Remanit® 4021

Material number

1.4021* | DIN X 20 Cr 13 | NF Z 20 C 13 | ASTM 420 | SIS 2303 | BS 420 S 37 | EN X20Cr13

** To DIN 17440 and EN 10088*

Chemical composition*

** Data to EN 10088 in % by mass*

	C	Cr
min.	0.16	12.0
max.	0.25	14.0

Depending on the properties desired, special agreements can be reached within the specified analysis limits.

Mechanical properties*

** Data to EN 10088*

At room temperature

Size range mm	Heat treatment status	0.2% proof stress (Rp 0.2) min. N/mm²	Tensile strength (Rm) N/mm²	Elongation after fracture A5 min. in % Long.	Elongation after fracture A5 min. in % Trans.	Notched bar impact work min. in J Long.	Notched bar impact work min. in J Trans.	Hardness HB max.
	A		max. 760					230
d ≤ 160	QT 700	500	650 to 850	13		25		
d ≤ 160	QT 800	600	800 to 950	12		20		

The mechanical properties have to be agreed on for thicker dimensions, or the delivered product is based on the values given.

At elevated temperatures in quenched and tempered condition

Treatment level	Temperature in °C	100	150	200	250	300	350	400
QT 700	0.2% proof stress	460	445	430	415	395	365	330
QT 800	(Rp 0.2) min. in N/mm²	515	495	475	460	440	405	355

Hot forming / Heat treatment, structure

Hot forming

°C	Cooling
1100 to 800	Slow cooling

Heat treatment, structure

Annealing A			Quenching QT		Tempering QT		
°C	Cooling	Structure	°C	Cooling	°C	Cooling	Structure
745 to 825	Air	Ferrite with integrated carbides	980 to 1030	Oil, air Sufficiently quick	QT 700 650 to 700 QT 800 600 to 700	Air	Transformation structure (+ ferrite)

Physical properties*

** Data to EN 10088*

Density at 20 °C	Modulus of elasticity kN/mm² at			Thermal conductivity at 20 °C	Specific heat at 20 °C	Resistivity at 20 °C
kg/dm³	20°C	200°C	400°C	W/mK	J/kgK	Ω mm²/m
7.7	215	205	190	30	460	0.6

Thermal expansion in 10^{-6} K^{-1} between 20 °C and

100 °C	200 °C	300 °C	400 °C	500 °C
10.5	11.0	11.5	12.0	

Processing

REMANIT 4021 is primarily supplied in quenched and tempered condition QT 700 and QT 800.
It can also be set to other tensile strengths. It must be borne in mind in this context that the temperature range between 425 and 525 °C must be avoided owing to embrittlement at 475 °C.
Any forming should only be carried out in heated condition between 200 and 400 °C.
The annealing colours or scaling occurring during hot forming or welding impair the corrosion resistance. They must be removed by pickling, grinding or sand-blasting (iron-free!).
Metal-cutting machining is the same as that for special structural steel grades of corresponding strength.
The material version REMANIT 4021 IM displays better cutting properties owing to the specific addition of sulphur.
REMANIT 4021 can be polished.

Welding

Limited weldability using the manual arc, TIG and resistance welding processes.
Preheat at 300 to 400 °C.

Filler metals:

** For welds which are not subjected to full mechanical stress.*

	Similar	More highly alloyed
Thermanit	14 K	Nicro 82*

Recommended heat treatment with similar types of filler metal: cool below martensite start temperature (to approx. 120 °C) after welding, then temper or reharden; with more highly alloyed filler metals, only temper after cooling to below martensite start temperature.

Notes on use

REMANIT 4021 is used for parts with relatively high strengths which come into contact with water or steam, such as turbine blades, shafts, spindles, valve cones and seats in steam and water fittings, as well as for surgical instruments, such as forceps and pincers.