

1.4125 / 440c Technical Data

Technical data:

Hot forming temperature °C 1100 – 900

Annealing temperature °C 780 – 840

Hardening temperature °C 1000 – 1050
 Quenchant Oil

Tempering temperature °C 100 – 300

Structure after Heat treatment	Condition	Product	Size mm	Hardness (average values) HB/HV
Ferrite + Carbide			≤	max. 285
Martensite + Carbide				ca. 61 HRC
Martensite + Carbide	hardened & tempered for obtaining high hardness			57 – 60 HRC

Physical properties at ambient temperature (average values):

Modulus of elasticity 10 ³ N/mm ² , at... °C					Density kg/dm ³	Electric resistivity Ohm.mm ² /m	Thermal conductivity W/(m.K)
20°C	100°C	200°C	300°C	400°C			
215	212	205	200	190	7,70	0,80	15

Physical properties:

Specific heat capacity at 20°C

Mean coefficient of thermal expansion between 20°C and ...°C, 10 (m/(m.K))

Magnetic properties

Physical properties:

	100°C	200°C	300°C	400°C	500°C	
430 J/(kg.K)	10,4	10,8	11,2	11,6	11,9	Magnetic

Chemical Composition

Chemical composition (%)

C	Si	Mn	P	S	Cr	Mo
0,95-1,20	≤ 1,00	≤ 1,00	≤ 0,040	≤ 0,030	16,00- 18,00	≤ 0,75

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Additional Technical Information for 1.4125 / 440c:

Mechanical Properties above ambient temperature:

Condition: Hardened & Tempered
Coefficient of Thermal Expansion between 20°C and...

Temperature °C	Coefficient (10 ⁻⁶ K ⁻¹)
100	10.5
200	11.0
300	11.0
400	11.5
500	12.0

Physical properties at 20°C

Density	Specific Heat	Heat Conduction	Electrical Resistance	Modulus of Elasticity	Magnetic	Polishable	Weldable
	$\frac{J}{g.K}$	$\frac{W}{K.m}$	$\frac{\Omega.mm^2}{m}$	10 ³ N/mm ²			
7.70	0.46	29.0	0.65	230	Yes	Yes	No



440c Martensitic Stainless Steel

Characteristics

This material will achieve the highest hardness of the available hardenable stainless steels. It possesses good corrosion resistance, particularly in the hardened and tempered condition. The material is magnetic in all conditions.

Heat Treatment Practice

In order to achieve the optimum properties for this material, it is imperative that the correct heat treatment is carried out in accordance with the following recommendations:

Normalising

Normalising is not recommended

Annealing

Annealing may be required on material in the as forged condition in order to aid machining prior to hardening and tempering. Annealing should be carried out under vacuum conditions to avoid surface decarburisation.

- Annealing: Process anneal 675°C - 760°C
 - Full anneal 845°C - 900°C
 - Hardness achievable: 23/25 HRc
 - Note: The material supplied by Intoco is already in the annealed condition unless otherwise stated.
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Hardening

Hardening should be carried out under vacuum conditions to avoid surface decarburisation and to maintain a clean bright product.

Preheat 760°C - 800°C

Austenitise 1010°C - 1065°C

Nitrogen gas quench 2 - 6 bar overpressure

As quenched hardness 60/62 HRc

The upper end of the temperature range should be used for larger sections or when maximum corrosion resistance and strength are required. Similarly the greater quench pressure should be used in order to maximise these properties.

Sub Zero treatment

For minimum retained austenite and maximum dimensional stability, parts should be sub-zero treated between -70° / -80°C.

This should be carried out immediately after hardening once the parts have reached ambient temperature.

Tempering

Tempering should be carried out depending on properties required, in all cases double tempering is recommended.

165°C for maximum hardness 60 HRc

190°C - 230°C for a combination of hardness & toughness 56/58 HRc

350°C for maximum toughness 52/54 HRc

Nitriding

To further enhance surface characteristics, post heat treatment nitriding may be carried out on this material. Typical depth achieved being 0.008/0.010"

Please note the above specification has been provided by and is the responsibility of the TTI Group Limited. This information is provided to further the possibilities to our customers. You must satisfy yourselves that this specification meets the criteria for your products.

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