§ 192.113 Longitudinal joint factor (E) for steel pipe.

The longitudinal joint factor to be used in the design formula in §192.105 is determined in accordance with the following table:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Pipe class</th>
<th>Longitudinal joint factor (E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM A 53/AS5 equivalent</td>
<td>Seamless</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Electric resistance welded</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Furnace butt welded</td>
<td>0.60</td>
</tr>
<tr>
<td>ASTM A 106</td>
<td>Seamless</td>
<td>1.00</td>
</tr>
<tr>
<td>ASTM A 333/A 333M</td>
<td>Seamless</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Electric resistance welded</td>
<td>1.00</td>
</tr>
<tr>
<td>ASTM A 381</td>
<td>Double submerged arc welded</td>
<td>1.00</td>
</tr>
<tr>
<td>ASTM A 671</td>
<td>Electric flash welded</td>
<td>1.00</td>
</tr>
<tr>
<td>ASTM A 672</td>
<td>Electric-fusion-welded</td>
<td>1.00</td>
</tr>
<tr>
<td>ASTM A 691</td>
<td>Submerged arc welded</td>
<td>1.00</td>
</tr>
<tr>
<td>API 5 L</td>
<td>Electric resistance welded</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Electric flash welded</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Submerged arc welded</td>
<td>1.00</td>
</tr>
<tr>
<td>Other</td>
<td>Furnace butt welded</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>Pipe over 4 inches (102 millimeters)</td>
<td>0.80</td>
</tr>
<tr>
<td></td>
<td>Pipe 4 inches (102 millimeters) or less</td>
<td>0.60</td>
</tr>
</tbody>
</table>

If the type of longitudinal joint cannot be determined, the joint factor to be used must not exceed that designated for “Other.”


§ 192.115 Temperature derating factor (T) for steel pipe.

The temperature derating factor to be used in the design formula in §192.105 is determined as follows:

<table>
<thead>
<tr>
<th>Gas temperature in degrees Fahrenheit (Celsius)</th>
<th>Temperature derating factor (T)</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 °F (121 °C) or less</td>
<td>1.00</td>
</tr>
<tr>
<td>300 °F (149 °C)</td>
<td>0.967</td>
</tr>
<tr>
<td>350 °F (177 °C)</td>
<td>0.933</td>
</tr>
<tr>
<td>400 °F (204 °C)</td>
<td>0.900</td>
</tr>
<tr>
<td>450 °F (232 °C)</td>
<td>0.867</td>
</tr>
</tbody>
</table>
For intermediate gas temperatures, the derating factor is determined by interpolation.

§ 192.117 [Reserved]

§ 192.119 [Reserved]

§ 192.121 Design of plastic pipe.

The design pressure for plastic pipe is determined by either of the following formulas:

\[
P = 2S \left( \frac{t}{D-t} \right) (DF)
\]

\[
P = \frac{2S}{(SDR - 1)} (DF)
\]

Where:

P = Design pressure, gauge, psig (kPa).
S = For thermoplastic pipe, the HDB is determined in accordance with the listed specification at a temperature equal to 73 °F (23 °C), 100 °F (38 °C), 120 °F (49 °C), or 140 °F (60 °C). In the absence of an HDB established at the specified temperature, the HDB of a higher temperature may be used in determining a design pressure rating at the specified temperature by arithmetic interpolation using the procedure in Part D.2 of PPI TR–3/2008, HDB/PDB/SDB/MRS Policies (incorporated by reference, see §192.7). For reinforced thermosetting plastic pipe, 11,000 psig (75,842 kPa). [Note: Arithmetic interpolation is not allowed for PA–11 pipe.]

P = Design pressure, gauge, psig (kPa).
S = For thermoplastic pipe, the HDB is determined in accordance with the listed specification at a temperature equal to 73 °F (23 °C), 100 °F (38 °C), 120 °F (49 °C), or 140 °F (60 °C). In the absence of an HDB established at the specified temperature, the HDB of a higher temperature may be used in determining a design pressure rating at the specified temperature by arithmetic interpolation using the procedure in Part D.2 of PPI TR–3/2008, HDB/PDB/SDB/MRS Policies (incorporated by reference, see §192.7). For reinforced thermosetting plastic pipe, 11,000 psig (75,842 kPa). [Note: Arithmetic interpolation is not allowed for PA–11 pipe.]

t = Specified wall thickness, inches (mm).
D = Specified outside diameter, inches (mm).
SDR = Standard dimension ratio, the ratio of the average specified outside diameter to the minimum specified wall thickness, corresponding to a value from a common numbering system that was derived from the American National Standards Institute preferred number series 10.

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SDR = Standard dimension ratio, the ratio of the average specified outside diameter to the minimum specified wall thickness, corresponding to a value from a common numbering system that was derived from the American National Standards Institute preferred number series 10.

D_F = 0.32 or 0.40 for PA–11 pipe produced after January 23, 2009 with a nominal pipe size (IPS or CTS) 4-inch or less, and a SDR of 11 or greater (i.e. thicker pipe wall).

P = Design pressure, gauge, psig (kPa).
S = For thermoplastic pipe, the HDB is determined in accordance with the listed specification at a temperature equal to 73 °F (23 °C), 100 °F (38 °C), 120 °F (49 °C), or 140 °F (60 °C). In the absence of an HDB established at the specified temperature, the HDB of a higher temperature may be used in determining a design pressure rating at the specified temperature by arithmetic interpolation using the procedure in Part D.2 of PPI TR–3/2008, HDB/PDB/SDB/MRS Policies (incorporated by reference, see §192.7). For reinforced thermosetting plastic pipe, 11,000 psig (75,842 kPa). [Note: Arithmetic interpolation is not allowed for PA–11 pipe.]

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S = For thermoplastic pipe, the HDB is determined in accordance with the listed specification at a temperature equal to 73 °F (23 °C), 100 °F (38 °C), 120 °F (49 °C), or 140 °F (60 °C). In the absence of an HDB established at the specified temperature, the HDB of a higher temperature may be used in determining a design pressure rating at the specified temperature by arithmetic interpolation using the procedure in Part D.2 of PPI TR–3/2008, HDB/PDB/SDB/MRS Policies (incorporated by reference, see §192.7). For reinforced thermosetting plastic pipe, 11,000 psig (75,842 kPa). [Note: Arithmetic interpolation is not allowed for PA–11 pipe.]

t = Specified wall thickness, inches (mm).
D = Specified outside diameter, inches (mm).
SDR = Standard dimension ratio, the ratio of the average specified outside diameter to the minimum specified wall thickness, corresponding to a value from a common numbering system that was derived from the American National Standards Institute preferred number series 10.

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S = For thermoplastic pipe, the HDB is determined in accordance with the listed specification at a temperature equal to 73 °F (23 °C), 100 °F (38 °C), 120 °F (49 °C), or 140 °F (60 °C). In the absence of an HDB established at the specified temperature, the HDB of a higher temperature may be used in determining a design pressure rating at the specified temperature by arithmetic interpolation using the procedure in Part D.2 of PPI TR–3/2008, HDB/PDB/SDB/MRS Policies (incorporated by reference, see §192.7). For reinforced thermosetting plastic pipe, 11,000 psig (75,842 kPa). [Note: Arithmetic interpolation is not allowed for PA–11 pipe.]

t = Specified wall thickness, inches (mm).
D = Specified outside diameter, inches (mm).
SDR = Standard dimension ratio, the ratio of the average specified outside diameter to the minimum specified wall thickness, corresponding to a value from a common numbering system that was derived from the American National Standards Institute preferred number series 10.

§ 192.121 Design of plastic pipe.

Subject to the limitations of §192.123, the design pressure for plastic pipe is determined by either of the following formulas:

\[
P = 2S \left( \frac{t}{D-t} \right) (DF)
\]

\[
P = \frac{2S}{(SDR - 1)} (DF)
\]

Where:

P = Design pressure, gauge, psig (kPa).
S = For thermoplastic pipe, the HDB is determined in accordance with the listed specification at a temperature equal to 73 °F (23 °C), 100 °F (38 °C), 120 °F (49 °C), or 140 °F (60 °C). In the absence of an HDB established at the specified temperature, the HDB of a higher temperature may be used in determining a design pressure rating at the specified temperature by arithmetic interpolation using the procedure in Part D.2 of PPI TR–3/2008, HDB/PDB/SDB/MRS Policies (incorporated by reference, see §192.7). For reinforced thermosetting plastic pipe, 11,000 psig (75,842 kPa). [Note: Arithmetic interpolation is not allowed for PA–11 pipe.]

t = Specified wall thickness, inches (mm).
D = Specified outside diameter, inches (mm).
SDR = Standard dimension ratio, the ratio of the average specified outside diameter to the minimum specified wall thickness, corresponding to a value from a common numbering system that was derived from the American National Standards Institute preferred number series 10.

D = Specified outside diameter, inches (mm).
SDR = Standard dimension ratio, the ratio of the average specified outside diameter to the minimum specified wall thickness, corresponding to a value from a common numbering system that was derived from the American National Standards Institute preferred number series 10.

D_F = 0.32 or 0.40 for PA–11 pipe produced after January 23, 2009 with a nominal pipe size (IPS or CTS) 4-inch or less, and a SDR of 11 or greater (i.e. thicker pipe wall).

For thermoplastic pipe, the temperature at which the HDB used in the design formula under §192.121 is determined.

(i) For thermoplastic pipe, the temperature at which the HDB used in the design formula under §192.121 is determined.

(ii) For reinforced thermosetting plastic pipe, 150 °F (66 °C).

(c) The wall thickness for thermoplastic pipe may not be less than 0.062 inches (1.57 millimeters).

(d) The wall thickness for reinforced thermosetting plastic pipe may not be less than that listed in the following table:

<table>
<thead>
<tr>
<th>Nominal size in inches (millimeters)</th>
<th>Minimum wall thickness inches (millimeters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 (51)</td>
<td>0.060 (1.52)</td>
</tr>
<tr>
<td>3 (76)</td>
<td>0.060 (1.52)</td>
</tr>
<tr>
<td>4 (102)</td>
<td>0.070 (1.78)</td>
</tr>
<tr>
<td>6 (152)</td>
<td>0.100 (2.54)</td>
</tr>
</tbody>
</table>