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Global Steel Grade Encyclopedia

涵盖的行业或国家与地区类别

国材料与试验协会 | GJB 国家军用标准 | SAE 动力机械工程师协会 | EU 前欧洲标准化 | AISI 美国钢铁学会 | DIN 德国工业标准 | AMS 国空航天材料规范 | ISO 国际标准 | JASO 日本汽车标准组织

EN 欧洲标准 | JB 国机械行业标准 | UNS 统一编号系统 | UNI 意大利标准 | ASME 美国机械工程师协会 | SS 瑞典标准 | GB 国家标准 | JIS 日本工业标准

CRUCIBLE CPM® 154

Issue #1

Data Sheet

CPM 154 is CPM-manufactured version of Crucible's standard 154 CM. The CPM manufacturing process produces a uniform distribution of the carbides in this grade, giving this CPM 154 easier grinding and polishing, plus better toughness, than conventional 154 CM, while retaining similar heat treat response and wear properties. CPM 154 offers better corrosion resistance, better wear resistance and better hot-hardness than 440C, plus higher toughness. For knifemakers, it offers better edge retention and chipping resistance than 440C.

Carbon	**1.05%**
Chromium	**14.00%**
Molybdenum	**4.00%**

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

CPM Steel | Conventional Steel

Physical Properties

Elastic Modulus	30 X 10^6 psi	(207 GPa)
Density	0.281 lbs./in^3	(7.78 g/cm^3)

Thermal Conductivity

	BTU/hr-ft-°F	W/m-°K	cal/cm-s-°C
at 200°F (95°C)	14.0	24.2	0.057

Coefficient of Thermal Expansion

	in/in/°F	mm/mm/°C
-100 to 70°F (-74 to 21°C)	3.90X10^{-6}	7.02X10^{-6}
70-100°F (21-38°C)	4.07X10^{-6}	7.33X10^{-6}
70-300°F (21-149°C)	5.75X10^{-6}	10.35X10^{-6}
70-500°F (21-260°C)	6.06X10^{-6}	10.91X10^{-6}

Typical Applications

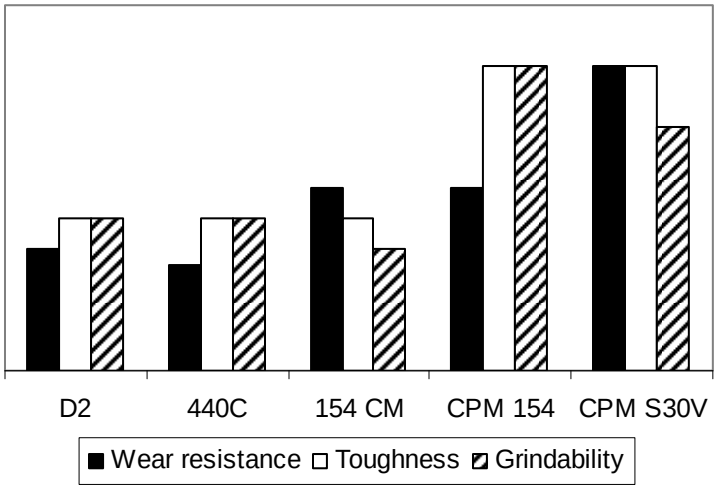
Cutlery Bearings
Corrosion resistant tooling

Note: These are some typical applications. Your specific application should not be undertaken without independent study and evaluation for suitability.

Machinability

Because of the CPM processing, CPM 154 is easier to machine and grind than standard 154 CM. General machining parameters are similar to 154 CM and 440C.

Blade Steel Comparagraph



Mechanical Properties

Grade	Hardness (HRC)	Wear Resistance*	Total Carbide Volume
154 CM	58.5	49 mg	17.5%
440C	57.5	66 mg. 55 mg	12%

* Wear resistance measured by the pin abrasion method. Lower number (mg) is a lower weight loss (in mg) and therefore better wear resistance.

Hot Hardness

Heat Treatment	Initial HRC	HRC tested at 400°F (204°C)	500°F (260°C)	600°F (315°C)	Final HRC
A	62	59	58	55	60
B	62	-	-	55	62
C	64	-	-	57	64

(A) Austenitized at 1850°F 1 hr., Oil Quench, cryo treated, tempered 600°F 1hr
(B) Austenitized at 1850°F 1 hr., Oil Quench, cryo treated, tempered 1000°F 1hr.
(C) Austenitized at 2000°F 20 min., Oil Quench, cryo treated, tempered 1000°F 1hr

Crucible Industries LLC

Thermal Treatments

Annealing: Heat to 1650°F (900°C), hold 2 hrs., slow cool no faster than 25°F (15°C) per hour to 1200°F (650°C), then furnace cool or cool in still air to room temperature. Crucible 154 CM can be cycle annealed by heating to 1600°F (900°C). hold 2 hrs., cool to 1300°F (704°C), hold 4 hrs., then air cool.

Annealed Hardness: About BHN 235

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 the original tempering temperature, hold 2 hours, then furnace cool or cool in still air.

Hardening

Preheat: Heat to 1400°F (760°C) Equalize.
Austenitize: 1900-2000°F (1037-1093°C), hold time at temperature 30-60 minutes.

Quench: Oil or positive pressure (4 bar minimum) to below 125°F (50°C), or salt 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: Twice at 400-1200°F (204-650°C), 2 hours minimum each time.

Note: As with all martensitic stainless steels, tempering at 800-1100°F (425-600°C) will result in sensitization which causes a minor reduction in both corrosion resistance and toughness. We recommend that this tempering range be avoided.

Aim hardness: HRC 55-62

Note: Properties shown throughout this data sheet are typical values. Normal variations in chemistry, size and heat treat conditions may cause deviations from these values. For additional data or metallurgical engineering assistance, consult

Heat Treat Response
Hardness (HRC)

Tempering Temperature	Austenitizing Temperature					
	1900° F (1040°C)		1950° (1065°)		2000° (1095°)	
Time at Temp.	1 hr.		1 hr.		30 min.	
Quench (Optional Freeze)	Oil	Oil & Freeze	Oil	Oil & Freeze	Oil	Oil & Freeze
As Quenched	62	63	61	63	54	63
400° F (204°C)	59	60	59	62	52	62
600° F (315°C)	56	59	56	60	50	60
800° F (427°C)	56	56	57	60	50	61
900° F (482°C)	56	57	58	61	52	61
1000° F (540°C)	54	58	60	61	54	63
1050° F (565°C)	51	52	55	56	52	58
No. of Tempers	2		2		2	

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.

Recommended Heat Treat Practice

To completely transform any retained austenite, a freezing treatment with dry ice at -100°F (-74°C) is recommended either after the quench or in between the two tempers. The freezing treatment is most effective right out of the quench, however complex parts with sharp corners are more safely frozen between the two tempers. Thin sections can be successfully quenched in forced air and will obtain results to those in the table above.

Surface Treatments

If surface treatments such as CVD, PVD, or nitriding are used, ensure that the coating process temperature is below the tempering temperature. Nitriding or tempering at 900F or higher may reduce the corrosion resistance of CPM 154 or any other stainless steel.

Note: Properties shown throughout this data sheet are typical values. Normal variations in chemistry, size and heat treat conditions may cause deviations from these values.