**SSAB Naval 700F**

**General Product Description**

SSAB Naval is a structural steel with a minimum yield strength of 690 MPa. Typical applications are naval applications where high strength, very good welding and bending properties are required. SSAB Naval 700F is available as plate in thicknesses of 5 - 80 mm.

**Benefits include:**

- Superior bendability and surface quality
- Weldability with excellent HAZ strength and toughness
- Exceptional consistency within a plate guaranteed by close tolerances
- High impact toughness which provides for good resistance to fractures

**Dimension Range**

SSAB Naval 700F is available as plate in thicknesses of 5 - 80 mm. More detailed information on dimensions can be obtained from the SSAB Protection sales team.

**Mechanical Properties**

<table>
<thead>
<tr>
<th>Thickness (mm)</th>
<th>Yield strength $R_{pl,2}$ (MPa)</th>
<th>Elongation $A_5$ (min %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.0 - 17.9</td>
<td>690 - 830</td>
<td>16</td>
</tr>
<tr>
<td>18.0 - 80.0</td>
<td>690 - 795</td>
<td>16</td>
</tr>
</tbody>
</table>

Transversal testing.

**Mechanical Testing**

- Tensile testing according to EN ISO 6892 on each heat and thickness.
- Charpy impact testing according to EN ISO 148.

**Ultrasonic testing**

According to EN ISO 10160 Class $E_3S_3$.

**Impact Properties**

<table>
<thead>
<tr>
<th>Product</th>
<th>Min transversal, impact energy, Charpy V 10x10 mm test specimen</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSAB Naval 700F</td>
<td>75 J / -60 °C</td>
</tr>
</tbody>
</table>

For thicknesses between 6 - 11.9 mm, sub-size Charpy V-specimens are used. The specified minimum value is then proportional to the cross-sectional area of the specimen compared to a full-size specimen (10 x 10 mm).

**Chemical Composition (heat analysis)**

<table>
<thead>
<tr>
<th>C(^*(\text{max %}))</th>
<th>Si(^*(\text{max %}))</th>
<th>Mn(^*(\text{max %}))</th>
<th>P(^*(\text{max %}))</th>
<th>S(^*(\text{max %}))</th>
<th>Cr(^*(\text{max %}))</th>
<th>Ni(^*(\text{max %}))</th>
<th>Mo(^*(\text{max %}))</th>
<th>B(^*(\text{max %}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.16</td>
<td>0.60</td>
<td>1.50</td>
<td>0.020</td>
<td>0.009</td>
<td>0.80</td>
<td>1.50</td>
<td>0.70</td>
<td>0.005</td>
</tr>
</tbody>
</table>

The steel is grain refined. *I* Intentional alloying elements.

**Carbon Equivalent CET(CEV)**

<table>
<thead>
<tr>
<th>Thickness (mm)</th>
<th>5.0 - 80.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typ CET(CEV)</td>
<td>0.31 (0.54)</td>
</tr>
</tbody>
</table>

\[ \text{CET} = C + \frac{\text{Mn} + \text{Mo}}{10} + \frac{\text{Cr} + \text{Cu} + \text{Ni}}{40} \]

\[ \text{CEV} = C + \frac{\text{Mn}}{6} + \frac{\text{Cr} + \text{Mo} + V}{5} + \frac{\text{Cu} + \text{Ni}}{15} \]
Tolerances
More details are given in SSAB's brochure 41-General product information Strenx®, Hardox®, Armox® and Toolox®-UK or on www.ssab.com.

Thickness
Tolerances according to SSAB Thickness Guarantees.
SSAB Naval 700F meet the requirements of EN 10 029 Class A, but offers narrower tolerances.

Length and Width
According to SSAB's dimension program. Tolerances conform with EN 10 029 or to SSAB's standard after agreement.

Shape
SSAB offers tolerances according to EN 10 029.

Flatness
Tolerances according to EN 10 029 Class N, steel type L.

Bending

<table>
<thead>
<tr>
<th>Rolling direction</th>
<th>Min. Inside bending radius</th>
<th>Min. Die opening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transversal to final rolling direction</td>
<td>2.0 x t</td>
<td>7.0 x t</td>
</tr>
<tr>
<td>Parallel to final rolling direction</td>
<td>3.5 x t</td>
<td>9.5 x t</td>
</tr>
</tbody>
</table>

Delivery Conditions
The delivery condition is Quenched and Tempered. The plates are delivered with sheared or thermally cut edges. Untrimmed edges after agreement. SSAB Naval 700F can be hot formed at maximum 580 ºC. Delivery requirements can be found in SSAB's brochure 41-General product information Strenx®, Hardox®, Armox® and Toolox®-UK or on www.ssab.com.

Fabrication and Other Recommendations
Welding, bending and machining
Recommendations are found in SSAB’s brochures at www.ssab.com or consult Protection team at protectionplate@ssab.com.

SSAB Naval 700F has obtained its mechanical properties by quenching and subsequent tempering. The properties of the delivery condition cannot be retained after exposure to temperatures in excess of 580ºC.

Appropriate health and safety precautions must be taken when welding, cutting, grinding or otherwise working on this product. Grinding, especially of primer coated plates, may produce dust with a high particle concentration.

Contact Information
www.armoxplate.com or protectionplate@ssab.com.