

RULES for CONSTRUCTION of
POWER BOILERS
SECTIONS I, VI, AND APPENDIX
A S.M.E. BOILER CONSTRUCTION CODE

1940 Edition



Formulated by the
Boiler Code Committee

**THE AMERICAN SOCIETY OF
MECHANICAL ENGINEERS**

**29 WEST THIRTY-NINTH STREET
NEW YORK**

Copyright, 1941, by
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

Printed in the United States of America

Adopted by the Council of The American Society of Mechanical Engineers, 1914.
Revised 1918, 1924, 1927, 1930, 1931, 1933, 1935, 1937, 1940.

(b).

FOREWORD

The A.S.M.E. Boiler Construction Code contains rules formulated by the Boiler Code Committee, and approved by the Council of the Society, to cover boilers and unfired pressure vessels. Specifications for materials used in such constructions have been adopted and included. As the primary object of these rules is safety, the interests of users of boilers and pressure vessels are of paramount importance. The rules have been formulated to afford reasonably certain protection of life and property and to provide a margin for deterioration in service so as to give a reasonably long, safe period of usefulness. The interests of manufacturers have also been recognized by taking into consideration advancements in design and material and the evidence of experience. The committee's function is the formulation of such rules and the interpretation thereof when the intent is not clearly indicated. Revisions and the adoption of new rules are given consideration at regular intervals to provide for progress in the art and the use of other materials. Proposed new rules and revisions, prior to their adoption, are published in Mechanical Engineering soliciting study and consideration by all interested parties.

The Boiler Code Committee does not approve, recommend, or endorse proprietary or specific designs, nor does it assume to limit in any way the builders' right to choose any method of design or form of construction that conforms to the code rules.

The committee meets at regular intervals for the purpose of considering inquiries relative to the Boiler Code. The ordinary procedure and handling of each case is as follows: All inquiries must be in written form and complete in detail before they are accepted for consideration. The inquiry is referred to the proper subcommittee to report its recommendation at the next or subsequent meeting of the main committee. The matter is then acted upon by the main committee at its meeting and also by letter ballot. If of general interest the reply is made by published interpretation, otherwise by letter communication. If an interpretation is approved by the main committee, it is submitted to the Council of the Society for its approval, after which it is issued to the inquirer and simultaneously published in Mechanical Engineering.

Each state and municipality that has accepted one or more of the sections of the Boiler Code is invited to appoint a representative to act on the Conference Committee to the Boiler

MEMBERS OF COMMITTEES

Boiler Code Committee

D. S. JACOBUS, <i>Chairman</i>	W. G. HUMPTON
E. R. FISH, <i>Vice-Chairman</i>	J. O. LEECH
C. A. ADAMS	I. E. MOULTROP
H. E. ALDRICH	C. O. MYERS
H. C. BOARDMAN	H. B. OATLEY
PERRY CASSIDY	JAMES PARTINGTON
R. E. CECIL	WALTER SAMANS
F. S. CLARK	S. K. VARNES
A. J. ELY	A. C. WEIGEL
V. M. FROST	C. W. OBERT, <i>Honorary Secretary</i>
C. E. GORTON	M. JURIST, <i>Acting Secretary</i>
A. M. GREENE, JR.	

HONORARY MEMBERS

W. H. BOEHM	W. F. KIESEL, JR.
W. F. DURAND	M. F. MOORE
T. E. DURBAN	H. H. VAUGHAN
C. L. HUSTON	H. LER. WHITNEY

Conference Committee

STATES

Arkansas	J. D. NEWCOMB
California	F. A. PAGE
Delaware	T. R. ARCHER
District of Columbia	H. K. KUGEL
Hawaiian Islands	WM. E. SMITH
Indiana	A. J. CONWAY
Louisiana	A. L. COLBY
Maine	E. K. SAWYER
Maryland	L. M. CAVE
Massachusetts	G. A. LUCK
Michigan	J. H. THORPE
Minnesota	H. S. BRUNSON
New Jersey	J. F. SCOTT
New York	W. H. FURMAN
North Carolina	C. E. WARD
Ohio	{ S. CHERRINGTON
	{ P. N. LEHOCZKY
Oklahoma	W. L. NEWTON
Oregon	C. H. GRAM
Pennsylvania	B. M. BOOK
Rhode Island	E. S. CARPENTER
Texas	JOE KUNSCHIK
Utah	C. I. SMITH
Washington	B. GRETZKE
West Virginia	M. R. FRANCIS
Wisconsin	M. A. EDGAR

CITIES

Chicago, Ill.	GERALD GEARON
Detroit, Mich.	H. H. MILLS
Evanston, Ill.	J. N. SEIGER
Houston, Texas	F. D. GARVIN
Kansas City, Mo.	D. J. CODY
Los Angeles, Cal.	C. E. MCGINNIS
Memphis, Tenn.	F. A. HECKINGER
Nashville, Tenn.	L. C. PEAL
Omaha, Neb.	C. W. FOSTER
Parkersburg, W. Va.	CITY BOILER INSPECTOR
St. Joseph, Mo.	J. G. BOLLOCK
St. Louis, Mo.	W. E. ALLEN
Seattle, Wash.	L. M. BARRINGER
Tampa, Fla.	A. H. SCHLEMAN
Tulsa, Okla.	J. A. STRAIT

Executive Committee

D. S. JACOBUS, <i>Chairman</i>	V. M. FROST
H. E. ALDRICH, <i>Vice-Chairman</i>	C. E. GORTON
E. R. FISH	C. W. OBERT
	JAMES PARTINGTON

Subcommittee on Boilers of Locomotives

JAMES PARTINGTON, <i>Chairman</i>	J. M. HALL
F. H. CLARK	H. B. OATLEY

Subcommittee on Care of Steam Boilers and Other Pressure Vessels in Service

F. M. GIBSON, <i>Chairman</i>	P. B. PLACE
D. C. CARMICHAEL	S. T. POWELL
V. M. FROST	C. W. RICE
J. R. GILL	J. B. ROMER
FRANK HENRY	W. C. SCHROEDER
J. A. HUNTER	N. STAHL
H. J. KERR	F. G. STRAUB

Subcommittee on Ferrous Materials

D. B. ROSSHEIM, <i>Chairman</i>	J. J. KANTER
A. B. BAGSAR	H. J. KERR
E. C. CHAPMAN	A. B. KINZEL
A. J. ELY	P. E. MCKINNEY
H. J. FRENCH	L. J. MASON
W. R. GRUNOW	N. L. MOCHEL
M. B. HIGGINS	E. L. ROBINSON
W. G. HUMPTON	S. K. VARNES
A. HURTGEN	A. E. WHITE
T. McL. JASPER	R. WILSON

(f)

C.
C.
J.
W.

P.
A.
W.

C.
W.

H.
J.
W.
D.
J.

F.
P.
E.

I.
H.
H.
J.

H.
C.
C.
I.

Subcommittee on Heating Boilers

C. E. GORTON, *Acting Chairman*
C. E. BRONSON
J. A. DARTS
WM. FERGUSON

L. N. HUNTER
W. E. STARK
J. W. TURNER

Subcommittee on Material Specifications

PERRY CASSIDY, *Chairman*
A. M. GREENE, JR.
W. G. HUMPTON

J. O. LEECH
P. J. SMITH
A. C. WEIGEL

Subcommittee on Miniature Boilers

C. E. GORTON, *Chairman*
W. H. FURMAN

G. A. LUCK
C. W. OBERT

Subcommittee on Nonferrous Materials

H. B. OATLEY, *Chairman*
J. J. AULL
W. N. BURCHFIELD
D. K. CRAMPTON
J. R. FREEMAN, JR.

A. M. HOUSER
E. F. MILLER
JOSEPH PRICE
R. L. TEMPLIN

Subcommittee on Power Boilers

H. E. ALDRICH, *Chairman*
PERRY CASSIDY
E. R. FISH

V. M. FROST
D. L. ROYER
A. C. WEIGEL

Subcommittee on Rules for Inspection

(This Committee is being reorganized.)

Subcommittee on Special Design

D. B. WESSTROM, *Chairman*
H. C. BOARDMAN
R. E. CECIL
T. W. GREENE

D. B. ROSSHEIM
E. O. WATERS
F. S. G. WILLIAMS

Subcommittee on Unfired Pressure Vessels

E. R. FISH, *Chairman*
C. A. ADAMS
C. E. BRONSON
R. E. CECIL

PAUL DISERENS
H. S. SMITH
D. B. WESSTROM

Subcommittee on Welding

A.S.M.E. Boiler Code Committee

JAMES PARTINGTON, *Chairman*
E. C. CHAPMAN
J. H. DEPPERER
W. D. HALSEY
J. C. HODGE
R. K. HOPKINS
J. T. PHILLIPS
L. A. SHELDON

Conference Committee of American Welding Society

C. W. OBERT, *Chairman*
C. A. ADAMS
H. C. BOARDMAN
WALTER SAMANS
A. C. WEIGEL

(d) For pressures exceeding 100 lb per sq in., the valves shall, if of cast iron, be equal at least to the requirements of the American Standards for 250 lb as given in Tables A-8 and A-11 in the Appendix; and if of steel construction shall be equal to the requirements of the American Standards as given in Table A-6 in the Appendix, subject to Par. P-299(e).

(e) For pressures over 200 lb per sq in., the valves or cocks shall be of steel construction equal at least to the requirements of the American Standard for 300 lb per sq in. as given in Table A-6 in the Appendix.

P-311 (a) On all boilers, except those used for traction and/or portable purposes, when the allowable working pressure exceeds 100 lb per sq in., each bottom blowoff pipe shall have two slow-opening valves, or one slow-opening valve and a quick-opening valve or a cock complying with the requirements of Par. P-310.

By slow-opening valve is meant one which requires at least five 360-deg turns of the operating mechanism to change from full-closed to full-opening, and vice versa.

On a boiler having multiple blowoff pipes, a single master valve may be placed on the common blowoff pipe from the boiler, in which case only one valve on each individual blowoff is required. In this case either the master valve or the individual valves or cocks must be of the slow-opening type.

Two independent slow-opening valves or a slow-opening valve and a quick-opening valve or a cock may be combined in one body provided the combined fitting is the equivalent of two independent slow-opening valves or a slow-opening valve and a quick-opening valve or a cock so that the failure of one to operate could not affect the operation of the other.

The drain or blowoff valves for waterwalls or water screens forming parts of a boiler shall conform to the requirements of this paragraph and also of Pars. P-308 and P-309.

(b) The bottom blowoff pipes of every traction and/or portable boiler shall have at least one slow- or quick-opening blowoff valve or cock conforming to the requirements of Par. P-310.

P-312 A bottom blowoff pipe when exposed to direct furnace heat shall be protected by firebrick, or other heat-resisting material, so arranged that the pipe may be inspected.

P-313 An opening in the boiler setting for a blowoff pipe shall be arranged to provide free expansion and contraction.

P-314 F into a boiler charged direct temperature riveted joint sary, the d baffle to di other than shall not be

When a diameter, t the length the hottest tubular boiler and circular feed pipe s from the p specified for fastened ins

In vertical the feedwa one-fourth or crown sh water shall crown sheet not be intro the water closed syst opening wh

P-315 use on boiler surface blowoff pipes being reinforcing attached a

P-316 nal and employed, the

P-317 valve near tween the boilers are globe valve

REV. 9.16.42

NOT
ADDITION
S-30-1

(9) On superheaters—on superheater header near the outlet.

(10) On economizers—at a handy location on water-inlet header or drums.

(11) On waterwalls—on one end of a lower header.

P-334 The American Society of Mechanical Engineers' standard symbol and the boiler builder's stamps shall not be covered by insulating or other material.

PART II RULES FOR INSPECTION OF INSTALLED BOILERS

I-38 General Instructions. It is essential to have every part of a boiler, that is accessible, open and properly prepared for examination, internally and externally. All boilers have openings through which an examination may be made and which for operation are closed; all such parts shall be opened whether for access to water surfaces or heat surfaces. In cooling a boiler down for inspection or repairs, the water should not be withdrawn until the setting is sufficiently cooled to avoid damage to the boiler, and when possible allowed to cool down naturally. It is not necessary, in order to comply with ordinary prudence, to remove insulation material, masonry or fixed parts of the boiler, unless defects or deterioration peculiar to certain types or inaccessible parts of boilers are suspected and where there is moisture or vapor showing through the covering, the covering should be removed at once and a complete investigation made. Upon sufficient visible evidence or suspicion due to age or other causes, every effort shall be made to discover the true condition, even to the removal of insulating material, masonry or fixed parts of a boiler. Sometimes drilling or cutting away of parts is justifiable and necessary to positively determine this condition.

The inspector shall get as close to the parts of the boiler, both internal and external, as is practicable, in order to get the best possible vision of the surfaces, and use a good artificial light if natural light is not sufficient. Whenever attachments or apparatus require testing, the tests shall be made by a plant operative in the presence of the inspector, unless otherwise desired.

I-39 Scale, Oil, Etc. Upon entering a boiler, the inspector shall examine all surfaces of the exposed metal to observe the action caused by the use of water, oil, scale solvents, or other substances which may have intentionally or unintentionally gone in with the feedwater. Any evidence of oil shall be carefully noted. The smallest amount of oil is dangerous and immediate steps shall be taken to prevent any further entrance of oil into the boiler. Oil or scale in the tubes of water-tube boilers or on plates over the fire of any boiler is particularly bad, often causing them to rupture.

I-40 Corrosion, Grooving. A given amount of corrosion along or immediately adjacent to a seam is more serious than a similar amount of corrosion in the solid plate away from the