

# CASE HARDENING STEELS

## Available Product Shapes

Long Products

## Product Description

Large and medium sized-moulds with intricate cavities.

## Properties

- > Toughness & Ductility: high
- > Wear Resistance: high
- > Machinability: good
- > Dimensional stability: very high
- > polishability: high

## Applications

- > Automotive Racing
- > Automotive

## Technical data

Material designation	
1.2764	SEL
X19NiCrMo4	EN

## Chemical composition (wt. %)

C	Si	Mn	Cr	Mo	Ni
0.19	0.25	0.3	1.3	0.2	4.1

## Delivery condition

### Annealed

Hardness	max. 250 HB
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## Heat treatment

### Case hardening

Temperature (°C   °F)	900   1652 to 950   1742	Oil, (water), salt bath (320 - 482°F / 160 - 250°C), air. Quite on principle, water cooling only for large size parts of simple shape.
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### Hardening and Tempering

Temperature (°C   °F)	800   1472 to 830   1526	Oil, (water), salt bath (410 - 482°F / 160 - 250°C), air. After hardening: tempering at 338 to 410°F (170 to 210°C) Achievable Core strength: 1200 - 1500 MPa / 174 - 217 ksi (oil or salt bath hardening); 1100 - 1300 MPa / 160 - 189 ksi (air).
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## Physical Properties at 20°C / 68°F

Density	7.85   0.28	[kg/dm <sup>3</sup>   lb/in <sup>3</sup> ]
Thermal conductivity	34   19.64	[W/(m.K)   BTU (IT) ft/hr/ft <sup>2</sup> /F]
Specific heat	460   109.87	[J/(kg.K)   BTU (IT) lb/F]
Spec. electrical resistance	0.2   0.95	[Ohm.mm <sup>2</sup> /m   10 <sup>-4</sup> Ohm.inch <sup>2</sup> /ft]
Modulus of elasticity	210   30.46	[10 <sup>3</sup> N/mm <sup>2</sup>   10 <sup>3</sup> ksi]

## Thermal Expansions

Temperature (°C   °F)	100   212	200   392	300   572	400   752	500   932	600   1112
Thermal expansion (10 <sup>-6</sup> m/(m.K)   10 <sup>-6</sup> inch/(inch.F))	11.1   6.167	12.1   6.722	12.9   7.167	13.5   7.5	13.9   7.722	14.1   7.833

For more information see [www.voestalpine.com/boehler-edelstahl](http://www.voestalpine.com/boehler-edelstahl)

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ONE STEP AHEAD.