

SA-765/SA-765M	SA-350/SA-350M
This specification covers heat-treated carbon steel and alloy steel <b>forgings</b> with <b>mandatory</b> toughness requirements. <b>Forgings</b> are intended for pressure vessels, feedwater heaters, and similar uses, such as tube sheets, covers, channel barrels, integral forged channels, rings, nozzles, flanges, and similar parts.	This specification covers several grades of carbon and low-alloy steel forged or ring-rolled flanges, forged fittings and valves intended primarily for low-temperature service and requiring notch toughness testing
<b>Melting Process</b> – Cross Referred in SA -788- The steel shall be produced by any of the following primary processes: electric-furnace, basic oxygen, vacuum induction (VIM), or open-hearth. The primary melting may incorporate separate degassing or refining and may be followed by secondary melting, using electro slag remelting (ESR) or vacuum arc remelting (VAR).	<b>Melting Process</b> -- The steel shall be produced by any of the following primary processes: open-hearth, basic oxygen, electric-furnace, or vacuum-induction melting (VIM). The primary melting may incorporate separate degassing or refining, and may be followed by secondary melting using electroslag remelting (ESR), or vacuum-arc remelting (VAR).
<b>Heat treatment</b> :- shall consist of normalizing and tempering, double normalizing and tempering, or quenching and tempering at the manufacturer's option.	<b>Heat treatment</b> :- shall consist of normalizing and tempering, double normalizing and tempering, or quenching and tempering at the manufacturer's option.
<b>Grain Size</b> The forgings, subsequent to the final heat treatment, shall have prior austenitic grain size of 5 or finer.	<b>Grain Size</b> :- Fine grain size.
<b>CHEMICAL REQUIREMENTS</b>  Carbon, max--0.30 Manganese- 0.60 to 1.35 Nickel-- 0.50 max Vanadium, max-0.05 Aluminum, max-0.05 Chromium, max- 0.40 Molybdenum, max-0.10 Copper, max- 0.35	<b>CHEMICAL REQUIREMENTS</b>  Carbon, max-- 0.30 Manganese- 0.60–1.35 Nickel- 0.40 max Chromium- 0.30 max Molybdenum- 0.12 max Copper- 0.40 max Columbium -0.02 max Vanadium- 0.08 max
Tensile strength, ksi [MPa]-- 70 to 95 [485 to 655] Yield strength,min, ksi[MPa]- 37.5 [260] Elongation in 2 in. [50 mm],min, %- 22	Tensile strength, ksi [MPa]-- 70 to 95 [485 to 655] Yield strength,min, ksi[MPa]- 37.5 [260] Elongation in 2 in. [50 mm],min, %- 22
<b>CHARPY V-NOTCH IMPACT REQUIREMENTS</b> <ul style="list-style-type: none"> <li>Minimum average value of set, of three</li> </ul>	<b>CHARPY V-NOTCH ENERGY REQUIREMENTS:-</b> <ul style="list-style-type: none"> <li>Minimum Impact Energy Required for</li> </ul>

<p><a href="#">specimens, ft-lbf (J)-- 15 [20]</a></p> <ul style="list-style-type: none"> <li>• Test temperature of, °F [°C]- -50 [-46]</li> <li>• Mandatory conformance to the values listed is a matter of agreement between the purchaser and the manufacturer. The energy values above are shown for information as to guarantees that are generally available.</li> </ul>	<p>Average of Each Set of Three Specimens, ft-lbf [J]</p> <ul style="list-style-type: none"> <li>• LF2, Class 1-- 15 [20]</li> <li>• Test temperature of, °F [°C]- -50 [-46]</li> </ul>
<p><b>SUMMARY:-</b></p> <ul style="list-style-type: none"> <li>• SA-350 LF2 has a long and successful history in both the petrochemical and power industries in similar thickness and thicker tube sheet applications.</li> <li>• SA-765 is more recent , specifically developed for <b>forgings</b>.</li> <li>• Some comparisons of both specs, probably would tell that both the specs are equally matching.</li> <li>• But since SA-765 is specially designed for <b>heavy forgings</b> probably clients/users would prefer to stick to this specification.</li> </ul>	