

# Stainless Steel

## 1.4003 (3CR12) Sheet and Plate



### SPECIFICATIONS

Commercial Nirosta 4003 / 3CR12

Type 1.4003 stainless steel is a utility ferritic stainless steel, often used in place of mild steel. It offers the benefits of more highly alloyed stainless steels such as strength, corrosion and abrasion resistance, durability and low maintenance. In addition type 1.4003 is weldable and formable allowing it to be fabricated using conventional techniques. Benefits of using type 1.4003 stainless steel:

- ~ 250 times greater corrosion resistance than mild steel
- ~ Corrosion/abrasion resistance
- ~ Economical - Low initial cost, low maintenance
- ~ High Strength
- ~ Excellent impact resistance
- ~ Can be welded by conventional methods
- ~ Can eliminate need for protective coating
- ~ Can eliminate need for corrosion allowance
- ~ Proven success in many applications across a wide range of industries
- ~ Good performance at elevated temperatures
- ~ Lower cost than austenitic stainless

This has led to the use of type 4003 stainless steel in many applications across a broad range of industries.

### CHEMICAL COMPOSITION

EN 10088-2:2005  
1.4003 Steel

| Element         | % Present   |
|-----------------|-------------|
| Chromium (Cr)   | 10.5 - 12.5 |
| Manganese (Mn)  | 1.5 max     |
| Silicon (Si)    | 1 max       |
| Nickel (Ni)     | 0.3 - 1     |
| Phosphorous (P) | 0.04 max    |
| Carbon (C)      | 0.03 max    |
| Nitrogen (N)    | 0.03 max    |
| Sulphur (S)     | 0.02 max    |
| Iron (Fe)       | Balance     |

### ALLOY DESIGNATIONS

Stainless Steel Grade 1.4003 also corresponds to **but may not be a direct equivalent to:**  
3CR12  
Nirosta 4003

### SUPPLIED FORMS

- Sheet
- Tube
- Plate

### GENERIC PHYSICAL PROPERTIES

| Property               | Value                          |
|------------------------|--------------------------------|
| Density                | 7.74 g/cm <sup>3</sup>         |
| Modulus of Elasticity  | 200 GPa                        |
| Melting Point          | 1430-1510 °C                   |
| Thermal Expansion      | 11.1-12.3 x10 <sup>-6</sup> /K |
| Thermal Conductivity   | 30.5 W/m.K                     |
| Electrical Resistivity | 0.678 x10 <sup>-6</sup> Ω .m   |

### MECHANICAL PROPERTIES

EN 10088-2:2005  
Sheet & Plate  
Up to 13.5mm Thick

| Property         | Value       |
|------------------|-------------|
| Proof Stress     | 280 Min MPa |
| Tensile Strength | 450-650 MPa |
| Elongation A     | 20 Min %    |

Properties listed above are for 1.4003 Sheet / Plate

EN 10088-2:2005  
Plate  
Over 13.5mm to 25mm Thick

| Property         | Value         |
|------------------|---------------|
| Proof Stress     | 250 Min MPa   |
| Tensile Strength | 450 - 650 MPa |
| Elongation A     | 18 Min %      |

Properties listed above are for 1.4003 Sheet / Plate

## APPLICATIONS

1.4003 stainless steel is typically used in:

Bulk wet materials handling  
Vehicle frames/chassis  
Rail car hoppers  
Sweeper and gritter vehicles  
Conveyors, chutes, screen, troughs  
Bunkers & hoppers  
Tanks & containers  
Chimneys & ducting  
Enclosures & cabinets  
Walkways, stairs & railings  
Cable trays

## CORROSION RESISTANCE

1.4003 stainless has 250 times the corrosion resistance of mild steels and is particularly good in corrosion/abrasion applications.

Corrosion/Abrasion - The cycle of abrasive removal of a metal surface following surface corrosion rapidly erodes mild/carbon steels even when costly coatings are applied. In wet or damp conditions where abrasion is present type 4003 provides excellent performance by resisting corrosion attack and thus maintaining better flow and slideability compared to non-alloyed or low-alloy steels including abrasion resistant grades.

## WELDABILITY

Type 4003 has a fine-grained microstructure which reduces grain growth in the heat-affected zone (HAZ) and allow high integrity welds in section thicknesses up to 30mm. Suitable weld processes include SMAW, GTAW, FCAW, PAW, Laser, Spot and Seam. Design and welding procedure consideration must be taken to avoid sensitization occurring in service.

## STRENGTH & STIFFNESS

Type 4003 offers higher strength than, and equal structural stiffness to, mild steels such as BSEN10113 Grade Fe430A (ASTM A36). It also offers greater impact and energy resistance than aluminium. It behaves much like austenitic steel in that it gradually yields and does not show a definite yield point.

## COATING & PAINTING

Type 4003 provides good corrosion resistance and excellent abrasion resistance, hence does not need coating or painting systems to be applied for performance reasons. For aesthetic reasons it may be desirable in some applications to apply paint, especially as type 4003 will tend to discolour in corrosive conditions. Type 4003 has exceptional under-paint corrosion resistance and will continue to resist corrosion even where the paint coat has been damaged. Normal preparation is required, such as ensuring a clean surface free of grease and other contamination. A primer coat is recommended for cold-rolled material due to its smoother surface, but hot rolled 1D finish material may be suitably painted in a single coat.

## COST BENEFIT

Type 4003 is proven to offer lower life-cycle costs than traditional materials where service conditions involve corrosion and/or abrasion. As compared to traditional materials there are options to reduce initial cost through the elimination of protective coatings and corrosion allowances. In service cost savings come from reduced maintenance, improved productivity and significantly longer life.

As type 4003 does not contain significant quantities of expensive alloying elements such as Nickel and Molybdenum, it is a lower cost material than austenitic stainless steel and can thus be considered as an option where these grades are not an economically viable choice.

## CONTACT

|                 |                                                                                                                        |
|-----------------|------------------------------------------------------------------------------------------------------------------------|
| <b>Address:</b> | Please make contact directly with your local service centre, which can be found via the Locations page of our web site |
| <b>Web:</b>     | <a href="http://www.aalco.co.uk">www.aalco.co.uk</a>                                                                   |

## REVISION HISTORY

|                          |               |
|--------------------------|---------------|
| <b>Datasheet Updated</b> | 13 March 2020 |
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