# Table HLW-301

**Maximum Allowable Stress Values in Tension for Unlined Water Heater Materials, ksi (MPa) (Cont'd)**

**NOTES:**

1. The maximum thickness is \( \frac{3}{6} \) in. (12.7 mm).
2. The service temperature shall not exceed 210°F (99°C).
3. Water heaters using this material are to be operated only on deionized water having a minimum specific resistivity of 1.0 M\(\Omega\) cm, unless lined in accordance with HLW-200.
4. The maximum is \( \frac{3}{6} \) in. (10 mm).
5. Deleted.
6. The stress value includes a joint factor of 0.85.
7. Heat treatment after forming or fabrication is neither required nor prohibited.
8. Due to the relatively low yield strength of the austenitic stainless steel materials, these higher stress values were established at temperatures at which the short time tensile properties govern to permit the use of these alloys where slightly greater deformation is acceptable. These higher stress values exceed two-thirds but do not exceed 90% of the yield strength at temperature. Use of these stress values may result in dimensional changes due to permanent strain. These stress values are not recommended for flanges of gasketed joints or other applications where slight amounts of distortion can cause leakage or malfunction.

## New Note 3: When fabricating water heaters or storage tanks with this material, refer to HF-207 for references, recommendations and cautionary notes

\[
P = \frac{SSEt}{R + 0.6t}
\]

where

- \( E \) = efficiency of longitudinal joint or ligament between tube holes, whichever is less. For welded joints, use the efficiency specified in HLW-402. For seamless shells, use \( E = 1 \).
- \( P \) = maximum allowable working pressure, psi (kPa) [but not less than 100 psi (700 kPa)]
- \( R \) = inside radius of cylinder, in. (mm)
- \( S \) = maximum allowable stress value from Table HLW-300, Table HLW-301, Table HF-300.1 (HF-300.1M), or Table HF-300.2 (HF-300.2M), psi (MPa)
- \( t \) = required wall thickness, exclusive of liner, in.

## HLW-305 BLANK UNSTAYED DISHED HEADS, PRESSURE ON CONCAVE SIDE

**HLW-305.1 General.** When the provisions of HLW-501 to HLW-504 are not used, the required thickness at the thinnest point after forming of ellipsoidal and torispherical heads under pressure on the concave side (plus heads) shall be computed by the appropriate formulas in this paragraph.
Stamping plates bearing the stamping and marking required in HLW-602.1 may be used in lieu of stamping these data directly on the water heater vessel if the stamping plates are permanently attached to the water heater vessel. In this case the required data on the stamping plate shall be in characters not less than \( \frac{1}{8} \) in. (3 mm) high.

If the required marking or stamping is to be covered by insulation, jacket, or other form of casing, one of the following shall be provided:

(a) an opening with a removal cover for viewing the marking or stamping.

(b) a nameplate, located in a conspicuous place on the jacket, duplicating the required Certification Mark and data. This plate shall be at least 3 in. \( \times \) 4 in. (75 mm \( \times \) 100 mm) in size marked with letters and numerals at least \( \frac{1}{8} \) in. (3 mm) high and of either metallic material attached by mechanical means or of any material attached by an adhesive system meeting the requirements of Mandatory Appendix 3.

HLW-602.3.1 When there is insufficient space for the nameplate required in HLW-602.3, smaller letter dimensions may be used, provided:

(a) stamping shall be as required in HLW-602.1,

(b) character size shall be no smaller than \( \frac{5}{32} \) in. (4 mm), and

(c) the information, including the Certification Mark, shall be applied by stamping or etching that leaves a permanent legible mark. Characters shall either be indented or raised at least 0.004 in. (0.10 mm).

HLW-602.4 Parts for which a Partial Data Report, Form HLW-7, is required by HLW-601.2, shall be marked with the following:

(a) the official symbol shown in Figure HLW-602.1 above the word “Part”

(b) the part manufacturer’s name

(c) the part manufacturer’s serial number

In lieu of stamping these data directly on the vessel, a stamping plate, as described in HLW-602.3, may be used.

HLW-602.5 Water heaters fabricated of austenitic stainless steel material listed in Table HLW-301 shall have a precautionary statement warning that the water heaters are to be operated only on deionized water having a minimum specific resistivity of 1.0 M\( \Omega \)/cm clearly marked and located on the water heater so that it will be readily visible.