



Designation: **F2783 – 14 F2783 – 17**

Standard Practice for Design, Manufacture, Operation, Maintenance, and Inspection of Amusement Rides and Devices, in Canada¹

This standard is issued under the fixed designation F2783; 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.

Note—This ASTM Standard has been developed to replace CAN/CSA Z267-00 (R2011), which is being withdrawn as an active CSA Standard.

INTRODUCTION

The Canadian Standards Association (CSA) and the American Society for Testing Materials (ASTM) have paved the way for the development of new ASTM amusement device standards, introducing uniform safety criteria for both Canada and the United States of America.

Seeking to gain a level of consistency and eliminate much duplication, CSA and ASTM struck a subcommittee to develop a new ASTM F24 standard, a comprehensive, one-volume document, that provides a mechanism to:

- adapt F24 standards to Canadian needs;
- provide greater two way communication between CSA and ASTM; and
- facilitate adoption by Canadian provinces and territories.

This one-source standard replaces the current CSA Z267 Safety Code for Amusement Rides and Devices. As CSA Z267 was primarily based on the ASTM F24 Family of Standards, Practice F2783 is a realignment of those core essentials with new sections tailor-made for Canada. Categorized in four distinct sections, the standard includes:

- **Core Standards** (for example, Terminology, Design, Manufacture, Operation, Maintenance, and Inspection);
- **Supporting Standards** (for example, Measuring Ride Dynamics and Hardness of Composite Foam);
- **Specific Classification of Amusement Rides and Devices Standards** (for example, Go-Karts, Water Slides, Inflatables and Trains); and
- **Unclassified Amusement Rides and Devices Standard** (for example, Zip Lines, Bungee Type Devices, Gravity or Patron Controlled Non-mechanical Spherical Devices and Extreme Thrill Devices); (other standards used to support amusement device design).

This standard is structured such that Section 2.1.2.2 listings of Core Standards capture the essential and broad safety requirements for all amusement rides and devices. Section 2.2.3 listings of Supporting Standards are intended to complement in design of all amusement rides and devices where applicable. Section 2.3.2.4 listings of Specific Classification of Amusement rides and Devices Standards capture supplemental requirements in addition to Core Standards for anomalous amusement rides and devices. Section 2.4 listing of Unclassified Amusement Rides and Devices Standards captures general essential safety requirements for new amusement rides or devices that have yet to be regulated but have recently appeared within the public domain for use in conjunction with Core Standards and Supporting Standards. 2.5 listing Other Standards used to support amusement device design.

To provide greater application within Canada, Practice F2783 also incorporates specific sections that include: Standards Cross Referencing Table; Substitutions; Exceptions; and Additional Requirements.

This unique initiative would not have been possible were it not for the active collaboration of the CSA Z267 and the ASTM F24.80 Harmonization Committees, representative of a diverse stakeholder base, including delegates from government (regulators), manufacturers, engineers, park owners/operators as well as general and consumer interests.

Practice F2783 is supported by Canadian provincial and territorial regulators and amusement device stakeholders, the International Association of Amusement Parks and Attractions (IAAPA), CSA and ASTM.

This standard has been printed in Canada's two official languages.

¹ This practice is under the jurisdiction of ASTM Committee F24 on Amusement Rides and Devices and is the direct responsibility of Subcommittee F24.80 on Harmonization.

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1. Scope

1.1 This practice applies to the terminology, design, manufacture, operation, maintenance, and inspection of amusement rides and devices in Canada.

1.2 This practice adopts ASTM Committee F24 Standards listed under Sections 2.2, 2.3 and 2.4.

1.3 This practice includes an annex (mandatory), which provides additional information (for example, rationale, background, interpretations, drawings, commentary, etc.) related to the application of the criteria presented in this practice.

1.4 This practice includes an appendix (non-mandatory), which provides additional information (for example, rationale, background, interpretations, drawings, commentary, and so forth) to improve the user’s understanding and application of the criteria presented in this practice.

1.5 It is the responsibility of the users of this practice and other ASTM Standards to judge their suitability for a particular purpose.

1.6 This practice includes the following sections:

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ASTM Committee F24 Core Standards for Amusement Rides and Devices	2.2
ASTM Committee F24 Supporting Standards for Amusement Rides and Devices	2.3
ASTM Committee F24 Standards for Specific Classification of Amusement Rides and Devices	2.4
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Hardness Measurement of Patron Seat and Restraint Padding	Appendix X2

1.7 For a glossary of terms that includes the meaning and intent of words such as shall, should, may, will, standard, practice, guide, classification, specification, etc. used in ASTM standards, please refer to “Form and Style for ASTM Standards,” which is available at www.astm.org.

1.8 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.9 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 The documents listed in 2.2, 2.3 and 2.4 contain provisions, which through reference in this standard, constitute provisions of this practice.

NOTE 1—For undated references, the latest edition of the referenced document applies. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, users of this practice are encouraged to investigate the possibility of applying the most recent editions of documents referenced below.

2.2 Core Standards for Amusement Rides and Devices:²

- [F747 Terminology Relating to Amusement Rides and Devices](#)
- [F770 Practice for Ownership, Operation, Maintenance, and Inspection of Amusement Rides and Devices](#)
- [F1193 Practice for Quality, Manufacture, and Construction of Amusement Rides and Devices](#)
- [F2291 Practice for Design of Amusement Rides and Devices](#)
- [F2974 Guide for Auditing Amusement Rides and Devices](#)

2.3 Supporting Standards for Amusement Rides and Devices:²

- [F1957 Test Method for Composite Foam Hardness-Durometer Hardness](#)
- [F2137 Practice for Measuring the Dynamic Characteristics of Amusement Rides and Devices](#)
- [F2375 Practice for Design, Manufacture, Installation and Testing of Climbing Nets and Netting/Mesh used in Amusement Rides, Devices, Play Areas and Attractions](#)

2.4 Standards for Specific Classification of Amusement Rides and Devices:²

- [F2007 Practice for Design, Manufacture, and Operation of Concession Go-Karts and Facilities](#)
- [F2374 Practice for Design, Manufacture, Operation, and Maintenance of Inflatable Amusement Devices](#)
- [F2376 Practice for Classification, Design, Manufacture, Construction, and Operation of Water Slide Systems](#)
- [F2460 Practice for Special Requirements for Bumper Boats](#)
- [F2461 Practice for Manufacture, Construction, Operation, and Maintenance of Aquatic Play Equipment](#)
- [F2959 Practice for Aerial Adventure Courses](#)
- [F2960 Practice for Permanent Amusement Railway Ride Tracks and Related Devices](#)
- [F2970 Practice for Design, Manufacture, Installation, Operation, Maintenance, Inspection and Major Modification of Trampoline Courts](#)
- [F3054 Practice for Operations of Amusement Railway Rides, Devices, and Facilities](#)
- [F3099 Practices for Parasailing](#)
- [F3133 Practice for Classification, Design, Manufacture, Construction, Maintenance, and Operation of Stationary Wave Systems](#)
- [F3158 Practice for Patron Transportation Conveyors Used with a Water Related Amusement Ride or Device](#)

2.5 Other Standards:

- [D785 Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials](#)
- [D2240 Test Method for Rubber Property—Durometer Hardness](#)
- [F1159 Practice for Design of Amusement Rides and Devices that are Outside the Purview of Other F24 Design Standards](#)

2.6 Reference Codes, Standards, Specifications, and Handbooks:

NOTE 2—Table 1 provides cross-references of document(s) acceptable in lieu of specific editions of codes, standards, specifications, and handbooks referenced in standards from ASTM Committee F24 on Amusement Rides and Devices. Only that portion of the codes, standards, specifications and handbooks as specified by the requirements of this standard is applicable.

<https://standards.iteh.ai/catalog/standards/sist/dfee98f8-ba5f-4422-ad88-037f08afd70a/astm-f2783-17>

3. Terminology

3.1 Terms that are meant to have common meaning among the ASTM Committee F24 standards referenced in Section 2 are defined in Terminology [F747](#).

3.2 Terms that are meant to have specific meaning within the ASTM Committee F24 standards are defined in those standards referenced in Section 2.

3.3 *engineer, n*—an engineer as defined by and licensed in accordance with the applicable provincial or territorial statute.

3.4 *Clarification of Terminology in ASTM Committee F24 Standards:*

3.4.1 The term “attractions” used in the ASTM F24 Committee Standards for Amusement Rides and Devices hold the same meaning as “amusement devices or rides” defined in Terminology [F747](#).

3.4.2 The term “English” used in the ASTM F24 Committee Standards for Amusement Rides and Devices means “English and French” for the purpose of this Standard.

4. Significance and Use

4.1 The purpose of this practice is to adopt the ASTM F24 Committee Standards for Amusement Rides and Devices for use in Canada.

4.2 This practice provides guidance for use of additional codes and standards in Canada.

4.3 In cases where conflicts exist between this practice and local codes, local codes would prevail.

² 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.

TABLE 1 Cross-References of Documents

Reference Documents in ASTM F24 Committee Standards			Alternate Acceptable Documents in Canada		Comments
ASTM Standards Reference Source	Designation (Publisher)	Title	Designation (Publisher)	Title	
F1193	ANSI/AWS D1.1/D1.1M	Structural Welding Code—Steel	W47.1-03 (CSA) W59-03 (CSA)	Certification of Companies for Fusion Welding of Steel Welded Steel Construction (Metal Arc Welding)	Refer to 5.4.4 for additional information: CSA W47.1 and CSA W59 together are acceptable to ANSI D1.1
F1193	E543 (ASTM) or ASNT-SNT-TC-1A	Standard Specification for Agencies Performing Nondestructive Testing Topical Outlines for Qualification of Nondestructive Testing Personnel	48.9712 / ISO 9712 (CGSB)	Nondestructive Testing: Qualification and Certification of Personnel	For all NDT Personnel: Natural Resources Canada (NRCan), through the CANMET Materials Technology Laboratory (MTL), is the Certifying Agency for the Canadian Non-Destructive Testing (NDT) Personnel Certification Program. NRCan certifies individuals according to the Canadian General Standards Board Standard CAN/CGSB-48.9712 (Qualification and Certification of Non-Destructive Testing Personnel). For NDT of Welding to CSA W47.1: In Canada, the CWB (Canadian Welding Bureau) is the Certification Body for the administration of CSA Standard W178: 1) NDT shall be conducted by organization certified to W178.1-08—Certification of Welding Inspection Organizations. 2) NDT shall be conducted by individual certified to W178.2-08—Certification of Welding Inspectors. Publication STP-1330 contains papers presented at the Seventh Symposium on Composite Materials, and Fatigue and Fracture. See also 5.3.2.6.
F2291	STP-1330 (ASTM)	Composite Materials: Fatigue and Fracture, 7th Volume	None	None	Publication STP-1330 contains papers presented at the Seventh Symposium on Composite Materials, and Fatigue and Fracture. See also 5.3.2.6.
F2291	301 (ACI)	Specifications for Structural Concrete	NBCC (NRCC)	National Building Code of Canada	See also 5.3.2.6.
F2291	318 (ACI)	Building Code Requirements for Structural Concrete (318) and Commentary (318R)	NBCC (NRCC)	National Building Code of Canada	See also 5.3.2.6.
F2291 NDS 2005 (AF&PA—American Forest & Paper Association) or USDA 72 (US Department of Agriculture) or 16 (ASCE)	National Design Specification for Wood Construction; or Handbook—Wood As An Engineering Material, Forest Service, Forest Products Laboratory; or Standard for Load and Resistance Factor Design (LRFD) for Engineered Wood Construction	086 (CSA)	Consolidation—Engineering design in wood		
F2291	316 (AISC)	Manual of Steel Construction, Allowable Stress Design (ASD)	(CISC) & S16 (CSA)	Handbook of Steel Construction—Ninth Edition; and Design of Steel Structures	AISC 316, the CISC Handbook, and CSA S16 are to be used in conjunction with the section on loads and strengths in Practice F2291.
F2291	M015 (AISC)	Manual on Steel Construction, Load & Resistance Factor Design (LRFD)	(CISC) & S16 (CSA)	Limit States Design in Structural Steel Ninth Edition, and Design of steel structures	AISC M015, the CISC LSD publication, and CSA S16 are to be used in conjunction with the section on loads and strengths in Practice F2291.

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TABLE 1 Continued

Reference Documents in ASTM F24 Committee Standards			Alternate Acceptable Documents in Canada		Comments
ASTM Standards Reference Source	Designation (Publisher)	Title	Designation (Publisher)	Title	
F2291	360-05 (ANSI/AISC)	Specifications for Structural Steel Buildings	(AISC) & S16 (CSA)	Limit States Design in Structural Steel Eighth Edition, and Design of steel structures	AISC 360, the AISC LSD publication, and CSA S16 are to be used in conjunction with the section on loads and strengths in Practice F2291.
F2291	Y32.10 (ANSI)	Graphic Symbols for Fluid Power Diagrams	None	None	None
F2291	T2.24.1 (NFPA)	Hydraulic fluid power—Systems standard for stationary industrial machinery—Supplement to ISO 4413:1998—Hydraulic fluid power—General rules relating to systems	None	None	None
F2291	B11.TR3 (ANSI)	Risk Assessment and Risk Reduction—A Guide to Estimate, Evaluate, and Reduce Risks Associated with Machine Tools	None	None	This technical report is intended to complement the topic about Ride Analysis covered in Practice F2291.
F2291	B77.1 (ANSI)	Passenger Ropeways—Aerial Tramways, Aerial Lifts, Surface Lifts, Tows and Conveyors—Safety Requirements	Z98 (CSA)	Passenger ropeways and passenger conveyors	See also 5.4.3.
F2291	7 (ASCE/SEI)	Minimum Design Loads for Buildings and Other Structures	NBCC (NRCC)	National Building Code of Canada	ASCE 7 and the NBCC are to be used in conjunction with the section on loads and strengths in Practice F2291.
F2291	(ASM)	ASM Atlas of Fatigue Curves and ASM Handbook Volume 19: Fatigue and Fracture	None	None	The ASM Atlas and the ASM Handbook are intended to complement the topic about fatigue strength of mechanical and structural components.
F2291	BPVC (ASME)	ASME Boiler and Pressure Vessel Code	B51 (CSA)	Boiler, pressure vessel, and pressure piping code.	Accumulators shall be constructed in accordance with Section 8, Division 1 of the ASME Boiler and Pressure Vessel Code for unfired pressure vessels, or equivalent.
F2291	B15.1 (ASME)	Safety Standards for Mechanical Power Transmission Apparatus	None	None	None
F2291	ASME A17.1-2010/GSA B44-10 (ASME/GSA)	Safety Code for Elevators and Escalators	ASME A17.1-2010/GSA B44-10 (ASME/GSA)	Safety code for elevators and escalators	This standard may be applicable where elevator and escalator technology is used in the design of amusement rides or devices.
F2291	D1.1/D1.1M (ANSI/AWS)	Structural Welding Code—Steel	W47.1 (CSA) W59 (CSA)	Certification of companies for fusion welding of steel	See also 5.4.4. Note: CSA W47.1 and CSA W59 together are acceptable as an equivalent to AWS D1.1.
F2291	D14.4 (ANSI/AWS)	Specification for Welded Joints in Machinery and Equipment	W59 (CSA)	Welded steel construction (metal arc welding)	See also 5.4.4.
F2291	D1.1/D1.1M (ANSI/AWS)	Structural Welding Code—Steel	W178.1 (CSA) W178.2 (CSA)	Welded steel construction (metal arc welding)	See also 5.4.4.
F2291	BS 5400-10 (BSI) and BS 7608 (BSI)	Steel, Concrete and Composite Bridges—Code of Practice for Fatigue Code of Practice for Fatigue Design and Assessment of Steel Structures	None	Certification of welding inspection organizations Certification of welding inspectors	None
F2291	International Building Code (IBC)	International Building Code Chapter 16, “Structural Design”	NBCC (NRCC)	National Building Code of Canada	BS 5400 and BS 7608 are intended to complement the topic about fatigue strength of mechanical and structural components. The International Building Code and the NBCC are to be used in conjunction with the section on loads and strengths in Practice F2291.

TABLE 1 Continued

Reference Documents in ASTM F24 Committee Standards			Alternate Acceptable Documents in Canada		Comments
ASTM Standards Reference Source	Designation (Publisher)	Title	Designation (Publisher)	Title	
F2291	Growth Charts (GDG) J833 (SAE) The MIT Press, Cambridge, MA, USA The MIT Press, Cambridge, MA, USA	Basic Body Measurements Human Physical Dimensions Human Scale 4/5/6, Bardagjy, J., Diffrient, N., and Tilley, A., 1981 Human Scale 7/8/9, Bardagjy, J., Diffrient, N., and Tilley, A., 1982	None 3411 (ISO) Tilley, A. R., Henry Drey- fuss & Associates.	None Earth-moving machinery—Physi- cal dimensions of operators and minimum operator space enve- lope. The measure of man and woman: Human factors in design None	SAE J833 has been superseded by ISO 3411. Human Scale 4/5/6 and 7/8/9 books are no longer published.
F2291	(GISC)	Hollow Structural Section Conne- tion and Trusses—A Design Guide	None	None	This document is referenced for the purpose of its application for design of structure using hollow structural section.
F2291	1055 (DIN) 1055-100 (DIN)	Actions on structures, Parts 1–7 Load combinations	NBCC (NRCC)	National Building Code of Canada	DIN 1055 and DIN 1055-100 are to be used in conjunction with the section on loads and strengths in Practice F2291.
F2291	15018-1 (DIN)	Cranes; Steel Structures; Verifica- tion and Analyses Data	None	None	DIN 15018-1 is not specifically referenced in Practice F2291. It is up to designer/engineer to determine its relevance in Practice F2291.
F2291	EN 280 (GEN)	Mobile Elevating Work Platforms —Design Calculations, Stability Criteria, Construction, Safety, Examinations, and Tests	B29.100 (ANSI/ASME)	Precision Power Transmission; Double Pitch Power Transmission; and Double Pitch Conveyor Roller Chains, Attachments and Sprock- ets	None
F2291	EN 954-1 (GEN)	Safety of Machinery—Safety Re- lated Parts of Control Systems —General Principles for Design	ISO 13849-1 (ISO)	Safety of machinery—Safety- related parts of control systems —Part 1: General principles for design	ISO 13849 is intended to complement the topic of electrical, electronic, and program- mable electronic systems covered in Practice F2291.
F2291	EN 1050 (GEN)	Safety of Machinery—Principles for Risk Assessment	12100 (ISO)	Safety of machinery—General principles for design—Risk as- sessment and risk reduction	EN 1050 and ISO 12100 are intended to complement the topic of ride analysis covered in Practice F2291.
F2291	EN 1991 (GEN) EN 1992 (GEN) EN 1993 (GEN) EN 1994 (GEN) EN 1995 (GEN)	Eurocode 1: Actions on structures Eurocode 2: Design of concrete Eurocode 3: Design of steel struc- tures Eurocode 4: Design of composite steel and concrete structures Eurocode 5: Design of timber structures	NBCC (NRCC) National Building Code of Canada	National Building Code of Canada	The Eurocodes 1 to 5 and the NBCC are to be used in conjunction with the section on loads and strengths in Practice F2291.
F2291	EN 60947-1 (GEN)	Low Voltage Switchgear and Con- trol gear	60947-1 (IEC)	Low-voltage switchgear and con- trol gear—Part 1: General rules	None
F2291	6930 (FM Global)	Flammability Classification of In- dustrial Fluids	None	None	None
F2291	60204-1 (IEC)	Safety of Machinery—Electrical Equipment of Machines—Part 1: General Requirements	None	None	NFPA 79 is also used for these devices.
F2291	61496-1 (IEC)	Safety of Machinery—Electro- sensitive Protective Equipment —General Requirements and Tests	E61496-1 (CSA)	Safety of machinery—electro- sensitive protective equipment— Part 1: General requirements and tests	GAN/CSA-E61496-1 adopted IEC 61496-1 with Canadian deviations.
F2291	61508-1 (IEC)	Functional Safety of Electrical/ Electronic/Programmable Elec- tronic Safety-Related Systems —General Requirements	None	None	IEC 61508-1 is Part 1 of a series of stan- dards on safety-related control systems. It is used commonly for testing and certification of electrical, electronic, and programmable elec- tronic systems.
F2291	61511 (IEC)	Functional Safety: Safety Instru- mented Systems for the Process Industry Sector	None	None	IEC 61511 relates primarily to instrumentation used in the process industry sector.

TABLE 1 Continued

Reference Documents in ASTM F24 Committee Standards			Alternate Acceptable Documents in Canada		
ASTM Standards Reference Source	Designation (Publisher)	Title	Designation (Publisher)	Title	Comments
F2291	62061 (IEC)	Safety of Machinery—Functional Safety—Electrical, Electronic, and Programmable Electronic Control Systems	None	None	IEC 62061 plays an increasing role in the achievement of overall machine safety as a result of automation; demand for increased production and reduced operator physical effort.
F2291	4113 (ISO)	Road Vehicles—Calibration Fluid for Diesel Injection Equipment	None	None	See 8.2.2.7 of ISO 4113.
F2291	4413 (ISO)	Hydraulic fluid power—General rules relating to systems	None	None	See 8.2.2.7 of ISO 4113.
F2291	4414 (ISO)	Pneumatic Fluid Power General Rules Relating to Systems	None	None	None
F2291	4406 (ISO)	Particle Count Chart	None	None	None
F2291	6149-1 (ISO)	Connections for hydraulic fluid power and general use—Ports and stud ends with ISO 261 metric threads and O-ring sealing—Part 1: Ports with truncated housing for O-ring seal	None	None	None
F2291	17 (MIL)	The Composite Materials Handbook	None	None	None
F2291	882C (MIL)	System Safety Program Requirements	None	None	MIL 882C is intended to complement the topic of ride analysis covered in Practice F2291.
F2291	250 (NEMA)	Enclosures for Electrical Equipment	G22.2 NO. 94 (CSA)	Special purpose enclosures	None
F2291	79 (NFPA)	Electrical Standard for Industrial Machinery	G22.2 NO. 14 (CSA)	Industrial control equipment	None
F2291	70 (NFPA)	National Electric Code (NEC)	G22.1 (CSA)	Canadian electrical code, part 1; safety standard for electrical installations	See also 5.3.2 and 5.3.3.
F2291	101 (NFPA)	Life Safety Code	None	None	None
F2291	B93.114M (ANSI)	Pneumatic Fluid Power—Systems Standard for Industrial Machinery (was NFPA/JIC T2.25.1M)	4414:2010 (ISO)	Pneumatic fluid power—General rules and safety requirements for systems and their components	None
F2291	T2.25.1M (NFPA/JIC)	Pneumatic Fluid Power—Systems Standard for Industrial Machinery	T2.25.1(NFPA/JIC) 4414:2010 (ISO)	Pneumatic fluid power—Systems Standard for industrial machinery—Supplement to ISO 4414:1998—Pneumatic fluid power—General rules relating to systems Pneumatic fluid power—General rules and safety requirements for systems and their components	ANSI/(NFPA) T2.25.1 is based upon the provisions of ISO 4414:1998, with certain exceptions as described in ANSI/(NFPA) T2.25.1. The user of ANSI/(NFPA) T2.25.1 will require both of these standards for use on a pneumatic systems application.
F2291	SAE J517	Hydraulic Hose	None	None	None
F2291	SAE J-211	Instrumentation for Impact Test—Electronic Instrumentation	None	None	SAE J211 provides guidelines and recommendations for the techniques of measurement used in impact tests. The aim is to achieve uniformity in instrumentation practice and in reporting test results. Use of this recommended practice will provide a basis for meaningful comparisons of test results from different sources.
F2291	J518 (SAE)	Hydraulic Flanged Tube, Pipe, and Hose Connections, Four Bolt Split Flange Type	None	None	None

TABLE 1 Continued

Reference Documents in ASTM F24 Committee Standards			Alternate Acceptable Documents in Canada		
ASTM Standards Reference Source	Designation (Publisher)	Title	Designation (Publisher)	Title	Comments
F2291	J1926 (SAE)	Connections for General Use and Fluid Power Ports and Stud Ends with ASME B1.1 Threads and O-Ring Sealing Part 3: Light-Duty (L-Series) Stud Ends	None	None	None
F2291	HS 4000 (SAE)	Fastener Standards	None	None	SAE HS 4000 is intended to complement the topic of fasteners covered in Practice F2291.
F2291	260 (SIA) 261 (SIA)	Basics of Planning Structural Design Projects Actions on Structures	NBCC (NRCC)	National Building Code of Canada	SIA 260, SIA 261, and NBCC are to be used in conjunction with the section on loads and strengths in Practice F2291.
F2291	508 (UL)	Industrial Control Equipment	G22.2 NO. 14 (GSA)	Industrial control equipment	None
F2291	508A (UL)	Industrial Control Panels	G22.2 NO. 14 (GSA)	Industrial control equipment	None
F2291	Organisation Internationale Pour L'Etude De L'Endurance Des Cables (OIPPEEC)	The International Journal of Rope Science and Technology	None	None	OIPPEEC is also known as International Organization for the Study of the Endurance of Ropes. The International Journal of Rope Science and Technology is intended to complement the testing of wire ropes to validate rope fatigue and life calculations covered in Practice F2291.
F2291	Handbook of Mechanical Engineering, Vol. 2, Berlin, Heinrich, D., and Kuttner, K.H. (Springer, New York, 1998)	None	None	The Handbook of Mechanical Engineering is intended to complement the topic on fatigue behavior due to surface finish and other material conditions as referenced in Practice F2291.	None
F2291	(McGraw-Hill, New York, NY)	Mechanical Engineering Design, Budynas, R., Mischke, C., and Shigley, J., 1988	None	None	Mechanical Engineering Design is intended to complement the topic on fatigue behavior due to surface finish and other material conditions as referenced in Practice F2291.
F2291	(Abington Publishing, Cambridge, England)	Fatigue Strength of Welded Structures, Maddox, S.J., 1993	None	None	Fatigue Strength of Welded Structures is intended to complement the topic on fatigue of welded structures as referenced in Practice F2291.
F2291	(McGraw-Hill, New York, NY)	Standard Handbook of Machine Design, Mischke, C., and Shigley, J., 1996	None	None	The Standard Handbook of Machine Design is useful general reference for design and manufacture of amusement rides or devices covered in Practice F2291.
F2783	None	None	GSA Z98 (GSA)	Passenger ropeways and passenger conveyors	Refer to 7.4.6 for additional information.

TABLE 1 Cross-References of Documents

Reference Documents in ASTM F24 Committee Standards			Alternate Acceptable Documents in Canada		
Designation (Listed by Authoring Organization)	ASTM Standards Reference Source	Title	Designation (Publisher)	Title	Comments
ACI Standards:					
ACI 301	F2291	Specifications for Structural Concrete	NBCC (NRCC)	National Building Code of Canada	See also 5.2.2.6.
ACI 318	F2291	Building Code Requirements for Structural Concrete (318) and Commentary (318R)	NBCC (NRCC)	National Building Code of Canada	See also 5.2.2.6.
AF&PA American Wood Council Standards:					

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TABLE 1 Continued

Reference Documents in ASTM F24 Committee Standards			Alternate Acceptable Documents in Canada		Comments
Designation (Listed by Authoring Organization)	ASTM Standards Reference Source	Title	Designation (Publisher)	Title	
NDS 2005	F2291	National Design Specification for Wood Construction	O86 (CSA)	Consolidation – Engineering design in wood	
AISC Manuals:					
AISC 316	F2291 F2970	Manual of Steel Construction, Allowable Stress Design (ASD)	(CISC) & S16 (CSA)	Handbook of Steel Construction – Ninth Edition; and Design of Steel Structures	AISC 316, the CISC Handbook, and CSA S16 are to be used in conjunction with the section on loads and strengths in Practice F2291 .
AISC 360-05	F2291	Specifications for Structural Steel Buildings	(CISC) & S16 (CSA)	Limit States Design in Structural Steel Eighth Edition, and Design of steel structures	AISC 360, the CISC LSD publication, and CSA S16 are to be used in conjunction with the section on loads and strengths in Practice F2291 .
AISC M015	F2291 F2970	Manual on Steel Construction, Load & Resistance Factor Design (LRFD)	(CISC) & S16 (CSA)	Limit States Design in Structural Steel Ninth Edition, and Design of steel structures	AISC M015, the CISC LSD publication, and CSA S16 are to be used in conjunction with the section on loads and strengths in Practice F2291 .
ANSI Standards:					
ANSI B11.TR3	F2291	Risk Assessment and Risk Reduction—A Guide to Estimate, Evaluate, and Reduce Risks Associated with Machine Tools	None	None	This technical report is intended to complement the topic about Ride Analysis covered in Practice F2291 .
ANSI B77.1	F2291 F2959 F3158	Passenger Ropeways—Aerial Tramways, Aerial Lifts, Surface Lifts, Tows and Conveyors—Safety Requirements	Z98 (CSA)	Passenger ropeways and passenger conveyors	See also 5.3.3 .
ANSI B77.2	F3054	Funiculars - Safety Requirements	Z98 (CSA)	Passenger ropeways and passenger conveyors	None
ANSI Y32.10	F2291	Graphic Symbols for Fluid Power Diagrams	None	None	None
ANSI Z359	F2959	Fall Protection Code	None	None	See also provincial Occupational Health and Safety requirements related to Fall Protection
ANSI A10.11	F2461	Personal and Debris Nets	None	None	None
ANSI/IAF-9	F2461	American National Standard for Aquatic Recreation Facilities	None	None	Refer to Provincial pool safety standards as required. Also known as APSP-9.
APSP (Association of Pool & Spa Professionals) Document:					
ANSI/APSP-16	F3133	Suction Fittings for Use in Swimming Pools, Wading Pools, Spas and Hot Tubs	None	None	Refer to Provincial pool safety standards as required
AREMA (American Railway Engineering and Maintenance-of-Way Association):					
Manual for Railway Engineering (AREMA)	F2960	Manual for Railway Engineering	None	None	None
ASCE Standards:					
ASCE 7	F2291	Minimum Design Loads for Buildings and Other Structures	NBCC (NRCC)	National Building Code of Canada	ASCE 7 and the NBCC are to be used in conjunction with the section on loads and strengths in Practice F2291 .
ASCE 16	F2291	Standard for Load and Resistance Factor Design (LRFD) for Engineered Wood Construction	O86 (CSA)	Consolidation – Engineering design in wood	
ASM Documents:					

TABLE 1 Continued

Reference Documents in ASTM F24 Committee Standards			Alternate Acceptable Documents in Canada		
Designation (Listed by Authoring Organization)	ASTM Standards Reference Source	Title	Designation (Publisher)	Title	Comments
Atlas of Fatigue Curves	F2291	ASM Atlas of Fatigue Curves	None	None	The ASM Atlas and the ASM Handbook are intended to complement the topic about fatigue strength of mechanical and structural components.
ASM Handbook Volume 19: Fatigue and Fracture	F2291	ASM Handbook Volume 19: Fatigue and Fracture	None	None	The ASM Atlas and the ASM Handbook are intended to complement the topic about fatigue strength of mechanical and structural components.
ASME Standards:					
ASME A17.1/CSA B44	F2291 F3158	Safety Code for Elevators and Escalators	ASME A17.1/CSA B44 (ASME/CSA)	Safety code for elevators and escalators	This standard may be applicable where elevator and escalator technology is used in the design of amusement rides or devices.
ASME B15.1	F2291	Safety Standards for Mechanical Power Transmission Apparatus	None	None	None
ASME B20.1	F3158	Safety Standard for Conveyors and Related Equipment	A17.1/B44 (ASME)	Safety code for Elevators and Escalators	Requirements of B20.1 may be subject to Provincial adoption
ASME BPVC	F2291	ASME Boiler and Pressure Vessel Code	B51 (CSA)	Boiler, pressure vessel, and pressure piping code.	Accumulators shall be constructed in accordance with Section 8, Division 1 of the ASME Boiler and Pressure Vessel Code for unfired pressure vessels, or equivalent.
ASNT Document:					
ASNT SNT-TC-1A	F1193	Topical Outlines for Qualification of Nondestructive Testing Personnel	48.9712 / ISO 9712 (CGSB)	Nondestructive Testing: Qualification and Certification of Personnel	For all NDT Personnel: Natural Resources Canada (NRCan), through the CANMET Materials Technology Laboratory (MTL), is the Certifying Agency for the Canadian Non-Destructive Testing (NDT) Personnel Certification Program. NRCan certifies individuals according to the Canadian General Standards Board Standard CAN/CGSB-48.9712 (Qualification and Certification of Non-Destructive Testing Personnel). For NDT of Welding to CSA W47.1: In Canada, the CWB (Canadian Welding Bureau) is the Certification Body for the administration of CSA Standard W178: 1) NDT shall be conducted by organization certified to W178.1-08 – Certification of Welding Inspection Organizations. 2) NDT shall be conducted by individual certified to W178.2-08 – Certification of Welding Inspectors.
ASTM Standards:					
ASTM D737	F2970	Test Method for Air Permeability of Textile Fabrics	None	None	None
ASTM D3574	F2970	Test Methods for Flexible Cellular Materials—Slab, Bonded, and Molded Urethane Foams	None	None	None
ASTM D3786	F2970	Test Method for Bursting Strength of Textile Fabrics— Diaphragm Bursting Strength Tester Method	None	None	None

iteh Standards
<https://standards.iteh.org/document/preview>

ASTM F2783-17

[//standards.iteh.ai/catalog/standards/sist/dfee1a5f-4422-ad88-037f08afd70a/astm-f2783-17](https://standards.iteh.ai/catalog/standards/sist/dfee1a5f-4422-ad88-037f08afd70a/astm-f2783-17)

