

DATASHEET

Super Duplex 2507



Fine Tubes Super Duplex 2507 Tubing

Product Form: Seam Welded, Cold Worked and Annealed Tubing

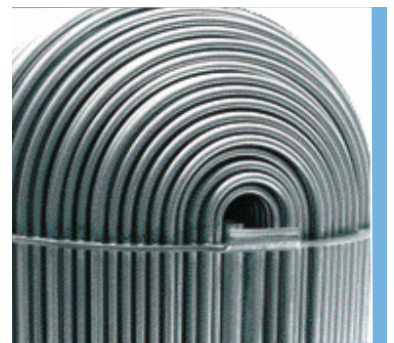
Introduction

Fine Tubes Super Duplex seam welded, cold redrawn and annealed tubing is a cost effective and high quality alternative to seamless tubing. Fine Tubes manufacture seam welded tubing in coiled control line product form for subsea umbilicals and also in straight lengths for heat exchanger and fluid handling applications.

Super Duplex 2507 grade has very high mechanical strength and excellent seawater corrosion resistance for use in some of the most demanding oil and gas, chemical process, desalination and geothermal power applications.

Fine Tubes Super Duplex stainless steel UNS S32750 is an austenitic-ferritic phase material which has the following properties:

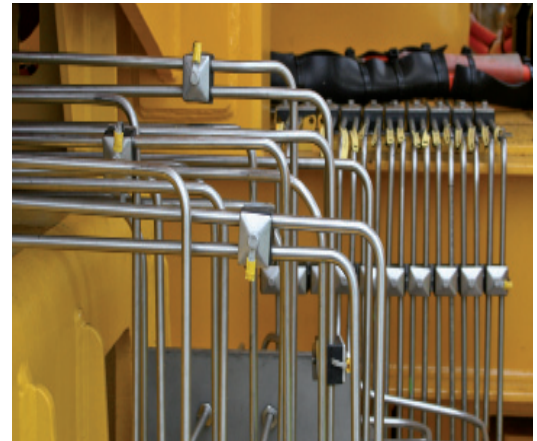
- Excellent resistance to stress corrosion cracking in chloride and hydrogen sulphide environments.
- Excellent corrosion resistance to seawater.
- Excellent resistance to pitting, crevice and general corrosion.
- Very high mechanical strength properties.
- Good weldability.
- High thermal conductivity and low coefficient of expansion.
- Good resistance to fatigue and erosion corrosion.



Product forms and dimensional tolerances:

Fine Tubes can supply subsea umbilical control line tubing in continuous coil product form in lengths up to 25,000m, depending on tube dimensions. One of the benefits of the Fine Tubes seam welded and redrawn tube compared with seamless manufacture is the improved dimensional tolerance control that can be achieved which helps to minimise the weight and cost of the tubing. Fine Tubes can also supply the tubing in straight lengths of up to 20m for heat exchanger and fluid handling applications.

Fine Tubes use orbital welds to join coils of seamless welded and cold worked tubing to produce very long continuous coils used in the subsea umbilical control line applications in the oil and gas industry. Careful process control is used to minimise the number of orbital welds.



Tube diameters available are 9.52mm (3/8") up to 25.4mm (1")
 Wall thickness from 1mm (0.039") up to 2.5mm (0.99")
 Wall thickness tolerance to within +/-7.5%
 Other sizes are available on request.

Chemical Composition of Super Duplex UNS S32750 (% by weight)

C _{max} 0.03	Si _{max} 0.8	Mn _{max} 1.2	P _{max} 0.035	S _{max} 0.015	Cr 25	Ni 7	Mo 4	N 0.3	PREN 42 Min
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*PREN (pitting resistance equivalent number) = %Cr + 3.3% Mo + 16N

Standards:

Alloy	UNS	EN	EN name	SS	Specifications
Super Duplex (2507)	S32750	1.4410 25-7-4	X2 CrNiMoN	2328	ASTM A789 & A790

Manufacturing Specifications:

Fine Tubes manufacture Super Duplex tubing according to ASTM A789 and ASTM A790. The seam welded and redrawn tubing complies with 15156:3/MR 0175 for sour service materials for oil field equipment.

The control line tubing meets the requirement of the Subsea umbilical control line standard ISO 13628-5 and individual customer specifications.

Physical Properties of Super duplex UNS S32750 at 20°C

Density		Heat Capacity		Thermal Conductivity		Coefficient of Thermal Expansion (RT-)		Modulus of Elasticity	
lb/in ³	g/cm ³	Btu/lb °F	J/(kg °C)	Btu/h ft °F	W/M °C	X 10 ⁻⁶ /°F	X 10 ⁻⁶ /°C	ksi	GPa
0.28	7.8	0.12	490	8.7	14	7.5 (200°F)	13.5 (100°C)	29	200

Typical room temperature mechanical properties of the tube:

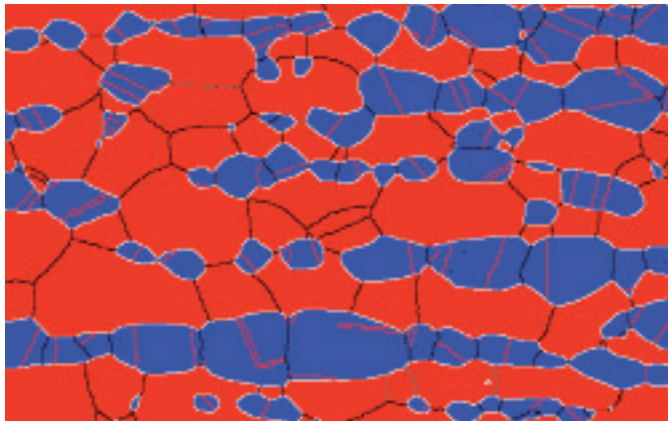
Alloy	Tensile Strength		0.2% Proof Stress		Elongation (min) %	Hardness Max		Corrosion ASTM G48 A @ 50°C	Phase Balance WM, BM, HAZ
	MPa	ksi	MPa	ksi		HV ₁₀	HRC		
UNS S32750	800-1000	116-145	620-720	90-105	25	320	32	Pass	35<F<65

Typical room temperature mechanical properties of the orbital weld:

Alloy	Tensile Strength		0.2% Proof Stress		Elongation (min) %	Hardness Max		Corrosion ASTM G48 A @ 50°C	Phase Balance WM, BM, HAZ
	MPa	ksi	MPa	ksi		HV ₁₀	HRC		
UNS S32750	800-1000	116-145	620-720	90-105	25	320	32	Pass	35<F<65

WM - Welded Metal
 BM - Base Metal
 HAZ - Heat Affected Zone

Microstructural control:

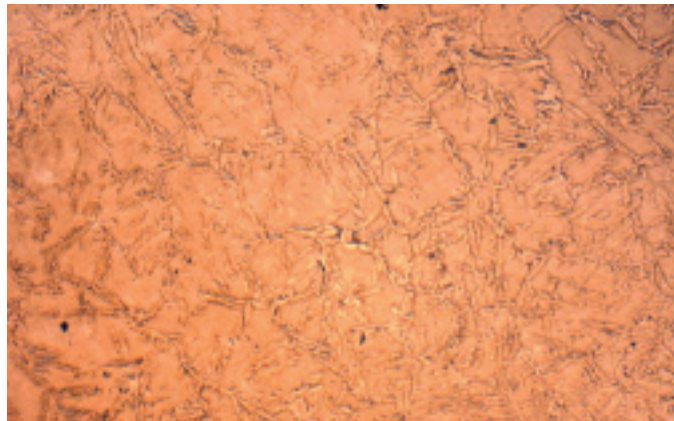


Microstructure of Super Duplex UNS S32750
 Red: Ferrite (F), Blue: Austenite (A)

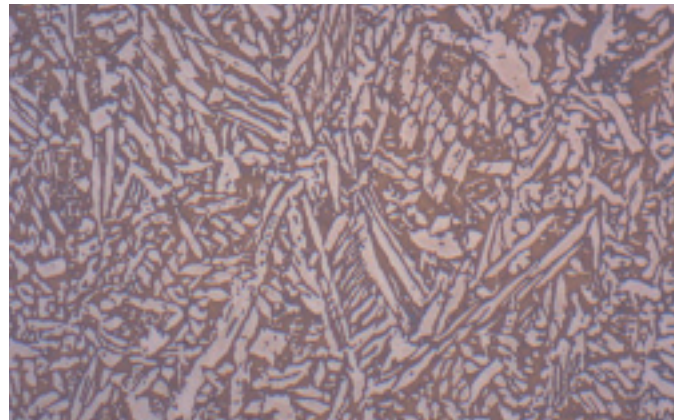
Phase balance in Super Duplex (35% < F < 65%)

Fine Tubes control the solution annealing heat treatment of the Super Duplex to maintain the optimum phase balance of austenite and ferrite for mechanical integrity and corrosion resistance. We can use a number of different light microscopy techniques to accurately determine the phase balance and ensure the material is free of Sigma or other deleterious phases.

Seam weld profile:



Redrawn seam weld prior to annealing.



Redrawn seam weld following annealing.

A comparison of the microstructure of the Super Duplex seam weld region before heat treatment and after annealing shows the benefits of the redraw and how it enhances grain refinement and homogenises the cast seam weld structure to improve the mechanical and corrosion properties of the tube.

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Non-Destructive Testing

Product integrity and reliability are critical to the performance of Super Duplex and Fine Tubes has invested in the latest NDT equipment to ensure product quality. With a full time team of qualified technicians and inspectors – Fine Tubes NDT department prides itself on its technical capability and its commitment to ensuring product quality. We use the latest NDT techniques with advanced data acquisition and storage capabilities to ensure product reliability and integrity in the most critical and demanding applications.

Ultrasound

Fine Tubes have automated equipment with the capability for 100% through wall defect detection to the international standards or to specific customer specification. The system also incorporates a full dimensional scanning system for accurate OD and wall measurement.

Eddy Current

Eddy current inspection is an NDT method that uses the principal of “electromagnetism” as the basis for conducting examinations. This method is used for the detection of flaws, cracks, surface defects and other potential tube defects.

Sigma Detection System

Sigma phase detection is carried out continuously during production to ensure the product is free from harmful levels of Sigma and intermetallic phases using fully automated equipment.

X-ray examination of control line orbital welds

Fine Tubes uses radiography to ensure the quality of orbital joints used to manufacture continuous long lengths of coiled tube. X-rays are examined according to the international or customer specification by trained technicians. Results are archived with full traceability. A full mechanical and structural qualification of orbital joints is performed when manufacturing control lines.

Summary

The Super Duplex 2507 seam welded and redrawn product has a number of advantages over the traditionally used seamless control line including:

- Minimum use of orbital joints in the seam welded and redrawn tube compared with seamless.
- Close control of dimensional accuracy to minimise weight.
- Continuous monitoring of production to ensure the material is free of Sigma phase.
- Lower production costs.

Please contact Fine Tubes for additional technical information about our seam welded and cold drawn Super Duplex tubing.



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