**Chemistry**

<table>
<thead>
<tr>
<th>Typical Analysis %</th>
<th>C</th>
<th>Cr</th>
<th>Ni</th>
<th>Cu</th>
<th>Nb</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.05</td>
<td>15.0</td>
<td>4.5</td>
<td>3.5</td>
<td>+</td>
</tr>
</tbody>
</table>

**Description**

- FORMADUR PH X Superclean is a corrosion-resistant, martensitic precipitation hardened stainless steel.
- FORMADUR PH X Superclean is supplied in pre-hardened condition with a hardness of 38 - 42 HRC.

**Characteristics**

- Excellent resistance to corrosion
- Good strength
- Excellent polishability
- Good toughness

**Applications**

- FORMADUR PH X Superclean is recommended for tools/molds for the processing of corrosive plastics.

**Physical Properties (38 - 42 HRC)**

<table>
<thead>
<tr>
<th>Thermal Conductivity</th>
<th>70°F</th>
<th>300°F</th>
<th>940°F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>0.285 lbs/in³ (room temperature)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coefficient of Thermal Expansion</td>
<td>5.9 X 10^-5/F</td>
<td>6.0 X 10^-5/F</td>
<td>9.2 X 10^-5/F</td>
</tr>
</tbody>
</table>

**Mechanical Properties (Typical)**

<table>
<thead>
<tr>
<th>Toughness (Charpy-V notch): 25 ft-lbs at 38 HRC</th>
<th>Hardness HRC</th>
<th>Y.S (0.2%) Ksi</th>
<th>T.S. Ksi</th>
<th>EL (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>38</td>
<td>160</td>
<td>162</td>
<td>12.8</td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>170</td>
<td>172</td>
<td>12.2</td>
</tr>
<tr>
<td></td>
<td>42</td>
<td>175</td>
<td>180</td>
<td>12.2</td>
</tr>
</tbody>
</table>

**Polishing**

Tool should be polished using the guidelines for polishing stainless steel. When properly polished, an A-1 surface finish is achievable.

**Heat Treatment**

- Refer to aging diagram below for aging temperatures.
- Aging is performed by uniformly heating to aging temperature, equalizing temperature from surface to center, holding for 4 hours at specified temperature, and air cooling.

**Welding Recommendations**

- FORMADUR PH X Superclean can be welded using shielded metal arc welding process. Oxyacetylene welding is not recommended.
- FORMADUR PH X Superclean usually does not require preheating to prevent cracking.
- AWS E/ER 630 filler material should be used to produce properties comparable to the parent material.
- If welded in the solution-treated condition, the welds can be aged to the desired strength level after welding.
- If welded in the over aged condition, the part must be solution treated and then aged. It may be advantageous to preheat to approximately 200°F and weld in the over aged (H 1150°F) condition for repair welds more than 1" deep or where high welding stresses are anticipated.
- For less critical applications, where high weld strength, hardness, final polish or texture quality is not paramount a standard austenitic stainless steel filler, E/ER308L, should be considered. This type of filler will not produce the precipitation hardening response.

**Corrosion Properties**

- THYROPLAST® 2316
- THYROPLAST® PH X Supra

**Applications**

- FORMADUR PH X Superclean is recommended for tools/molds for the processing of corrosive plastics.