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Z245.12-17

Steel flanges

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Steel flanges



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J.A. Fournell	QAi Quality Assurance Inc., Edmonton, Alberta <i>Category: General Interest</i>	<i>Chair</i>
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B. Wilson	Acuren Group Inc., Calgary, Alberta <i>Category: Supplier/Fabricator/Contractor</i>	<i>Vice-Chair</i>
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F.B. Austin	BC Oil & Gas Commission, Victoria, British Columbia <i>Category: Government and/or Regulatory Authority</i>	
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M. Béland	Gaz Métro, Montréal, Québec	<i>Associate</i>

M. Binet	Gaz Métro, Montréal, Québec <i>Category: User Distribution</i>	
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S. Gosse	Encana Services Company Ltd., Calgary, Alberta <i>Category: Producer Interest</i>	
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D.K. Mann	SaskEnergy, Regina, Saskatchewan <i>Category: User Transmission</i>	
K. Manouchehri	Technical Standards & Safety Authority (TSSA), Toronto, Ontario	Associate

R.A. Marsden	Cenovus Energy Inc., Calgary, Alberta <i>Category: Producer Interest</i>	
T.W. McQuinn	New Brunswick Energy and Utilities Board, Saint John, New Brunswick <i>Category: Government and/or Regulatory Authority</i>	
G. McShane	Tenaris, Calgary, Alberta <i>Category: Supplier/Fabricator/Contractor</i>	
G.F. Palermo	Palermo Plastics Pipe (P3) Consulting, Friendsville, Tennessee, USA <i>Category: Supplier/Fabricator/Contractor</i>	
R.B. Partington	Federation of Alberta Gas Co-ops Ltd., Sherwood Park, Alberta <i>Category: User Distribution</i>	
J. Pavigianiti	National Energy Board, Calgary, Alberta <i>Category: Government and/or Regulatory Authority</i>	
T.J. Pesta	Pesta Consulting Ltd., Calgary, Alberta	<i>Associate</i>
D. Petursson	Manitoba Hydro, Winnipeg, Manitoba <i>Category: User Distribution</i>	
M. Poehlmann	ABSA, Edmonton, Alberta <i>Category: Government and/or Regulatory Authority</i>	
L. Radke	ATCO Pipelines, Edmonton, Alberta	<i>Associate</i>
C.E. Rollings	H3R Inc., Halifax, Nova Scotia	<i>Associate</i>
A.B. Rothwell	Brian Rothwell Consulting Inc., Calgary, Alberta	<i>Associate</i>

J.D. Sandison	CMC Consultants Inc., Winnipeg, Manitoba <i>Category: General Interest</i>	
W.A. Simpson	North American Standards Assessment Corp., Sherwood Park, Alberta	<i>Associate</i>
T. Starodub	Manitoba Hydro, Winnipeg, Manitoba	<i>Associate</i>
J.K. Steeves	AMEC Foster Wheeler, Calgary, Alberta	<i>Associate</i>
J. Sutherland	PII Pipeline Solutions (GE Oil & Gas), Calgary, Alberta <i>Category: Supplier/Fabricator/Contractor</i>	
N. Thalassinos	Entity Consulting Inc., Richmond Hill, Ontario <i>Category: General Interest</i>	
A. Van Der Veen	TransCanada PipeLines Limited, Calgary, Alberta	<i>Associate</i>
M. Wagle	Enbridge Gas Distribution, Toronto, Ontario <i>Category: User Distribution</i>	
S. Walker	Union Gas Limited, Chatham, Ontario	<i>Associate</i>
H. Wallace	Alberta Energy Regulator, Calgary, Alberta <i>Category: Government and/or Regulatory Authority</i>	
L. Wojtanowski	Sun-Canadian Pipe Line Company Limited, Waterdown, Ontario <i>Category: User Transmission</i>	
J. Zhou	TransCanada PipeLines Limited, Calgary, Alberta <i>Category: User Transmission</i>	
S. Capper	CSA Group, Toronto, Ontario	<i>Project Manager</i>

P. Fernandez Marchi

CSA Group,
Toronto, Ontario

Project Manager

Subcommittee on Materials

A.J. Afaganis	EVRAZ Inc. NA, Calgary, Alberta	<i>Chair</i>
M. Whitehouse	Enbridge Gas Distribution, Mooretown, Ontario	<i>Vice-Chair</i>
E.B. Willett	Enbridge Gas Transmission & Midstream, Calgary, Alberta	<i>Vice-Chair</i>
D.M. Duan	TransCanada PipeLines Limited, Calgary, Alberta	
K. Durand	Canadoil Forge Ltd., Bécancour, Québec	
T. Gorrell	Allied Group, Houston, Texas, USA	
C. Guan	TransCanada PipeLines Limited, Calgary, Alberta	
D. Horsley	Horsley Consulting Ltd., Calgary, Alberta	
T.H. Lawrence	TMK IPSCO, Houston, Texas, USA	
M.Q. Li	Fortune Group, Edmonton, Alberta	
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S. Tracy	EVRAZ Inc. NA, Calgary, Alberta	
W.R. Tyson	Natural Resources Canada, Ottawa, Ontario	
I.A. Ward	Shell Global Solutions Canada, Calgary, Alberta	
B. Wray	Galperti Canada, Edmonton, Alberta	
S. Xu	CanmetMATERIALS Natural Resources Canada, Hamilton, Ontario	
P. Fernandez Marchi	CSA Group, Toronto, Ontario	<i>Project Manager</i>

In addition to the members of the Subcommittee on Materials, **Jan Andersson** made a valuable contribution to the development of this Standard.

Preface

This is the eighth edition of CSA Z245.12, *Steel flanges*. It supersedes the previous editions published in 2013, 2009, 2005, 2001, 1996, 1991, and 1985.

This Standard covers the requirements for steel flanges intended to be used for transporting fluids as specified in CAN/CSA-Z662.

Changes to this edition include the following:

- a) addition of manufacturing procedure specification requirements (Clause 6.4);
- b) addition of inspection and test plan requirements (Clause 6.5);
- c) revised heat treatment procedures and records requirements (Clause 8);
- d) revised test frequency requirements (Clause 9.1.3);
- e) revised certification requirements (Clause 15); and
- f) revised Annex C (now a mandatory Annex).

In this 2017 edition, where a major change or addition to the previous edition of this Standard has been made, the clause, table, or figure affected is identified by the symbol © in the margin. Users of this Standard are advised that the change markers in the text are not intended to be all-inclusive and are provided as a convenience only; such markers cannot constitute a comprehensive guide to the revisions made to this Standard. Care must therefore be taken not to rely on the change markers to determine the current requirements of this Standard. As always, users of this Standard must consider the entire Standard.

This Standard was prepared by the Subcommittee on Materials, under the jurisdiction of the Technical Committee on Petroleum and Natural Gas Industry Pipeline Systems and Materials and the Strategic Steering Committee on Petroleum and Natural Gas Industry Systems, and has been formally approved by the Technical Committee.

Notes:

- 1) *Use of the singular does not exclude the plural (and vice versa) when the sense allows.*
- 2) *Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.*
- 3) *This Standard was developed by consensus, which is defined by CSA Policy governing standardization — Code of good practice for standardization as “substantial agreement. Consensus implies much more than a simple majority, but not necessarily unanimity”. It is consistent with this definition that a member may be included in the Technical Committee list and yet not be in full agreement with all clauses of this Standard.*
- 4) *To submit a request for interpretation of this Standard, please send the following information to inquiries@csagroup.org and include “Request for interpretation” in the subject line:*
 - a) *define the problem, making reference to the specific clause, and, where appropriate, include an illustrative sketch;*
 - b) *provide an explanation of circumstances surrounding the actual field condition; and*
 - c) *where possible, phrase the request in such a way that a specific “yes” or “no” answer will address the issue.*

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 - a) *Standard designation (number);*
 - b) *relevant clause, table, and/or figure number;*
 - c) *wording of the proposed change; and*

d) *rationale for the change.*

Z245.12-17

Steel flanges

1 Scope

1.1 General

This Standard covers wrought steel welding neck and blind flanges primarily intended for use in oil or gas pipeline systems.

1.2 Size, grade, nominal pressure class, and category

1.2.1 Size

This Standard covers flanges in sizes from NPS 1/2 to NPS 60. (See Table A.1.)

① 1.2.2 Grade

For other than sour service, this Standard covers flanges from Grade 248 to Grade 690. For sour service, this Standard covers flanges from Grade 248 to Grade 483.

Note: The standard grades are Grades 248, 290, 317, 359, 386, 414, 448, 483, 550, 620, and 690 (see Table 4); however, intermediate grades may also be used.

1.2.3 Nominal pressure class

This Standard covers flanges having cold working-pressure ratings designated by nominal pressure classes from PN 20 to PN 420. The standard nominal pressure classes are shown in Table 1. (ASME class designations are shown in Table B.1.)

1.2.4 Category

This Standard covers flanges in the following categories:

- a) Category I: flanges without requirements for proven notch-toughness properties; and
- b) Category II: flanges with requirements for proven notch-toughness properties.

1.3 Assemblies

This Standard does not cover assemblies.

Note: An assembly is a grouping of fittings or flanges, or both, joined by one or more circumferential welds.

1.4 Terminology

In this Standard, “shall” is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the standard; “should” is used to express a recommendation or that which is advised but not required; and “may” is used to express an option or that which is permissible within the limits of the Standard.

Notes accompanying clauses do not include requirements or alternative requirements; the purpose of a note accompanying a clause is to separate from the text explanatory or informative material.

Notes to tables and figures are considered part of the table or figure and may be written as requirements.

Annexes are designated normative (mandatory) or informative (non-mandatory) to define their application.

② **2 Reference publications**

This Standard refers to the following publications, and where such reference is made, it shall be to the edition listed below, unless the user finds it more appropriate to use newer or amended editions of such publications.

CSA Group

CAN/CSA-Z662-15

Oil and gas pipeline systems

ASME (The American Society of Mechanical Engineers)

Boiler and Pressure Vessel Code,

Section II — Materials, Part D, Properties, 2015

Section VIII — Pressure Vessels, Division 1, 2015

Section IX — Welding and Brazing Qualifications, 2015

B16.5-2013

Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard

B46.1-2009

Surface Texture (Surface Roughness, Waviness, and Lay)

ASTM International (American Society for Testing and Materials)

A370-16

Standard Test Methods and Definitions for Mechanical Testing of Steel Products

A751-14A

Standard Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products

E18-16

Standard Test Methods for Rockwell Hardness of Metallic Materials

E29-13

Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E140-12BE1

Standard Hardness Conversion Tables for Metals Relationship Among Brinell Hardness, Vickers Hardness, Rockwell Hardness, Superficial Hardness, Knoop Hardness, Scleroscope Hardness, and Leeb Hardness.

EN (European Standard)

10204:2004

Metallic products — Types of inspection documents

ISO (International Organization for Standardization)

15156-2:2015

Petroleum and natural gas industries — Materials for use in H₂S-containing environments in oil and gas production — Part 2: Cracking-resistant carbon and low alloy steels, and the use of cast irons

NACE International/ISO (International Organization for Standardization)

NACE MR0175/ISO 15156-2:2015

Petroleum and natural gas industries — Materials for use in H₂S-containing environments in oil and gas production — Part 2: Cracking-resistant carbon and low alloy steels, and the use of cast irons

Ⓢ 3 Definitions

The following definitions shall apply in this Standard:

Defect — an imperfection of sufficient magnitude to warrant rejection based on the requirements of this Standard.

Demonstrate — verify, or describe and explain, by the use of records, measurements, tests, comparison of specimens, experiments, or analysis by a competent person, supported by documentation.

Grade — a product designation based on strength.

Note: *A grade designation is nondimensional; however, it is numerically equivalent to the specified minimum yield strength in megapascals.*

Heat-affected zone — that portion of the base metal that has not been melted but whose mechanical properties or microstructure has been altered by the heat of welding.

Heat analysis — the chemical analysis reported by the steel producer as being representative of the heat of steel.

Imperfection — a material discontinuity or irregularity that is detectable by inspection in accordance with the requirements of this Standard.

Material test report (MTR) — a document that presents all Clause 15 applicable or quantitative results obtained by applying one or more given test methods in accordance with EN10204 Type 3.1B.

Notch toughness — the resistance of the steel to fracture under suddenly applied loads at a notch.

Product analysis — the chemical analysis made on a sample taken from the finished flange or from material representative of the finished flange.

Tensile strength — the stress obtained by dividing the maximum load applied in a conventional tensile test by the original cross-sectional area of the test sample.

Yield strength — the stress at which the steel exhibits either 0.2% offset deviation from the proportionality of stress to strain or 0.5% total elongation under load in a tensile test.