

# 16NiCrS4 +HL All

## General Information

### M-Steel®

The concept: Our M-Steel treatment can be applied to any steel grade. The basis for the concept is that non-metallic inclusions are modified and controlled with calcium treatment. These inclusions are modified in a way to maximize machinability and to improve transverse fatigue strength. In this way, a protective layer is formed on the cutting tool during machining that very significantly reduces the wear on the tool and increases the tool life. At every stage of the M-Steel production process the material is optimised to improve machinability, from raw material through melt, to casting, hot rolling and the final heat treatment. Individual delivery requirements can be met to supply your material in the best form for your machines in compliance with tight straightness and dimensional tolerances. M-Steel has a consistent machinability from cast to cast, meaning that machines can be run with fixed high cutting rates and predictable tool change intervals from one production run to another. Recent findings also show that the M-Steel effect is particularly pronounced in turning in very hard condition using Cubic Boron Nitride (CBN) inserts. Replacing traditional grinding of case- or induction-hardened surfaces with Hard Part Turning can mean very large cost savings, together with production lead time and quality improvements.

## Similar designations

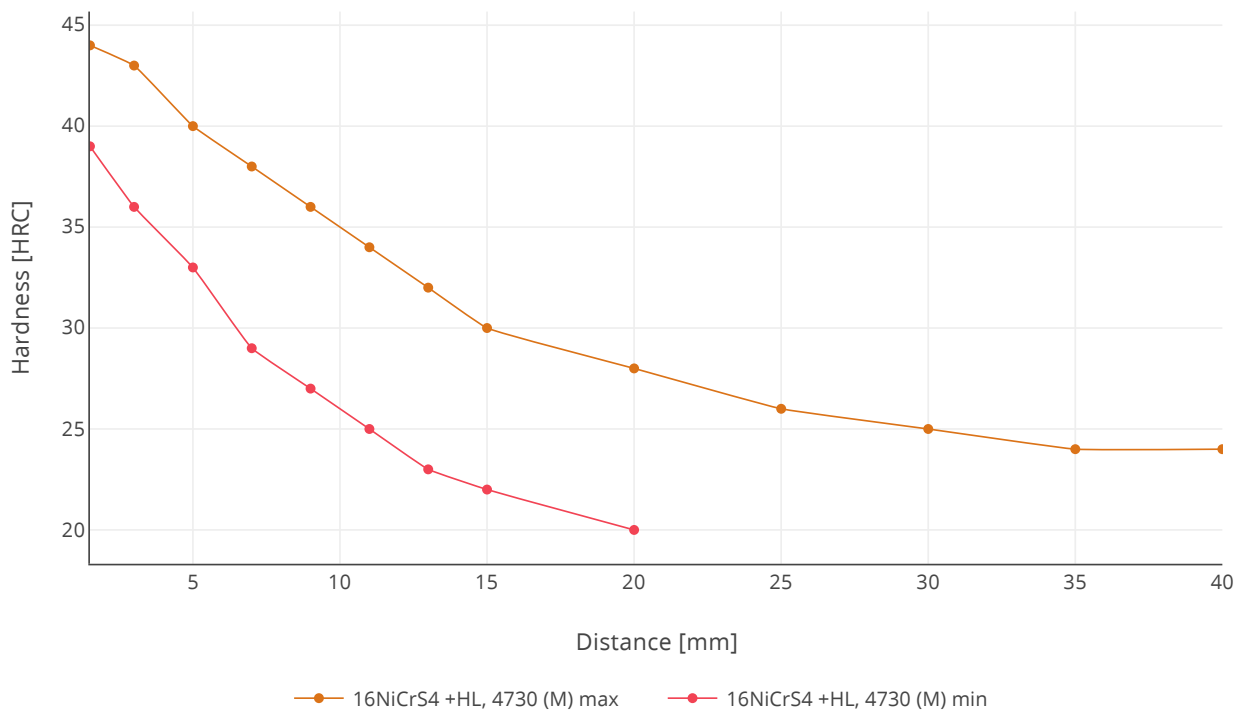
SS 2511 M, BS 637M17 M, 16NC6 (AFNOR)

## Transformation temperatures

	Temperature °C
MS	409
AC1	725
AC3	835

## Heat treatment recommendations

Treatment	Condition <sup>i</sup>	Temperature cycle	Cooling/quenching
Hot forging	+AR	Forging temperature 800 - 1200°C	Cooling still air
Normalizing	+N	Soaking at 860 - 890°C	Allow to cool in draught-free air
Soft annealing	+A	Soaking at 600 - 670°C for 2 hrs	In draught-free air or in furnace
Carburizing	+Q	Carburizing at 850 - 930°C Carburizing temperature must be adjusted to suit carburizing agent and required depth of case	Quenching from 780 - 830°C in oil
Tempering	+QT	Tempering at 160 - 200°C for min 1 h to obtain a surface hardness of 58 - 63 HRC, with a case depth of min 0.5 mm	



### Other properties (typical values)

Youngs module (GPa)	Poisson's ratio (-)	Shear module (GPa)	Density (kg/m3)
210	0.3	80	7800
Average CTE 20-300°C (µm/m°K)	Specific heat capacity 50/100°C (J/kg°K)	Thermal conductivity Ambient temperature (W/m°K)	Electrical resistivity Ambient temperature (µΩm)
12	460 - 480	40 - 45	0.20 - 0.25

### Contact us

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