

# SANMAC® 4305 HOLLOW BAR

## DATASHEET

Sanmac® 4305 is an austenitic chromium-nickel steel with extremely high machinability. For example, cutting speeds of up to twice those for Sanmac 304/304L can be used.

### STANDARDS

- MT 303
- S30300
- 1.4305

### Product standards

- EN 10297-2, EN 10294-2
- ASTM A511

### CHEMICAL COMPOSITION (NOMINAL) %

C	Si	Mn	P	S	Cr	Ni
≤0.035	0.4	1.8	≤0.040	0.2	17.5	9

### APPLICATIONS

Sanmac® 4305 is a good choice for components where high machinability is needed, but where corrosion resistance and high stresses are not a concern.

### CORROSION RESISTANCE

#### General corrosion

Sandvik Sanmac® 4305 has good resistance to:

- Organic acids at moderate temperatures, with the exception of formic acid
- Sulphates, sulphides and sulphites
- Caustic solutions at moderate temperatures
- Oxidizing acids like nitric acid

#### Intergranular corrosion

Sandvik Sanmac® 4305 has a low carbon content and therefore good resistance to intergranular corrosion.

#### Stress corrosion cracking

Austenitic steels are susceptible to stress corrosion cracking. This may occur at temperatures above about 60°C (140°F) if the steel is subjected to tensile stresses and at the same time comes into contact with certain solutions, particularly those containing chlorides. In applications demanding high resistance to stress corrosion cracking the austenitic-ferritic steels Sandvik SAF 2304®, Sandvik 10RE51 or Sandvik Sanmac® 2205 have higher resistance to stress corrosion cracking than 4305.

### Pitting and crevice corrosion

The steel may be sensitive to pitting and crevice corrosion even in solutions of relatively low chloride content. Molybdenum-alloyed steels have better resistance and the resistance improves with increasing molybdenum content.

### FORMS OF SUPPLY

#### Hollow bar- Finishes, dimensions and tolerances

Hollow bar in Sanmac 4305 can be produced in various sizes in the solution annealed and white-pickled condition.

Dimensions are given as outside and inside diameters with guaranteed component sizes after machining, see catalogues.

Outside diameter tolerance is +2/-0%, but minimum +1/-0mm

Inside diameter tolerance is +0/-2%, but minimum +0/-1mm

Straightness +/-1.5mm/m

Better tolerances can be supplied on special order.

#### Other forms of supply

##### Bar

Steel with improved machinability, Sanmac, is also available in bar.

### MECHANICAL PROPERTIES

#### At 20°C (68°F)

##### Metric units

Proof strength		Tensile strength		Elong.		Hardness
R <sub>p0.2</sub> <sup>a</sup>	R <sub>p1.0</sub> <sup>a</sup>	R <sub>m</sub>		A <sub>b</sub>	A <sub>2</sub> <sup>"</sup>	HRB
MPa	MPa	MPa		%	%	
≥210	≥230	≥515		≥35	≥35	≤90

##### Imperial units

Proof strength		Tensile strength		Elong.		Hardness
R <sub>p0.2</sub> <sup>a</sup>	R <sub>p1.0</sub> <sup>a</sup>	R <sub>m</sub>		A <sub>b</sub>	A <sub>2</sub> <sup>"</sup>	HRB
ksi	ksi	ksi		%	%	
≥30	≥33	≥75		≥35	≥35	≤90

1 MPa = 1N/mm<sup>2</sup>

a) R<sub>p0.2</sub> and R<sub>p1.0</sub> correspond to 0.2% offset and 1.0% offset yield strength, respectively.

b) Based on L<sub>0</sub> = 5.65 ÖS<sub>0</sub> where L<sub>0</sub> is the original gauge length and S<sub>0</sub> the original cross-section area.

#### Impact strength

Sandvik Sanmac® 4305 possesses good impact strength both at room temperature and at low temperatures.

### PHYSICAL PROPERTIES

Density: 7.9 g/cm<sup>3</sup>, 0.29 lb/in<sup>3</sup>

#### Thermal conductivity

Temperature, °C	W/m °C	Temperature, °F	Btu/ft h °F
20	15	68	8.5

**Thermal conductivity**

Temperature, °C	W/m °C	Temperature, °F	Btu/ft h °F
100	16	200	9.5
200	18	400	19.5
300	20	600	12
400	22	800	13
500	23	1000	14
600	25	1200	15
700	26	1300	15

**Specific heat capacity**

Temperature, °C	J/kg °C	Temperature, °F	Btu/lb °F
20	475	68	0.11
100	500	200	0.12
200	530	400	0.13
300	560	600	0.13
400	580	800	0.14
500	600	1000	0.14
600	615	1200	0.15
700	625	1300	0.15

**Thermal expansion, mean values in temperature ranges (x10<sup>-6</sup>)**

Temperature, °C	Per °C	Temperature, °F	Per °F
30-100	16.5	86-200	9.5
30-200	17	86-400	9.5
30-300	17.5	86-600	10
30-400	18	86-800	10
30-500	18.5	86-1000	10
30-600	18.5	86-1200	10.5
30-700	19	86-1400	10.5

**Modulus of elasticity**

Temperature, °C	MPa	Temperature, °F	ksi
20	200	68	29.0
100	194	200	28.2

## Modulus of elasticity

Temperature, °C	MPa	Temperature, °F	ksi
200	186	400	26.9
300	179	600	25.8
400	172	800	24.7
500	165	1000	23.5

## WELDING

Welding of Sanmac® 4305 should be carried out with filler material under carefully control due to Sulphur addition in the material. Suitable methods of fusion welding are manual metal-arc welding (MMA/SMAW) and gas-shielded arc welding, with the TIG/GTAW method as first choice.

For Sanmac® 4305, heat input of <1.0 kJ/mm and interpass temperature of <100°C (210°F) are recommended.

### Recommended filler metals

TIG/GTAW or MIG/GMAW welding

ISO 14343 S 19 9 L / AWS A5.9 ER308L (e.g. Exaton 19.9.L)

ISO 14343 S 23 12 L / AWS A5.9 ER309L (e.g. Exaton 24.13.L)

ISO 14343 S 18 8 Mn / AWS A5.9 ER307 (e.g. Exaton 18.8.Mn)

MMA/SMAW welding

ISO 3581 E 19 9 L R / AWS A5.4 E308L-17(e.g. Exaton 19.9.LR)

ISO 3581 E 23 12 L R / AWS A5.4 E309L-17(e.g. Exaton 24.13.LR)

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Disclaimer: Recommendations are for guidance only, and the suitability of a material for a specific application can be confirmed only when we know the actual service conditions. Continuous development may necessitate changes in technical data without notice. This datasheet is only valid for Sandvik materials.