COBALT CCM®

Austenitic Cobalt-Chromium-Molybdenum corrosion resistant alloy

Distinctive features & main attributes

This alloy of Cobalt-Chromium-Molybdenum for implants is the MicroMelt® Biodur® Carpenter CCM® alloy. It meets the strictest requirements regarding biocompatibility and corrosion resistance. It is produced by powder metallurgy and has an exceptionally fine microstructure. It is tough, ductile, hard, as well as fatigue and wear resistant. Its high cobalt content may impair its machinability. Its cold deformability is difficult. It is non-magnetic.

Use & application range

This alloy is especially applicable for medical implants (endoprothesis and osteosynthesis) wherever high mechanical stress is expected. It is widely used in the watch making industry as well as other industries where hardness, toughness, ductility and corrosion resistance are required.

Material No. and norms

<table>
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<tr>
<th>Material No.</th>
<th>DIN Abbreviation</th>
<th>AFNOR</th>
<th>AISI/SAE/ASTM</th>
<th>ISO</th>
<th>Euro Standard EN</th>
<th>Others</th>
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<tbody>
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<td>CCM® MicroMelt®</td>
<td>CoCr28Mo</td>
<td>CoCr28Mo</td>
<td>ASTM F1537 alloy 1</td>
<td>5832-12</td>
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<td>UNS R31537</td>
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Reference analysis

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<td>7.00</td>
<td>1.00</td>
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Execution, delivery form, standard sizes and availability

- Execution: round bars 3 m
- Standard sizes on stock: see delivery program
- Other sizes on request

Tolerances

- ISO h6 – h9
- Narrowest tolerances (down to +/- 0.002 mm) on request

Mechanical properties

Typical properties at room temperature:

- Tensile strength (UTS/Rm): Warm deformed condition up to 1400 MPa ≥ 1192 MPa
- Yield strength (R0.2): up to 1115 MPa ≥ 827 MPa
- Elongation 4D: up to 28 % ≥ 12%
- Reduction of area: up to 24%
- Hardness: up to 46 HRC ≥ 40HRC

Fatigue limit

- Fatigue limit: up to 895 MPa warm deformed condition

Heat treatment

- Solution annealing: 1075 – 1150 °C, 30 Min, air cooling, grain growth up to ASTM Nr 7, HRC 36-40 possible
- Warm deformation: 1120 – 1200 °C (grain growth!)

Density

- Density at 23°C: 8.29 g/cm³

Disclaimer: The information and data on this data sheet are informative only. They are not user instructions. The user of this material must define the application from case to case.
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Elastic physical properties
- Young modulus E:\ 241*10³ MPa
- Shear modulus G: 92.4*10³ MPa
- Poisson’s ratio: 0.300

Thermal physical properties
- Coefficient of expansion 20–100°C: 13.2*10⁻⁶ cm/cm/°C
- Thermal conductivity at 23°C: 12.66 W/m/K
- Specific heat at 23°C: 0.4439 kJ/kg/K

Cutting rates
- Turning HB < 260: Vc ~ 27.5 – 30.5 m/min, K30
- Turning HB 260 – 340: Vc ~ 21.5 – 27.5 m/min, K10-K30
- Turning HB > 340: Vc ~ 18.5 – 21.5 m/min, K10

Equivalence HRC vs Rm
- Rm (MPa) = (126 + (4.3 * (HRC - 25))) * 7.037
- UTS (ksi) = 126 + (4.3 * (HRC - 25))

Annealing curve

Grain size

ASTM No

More information

Technical Datasheet

The curves above have been established with given sections. They are only indicative. Their validities should be checked for each application, part design, size and risk of distortion. The diligent observance of the recommended temperature ranges helps to avoid the formation of cracks.

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