

## Introduction

Cromgard C12 is recognized as the original and now the world's most specified 12% chromium utility grade ferritic stainless steel.

The yield strength of Cromgard C12 is approximately 85% higher than that of austenitic stainless steels such as grades 304L and 316L. Cromgard C12 has a large yield strength advantage over mild steel and A36 grade steels as well. This advantage often allows down gauging in the design, depending on Young's Modulus and buckling limitations.

The main advantage of Cromgard C12 over other ferritic stainless steels is that it is very tough, even when welded, in thicknesses of up to 30mm and retains its toughness at temperatures below the freezing point.

In terms of atmospheric corrosion resistance, Cromgard C12 is superior to mild steel, weathering steel, copper and aluminum. When exposed to aggressive atmospheric conditions, staining may occur, but this does not affect the lifetime performance. However, if aesthetic appearance is important, it is recommended that Cromgard C12 is painted or more corrosion resistant stainless steels, like the Cromgard C20 + series should be considered.

Cromgard C12 has also found widespread use in wet sliding abrasion conditions and in aqueous environments involving exposure and/or immersion.

## Applications

Cromgard C12 is used in over 30 industries in various applications today. Below is a list of some of the more developed industries where Cromgard C12 has proven successful.

### RAIL TRANSPORT

- Coal & Aggregate Freight
- Passenger Rail
- Light Rail
- Rail Infrastructure

### ROAD TRANSPORT

- Bus
- Sweeper
- Truck
- Fire Apparatus

### MINING

- Coal
- Sand, Ore & Aggregate
- Conveyors
- Bulk Handling Equipment

### • Water Treatment Plants

### • Power Generation

### • Storage Tanks

### • Pulp & Paper Production

### • Mining

### • Heat Exchangers

### • Petro-Chemical

### • Cabinets/Enclosures

## Corrosion Resistance

### General Corrosion

Cromgard C12 is significantly more corrosion resistant than mild or low alloy corrosion resistant steels. If higher chromium content and better corrosion resistance are needed, take a look at our Cromgard C18 series or Cromgard C20+ series.

Cromgard C12 should only be used in mildly corrosive conditions where aesthetics is not a prime requirement. A light surface patina or discoloration will form in most corrosive environments and this patina will, to some extent, hinder further corrosion.

### Pitting Corrosion

Pitting corrosion is possible in applications involving contact with chloride solutions, particularly in the presence of oxidizing media. These conditions may be conducive to localized penetration of the passive surface film on the steel and a single deep pit may well be more damaging than a much greater number of relatively shallow pits.

Where pitting corrosion is anticipated, steels with high pitting resistance equivalents (PRE), such as Cromgard C20-1, C20-3 or C23, should be considered. The PRE number for Cromgard C12 is 13.

## Welding

Cromgard C12 has good weldability and is suited to most standard welding methods (MMA/SMAW, MIG/GMAW, TIG/ GTAW, FCAW and PAW). It can be welded to other ferrous metals, for example mild and stainless steels, quite satisfactorily.

The recommended grade of electrode is the AWS 309L type. It is important that this type of over-alloyed consumable is used, rather than one which matches either of the base metals, in order to avoid the formation of martensite in the weld. When welding Cromgard C12 to itself, E308L or E316L can also be used. The heat input should be controlled to between 0.5kJ/mm and 1.5kJ/mm per pass. The weld discoloration should be removed by pickling and passivating to restore maximum corrosion resistance.

## Chemical Composition

Element	Range
Carbon	0.030 max
Silicon	1.000 max
Manganese	1.500 max
Phosphorus	0.040 max
Sulfur	0.015 max
Chromium	10.500 - 12.500 max
Nickel	0.030 - 1.000 max
Nitrogen	0.030 max
Iron	Balance

Per ASTM A240

## Mechanical Properties

Property	Value
Tensile Strength (ksi) $\leq$ 6.00mm Thickness	66
Tensile Strength (ksi) $>$ 6.00mm Thickness	95
0.2% Proof Strength (ksi) $\leq$ 6.00mm Thickness	46.4
0.2% Proof Strength (ksi) $>$ 6.00mm Thickness	40.5
Elongation*	18-20%

Per ASTM A240

Values are minimum unless stated

\* Elongation over a length of 50.8 mm

## Physical Properties

Property	Value
Density (lb/in <sup>3</sup> )	0.28
Modulus of Elasticity	Tension (GPa) 200
Modulus of Elasticity	Torsion (GPa) 77
Specific Heat Capacity (J/kg K)	478
Thermal Conductivity	100°C (W/m K) 30.0
	500°C (W/m K) 40.0
Resistivity (x10 <sup>-9</sup> Ωm)	678
Coefficient of Thermal Expansion	0 - 100°C (x10 <sup>-6</sup> K <sup>-1</sup> ) 11.1
	0 - 300°C (x10 <sup>-6</sup> K <sup>-1</sup> ) 11.7
	0 - 500°C (x10 <sup>-6</sup> K <sup>-1</sup> ) 12.3
	0 - 700°C (x10 <sup>-6</sup> K <sup>-1</sup> ) 12.8
Melting Point (°C)	1430 - 1510
Magnetic	Yes

Per ASTM A240



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Note: This data sheet is intended as a source of information, and as an ongoing service for the benefit of Cromgard C12 users and specifiers. However, Crompion International cannot be held responsible either for the suitability of the steel in question for any particular purpose, or for the performance or selection of the steel, on the basis of the information contained herein or otherwise; unless Crompion International has specifically authorized the purpose or selection. Crompion International shall not be liable in the event of a breakdown or malfunction occurring due to faulty design, material or workmanship of the steel, whether based on the information contained herein or not, and shall not under any circumstances be liable for any damages, either direct or indirect, particularly consequential damages, including but not limited to damages for loss of profits arising from the installation and use of such steel.

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