Super Duplex Ferralium 255-SD50, WNR 1.4507, UNS S32550, Grade 255, AFNOR Z3 CNDU 25-07 Az, ALLOY 255

Introduction :

F255 alloy is a super duplex, highly alloyed, solid solution strengthened alloy, which exhibits wear resistance and high strength while providing superior corrosion resistance compared to stainless steel 316. This makes Alloy F255 ideal for demanding applications in different numbers of industries such as nuclear, marine, offshore oil & gas, pulp & paper, chemical processing and flue gas desulfurization. When selecting Alloy 255 Operating temperatures should be considered as next stage could form within higher temperature ranges. Carbides, nitrides and sigma phase can formed if the alloy is allowed to soak between the temperatures of 1000°F and 1800°F. In most media UNS S32550 displays superior corrosion resistance, as compared to typical austenitic alloys such as 304, 316 and 317 stainless steels. WNR 1.4507 performs well in phosphoric, sulfuric, nitric and shows excellent resistance to organic acids such as formic and acetic acid.

Products Available in forms :

- Super Duplex Ferralium 255-SD50, WNR 1.4507, UNS S32550 Plates
- Super Duplex Ferralium 255-SD50, WNR 1.4507, UNS S32550 Pipes
- Super Duplex Ferralium 255-SD50, WNR 1.4507, UNS S32550 Round Bar
- Super Duplex Ferralium 255-SD50, WNR 1.4507, UNS S32550 Tube
- Super Duplex Ferralium 255-SD50, WNR 1.4507, UNS S32550 Flanges
- Super Duplex Ferralium 255-SD50, WNR 1.4507, UNS S32550 Wire
- Super Duplex Ferralium 255-SD50, WNR 1.4507, UNS S32550 Fittings

Standard Available in forms :

- ASTM A240 / ASME SA240
- ASTM A479 / ASME SA479
- ASTM A249 / ASME SA249
- ASTM A269 / ASME SA269
- ASTM A312 / ASME SA312
- ASTM A182 / ASME SA182
- ASTM A403 / ASME SA403
- ASTM A276 / ASME SA276
- ASTM A789 / ASME SA789
- ASTM A790 / ASME SA790

Chemical Composition

	WNR	UNS	Grade 225	AFNOR Z3 CNDU 25-07 Az	ALLOY 255
Carbon	0.025max	0.025max	0.025max	0.025max	0.025max
Nitroger	6.3	6.3	6.3	6.3	6.3
Molybdenum	3.5	3.5	3.5	3.5	3.5
Copper	1.75	1.75	1.75	1.75	1.75
Nickel	0.23	0.23	0.23	0.23	0.23
Tungsten	0.15	0.15	0.15	0.15	0.15
Silicon	0.5	0.5	0.5	0.5	0.5
Manganese	1.00	1.00	1.00	1.00	1.00
Phosphours	0.025max	0.025max	0.025max	0.025max	0.025max
Sulfur	0.005max	0.005max	0.005max	0.005max	0.005max
Chromium	26.0	26.0	26.0	26.0	26.0

Mechanical Properties

	WNR	UNS	Grade 225	AFNOR Z3 CNDU 25-07 Az	ALLOY 255
Ultimate Tensile Strength N/mm^2(min)	790	110 min	110 min	110 min	110 min
0.20% Proof (min)	570-600	80 min	80 min	80 min	80 min
Elongation %	25 min	25 min	25 min	25 min	25 min
Reduction in Area %	-	-	-	-	-
Hardness, HB	270max	270max	270max	270max	270max

SPECIFICATION	ASM	ASME
Bar	A276 / A479	SA276 / SA479
Forging	A182	SA182
Plate	A240	SA240
Pipe	A789 / A790	SA789 / SA790

Applications

- Chemical Process Industry
- Marine Industry and Shipbuilding
- Oil and Gas Industry
- Pollution Control
- Copper Smelting
- Pulp and Paper Industry
- Food Industry
- Agrochemicals
- Civil Engineering

Features

- Alloy 255 sets a new bench mark for superduplex as the first to state 570N/mm2 as the minimum 0.2% Proof Stress
- Excellent corrosion resistance in a wide variety of corrosive chemicals including sulphuric, phosphoric and nitric acids
- Outstanding resistance to pitting and crevice corrosion in seawater and other chloride containing environments, with Critical Pitting Temperature exceeding 50°C
- Excellent ductility and impact strength at both ambient and sub-zero temperatures
- High resistance to abrasion, erosion and cavitation erosion
- Excellent resistance to stress corrosion cracking in chloride containing environments

Corrosion Resistance

- Alloy 255 is extremely corrosion resistant.
- It has high resistance to intergranular corrosion.
- Even in chloride and sulphide environments, it exhibits very high resistance to stress corrosion cracking.
- Alloy 255 (Super Duplex) is more resistant to corrosion, compared to other duplex steels.

Heat Resistance

- The high chromium content of Alloy 255 that protects against corrosion, causes embrittlement at temperatures over about 300°C.
- At low temperatures, it has better ductility than the ferritic and martensitic grades.
- It can readily be used down to at least -50°C.

Fabrication

- Fabrication of Alloy 255 should be done only with tools dedicated to stainless steel materials.
- Tooling and work surfaces must be thoroughly cleaned before use.
- These precautions are necessary to avoid cross contamination of stainless steel by easily corroded metals that may discolour the surface of the fabricated product.

Machinability

- Although machinable, the high strengths of Alloy 255 makes machining difficult. As an example, machining of Alloy 255 is around 20% slower than for 304.
  Machining can be enhanced by using the following rules:
- Cutting edges must be kept sharp. Dull edges cause excess work hardening.
- Cuts should be light but deep enough to prevent work hardening by riding on the surface of the material.
- Chip breakers should be employed to assist in ensuring swarf remains clear of the work
- Low thermal conductivity of austenitic alloys results in heat concentrating at the cutting edges. This means coolants and lubricants are necessary and must be used in large quantities.

Heat Treatment

- Alloy 255 cannot be hardened by heat treatment. They can however be work hardened.
- Solution treatment or annealing can be done by rapid cooling after heating to around 1100°C.

Weldability

- Alloy 255 have good weldability.
- All standard welding processes can be used.
- They are not quite as easily welded as the austenitic grades but low thermal expansion in duplex grades reduces distortion and residual stresses after welding.

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