

# ACEROS RÁPIDOS

## Formatos disponibles

Productos largos\*

Chapas

\* ) Presented data refer exclusively to long products. Please observe the detailed explanations at the end of the data sheet (pdf).

## Descripción

### BÖHLER S390 MICROCLEAN - "El decatleta"

Es un acero pulvimetalúrgico con muchas propiedades positivas de rendimiento. Si se trata de trépanos, machos de roscar, fresas, herramientas de brochado o aplicaciones de trabajo en frío, BÖHLER S390 MICROCLEAN siempre aporta el máximo rendimiento.

## Método de obtención

Pulvimetalurgia

## Propiedades

- > Dureza y Ductilidad : alto
- > Resistencia al desgaste : alto
- > Resistencia a la compresión : muy alta
- > Estabilidad de los bordes : muy alta
- > Afilabilidad : alto
- > Dureza en caliente (dureza roja) : muy alta

## Aplicaciones

- > Carreras automovilísticas
- > Puntas de brocas
- > Compactación de polvo
- > Herramientas de corte especiales
- > Pill punching dies
- > Broches y escariadores
- > Corte fino / Troquelado / Estampado
- > Laminación
- > Brocas helicoidales y grifos
- > Conformado en frío / acuñado
- > Talladura de engranajes, herramientas de rasurado y perfiladoras
- > Cizallas / Cuchillas
- > Componentes de desgaste

## Composición Química

C	Cr	Mo	V	W	Co
1,64	4,80	2,00	4,80	10,40	8,00

**Características**

	Resistencia a la compresión	Aptitud para el rectificado	Dureza en caliente	Tenacidad	Resistencia al desgaste	Retención del filo de la navaja
<b>BÖHLER S390</b> MICROCLEAN®	★★★★	★★★	★★★★	★★★★	★★★★	★★★★
<b>BÖHLER S290</b> MICROCLEAN®	★★★★★	★	★★★★	★★	★★★★★	★★★★
<b>BÖHLER S393</b> MICROCLEAN®	★★★★	★★★	★★★★	★★★★	★★★★	★★★★
<b>BÖHLER S590</b> MICROCLEAN®	★★★★	★★★	★★★★	★★★	★★★	★★★
<b>BÖHLER S690</b> MICROCLEAN®	★★★	★★★	★★	★★★★★	★★★	★★
<b>BÖHLER S790</b> MICROCLEAN®	★★★	★★★	★★	★★★★	★★	★★★
<b>BÖHLER S792</b> MICROCLEAN®	★★★	★★★	★★	★★★★	★★	★★★
<b>BÖHLER S793</b> MICROCLEAN®	★★★	★★★	★★★★	★★★	★★★	★★★

**Estado de suministro**

**recocido**

Dureza (HB)	máx. 320   drawn execution max. 320 HB
Resistencia a la tracción (N/mm²)	máx. 1.080

**Endurecido y templado**

Dureza (HRC)	64 a 68
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**Tratamiento térmico**

**Recocido**

Temperatura	870 a 900 °C	4 h, controlled slow cooling in furnace ( 10 to 20°C/h / (50 to 68°F/h) to 740°C/2h (1364°F/2 h) cooling in furnace,
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**Alivio de tensiones**

Temperatura	600 a 650 °C	Slow cooling in furnace.    To relieve stresses set up by extensive machining or in tools of intricate shape.    After through heating, hold in neutral atmosphere for 1 to 2 hours.
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**Temple y revenido**

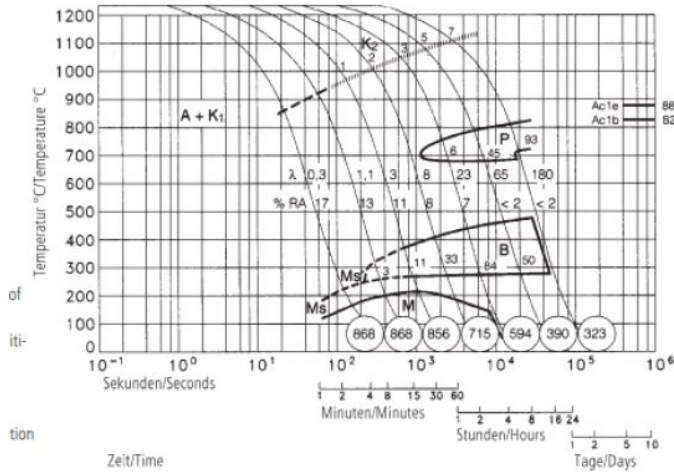
Temperatura	1.100 a 1.200 °C	Salt bath, vacuum    Preheating: 1st stage ~ 500 °C (930 °F), 2nd stage ~ 850 °C (1560 °F), 3rd stage ~1050 °C (1920 °F)    Austenitising: 1100 - 1200 °C (2010 °F - 2190 °F), holding time after complete heating 80 seconds, maximum 150 seconds, to avoid material damage due to overheating.    Quenching: oil, warm bath (500 - 550 °C (930 °F - 1020 °F)), gas
Temperatura	550 a 570 °C	Slow heating to tempering temperature immediately after austenitising.    Holding time in the furnace 1 hour per 20 mm material thickness (at least 1 hour)    Slow cooling to room temperature between each tempering step    3 tempering cycles recommended    Hardness see tempering chart

**Continuous cooling CCT curves**

Austenitising temperature: 1230°C  
Haltedauer: 180 Sekunden

Austenitising temperature: 1230°C (2246°F)  
Holding time: 180 seconds

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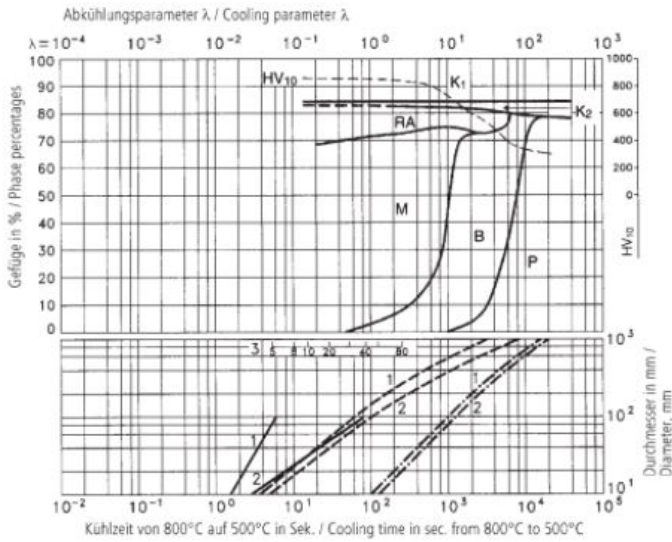


A....Austenite  
B....Bainite  
K....Carbide  
P....Pearlite  
M....Martensite  
RA...Retained Austenite

**Quantitative phase diagram**

Austenitising temperature: 1230°C  
Haltedauer: 180 Sekunden

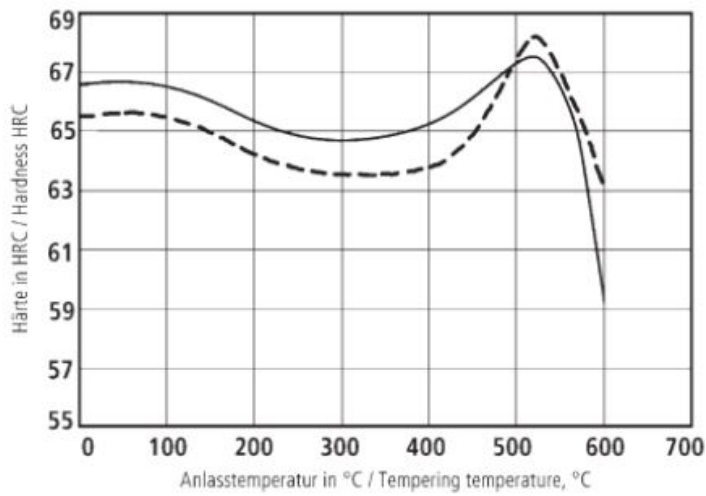
Austenitising temperature: 1230°C (2246°F)  
Holding time: 180 seconds



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1....Edge or Face  
2....Core  
3....Jominy test: distance from quenched end

### Tempering Chart



Holdingtime 3x2 hours

Specimensize: square 25mm

Austenitising in saltbath

Hardeningtemperature:

— 1150°C (2102°F)

- - - - - 1210°C (2210°F)

### Propiedades físicas

Temperatura (°C)	20
Densidad (kg/dm <sup>3</sup> )	8,1
Conductividad térmica (W/(m.K))	17
Calor específico (kJ/kg K)	0,42
Resistencia eléctrica específica (Ohm.mm <sup>2</sup> /m)	0,61
Módulo de elasticidad (10 <sup>3</sup> N/mm <sup>2</sup> )	231

## Expansión térmica

Temperatura (°C)	100	200	300	400	500	600	700
Expansión térmica (10 <sup>-6</sup> m/(m.K))	10	10,5	10,8	11,2	11,3	11,4	11,6

**Long Products:** For additional specifications and technical requirements, please contact our regional voestalpine BÖHLER sales companies.

**Sheet & Plates:** Product Variant may differ in terms of melting process, technical data, delivery, and surface condition as well as available product dimensions. Please contact voestalpine BÖHLER Bleche GmbH & Co KG.

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