KANTHAL®

Part of Sandvik Group

FURNACE ROLLERS
GX40CrNiSi25-20

MATERIAL DATA SHEET

FEATURES

GX40CrNiSi25-20 is a cast austenitic, 25% chromium and 20% nickel iron-base alloy. A balanced composition provides excellent structural stability, high stress rupture strength and solid resistance to oxidation and carburization.

The alloy is widely used in structural applications up to 1100°C, where long-term creep properties are not a main design criteria. The alloy offers reliable resistance to high-temperature corrosion in both oxidizing and reducing conditions.

CHEMICAL COMPOSITION*	MASS, %
Carbon	0.4
Silicon	1.5
Manganese	1.5
Chromium	25
Nickel	20
Iron	Balance

* This is a typical composition which may be slightly modified according to the application.

APPLICATIONS

The alloy is typically used for general heat-resistance applications in industrial furnaces, petrochemical/chemical industries and for iron ore direct reduction processes, i.e tubular products, castings, furnace rollers, rails, retorts etc. Heat treatment is not required for most applications of this grade. The main high-temperature applications for the material are:

PROCESS	MAX. OPERATING TEMPERATURE, °C
Steam cracking	1000
Steam reforming	1000
Furnace support components	1100

PHYSICAL PROPERTIES

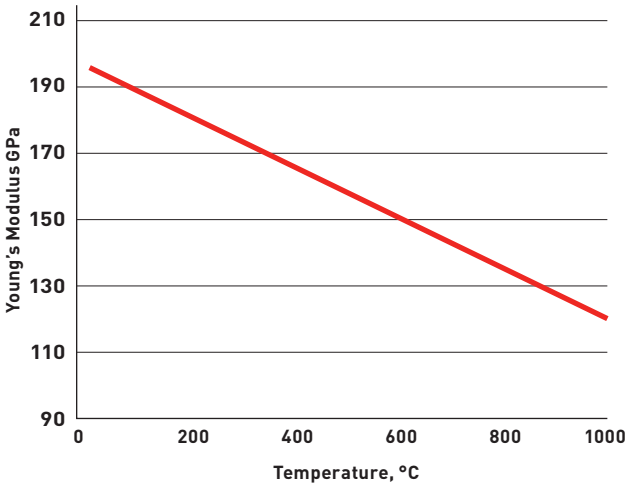
Density at 20°C: 7.9 g/cm^3

TYPICAL PHYSICAL PROPERTIES

δ, °C	α, 10^{-6}/K	λ, W/m K	c_p, J/kg K	a, $10^{-6}m^2/s$
20	16.1	11.9	472	3.3
100	16.7	13.3	287	3.4
200	17.2	15.1	503	3.7
300	17.7	16.7	512	4.1
400	18.1	18.3	520	4.3
500	18.4	19.8	530	4.5
600	18.8	21.3	541	4.7
700	19.1	22.8	551	5.0
800	19.4	24.3	559	5.4
900	19.7	25.7	565	5.7
1000	20.0	27.1	571	5.8

δ: Temperature
α: Mean coefficient of linear thermal expansion
λ: Thermal conductivity
c_p: Mean specific heat
a: Thermal diffusivity

YOUNG'S MODULUS OF ELASTICITY



MECHANICAL PROPERTIES

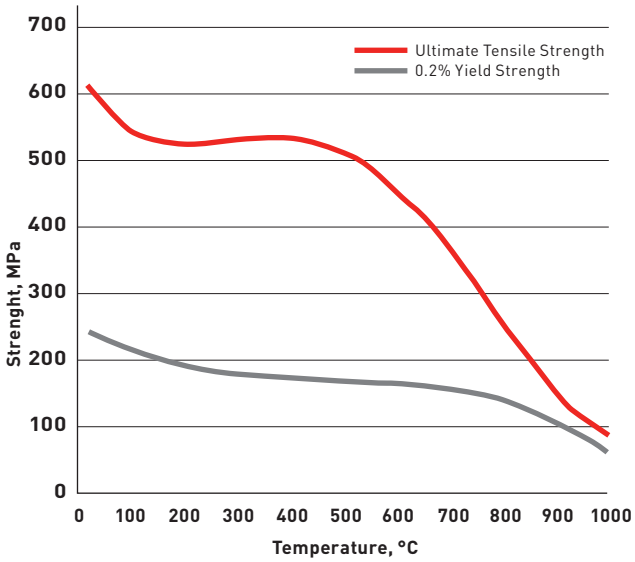
(only for wall thickness less than 25 mm, in the as-cast condition).

TENSILE PROPERTIES

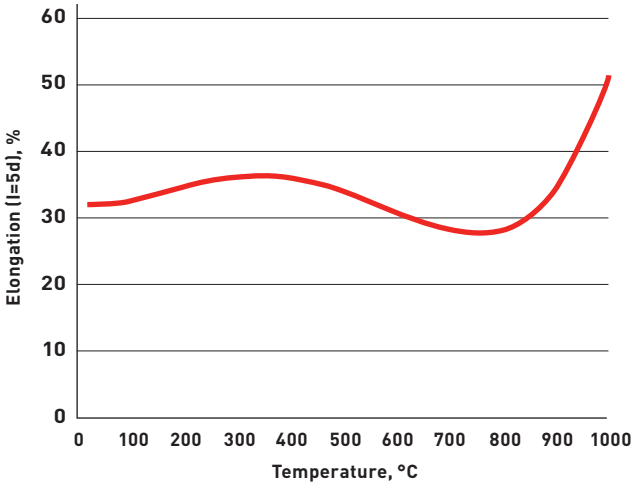
MINIMUM TENSILE PROPERTIES AT 20°C:

0.2% Yield strength:	240 MPa
Ultimate tensile strength:	450 MPa
Elongation, (l = 5d):	10% for centricast tubes
	10% for static castings

TYPICAL TENSILE STRENGTH AND 0.2% YIELD STRENGTH VS. TEMPERATURE

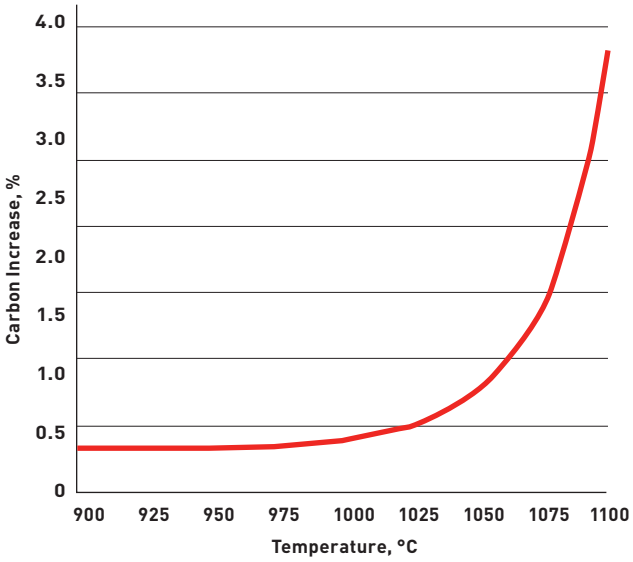


TYPICAL TENSILE STRENGTH TEST ELONGATION VS. TEMPERATURE



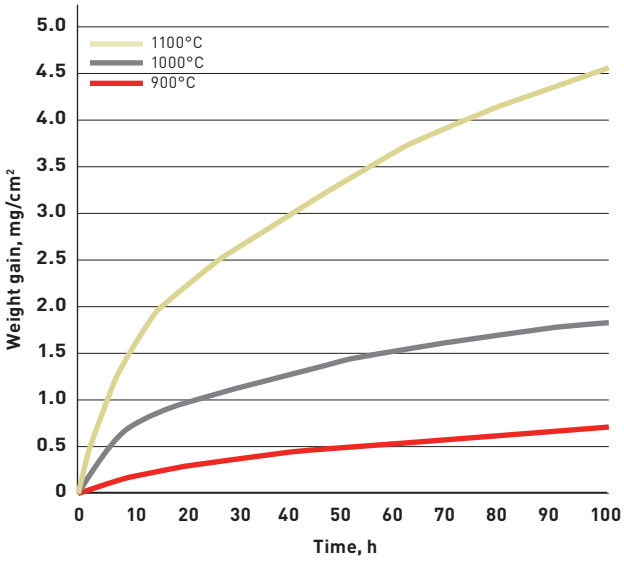
CARBURIZATION RESISTANCE

INCREASE IN CARBON CONTENT VS. TEMPERATURE AFTER PACK CARBURIZATION FOR 260 HOURS AT INDICATED TEST TEMPERATURE



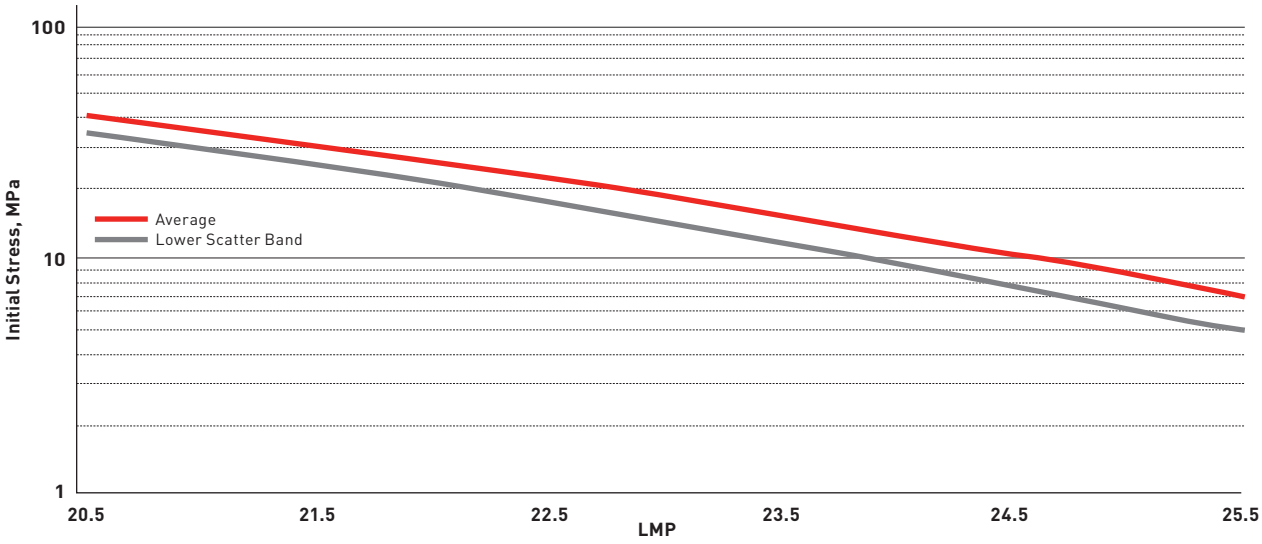
OXIDATION RESISTANCE

OXIDATION WEIGHT GAIN VS. TIME FOR DIFFERENT TEMPERATURES



PARAMETRIC STRESS RUPTURE STRENGTH

PARAMETRIC STRESS RUPTURE



LMP = Larson Miller Parameter. LMP = T (15.0 + log tr)/1000. Where T: temperature [K] and tr: rupture time [h]. Lower Scatter Band represents 95% confidence level

MANUFACTURING CHARACTERISTICS

MACHINING

In general terms the machinability of GX40CrNiSi25-20 is similar to that of other heat-resistant alloys.

WELDING

GX40CrNiSi25-20 can be welded by most conventional methods including gas tungsten arc (GTAW), plasma arc (PAW) and manual-shielded metal arc welding (SMAW) processes.

Approved filler materials are bare welding rods and electrodes. Preheating and postweld heat treatment of the joint is not necessary. Further information is available on request.

HEALTH AND SAFETY

The operation and maintenance of welding equipment should conform to the provisions of relevant national standards for the protection of personnel.

Mechanical ventilation is advisable and under certain conditions in confined spaces, it is necessary during welding operations to prevent possible exposure to hazardous fumes, gases or dust that may occur.

Nickel- and iron-base materials may contain, in varying concentrations, the elements chromium, iron, manganese, molybdenum, cobalt, nickel, tungsten and aluminium. Inhalation of metal dust from welding, grinding, melting and dross handling of these alloy systems may cause adverse health effects.

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