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HG-340 STAYED SURFACES

HG-340.1 Required Thickness and Design Pressure.

(a) The required thickness and design pressure for stayed flat plates and those parts that, by these rules, require staying, as flat plates with stays or staybolts of uniform cross section that are symmetrically spaced, shall be calculated by the following equations:

\[ t = \frac{p \sqrt{P}}{SC} \quad (1) \]

\[ p = \frac{t^2 SC}{p^2} \quad (2) \]

where

\[ C = 2.7 \text{ for stays welded to plates or for stays screwed through plates not over } \frac{7}{16} \text{ in. (11 mm) in thickness, with ends riveted over} \]

\[ = 2.8 \text{ for stays welded to plates or for stays screwed through plates over } \frac{7}{16} \text{ in. (11 mm) in thickness, with ends riveted over} \]

\[ = 3.1 \text{ for stays screwed through plates and fitted with single nuts outside of plate, or with inside and outside nuts, omitting washers} \]

\[ = 3.5 \text{ for stays with heads not less than 1.3 times the diameter of the stays screwed through plates, or made a taper fit and having the heads formed on the stays before installing them and not riveted over, said heads being made to have a true bearing on the plate} \]

\[ = 4.0 \text{ for stays fitted with inside and outside nuts and outside washers where the diameter of washers is not less than } 0.4p \text{ and thickness not less than } t \]

\[ P = \text{design pressure} \]

\[ p = \text{maximum pitch measured between straight lines passing through the centers of the stays in the different rows, which lines may be horizontal, vertical, or inclined} \]

\[ r = \text{radius of firebox corner} \]

\[ S = \text{maximum allowable stress value given in Table HF-300.1 (HF-300.1M) or Table HF-300.2 (HF-300.2M)} \]

\[ t = \text{required thickness of plate} \]

(b) When two flat stayed surfaces intersect at an angle as shown in Figure HG-340.1, the pitch from the staybolt nearest to the intersection to the point of tangency of the corner curve with the plate shall be

\[ p = \frac{90t}{\beta} \sqrt{\frac{SC}{P}} \]

where \( \beta \) is the angle shown in Figure HG-340.1. In the application of this rule, \( \beta \) shall be limited to between 90 deg and 180 deg inclusive.

(c) When two plates are connected by stays and only one of these plates requires staying, the value of \( C \) shall be governed by the thickness of the plate requiring staying.

HG-340.2 Proportions of Through-Stay With Washers. Acceptable proportions for the ends of through-stays with washers are indicated in Figure HG-340.2.

HG-340.3 Maximum Pitch of Stays. The maximum pitch shall be \( 8\frac{1}{2} \) in. (216 mm) except that for welded-in stays the pitch may be greater provided it does not exceed 15 times the diameter of the stay.

HG-340.4 Unsymmetrical Staying. Where the staying of shells is unsymmetrical by reason of the construction, it is permissible to consider the load carried by each stay as that on the area calculated by taking the distance from the center of the spacing on one side of the stay to the center of the spacing on the other side.

HG-340.5 Stay Distance to Corner Joints, Welded Joints, and Flanges.

(a) In the construction of a heating boiler designed for not over 50 psi (200 kPa) and having welded joints, the allowable distance from a corner-welded joint to the nearest row of stays may be a full pitch as provided by the formula in HG-340.1. A welded joint in a flat surface shall be between two rows of stays that are not over one pitch apart except that the type of joint shown in Figure HG-340.3 shall have a row of stays not more than one pitch from the weld.

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**NOTES:**

1. Maximum \( r = p \) as calculated by HG-340.5; minimum \( r = 3t \). If the radius, \( r \), exceeds the pitch, the curved plate shall be stayed as a flat plate in accordance with HG-340.
or other form of casing is applied to a boiler, an opening with a removable cover shall be provided for viewing the required marking.

(2) Stamping or etching the required markings directly into the boiler jacket in some conspicuous place using letters and numerals at least $\frac{7}{16}$ in. (8 mm) high.

(3) Stamping or etching the required data on a nonferrous nameplate at least 3 in. x 4 in. (75 mm x 100 mm) in size using letters and numerals at least $\frac{7}{16}$ in. (3 mm) high and permanently attaching the nameplate to the casing in some conspicuous place by mechanical means or by an adhesive system.

(4) Marking the required data on a nonmetallic nameplate at least 3 in. x 4 in. (75 mm x 100 mm) in size using letters and numerals at least $\frac{7}{16}$ in. (3 mm) high and permanently attaching the nameplate to the casing in some conspicuous place by an adhesive system.

(5) The nameplate and the adhesive system shall meet the requirements of Mandatory Appendix 3. Other data may be marked on the jacket or the nameplate provided the required markings are distinct and separate from the other data. The marking "ASME" or "ASME standard" shall not be used.

(6) The Certification Mark may be preapplied to a nameplate.

(7) The nameplate may be attached to the casing of a cast iron or cast aluminum boiler by the Manufacturer or Shop Assembler at a plant other than that shown on his Certificate of Authorization provided the plant is owned by the Certificate Holder and the nameplate's control and use is addressed in his Quality Control Manual.

(8) The Certification Mark shall not be used by an organization to which it was not issued.

HG-530.3 Modular Boilers. Requirements for marking are shown in Article 8. Modular boilers complying with HG-607, HG-615, HG-710.4, and HG-716 may be stamped and certified as follows:

(a) Individual modules are stamped and certified as complete boilers, each with its own nameplate stamping and Manufacturer’s Data Report. The heating surface and required minimum relief valve capacity of each module shall be stamped on the individual nameplates.

(b) Individual modules are combined together and provided with a single nameplate stamping and Manufacturer’s Data Report. When certified as a single boiler, the aggregate heating surface of all the modules and the combined minimum relief valve capacity shall be stamped on the nameplate. Additionally, the supply and return headers shall be constructed in accordance with Section IV and recorded on the Manufacturer’s Data Report.

(c) Modular boilers that are installed side by side, front to back, or by stacking in accordance with the Manufacturer’s recommendations shall have their nameplate stamping located to provide access for inspection in the assembled position.

HG-531 MARKING OF PARTS AND ACCESSORIES

(a) Parts and accessories of boilers for which Partial Data Reports are required by HG-520.2 shall be marked in one of the following manners:

(1) The official Certification Mark shown in Figure HG-530.1 with the H designator above the word “Part” along with the following manufacturer’s name

(-b) the part manufacturer’s serial number

(2) The official Certification Mark shown in Figure HG-530.1 with the PRT designator along with the following:

(-a) the part manufacturer’s name
(c) Fuel cutoffs and water feeding devices embodying a separate chamber shall have a vertical drain pipe and a blowoff valve not less than NPS $\frac{3}{4}$ (DN 20), located at the lowest point in the water equalizing pipe connections so that the chamber and the equalizing pipe can be flushed and the device tested.

HG-607 MODULAR STEAM HEATING BOILERS

(a) Each module of a modular steam heating boiler shall be equipped with
   (1) steam gage, see HG-602
   (2) water gage glass, see HG-603
   (3) a pressure control that will cut off the fuel supply when the pressure reaches an operating limit, which shall be less than the maximum allowable pressure
   (4) low water cutoff, see HG-606

(b) The assembled modular steam boiler shall also be equipped with a safety limit control that will cut off the fuel supply to prevent steam pressure from exceeding the 15 psi (100 kPa) maximum allowable working pressure of the boiler. The control shall be constructed to prevent a pressure setting above 15 psi (100 kPa).

(c) When the assembled modular boiler is certified as a single boiler in accordance with HG-530.3(b), the steam gage required on each module by (a)(1) may be replaced by a single gage located on the supply header.

HG-610 FOR HOT WATER HEATING OR HOT WATER SUPPLY BOILERS

HG-611 PRESSURE OR ALTITUDE GAGES

(a) Each hot water heating or hot water supply boiler shall have a pressure or altitude gage connected to it or to its flow connection in such a manner that it cannot be shut off from the boiler except by a cock with tee or lever handle, placed on the pipe near the gage. The handle of the cock shall be parallel to the pipe in which it is located when the cock is open.

(b) Mechanical Gages (Analog). The scale on the dial of the pressure or altitude gage shall be graduated to not less than 1½ nor more than 3½ times the pressure at which the safety relief valve is set.

(c) Electronic gages used in lieu of mechanical gages shall meet the following requirements:
   (1) Gage shall be powered from the boiler power supply and it shall have a display that remains on at all times. The gage shall have a backup power supply.
   (2) The full scale range of the transducer must be a minimum of 1½ times the pressure at which the safety relief valve is set. It shall be accurate to within ±2% of full scale.

(3) The transducer shall have a media compatibility of both liquids and gases and be temperature compensated.

(4) The gage shall have an operating temperature range of 32°F to 250°F (0°C to 120°C) unless otherwise required by the application.

(d) Piping or tubing for pressure- or altitude-gage connections shall be of nonferrous metal when smaller than NPS 1 (DN 25).

HG-612 THERMOMETERS/TEMPERATURE SENSORS

Each hot water heating or hot water supply boiler shall have a thermometer or temperature sensor with display so located and connected that it shall be easily readable. The thermometer or sensor shall be so located that it shall at all times indicate the temperature of the water in the boiler at or near the outlet.

(a) Thermometer shall have a minimum reading of 70°F (20°C) or less.

(b) Thermometer shall have a maximum reading at least equal to 320°F (160°C) but not more than 400°F (205°C).

(c) Electronic temperature sensor used in lieu of a thermometer shall meet the following requirements:
   (1) The sensor shall be powered from the boiler power supply, and it shall have a display that remains on at all times. The sensor shall have a backup power supply.
   (2) The full scale of the sensor and display must be a minimum of 70°F (20°C) to 320°F (160°C). It shall be accurate to within ±1 deg.
   (3) The sensor shall have a minimum operating temperature range of 32°F to 300°F (0°C to 150°C).

(4) The display shall have an ambient operating temperature range of 32°F to 120°F (0°C to 50°C) unless otherwise required by the application.

HG-613 TEMPERATURE CONTROL

Each automatically fired hot water heating or hot water supply boiler shall be protected from over-temperature by two temperature-operated controls. These temperature control devices shall conform to UL 353, Standard for Limit Controls, and shall be accepted by a nationally recognized testing agency.

(a) Each individual automatically fired hot water heating or hot water supply boiler shall have a high temperature limit control that will cut off the fuel supply at or below the marked maximum water temperature at the boiler outlet. This control shall be constructed to prevent a temperature setting above the maximum.

(b) Each individual hot water heating or hot water supply boiler shall have a control that will cut off the fuel supply when the system water temperature reaches a preset operating temperature, which shall be less than the maximum water temperature.
HG-614  LOW-WATER FUEL CUTOFF

(a) Each automatically fired hot water heating or hot water supply boiler with heat input greater than 400,000 Btu/hr (117 kW) shall have an automatic low-water fuel cutoff that has been designed for hot water service conforming to UL 353, Standard for Limit Controls, and accepted by a nationally recognized testing agency. This device shall be so located as to automatically cut off the fuel supply when the surface of the water falls to the level established in (b) below (see Figure HG-703.2).

(b) As there is no normal waterline to be maintained in a hot water boiler, any location of the low-water fuel cutoff above the lowest safe permissible water level established by the boiler manufacturer is satisfactory.

(c) A coil-type boiler or a watertube boiler with heat input greater than 400,000 Btu/hr (117 kW) requiring forced circulation to prevent overheating of the coils or tubes shall have a flow-sensing device installed in lieu of the low-water fuel cutoff required in (a) above to automatically cut off the fuel supply when the circulating flow is interrupted.

(d) A means shall be provided for testing the operation of the external low-water fuel cutoff without resorting to draining the entire system. Such means shall not render the device inoperative except as described as follows. If the means temporarily isolates the device from the boiler during this testing, it shall automatically return to its normal position. The connection may be so arranged that the device cannot be shut off from the boiler except by a cock placed at the device and provided with a tee or lever-handle arranged to be parallel to the pipe in which it is located when the cock is open.

HG-615  MODULAR HOT WATER HEATING BOILERS AND HOT WATER SUPPLY BOILERS

(a) Each module of a modular boiler shall be equipped with

(1) pressure/altitude gage, see HG-611
(2) thermometer, see HG-612
(3) temperature control that will cut off the fuel supply when the temperature reaches an operating limit, which shall be less than the maximum allowable temperature

(b) The assembled modular boiler shall also be equipped with

(1) a safety limit control that will cut off the fuel supply to prevent the water temperature from exceeding the maximum allowable temperature at the boiler outlet. The control shall be constructed to prevent a temperature setting above the maximum. This control shall be located within 3 ft. (1.0 m) of the fitting connecting the last module to the heating supply piping
(2) low water fuel cutoff, see HG-614

(c) When the assembled modular boiler is certified as a single boiler in accordance with HG-530.3(b), the pressure/altitude gage and thermometer required on each module by (a)(1) and (a)(2) may be replaced by a single gage and thermometer located on the supply header.

HG-620  FOR ALL BOILERS

HG-621  INSTRUMENTS, FITTINGS, AND CONTROLS MOUNTED INSIDE BOILER JACKETS

Any or all instruments, fittings, and controls required by these rules may be installed inside of boiler jackets provided the water gage on a steam boiler is accessible without the use of tools and provided the water gage and pressure gage on a steam boiler or the thermometer and pressure gage on a water boiler are visible through an opening or openings at all times.

HG-630  ELECTRIC WIRING

HG-631  ELECTRICAL CODE COMPLIANCE

All field wiring for controls, heat generating apparatus, and other appurtenances necessary for the operation of the boiler or boilers should be installed in accordance with the provisions of the National Electric Code and/or should comply with the applicable local electrical codes. All boilers supplied with factory mounted and wired controls, heat generating apparatus, and other appurtenances necessary for the operation of the boilers should be installed in accordance with the provisions of the nationally recognized standards such as those of HG-640.14

HG-632  TYPE CIRCUITRY TO BE USED

Whether field or factory wired, the control circuitry shall be positively grounded and shall operate at 150 V or less. One of the two following systems may be employed to provide the control circuit.

(a) Two-Wire Nominal 120 V System With Separate Equipment Ground Conductor

(1) This system shall consist of the line, neutral, and equipment ground conductors. The control panel frame and associated control circuitry metallic enclosures shall be electrically continuous and be bonded to the equipment ground conductor.

(2) The equipment ground conductor and the neutral conductor shall be bonded together at their origin in the electrical system as required by the NEC.15

(3) The line side of the control circuit shall be provided with a time delay fuse sized as small as practicable.
The minimum capacity of the closed type expansion tank may be determined from Table HG-709.2 or from the following formula where the necessary information is available:

(U.S. Customary Units)

\[ V_t = \left[ \left( 0.000417 - 0.0466 \right) V_s \right] / \left[ \left( \frac{P_a}{P_f} \right) - \left( \frac{P_d}{P_0} \right) \right] \]

(SI Units)

\[ V_t = \left[ \left( 0.000738 - 0.03348 \right) V_s \right] / \left[ \left( \frac{P_a}{P_f} \right) - \left( \frac{P_d}{P_0} \right) \right] \]

where

- \( P_a \) = atmospheric pressure
- \( P_f \) = fill pressure
- \( P_d \) = maximum operating pressure
- \( T \) = average operating temperature
- \( V_s \) = volume of system, not including tanks
- \( V_t \) = minimum volume of tanks

HG-709.3 Hot Water Supply Systems. If a system is equipped with a check valve or pressure reducing valve in the cold water inlet line, consideration should be given to the installation of an airtight expansion tank or other suitable air cushion. Otherwise, due to the thermal expansion of the water, the safety relief valve may lift periodically. If an expansion tank is provided, it shall be constructed in accordance with Section VIII, Division 1 or Section X. Except for prepressurized tanks, which should be installed on the cold water side, provisions shall be made for draining the tank without emptying the system. See Figure HLW-809.1 for a typical acceptable installation.

HG-710 STOP VALVES

HG-710.1 For Single Steam Boilers. When a stop valve is used in the supply pipe connection of a single steam boiler, there shall be one used in the return pipe connection.

HG-710.2 For Single Hot Water Heating Boilers.

(a) Stop valves shall be located at an accessible point in the supply and return pipe connections as near the boiler nozzle as is convenient and practicable, of a single hot water heating boiler installation to permit draining the boiler without emptying the system.

(b) When the boiler is located above the system and can be drained without draining the system, stop valves may be eliminated.

HG-710.3 For Multiple Boiler Installations. A stop valve shall be used in each supply and return pipe connection of two or more boilers connected to a common system. See Figures HG-703.1(a), HG-703.1(b), and HG-703.2.

HG-710.4 Modular Boilers. Modular boilers shall be installed without stop valves between modules and shall be provided with a single set of stop valves on the common supply and return headers in accordance with HG-710.1 and HG-710.2. Flow control valves and circulating pumps may be located in the return line of each module.

HG-710.5 Type of Stop Valve(s).

(a) All valves or cocks shall conform with the applicable portions of HF-203 and may be ferrous or nonferrous.

(b) The minimum pressure rating of all valves or cocks shall be at least equal to the pressure stamped upon the boiler, and the temperature rating of such valves or cocks, including all internal components, shall be not less than 250°F (120°C).

(c) Valves or cocks shall be flanged, threaded, or have ends suitable for welding or brazing.

(d) All valves or cocks with stems or spindles shall have adjustable pressure type packing glands and, in addition, all plug type cocks shall be equipped with a guard or gland. The plug or other operating mechanism shall be distinctly marked in line with the passage to indicate whether it is opened or closed.

(e) All valves or cocks shall have tight closure when under boiler hydrostatic test pressure.

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**Table HG-709.2 Expansion Tank Capacities for Forced Hot Water Systems**

<table>
<thead>
<tr>
<th>System Volume, gal (m³)</th>
<th>Prepressurized</th>
<th>Nonpressurized</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Diaphragm Type</td>
<td>Type</td>
</tr>
<tr>
<td>100 (0.38)</td>
<td>9 (0.034)</td>
<td>15 (0.057)</td>
</tr>
<tr>
<td>200 (0.76)</td>
<td>17 (0.064)</td>
<td>30 (0.114)</td>
</tr>
<tr>
<td>300 (1.14)</td>
<td>25 (0.095)</td>
<td>45 (0.170)</td>
</tr>
<tr>
<td>400 (1.51)</td>
<td>33 (0.125)</td>
<td>60 (0.227)</td>
</tr>
<tr>
<td>500 (1.89)</td>
<td>42 (0.159)</td>
<td>75 (0.284)</td>
</tr>
<tr>
<td>1,000 (3.79)</td>
<td>83 (0.314)</td>
<td>150 (0.568)</td>
</tr>
<tr>
<td>2,000 (7.57)</td>
<td>165 (0.625)</td>
<td>300 (1.136)</td>
</tr>
</tbody>
</table>

**GENERAL NOTES:**

(a) The capacities in this Table are based on an average operating temperature of 195°F (90°C), a fill pressure of 12 psig, and a maximum operating pressure of 30 psig (200 kPa).

(b) System volume includes volume of water in boiler, radiation, and piping, not including the expansion tank. Expansion tank capacities are based on an acceptance factor of 0.4027 for prepressurized types and 0.222 for nonprepressurized types. A procedure for estimating system volume and determining expansion tank sizes for other design conditions may be found in Chapter 12 of the 1996 HVAC Systems and Equipment Volume of the ASHRAE Handbook.
HG-715  BOTTOM BLOWOFF AND DRAIN VALVES

(a) Bottom Blowoff Valve. Each steam boiler shall have a bottom blowoff connection fitted with a valve or cock connected to the lowest water space practicable with a minimum size as shown in Table HG-715. The discharge piping shall be full size to the point of discharge.

(b) Boilers having a capacity of 25 gal (95 l) or less are exempt from the above requirements, except that they must have an NPS $\frac{3}{4}$ (DN 20) minimum drain valve.

(c) Drain Valve. Each steam or hot water boiler shall have one or more drain connections, fitted with valves or cocks. These shall be connected at the lowest practicable point on the boiler, or to the lowest point on piping connected to the boiler, at the lowest practicable point on the boiler. The minimum size of the drain piping, valves, and cocks shall be NPS $\frac{3}{4}$ (DN 20). The discharge piping shall be full size to the point of discharge. When the blowoff connection is located at the lowest water containing space, a separate drain connection is not required.

(d) Minimum Pressure Rating. The minimum pressure rating of valves and cocks used for blowoff or drain purposes shall be at least equal to the pressure stamped on the boiler but in no case less than 30 psi (200 kPa). The temperature rating of such valves and cocks shall not be less than 250°F (120°C).

HG-716  MODULAR BOILERS

(a) Individual Modules

(1) The individual modules shall comply with all the requirements of Part HG, except as specified in HG-607, HG-615, and this paragraph.

(2) Each module of a steam heating boiler shall be equipped with

- (a) safety valve, see HG-701
- (b) blowoff valve, see HG-715(a)
- (c) drain valve, see HG-715(c)

(3) Each module of a modular hot water heating boiler shall be equipped with

- (a) safety relief valve, see HG-701
- (b) drain valve, see HG-715(c)

(b) Assembled Modular Boilers

(1) The individual modules shall be manifolded together at the job-site without any intervening valves. The header or manifold piping is field piping and is exempt from Article 2, Part HG, HF, HB, or HC.

(2) The assembled modular steam heating boiler shall also be equipped with

- (a) feedwater connection, see HG-705(a)
- (b) return pipe connection, see HG-703.2

(3) The assembled modular hot water heating boiler shall also be equipped with

- (a) makeup water connection, see HG-705(b)
- (b) provision for thermal expansion, see HG-709
- (c) stop valves, see HG-710.2

(4) When the assembled modular boiler is certified as a single boiler in accordance with HG-530.3(b), the safety valve required on each module by (a)(2)-(a) and (a)(3)-(a) may be replaced by one or more safety valves located on the supply header.

HG-720  SETTING

Boilers of wrought materials of the wet-bottom type having an external width of over 36 in. (900 mm) shall have not less than 12 in. (300 mm) between the bottom of the boiler and the floorline, with access for inspection. When the width is 36 in. (900 mm) or less, the distance between the bottom of the boiler and the floorline shall be not less than 6 in. (150 mm), except that, when any part of the wet bottom is not farther from an outer edge than 12 in. (300 mm), this distance shall be not less than 4 in. (100 mm).

HG-725  METHODS OF SUPPORT

HG-725.1 Loadings.

(a) The design and attachment of lugs, hangers, saddles, and other supports shall take into account the stresses due to hydrostatic head in determining the minimum thicknesses required. Additional stresses imposed by effects other than working pressure or static head, which increase the average stress by more than 10% of the allowable working stress, shall also be taken into account. These effects include the weight of the component and its contents, and the method of support.

(b) In applying the requirements of (a) above, localized stresses due to concentrated support loads, temperature changes, and restraint against dilation of the boiler due to pressure shall be provided for. Lugs, hangers, brackets, saddles, and pads shall conform satisfactorily to the shape of the shell or surface to which they are attached or are in contact.

HG-725.2 Boilers Over 72 in. (1 800 mm) in Diameter. A horizontal-return tubular boiler over 72 in. (1 800 mm) in diameter shall be supported from steel

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### Table HG-715

<table>
<thead>
<tr>
<th>Minimum Required Safety Valve Capacity, lb (kg) of steam/hr</th>
<th>Blowoff Piping, Valves, and Cocks Min. Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 500 (225)</td>
<td>$\frac{3}{4}$ (20)</td>
</tr>
<tr>
<td>501 to 1,250 (225 to 550)</td>
<td>1 (25)</td>
</tr>
<tr>
<td>1,251 to 2,500 (550 to 1,200)</td>
<td>1$\frac{1}{4}$ (32)</td>
</tr>
<tr>
<td>2,501 to 6,000 (1,200 to 2,700)</td>
<td>1$\frac{3}{4}$ (40)</td>
</tr>
<tr>
<td>6,001 (2,700) and larger</td>
<td>2 (50)</td>
</tr>
</tbody>
</table>

**Note:**

(1) To determine the discharge capacity of safety relief valves in terms of Btu, multiply the relieving capacity in lb of steam/hr by 1,000.
ARTICLE 8
MODULAR BOILERS

HG 800        Inspection and Access Openings

Modular boilers that are installed side by side, front to
back, or by stacking in accordance with the Manufacturer’s
recommendations shall have their inspection openings
located so that they are accessible.

HG-801        Marking of Boilers

Modular boilers may be marked and certified as follows:

(a) Individual boilers are marked and certified as
complete boilers as follows:

(1) Individual boilers, other than those constructed
primarily of cast iron or cast aluminum, shall have its own
marking applied directly on the boiler per the requirem
ents of HG-530.1. Each individual boiler shall have its own
Manufacturer’s Data Report.

(2) Individual boilers, constructed primarily of cast
iron or cast aluminum, shall have its own marking applied
per the requirements of HG-530.2.

(3) The common supply and return headers are
exempt from Section IV requirements.

(b) Multiple individual modules are combined together
and certified as a complete boiler.

(1) The assembled boiler shall have a single
nameplate and Manufacturer’s Data Report.

(2) The aggregate heating surface of all the modules
and the combined minimum relief valve capacity shall be
marked on the nameplate.

(3) The supply and return headers shall be
constructed in accordance with Section IV and recorded on
the Manufacturer’s Data Report.

HG-802        Instruments, Fittings and Controls

HG-802.1        Modular Steam Heating Boilers

(a) Each individual boiler of a modular steam heating
boiler shall be equipped with:

(1) steam gage, see HG-602
(2) water gage glass, see HG-603
(3) pressure control that will cut off the fuel supply
when the pressure reaches an operating limit, which shall
be less than the maximum allowable pressure, see HG-605(b)
(4) low water cutoff, see HG-606

(b) The assembled modular steam boiler shall also be
equipped with a safety limit control that will cut off the
fuel supply to prevent steam pressure from exceeding the
15 psi (100 kPa) maximum allowable working pressure of
the boiler. The control shall be constructed to prevent a
pressure setting above 15 psi (100 kPa), see HG-605(a)

(c) When the assembled steam heating boiler is certified
as a single boiler in accordance with HG-801(b) the boiler
assembly shall be equipped with:

(1) steam gage, may be located on the supply header,
see HG-602
(2) water gage glass, see HG-603
(3) pressure control that will cut off the fuel supply
when the pressure reaches an operating limit, which shall
be less than the maximum allowable pressure, see
HG-605(b)
(4) low water cutoff, see HG-606
(5) safety limit control that will cut off the fuel supply
to prevent steam pressure from exceeding the 15 psi (100
kPa) maximum allowable working pressure of the boiler.
The control shall be constructed to prevent a pressure
setting above 15 psi (100 kPa), see HG-605(a)

HG-802.2        Modular Hot Water Heating and Hot
                Water Supply Boilers

(a) Each individual boiler of a modular hot water
heating/hot water supply boiler shall be equipped with:

(1) pressure/altitude gage, see HG-611
(2) thermometer, see HG-612
(3) temperature control that will cut off the fuel supply
when the temperature reaches an operating limit, which
shall be less than the maximum allowable temperature, see
HG-613(b)

(b) The assembled modular hot water heating/hot water
supply boiler shall also be equipped with:

(1) a safety limit control that will cut off the fuel supply
to prevent the water temperature from exceeding the
maximum allowable temperature at the boiler outlet. The
control shall be constructed to prevent a temperature
setting above the maximum. This control shall be located
within 3 ft. (1.0 m) of the fitting connecting the last boiler
to the supply piping, see HG-613(a)
(2) low water fuel cutoff, see HG-614

(c) When the assembled hot water heating/hot water
supply boiler is certified as a single boiler in accordance
with HG-801(b) the boiler assembly shall be equipped with:

(1) pressure/altitude gage, may be located on the supply
header, see HG-611
(2) thermometer, may be located in the supply header,
see HG-612
(3) temperature control that will cut off the fuel supply
when the temperature reaches an operating limit, which
shall be less than the maximum allowable temperature, see
HG-613(b)
(4) a safety limit control that will cut off the fuel supply
to prevent the water temperature from exceeding the
maximum allowable temperature at the boiler outlet. The
control shall be constructed to prevent a temperature
setting above the maximum. This control shall be located
within 3 ft. (1.0 m) of the fitting connecting the last
module to the supply piping, see HG-613(a)
(5) low water fuel cutoff, see HG-614
ARTICLE 8
MODULAR BOILERS

HG-803 Installation Requirements

HG-803.1 Modular Boilers.

(a) The individual boilers shall be manifolded together at the job site without intervening valves between modules and shall be provided with a single set of stop valves on the common supply and return headers in accordance with HG-710.

(b) Flow control valves and circulating pumps may be located in the return line of each boiler.

(c) Modular boilers that are installed side by side, front to back, or by stacking in accordance with the Manufacturer’s recommendations shall have their nameplate marking located to provide access for inspection in the assembled position.

(d) When the assembled boiler is certified as a single boiler in accordance with HG-801(b) the boiler manifold assembly shall be provided with stop valves as follows:

1. Steam Boiler. When a stop valve is used in the supply pipe connection, there shall be one used in the return pipe connection.

2. Water Boiler

   (a) Stop valves shall be located at an accessible point in the supply and return pipe connections as near the boiler nozzle as is convenient and practicable to permit draining the boiler without emptying the system.

   (b) When the boiler is located above the system and can be drained without draining the system, stop valves may be eliminated.

HG-803.2 Modular Steam Heating Boilers

(a) Each individual boiler of a modular steam heating boiler shall be equipped with:

   1. safety valve, see HG-701
   2. blowoff valve, see HG-715(a)
   3. drain valve, see HG-715(c)

(b) The assembled modular steam heating boiler shall also be equipped with

   1. feedwater connection, see HG-705(a)
   2. return pipe connection, see HG-703.2

(c) When the assembled steam heating boiler is certified as a single boiler in accordance with HG-801(b) it shall be equipped with:

   1. safety valve, may be located on the supply header, see HG-701
   2. blowoff valve, see HG-715(a)
   3. drain valve, see HG-715(c)
   4. feedwater connection, see HG-705(a)
   5. return pipe connection, see HG-703.2

HG-803.3 Modular Hot Water Heating and Hot Water Supply Boilers

(a) Each boiler of a modular hot water heating/hot water supply boiler shall be equipped with

   1. safety relief valve(s), see HG-701
   2. drain valve, see HG-715(c)

(b) The assembled modular hot water heating/hot water supply boiler shall also be equipped with

   1. makeup water connection, see HG-705(b)
   2. provision for thermal expansion, see HG-709

(c) When the assembled hot water heating/hot water supply boiler is certified as a single boiler in accordance with HG-801(b), it shall be equipped with:

   1. safety relief valve(s), may be located on the supply header, see HG-701
   2. drain valve, see HG-715(c)
   3. makeup water connection, see HG-705(b)
   4. provision for thermal expansion, see HG-709