How to Specify a Cylindrical Vacuum Chamber

Quality | Precision | Service

STEP 1:
Specify the Material and Finish

MATERIAL OPTIONS:
- 304L Stainless Steel (standard)
- 316L Stainless Steel
- 6061 Aluminum

FINISH OPTIONS:
  Tubing Finish Options:
- Glass Bead-Blasted (standard)

- Mechanically Polished (Brushed)
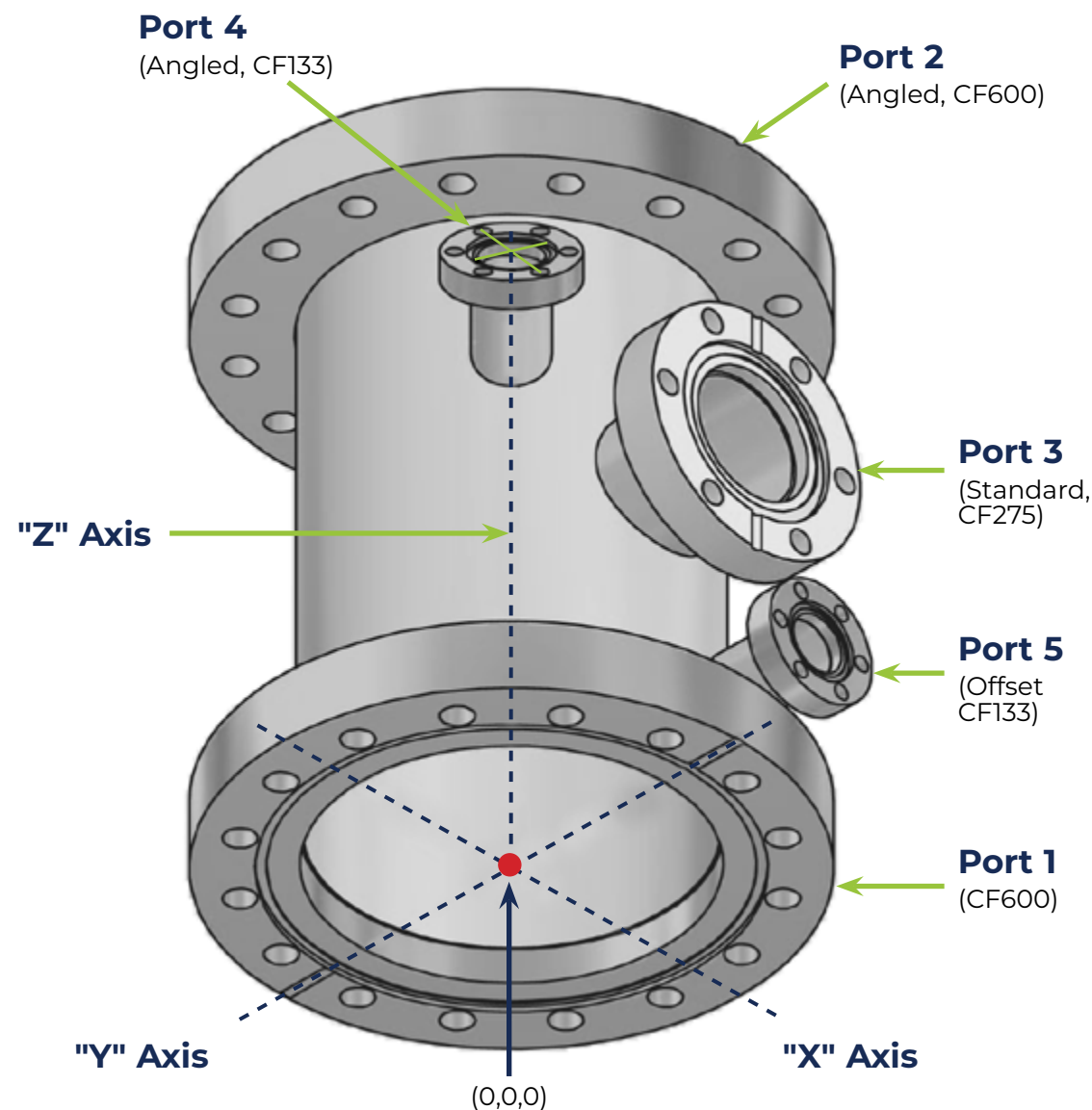- Electropolished

Flange Finish Options*
- Machined Finish (standard)
- Electropolished

*Sealing surfaces and knife edges are protected during any finishing process to ensure functionality.

Port 4
(Angled, CF133)

Port 2
(Angled, CF600)

"Z" Axis

Port 3
(Standard, CF275)

Port 5
(Offset CF133)

Port 1
(CF600)

"Y" Axis

(0,0,0)

"X" Axis

Figure 1:
Cylindrical Example Chamber with Port Numbers, Flange Type & Size, and 3D Cartesian Coordinate System (Isometric)

STEP 2:
Specify the Main Body

The **Main Body** of a cylindrical chamber is defined as the section comprised of the largest-diameter tubing segment and its associated flange terminations. On our **Cylindrical Example Chamber (Figure 1)**, the Main Body consists of **Port 1**, **Port 2**, and the section of tubing that connects them **(Figure 2)**.

A) SPECIFY THE MAIN BODY OVERALL LENGTH (OAL)
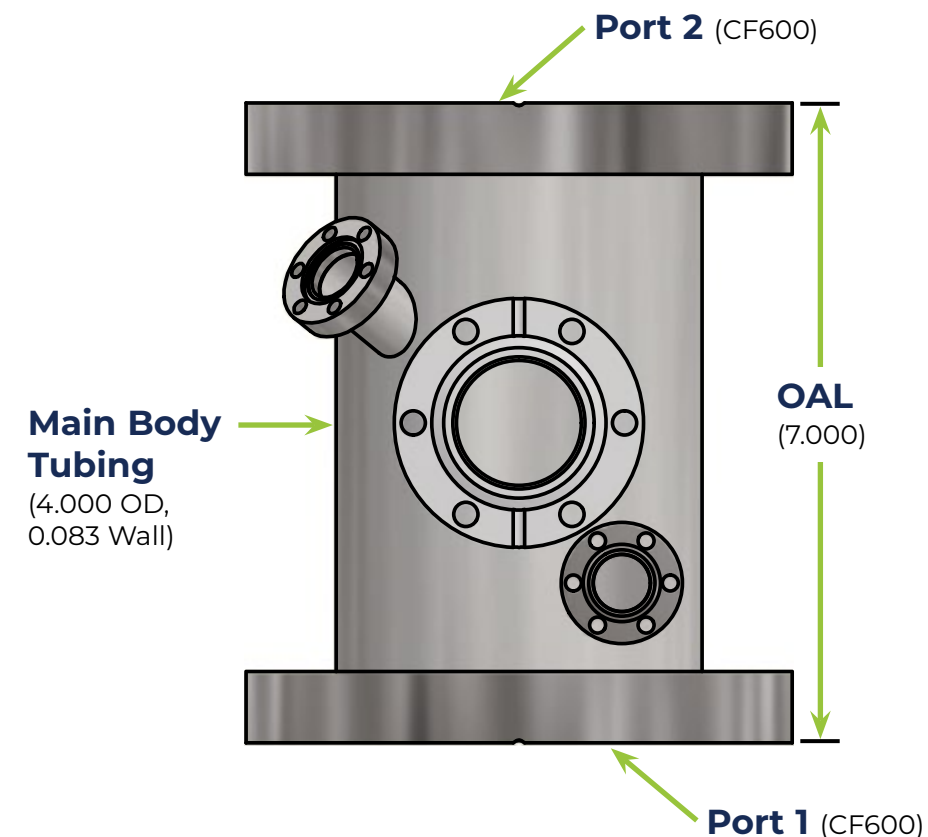The Main Body OAL is measured from flange face-to-flange face.

B) SPECIFY THE MAIN BODY FLANGES (Type and Size)
Please refer to the catalog for all possible flange sizes. Representative examples are provided in Table 2 on page 6.

C) SPECIFY MAIN BODY TUBING*
- Nominal Diameter
- Wall Thickness
*Pipe can be used in place of tubing upon request

Port 2 (CF600)

Main Body Tubing
(4.000 OD, 0.083 Wall)

OAL
(7.000)

Port 1 (CF600)

Figure 2:
Cylindrical Example Chamber with Main Body Items & Dimensions Labeled (Front)

STEP 3:
Specify the Side Ports

The **Side Ports** of a cylindrical chamber are those ports that branch off from the Main Body. On our Cylindrical Example Chamber (Figure 1), the Side Ports are Port 3, Port 4, and Port 5.

A) SPECIFY PORT FLANGES* (Type & Size)

Please refer to the catalog for all possible flange sizes. Representative examples are provided in Table 2 on page 6.

Each flange size has an associated standard tube size. Unless otherwise requested, this standard tube size will be used.

B) SPECIFY PORT LOCATION AND ORIENTATION

The following features and dimensions define a port's location and orientation on the cylindrical chamber **(Figures 3, 4, & 5)**:

FOCAL POINT: A port's Focal Point is a feature that helps define the port's orientation and focal length.
· Locate each Focal Point in space using a 3-dimensional Cartesian coordinate system.

AZIMUTHAL ANGLE: A port's **Azimuthal** Angle defines its angular position along the circumference of the cylindrical chamber.
· Specify each port's **Azimuthal Angle** relative to a common azimuthal origin.

POLAR ANGLE: A port's **Polar Angle** defines its angular orientation relative to the Z-Axis of the Main Body.
· Specify each port's Polar Angle relative to a common polar origin

OFFSET DISTANCE: A port's **Offset Distance** defines how far its Focal Point is from the Z-Axis of the Main Body. This distance can be defined along the X-Axis or the Y-Axis of the Main Body.
· Specify each port's Offset Distance

FOCAL LENGTH: A port's Focal Length defines the linear distance between the port's flange face and Focal Point.
· Specify each port's Focal Length relative to its flange face and its established Focal Point.

ORIENTION: A port's Orientation is a term that quickly describes key qualities of the port. There are four different orientations that can describe a port:

· **Standard:** (e.g., Port 3)
   o Polar Angle equals 90-degrees
   o Focal Point lies on the Z-Axis of the Main Body

· **Angled:** (e.g., Port 4)
   o Polar Angle does not equal 90-degrees
   o Focal Point lies on the Z-Axis of the Main Body

· **Offset:** (e.g., Port 5)
   o Polar Angle equals 90-degrees
   o Focal Point does not lie on the Z-Axis of the Main Body

· **Angled-Offset:** (no example shown)
   o Polar Angle does not equal 90-degrees
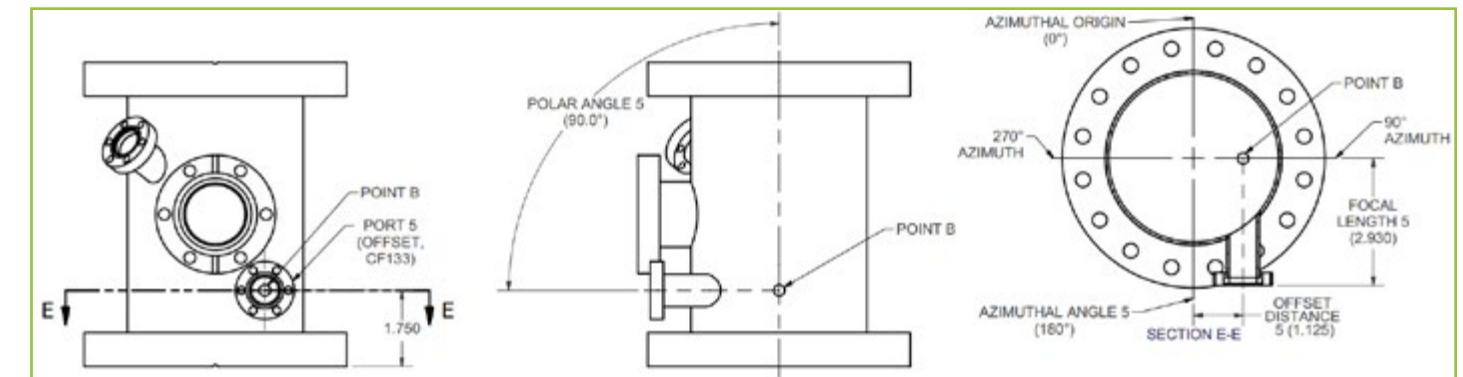   o Focal Point does not lie on the Z-Axis of the Main Body

Table 1 on page 5 summarizes all the information needed to specify the Side Ports on our Cylindrical Example Chamber.
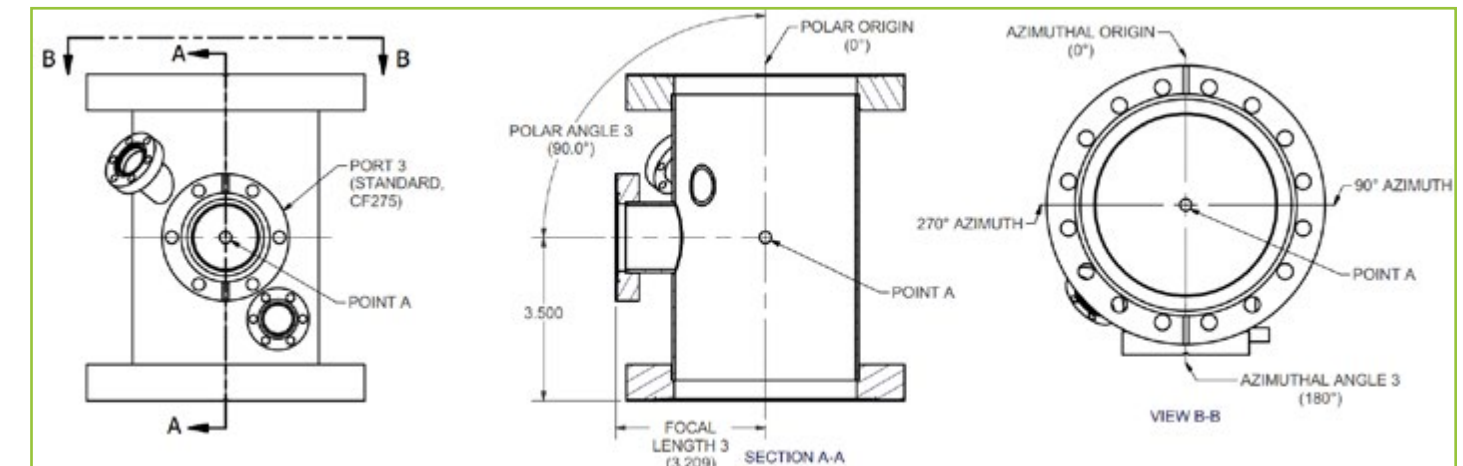
Figure 3: *Cylindrical Example Chamber - Features and Dimensions of a Standard Port (e.g., Port 3)*
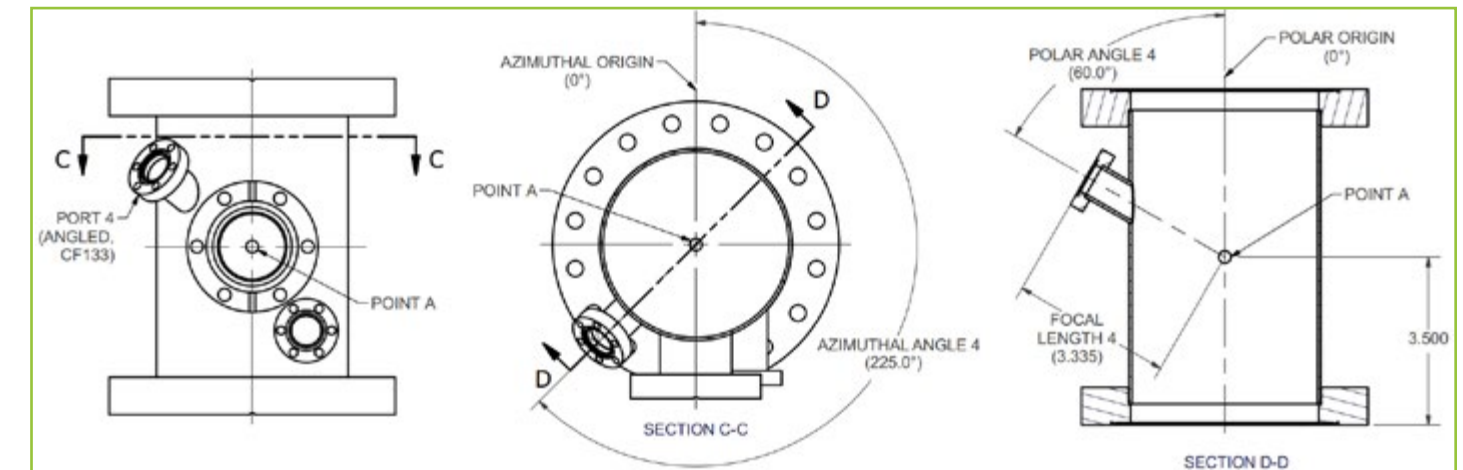
Figure 4: *Cylindrical Example Chamber - Features and Dimensions of an Angled Port (e.g., Port 4)*

Figure 5: *Cylindrical Example Chamber - Features and Dimensions of an Offset Port (e.g., Port 5)*

Table 1: *Side Port Specifications for Cylindrical Example Chamber*

Port	Flange	Orientation	Focal Pt.	Focal Pt. Coordinates (X,Y,Z)	Polar Angle	Azimuthal Angle	Offset Distance	Focal Length
3	CF275	Standard	Point A	(0.000, 0.000, 3.500) in.	180.0°	90.0°	0.000 in	3.209 in.
4	CF275	Angled	Point A	(0.000, 0.000, 3.500) in.	225.0°	60.0°	0.000 in	3.335 in.
5	CF133	Offset	Point B	(1.125, 0.000, 1.750) in.	180.0°	90.0°	1.125 in	2.930 in.

Table 2: *Flange Types, Sizes, Vacuum Ratings, and Temperature Ratings*

Flange Type	Flange Sizes	Vacuum Rating	Temperature Range
CF - ConFlat	133, 212, 275, 338, 450, 462, 600, 675, 800, 1000, 1200, 1325, 1400, 1450, 1650	1×10^{-13} Torr	-200°C to 450°C
WF - Wire-Sealed	1200, 1400, 1700, 1900, 2200, 2700	1×10^{-13} Torr	-200°C to 450°C
QF - Quick Flange	10 ,16, 25, 40, 50, 63, 80, 100, 160, 200	1×10^{-8} Torr	-50°C to 200°C
LF - Large Flange (Clamp)	63, 80, 100, 160, 200, 250, 320, 400, 500	1×10^{-8} Torr	-50°C to 200°C
LFB - Large Flange (Bolt)	63, 80, 100, 150, 200, 250, 320, 400, 500	1×10^{-8} Torr	-50°C to 200°C
ASA	100, 150, 200, 300, 400, 600, 800, 1000	1×10^{-8} Torr	-20°C to 200°C

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