

Electron Beam Evaporation Crucibles and Selection Process

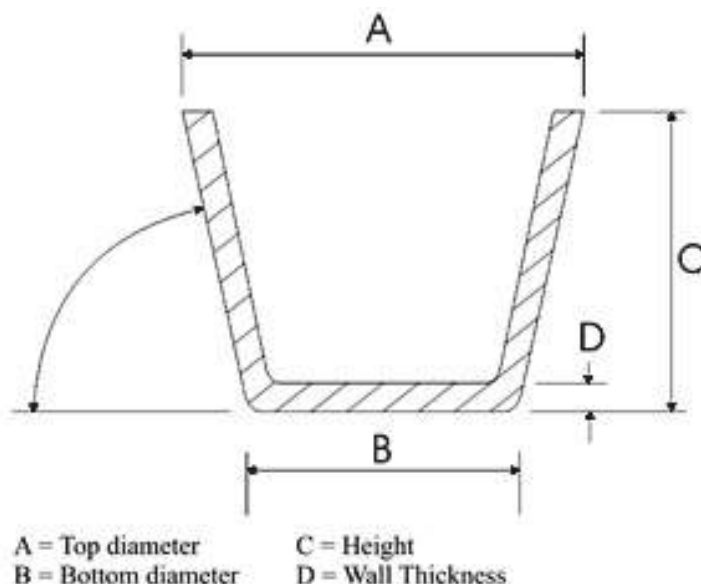
Electron beam evaporation employs a heated cathode that emits a high flux of electrons which are accelerated by high voltage and focused into a water cooled hearth by a magnetic system.

The evaporant (the material to be evaporated) is placed in a crucible within the e-beam hearth, where it is heated to vaporization which then deposits on the substrate to form the required thin film. Electron beam evaporation enables very high temperatures allowing fast deposition rates and a wide range of materials to be evaporated. E-beam evaporation is controllable, repeatable and compatible with the use of an ion source to enhance the desired thin film performance characteristics.

Before starting the actual thin film deposition run, a shutter is placed above the crucible and kept in a closed position while the evaporant is conditioned, degassed and monitored for any spitting characteristics. The amount of conditioning required depends on the type of material, its quality and method of manufacture.

Crucibles are specified by height, bottom diameter, top diameter, wall thickness and other physical characteristics (such as lips).

The following table reflects required crucibles for specific materials.



Crucible Selection Table								
Evaporant	Crucible Materials							
	Standard Graphite	Glassy Coated Graphite	Alumina	Boron Nitride	Moly	Tantalum	Tungsten	Intermetallies
Aluminium		x		x			x	
Alumina Al ₂ O ₃							x	
Antimony	x		x	x				
Barium					x	x	x	
Beryllium		x						
Boron		x						
Cerium		x	x					
Chromium		x						
Cobalt			x					
Copper			x		x	x		
Gallium			x					
Germanium			x					
Gold		x	x				x	
Indium					x			
Iron			x					
Lead			x					
Magnesium			x					
Manganese			x					
Molybdenum					x			
Neodymium			x					
Nickel		x	x					
Palladium			x					

Crucible Selection Table								
Evaporant	Crucible Materials							
	Standard Graphite	Glassy Coated Graphite	Alumina	Boron Nitride	Moly	Tantalum	Tungsten	Intermetallies
Platinum			x					
Rhodium		x						
Samarium			x					
Selenium		x	x					
Silicon		x				x		
Silver			x		x			
Strontium		x						
Tin			x			x		
Titanium		x					x	
Titanium Dioxide						x		
Yttrium			x					
Zinc			x					
Zirconium							x	
Zirconium Oxide							x	

Standard crucible sizes available for e-beam evaporation

Volume	Top Diameter	Bottom Diameter	Height	Wall Angle
4 cc crucible liner	20.8mm	11.5mm	15.5mm	15°
7 cc crucible liner	1.16"	0.87"	0.56"	15°
10 cc crucible liner	1.28"	0.87"	0.75"	15°
15 cc crucible liner	1.48"	1.12"	0.67"	15°
25 cc crucible liner	1.75"	1.30"	0.83"	15°
40 cc crucible liner	2.00"	1.49"	1.06"	15°
75 cc crucible liner	2.50"	1.83"	1.25"	15°
100 cc crucible liner	2.75"	2.01"	1.38"	15°
156 cc crucible liner	3.25"	2.44"	1.56"	15°