other entities from whom Mr. Malamud has received any compensation in the last three years?
A. No.
Q. Are you on the board of directors of Public.Resource?
A. No.
Q. Are you on the board of directors of any entity?
A. I don't want to be. No.
Q. All right. So I want to talk to you now a little bit about the instructions that you received from Mr. Malamud regarding the work that was done for Public.Resource. Okay?
A. (Nods.)
Q. With respect to the work you did for Public.Resource, you knew that Public.Resource wanted Point B to make exact copies of everything that it provided to Point B Studios. Correct?

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A. Correct.
Q. And Mr. Malamud himself asked you to make exact copies of all the images that he provided to you. Right?
A. Yes.
Q. Did Mr. Malamud ever explain to you why he wanted exact copies made of all the images that were provided to you?
A. To release it in the public domain.
Q. Did he ever tell you anything else about the importance of making the exact copies?
A. He emphasized to be accurate.
Q. And he told you to make exact copies of every image that was provided to you. Correct?
A. Correct.
Q. And that includes making exact copies of ASTM images. Correct?
A. Yes.
Q. And Mr. Malamud also instructed you to make exact copies of NFPA images. Right?
A. Yes.
Q. And you did in fact make exact copies of ASTM images for Public.Resource?
A. To the best of my ability.
Q. And you also made exact copies of NFPA

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images for Public Resources. Correct?
A. Yes.
Q. Now, in your answer with regard to the ASTM images, you said you made exact copies to the best of your ability. What do you mean by "to the best of your ability"?
A. When -- as we create the diagrams, we have a proofreading -- you know, quality control work flow, and I try to catch every mistake, so --
Q. Would you describe to me how the process actually worked starting with how you received any images from Public.Resource and then ending with how you delivered your work product to Public.Resource?
A. Well, the standards documents are posted on Public.Resource.org as triple-keyed HTML and CSS with low-resolution JPEGs.
And once it's decided what document is set to work on, it's -- I download those to my computer. And then I separate them into MathML and -- images that need to be coded in MathML and images that need to be vectorized we call it.
And also on the diagram side, especially for purposes of learning, I sort them another level as to areas of difficulty, or if

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there's a lot of repetition in an image that would facilitate creating another graphic quickly, I do that so it -- you know, it helps with the production of the work flow.
And then the MathML images are coded in MathML, mathematical markup language, and at that point -- do you want me to go on?
Q. Yes, please.
A. It gets pretty technical. Okay. At that point we use an open source tool called Amaya.
Q. Can you spell that, please?
A. A-M-A-Y-A. And so the image -- they're coded. And then we have -- we have to convert them using an open-source tool called SVG/Math. This is how we get it into the graphic form. And it was a program by Jacques Distler out of University of Texas. And we use that program. It can interpret the MathML and produce a scaleable vector graphic.
And then once we have that scaleable vector graphic we open it up in Inkscape and we convert it to outlines and save it as SVG1.1 to make sure that it is compatible with the broadest range of platforms. And that's the math. And

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object. Asked and answered. Counsel, can we move on?
BY MR. FEE:
Q. No. Answer the question. Do you have anything else?
A. No.
Q. Okay. So it was your intention to make sure that this file conversion process led to files that the general public could use and make copies of at their leisure. Correct?
A. Correct.
Q. And did Mr. Malamud tell you that he intended to make these files available so anybody could copy them whenever they wanted to?
A. He published them on the Internet.
Q. In a way that was easily copyable. Correct?
A. Yes.
Q. And his intention was to make it available for free so people wouldn't have to purchase them?
MR. STOLTZ: Objection. The question lacks foundation. You can answer if you know.
BY MR. FEE:

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Q. Let me re-ask that question. Did he ever tell you that one of the benefits of his project was that people will be able to get copies of these standards for free and not have to purchase them?
A. That wouldn't be exactly what he would say, so --
Q. Well, what exactly do you recall?
A. I wouldn't want to surmise what he would say or think.
Q. Did you ever have a discussion with him about the benefits of making things such as ASTM and NFPA standards available for free?
A. Publicly accessible. Right.
Q. Publicly accessible and freely copyable?
A. To increase knowledge.
Q. Did you ever have any discussions with him about persons being able to access and copy these files without having to buy them from the authors?
A. No. Never had that.
Q. But you knew that the work you were doing was going to be posted in a way that persons could make copies of the files --

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A. Yes.
Q. -- without purchasing them from the authors. Correct?
A. Correct.
Q. Have you ever had any discussions with Mr. Malamud regarding this lawsuit?
A. Not -- no.
Q. Have you ever had any written communications with Mr. Malamud regarding this lawsuit?
A. Quite possible.
Q. Do you recall any written communications with Mr. Malamud regarding this lawsuit?
A. I don't recall any particular conversation.
MR. FEE: Would it be all right if we take a quick break?
MR. STOLTZ: It would.
THE VIDEOGRAPHER: Okay. Going off the record 11:18 a.m.
(Recess: 11:18 a.m. to 11:26 a.m.)
THE VIDEOGRAPHER: We're going back on the record. The time is 11:26 a.m. Beginning disc 3.

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(Deposition Exhibit No. 19 marked for identification.)
BY MR. FEE:
Q. Ms. Malamud, I'm going to hand you what's been marked as Exhibit 19. It's an email from Carl Malamud to Rebecca Malamud dated January 28th, 2014, at 2:30 p.m., and Bates labeled PRO4234 -- hmm.
(Off-the-record discussion.)
MR. REHN: It's 04234.
MR. FEE: Oh, okay. 42340 through 41.
BY MR. FEE:
Q. Do you recognize that as a series of emails between you and Mr. Malamud?
A. Yes.
Q. We'll just start towards the bottom of that email chain on the second page. Do you see it appears to be an email from you at 1:07 p.m. on the 28th, just a couple lines? You see, it says, "Do you want us to redraw illustrations that look like this?" And there's a file name underneath it that includes ASTM among other things.
A. Right.
Q. First of all, that file reference that

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A. No.
Q. Do you know who made the decision not to do any work on ASHRAE standards?
A. I just -- it just didn't happen. There was no formal decision.
Q. Was there ever any discussion between yourself and Mr. Malamud regarding work on ASHRAE standards?
A. References in email, but other than that, no.
Q. Did Public.Resource ever provide any instructions regarding ASHRAE PDF for standard?
A. No.
Q. If you could, Mrs. Malamud, take a look at what's been marked as Exhibit 31.
A. Okay.
Q. This is an email from Carl Malamud to yourself dated January 4th, 2014, 2:30 p.m. Do you see that?
A. Correct.
Q. And the first line of that email says, "Thinking about it, why don't you focus on ASTM and ASHRAE standards for your next big batch." Correct?
A. Correct.

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Q. Do you know why Mr. Malamud is asking you to focus on ASHRAE standards if --
A. Because it was -- we were going to work on it and we worked on ASTM, but did not get into the ASHRAE standards.
Q. Why did you not get into the ASHRAE standards?
A. For -- for me because the files weren't there, the JPEG, the document hadn't been converted to this point.
Q. What was that?
A. The document -- the PDF hadn't been converted to the point where I -- I can begin work.
Q. So was the decision not to work on the ASHRAE PDF your decision?
MR. STOLTZ: Objection. Asked and answered.
A. In the natural -- in the work flow, it just didn't happen so --
BY MR. ZEE:
Q. Are you aware of Point B ever asking for permission from ASHRAE to make copies of its standards?
A. No.

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Q. Are you aware of Point B ever receiving any permission from ASHRAE to make copies of its standards?
A. No.
Q. And did Public.Resource ever inform you that it had permission from ASHRAE to work on its standards?
A. No.
MR. ZEE: Thank you. That's all I have.
MR. STOLTZ: I have a few questions, but, first, I think we need to take a break.
THE VIDEOGRAPHER: Okay. Going off the record. 4:20 p.m.
(Recess: 4:20 p.m. to 4:33 p.m.)
THE VIDEOGRAPHER: We're going back on the record. The time is 4:33 p.m.

EXAMINATION
BY MR. STOLTZ:
Q. Okay. Thanks, Ms. Malamud, for your -- for coming today. I just have a few questions. How often do you talk to Mr. Malamud on the phone, say, in the past three years?
A. Never.

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Q. Would you say that most of your communication is by email?
A. Yes.
Q. You've testified earlier about the steps that you went through to do quality assurance on SVG images.
A. Correct.
Q. If, in the process of reviewing an SVG image you happened to find a mistake, what would you do?
A. I would correct it.
Q. And is that true for every SU -- SVG image that you reviewed as part of the codes project?
A. Yes.
Q. Can text to speech software read MathML files?
A. Yes.
Q. Can text to speech software read JPEG files?
A. No. There -- there is an ALT tag in every image in an HTML document and the text is put into this ALT tag, it could read that. But it's generally very minimal.
Q. So would you say that MathML files are

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easier to use than JPEG files for people with disabilities?
MR. FEE: Objection. Lack of foundation. Leading.
BY MR. STOLTZ:
Q. You can answer.
A. Yes.
Q. You testified about text that would appear in diagrams in standards documents. Typically how much text appeared in the diagrams in the standards documents that Point B worked on?
MR. FEE: Objection. Vague.
A. Usually it would be numbers and captions, call-outs on the graphic, but sometimes there would be notes underneath the graphic.
BY MR. STOLTZ:
Q. What's the most number of characters that were in those notes?
A. I would say it's anywhere from 100 to 500 characters. That's just a ballpark figure.
Q. You testified that some older diagrams contained flourishes. In what part of the diagram were those flourishes?
A. In the -- usually it has hand-lettered text.

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Q. So was it your practice to where hand-lettered text appeared in an original image, that Point B would replace that text with text rendered in a font?
MR. FEE: Objection. Form.
A. Correct.
BY MR. STOLTZ:
Q. You testified that some images would have required interpretation. In those cases, what did Point B do with the image?
A. I would file it in a folder called "bad art" while we were working on the diagrams or sometimes label them in red. That came later because by filing them in a folder called bad art I would have to remove them in order that they were still in the standard document.
Q. So if you had placed a file in the folder labeled bad art or you had marked that file as red, would the file go into the final HTML document that you gave to Public.Resource?
A. The original JPEG --
Q. What --
A. -- would be an HTML document.
Q. The SVG file would not?
A. Right. We didn't do an SVG file for those.

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Q. Other than at the very beginning of the product, what did you do when you encountered logos in the documents?
A. I would leave in the original JPEG scan.
Q. If I could direct your attention to the document marked Exhibit 28. It will be the second-to-the-last page of that document. The Bates number PRO24984. At the very bottom of that page, do you see the line that says, page 00201, SVG logo, Wikimedia Commons?
A. Yes.
Q. Do you know what the word logo refers to?
A. I -- when I first saw it I thought it might be a logo, but it could be a symbol. Without seeing the picture, I don't know.
MR. STOLTZ: Thank you. I have no more questions.

EXAMINATION
BY MR. FEE:
Q. That file that you were just referencing, page 0020.SVG-logo, do you still have

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that file at Point B?
A. I may.
Q. Now, in response to the testimony you gave to your counsel regarding your practice with logos after some initial period, you, I think testified that you would leave the original JPEG scan in the HTML file. Is that right?
A. Correct.
Q. And the HTML file was not the original file as it was distributed by the standards provider. Correct?
MR. STOLTZ: Objection to form. Foundation.
A. Correct.
BY MR. FEE:
Q. So the files that were created by Public.Resource -- or the files that were created by Point B bore logos of ASTM and NFPA even though those files were not authored by Point B or -- strike that question.
So the files that were created by Point B bore the logos of ASTM or NFPA even though ASTM and NFPA did not author those files?
MR. STOLTZ: Objection to form. It's asking for a legal conclusion.

beyond the scope of the redirect.
A. It's not exactly my words.
BY MR. FEE:
Q. Okay. What were your exact words, can you say you remember?
MR. STOLTZ: Objection. Asked and answered.
BY MR. FEE:
Q. How is my description wrong?
A. Broader access to public safety standards.
Q. Are you aware that at least ASTM's standards are available for free on the Internet to the extent that they've been incorporated by reference by any federal regulation?
MR. STOLTZ: Objection. Still beyond the scope of the redirect.
A. I am not a lawyer and it's outside a bit of the scope of my expertise, but eventually it's -- it's not free.
BY MR. FEE:
Q. The ASTM standards in its reading room are not free. Is that your testimony?
MR. STOLTZ: Same objection.
A. I'm not familiar with the reading

room.
MR. FEE: I have no other questions.
MR. REHN: Nothing for me.
THE VIDEOGRAPHER: Anything further? Anything further on the phone?
MR. ZEE: Nothing further.
THE VIDEOGRAPHER: Okay. We're going off the record.
(The deposition concluded at 4:50 p.m.)

State of Oregon)
) ss.
County of Lane)

I, Jan R. Duiven, CSR, FCRR, CCP, a Certified Shorthand Reporter for the State of Oregon, certify that the witness was sworn and the transcript is a true record of the testimony given by the witness; that at said time and place I reported all testimony and other oral proceedings in the matter; that the foregoing transcript consisting of 243 pages, contains a full, true and correct transcript of the proceedings reported by me to the best of my ability on said date.

If any of the parties or the witness requested review of the transcript at the time of the proceedings, correction pages have been inserted.

IN WITNESS WHEREOF, I have set my hand and CSR seal this 24th day of November, 2014, in the City of Eugene, County of Lane, State of Oregon.

_____
Jan R. Duiven, CSR, FCRR, CCP

CSR No. 96-0327
Expiration Date: September 14, 2017

ACKNOWLEDGEMENT OF DEPONENT

I, REBECCA MALAMUD, do hereby acknowledge I have read and examined the foregoing pages of testimony, and the same is a true, correct and complete transcription of the testimony given by me, and any changes or corrections, if any, appear in the attached errata sheet signed by me.

_____ _____
Date REBECCA MALAMUD

MR. MITCH STOLTZ
ELECTRONIC FRONTIER FOUNDATION
815 Eddy Street
San Francisco, California 94109
415/436-9333
In Re: ASTM International. v. Public.Resource.Org
Dear Mr. Stoltz,

Enclosed please find your copy of the deposition of REBECCA MALAMUD, along with the original signature page. As agreed, you will be responsible for contacting the witness regarding signature.

Within 30 days of December 1, 2014, please forward errata sheet and original signed signature page to counsel present.

If you have any questions, please do not hesitate to call. Thank you.

Yours,
Jan R. Duiven, CSR, FCRR, CCP
Reporter/Notary

cc: Original transcript
All Counsel

Capital Reporting Company
1821 Jefferson Place, Northwest
Third Floor
Washington, D.C. 20036
(202)857-3376

E R R A T A S H E E T

Case Name: ASTM International. v. Public.Resource.Org
Witness Name: REBECCA MALAMUD
Deposition Date: November 13, 2014
Page No. Line No. Change/Reason for Change

_____ _____
Signature Date