

### PG-93 INSPECTION AND REPAIR OF FLAT PLATE IN CORNER JOINTS

**PG-93.1** When flat plate greater than  $\frac{1}{2}$  in. (13 mm) thickness is welded to other pressure parts to form a corner joint, such as in flat heads [Fig. PG-31, illustrations (g), (i-1), and (i-2)], waterlegs of firebox boilers or combustion chambers of wetback boilers [Fig. A-8, illustrations (l) through (n) and (p)], and the exposed edges of the plate are closer to the edge of the weld than a distance equal to the thickness of the plate, the peripheral plate edges and any remaining exposed surface of the weld joint preparation shall be examined after welding by either the magnetic particle or liquid penetrant method. When the plate is non-magnetic, only the liquid penetrant method shall be used. The requirements of this paragraph shall not apply to those joints when 80% or more of the pressure load is carried by tubes, stays, or braces, or when the exposed edges of the plate are farther from the edge of the weld than a distance equal to the thickness of the plate.

**PG-93.2** Laminations, cracks, or other imperfections found during the examination required by PG-93.1 that would affect the safety of the vessel shall be repaired in accordance with PG-78. The imperfection(s) may be pursued by any suitable method (grinding, chipping, etc.). The repaired area shall be subjected to the same examination that first revealed the imperfection.

**PG-93.3** Methods and acceptance criteria for magnetic particle and liquid penetrant examination shall be in accordance with A-260 or A-270, respectively.

### PG-99 HYDROSTATIC TEST

Hydrostatic testing of the completed boiler unit shall be conducted in accordance with the following requirements:

After a boiler has been completed (see PG-104), it shall be subjected to pressure tests using water at not less than ambient temperature, but in no case less than 70°F (20°C). Where required test pressures are specified in this paragraph, whether minimum or maximum pressures, they apply to the highest point of the boiler system. When the boiler is completed in the Manufacturer's shop without boiler external piping, subsequent hydrostatic testing of the boiler external piping shall be the responsibility of any holder of a valid "S," "A," or "PP" stamp. The pressure relief valves need not be included in the hydrostatic test. The tests shall be made in two stages in the following sequence:

**PG-99.1** Hydrostatic pressure tests shall be applied by raising the pressure gradually to not less than  $1\frac{1}{2}$  times the maximum allowable working pressure as shown on the data report to be stamped on the boiler. No part of the boiler shall be subjected to a general membrane stress

greater than 90% of its yield strength (0.2% offset) at test temperature. The primary membrane stress to which boiler components are subjected during hydrostatic test shall be taken into account when designing the components. Close visual inspection for leakage is not required during this stage.

**PG-99.2** The hydrostatic test pressure may then be reduced to the maximum allowable working pressure, as shown on the Data Report, to be stamped on the boiler and maintained at this pressure while the boiler is carefully examined. The metal temperature shall not exceed 120°F (50°C) during the close examination.

**PG-99.3** A completed forced-flow steam generator with no fixed steam and waterline, having pressure parts designed for different pressure levels along the path of water-steam flow, shall be subjected to a hydrostatic pressure test by the above procedure (PG-99.1 and PG-99.2) based upon

**PG-99.3.1** For the first stage test (PG-99.1) a hydrostatic test pressure of not less than  $1\frac{1}{2}$  times the maximum allowable working pressure at the superheater outlet as shown in the master stamping (PG-106.3) but no less than  $1\frac{1}{4}$  times the maximum allowable working pressure of any part of the boiler, excluding the boiler external piping.

**PG-99.3.2** For the second stage test (PG-99.2) the hydrostatic test pressure may be reduced to not less than the maximum allowable working pressure at the superheater outlet.

### PG-99.4 Test Gages

**PG-99.4.1** An indicating gage, visible to the operator controlling the pressure applied, shall be connected to the pressure parts. Hydrostatic head on the gage shall be considered such that the required test pressure is achieved at the top of the boiler.

**PG-99.4.2** Dial pressure gages used in testing shall preferably have dials graduated over their entire range of about double the intended maximum test pressure, but in no case shall the range be less than  $1\frac{1}{2}$  times that pressure. The spacing between graduations shall be such that the inspector and the operator controlling the test shall be able to determine when the required test pressure has been applied. Digital pressure gages having a wider range of pressure readings may be used provided the readings give the same or greater degree of accuracy as obtained with dial pressure gages.

### CERTIFICATION BY STAMPING AND DATA REPORTS

#### PG-101 HEATING SURFACE COMPUTATION

**PG-101.1** For the stamping required by PG-106, the heating surface shall be computed as specified in PG-101.1.1 through PG-101.1.3.