

MOCVD – Note on VCR gasket installation

The installation procedure consists of the alignment of the VCR fittings with the VCR gasket, hand-tightening the fittings, then tightening it 1/8 to 1/4 turn by wrenches. The exact amount of tightening depends on the gasket (see below for a detailed discussion). Several issues need to be considered when putting together VCR fittings with VCR gaskets:

- There are three kinds of common gaskets. They are made of stainless steel, nickel, and copper. Select the proper gaskets based on the application or on the manufacturer's recommendations.
- Check the surface of the gaskets (Use stereo microscope) before you put them in. Any visible dust or scratch will result in a leak.
- Alignment is very critical in order to avoid any kind of leak. If it is difficult to align the fittings with the gasket in place due to the positioning of the tubing, a gasket with a *retainer assembly* can be used. The retainer assembly is clamped onto the fittings to reduce the amount of effort needed and to reduce the misalignment risk.



Figure 1: Gasket with and without retainer assembly.

- Hand-tight is not that straightforward when there is strong tension between the tubings. Some small bending or wiggling may help to get a good hand-tight fitting.
- For a copper gasket, 1/4 turn is recommended. But for either a stainless steel or nickel gasket, between 1/8 turn and 1/4 turn is already good enough to prevent any leak.
- An example based on a stainless steel gasket is as follows:

The thread pitch of the fitting is 1.16 mm;

The thickness of 1/4 inch gasket is 0.7 mm;

1/8 turn means the gasket is compressed in by: $(1.16 \text{ mm}/8) \div 0.7 \text{ mm} = 21 \%$

1/4 turn means the gasket is compressed in by: $(1.16 \text{ mm}/4) \div 0.7 \text{ mm} = 42 \%$

1/2 turn means the gasket is compressed in by: $(1.16 \text{ mm}/2) \div 0.7 \text{ mm} = 84 \%$.

From above discussion, it is clear that 1/2 turn is too much for stainless steel gaskets.

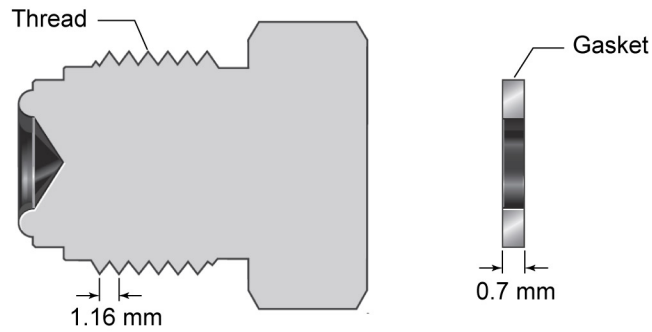


Figure 2: VCR fitting cross section.

- In our laboratory, we use silver-plated stainless steel gasket and nickel gaskets for MOCVD applications. Silver-plated stainless steel gaskets are used for our MOCVD system except for the hydrogen purifier. Nickel gaskets are used for the hydrogen purifier as recommended by the manufacturer.