BÖHLER K137

# COLD WORK TOOL STEEL

| | | | |
|---|---|---|---|
| Standards | ~1.2379 | (DIN) | **Properties**<br>Dimensionally stable, ledeburitic 12% chromium steel with very good wear resistance and acceptable toughness. |
| | ~X153CrMoV12 | (EN) | |
| | ~D2 | (AISI) | |
| | SKD11 | (JIS) | **Application**<br>High-performance cutting tools (dies and punches), die-cutting tools, woodworking tools, shear knives for thin items, thread rolling tools. Drawing, deep drawing and extrusion press tools, pressing tools for the ceramic and pharmaceutical industry, cold rolling (work rolls) for multi-roll stands, gauges, smaller plastic molds, which require high wear resistance. |
| Delivery condition | annealed | | |

## Chemical Composition (%)

| C | Si | Mn | Cr | Mo | V |
|---|---|---|---|---|---|
| 1.50 | 0.25 | 0.45 | 12.00 | 1.00 | 0.35 |

## Material Characteristics

| | Wear resistance abrasive | Wear resistance adhesive | Toughness | Compressive strength | Dimensional stability during heat reatment |
|---|---|---|---|---|---|
| BÖHLER K137 | ★★★ | ★★ | ★ | ★★ | ★★★ |
| BÖHLER K100 | ★★★ | ★ | ★ | ★ | ★★ |
| BÖHLER K340 ISODUR® | ★★★ | ★★★★ | ★★★ | ★★★ | ★★★ |
| BÖHLER K353 | ★★ | ★★★ | ★★★★★ | ★★ | ★★ |
| BÖHLER K360 ISODUR® | ★★★★ | ★★★★ | ★★ | ★★★ | ★★★ |
| BÖHLER K390 MICROCLEAN® | ★★★★★ | ★★★★★ | ★★★★ | ★★★★ | ★★★★ |
| BÖHLER K490 MICROCLEAN® | ★★★★★ | ★★★★ | ★★★★★ | ★★★ | ★★★★ |
| BÖHLER K890 MICROCLEAN® | ★★★ | ★★★ | ★★★★★ | ★★★ | ★★★★ |

*) The evaluation of the characteristics refers only to the brands considered here.
Cross-comparisons with other reviews are discouraged due to different framework conditions.

## Heat Treatment

### Annealing

| | | |
|---|---|---|
| Temperature | 800 - 850 °C | Controlled slow oven cooling with 10 to 20°C/h up to approx. 600°C, further cooling in air.<br>Supplied hardness max.: 255 HB |

### Stress relieving

| | | |
|---|---|---|
| Temperature | 650 - 700 °C | Slow oven cooling.<br>For stress relief after extensive machining or at complicated tools.<br>Holding time after complete through heating 1 - 2 hours in neutral atmosphere. |

### Hardening

| | | |
|---|---|---|
| Temperature | 1030 °C | Difficultly shaped tools in air, simply shaped tools in compressed air, oil, hot bath or gas.<br>Holding time after complete soaking: 15 to 30 minutes. Achievable hardness: min. 58 HRC. |

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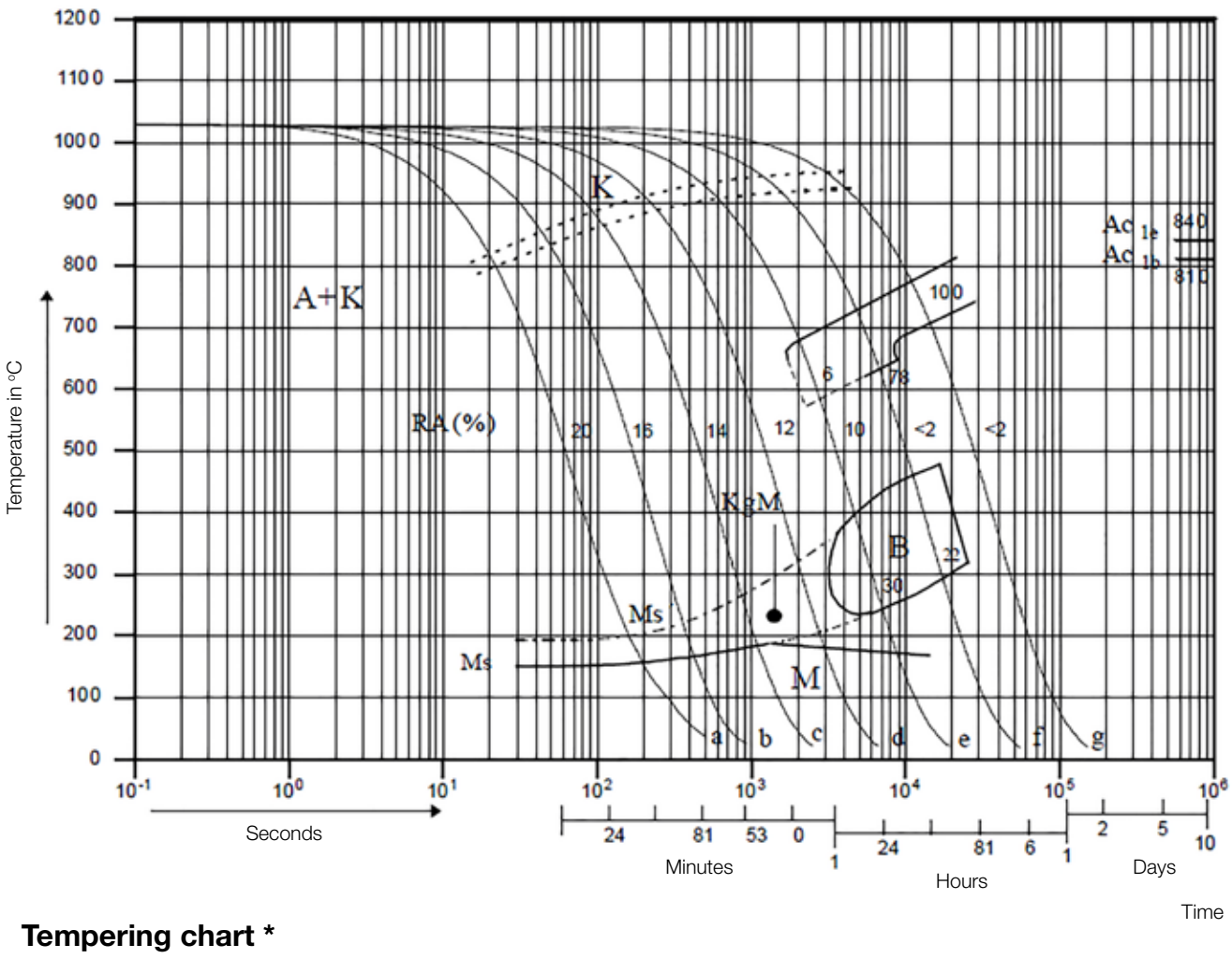
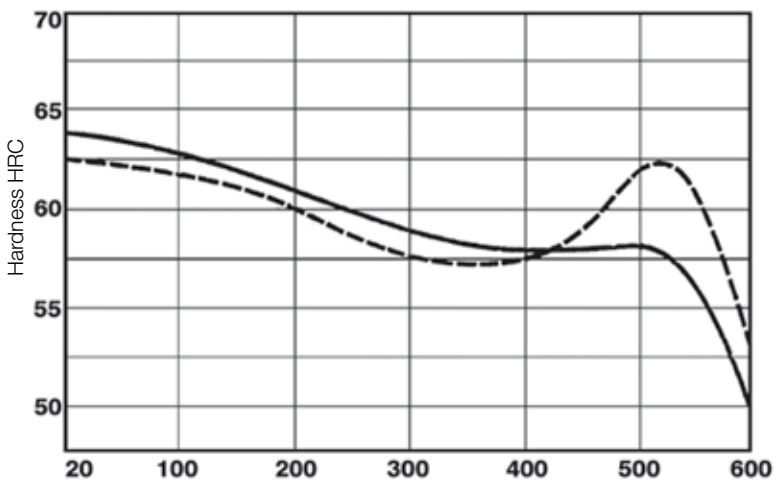
## Continuous cooling CCT curves




Austenitising temperature: 1030°C
Holding time: 30 minutes

## Tempering chart *




### Tempering

Slow heating to tempering temperature immediately after hardening/time in furnace 1 hour for each 20 mm of workpiece thickness but at least 2 hours/cooling in air.

Please refer to the tempering chart for obtainable hardness after tempering.

Tempering after the secondary hardness maximum is recommended.

### Hardening temperature

——— 1030 °C
– – – 1070 °C

## Physical properties at 20°C

| | | |
|---|---|---|
| Density | 7.67 | [kg/dm$^3$] |
| Thermal conductivity | 23.90 | [W/(m.K)] |
| Specific heat | 470 | [J/(kg.K)] |
| Spec. electrical resistance | 0.65 | [Ohm.mm$^2$/m] |
| Modulus of elasticity | 200 | [GPa] |

| Temperature [°C] | 100/212 | 200/392 | 300/572 | 400/752 | 500/932 | 600/1112 | 700/1292 |
|---|---|---|---|---|---|---|---|
| Thermal expansion [10$^{-6}$ m/(m.K)] | 11.0 | 11.4 | 11.9 | 12.2 | 12.7 | 12.8 | 12.1 |

***** Tempering chart and physical properties correspond to BOHLER K110 (D2, 1.2739)

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