Kuhn Special Steel

Reliable solutions. Always.

Centrifugally-cast alloy
G-NiCr60 (K6040)

Not just for today's high-performance engines: valve seat rings made of K6040

Thanks to its hardness and resistance to corrosion, our material withstands the toughest challenges that valve seat rings can encounter in an engine operating under these conditions

Large engines are set to become even more efficient over the coming years. This will be thanks to such factors as increased temperatures and/or higher pressures in the combustion chamber. However, many of the materials currently in use are not designed to handle this type of load.

The International Maritime Organisation (IMO) has meanwhile issued guidelines that impose stricter limits on certain harmful emissions, particularly in emission control areas (ECAs) such as the North Sea and Baltic.

For this reason, engine manufacturers are being forced to develop large diesel units that can run on alternative liquid natural gas (LNG) fuel.

Reductions in the sulphur content of fuel are cutting emissions of sulphur dioxide, but also leading to increased engine wear, as moving parts no longer benefit from the lubricating effect of sulphur in the combustion chamber.

Against this background, centrifugally-cast material K6040 from Kuhn Special Steel is an outstanding choice. This product has been successfully proving itself for more than ten years, as a material for valve seat rings fitted to engines operating under tough conditions.

Hardness of up to 46 HRC makes this material an ideal partner for use in tribosystems, valve discs and valve seat rings. The outstanding corrosion resistance of material K6040 helps it to withstand the fumes normally found in the combustion chamber, and also the wet corrosion caused by condensate accumulating outside it.

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Data sheet G-NiCr60 (K6040)

Heat-resistant cast alloy

KUHN-designation

K6040

Standard

Kuhn Special Steel specification

Chemical composition

C	Ni	Cr	Si	Mn
< 0.1	residual	55–57	< 0.6	< 0.5

As-delivered condition

Hardened

Microstructure

Austenite with intermetallic phases

Achievable hardness-grades

hardness HB	hardness HV	hardness HRC
380–460	420–500	39–46

Mechanical properties at high temperature (measured values)

T	0.2 % yield strength	tensile strength
300 °C	795 MPa	880 MPa
400 °C	790 MPa	870 MPa
500 °C	785 MPa	850 MPa
600 °C	770 MPa	830 MPa
700 °C	690 MPa	780 MPa

Maximum working temperature in air

1050 °C

Physical properties at 20 °C (measured values)

T	thermal expansion coefficient α_{th} [1 / K]	thermal conductivity κ [W / (K × m)]	thermal capacity c_p [J / (kg × K)]	density kg / dm³
20–200 °C	10.9×10^{-6}	22.8	480	7.65
20–300 °C	11.6×10^{-6}	24.2	495	7.65
20–400 °C	11.9×10^{-6}	25.6	510	7.65
20–500 °C	12.7×10^{-6}	26.9	525	7.65
20–600 °C	12.9×10^{-6}	28.9	555	7.65
20–700 °C	13.6×10^{-6}	31.1	585	7.65

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