DATA SHEET

LATROBE SPECIALTY STEEL COMPANY
Latrobe, PA 15650-0031 USA

Issue 1

Crucible Industries CPM® 4V® Powder Metal Tool Steel

LATROBE SPECIALTY STEEL your source for all Crucible CPM products

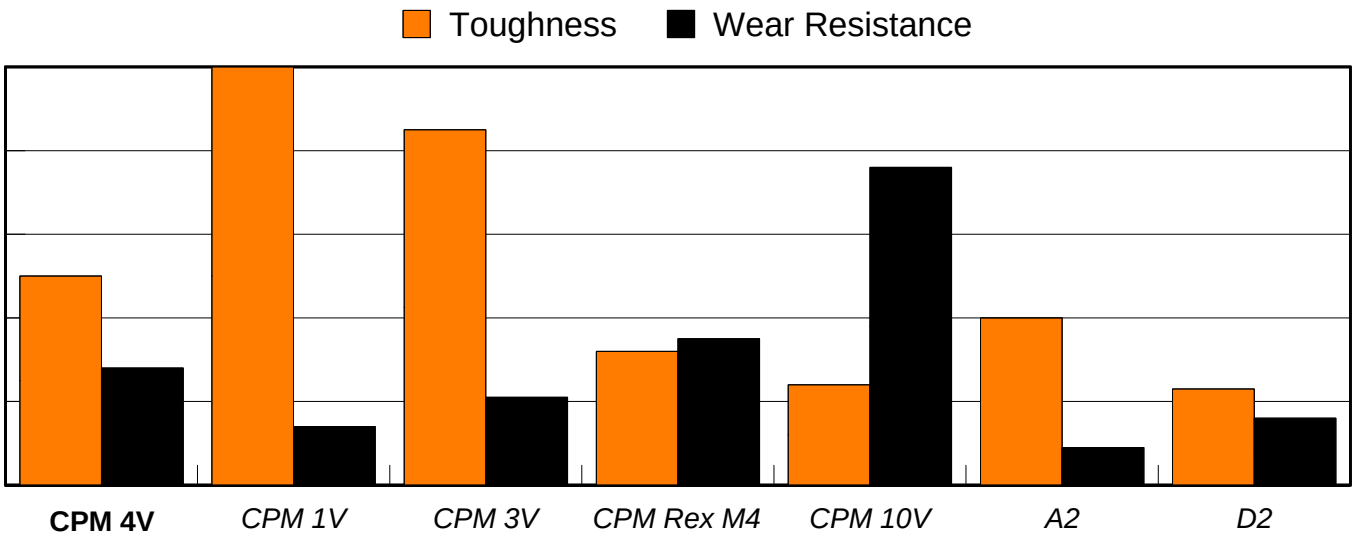
Typical Composition

C	Mn	Si	Cr	Mo	V
1.35	0.40	0.80	5.0	2.95	3.85

CPM 4V is a powder metal tool steel with an outstanding combination of properties including high impact toughness and very good wear resistance. CPM 4V should be considered for service in fine blanking, powder compaction tools, for processing high-strength low-alloy (HSLA) steels, advanced high-strength steels (AHSS) and applications where a combination of strength , wear resistance and toughness is required.
CPM 4V should be considered for applications where a higher attainable hardness and additional abrasion resistance is required than can be offered by CPM 3V.

CPM 4V chemistry from Latrobe patent (Koncor) 2,949,356
CPM 4V performance achieved from Crucible patents 3,809,541(CPM) and 5,830,287(CPM 3V)

Relative Properties



Physical Properties

Density: 0.278 lb/in^3 (7700 kg/m^3)
Specific Heat: 0.11 Btu/lb/ºF (460 J/kg°C)
Modulus of Elasticity: 30x10^6 psi (207 GPa)

Machinability: 50-60% of a 1% carbon steel

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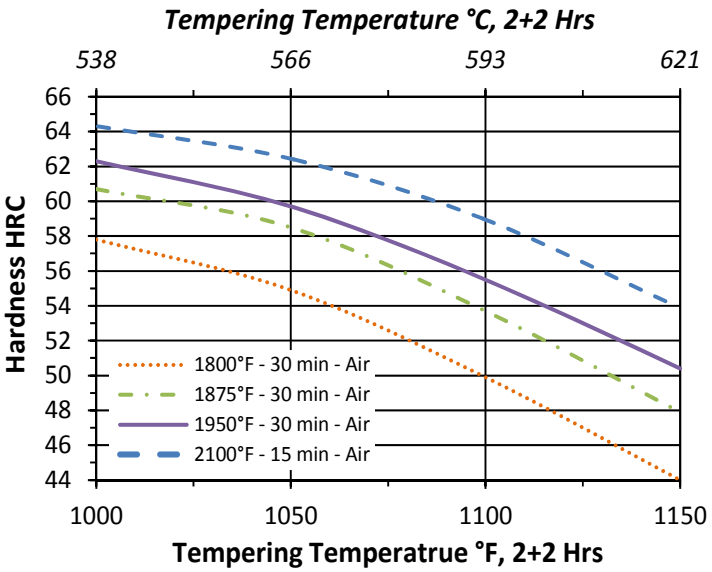
HEAT TREATING INSTRUCTIONS

HARDENING:
Preheating: 1500-1550°F (816-845°C), equalize.
Austenitizing (High Heat): Heat rapidly from the preheat.
For Maximum Wear Resistance:
Furnace or Salt Bath: 2100°F (1149°C)
Soak for 15 minutes at temperature
For Balanced Wear & Toughness:
Furnace or Salt Bath: 1875-1950°F (1024-1065°C)
Soak for 30 minutes at temperature
For Maximum Toughness:
Furnace or Salt Bath: 1800°F (982°C)
Soak for 30 minutes at temperature
Quenching: Air, pressurized gas, warm oil, or salt.
For pressurized gas, the furnace should have a minimum quench pressure of 4 bars.
For oil, quench until black, about 900°F (482°C), then cool in still air to 150-125°F (66-51°C).
For salt maintained at 1000-1100°F (538-593°C), equalize in the salt, then cool in still air to 150-125°F (66-51°C).
Tempering: *Temper immediately after quenching*. Typical temperature range is 1000-1100°F (538-593°C). Do not temper below 1000°F (538°C). Hold at temperature for 1 hour per inch if thickness, 2 hours minimum, then air cool to ambient temperature. Double tempering is required.

ANNEALING:
Annealing must be performed after hot working and before rehardening.
Heat at a rate not exceeding 400°F per hour (222°C per hour) to 1600-1650°F (871-899°C), and hold at temperature for 1 hour per inch of maximum thickness; 2 hours minimum. Then cool slowly with the furnace at a rate not exceeding 50°F per hour (28°C per hour) to 1000°F (649°C). Continue cooling to ambient temperature in the furnace or in air. The resultant hardness should be approximately 241 HBW.

HEAT TREATMENT RESPONSE

As Air Cooled from	HRC
1800°F (982°C), 30 minutes	62.5
1875°F (1024°C), 30 minutes	63.5
1950°F (1065°C), 30 minutes	64.5
2100°F (1149°C), 15 minutes	64.0



Grade	Austenitize [1] °F	°C	HRC	Impact [2] ft-lbs	Joules
CPM 4V	1800	982	58	55	75
CPM 4V	1950	1066	60	50	68
CPM 4V	1950	1066	62	36	49
CPM 3V	1875	1024	58	85	115
CPM 3V	1950	1066	60	70	95
CPM 3V	2050	1121	62	40	54
CPM 10V	1950	1066	59	26	35
CPM 10V	2050	1121	61	23	31
CPM M4	2050	1121	62	32	43
D2	1850	1010	60	23	31
A2	1775	954	60	41	56

1: Austenitized as indicated and tempered to hardness

2: Charpy C-Notch Impact Test

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Crucible Industries

The data presented herein are typical values, and do not warrant suitability for any specific application or use of this material. Normal variations in the chemical composition, the size of the product, and heat treatment parameters may result in different values for the various physical and mechanical properties.

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