

UNS S31803 F51 – Duplex stainless Steel

Related Specifications

EN10088-3 X2CrNiMoN22-5-3

ASTM A182 F51

W.Nr. 1.4462

NORSOK D41 to D45

F51 is a duplex stainless steel with a 50:50 austenite, ferrite microstructure. The material combines good mechanical strength and ductility with moderate to good corrosion resistance in a variety of environments.

This material is generally supplied in the annealed condition giving yield strengths in excess of 65 KSI (450Mpa), this material cannot be hardened by heat treatment but stronger surface strengths can be achieved by cold working. Typical applications include pumps, valves, pipework, flanges etc together with various applications in the oil and gas, brewing, power generation and chemical engineering industries. In fact this alloy can be used successfully as an alternative to 300 series austenitic stainless steels in almost all applications where higher mechanical strength/lower weight is required.

Typical Chemical composition

| | | |
|---|-------------|--------------|
| PREn = Pitting Resistance Equivalent PREn= Cr% + 3.3Mo% + 16N% | Carbon | 0.03% Max |
| | Silicon | 1.00% Max |
| | Manganese | 2.00% Max |
| | Phosphorous | 0.035% Max |
| | Sulphur | 0.015% Max |
| | Chromium | 21.0 – 23.0% |
| | Nickel | 4.5 – 6.5% |
| | Molybdenum | 2.5 – 3.5% |
| | Nitrogen | 0.10 – 0.20% |
| | PREn | >34 |

Mechanical Property Requirements - Annealed condition

| Yield | Tensile Strength | Elongation | Charpy Impact @ Rt J | Hardness |
|-----------------|-------------------------------|------------|-------------------------|-----------|
| >450Mpa (65KSI) | 650 – 800Mpa (94 – 128KSI) | 25% | 100 | 270HB Max |

Forging

Forging temperature for this material should be 1100 – 1250°C
Reheat as often as necessary and cool in still air.

Heat Treatment

Anneal – Heat to 1020 – 1120°C ensuring sufficient time is allowed for the centre to achieve furnace temperature and hold for a time commensurate with the ruling section, followed by water quenching.

Machining

Material in the annealed condition is readily machinable by all conventional methods.

Welding

F51 is readily weldable using many of the standard electric arc welding processes but oxyacetylene welding is not recommended because carbon pickup in the weld metal may occur.