

# Duplex Stainless Steel


**COLUMBIA  
METALS**
**S31803 • S32550 • S32760**
**www.columbiametals.com**  
**sales@columbiametals.co.uk**

Duplex stainless steels exhibit significantly enhanced mechanical properties and corrosion resistance compared with normal grades of stainless steel. They are suitable for continuous operation from temperatures as low as  $-50^{\circ}\text{C}$  up to about  $275^{\circ}\text{C}$ . With excellent resistance to fatigue and corrosion fatigue, duplex stainless steels are an ideal choice for shafts and other variably stressed components.

The various grades of duplex contain different alloying additions, ensuring the alloys combine the good stress corrosion resistance of ferritic stainless steels with the good ductility and weldability of austenitic stainless steels. The duplex structure gives excellent mechanical properties and low thermal expansion characteristics. Their microstructure consists of approximately equal proportions of ferrite and austenite.

Duplex stainless steels are particularly resistant to pitting in chloride environments. A Pitting Resistance Equivalent Number (PREN) of greater than 40 qualifies a duplex alloy as a super duplex.

Application areas include components and equipment for oil production, such as refinery equipment, desalination units, offshore platforms, subsea wellhead equipment and fasteners. Duplex stainless steels are also used in marine technology, such as in marine shafts, and in the chemical processing industry for sewage plant components, fire extinguishing systems and any application where chloride contamination is expected.



Columbia Metals stocks three primary grades of duplex stainless steel from 1/2" to 7" diameter in round bar.

## **S31803 / COLDUPLEX-CS**

COLDUPLEX-CS is the basic grade of duplex stainless steel based on a 22% chromium and 5% nickel content. It is suitable for applications which involve high mechanical stresses and severe corrosion conditions, particularly where there is frequent contact with high levels of chlorides, carbon dioxide and hydrogen sulphide as may be encountered in the gas, petrochemical and offshore industries. Columbia Metals stocks S31803 in the solution treated and quenched condition.

- **HIGH YIELD STRENGTH**
- **SUPERIOR RESISTANCE TO STRESS CORROSION CRACKING**
- **RESISTANCE TO ABRASION AND EROSION AT HIGH FLOW RATES**
- **LOWER THERMAL EXPANSION THAN AUSTENITIC GRADES**
- **HIGHER CONDUCTIVITY THAN AUSTENITIC GRADES**
- **SUPERIOR DUCTILITY, TOUGHNESS AND WELDABILITY**
- **HIGH RESISTANCE TO PITTING, CREVICE AND GENERAL CORROSION**
- **EXCELLENT RESISTANCE TO HYDROGEN EMBRITTLEMENT**
- **HIGH FATIGUE STRENGTH AND CORROSION FATIGUE RESISTANCE**

## **S32550 / AMAZON 256**

AMAZON 256 is a super duplex stainless steel widely used in critical offshore, petrochemical and chemical plant applications. It is based on a 26% chromium and 6% nickel composition. The grade has very good pitting and crevice corrosion resistance resulting from a controlled addition of copper, as well as excellent ductility and impact strength at both ambient and sub-zero temperatures, combined with a high resistance to abrasion, erosion and cavitation erosion. These features make it particularly suitable for use in seawater and other chloride-containing environments.

## **S32760 / SEACOL-760**

SEACOL-760 provides superior pitting resistance as a result of an addition of tungsten to its chemistry, which also contributes to the alloy's strength. This super duplex grade contains 25% chromium and 7% nickel in addition to a small percentage of copper to enhance its general corrosion resistance. SEACOL-760 has a Critical Pitting Temperature exceeding  $50^{\circ}\text{C}$  and is listed in NACE MR0175 for sour service applications.

**PLEASE CONTACT US FOR AN IMMEDIATE QUOTATION OR TECHNICAL ADVICE**

### **London & South**

**Tel: 020 7732 1022**
**Fax: 020 7732 1029**
**londonsales@columbiametals.co.uk**

### **Midlands & Wales**

**Tel: 01604 810191**
**Fax: 01604 812889**
**northamptonsales@columbiametals.co.uk**

### **North & International**

**Tel: 01422 343026**
**Fax: 01422 346587**
**halifaxsales@columbiametals.co.uk**  
**export@columbiametals.co.uk**


# Duplex Stainless Steel



## Technical Data

### Nominal Composition (%)

		C	Si	Mn	S	P	Cr	Ni	Mo	W	Cu	N <sub>2</sub>	Fe
<b>S31803</b>	<i>min</i>	-	-	-	-	-	21.0	4.50	2.50	-	-	0.08	Rem
	<i>max</i>	0.03	1.00	2.00	0.02	0.02	23.0	6.50	3.50	-	-	0.20	
<b>S32550</b>	<i>min</i>	-	-	-	-	-	24.0	4.50	2.90	-	1.50	0.10	Rem
	<i>max</i>	0.04	1.00	1.50	0.03	0.04	27.0	6.50	3.90	-	2.50	0.25	
<b>S32760</b>	<i>min</i>	-	-	-	-	-	24.0	6.00	3.00	0.50	0.50	0.20	Rem
	<i>max</i>	0.03	1.00	1.00	0.01	0.03	26.0	8.00	4.00	1.00	1.00	0.30	

### Mechanical Properties (specification minima - room temperature)

	S31803	S32550	S32760
<b>Ultimate Tensile Strength (N/mm<sup>2</sup>)</b>	620	760	750
<b>0.2% Proof Strength (N/mm<sup>2</sup>)</b>	448	550	550
<b>Elongation (%)</b>	25	25	25
<b>Hardness (HB)</b>	270 max	270 max	270 max

### Typical Physical Properties

	at 20°C
<b>Density (g/cm<sup>3</sup>)</b>	7.8
<b>Coefficient of Thermal Expansion (20-100°C; per °C)</b>	11.1 x 10 <sup>-6</sup>
<b>Thermal Conductivity (20-300°C; W/m<sup>2</sup>K)</b>	0.000014
<b>Specific Heat (J/kg°C)</b>	425
<b>Specific Electrical Resistance (microhm cm)</b>	80
<b>Magnetic Permeability</b>	33
<b>Young's Modulus (N/mm<sup>2</sup>)</b>	199,000
<b>Torsional Modulus (N/mm<sup>2</sup>)</b>	75,000
<b>Poisson Ratio</b>	0.32

### Stock Sizes

Round Bar								
1/2"	7/8"	1.1/4"	1.5/8"	2.1/4"	3.1/4"	3.3/4"	5"	6"
5/8"	1"	1.3/8"	1.3/4"	2.1/2"	3.1/2"	4"	5.1/4"	6.1/2"
3/4"	1.1/8"	1.1/2"	2"	3"	90mm	4.1/4"	5.1/2"	7"