What is the minimum volume for the demountable transmission liquid cells?

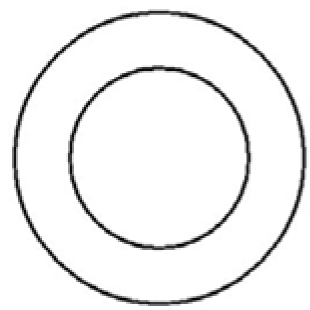
There is no such thing as a discrete single value "minimum volume" as such. The volume that would be needed to fill the cell so that the infrared incident beam fully samples or "sees" liquid within the aperture of the cell would be determined by the pathlength of the cell---i.e., by the thickness of the spacer.

Additional sample volume may be needed to fill the inlet and outlet of the cell, depending on the application and type of fitting:

- Luer fitting cells are usually filled from the bottom Luer fitting to eliminate bubble formation, so that additional volume is essentially the volume of one Luer fitting and the hole between the fitting and the inside of the cell.
- Swagelok and flangeless fittings are designed for flow applications. So technically the minimum volume needed to fill these cells depends on the lengths of tubing attached. However, for many flow applications, the more important number is not really the total volume of liquid but rather the volume of liquid sampled.

VOLUME OF THE SAMPLED AREA OF LIQUID

Typical Spacer (uncut)



The volume of liquid in the cell for a given pathlength (spacer thickness) as a first approximation would be the volume that contains the liquid inside the cell. The liquid is essentially contained within the spacer which, in the first approximation, is the volume contained within the cylinder defined by the inner diameter of the spacer and the spacer thickness.

The volume of the cylinder, V, is:

$$V = \pi r^2 h$$

where r is the radius of the cylinder and h is the height. The radii for the various cells are listed in the table below and the spacer thickness is also known.

Cell Part Number	Window Diameter (mm)	Inner Radius of the Spacer (mm)	Cell Part Number	Window Diameter (mm)	Inner Radius of the Spacer (mm)
DLC-F13-062	13	4	TFC-M13-3	13	4
DLC-F13-125	13	4	TFC-M25-3	25	10
DLC-L13	13	4	TFC-S13-3	13	4
DLC-M13	13	4	TFC-S25-3	25	10
DLC-M25	25	10	HPL-C-13	13	4
DLC-S13	13	4	HPL-TC-13	13	4
DLC-S25	25	10			

For example, the volume within the cell for a cell using a 13 mm diameter window and a 100 µm thick spacer is:

$$V \text{ in mm}^3 = \pi \text{ (inner radius of the spacer in mm)}^2 \text{ (thickness of spacer/pathlength in mm)}$$

$$V = \pi (4^2) (0.1) = 5.025 \text{ mm}^3 = 5.025 \text{ µL } 0.00502 \text{ cm}^3 = 0.00502 \text{ mL}$$

Note that this does not take into account the little gaps in the spacers that are cut to permit flow of liquid or the volume of the inlet and outlet of the cell.

ADDITIONAL VOLUME

For the total volume of the cell, presumably the gap between the spacers would need to be added along with the volume of the hole in the cell body and the volume of the fittings or tubing on the cell.

What is the minimum volume for the demountable transmission liquid cells?

The gap between the spacers depends on how the spacer is cut. If the washer is cut with essentially a rectangular cut-out, the additional volume can be approximated as that of a rectangle:

$$V = L * W * H$$

where L and W are the length and width of the gap in the spacer and H is the thickness.

The additional volume for the fittings and hole in the cell body are shown in the table below for some of our offerings.

Cell Part Number	Estimated Volume (in^3)	Estimated Volume (mL)	Cell Part Number	Estimated Volume (in^3)	Estimated Volume (mL)
DLC-M13	0.0193	0.3163	TFC-M13-3	0.0193	0.3163
DLC-M25	0.0184	0.3017	TFC-M25-3	0.0184	0.3017
DLC-S13	0.0296	0.4844	TFC-S13-3	0.0296	0.4844
DLC-S25	0.0264	0.4328	TFC-S25-3	0.0264	0.4328
DLC-F13-062	0.0010	0.0172	HPL-C-13	0.0163	0.2671
DLC-F13-125	0.0010	0.0172	HPL-TC-13	0.0163	0.2671
DLC-L13	0.0201	0.3294			

Note that the cells with Swagelok fittings have larger volumes due to the lengths of tubing attached to the cells. The tubing supplied with the DLC-F13-062 and DLC-F13-125 ha an inner diameter of 0.0300” and 0.0625” respectively