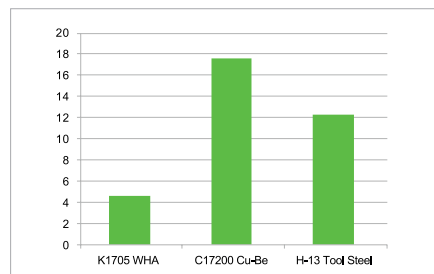


Tungsten Alloys for Die Casting Applications

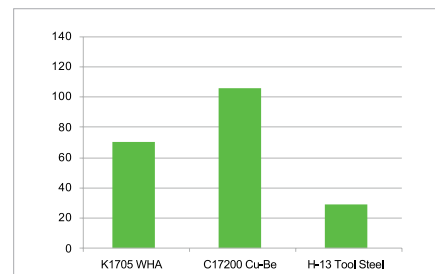
Advantages:

- Good thermal fatigue resistance due to high thermal conductivity and low coefficient of expansion
- Longer tool and die life
- Less down time
- Readily machined
- Additional cooling due to high thermal conductivity
- High resistance to die soldering and chemical erosion due to lower reactivity in molten aluminum
- No heat treatment necessary
- Lower price per casting
- Better equipment utilization
- Fewer casting rejects
- Better surface finish on cast parts

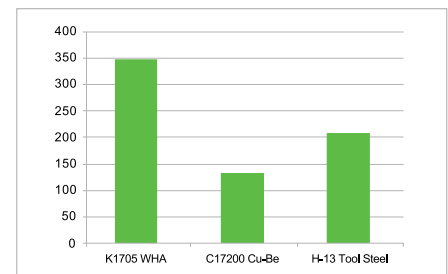
Coefficient of Thermal Expansion (ppm/°K)



Thermal Conductivity (W/m°K)



Elastic Modulus (GPa)



Enhanced Quality and Cost Performance with Tungsten Alloys

H.C. Starck Solutions' tungsten alloys provide superior material properties compared to conventional tool steel, ultimately resulting in lower machine downtime, reliably high casting quality, and shorter cycle times. Using inserts made from tungsten alloys improves the tool's resistance to heat checking and wear and ensures a smooth part release since die soldering is virtually eliminated. Through improved thermal management the risk of hot tearing can be lowered, and a higher net thermal conductivity allows for faster solidification and less external cooling.

TYPICAL PROPERTIES

Density
17.3 ± 0.2 g/cm ³

Hardness [HRC RT]	26-34
Hot Hardness [HV 10]	
at 300 °C	>220
at 600 °C	>190
at 800 °C	>120

Coef. of Expansion [10 ⁻⁶ /K]	
[20-100 °C]	4.5
[20-400 °C]	5.2
[20-600 °C]	5.4
[20-800 °C]	5.7

Thermal Conductivity [W/mK]	128
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Ult. Tensile Strength [MPa]	
at 540 °C	>700
at 650 °C	>650
at 815 °C	>450
at 1095 °C	>200

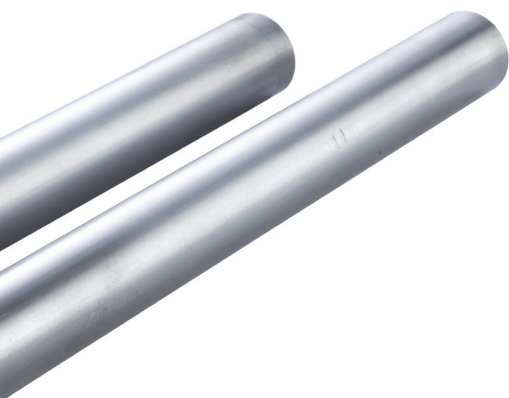
Yield Strength [R..MPa]	>800
at 300 °C	>220
at 600 °C	>190
at 800 °C	>120

Elastic Modulus [GPa]	338
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Elongation [% RT]	7
at 540 °C	8
at 650 °C	10
at 815 °C	6.5
at 1095 °C	4

Bending	
Mod of Rupture [MPa RT]	1520

Impact	7
Charpy V-notched [J]	3
Charpy unnotched [J]	23



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The values in this publication are typical values and do not constitute a specification.

USA

H.C. Starck Inc.
21801 Tungsten Road
Euclid, OH 44117-1117 USA
T +1 216 692 3990
F +1 216 692 0029

Germany

H.C. Starck Hermsdorf GmbH
Robert-Friese-Straße 4
Hermsdorf, Germany 07629
T +49 36601 922 0
F +49 36601 922 111

info@hcstarcksolutions.com
www.hcstarcksolutions.com