Vertical Electron Beam Evaporators EBVV

EBVV-B 63-4, vertical electron beam evaporator with 4 cm³ hearth volume, mounted on DN63 CF (O.D. 4,5") flange

- **UHV compatible, low outgassing**
- **Small dimensions; can be used in DN63 CF (O.D. 4,5") effusion cell ports**
- **High purity evaporation**
- **Hearth volumes 4 cm³ or 5 cm³**
- **Long filament lifetimes**
- **High frequency x-y-beam deflection system**
- **Optimized version for SiGe MBE with silicon shielding parts**

The Vertical Electron Beam Evaporators EBVV 63-4 and EBVV 63-5 allow to introduce real e-beam evaporation into many growth systems that have originally been designed for radiation-heated effusion cells only.

The unique and extremely compact design permits to install the EBVV 63 instead of an ordinary effusion cell on any MBE system having CF63 ports with an I.D. ≥ 60mm. Even tilted ports can be used without problems for many evaporants. Despite its small footprint the new EBVV 63 includes a complete electromagnetic x- and y-dynamic beam deflection system and can deliver beam powers up to 3kW.

Only UHV-grade materials are used without any compromise, especially for hot parts: molybdenum emitter block, tungsten filament and Al_2O_3 ceramics. The copper body is manufactured from OFHC-Cu (Oxygen-Free High-Conductivity Copper). For highly effective cooling the copper hearth is closely surrounded by a complete turn of an Ω-shaped water channel.

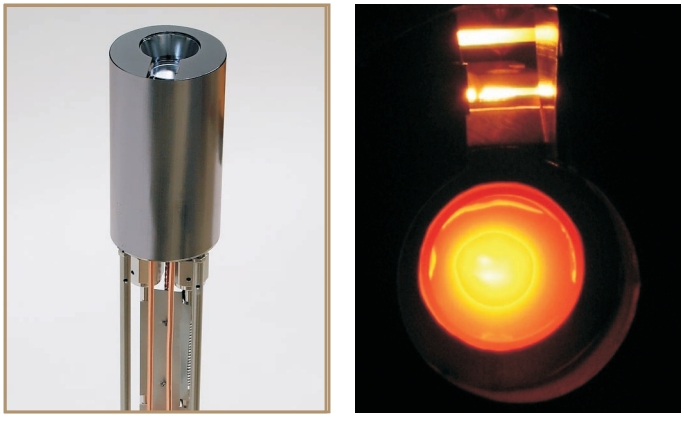
The evaporator hearth volume can be chosen between 4cm³ - a standard geometry compatible with many crucible liners - and 5cm³, recommended for Si epitaxy with our Si accessory parts.

The 270° beam deflection design of the electron emitter eliminates nearly all ion bombardment on the filament due to a sharply bent electron beam path near the beam exit aperture. Thus, the filament is well shielded from evaporant or charged particles ejected from the crucible. In addition, the sample is shielded from a direct sight onto the hot tungsten filament, further reducing the chance of sample contamination by impurities from the hot emitter area.

Application

The EBVV 63-4 (5) closes the gap between small rod-fed e-beam evaporators, usually only producing very low fluxes and only suitable for sublimating evaporants, and the common large horizontally mounted e-beam evaporators, which often are excessively space-consuming and far overrated for many MBE applications.
EBVV 63-4 evaporators may even be a good alternative for radiation-heated high-temperature sources running into their flux-, temperature- or purity-limits.

The EBVV 63-4 is the ideal evaporator for any low-vapour pressure material, including refractory metals or dopants like e.g. boron or carbon. It can also serve the upcoming demands in newly developed material systems, like high-k materials (Al_2O_3 or Pr_2O_3) or for other oxides / dielectrics.



EBVV-B 63-5 filled with high purity Si-B charge and optimized for clean Si evaporation with silicon shielding parts

For Si growth in an MBE system we provide a specially adapted set of shielding parts manufactured from high-purity single-crystalline silicon for the EBVV 63-5. A Si plate and a ring cover all parts of the metallic body that are potentially subject to electron or ion bombardment and that face the substrate. Only this Si-shielding allows the growth of highest purity Si-based films with virtually no metallic contamination. We also supply high purity Si source material in superior quality. It is machined from wafer-grade Si-single crystals, fitting the evaporator hearth closely.

For metal deposition the EBVV 63-4 can be used with bare Cu hearth for all metals that do not melt completely (e.g. Al) or that do not react with the cooled Cu-wall. Crucible-liners manufactured from graphite or refractory metals are available for all other materials. Please ask for a solution for your particular evaporant.

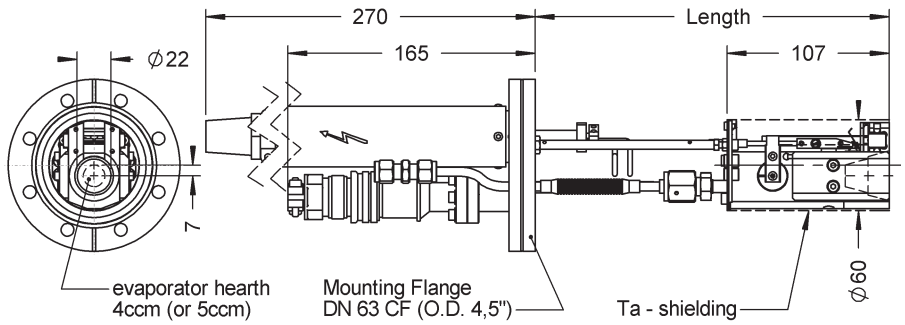
Technical Data

Mounting Flange	DN63 CF (O.D. 4,5") or DN100 CF (O.D. 6")
Dimensions in vacuum	**Length:** 234 – 450 mm (user specific); **ØD:** 60 mm
Crucible capacities	4 cm^3 (EBVV 63-4, EBVV 100-4) or 5 cm^3 (EBVV 63-5, EBVV 100-5)
Hearth dimensions (Ø x depth)	Ø22mm (15° taper) x 15mm or Ø23mm (12° taper) x 15mm
Filament type	short-legged coil of W wire, electron emitting filament
Bakeout temperature	250°C (all air side connectors removed)
Operating pressure	1×10^{-11} mbar ….1×10^{-5} mbar
Acceleration voltage	4 – 6 kV
Beam power	max. 3 kW
Filament current	max. 25 A at 10V (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; x-deflection current: ± 1,5 A max.; y-deflection current: ± 2 A max.
Water cooling	water flow rate 5 l/min at 4 bar; connectors Swagelok™ Ø8 mm (air side)
Options	integrated rotary shutter (**S**) (for DN100 CF or larger only)

Schematic drawing of the
Vertical Electron Beam Evaporator

Drawing shows EBVV 63-4 (5).

The DN100 CF version only
differs in the base flange
dimension.



Dr. Eberl MBE-Komponenten GmbH
Gutenbergstrasse 8
71263 Weil der Stadt, Germany
Phone : +49 7033 6937-0
Fax : +49 7033 6937-20

info@mbe-components.com
www.mbe-components.com

USA / Canada
United Mineral & Chemical Corporation
Lyndhurst NJ 07071 (USA)
Phone : 1 800 777 0505
Fax : 201 507 1506
www.umccorp.com/

India
MACK INTERNATIONAL
Colaba, Mumbai 400 005
Phone : 22 2285 5261
Fax : 22 2285 2326
darius@mack.in

China
GERMAN TECH CO. Ltd.
Beijing 100083
Phone : +86 10 82867920
Fax :+86 10 82867919
www.germantech.com.cn/

Italy
OMICRON NanoTechnology GmbH
00136 Roma
Phone : 06 35 45 85 53
Fax : 06 35 40 38 67
omicron.italia@tiscali.it

Japan
VIEETECH JAPAN CO., Ltd
Mito, Ibaraki 311-1112
Phone : 29 269 9211
Fax : 29 269 9814
www.vieetech.co.jp/

Singapore
RESEARCH INTRUMENTS PTE LTD
Singapore 139944
Phone : 6775-7284
Fax : 6775-9228
www.ri.com.sg/