

# Infiltrant Copper Powder

Infiltration is a process whereby interconnected pores of an iron or iron based powder compact are filled through capillary action with a molten metal of lower melting point than the iron *P/M* part. This process offers improved tensile strength, elongation, hardness and impact properties. The result of this process is a steel-copper structure unique to the powder metallurgy industry.

## APPLICATION

As copper infiltrant offers improved tensile strength, elongation, hardness and impact properties of iron or iron based *P/M* parts; it allows the fabricator to compete with other markets. The infiltrated part may be used in the as-infiltrated or heat treated condition. As the infiltration process closes off the porosity inherent in the *P/M* process, electroplating characteristics are improved as entrapment of plating solutions and subsequent tendency for staining are avoided. For the same reason, infiltrated *P/M* parts can be used in low to medium pressure applications. When machining an infiltrated part, the consistent surface finish (i.e. minimal/no porosity) allows for uninterrupted cuts and therefore a smooth machined surface. As *P/M* continues to grow and new opportunities present themselves as complex components, the infiltration process can be used in joining/bonding multiple parts as they are sintered. Infiltrated and wrought parts may also be joined by brazing because the brazing alloy remains at the inter-face of the surface being brazed, rather than dissipating into the pores of an as-sintered *P/M* part. The sealed surface of an infiltrated part permits surface hardening by induction or flame processes in air without excessive internal oxidation of the steel matrix. Clearly defined cases may be obtained at high density by carburizing or carbonitriding a low carbon matrix. This results in hard, wear resistant surfaces and a tough internal core. **ACuPowder** offers three grades of infiltrating powder that will maximize the strength of your iron/steel parts, while simultaneously allowing you to utilize your particular processing strengths.

## EF-98S INFILTRATING POWDER

This infiltrating powder is a widely used infiltrant that leaves little or **no erosion**, while providing an efficiency of about 90%-95%. It will infiltrate over a wide-range of sintering conditions and mask weight variation in the iron compact without adhering to or eroding the contact area. The high compressibility and green strength will allow the use of lower compacting pressures and facilitate handling of the slugs.

### EF-98S is particularly beneficial when:

Bottom infiltration is desired  
Localized infiltration is required  
Surface finish and appearance are critical

### The suggested operating parameters for this grade are:

Temperature/time-2050 F for 20-30 minutes  
Slug density-6.7-7.2 g/cc  
Iron compact density-up to 6.7 g/cc

## LR-99 INFILTRATING POWDER

ACuPowder's new **high-efficiency, low residue** infiltrant designed to maximize sintered density and formulated to yield little or no residue and minimize surface degradation of the infiltrated iron part. This powder will infiltrate at temperatures as low as 2020 F, which reduces wear and tear on furnace belts. If you've had problems controlling your sintering conditions for infiltration, then LR-99 is for you. It excels in all sintering atmospheres and infiltrates any iron base matrix. It leaves little or no erosion and has an efficiency of 99%. This infiltrant has excellent compressibility and good green strength to allow lower compacting pressures and better handling.

### LR-99 is ideal for infiltrating:

Parts with green densities in excess of 6.7 g/cc  
Problem parts  
Cost-sensitive applications since less material is required to infiltrate

### The suggested operating parameters for this grade are:

Temperature/time-2020-2050 F for 20-30 minutes  
Slug weight-Assume 99% efficiency as excessive weight can give misleading result  
Slug density-7.2-7.6g/cc

**ACuPowder**

*We have been part of your lives for over 90 years*

<b>SYMPTOM</b>	<b>POSSIBLE CAUSE</b>	<b>CORRECTIVE ACTION</b>
<b>Residue adhesion</b>	Low temperature/time Excessive infiltrant	Increase temperature/time Reduce slug weight
<b>Sooting</b>	High carbon potential Excessive infiltrant	Check dew point and adjust Reduce slug weight
<b>Infiltrant running over sides</b>	Excessive infiltrant Temperature too high Slug density too low	Reduce slug weight Reduce temperature 20F Increase to 7.4+ g/cc
<b>Erosion</b>	High slug density High temperature Low surface contact area  Infiltrant segregated Low carbon content in part	Reduce density to <7.6 g/cc Reduce temperature 20F De-burr slug Redesign slug shape Contact ACuPowder Check carbon content and adjust if needed
<b>Excessive residue</b>	Excessive infiltrant used Temperature too high High steel matrix density	Reduce slug weight Decrease temperature Reduce slug weight Reduce steel matrix density
<b>Low efficiency</b>	Low temperature/time Undissolved graphite High carbon potential	Increase time/temperature Increase time/temperature Adjust dew point Clean furnace
<b>Erratic efficiency</b>	Low time/temperature Insufficient infiltrant used Infiltrant segregated Outside dew point range	Increase time/temperature Increase slug weight Contact ACuPowder Adjust dew point
<b>Residue crumbling</b>	Low temperature Slug density too low	Increase temperature Increase slug density

The information contained herein is presented as a guide for your investigation and verification. Products mentioned are sold without warranty, expressed or implied, that the goods shall be fit for any particular purpose of or use by the purchaser. Purchasers must conduct their own tests to determine the suitability for their intended purpose. We assume no liability for infringement of any patent resulting from the application of this information. By reason of lack of knowledge as to specific uses, no representation or warranty is made regarding the safety of these products or materials under the Federal Food, Drug and Cosmetics Act.

**ISO 9001**

*From industry pioneer to industry leader,  
We are innovation in motion*

**ISO 14001**

**ACuPowder International, LLC**  
901 Lehigh Avenue, Union NJ 07083 USA  
Phone: (908) 851-4500 X590 Customer Service.  
X521 Technical Service  
Fax: (908) 851-4597

**ACuPowder**

[www.acupowder.com](http://www.acupowder.com)

**ACuPowder TN, LLC**  
6621 Highway 411 S, Greenback, TN 37742  
Phone: (865) 856-3021 x112  
Fax: (865) 856-3083

*We have been part of your lives for over 90 years*