



Powder metallurgy HSS

T15 PM

CHEMICAL COMPOSITION

C	Cr	Mo	W	Co	V
1.55	4.0	-	12	5.0	5.0

STANDARDS

- USA: AISI T15
- Europe: HS 12-0-5-5
- Germany: W.Nr.1.3202

DELIVERY HARDNESS

Soft annealed max. 280 HB
 Cold drawn max. 300 HB

DESCRIPTION

T15 PM is a high tungsten alloy grade for high performance cutting tools.

APPLICATIONS

- Endmills
- Hobs
- Shaper cutters
- Broaches

FORM SUPPLIED

- Coils
- Round bars
- Forged blanks
- Flat & square bars

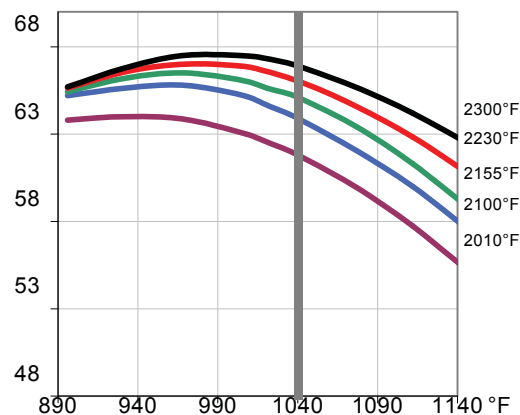
Available surface conditions: drawn, centerless-ground, hot-worked, peeled, rough-machined, cold rolled, hot rolled.

HEAT TREATMENT

- Soft annealing in a protective atmosphere at 1560-1650°F for 3 hours, followed by slow cooling at 20°F/h down to 1290°F, then air cooling.
- Stress-relieving at 1110°F to 1290°F for approximately 2 hours, slow cooling down to 930°F.
- Hardening in a protective atmosphere with pre-heating in 2 steps at 840-930°F and 1560-1650°F and austenitising at a temperature suitable for chosen working hardness. Cooling down to 100-120°F.
- Tempering at 1040°F three times for at least 1 hour each time. Cooling to room temperature (77°F) between temperings.

GUIDELINES FOR HARDENING

HRC



Tempering temperature
 Hardness after hardening, quenching and tempering 3x1 hour

PROCESSING

T15 PM can be worked as follows:

- machining (grinding, turning, milling)
- polishing
- plastic forming
- electrical discharge machining
- welding (special procedure including preheating and filler materials of base material composition).



GRINDING

During grinding, local heating of the surface, which may alter the temper, must be avoided. Grinding wheel manufacturers can furnish advice on the choice of grinding wheels.

SURFACE TREATMENT

The steel grade is a good substrate material for PVD and CVD coating. If nitriding is requested a small zone of 2-15 μm is recommended. The steel grade can also be steam-tempered if so desired.

PROPERTIES

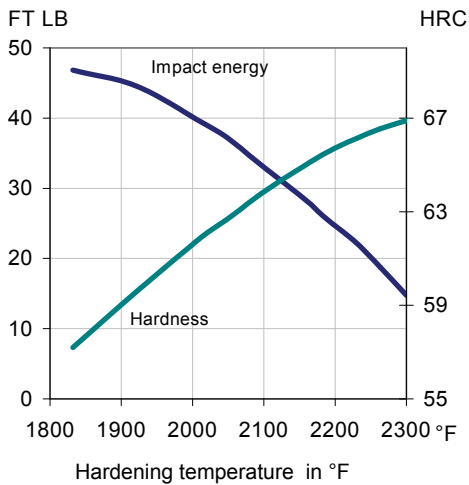
PHYSICAL PROPERTIES

		Temperature		
		70°F	750°F	1110°F
Density	lb/in ³ (1)	0.30	0.29	0.29
Modulus of elasticity	psi (2)	3.6x10 ⁷	3.6x10 ⁷	2.8x10 ⁷
Thermal expansion ratio	per °F (2)	-	6.2x10 ⁻⁶	6.5x10 ⁻⁶

(1)=Soft annealed

(2)=Hardened 2155°F and tempered 1040°F, 3x1 hour

IMPACT STRENGTH

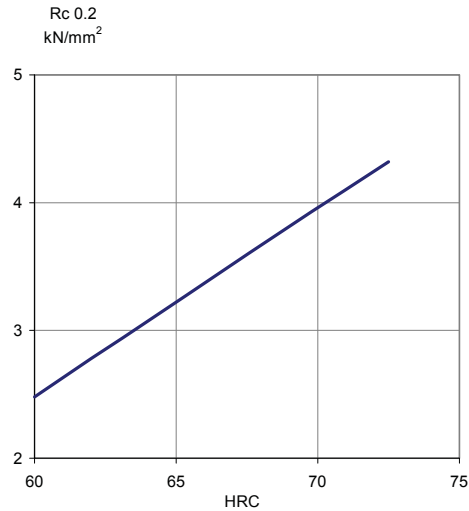


Original dimension 1/3x1/2 mm

Tempering 3 x 1 hour at 1040°F

Unnotched test piece 9/32 x 13/32 x 25/32 inch

COMPRESSION YIELD STRESS



Test piece : hour glass with 2/5 inch Ø waist

COMPARATIVE PROPERTIES

