



TIP Number 9 - Multi-Port Manifolding Recommendations

Of the various methods of connecting vessels together **direct connection** without intermediate pipe section and additional coupling is the most difficult. This guide should be read in conjunction with existing **User Guides** which already describe the connection of a 2 ported side ported vessel using intermediate pipe section and coupling.

The direct connection method is often referred to as **Multi-Porting**. It requires more care to control connection tolerances in order to meet the required 0.75mm **misalignment tolerance** per coupling and 2.5mm to 3.2mm **Port to Manifold clearance** (see illustration).

Note: This clearance is described as port to manifold clearance even though the use of multiports eliminates the need for long manifolds connected to each vessel – the port to manifold clearance is then only found on the first vessel but the principle (and terminology used) still applies to all subsequent side port connections.

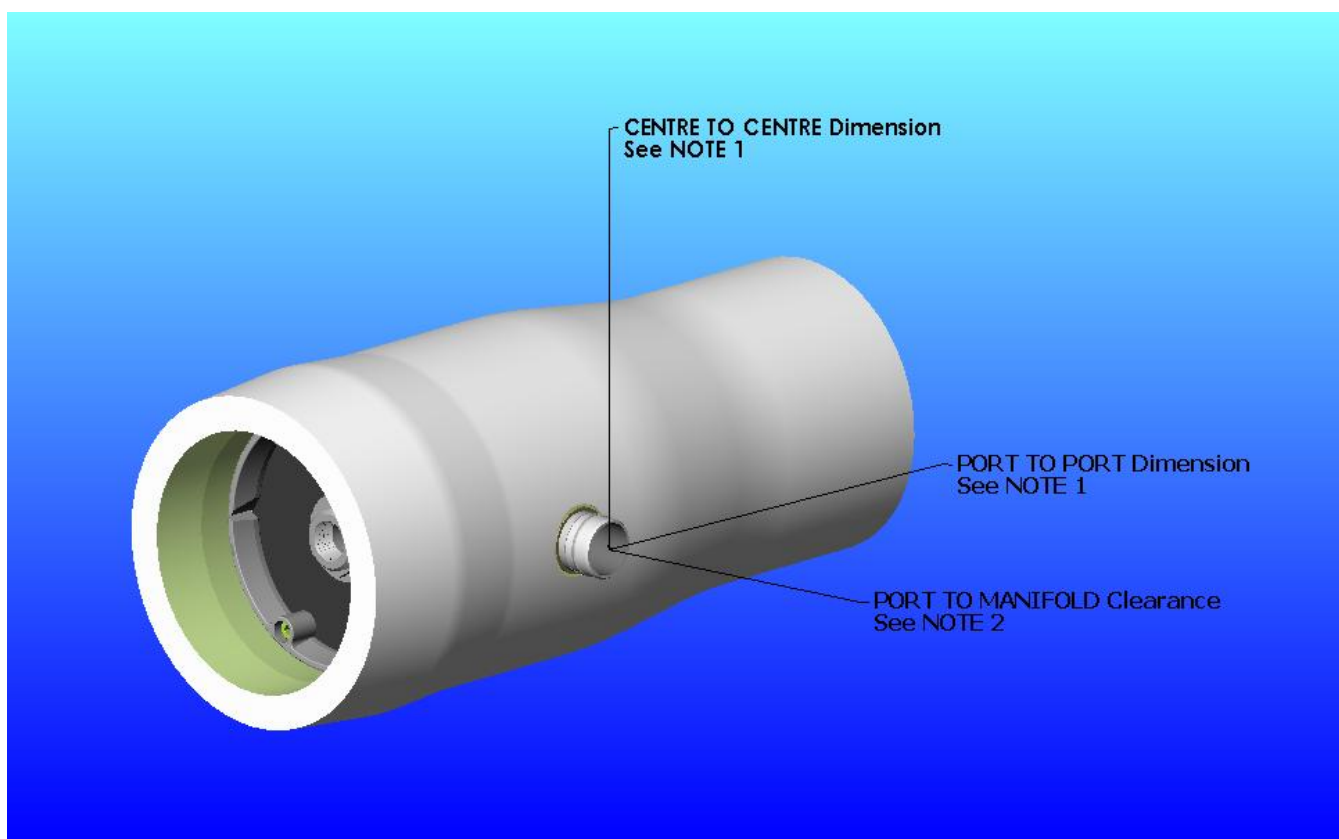
If the misalignment tolerance is not maintained the effect can be leverage on the port which exerts higher than expected load into the vessel shell and reduces the seal compression on the inside bore of the vessel.

If the port to manifold clearance is less than required, the difference is made up by the port being forced inwards which reduces the seal contact area and may cause leaks.

It is possible to have a combination of misalignment and incorrect port to manifold clearance.

DO's:

- (1) Leave the vessel straps loose until all pipework has been attached.
- (2) Centre the vessel between the feed and reject manifold or between any pair of directly connected vessel ports to ensure that inherent misalignment is halved between any two ports.
- (3) Consider placing thin shims 0.5-1.5 mm under the saddles so that vessel height can be adjusted. This may be required to achieve the 2.5 to 3.2 mm port to manifold clearance. In extreme cases the saddle feet may need to be removed using a hacksaw so that the vessel height can be reduced.
- (4) Connect to manifolds in an orderly manner (eg starting at the coupling which connects the feed manifold to the first vessel or the reject manifold to the last vessel).
- (5) Arrange for adjustment in the height and position of the manifolds whilst at the same time ensuring that it is self supporting.
- (6) Expect the vessel to grow in length by at least 4mm (for a 7 element length) when under pressure.
- (7) Consider thermal expansion if temperature variations are likely.
- (8) Make sure that the end face of all pipework is square and parallel before connecting.
- (9) Give priority to the high pressure connections before connecting the permeate pipework.



Note 1 – Alignment to be within 0.75mm per connection

Note 2 – Clearance to be between 2.5 and 3.2mm per connection.

For more information regarding this TIP please contact Phoenix Vessel Technology via b.dunn@phoenixvessel.co.uk .