ASME B31.8-2014

(Revision of ASME B31.8-2012)

Gas Transmission and Distribution Piping Systems

ASME Code for Pressure Piping, B31

AN INTERNATIONAL PIPING CODE®



ASME B31.8-2014

(Revision of ASME B31.8-2012)

Gas Transmission and Distribution Piping Systems

ASME Code for Pressure Piping, B31

AN INTERNATIONAL PIPING CODE®



Date of Issuance: September 30, 2014

The next edition of this Code is scheduled for publication in 2016. This Code will become effective 6 months after the Date of Issuance.

ASME issues written replies to inquiries concerning interpretations of technical aspects of this Code. Interpretations, Code Cases, and errata are published on the ASME Web site under the Committee Pages at http://cstools.asme.org/ as they are issued. Interpretations and Code Cases are also included with each edition.

Errata to codes and standards may be posted on the ASME Web site under the Committee Pages to provide corrections to incorrectly published items, or to correct typographical or grammatical errors in codes and standards. Such errata shall be used on the date posted.

The Committee Pages can be found at http://cstools.asme.org/. There is an option available to automatically receive an e-mail notification when errata are posted to a particular code or standard. This option can be found on the appropriate Committee Page after selecting "Errata" in the "Publication Information" section.

ASME is the registered trademark of The American Society of Mechanical Engineers.

This international code or standard was developed under procedures accredited as meeting the criteria for American National Standards and it is an American National Standard. The Standards Committee that approved the code or standard was balanced to assure that individuals from competent and concerned interests have had an opportunity to participate. The proposed code or standard was made available for public review and comment that provides an opportunity for additional public input from industry, academia, regulatory agencies, and the public-at-large.

ASME does not "approve," "rate," or "endorse" any item, construction, proprietary device, or activity.

ASME does not take any position with respect to the validity of any patent rights asserted in connection with any items mentioned in this document, and does not undertake to insure anyone utilizing a standard against liability for infringement of any applicable letters patent, nor assumes any such liability. Users of a code or standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, is entirely their own responsibility.

Participation by federal agency representative(s) or person(s) affiliated with industry is not to be interpreted as government or industry endorsement of this code or standard.

ASME accepts responsibility for only those interpretations of this document issued in accordance with the established ASME procedures and policies, which precludes the issuance of interpretations by individuals.

No part of this document may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.

The American Society of Mechanical Engineers Two Park Avenue, New York, NY 10016-5990

Copyright © 2014 by
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
All rights reserved
Printed in U.S.A.

CONTENTS

Foreword		viii
Committee Roster		х
Introduction		xiv
		xvi
, 0	General Provisions and Definitions	1
801	General	1
802	Scope and Intent	1
803	Piping Systems Definitions	2
804	Piping Systems Component Definitions	4
805	Design, Fabrication, Operation, and Testing Terms and Definitions	6
806	Quality Assurance	12
807	Training and Qualification of Personnel	12
Chapter I	Materials and Equipment	14
810	Materials and Equipment	14
811	Qualification of Materials and Equipment	14
812	Materials for Use in Low-Temperature Applications	15
813	Marking	15
814	Material Specifications	15
815	Equipment Specifications	16
816	Transportation of Line Pipe	16
817	Conditions for the Reuse of Pipe	16
Table		
817.1.3-1	Tensile Testing	17
Chapter II	Welding	19
820	Welding	19
821	General	19
822	Preparation for Welding	19
823	Qualification of Procedures and Welders	19
824	Preheating	20
825	Stress Relieving	20
826	Weld Inspection Requirements	21
827	Repair or Removal of Defective Welds in Piping Intended to Operate at Hoop Stress Levels of 20% or More of the Specified Minimum Yield Strength	22
Chapter III	Piping System Components and Fabrication Details	23
830	Piping System Components and Fabrication Details	23
831	Piping System Components	23
832	Expansion and Flexibility	30
833	Design for Longitudinal Stress	31
834	Supports and Anchorage for Exposed Piping	33
835	Anchorage for Buried Piping	34
Tables	2 2	
831.4.2-1	Reinforcement of Welded Branch Connections, Special Requirements	28
832.2-1	Thermal Expansion or Contraction of Piping Materials	30

832.5-1	Modulus of Elasticity for Carbon and Low Alloy Steel	31
Chapter IV	Design, Installation, and Testing	35
840	Design, Installation, and Testing 3	35
841		37
842	Other Materials 5	51
843	Compressor Stations 5	59
844	•	62
845		63
846		68
847	Vaults 6	69
848	Customers' Meters and Regulators	70
849		71
Tables		
841.1.6-1	Basic Design Factor, F	39
841.1.6-2		40
841.1.7-1	2	41
841.1.8-1	0 .	41
841.1.11-1		43
841.2.3-1		45
841.3.2-1	Test Requirements for Steel Pipelines and Mains to	
011.0.2	Operate at Hoop Stresses of 30% or More of the	49
841.3.3-1	Maximum Hoop Stress Permissible During an Air or Gas Test	50
842.1.1-1	Standard Thickness Selection Table for Ductile Iron Pipe	52
842.2.2-1	Wall Thickness and Standard Dimension Ratio for	54
842.2.3-1	Diameter and Wall Thickness for Reinforced	54
842.2.9-1	Nominal Values for Coefficients of Thermal Expansion	
044.2.1	1 1	56 63
844.3-1	0 ,	62
844.3-2		62
845.2.2-1	Maximum Allowable Operating Pressure for Steel or Plastic Pipelines or Mains	64
845.2.3-1	Maximum Allowable Operating Pressure for Pipelines Operating at 100 psig (690 kPa) or More	64
845.2.3-2	Maximum Allowable Operating Pressure for Pipelines Operating at Less Than 100 psig (690 kPa)	64
Chapter V	Operating and Maintenance Procedures	75
850	Operating and Maintenance Procedures Affecting the Safety of Gas Transmission and Distribution	
		75
851	T	77
852	1 0	83
853		86
854	Location Class and Changes in Number of Buildings	
	Intended for Human Occupancy 8	89
855	Pipeline Service Conversions	91
856		91
857	Uprating 9	92

Figure 851.4.1-1	Allowable Ripple Heights	80
Tables		
851.4.4-1	Wall Thickness for Unlikely Occurrence of Burn-Through	81
854.1-1	Location Class	90
857.4-1	Wall Thickness Allowance for Uprating a Ductile Iron High-Pressure Main or System	94
Chapter VI	Corrosion Control	95
860	Corrosion Control — General	95
861	External Corrosion Control for Steel Pipelines	96
862	Cathodic Protection Criteria	98
863	Operation and Maintenance of Cathodic Protection	0.0
961	Systems	98 98
864 865	Internal Corrosion Control	90 99
866	-	100
	Steel Pipelines in High-Temperature Service Stress Corrosion and Other Phenomena	100
867		101
868	Cast Iron, Wrought Iron, Ductile Iron, and Other Metallic Pipelines	101
Chapter VII	Intentionally Left Blank	102
Chapter VIII	Offshore Gas Transmission	103
A800	Offshore Gas Transmission	103
A801	General	103
A802	Scope and Intent	103
A803	Offshore Gas Transmission Terms and Definitions	103
A811	Qualification of Materials and Equipment	104
A814	Material Specifications	104
A817	Conditions for the Reuse and Requalification of Pipe	105
A820	Welding Offshore Pipelines	105
A821	General	105
A823	Qualification of Procedures and Welders	105
A825	Stress Relieving	106
A826	Inspection of Welds	106
A830	Piping System Components and Fabrication Details	106
A831	Piping System Components	106
A832	Expansion and Flexibility	106
A834	Supports and Anchorage for Exposed Piping	106
A835	Anchorage for Buried Piping	106
A840	Design, Installation, and Testing	107
A841	Design Considerations	107
A842	Strength Considerations	108
A843	Compressor Stations	111
A844	On-Bottom Stability	112
A846	Valves	113
A847	Testing	113
A850	Operating and Maintenance Procedures Affecting the Safety of Gas Transmission Facilities	114
A851	Pipeline Maintenance	114
A854	Location Class	115
A860	Corrosion Control of Offshore Pipelines	115
A861	External Corrosion Control	115
A862	Cathodic Protection Criteria	117
A864	Internal Corrosion Control	117

Table		
A842.2.2-1	Design Factors for Offshore Pipelines, Platform	
	Piping, and Pipeline Risers	109
Chamter IV	Saur Can Samilar	110
Chapter IX	Sour Gas Service	118
B800	Sour Gas Service	118
B801	General	118
B802	Scope and Intent	118
B803	Sour Gas Terms and Definitions	118
B813	Marking	119
B814	Material Specifications	119
B820	Welding Sour Gas Pipelines	119
B821	General	119
B822	Preparation for Welding	119
B823	Qualification of Procedures and Welders	119
B824	Preheating	119
B825	Stress Relieving	120
B826	Welding and Inspection Tests	120
B830	Piping System Components and Fabrication Details	120
B831	Piping System Components	120
B840	Design, Installation, and Testing	120
B841	Steel Pipe	120
B842	Other Materials	121
B843	Compressor Stations	121
B844	Pipe-Type and Bottle-Type Holders	121
B850	Additional Operating and Maintenance	141
D030	Considerations Affecting the Safety of Sour Gas	101
D0F1	Pipelines	121
B851	Pipeline Maintenance	122
B854	Location Class and Changes in Number of Buildings	
	Intended for Human Occupancy	122
B860	Corrosion Control of Sour Gas Pipelines	122
B861	External Corrosion Control for Steel Pipelines	124
B864	Internal Corrosion Control	124
B867	Stress Corrosion and Other Phenomena	124
Tables		
B850.1-1	100 mm POE	100
	100-ppm ROE	123
B850.1-2	500-ppm ROE	123
B850.1-3	Metric Example for 100-ppm ROE	123
B850.1-4	Metric Example for 500-ppm ROE	123
Appendices		
Mandatory Appendix A	References	125
Mandatory Appendix B	Numbers and Subjects of Standards and Specifications	
7 11	That Appear in Mandatory Appendix A	130
Nonmandatory Appendix C	Publications That Do Not Appear in the Code or	
	Mandatory Appendix A	131
Mandatory Appendix D	Specified Minimum Yield Strength for Steel Pipe Commonly Used in Piping Systems	134
Mandatory Appendix E	Flexibility and Stress Intensification Factors	137
Mandatory Appendix F	Extruded Headers and Welded Branch Connections	143
		143
Mandatory Appendix G	Testing of Welders Limited to Work on Lines Operating at Hoop Stresses of Less Than 20% of the Specified	454
M 1	Minimum Yield Strength	151
Mandatory Appendix H	Flattening Test for Pipe	152
Mandatory Appendix I	End Preparations for Buttwelding	153
Nonmandatory Appendix J	Commonly Used Conversion Factors	162

Mandatory Appendix K	Criteria for Cathodic Protection	166
Nonmandatory Appendix L	Determination of Remaining Strength of Corroded	
, 11	Pipe	168
Nonmandatory Appendix M	Gas Leakage Control Criteria	169
Nonmandatory Appendix N	Recommended Practice for Hydrostatic Testing of	
, ,,	Pipelines in Place	176
Nonmandatory Appendix O	Preparation of Technical Inquiries	178
Nonmandatory Appendix P	Nomenclature for Figures	179
Mandatory Appendix Q	Scope Diagrams	180
Nonmandatory Appendix R	Estimating Strain in Dents	183
Index		185