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Sanmac 4305

(Hollow bar)

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

- ASTM MT 303
- UNS S30300
- EN number 1.4305

Product standards

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

CHEMICAL COMPOSITION (NOMINAL) %

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

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
$R_{p0.2}$[a]	$R_{p1.0}$[a]	R_m	A[b]	$A_{2"}$	HRB
MPa	MPa	MPa	%	%	
min.	min.	min.	min.	min.	max.
210	230	515	35	35	90

IMPERIAL UNITS

Proof strength		Tensile strength	Elong.		Hardness
$R_{p0.2}$[a]	$R_{p1.0}$[a]	R_m	A[b]	$A_{2"}$	HRB
ksi	ksi	ksi	%	%	
min.	min.	min.	min.	min.	max.
30	33	75	35	35	90

1 MPa = 1N/mm^2
a)$R_{p0.2}$ and $R_{p1.0}$ correspond to 0.2% offset and 1.0% offset yield strength, respectively.
b) Based on L_0 = 5.65 ÖS_0 where L_0 is the original gauge length and S_0 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^3, 0.29 lb/in^3

THERMAL CONDUCTIVITY

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

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^{-6})

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
200	186	400	26.9
300	179	600	25.8
400	172	800	24.7
500	165	1000	23.5

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
- Oxidising 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.

WELDING

Despite very high sulphur levels in Sandvik Sanmac 4305, welding is comparable with that for 18/8 stainless steels (e.g.Sanmac 304L) if filler metal is used and the fusion between base material and filler metal is kept low.

Suitable welding methods are manual metal arc welding (MMA) with covered electrodes and gas shielded arc welding with the TIG and MIG methods as first choice. No pre-heating is necessary, and post weld heat treatment is normally not necessary.

Since the material has low thermal conductivity and high thermal expansion, welding must be carried out with low heat input, and with welding plans well thought out in advance, so that deformation of the weld joint can be kept under control. If, despite these precautions, it is forseen that residual stresses might impair the structures performance, we recommend that the entire structure is stress relieved.

Recommendations of filler metal:

TIG (GTAW/141)	22.15.3.L, 22.8.3.L , 18.8.Mn
MIG (GMAW/131)	22.15.3.L, 22.8.3.L , 18.8.Mn
MMA (SMAW/111)	23.12.2.LR, 24.13.LHF

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.

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.