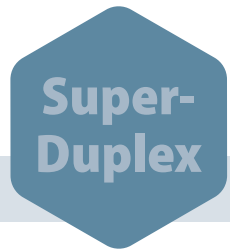




Langley Alloys



Ferralium® 255 (Plate)

Specifications:

Alloy 255, UNS S32550, UNS S32520, ASTM A240, Werkstoff No. 1.4507, Norsok MDS D55, NACE MR0175 / ISO 15156, ASME Approval (Table UHA 23 and Code Case 1883).

Ferralium® 255 is a super duplex stainless steel supplied in the hot worked, annealed and pickled condition. It achieves higher strengths than other alternative corrosion resistant alloys, offering the potential to reduce section size and therefore weight and cost.

As a 25% Chromium alloy, with significant additions of Copper, it offers excellent corrosion resistance in a wide variety of corrosive chemicals including sulphuric, nitric and phosphoric acid. In seawater and other chloride containing environments it also provides outstanding resistance to pitting and crevice corrosion, with Critical Pitting Temperature exceeding 50°C. Excellent ductility and impact strength at both ambient and sub-zero temperatures combine with a high resistance to abrasion, erosion and cavitation erosion.

Listed in NACE MR0175 for sour service and having gained ASME Approval for Pressure Vessel applications, Ferralium® 255 is tested to the highest degree using tests designed to guarantee that the trade-marked product possesses high integrity, a correct phase balance and the absence of sigma and other deleterious phases.

Key Features:

- Originally developed in 1960's, pioneering the addition of nitrogen, to create the first super duplex stainless steel
- Continuously developed through 1990's to extend PREN > 40, and more recently to increase mechanical properties
- Pitting Resistance Equivalent Number (PREN) >40, indicating outstanding resistance to pitting and crevice corrosion
- Very low levels of Sulphur minimise the likelihood of inclusions as sites for potential pitting corrosion
- Higher Copper content provides self-healing effect at sites of pitting to inhibit further growth
- Available as bars, plate, pipe and fittings with complementary weld wire
- Particularly suitable for larger components as the formation of sigma phase is much less likely than it is for other super duplex stainless steels

Typical Applications:

- Oil & Gas industry pumps, valves, wellhead and subsea equipment
- Pollution control scrubbers, precipitators, fans and pumps
- Marine propellers, shafts, rudders, seals, pumps, valves
- Bolts and fasteners
- Process industry equipment in sulphuric acid, nitric acid, phosphoric acid, PP / PVC/TiOx production, agrochemicals
- Grain and vegetable processing plant, sugar cane centrifuges
- Pulp and paper digester blow vales, feed valves, washers, black liquor heater tubes, bleaching components
- Copper smelting fans, tuyere bars, wet scrubbers, leaching area precipitators
- Water and sewage treatment, desalination, swimming pools

Physical Properties:

Density (Kg/m ³)	7810
Magnetic Permeability (20°C)	33
Young's Modulus (kN/mm ²)	199
Specific Electrical Resistance, 20°C (Ω-m)	0.80 x 10 ⁻⁶
Mean coefficient of thermal expansion, 20 - 100°C (m/m/°C)	11.1 x 10 ⁻⁶
Specific Heat, 20°C (J/kg.K)	475
Thermal conductivity, 20°C (W/m.K)	14.2

Product Forms Available:

Bar	Enquiry
Plate	✓
Tube	Enquiry
Fittings	Enquiry
Forgings	To order
Castings	To order

Chemical Composition:

	Cr	Ni	Mo	Co	Nb (+Ta)	Ti	V	W	Cu	C	Mn	N	Si	P	S	Fe	Al
Min	24.00	4.50	3.10						1.50		0.80	0.21					
Max	26.50	6.50	3.80						2.00	0.025	1.20	0.25	0.70	0.025	0.005	Bal	0.02

Notes:

1. Pb < 0.005%, Sn < 0.02
2. PREN >40 (PREN = %Cr + 3.3 % Mo + 16 % N)

Mechanical Properties:

	For plates up to 3" in thickness	
0.2% Proof Stress	550 N/mm ²	79.8 ksi
Tensile Strength	790 N/mm ²	114.5ksi
Elongation, 5.65√S0 and 4D	25%	
Reduction of Area	50%	
Hardness (Brinell)	220 - 270	
Impact Strength (Room Temp)	80J	59 ft.lb

Notes:

- Testing shall be carried out in accordance with ASTM A370 or EN ISO 6892-1 (tensile), EN ISO 6506-1 (hardness)
- Minimum properties quoted (tested at room temperature in a longitudinal direction)
- Testing performed on each melt of material per heat treatment batch
- Hardness shall be in accordance with NACE MR0175 with a maximum HRC value of 28 (270HB)
- Additional tests routinely undertaken:
 - ASTM G48A corrosion test (at 40°C) - No pitting and < 0.8g/m² weight loss
 - Ferrite content - 35-55%
 - Microstructure certified free from grain boundary carbides, sigma, chi and laves phases

Product Comparison:

Alloy Comparisons	Ferrallium® 255	S17400 H1025	S32205	N07718	S31254
Pitting Resistance Equivalent number	>40	16	34	31	43
0.2% Proof Strength (N/mm ²)	550	1137	510	500	325
Corrosion Rate (mm/year) - Seawater	<0.01	~1	<0.10	<0.01	<0.01
Corrosion Rate (mm/year) - 10% sulphuric acid at 80°C	<0.15	10	0.4	<0.15	1.5
Corrosion Rate (mm/year) - Boiling 50% nitric acid	<0.15	<0.15	<0.15	<0.15	0.4
Wear Properties related to Hardness (HRC), maximum	28	38	25	20	20

Machining Advice:

Operation	Cutting Speed m/min (ft/min)	Feed Rate mm/rev (in/rev)	Depth of cut mm (in)
Milling	40 (130)	0.05-0.13 mm/tooth 0.02-0.005 in/tooth	0.5-6.0 (0.02 - 0.25)
Drilling 6.4mm (1/4") dia	250 rpm	0.075(0.003)	
Drilling 12.7mm (1/2") dia	250 rpm	0.125(0.005)	
Drilling 25.4mm (1") dia	150 rpm	0.28(0.011)	
Turning - Roughing	30 - 45 (100 - 150)	0.2-0.38 (0.008 - 0.015)	3 (0.125)
Turning - Finishing	50 - 60 (165 - 200)	0.13-0.20 (0.005 - 0.008)	0.5 (0.02)
Tooling	Milling/Turning: Carbide (SANDVIK GC 235, SECO T25M) Drilling: HSS, point angle 118°, chisel angle 120°		

Notes: 1) Machining advice based upon Ferrallium® 255 - SD50

Production Route:

Ferrallium® 255 is produced through high-precision steelmaking processes to ensure cleanliness and consistency.

- All material shall be refined by Vacuum Oxygen Decarburisation (VOD) or Argon Oxygen Decarburisation (AOD)
- Further refinement by Electric Slag Refining (ESR) is allowable if required for particular customer specifications.
- Plate is hot worked between 1050-1200°C.
- Solution treatment shall be carried out at a temperature between 1060-1120°C.
- This will be followed by immediate water quench
- Plates are supplied in the pickled condition
- Each plate is visually inspected

Further Processing:

- Order processing and stock control is facilitated by a fully-integrated computer system which links to item production and inspection.
- Automated band saws are available for accurate stock cutting up to a section size of 650mm (25").
- First-stage processing, including water jet cutting, turning, boring and grinding can be undertaken to help manage your overall supply chain.
- Additional documentation and certification can be supplied as required.

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