



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Note—This ASTM Standard has been developed to replace CAN/CSA Z267-00 (R2011), which is being withdrawn as an active CSA Standard.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

This standard is structured such that Section 2.1 listings of Core Standards capture the essential and broad safety requirements for all amusement rides and devices. Section 2.2 listings of Supporting Standards are intended to complement in design of all amusement rides and devices where applicable. Section 2.3 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.

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. 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:

Title	Section
Scope	1
Referenced Documents	2
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
Reference Codes, Standards, Specifications, and Handbooks	2.6
Terminology	3
Significance and Use	4
Design	5
General	5.1
Substitution of Referenced Documents in Practice F2291 with Alternate Documents	5.3
General	5.3.1
Canadian Standards	5.3.2
Exceptions from Practice F2291	5.4
Additional Requirements	5.5
Manufacture	6
Ownership, Operation, Maintenance, and Inspection	7
Exceptions from Practice F770	7.3
Additional Requirements	7.4
Auditing of Amusement Rides and Devices	8
Recognized Certification Marks	Annex A1
Significance and Use	Appendix X1
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 and health practices and determine the applicability of regulatory limitations prior to use.

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](#)

2.5 Other Standards:

[D785 Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials](#)

[D2240 Test Method for Rubber Property—Durometer Hardness](#)

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.

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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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		
ASTM Standards Reference Source	Designation (Publisher)	Title	Designation (Publisher)	Title	Comments
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 . See also 5.3.2.6 .
F2291	STP-1330 (ASTM)	Composite Materials: Fatigue and Fracture, 7th Volume	None	None	
F2291	301 (ACI)	Specifications for Structural Concrete	NBCC (NRCC)	National Building Code of Canada	
F2291	318 (ACI)	Building Code Requirements for Structural Concrete (318) and Commentary (318R)	NBCC (NRCC)	National Building Code of Canada	
F2291	NDS 2005 (AF&PA - American Wood Council); or USDA-72 (US Department of Agriculture); or 16 (ASCE)	National Design Specification for Wood Construction; or The Wood Handbook – Wood As An Engineering Material, Forest Service, Forest Products Laboratory; or Standard for Load and Resistance Factor Design (LRFD) for Engineered Wood Construction	O86 (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 .





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	360-05 (ANSI/AISC)	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 . None
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	None	None	None
F2291	B11.TR3 (ANSI)	—General rules relating to systems 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 . See also 5.4.3 .
F2291	B77.1 (ANSI)	Passenger Ropeways—Aerial Tramways, Aerial Lifts, Surface Lifts, Tows and Conveyors—Safety Requirements	Z98 (CSA)	Passenger ropeways and passenger conveyors	
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 . The ASME Atlas and the ASME Handbook are intended to complement the topic about fatigue strength of mechanical and structural components.
F2291	(ASM)	ASM Atlas of Fatigue Curves and ASM Handbook Volume 19: Fatigue and Fracture	None	None	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. None
F2291	BPVC (ASME)	ASME Boiler and Pressure Vessel Code	B51 (CSA)	Boiler, pressure vessel, and pressure piping code.	
F2291	B15.1 (ASME)	Safety Standards for Mechanical Power Transmission Apparatus	None	None	This standard may be applicable where elevator and escalator technology is used in the design of amusement rides or devices. See also 5.4.4 . Note: CSA W47.1 and CSA W59 together are acceptable as an equivalent to AWS D1.1.
F2291	ASME A17.1-2010/CSA B44-10 (ASME/CSA)	Safety Code for Elevators and Escalators	ASME A17.1-2010/CSA B44-10 (ASME/CSA)	Safety code for elevators and escalators	
F2291	D1.1/D1.1M (ANSI/AWS)	Structural Welding Code—Steel	W47.1 (CSA) W59 (CSA)	Certification of companies for fusion welding of steel Welded steel construction (metal arc welding) Welded steel construction (metal arc welding)	See also 5.4.4 . See also 5.4.4 .
F2291	D14.4 (ANSI/AWS)	Specification for Welded Joints in Machinery and Equipment	W59 (CSA)	arc welding	
F2291	D1.1/D1.1M (ANSI/AWS)	Structural Welding Code – Steel	W178.1 (CSA) W178.2 (CSA)	Certification of welding inspection organizations Certification of welding inspectors	
F2291	BS 5400-10 (BSI) and BS 7608 (BSI)	Steel, Concrete and Composite Bridges—Code of Practice for Fatigue Design and Assessment of Steel Structures	None	None	BS 5400 and BS 7608 are intended to complement the topic about fatigue strength of mechanical and structural components.
F2291	International Building Code (ICC)	International Building Code Chapter 16, “Structural Design”	NBCC (NRCC)	National Building Code of Canada	The International Building Code and the NBCC are to be used in conjunction with the section on loads and strengths in Practice F2291 .

