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TECHNICAL BULLETIN

AISI M48 Powdered Metal

Typical Chemistry				Physical Properties	
Carbon	1.55	Molybdenum	5.25	Specific Gravity	8.26
Sulfur	0.07	Silicon	0.40	Density	0.298 lb/in ³
Chromium	4.00	Cobalt	8.90	Typical Heat Treated Hardness	65-70 HRC
Vanadium	3.10	Tungsten	9.80	Modulus of Elasticity	31 x 10 ⁶ psi
Manganese	0.20			Machinability	10-50% of 1% Carbon Steel

DESCRIPTION

Lindquist Steels AISI M48 is considered a super high performance powdered metal high speed steel. M48 is a dependable choice for tools that require high wear and abrasion resistance, high red hardness values, balanced by good toughness. This material has wear resistance similar to T-15 and given its high cobalt content it can achieve improved red hardness over materials like M42. Our M48 is often used for specialty cutting tools, broaches, and technical forming tools.

Many of the benefits realized in the use of powdered metals, such as M48 PM, are a direct result of the refined microstructure (smaller, more uniformly distributed carbide particles and a finer grain size) and the lack of segregation in the powder metallurgy product. These advantages include ease of grinding, improved response to heat treatment, greater wear resistance, and increased toughness of the finished tool.

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HEAT TREATMENT

*Important Note: Always consult with your Heat Treating professional to ensure optimal results

ANNEALING

An annealing process must be used after any hot working is performed or

before re-hardening.

Begin heating at 400° F per hour to 1575-1600° F. Be careful not to exceed a 400° F per hour. Hold at temperature for 1 full hour per inch of the thickest section. Hold for two hours minimum. Cool slowly allowing the furnace to drop temperature no more than 50° F per hour until it reaches 1000° F. Remove the material from the furnace and continue to cool at room temperature (77° F).

HARDENING

Hardening should occur in a modern protective vacuum furnace atmosphere. Pre-heat the furnace to 1500-1550° F. It is highly recommended to add a second pre-heat at 1850-1900° F for M48 material.

- To austenitize, heat quickly from the pre-heat cycle and ensure that the vacuum furnace is at 2125-2200° F.
- The quenching process should be performed at a minimum of 4 bar pressure. A fast quench is recommended. The quench rate should be carefully controlled at around 400° F per minute below 1000° F. This is absolutely critical in order to achieve the optimal properties of M48.
- The material has to be tempered immediately after quenching. The standard temperature range to temper M48 is 1000-1100° F. The material should not be tempered below 1000° F and should be held for 2 full hours. A triple temper is required for M48 and a 4th temper is required when the material has been austenitized at 2175° F or higher.
- A slight size change should be expected during the heat treat process.

GRINDING

During the grinding process localized heating can alter the temper of the material. Caution needs to be given to avoid this. Contact your grinding wheel supplier for advice on the appropriate grinding wheel of choice.

SURFACE TREATMENTS

LSI M48 PM is a very good substrate material for various surface treatments such as PVD and CVD coatings. The material also lends itself well to nitriding.

For further information regarding LSI M48 PM please contact the Lindquist Steels branch nearest your location by logging on to www.lindquiststeels.com

Disclaimer: The information and data presented on this technical bulletin is for informational purposes only. The values listed are typical values only. Variations in chemistry, mechanical, physical properties, as well as heat treatment parameters may vary. The information contained herein should not be construed as a warranty.

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