Technical Datasheet

CarTech® Micro-Melt® T15 Plus Alloy

Type Analysis

Single figures are nominal except where noted.

Carbon	1.60 %	**Sulfur (Maximum)**	0.030 %
Chromium	4.80 %	**Molybdenum**	2.00 %
Cobalt	8.00 %	**Vanadium**	5.00 %
Tungsten	10.50 %	**Iron**	Balance

General Information

Description

CarTech Micro-Melt T15 Plus alloy is a high alloy content high speed powder metal tool steel with improved hardness capability and wear resistance compared to standard M-series high speed steels.

Applications

CarTech Micro-Melt T15 Plus alloy may be considered for many types of tooling applications where either conventional or powder metal high speed steels of either the M- or T- types are being used.

Possible applications for this alloy may include:
Hobs
End Mills
Broaches
Punches Milling Cutters
Twist Drills
Form Tools
Thread Roll Dies
Taps
Indexable Inserts

Properties

Typical Mechanical Properties

Hot Hardness

Due to its high alloy and especially its high cobalt content, the hot hardness of Micro-Melt T15 Plus alloy is superior to that of standard M-series high speed steels.

Toughness

The toughness of Micro-Melt T15 Plus alloy is similar to that of other high hardness powder metal high speed steels.

Heat Treatment

Decarburization

Micro-Melt T15 Plus alloy is somewhat less susceptible to decarburization during hardening than standard molybdenum-type high speed steels; however, a controlled atmosphere is required to insure that there is no decarburization during heat treatment. Salt bath or vacuum furnace treating is preferred for this alloy.

Annealing

Suitable precautions should be taken to prevent excessive decarburization or carburization.

Heat slowly to 1600/1650°F (871/899°C), hold until the entire mass is heated through, and cool slowly (do not exceed 20°F [11°C] per hour) in the furnace to about 1000°F (538°C), after which the cooling rate may be increased. The annealed hardness should be BHN 300 max. (HRC 33).

Hardening

Preheat at 1500/1600°F (816/871°C) long enough to ensure a thorough soak.

Austenitize at 2100/2250°F (1149/1232°C) for 3-5 minutes, then oil quench. Parts may also be salt quenched to 950°F (510°C), and air cooled. Vacuum furnaces with positive pressure quench capability can be used, but resultant hardness may be approximately 1-2 points HRC lower than that obtained with other heat treating methods. Parts should be allowed to cool to room temperature prior to tempering.

Stress Relieving

To relieve the stresses of machining, heat slowly to 1150/1250°F (621/677°C), hold 1 to 2 hours, then cool in still air.

Tempering

Tools should be tempered immediately after the completion of the quench. The tempering temperature may be varied according to the desired hardness, but is usually in the range of 950/1100°F (510/593°C). A triple temper is suggested. Each temper should be 2 hours at temperature, with parts cooled to room temperature between tempers.

Hardness Results—Micro-Melt T15 Plus Alloy

All samples below were salt quenched to 950°F (510°C) and then air cooled from the austenitizing temperature. Vacuum hardening may result in slightly lower hardness values.

Tempering Temperature		Hardening Temperature		
		2100°F (1149°C)	2210°F (1210°C)	2275°F (1246°C)
As-quenched		66.5	65.5	64.0
950°F	510°C	67.0/67.5	67.5	67.5
1000°F	538°C	67.5	68.0	68.0
1050°F	566°C	65.5/66.0	66.0/66.5	67.0
1100°F	593°C	60.5/61.0	63.5/64.0	64.5/65.0
Tempering Practice		2 + 2 + 2	2 + 2 + 2	2 + 2 + 2

Other Information

Wear Resistance

Due to its high carbide volume, the wear resistance of Micro-Melt T15 Plus alloy is superior to that of standard M-series high speed steels.

Forms Manufactured

- Bar-Flats
- Bar-Rounds
- Bar-Squares
- Billet
- HIP'd Shapes
- Wire

Technical Articles

- New Powder Metal Alloy Bridges Gap Between High Speed Steel and Tungsten Carbide

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