

are considered consistent with good practice, although there are boilers which have high efficiencies and also operate at higher transmission rates.

RATING AND TESTING CODES

Heating boilers are usually rated according to codes developed by the *Steel Boiler Institute*, the *Institute of Boiler and Radiator Manufacturers*, the *American Gas Association*, and the *Heating, Piping and Air Conditioning Contractors National Association*, whose test codes have been prepared specifically for the purpose of obtaining information required for establishing acceptable ratings. In view of the preference of industry for the above codes which have been found suitable for determining efficiency and performance characteristics of boilers, the following Society codes have been withdrawn.

ASHVE Standard and Short Form Heat Balance Codes for Testing Low-Pressure Steam Heating Solid Fuel Boilers—Codes 1 and 2—(Revision of June, 1929).¹

ASHVE Performance Test Code for Steam Heating Solid Fuel Boilers—Code No. 3—(Edition of 1929).²

The ASHVE Standard Code for Testing Steam Heating Boilers Burning Oil Fuel, (Adopted June, 1938).³

The ASHVE Standard Code for Testing Stoker-Fired Steam Heating Boilers, (Adopted June 1938;⁴ also adopted by the Stoker Manufacturers Association, 1938).

The various current rating and testing codes will be discussed in following paragraphs in which limitations, methods of application, and resulting ratings will be described.

The *Steel Boiler Institute* has adopted a rating code for boilers designated *Table 1 Steel Boilers* and *Table 2 Steel Boilers* and a testing code for *Oil-fired Table 2 Steel Boilers* (SBI Rating Code, Sixth Edition, July 1954). Tables 1 and 2 of this chapter show the SBI ratings of these two classes of boilers. The *Table 1* boilers (defined as those having 129 to 3571 sq ft of heating surface and formerly designated as *Commercial* boilers) are rated in square feet E.D.R. (steam) on the basis of heating surface with limitations set for grate area, furnace volume, and furnace height. The *Table 2* boilers (defined as those having not more than 294 sq ft of heating surface and formerly designated as *Residential* boilers) are rated from tests of oil-fired boilers, with limitations in relation to heating surface and testing conditions. Stoker-fired and gas-fired *Table 2* boilers are rated (SBI Net Rating) not in excess of the oil-fired rating. Hand-fired *Table 2* boilers are rated (SBI Net Rating) not greater than fourteen times the heating surface.

The *Institute of Boiler and Radiator Manufacturers* has adopted a code⁵ for rating cast-iron heating boilers, based upon performance obtained under controlled test conditions. This code applies to all sectional cast-iron heating boiler except those of magazine-feed type.

The *Gross I=B=R Output* is obtained by test, and is subject to certain limiting factors. For hand-fired boilers, the number of boilers of a series to be tested, the minimum overall efficiency, the minimum time limit (the time an *Available Fuel Charge* will last when burned at a rate which will produce the *Gross I=B=R Output*), the chimney area and height, and the draft in the stack are all subject to the limits established in the code. Tests are run using anthracite coal of standard specification. Bituminous coal and coke ratings are the same as for anthracite.

For automatically-fired boilers, the number of boilers of a series to be

TABLE 1. SBI RATINGS FOR Table 1 STEEL BOILERS

MECHANICALLY-FIRED										HAND-FIRED					(e) TAPPINGS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
SBI Rating				SBI Net Rating			(e) Minimum Furnace Height In. (7)			(b) Minimum Furnace Height In. (8)		MINIMUM HEATING SURFACE Sq. Ft. (9)		SBI Rating			SBI Net Rating			(d) Minimum Grate Area Sq. Ft. In. (16)		Steam Outlet I.P.S. In. (17)		(e) Steam Return I.P.S. In. (18)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
Sq Ft Steam (1)	Sq Ft Water (2)	Btu Per Hr (3)	Sq Ft Steam (4)	Sq Ft Water (5)	Btu Per Hr (6)	Min. Furnace Volume Cu Ft (7)	Min. Furnace Height In. (8)	Sq Ft Steam (9)	Sq Ft Water (10)	Sq Ft Steam (11)	Btu Per Hr (12)	Sq Ft Steam (13)	Sq Ft Water (14)	Btu Per Hr (15)	Sq Ft Steam (16)	Sq Ft Water (17)	Btu Per Hr (18)	Sq Ft Steam (19)	Sq Ft Water (20)	Btu Per Hr (21)	Sq Ft Steam (22)	Sq Ft Water (23)	Btu Per Hr (24)	Sq Ft Steam (25)	Sq Ft Water (26)	Btu Per Hr (27)	Sq Ft Steam (28)	Sq Ft Water (29)	Btu Per Hr (30)	Sq Ft Steam (31)	Sq Ft Water (32)	Btu Per Hr (33)	Sq Ft Steam (34)	Sq Ft Water (35)	Btu Per Hr (36)	Sq Ft Steam (37)	Sq Ft Water (38)	Btu Per Hr (39)	Sq Ft Steam (40)	Sq Ft Water (41)	Btu Per Hr (42)	Sq Ft Steam (43)	Sq Ft Water (44)	Btu Per Hr (45)	Sq Ft Steam (46)	Sq Ft Water (47)	Btu Per Hr (48)	Sq Ft Steam (49)	Sq Ft Water (50)	Btu Per Hr (51)	Sq Ft Steam (52)	Sq Ft Water (53)	Btu Per Hr (54)	Sq Ft Steam (55)	Sq Ft Water (56)	Btu Per Hr (57)	Sq Ft Steam (58)	Sq Ft Water (59)	Btu Per Hr (60)	Sq Ft Steam (61)	Sq Ft Water (62)	Btu Per Hr (63)	Sq Ft Steam (64)	Sq Ft Water (65)	Btu Per Hr (66)	Sq Ft Steam (67)	Sq Ft Water (68)	Btu Per Hr (69)	Sq Ft Steam (70)	Sq Ft Water (71)	Btu Per Hr (72)	Sq Ft Steam (73)	Sq Ft Water (74)	Btu Per Hr (75)	Sq Ft Steam (76)	Sq Ft Water (77)	Btu Per Hr (78)	Sq Ft Steam (79)	Sq Ft Water (80)	Btu Per Hr (81)	Sq Ft Steam (82)	Sq Ft Water (83)	Btu Per Hr (84)	Sq Ft Steam (85)	Sq Ft Water (86)	Btu Per Hr (87)	Sq Ft Steam (88)	Sq Ft Water (89)	Btu Per Hr (90)	Sq Ft Steam (91)	Sq Ft Water (92)	Btu Per Hr (93)	Sq Ft Steam (94)	Sq Ft Water (95)	Btu Per Hr (96)	Sq Ft Steam (97)	Sq Ft Water (98)	Btu Per Hr (99)	Sq Ft Steam (100)	Sq Ft Water (101)	Btu Per Hr (102)	Sq Ft Steam (103)	Sq Ft Water (104)	Btu Per Hr (105)	Sq Ft Steam (106)	Sq Ft Water (107)	Btu Per Hr (108)	Sq Ft Steam (109)	Sq Ft Water (110)	Btu Per Hr (111)	Sq Ft Steam (112)	Sq Ft Water (113)	Btu Per Hr (114)	Sq Ft Steam (115)	Sq Ft Water (116)	Btu Per Hr (117)	Sq Ft Steam (118)	Sq Ft Water (119)	Btu Per Hr (120)	Sq Ft Steam (121)	Sq Ft Water (122)	Btu Per Hr (123)	Sq Ft Steam (124)	Sq Ft Water (125)	Btu Per Hr (126)	Sq Ft Steam (127)	Sq Ft Water (128)	Btu Per Hr (129)	Sq Ft Steam (130)	Sq Ft Water (131)	Btu Per Hr (132)	Sq Ft Steam (133)	Sq Ft Water (134)	Btu Per Hr (135)	Sq Ft Steam (136)	Sq Ft Water (137)	Btu Per Hr (138)	Sq Ft Steam (139)	Sq Ft Water (140)	Btu Per Hr (141)	Sq Ft Steam (142)	Sq Ft Water (143)	Btu Per Hr (144)	Sq Ft Steam (145)	Sq Ft Water (146)	Btu Per Hr (147)	Sq Ft Steam (148)	Sq Ft Water (149)	Btu Per Hr (150)	Sq Ft Steam (151)	Sq Ft Water (152)	Btu Per Hr (153)	Sq Ft Steam (154)	Sq Ft Water (155)	Btu Per Hr (156)	Sq Ft Steam (157)	Sq Ft Water (158)	Btu Per Hr (159)	Sq Ft Steam (160)	Sq Ft Water (161)	Btu Per Hr (162)	Sq Ft Steam (163)	Sq Ft Water (164)	Btu Per Hr (165)	Sq Ft Steam (166)	Sq Ft Water (167)	Btu Per Hr (168)	Sq Ft Steam (169)	Sq Ft Water (170)	Btu Per Hr (171)	Sq Ft Steam (172)	Sq Ft Water (173)	Btu Per Hr (174)	Sq Ft Steam (175)	Sq Ft Water (176)	Btu Per Hr (177)	Sq Ft Steam (178)	Sq Ft Water (179)	Btu Per Hr (180)	Sq Ft Steam (181)	Sq Ft Water (182)	Btu Per Hr (183)	Sq Ft Steam (184)	Sq Ft Water (185)	Btu Per Hr (186)	Sq Ft Steam (187)	Sq Ft Water (188)	Btu Per Hr (189)	Sq Ft Steam (190)	Sq Ft Water (191)	Btu Per Hr (192)	Sq Ft Steam (193)	Sq Ft Water (194)	Btu Per Hr (195)	Sq Ft Steam (196)	Sq Ft Water (197)	Btu Per Hr (198)	Sq Ft Steam (199)	Sq Ft Water (200)	Btu Per Hr (201)	Sq Ft Steam (202)	Sq Ft Water (203)	Btu Per Hr (204)	Sq Ft Steam (205)	Sq Ft Water (206)	Btu Per Hr (207)	Sq Ft Steam (208)	Sq Ft Water (209)	Btu Per Hr (210)	Sq Ft Steam (211)	Sq Ft Water (212)	Btu Per Hr (213)	Sq Ft Steam (214)	Sq Ft Water (215)	Btu Per Hr (216)	Sq Ft Steam (217)	Sq Ft Water (218)	Btu Per Hr (219)	Sq Ft Steam (220)	Sq Ft Water (221)	Btu Per Hr (222)	Sq Ft Steam (223)	Sq Ft Water (224)	Btu Per Hr (225)	Sq Ft Steam (226)	Sq Ft Water (227)	Btu Per Hr (228)	Sq Ft Steam (229)	Sq Ft Water (230)	Btu Per Hr (231)	Sq Ft Steam (232)	Sq Ft Water (233)	Btu Per Hr (234)	Sq Ft Steam (235)	Sq Ft Water (236)	Btu Per Hr (237)	Sq Ft Steam (238)	Sq Ft Water (239)	Btu Per Hr (240)	Sq Ft Steam (241)	Sq Ft Water (242)	Btu Per Hr (243)	Sq Ft Steam (244)	Sq Ft Water (245)	Btu Per Hr (246)	Sq Ft Steam (247)	Sq Ft Water (248)	Btu Per Hr (249)	Sq Ft Steam (250)	Sq Ft Water (251)	Btu Per Hr (252)	Sq Ft Steam (253)	Sq Ft Water (254)	Btu Per Hr (255)	Sq Ft Steam (256)	Sq Ft Water (257)	Btu Per Hr (258)	Sq Ft Steam (259)	Sq Ft Water (260)	Btu Per Hr (261)	Sq Ft Steam (262)	Sq Ft Water (263)	Btu Per Hr (264)	Sq Ft Steam (265)	Sq Ft Water (266)	Btu Per Hr (267)	Sq Ft Steam (268)	Sq Ft Water (269)	Btu Per Hr (270)	Sq Ft Steam (271)	Sq Ft Water (272)	Btu Per Hr (273)	Sq Ft Steam (274)	Sq Ft Water (275)	Btu Per Hr (276)	Sq Ft Steam (277)	Sq Ft Water (278)	Btu Per Hr (279)	Sq Ft Steam (280)	Sq Ft Water (281)	Btu Per Hr (282)	Sq Ft Steam (283)	Sq Ft Water (284)	Btu Per Hr (285)	Sq Ft Steam (286)	Sq Ft Water (287)	Btu Per Hr (288)	Sq Ft Steam (289)	Sq Ft Water (290)	Btu Per Hr (291)	Sq Ft Steam (292)	Sq Ft Water (293)	Btu Per Hr (294)	Sq Ft Steam (295)	Sq Ft Water (296)	Btu Per Hr (297)	Sq Ft Steam (298)	Sq Ft Water (299)	Btu Per Hr (300)	Sq Ft Steam (301)	Sq Ft Water (302)	Btu Per Hr (303)	Sq Ft Steam (304)	Sq Ft Water (305)	Btu Per Hr (306)	Sq Ft Steam (307)	Sq Ft Water (308)	Btu Per Hr (309)	Sq Ft Steam (310)	Sq Ft Water (311)	Btu Per Hr (312)	Sq Ft Steam (313)	Sq Ft Water (314)	Btu Per Hr (315)	Sq Ft Steam (316)	Sq Ft Water (317)	Btu Per Hr (318)	Sq Ft Steam (319)	Sq Ft Water (320)	Btu Per Hr (321)	Sq Ft Steam (322)	Sq Ft Water (323)	Btu Per Hr (324)	Sq Ft Steam (325)	Sq Ft Water (326)	Btu Per Hr (327)	Sq Ft Steam (328)	Sq Ft Water (329)	Btu Per Hr (330)	Sq Ft Steam (331)	Sq Ft Water (332)	Btu Per Hr (333)	Sq Ft Steam (334)	Sq Ft Water (335)	Btu Per Hr (336)	Sq Ft Steam (337)	Sq Ft Water (338)	Btu Per Hr (339)	Sq Ft Steam (340)	Sq Ft Water (341)	Btu Per Hr (342)	Sq Ft Steam (343)	Sq Ft Water (344)	Btu Per Hr (345)	Sq Ft Steam (346)	Sq Ft Water (347)	Btu Per Hr (348)	Sq Ft Steam (349)	Sq Ft Water (350)	Btu Per Hr (351)	Sq Ft Steam (352)	Sq Ft Water (353)	Btu Per Hr (354)	Sq Ft Steam (355)	Sq Ft Water (356)	Btu Per Hr (357)	Sq Ft Steam (358)	Sq Ft Water (359)	Btu Per Hr (360)	Sq Ft Steam (361)	Sq Ft Water (362)	Btu Per Hr (363)	Sq Ft Steam (364)	Sq Ft Water (365)	Btu Per Hr (366)	Sq Ft Steam (367)	Sq Ft Water (368)	Btu Per Hr (369)	Sq Ft Steam (370)	Sq Ft Water (371)	Btu Per Hr (372)	Sq Ft Steam (373)	Sq Ft Water (374)	Btu Per Hr (375)	Sq Ft Steam (376)	Sq Ft Water (377)	Btu Per Hr (378)	Sq Ft Steam (379)	Sq Ft Water (380)	Btu Per Hr (381)	Sq Ft Steam (382)	Sq Ft Water (383)	Btu Per Hr (384)	Sq Ft Steam (385)	Sq Ft Water (386)	Btu Per Hr (387)	Sq Ft Steam (388)	Sq Ft Water (389)	Btu Per Hr (390)	Sq Ft Steam (391)	Sq Ft Water (392)	Btu Per Hr (393)	Sq Ft Steam (394)	Sq Ft Water (395)	Btu Per Hr (396)	Sq Ft Steam (397)	Sq Ft Water (398)	Btu Per Hr (399)	Sq Ft Steam (400)	Sq Ft Water (401)	Btu Per Hr (402)	Sq Ft Steam (403)	Sq Ft Water (404)	Btu Per Hr (405)	Sq Ft Steam (406)	Sq Ft Water (407)	Btu Per Hr (408)	Sq Ft Steam (409)	Sq Ft Water (410)	Btu Per Hr (411)	Sq Ft Steam (412)	Sq Ft Water (413)	Btu Per Hr (414)	Sq Ft Steam (415)	Sq Ft Water (416)	Btu Per Hr (417)	Sq Ft Steam (418)	Sq Ft Water (419)	Btu Per Hr (420)	Sq Ft Steam (421)	Sq Ft Water (422)	Btu Per Hr (423)	Sq Ft Steam (424)	Sq Ft Water (425)	Btu Per Hr (426)	Sq Ft Steam (427)	Sq Ft Water (428)	Btu Per Hr (429)	Sq Ft Steam (430)	Sq Ft Water (431)	Btu Per Hr (432)	Sq Ft Steam (433)	Sq Ft Water (434)	Btu Per Hr (435)	Sq Ft Steam (436)	Sq Ft Water (437)	Btu Per Hr (438)	Sq Ft Steam (439)	Sq Ft Water (440)	Btu Per Hr (441)	Sq Ft Steam (442)	Sq Ft Water (443)	Btu Per Hr (444)	Sq Ft Steam (445)	Sq Ft Water (446)	Btu Per Hr (447)	Sq Ft Steam (448)	Sq Ft Water (449)	Btu Per Hr (450)	Sq Ft Steam (451)	Sq Ft Water (452)	Btu Per Hr (453)	Sq Ft Steam (454)	Sq Ft Water (455)	Btu Per Hr (456)	Sq Ft Steam (457)	Sq Ft Water (458)	Btu Per Hr (459)	Sq Ft Steam (460)	Sq Ft Water (461)	Btu Per Hr (462)	Sq Ft Steam (463)	Sq Ft Water (464)	Btu Per Hr (465)	Sq Ft Steam (466)	Sq Ft Water (467)	Btu Per Hr (468)	Sq Ft Steam (469)	Sq Ft Water (470)	Btu Per Hr (471)	Sq Ft Steam (472)	Sq Ft Water (473)	Btu Per Hr (474)	Sq Ft Steam (475)	Sq Ft Water (476)	Btu Per Hr (477)	Sq Ft Steam (478)	Sq Ft Water (479)	Btu Per Hr (478)	Sq Ft Steam (480)	Sq Ft Water (481)	Btu Per Hr (481)	Sq Ft Steam (482)	Sq Ft Water (482)	Btu Per Hr (482)	Sq Ft Steam (483)	Sq Ft Water (483)	Btu Per Hr (483)	Sq Ft Steam (484)	Sq Ft Water (484)	Btu Per Hr (484)	Sq Ft Steam (485)	Sq Ft Water (485)	Btu Per Hr (485)	Sq Ft Steam (486)	Sq Ft Water (486)	Btu Per Hr (486)	Sq Ft Steam (487)	Sq Ft Water (487)	Btu Per Hr (487)	Sq Ft Steam (488)	Sq Ft Water (488)	Btu Per Hr (488)	Sq Ft Steam (489)	Sq Ft Water (489)	Btu Per Hr (489)	Sq Ft Steam (490)	Sq Ft Water (490)	Btu Per Hr (490)	Sq Ft Steam (491)	Sq Ft Water (491)	Btu Per Hr (491)	Sq Ft Steam (492)	Sq Ft Water (492)	Btu Per Hr (492)	Sq Ft Steam (493)	Sq Ft Water (493)	Btu Per Hr (493)	Sq Ft Steam (494)	Sq Ft Water (494)	Btu Per Hr (494)	Sq Ft Steam (495)	Sq Ft Water (495)	Btu Per Hr (495)	Sq Ft Steam (496)	Sq Ft Water (496)	Btu Per Hr (496)	Sq Ft Steam (497)	Sq Ft Water (497)	Btu Per Hr (497)	Sq Ft Steam (498)	Sq Ft Water (498)	Btu Per Hr (498)	Sq Ft Steam (499)	Sq Ft Water (499)	Btu Per Hr (499)	Sq Ft Steam (500)	Sq Ft Water (500)	Btu Per Hr (500)