Increase Your Deposition Rate

Up to 400% increase in deposition rate by using POCO graphite E-Beam Crucibles

The POCO graphite electron beam evaporation crucibles are designed to offer E-Beam users improved evaporation performance over that obtainable in bare hearth mode. Our graphite crucible acts as an “energy efficient” thermal barrier between the molten evaporant and the water cooled copper hearth.

This will allow an increased deposition rate of up to 400% with the same power, or the same deposition using only 25% of the power, when compared to evaporation from a bare hearth. In some applications, the high power required to achieve an economical deposition rate can emit a form of radiation that can damage the devices on the wafers.

POCO’s crucible can allow a much lower power setting while maintaining an acceptable deposition rate.

The outstanding purity of POCO Crucibles does not introduce contaminants into the melt. Solve contamination problems by eliminating them from the process.
FABMATE®-BG Electron Beam Crucibles

FABMATE-BG crucibles offer the user cleaner handling with reduced particle content in the melt. Additional benefits are reduced wetting and longer crucible life.

The process is described below:

DFP-1 graphite is densified, machined and purified and then given an amorphous carbon treatment. This treatment is unique because it does more than coat the surface. It also infiltrates and locks onto the graphite. This treatment provides a harder surface with the porosity sealed to reduce wetting and eliminate particles.

IMPORTANT NOTICE

The information provided in this publication is believed to be correct as of the date issued. HOWEVER NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY USE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THIS INFORMATION. The information is furnished on the condition that the person receiving it shall make his own determination as to the suitability of the product for his particular purpose and on the condition that he assume the risk, if any for the use of any product purchased.
**Use POCO Graphite Materials for Crucibles**

POCO Electron Beam Evaporation Crucibles exhibit long life due to the unique microstructure and high strength of the material. Other properties include:
- ultrafine-grain
- isotropic microstructure
- high density
- strong polycrystalline material
- inter-connecting porosity
- purified to below 5 ppm

**Typical Purity Analysis**

(Total ash range 5 ppm or less)

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<td>Silicon (Si)</td>
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<tr>
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<td>Sodium (Na)</td>
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*ND = Not Detected

**Crucible Capacity**

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<th>Total Volume</th>
<th>Max. Weight of Aluminum (Grams)</th>
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**Melt Level is Critical**

The ideal melt level for most metals is between 30% to 80% of the crucible volume. Spill-over may occur if the melt level is greater than 80%. Crucible overheating or breakage due to the beam striking the crucible bottom may occur if the melt level is below 30%.

To aid in obtaining the ideal melt level, the capacity chart can be used to determine the maximum crucible cavity volume. Calculate 80% of the volume to determine the amount of material needed.

Aluminum is the most frequently evaporated metal. Since aluminum is known to “wet” graphite, the melt level needs to be reduced. Crucibles should only be filled to 70% of the crucible height rather than 80% of the total volume. Use the special column for aluminum in the capacity chart to determine the correct amount of material.

**Recommended Melt Materials**

The POCO E-Beam Crucible is suitable for use with a large variety of materials including:

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<th>SiO</th>
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<td>Na₂AlF₆</td>
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<td>Ta</td>
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<td>Au</td>
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<td>Ti</td>
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<tr>
<td>B</td>
<td>Ge</td>
<td>Se</td>
<td>TiO</td>
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*ND = Not Detected*
Solutions to Common Problems

**Melt Levels** - The most common cause of crucible failures is overfilling. Overfilling can cause the melt to spill over the edge of the crucible. When a spill-over occurs, a thermal short is created between the crucible and the hearth. The resultant thermal stress causes the crucible to crack. For this reason a maximum melt level of 80% of the crucible capacity is recommended.

**Crucible Contact** - Another significant cause of crucible failures is cracking due to the improper seating of the crucible in the hearth. Out of round or chiseled hearths often create nonuniform mechanical stresses on the crucible walls. For the longest crucible life and for the most reproducible evaporation results, contact between the graphite crucible and the copper hearth should be restricted to the bottom of the hearth cavity. A circular graphite or copper shim is frequently used to achieve proper contact.

**Handling** - Improper crucible handling and storage also can be the source of crucible life problems. Crucibles should be handled with tongs, gloves or finger cots; never with bare hands or fingers. Used crucibles available for reuse should be stored in a dry, oxygen-free environment.

**Aluminum Melts** - Aluminum carbide formation affects the life of crucibles used for aluminum evaporation. The aluminum carbide forms a transparent, yellowish film on the surface of the aluminum. When the film covers the entire surface of the aluminum, the evaporation rate is reduced to near zero. The presence of this phenomenon is indicative of excessive crucible temperature. The beam power should be reduced to minimize the formation of aluminum carbide.

Crucible Selection

Not sure which size crucible to order for your application?

Check our Crucible Source Cross-Reference Table. This table was developed as a guide to the selection of the correct crucible. Information in the table was supplied by gun manufacturers and customer experience. Due to variations in the pocket sizes we recommend hearth dimensions be checked prior to ordering.

Still need help in your selection? Call POCO at 1-800-433-5547 (Toll Free USA)
940-627-2121
info@poco.com
www.poco.com

Tall Crucibles

Two of our most popular sizes are also inventoried in taller versions. EB-17 and EB-18 tall crucibles are designed to hold a larger charge of metal and fit in the same hearths as the EB-6, EB-8 and EB-13 crucibles. Although these crucibles are designed to have adequate top clearance, we recommend verifying clearance prior to placing an order.

Crucibles Increase Hearth Life

Physical protection of the hearth means less downtime for cleaning, less damage from destructive cleaning techniques, and less damage from accidents while handling.
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<th>HIEGHT (B)</th>
<th>WALL (C)</th>
<th>ANGLE (D)</th>
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<td>MM</td>
<td>INCH</td>
<td>MM</td>
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Note: Typical outside radius is .125"
*Outside radius is .260"
**Outside radius is .250"
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<th>CRUCIBLE NUMBER</th>
<th>EQUIPMENT MANUFACTURER</th>
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Note: EB-17 is a tall crucible designed to be used in the same hearth as an EB-6 or EB-8

Note: EB-18 is a tall crucible designed to be used in the same hearth as an EB-13. Will work with 4 pocket rotary hearths.

Continued on next page.
Order Placement

Our customer service representatives are ready to help you with quotes and placing inventory orders. They can be reached between the hours of 8:00 am and 4:45pm CST at 1-800-433-5547 or 1-940-627-2121. Some crucibles may be available at our online store, www.pocostore.com.