

# DATA SHEET

## CPM 4V

Typical Composition					
C	Mn	Si	Cr	Mo	V
1.35	0.40	.80	5.0	2.95	3.85

**CPM 4V**, made by the Crucible Particle Metallurgy process, is a powder tool steel designed as an upgrade for **CPM 3V** for the blanking and advanced high strength steel applications. Crucible's primary goal was to design an alloy with high impact toughness and more wear resistance than currently available with **CPM 3V**. Knife makers have often regarded **CPM 3V** as a great heavy duty knife material and **CPM 4V** will be an improvement for those who need more wear resistance. Intended to be used at HRC 62-64. **CPM 4V** should be used in **CPM 3V** applications that require more wear resistance.

The *typical applications* of **CPM 4V** are powder compaction tooling, fine blanking tools, stamping or forming tools, and advanced high strength steel applications.

### Mechanical Properties

#### Impact Toughness

The CPM microstructure gives 4V its high impact toughness which approaches that of the shock-resistant tool steels.

#### Relative Mechanical Properties

The combination of wear resistance and toughness of CPM 4V makes it an excellent alternative to some other tool steel due to its high impact toughness and high range of wear resistance.

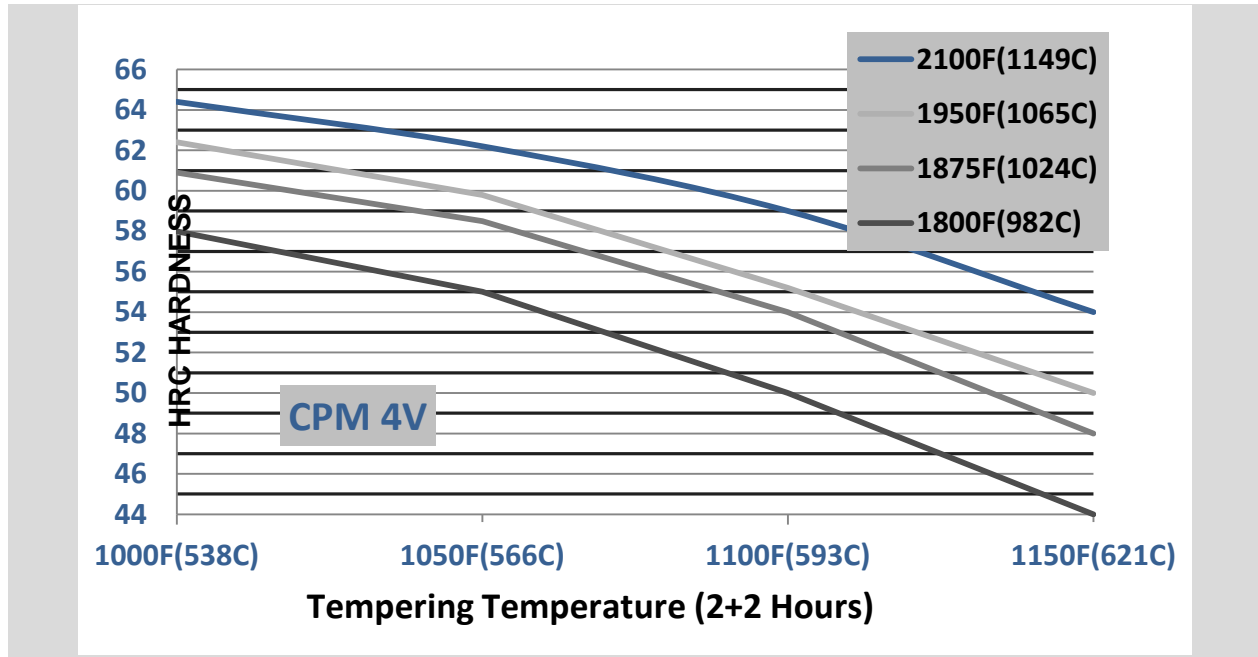
### Heat Treat Response

Tempering Temp Minimum Time	HRC Hardness			
	Austenitizing Temperature			
	1800°F (982°C)	1875°F (1024°C)	1950°F (1065°C)	2100°F (1149°C)
30 Min	30 Min	30 Min	30 Min	15 Min
1000°F (540°C)	58	61	62.5	64.5
1050°F (565°C)	55	58.5	59.5	63
1100°F (593°C)	50	54	55.5	59
1150°F (621°C)	44	48	50	54
Minimum Tempers	2	2	2	2

This data sheet is for informational purposes only. Alloy characteristics are subject to change due to chemical composition and/or processing. We do not certify the material's suitability for specific applications.



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## Thermal Treatments

### Hardening

**Preheat:** Heat to 1500-1550°F (816-845°C), equalize.

**Austenitize:** Following preheat heat material rapidly.

**Quench:** Air or positive pressure quench (4 bar minimum), or oil quench (black) to about 900°F (482°C), then air cool to 150°F - 125°F (66°C - 51°C). Salt bath treatment, if practical, will ensure the maximum attainable toughness for a given hardening treatment. Salt quench at 1000°F-1100°F (538°C-593°C), equalize, then air cool to 150°F-125°F (66°C-51°C).

**Temper:** Immediately after quenching, temper three times (two times minimum) at 1000-1100°F (538-593°C). Hold at temperature for 1 hour per inch of thickness, 2 hours minimum, then air cool. Do not temper below 1000°F (538°C).

**Recommended Heat Treatment:** For the best combination of toughness and wear resistance, austenitize (furnace or salt bath) at 1875-1950°F (1024-1065°C), soak 30 minutes, and quench. Temper 3 times at 1000°F (538°C). For maximum wear resistance austenitize (furnace or salt bath) at 2100°F (1149°C), soak 15 minutes, and quench. For maximum toughness austenitize (furnace or salt bath) at 1800°F (982°C), soak 30 minutes, and quench.

**Aim hardness:** HRC 62-64 higher austenitizing temperatures can be used to obtain higher hardness, at a slight decrease in impact resistance. The lower austenitizing temperatures provide the best impact toughness.

### Annealing

Annealing must be performed after hot working and before rehardening. Heat at a rate no higher than 400°F (222°C) per hour to 1600-1650°F (871-899°C). Hold at temperature for 1 hour per inch of thickness, 2 hours minimum. Cool slowly with the furnace at a rate no higher than 50°F (28°C) to 1000°F (649°C), until cooled to ambient temperature, in the furnace or in air.

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