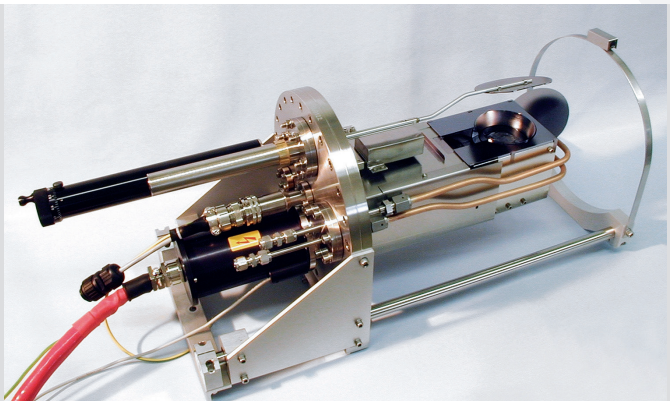
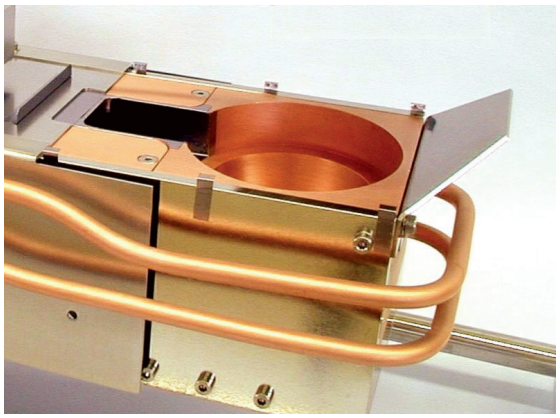
MBE
KOMPONENTEN | DR. EBERL

ELECTRON BEAM EVAPORATOR EBV

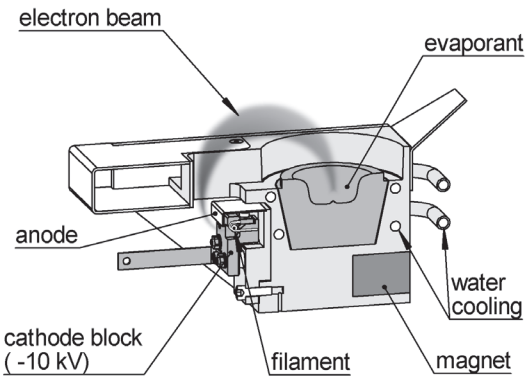
- UHV compatible, low outgassing
- High flux rates
- High purity evaporation
- Hearth volumes 40 cm^3 or 100 cm^3
- Long filament lifetimes
- Optimized version for SiGe MBE with silicon shielding parts



EBV 200-100-SR, electron beam evaporator with 100 cm^3 hearth, manual linear shutter, refill unit & Si shielding parts



Single-pocket Cu-hearth, capacity 100 cm^3



Principle of e-beam evaporator operation with 270° beam deflection

Standard Electron Beam Evaporators EBV are single-pocket UHV evaporation sources recommended for evaporation of low vapor pressure materials (refractory metals, semiconductors, oxides, etc.) at high rates. They ensure evaporation with high purity over a longer period without evaporant depletion. Hearth capacities of 40 cm^3 and 100 cm^3, respectively, provide a long system uptime.

Only UHV-grade materials are used as construction materials without exception, obtaining a design that is bakeable up to 250°C. In the hot areas near the emitter only high purity low vapor pressure materials like Mo, Ta, W or Al_2O_3 are used. The electromagnetic coils are manufactured from Kapton™ (polyimide) isolated wires and nickel-plated magnetic steel. The permanent magnets are of high temperature rare earth materials, while the single-hearth crucible as well as the surrounding water cooling bores are directly machined into a high purity OFHC (oxygen-free high thermal conductivity) copper block. In addition, the special SiGe version of the EBV features a set of high purity single-crystalline Si shielding parts.
Ion bombardment effects on the filament are eliminated by an electron emitter design with 270° beam deflection. This also shields the sample from direct sight onto the hot filament, further reducing the chance of sample contamination by impurities from the hot emitter area.

EBV evaporators are compatible with any MBE system having at least a DN150CF (O.D. 8") horizontal port. As the EBV evaporators are heavy pieces of equipment a mounting slide, bolted to the chamber port, is available. This slide facilitates handling, mounting and servicing of the EBV.

MBE
KOMPONENTEN | DR. EBERL

Applications

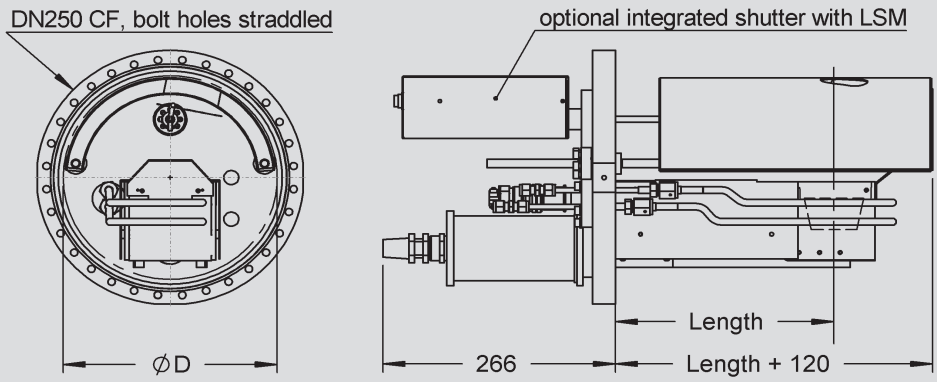
EBV evaporators are designed for high rate evaporation of low vapor pressure materials, especially when high purity of the evaporant is desired. They are frequently used for evaporation of refractory metals, e.g. Mo, Nb, Ta, W or Zr, and are suited for high rate evaporation of Al and semiconductors like Si and Ge.

For application in a SiGe MBE system we provide a specially adapted shielding part set manufactured from high purity single-crystalline silicon. These plates and rings cover all parts of the metallic body facing the substrate that are potentially subject to electron or ion bombardment. We also supply high purity Si and Ge source material in superior quality, machined from wafer-grade single crystals. Whilst the Si charge fits the evaporator hearth closely, the Ge charge is used in combination with a Si crucible liner in order to prevent interaction of the molten Ge with the copper hearth.

For deposition of all metals that do not melt completely or do not react with the cooled Cu wall the EBV can be used in its standard configuration. For some metals using crucible liners of graphite, ceramic or refractory metals is advisable. Please inquire a solution for your particular evaporant.

Technical Data

Mounting flange	DN150CF (O.D. 8"), DN200CF (O.D. 10") or DN250CF (O.D. 12")
Hearth capacities	40 cm^3 dimensions: Ø 51.0 mm (15° taper) x 25.5 mm depth
	100 cm^3 dimensions: Ø 68.0 mm (15° taper) x 37.5 mm depth
Filament type	short-legged coil of thick W wire, electron emitting filament
Bakeout temperature	max. 200°C (all air side connectors removed)
Operating pressure	1×10^{-11} mbar ....1×10^{-5} mbar
Accelaration voltage	4 - 10 kV
Beam power	max. 10 kW (depending on power supply)
Filament current	max. 50 A at 10 V (AC)
Spot size	5 mm diameter, approx.
Primary beam deflection	270° by permanent magnet system
Dynamic beam deflection	coils wound from KAPTON ™-isolated wire
	deflection frequency: max. 150 Hz
	max. x-deflection current: ± 3.0 A; max. y-deflection current: ± 3.0 A
Hearth cooling	water flow rate 8 l/min at 4 bar; connectors Swagelok™ Ø8 mm (air side)
Options	base flange integrated water cooling roof with custom apertures (K);
	integrated custom-made source shutter (S) (with optional drive unit LSM)
	integrated refill unit ERU 16 (R)



Schematic drawing of the Standard Electron Beam Evaporator EBV
(Drawing shows EBV 250-100-KS with integrated source shutter (motor-actuated by LSM 40-100) and water cooling roof)

Dr. Eberl MBE-Komponenten GmbH
Josef-Beyerle-Str. 18/1
71263 Weil der Stadt, Germany

Fon +49 7033 6937-0
Mail info@mbe-components.com
Web www.mbe-components.com