

C: max. 0,12
Cr: 6,0 - 8,0
Al: 0,5 - 1,0

FERROTHERM®
4713
X10CrAl 7

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Stainless heat resistant ferritic chromium steel with aluminium addition

Relevant current and obsolete standards:

- EN 10095 : 1.4713 X10CrAl 7
- AISI :
- BS :
- JIS :
- AFNOR : Z8CA7
- DIN : 1.4713
- SIS :
- SEW 470 : 1.4713 X10CrAl 7

General properties

- corrosion resistance : low
- mechanical properties : medium
- forgeability : good
- weldability : limited
- machinability : good

Special properties

- resistant to scaling up to around 800 °C

Physical properties

- density (kg/dm³) : 7,7
- electrical resistivity at 20°C (Ω mm²/m) : 0,70
- magnetisable : yes
- thermal conductivity at 20°C (W/m K) : 23
- thermal conductivity at 500°C (W/m K) : 25
- specific heat capacity at 20°C (J/kg K) : 450
- thermal expansion (µm/mK) between
- 20 and 200°C : 11,5
- 20 and 400°C : 12,0
- 20 and 600°C : 12,5
- 20 and 800°C : 13,0

Typical applications

- construction of high temperature components
- automotive engineering
- chains, screens and mesh
- mechanical engineering
- furnace engineering

hint: - available from stock.

Processing properties

- automated machining : seldom
- hammer and die forging : yes
- cold forming : yes
- cold heading : not common

Product forms and conditions

- wire rod
- bars Ø 20 - 60
- bright wire h9, Ø 4 - 20
- solution annealed
- pickled
- drawn
- straightened
- peeled
- ground

Demand tendency

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Properties, applications and processing

FERROTHERM® 4713 is the standard grade of heat resisting steel used in furnace building and construction.

High temperature corrosion resistance

FERROTHERM® 4713 is resistant to oxidising sulphur bearing gases and is also resistant to carburisation. This grade of steel is resistant to scaling in air up to temperatures of 800°C. Only limited resistance to nitrogen containing and oxygen denuded gasses is to be expected.

Heat treatment / mechanical properties

Optimal material properties are realised after solution annealing by holding in the temperature range 780 - 840°C, followed by rapid cooling in air or water. In this condition the following mechanical properties can be expected:

Property	Specification	Typical
- yield strength (N/mm ²)	R _{p0,2} : ≥ 250	310
- tensile strength (N/mm ²)	R _m : 450 – 600	490
- hardness	HB : ≤ 200	

Welding

FERROTHERM® 4713 is weldable using all usual welding processes with preheating to a temperature between 200 and 300°C, being recommended. Low heat inputs should be used when welding to reduce any possible grain coarsening. Although post weld heat treatment is not necessary, a stress relief treatment is sometime performed in the temperature range 650 to 750°C. **Novonit® 4502** and **4551** are suitable for use as filler materials when welding **FERROTHERM® 4713**.

Forging

Forging is usually performed at 800 - 1150°C followed by rapid cooling in air or water. Generally, forging is followed by the heat treatment described previously. Post forging heat treatment may not be necessary if the temperature of the final forging pass is above 900°C and the forged components are then allowed to cool slowly in a closed box.

Machining properties

Ferritic stainless steels such as **FERROTHERM® 4713** tend to smear during machining which results in the formation of longer swarf which makes machining difficult and creates extreme difficulty during automated machining.

When machining this grade of steel with coated hard metal cutting/machining tools, the following machining parameters can be used as a guideline:

tensile strengths	depth of cut (mm)		
	feed (mm/rev)		
R _m in N/mm ²	6 mm 0,5 mm/r	3 mm 0,4 mm/r	1 mm 0,2 mm/r
solution annealed (450 - 550)	160 m/min	190 m/min	260 m/min