



Casting Material: Stainless Steel CF3M (SS316L)

CF3M is a cast austenitic corrosion resistant alloy material for pressure containing parts, which covered by ASTM A351, ASTM A743 and ASTM A744 standard. The difference between CF3M and CF8M is carbon content; CF3M has only 0.03% carbon. CF3M generally is named as stainless steel 316L in ASTM A240 standard.

CF3M (J92800) Chemical Requirements in those two standards as bellow, little difference:

ASTM A351 Standard Specification for Castings, Austenitic, for Pressure-Containing Parts:

Carbon: 0.03 max
Manganese: 1.50 max
Silicon: 1.50 max
Sulfur: 0.040 max
Phosphorus: 0.040 max
Chromium: 17.0-21.0
Nickel: 9.0-13.0
Molybdenum: 2.0-3.0
Tensile Strength: min 70ksi(485Mpa)
Yield Strength: min 30ksi (205Mpa)
Elongation in 2in. or 50mm: min 30.0%

ASTM 743A Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application:

Carbon: 0.03 max
Manganese: 1.50 max
Silicon: 1.50 max
Sulfur: 0.040 max
Phosphorus: 0.040 max
Chromium: 17.0-21.0
Nickel: 9.0-13.0
Molybdenum: 2.0-3.0
Tensile Strength: min 70ksi(485Mpa)
Yield Strength: min 30ksi (205Mpa)
Elongation in 2in. or 50mm: min 30.0%

ASTM A744 Standard Specification for Castings, Iron-Chromium-Nickel, Corrosion Resistant, for Severe Service : The chemistry and mechanical property is same as ASTM A743



SS316L (UNS Designation S31603) is generally named for pipe, pipe fittings, flange and forged fittings as bellow standard:



ASTM A240 / A240M - 18 Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

ASTM A182/A182M-18a Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service

ASTM A312/A312M-18a Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes

ASTM A213/A213M-18b Standard Specification for Seamless Ferritic and Austenitic Alloy-Steel Boiler, Superheater, and Heat-Exchanger Tubes

ASTM A249/A249M-18 Standard Specification for Welded Austenitic Steel Boiler, Superheater, Heat-Exchanger, and Condenser Tubes

ASTM A276/A276M-17 Standard Specification for Stainless Steel Bars and Shapes

ASTM A403/A403M-18a Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings

ASTM A479 / A479M - 18 Standard Specification for Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels

Steel Grade	ASTM A240 316L	ASTM A182 F316L	ASTM A403 WP316L(CR316L)
Carbon, max	0.030	0.030	0.030
Manganese, max	2.00	2.00	2.00
Phosphorus, max	0.045	0.045	0.045
Sulfur, max	0.030	0.030	0.030
Silicon, max	0.75	1.00	1.00
Chromium	16.0-18.0	16.0-18.0	16.0-18.0
Nickel	10.0-14.0	10.0-15.0	10.0-14.0
Molybdenum	2.00-3.00	2.00-3.00	2.00-3.00
Nitrogen, max	0.10	-	-
Tensile, min	70ksi (485MPa)	70ksi (485MPa)	70ksi (485MPa)
Yield, min	25ksi (170MPa)	25ksi (170MPa)	25ksi (170MPa)
Elongation, min	40%	30%	L-28%; T- 20%
Reduction, min	-	50%	-
Hardness, max	217HB (95Rc)	-	-

CF3M Heat treatment process: Heat to 1900°F [1040°C] minimum, hold for sufficient time to heat casting to temperature, quench in water or rapid cool by other means.

Similar Material: EN 10088-3 Grade X2CrNiMo17-12-2 (EN10213)/EN No. 1.4404; SCS16A;

CF-3M is a Fe-Cr-Ni-Mo alloy that is the cast equivalent of wrought, low carbon, AISI 316L /F316L stainless steel. The low carbon content of the alloy results in greater resistance to sensitization of the welds. Consequently, it is most commonly used in applications where post-weld heat treatment cannot be applied. Optimum corrosion resistance is reached after solution annealing at 1900 to 2050oF followed by rapid cooling. It has good resistance to organic acids and salts, sulphuric and sulphurous acids, phosphoric and phosphoric-sulphurichydrofluoric acid mixtures, sulphate and sulphite liquors, sea water and other chloride solutions, sodium hydroxide and steam.



A modified form of the alloy, known as CF-3MA, has higher strength than the normal CF-3M This is achieved by balancing the composition to produce a higher range of ferrite than the 20% present in the CF-3M grade.

APPLICATIONS

Impellers, propellers, pump casings, suction manifolds and valve bodies.

WELDABILITY

CF-3M may be welded by the SMAW, GTAW and GMAW processes.

Electrodes 308Mo, 316, 317, 316L, 308MoL.

Preheat not required.

Post weld heat treatment not normally required

What means of CF3M:

As to the designation -

C (first letter) means the service it is intended to be used in this case - corrosion resistant service , but casting quality think sometimes it means of CASTING USAGE because you will find F316 in ASTM A 350 (F = FORGE)

F(second letter) -The second letter indicates the approximate location of the alloy on the iron-chromium-nickel (FeCrNi) ternary diagram. For users familiar with the diagram, the second letter does provide an indication of the nominal iron, nickel, and chromium content, but most people would have to obtain alloying information from a material specification.

3 - the third and fourth digits represent the maximum permitted carbon content in units of 0.01% (e.g., CF3M has a maximum of 0.03% carbon)

M- the Molybdenum contained. If no "M", means no Molybdenum contained, such as CF3 or CF8 which no Molybdenum chemistry.

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