DATA SHEET

CPM® 15V®

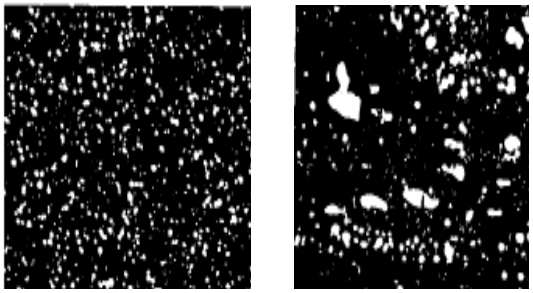
Typical Composition

C	Mn	Si	Cr	Mo	V
3.40	0.50	0.90	5.25	1.30	14.50

CPM® 15V® is intended for applications requiring exceptional wear resistance. It has more vanadium carbides in its microstructure than CPM® 10V® and provides more wear resistance and longer tool life in those applications where 10V® has proven to be successful. CPM® 15V® also offers an alternative to solid carbide where carbide fails by fracture or where intricate tool design makes carbide difficult or risky to fabricate.

The CPM® (Crucible® Particle Metallurgy) process produces very homogeneous, high quality steel characterized by superior dimensional stability, grindability, and toughness compared to steels produced by conventional processes.

The *typical applications* of CPM® 15V® include Powder Compactions Tooling: Dies and Core Rods, Plastic processing Equipment: Barrel Lines and Screw Tips, Industrial Knives: Granulator Blades, Slitter Knives, and Dies/Punches for Cold Work (Forming, Extrusion, Drawing, and Piercing), Woodworking Tools, Ceramic Dies, and Wear Parts.



CPM® STEEL Conventional Steel

Wear Resistance

With it's nearly 15% vanadium content, CPM® 15V® has the highest wear resistance of any cold work tool steel available today.

Impact Toughness

The CPM® process makes possible the production of high vanadium grades without sacrificing toughness. For example, although both CPM® 10V® and CPM® 15V® have significantly higher wear resistance than the conventional high vanadium tool steel D7, they also offer greater toughness.

DATA SHEET

Thermal Treatments

Critical Temperature: 1540°F (838°C).
Forging: 2000-2100°F (1095-1150°C) Do not forge below 1700°F (930°C). Slow cool.
Annealing: Heat to 1600°F (870°C), hold 2 hours. Slow cool no faster than 30°F (15°C) per hour to 1000°F (540°C), then furnace cool or cool in still air to room temperature.
Annealed Hardness: About BHN 255-277

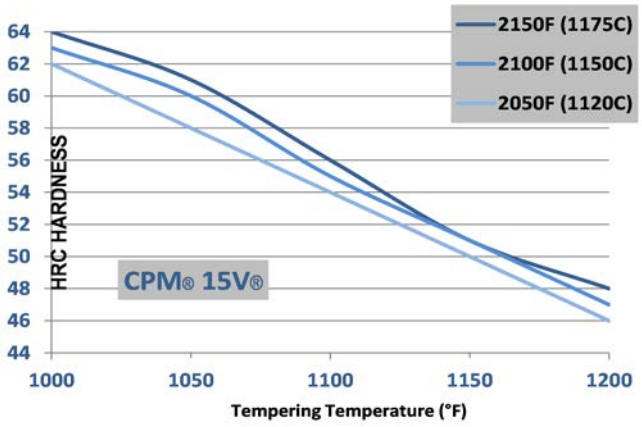
Stress Relieving
Annealed Parts: Heat to 1100-1300°F (595-705°C), hold 2 hours, then furnace cool or cool in still air.
Hardened Parts: Heat to 25-50°F (15-30°C) below original tempering temperature, hold 2 hours, then furnace color cool in still air.

Hardening
Preheat: Heat to 1500-1550°F (815-845°C), Equalize. A second pre-heat stage at 1850-1900°F (1010-1040°C) is suggested for vacuum or atmosphere hardening.
Austenitize: 1950-2150°F (1065-1175°C), hold time at temperature 20-30 minutes.
Quench: Air or positive pressure quench (2 bar minimum) to below 125°F (50°C), or salt or interrupted oil quench to about 1000°F (540°C), then air cool to below 125°F (50°C). Salt bath treatment, if practical, will ensure the maximum attainable toughness for a given hardening treatment.
Temper: Two times at 1000°F (540°C), 2 hrs. minimum each time. Temper three times for hardening temperatures over 2100°F (1150°C).
Size Change: +0.04/0.05%

Recommended Heat Treatment: For maximum wear resistance, austenitize at 2150°F (1175°C), hold 10 minutes, and quench. Temper 3 times at 1025°F (550°C).
Aim hardness: HRC 61-63

Heat Treat Response HRC Hardness			
Austenitizing Temperature			
Tempering Temp.	2050°F (1120C)	2100°F (1150C)	2150°F (1175C)
Minimum Time	30 Min.	20 Min.	10 Min.
1000°F(540C)	62	63	64
Optimum Time and Temp to be Effective			
1025°F(550C)	60	62	63
1050°F(565C)	58	60	61
1100°F(595C)	54	55	56
1150°F(620C)	48	50	51
1200°F(650C)	46	47	48
Minimum Tempers	2	2	3

Results may vary with hardening method and section size. Salt or oil quenching will give maximum response. Vacuum or atmosphere cooling may result in up to 1-2 HRC points lower.



Surface Treatments

Because of its high tempering temperatures (>1000°F) CPM® 15V® is suitable for nitriding, PVD coating or similar surface treatments. CVD coating processes generally exceed the critical temperature and may result in non-predictable dimensional changes.