M42 3247 HIGH SPEED STEEL

Identification

UNS Number

- T11342

AISI Number

- Type M42

Type Analysis

Single figures are nominal except where noted.

Carbon	1.10 %	**Chromium**	3.90 %
Molybdenum	9.20 %	**Cobalt**	7.80 %
Vanadium	1.20 %	**Tungsten**	1.40 %

General Information

Description

M42 high speed steel, a molybdenum-type super high speed steel containing high carbon and cobalt contents, is capable of being heat treated to high hardness levels.

This combination of composition and properties allows successful machining of high hardness materials and difficult-to-machine superalloys. Due to the alloy's high hardness, excellent hot hardness and wear resistance are obtained without loss of edge toughness.

Applications

M42 high speed steel has been used primarily to machine difficult-to-cut or high hardness alloys. Typical tools made from the alloy include:

Broaches
Chasers
Drills
End Mills
Counterbores
Form Cutters
Gear Cutters
Hobs
Taps
Milling Cutters

Heat Treatment

Decarburization

Super Star high speed steel, like all high speed steels, is subject to decarburization in hardening. The use of rectified salt baths or the proper atmosphere control in furnace hardening will impart good results in heat treating.

Normalizing

Normalizing is not recommended.

Annealing

To anneal, the steel should be packed in a container using a neutral packing compound or in a suitable protective atmosphere.

Heat uniformly to 1550/1600°F (843/871°C) ensuring that the entire section is at temperature. Cool slowly in the furnace at a rate not to exceed 40°F (22°C) per hour to 1000°F (538°C), then allow to cool naturally. This should produce a hardness of BHN 255 or less.

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Hardening

For best results Super Star high speed steel should be heat treated from properly rectified salt baths or controlled atmosphere furnaces.

Preheat at 1500/1600°F (816/871°C) being sure to heat thoroughly, then transfer to the high heat of 2150/2200°F (1177/1204°C) in salt or 25°F (14°C) higher in atmosphere furnaces.

Quench in salt at 1000/1150°F (538/621°C) until equalized, then cool in air. The steel may also be quenched in warm oil. In either case, cool to 150°F (66°C) maximum before tempering, but do not allow parts to be at room temperature for extended periods before placing in the tempering furnace.

Deformation (Size Change) in Hardening

Super Star high speed steel changes size only slightly on hardening. When hardened from 2175°F (1191°C) in salt, a 1" (25.4 mm) cube will expand about 0.0005" (0.013 mm) and also expand the same amount when tempered at 1000°F (538°C). Average diameter cutters and form tools will open up slightly in the hole and expand slightly on the O.D.

Tempering

The alloy should normally be tempered between 950°F (510°C) and 1100°F (593°C). Tempering temperatures below 1000°F (538°C) usually do not provide adequate relief of hardening stresses and are not generally recommended.

Super Star high speed steel should be given triple temper cycle with a minimum of two hours at temperature each time. The tools must be cooled completely to room temperature following each cycle so that the tempering may be completely effective.

The following table displayed in the hyperlink below shows the results of various tempering temperatures.

Tempering °C	HRC
200	62.5
300	61
400	61.5
500	66.5
520	68
560	67
600	64
650	50
700	42

Tempering Diagram