

PM-HIP HIGH SPEED STEEL	MATERIAL DATASHEET	M3 class 2
	APM 2723	UNS T11323
		-
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GENERAL

The material is classified as high-speed steel for cold working tool applications. The steel is alloyed with chromium, tungsten, vanadium and molybdenum to achieve an excellent combination of wear resistance, strength and toughness at high cutting speeds. It has good dimensional stability during quenching and tempering.

The steel is manufactured through Powder Metallurgy (PM) and Hot Isostatic Pressing (HIP) technology. It has superior material properties and cost advantages than conventionally processed materials.

Typical advantages of PM-HIP technology are as follows:

- Isotropic mechanical properties in all directions and independent of section thickness.
- Homogeneous fine grain size.
- Fine precipitates
- No segregation or flow lines.
- Narrow scatter band of mechanical properties.
- Freedom from macro-inclusions.
- Low levels of micro-inclusions.
- Ultrasonic inspectability.

APPLICATIONS

Typical applications: Cutting tools for turning, drilling and milling operations, wear parts and cold work tooling applications.

AVAILABLE FORMS

Blocks, solid bars and hollow sections.

CHEMICAL COMPOSITION

ELEMENTS wt %	Fe	C	Cr	Mo	V	W	N
Typical	Bal.	1,28	4	5	3	6,2	0,06

FREEDOM FROM INCLUSIONS

MACRO-INCLUSIONS	MICRO-INCLUSIONS	TEST STANDARD
No Presence	K1 < 3	DIN 50602

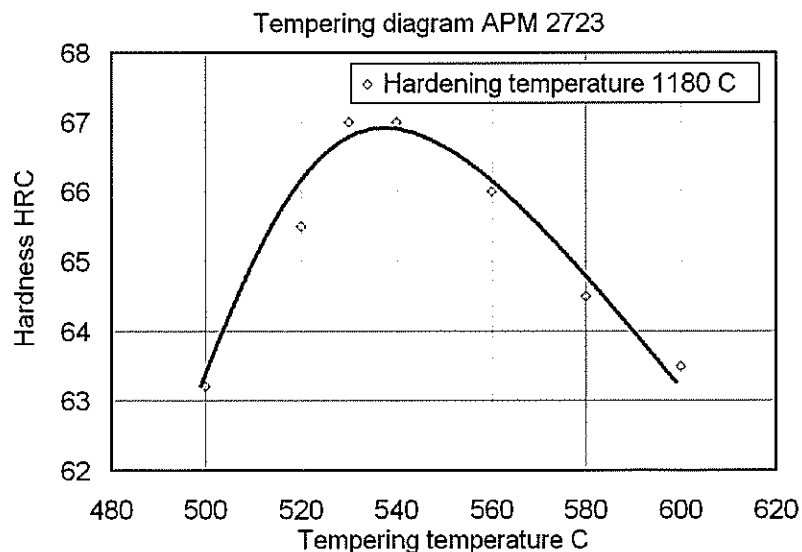
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MECHANICAL PROPERTIES

CONDITION	HARDNESS
As quenched & tempered	60-68 HRC
As soft annealed	Max 280 HB

HEAT TREATMENT GUIDELINES

- Soft annealing:** Recommended after hot working.
Slow heating to 850-900 °C for min 4 hours, furnace cooling at 10 °C/hour down to 700 °C, following by cooling in air to room temperature.
- Stress-relief Annealing:** Recommended after rough machining.
Slow heating to 600-700 °C. Holding time 1-2 hours following by slow cooling in furnace to room temperature.
- Hardening:** Preheat to 450-500 °C and then heating in a salt bath to 850-900 °C. Hold for 30 minutes to achieve uniform temperature throughout the work piece, following by rapid quenching in salt bath maintained at 550 °C then cooling in air.
- Tempering:** Directly after hardening, the work piece shall be tempered 3 times at temperature 500-600 °C with hold for 2 hours. It is necessary to cool down to room temperature after each tempering.



FURTHER INFORMATION

For more information please contact technical customer service at Bodycote Hot Isostatic Pressing AB.