

DATA SHEET

CPM® 154CM

Typical Composition

C	Cr	Mo
1.05	14.00	4.00

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

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

Typical Applications: Cutlery, bearings, and corrosion resistant tooling.

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

Mechanical Properties

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

Hot Hardness

Heat Treatment	Initial HRC	HRC Test at: 400°F	HRC Test at: 500°F	HRC Test at: 600°F	Final HRC
A	62	59	58	55	60
B	62			55	62
C	64			57	64

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

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Thermal Treatments

Annealing: Heat to 1650°F (900°C), hold 2 hours, 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. CPM® 154CM can be cycle annealed by heating to 1600°F (900°C), hold 2 hours, cool to 1300°F (704°C), hold 4 hours, 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.

Heat Treat Response – HRC Hardness

Tempering Temperature	Austenitizing Temperature					
	1900°F (1040°C)		1950°F (1065°C)		2000°F (1095°C)	
Time at Temp	1 hour		1 hour		30 minutes	
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
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.						
Minimum Number of Tempers	2		2		2	

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 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 900°F or higher may reduce the corrosion resistance of CPM® 154CM or any other stainless steel.

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