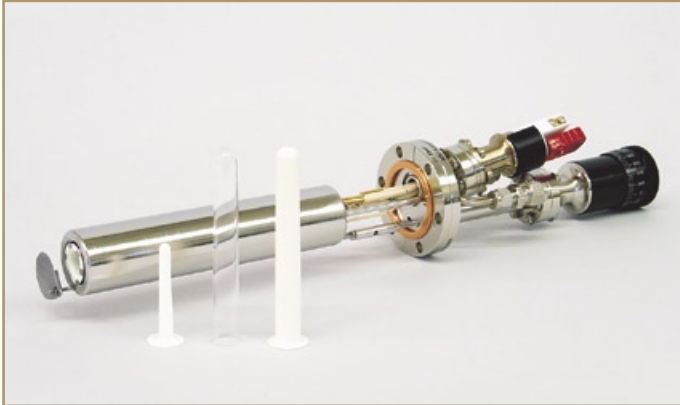


COMPACT EFFUSION CELLS FOR THIN FILM DEPOSITION OR MBE IN RESEARCH UHV SYSTEMS



Compact effusion cell on DN40 CF (O.D. 2.75") flange with a 10 cm³ PBN crucible, integrated cooling shroud and shutter

- Compact and robust cell design
- Cooling shroud and shutter integrated on mounting flange
- Clean operation in UHV systems
- Excellent temperature and flux stability
- Low power consumption
- high temperature effusion cells
- Optimised low temperature cells
- Hot lip, cold lip and dual filaments

Effusion cells are generally used to evaporate or sublime a great variety of materials. The evaporant in the crucible is heated by tantalum or tungsten wire filaments and the heater is shielded by multiple layers of tantalum foil. Only highest quality refractory metals such as W and Ta are used in the hot area to obtain high purity and low outgassing at high temperatures.

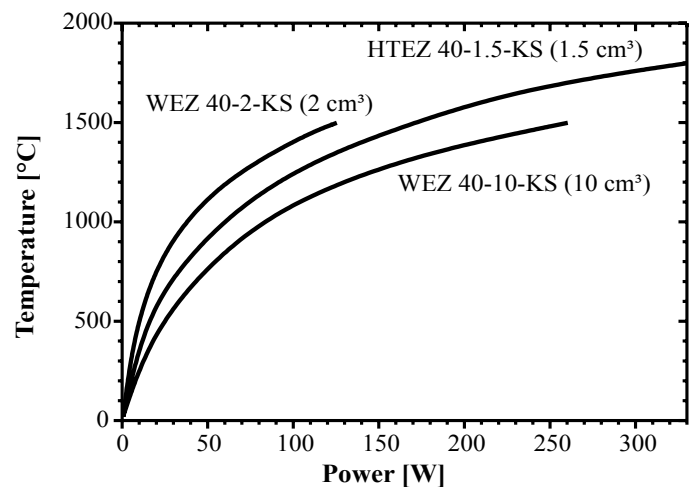
Excellent operation temperature stability of ± 0.1 °C and therefore very stable flux rates are achieved with our cells. Standard crucible material is PBN (pyrolytic boron nitride), which is a very clean and stable ceramic material. Other crucible materials such as Al₂O₃, BeO, tungsten, pyrolytic graphite (PG) or quartz are also available.

The compact cell design with integrated water cooling and shutter on a DN40 CF (O.D. 2.75 inch) mounting flange is ideally suited for small research surface analysis systems. The effective water cooling around the cell is protecting both vacuum chamber and port tubes and avoids heating up by thermal radiation.

For evaporation of high vapour pressure materials and of organic materials our low temperature effusion cell -NTEZ- is recommended.

Our standard effusion cell -WEZ- is suitable for most materials evaporated at temperatures from 700 to 1300 °C. For applications at higher temperatures we recommend our high temperature effusion cell -HTEZ- with a free-standing tungsten filament.

WEZ and NTEZ cells are provided with standard, hot lip, cold lip or dual filament, to cover the different evaporation material requirements.



Material	M. P. *	T op.**	Source Type	Filament
Zn	419 °C	250 °C	NTEZ	HL
Mg	649 °C	327 °C	NTEZ	SF
Ca	842 °C	459 °C	NTEZ	HL
In	157 °C	742 °C	WEZ	HL
Ag	961 °C	832 °C	WEZ	SF
Ga	30 °C	907 °C	WEZ	HL
Al	660 °C	972 °C	WEZ	CL
Cu	1084 °C	1027 °C	WEZ / HTEZ	HL
Au	1063 °C	1132 °C	WEZ / HTEZ	SF
Ge	937 °C	1167 °C	WEZ / HTEZ	SF
Fe	1535 °C	1180 °C	WEZ / HTEZ	SF

* Melting point ** Typical operating temperatures required for growth rates in the range of 0.1 to 0.5 ML/s (about 1-3 nm/min) using a WEZ 40-10-KS at a source to sample distance of 100mm

Application

Compact effusion cells in combination with DC power supplies and temperature controllers are an economy-priced solution for thin film deposition in surface analysis systems or in small sample preparation chambers.

The concept of a radiation-heated crucible allows evaporation of most materials. Evaporation from crucibles is especially suited for materials which melt before a sufficient evaporation rate is achieved. We provide compact effusion cells for high vapour pressure materials and for low vapour pressure materials. Typical operating temperatures for various materials are listed in the table overleaf. Due to the compact design minimum power is needed for our high temperature cells. The cell temperature versus heater power of different effusion cells is shown in the figure overleaf.

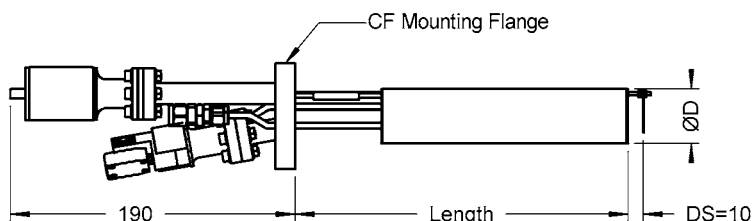
The simple and robust cell design allows the change of evaporation material by a simple crucible exchange procedure. Large crucible capacities guarantee long operation periods without any refilling or service.

Precise temperature measurement and control produces very stable and reproducible growth rates in an extremely wide range from below 0.01 nm/h (e.g. doping applications) up to several nm/s for thin film growth. A temperature variation of typically 100 °C changes the flux about one order of magnitude. By using thermal evaporation, the ionisation processes which could lead to ion-induced damages of the sample are avoided.

Technical Data

Mounting flange	DN40 CF (O.D. 2.75")
Dimensions in vacuum (Length / ØD)	190-400 mm / Ø34 mm for NTEZ / WEZ 40-2-KS ; 220-400 mm / Ø36 mm for NTEZ / WEZ 40-10-KS and HTEZ 40-1.5-KS
Filament type	Ta wire filament: standard (SF), hot lip (HL), cold lip (CL), dual (DF) for NTEZ / WEZ ; free standing tungsten heater for HTEZ
Thermocouple	W5%Re/W26%Re (type C) or NiCr/NiAl (type K)
Bakeout temperature	max. 250°C
Operating temperature	80-400°C / 300-700°C (NTEZ); 700-1300°C (WEZ); 800-1700°C (HTEZ)
Outgassing temperature	max. 800°C / 1100°C (NTEZ); max. 1500°C (WEZ); max. 1900°C (HTEZ)
Cooling	integrated water cooling shroud (K)
Shutter	integrated rotary shutter (S) with Ta shutter plate
Crucibles	1.5 cm ³ (PBN, Al ₂ O ₃ , BeO, PG, W) for HTEZ 2 cm ³ (PBN) for WEZ / NTEZ 10 cm ³ (PBN, Al ₂ O ₃ , PG, quartz) for WEZ / NTEZ

Schematic drawing of a compact effusion cell with integrated cooling shroud and shutter (Drawing shows WEZ 40-10-KS)



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



Please find your local representative on our website