# 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 |

## 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 |
|---|---|---|---|---|---|
| Rp0.2[a] | Rp1.0[a] | Rm | A[b] | A2" | HRB |

| MPa | MPa | MPa | % | % | |
|---|---|---|---|---|---|
| ≥210 | ≥230 | ≥515 | ≥35 | ≥35 | ≤90 |

Imperial units

| Proof strength | | Tensile strength | Elong. | | Hardness |
|---|---|---|---|---|---|
| Rp0.2[a] | Rp1.0[a] | Rm | A[b] | A2" | HRB |
| ksi | ksi | ksi | % | % | |
| ≥30 | ≥33 | ≥75 | ≥35 | ≥35 | ≤90 |

1 MPa = 1N/mm2

a) Rp0.2 and Rp1.0 correspond to 0.2% offset and 1.0% offset yield strength, respectively.

b) Based on L0 = 5.65 ÖS0 where L0 is the original gauge length and S0 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/cm3, 0.29 lb/in3

### 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 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- 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
- 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.

## 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 notnecessary.

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 foreseen that residual stresses might impair the structures performance, we recommend that the entire structure is stress relieved.

Recommendations of fillermetal:

| | |
|---|---|
| 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.







Datasheet updated 7/5/2018 10:28:14 AM (supersedes all previous editions)