

Duplex / Super Duplex Steel

F44, F51, F53, F55

The word *duplex* is based upon the concept that the material has a two-phase microstructure consisting of grains of ferritic and austenitic stainless steel formulated in the same material. The term "Super-Duplex" denotes high-performance Duplex steel based on elevated contents of chromium, nickel and molybdenum to improve pitting corrosion resistance, while additions of nitrogen promoted structural hardening, raising the yield strength and ultimate strength values without impairing toughness.

Duplex stainless steels are about twice as strong as regular austenitic or ferritic stainless steels, have significantly better toughness and ductility than ferritic grades (although they do not reach the values of austenitic grades), have a range of corrosion resistance comparable to the range for austenitic stainless steels, have very good stress corrosion cracking resistance, and Duplex steels are cost-effective in a number of ways.

AI Materials offers 4 core grades within this category:

F44 - an austenitic stainless steel used in seawater and other aggressive chloride-bearing media. This grade has excellent resistance to pitting and crevice corrosion, high resistance to general corrosion and stress corrosion cracking, with a higher strength than conventional austenitic stainless steels, and good weldability.

Specifications – 254SMO, UNS S31254; EN 1.4547

F51 - combines improved resistance to stress corrosion cracking, pitting, crevice corrosion and high strength when compared with other stainless alloys. F51 resists chloride environments and sulphide stress corrosion.

Specifications – UNS S31803; EN 1.4462

F53 - ideal for use in highly corrosive conditions, F53 has excellent resistance to stress corrosion cracking in chloride bearing environments, excellent resistance to pitting, crevice and general corrosion, high mechanical strength, and good weldability.

Specifications – SAF 2507 / UNS S32750 / EN1.4410

F55 - with additions of chromium, molybdenum, and nitrogen F55 has enhanced pitting and crevice corrosion resistance compared with the ordinary austenitic or duplex types.

Specifications – UNS S32760; EN 1.4501

AI Materials can supply Pipe, Plate and Rings as well as round bar from 10 mm through to 462 mm – please contact us with your requirements.

See next page for Technical & Mechanical data comparison.

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Technical data – nominal percentages:

Chemical Content %	F44	F51	F53	F55
C	≤ 0.02	≤ 0.03	≤ 0.03	≤ 0.03
Mn	≤ 1.00	≤ 2.00	≤ 1.20	≤ 1.00
Si	≤ 0.70	≤ 0.1	0.20-0.80	≤ 1.00
S	≤ 0.01	≤ 0.01	≤ 0.02	≤ 0.015
P	≤ 0.03	≤ 0.025	≤ 0.035	≤ 0.035
Cr	19.5-20.5	21.0-23.0	24.0-26.0	24.0-26.0
Ni	17.5-18.5	4.5-6.5	6.0-8.0	6.0-8.0
Mo	6.0-6.5	2.5-3.5	3.5-5.0	3.0-4.0
Cu	0.5-1.0		≤ 0.50	0.50-1.00
N	0.18-0.22	0.14-0.20	0.24-0.32	0.20-0.30
W				0.50-1.00
PREN	40	33.34	40	40

Mechanical data:

Mechanical (room temperature)	F44	F51	F53	F55
UTS	650-850 Mpa	≥ 650 Mpa	≥ 750 Mpa	750 - 895 Mpa
0.2% Proof Strength	≥ 300 Mpa	≥ 450 Mpa	≥ 530 Mpa	≥ 530 Mpa
Elongation	35.00%	25.00%	25.00%	25.00%
Reduction in area	50.00%	45.00%	40.00%	45.00%
Hardness	≤ 260 HB	≤ 271 HB	≤ 290 HB	≤ 290 HB