

MSS SP-44-2010

Steel Pipeline Flanges

Standard Practice
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This MSS Standard Practice was developed under the consensus of the MSS Technical Committee 110 and the MSS Coordinating Committee. The content of this Standard Practice is the result of the efforts of competent and concerned volunteers to provide an effective, clear, and non-exclusive specification that will benefit the industry as a whole. This MSS Standard Practice is intended as a basis for common practice by the manufacturer, the user, and the general public. The existence of an MSS Standard Practice does not in itself preclude the manufacture, sale, or use of products not conforming to the Standard Practice. Mandatory conformance is established only by reference in a code, specification, sales contract, or public law, as applicable.

Unless otherwise specifically noted in this MSS SP, any standard referred to herein is identified by the date of issue that was applicable to the referenced standard(s) at the date of issue of this MSS SP. (See Annex D.)

In this Standard Practice all notes, annexes, tables, and figures are construed to be essential to the understanding of the message of the standard, and are considered part of the text unless noted as "supplemental". All appendices appearing in this document are construed as "supplemental". Supplemental information does not include mandatory requirements.

This document has been substantially revised from the previous 2006 edition. It is suggested that if the user is interested in knowing what changes have been made, that direct page by page comparison should be made of this document.

Non-toleranced dimensions in this Standard Practice are nominal, and unless otherwise specified, shall be considered "for reference only".

The Metric (SI) units and U.S. Customary units in this SP are regarded separately as the standard; each should be used independently of the other. Combining or converting values between the two systems may result in nonconformance with this Standard Practice.

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FOREWORD

The Manufacturers Standardization Society originally developed this Standard Practice in response to the continued requests for steel pipe flanges for pipeline use, particularly in sizes larger than those covered by ANSI Standard B16.5 on Steel Pipe Flanges and Flanged Fittings. The line pipe is uniquely characterized by high-strength, cold worked, thin-wall of the carbon steel grade, which necessitates special considerations for the welding end of the flanges.

The size and pressure class range was originally NPS 26 through NPS 36 in pressure classes customarily designated in ANSI Standard B16.5 as 300, 400, 600, and 900 lb. The 1970 edition deleted the slip-on flanges for lack of demand, and added a 150 lb. class and coverage for sizes NPS 12 through NPS 24. Additional coverage was also necessitated by the advent of the use of line pipe of grades having minimum specified yield strength higher than the 52,000 psi maximum contemplated at the time of initial development, and therefore still thinner walls.

In some instances, this advent widened the differential between the tensile properties of the flange steel versus that of the mating pipe steel. This, in turn necessitated greater flexibility in the selection of hub dimensions, so that various combinations of material-strength and flange-dimensions could be utilized to supply the flanges. Section 5 on Flange Design was introduced at this point, and is one of the key features of this Standard Practice. The 1972 edition included the coverage of blind flanges in all pressure classes and clarification of text requirements for better understanding and usage under the more diverse conditions.

The 1975 edition expanded the size range above size NPS 36. The drilling templates for the Class 150 flanges of the NPS 38 and larger sizes continued the previous philosophy of adopting the drilling template of the Class 125 of ANSI Standard B16.1. However, the drilling templates of the Class 300 flanges of the NPS 38 and larger sizes did not continue the adoption of the Class 250 of ANSI Standard B16.1 drilling templates, nor did the NPS 38 and larger sizes of Classes 400, 600, and 900 continue the extrapolation of ANSI B16.5 drilling templates; instead, these drilling templates were necessarily designed more compactly because of the increased loads. While these flanges are designated by the customary ANSI Standard Class 150, 300, 400, 600, and 900, their use is almost entirely confined to cross country transmission pipelines at atmospheric temperatures. The flanges have been designed primarily for use at their cold ratings which conform to the ANSI Standard B16.5 ratings of 100⁰F, and are intended primarily for attachment to relatively thin-wall, high-strength cold worked pipe, and ,high-strength butt-welding fittings in pipeline service at temperatures of 450⁰F and lower. However, flanges forged of other materials are capable of pressure temperature ratings as specified in Section 2.1.

The 1980 edition was created to bring the document into closer editorial alignment with ANSI B16.5. However, out of recognition of the successful experience of the pipeline industry, room temperature ratings were extended to 250⁰F. Derating above 250⁰F was accelerated such that the 450⁰F ratings are the same as ANSI B16.5. Users are cautioned that when these flanges are bolted to valves and used at temperatures between 100⁰F and 450⁰F, the rating of the valve will not be as high as the flange.

The 1990 revision of this SP was required to update the referenced standards list and delete the metric equivalents.

The 1991 revision of this SP was required to add blind flange machining guidance, flat face requirements and precautionary notes as well as update of referenced standards.

The 1996 revision adds a table with permissible imperfections in flange facing finish and clarifies Annex A design criteria. There were several errata, or corrections made to references to other standards. Dimensional tolerances have been changed where necessary to conform to ASME B16.5 and B16.47.

The 2006 revision was required to add metric equivalent units, notch toughness requirement, new bolting materials and update of reference standards list.

This 2010 revision recognized the existence of ASME B16.47 Series A flanges, which adopted MSS SP-44 dimensions but does not cover the SP-44 high strength materials used in the pipeline industry to match API line pipe of equivalent grades.

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ERRATA SHEET FOR MSS SP-44-2010 and SP-44-2006

May 20, 2011

This “normative” errata correction applies to MSS SP-44-2010 (current version) and SP-44-2006, involving *Steel Pipeline Flanges*.

Note the following correction:

1. **Page 26 (2010 version)/Page 25 (2006 version), Table C4, Headings/Sub-Headings: Pipe Size “42”/Drilling/No. of Bolt Holes.** The number of bolt holes for Pipe Size 42 should indicate “32” instead of the existing “28”. Note that Table C4 involves *Class 300, 740 psi at Atmospheric Temperature Raised Face and Ring-Type Joints*.

This Errata Sheet is included in the Standard Practice.

Future printing of the Standard Practice will include this revised data.

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STEEL PIPELINE FLANGES

1. SCOPE

1.1 **General** This Standard Practice covers pressure-temperature ratings, materials, dimensions, tolerances, marking, and testing. The welding neck type flanges shall be forged steel, and the blind flanges may be made of either forged steel or from steel plates.

1.1.1 Dimensional and tolerance requirements for sizes NPS 10 and smaller are provided by reference to ASME B16.5. When such flanges are made of materials meeting Table 1 requirements and meet all other stipulations of this standard, they shall be considered as complying therewith.

1.2 **References**

1.2.1 **Referenced Standards** Standards and specifications adopted by reference in this Standard Practice are shown in Annex D, for convenience of identifying edition number, date and source of supply.

A flange made in conformance with a prior edition of referenced standards and in all other respects conforming to this Standard Practice will be considered to be in conformance even though the edition reference may be changed in a subsequent revision of this Standard Practice.

1.2.2 **Codes and Regulations** A flange used under the jurisdiction of the ASME Boiler and Pressure Vessel Code, the ANSI Code for Pressure Piping, or Governmental Regulations, is subject to any limitation of that code or regulation. This includes any maximum temperature limitation for a material, or rule governing the use of a material at a low temperature.

1.3 **Relevant Units** This Standard Practice states values in both metric and U.S. Customary units. As an exception, diameter of bolts and flange bolt holes are expressed in inch units only. These systems of units are to be regarded separately as standard.

Within the text, the U.S. Customary units are shown in parentheses, combined tables, or in separate tables. The values stated in each system are not exact equivalents; therefore, it is required that each system of units be used independently of the other. Except for diameter of bolts and flange bolt holes, combining values from the two systems constitutes nonconformance with the Standard Practice.

2. DENOTATION

2.1 **Pressure-Temperature Ratings**

2.1.1 General Flanges covered by this Standard Practice shall be designated as one of the following: Class 150, 300, 400, 600 and 900. Pressure temperature ratings in Table 3 are in metric and U.S. Customary.

2.2 **Size** NPS, followed by a dimensionless number, is the designation for nominal flange size. NPS is related to the reference nominal diameter, DN, used in international standards. The specific relationship for the NPS size flange to DN size flange in this Standard Practice is as follows:

NPS	12	14	16	18	20	22	24
DN	300	350	400	450	500	550	600
NPS	26	28	30	32	34	36	38
DN	650	700	750	800	850	900	950

NPS	40	42	44	46	48	50
DN	1000	1050	1100	1150	1200	1250
NPS	52	54	56	58	60	
DN	1300	1350	1400	1450	1500	