15.1 UHV AND HV CHAMBERS
Stainless Steel UHV Chambers
Stainless Steel HV Chambers
Chamber Options

15.2 SPECIAL FABRICATIONS
Special vacuum Fabrications
Vacuum Equipment Assembly
Non-magnetic Chamber
Mu-metal Shields
Mu-metal Chambers

15.3 STANDARD CHAMBERS
Fast Entry Lock (FEL) Chambers
Complete Load Locks
Variation of Standard Fittings

Chamber Types

<table>
<thead>
<tr>
<th>Geometry</th>
<th>Material</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cylinder</td>
<td>Stainless Steel, Aluminium, Mu-Metal</td>
<td>General Purpose UH and UHV</td>
</tr>
<tr>
<td>Sphere</td>
<td>Stainless Steel, Aluminium, Mu-Metal</td>
<td>Surface Science AFM/ STM</td>
</tr>
<tr>
<td>Cube with door</td>
<td>Stainless Steel, Aluminium</td>
<td>HV, Box coating, deposition</td>
</tr>
</tbody>
</table>

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UHV and High Vacuum Chambers

Allectra offers custom built chambers for UHV and HV systems:
- Stainless Steel 316L or 304
- Standard design available
- Engineering drawings produced from customer’s sketches or plans
- Chambers are cleaned to UHV standards using modern environmentally friendly processes

General Specification for SS Chamber

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacuum</td>
<td>UHV 5 x 10^{-12} mbar HV 5 x 10^{-9} mbar</td>
</tr>
<tr>
<td>Material Body</td>
<td>SS304 (1.4301) or 316L (1.4404)</td>
</tr>
<tr>
<td>Material CF Flanges</td>
<td>SS 316L option 316LN (1.4429)</td>
</tr>
<tr>
<td>Fixed Flange orientation</td>
<td>Fixed Flange bolt holes straddle the vertical axis</td>
</tr>
<tr>
<td>Wall Thickness</td>
<td>diameters up to 160 2 mm</td>
</tr>
<tr>
<td></td>
<td>diameters over 160 3.2 mm</td>
</tr>
<tr>
<td></td>
<td>Large vessels 5.0 mm</td>
</tr>
<tr>
<td>Standard Tolerances</td>
<td>+/- 0.5mm linear</td>
</tr>
<tr>
<td></td>
<td>+/-0.5° angular</td>
</tr>
<tr>
<td>Welding</td>
<td>TIG internal welds or full penetration</td>
</tr>
<tr>
<td></td>
<td>if internal welding is not possible</td>
</tr>
<tr>
<td>Finish</td>
<td>UHV clean and hand polish – Electro-polish option</td>
</tr>
</tbody>
</table>

Chamber Options
- Vacuum - HV or UHV
- Electropolish
- Spherical Chambers for Surface Science or UHV STM/AFM
- Box or Cube shape chambers with a full width O-Ring sealed door
- Mu-metal construction or Stainless Steel with Mu-metal shields
- Flanges CF, KF, ISO(K) or custom
- Ports focussed on chamber centre or another defined point, straight or angled
- Water cooling - either double wall vessel or brazed-on cooling channels
- Mounting bench
- Blanking flanges, pump down and seal off with dry \( \text{N}_2 \) at atmospheric pressure
- Vacuum annealing

Send us your sketch for an initial 3D check and a quote.
Special Vacuum Fabrications/ Vacuum Instrument Assembly/ Non-magnetic Chambers

Special Vacuum Fabrications
Allectra can design and build special purpose equipment or alternatively build HV or UHV items to customers drawings. If required, fully detailed manufacturing drawings can be prepared from sketches.

Some examples of special equipment built by Allectra:
- Differentially pumped beamline element for SOLEIL synchrotron
- Miniature rectangular UHV chamber for an industrial application
- Stepper Motor controlled shutter mechanism for a Synchrotron application
- Chamber including pumping system

Non-magnetic Chambers
Allectra offers a number of solutions for creating a very low magnetic field environment.
- SS chambers 316L with 316LN flanges
- Aluminium-chambers with Bi-Metal flanges (see p. 156)
- SS chambers with Mu-metal shields
- Mu-metal chambers

Mu-metal Shields
Allectra Stainless Steel Cylindrical Chambers can be supplied with internal mu-metal shielding which with proper design will reduce the residual magnetic field at the centre to less than 5 milli-Gauss.

In order to achieve this care must be taken with the port sizes and position to minimise field ingress. Allectra can advise on design suitability if required.

For minimum magnetic field, the very low magnetic permeability stainless steel grade 316LN is recommended for the Flanges.

Mu-metal Chambers
UHV chambers can be constructed entirely from Mu-metal except for the Flanges. This method yields a very low residual magnetic field at the centre. However, the manufacturing technique is more involved and Mu-metal chambers are generally more expensive than SS chambers with shields.

Mu-metal chambers are used typically for Surface Science Analysis Chambers where techniques like EELS are used. They are constructed from 5mm Mu-metal to obtain sufficient strength. Careful design is essential because Mu-metal is a soft alloy and not as strong as Stainless Steel.

See Section 16 for examples of Al chambers.

...Blanking Flanges 316L: Sec. 11........Blanking Flanges 316LN: Sec. 11.....
15.4 FEL CHAMBERS

Fast Entry Lock (FEL) Chamber

Modified Fittings

Allectra offers a standard design of Fast Entry Lock chamber which is very versatile and which provides the maximum access and viewing diameters to the sample carrier position.

Also available are a range of modified standard fittings like 4 way crosses which can be easily and cheaply fitted with extra ports or simple modifications.

<table>
<thead>
<tr>
<th>Specification FEL Chamber</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacuum</td>
</tr>
<tr>
<td>Material</td>
</tr>
<tr>
<td>Door Seal</td>
</tr>
<tr>
<td>Hinge</td>
</tr>
<tr>
<td>Viewport</td>
</tr>
<tr>
<td>Viewport Seals</td>
</tr>
<tr>
<td>Temp.</td>
</tr>
</tbody>
</table>

FEL Chamber includes the Quick Access Door.

Quick Access Door

Flanges  Access Ø  View Ø
CF63    60 mm  63 mm
CF100   95 mm  90 mm
CF160   150 mm 135 mm

(For specification of QADs see Sec. 9)

FEL Chamber Construction

FEL Chambers are designed to give the maximum opening diameter for easy access and the maximum view diameter if a viewport door is fitted. They are based on a 316L Stainless steel Sphere with ports for:
- Port 1 Pump
- Port 2 Tapped for Door
- Port 3 Magnetic transporter
- Port 4 Gate valve
- Port 5 40CF for Gauge or viewport
- Port 6 16CF for gas inlet
- Port 7 16CF for Gauge or spare

Complete Load Locks

Include Fast Entry Lock Chamber and Door with viewport

UHV Gate Valve with Viton seal.
Standard Magnetic transporter with 800mm travel
Blanking flanges for unused ports.

Modified Standard Fittings

Allectra offers a cost effective way of building a custom vacuum chamber. Starting with a Standard CF or ISO fitting (Sec. 13), ports can be added, taken away or port sizes changed as required. In this case the price is the cost of the standard fitting plus the cost of the changes. If these are quite simple, usually no drawing is required.

Please ask Sales Office for details.

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FEL Chambers Stainless Steel
with Viton sealed DOOR & Viewport

<table>
<thead>
<tr>
<th>DOOR (2)*</th>
<th>GV (4)*</th>
<th>PART NUMBER</th>
<th>EURO</th>
</tr>
</thead>
<tbody>
<tr>
<td>63CF</td>
<td>63CF</td>
<td>640-LLC-63-63-VP</td>
<td>2.200.00</td>
</tr>
<tr>
<td>100CF</td>
<td>63CF</td>
<td>640-LLC-100-63-VP</td>
<td>2.300.00</td>
</tr>
<tr>
<td>100CF</td>
<td>100CF</td>
<td>640-LLC-100-100-VP</td>
<td>2.550.00</td>
</tr>
<tr>
<td>100CF</td>
<td>160CF</td>
<td>640-LLC-160-160-VP</td>
<td>2.850.00</td>
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<tr>
<td>160CF</td>
<td>160CF</td>
<td>640-LLC-160-160-VP</td>
<td>2.950.00</td>
</tr>
</tbody>
</table>

* Port numbers - see Table on left

Complete Load Lock Systems including Gate Valve (GV)
with Viton sealed DOOR, Viewport & 600mm travel

<table>
<thead>
<tr>
<th>DOOR (2)*</th>
<th>GV (4)*</th>
<th>PART NUMBER</th>
<th>EURO</th>
</tr>
</thead>
<tbody>
<tr>
<td>63CF</td>
<td>63CF</td>
<td>640-LLS-63-63-VP-600</td>
<td>POR</td>
</tr>
<tr>
<td>100CF</td>
<td>63CF</td>
<td>640-LLS-100-63-VP-600</td>
<td>POR</td>
</tr>
<tr>
<td>100CF</td>
<td>100CF</td>
<td>640-LLS-100-100-VP-600</td>
<td>POR</td>
</tr>
<tr>
<td>160CF</td>
<td>100CF</td>
<td>640-LLS-160-160-VP-600</td>
<td>POR</td>
</tr>
<tr>
<td>160CF</td>
<td>160CF</td>
<td>640-LLS-160-160-VP-600</td>
<td>POR</td>
</tr>
</tbody>
</table>

* Port numbers - see Table on left

Load Lock Systems can be supplied without Viewport or Gate Valve. If required, Customer's own fittings can be re-used to save cost. Please ask Sales Office for details.

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...Quick Access doors: Sec. 9......Magnetic Transporters: Sec. 9....