



the corrosion expert

Venting Systems



Inappropriate or no venting can lead to premature failure of lined piping and therefore cause both unnecessary plant cost and present a safety hazard. CRP has an all-inclusive approach for managing both permeant and non-permeant services and insulated and uninsulated lines. This will provide longevity in service - assisting in preventing liner failure and external steelwork corrosion.

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The purpose of Venting

Venting is required in the two key PTFE lined pipe and fittings specifications ASTM F1545 and DIN2874. There are two user reasons for venting:

- First, to vent the space between liner and steelwork of any material (liquid or gas) that may collect behind the liner. Such liquid or gas build up can occur by means of permeation through the liner. Permeation rates can be significantly affected by the choice of which PTFE or PFA to use – CRP would always recommend PFA for pipe fittings and UltraHiPerFlon (UHP) for PTFE lined piping. However, even with such lining systems it is still necessary to guard against the effects of permeation.
- Secondly, as an early indicator of failure. In the unlikely event of a liner failure the steel housing is likely to corrode evenly within the pipe and cause a catastrophic and unannounced failure of the complete pipe. With a venting system, the leaking materials should show at the vent first, providing some opportunity to take the equipment out of service before massive failure.



Cut steel pipe showing PTFE lined collapse through blocked vent holes

Corrosion of the vent hole area following permeation and no particular corrosion protection



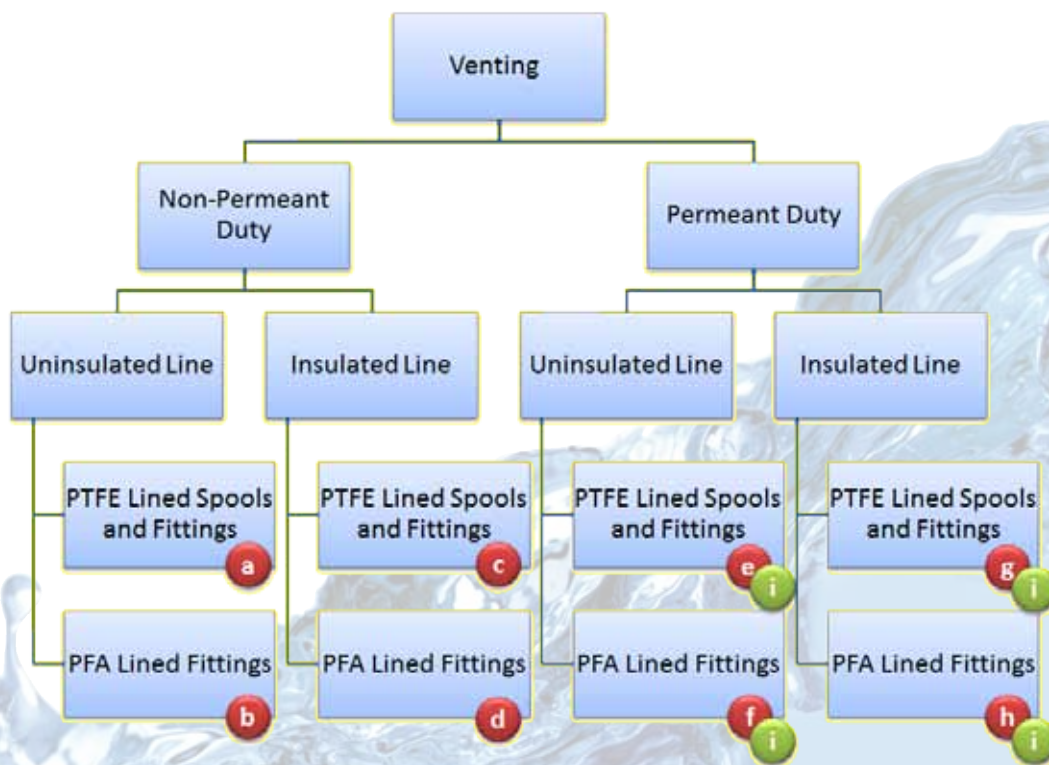
Venting Types

The key consideration is whether the duty is for a permeating or non-permeating duty. If the duty is non-permeating then the venting system only needs to provide the leak detection function. However, if it is permeating then it has to be capable of managing the evacuation of permeant materials from the inside of the item without weakening the steelwork. If not, the steelwork will be weakened to the point of making it unsafe as in the photograph opposite.

Once the duty has been determined one needs to decide if the line is to be insulated or not.

Insulation may be selected for process control reasons – keeping the process cold or hot, or to assist in managing permeation by moving the dew point out of the lining material. Either way whether the line is or is not carrying a permeant media it is necessary to carry the vent to the outside of the insulation such that leakage or permeation is not discharged within the insulation.

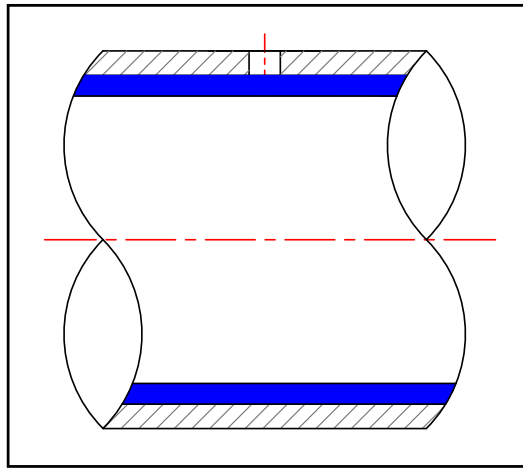
Some variation in the system is then driven by whether the component is PTFE or PFA lined and in the case of pipe spools by their length.



Non-Permeant Duty Uninsulated Line

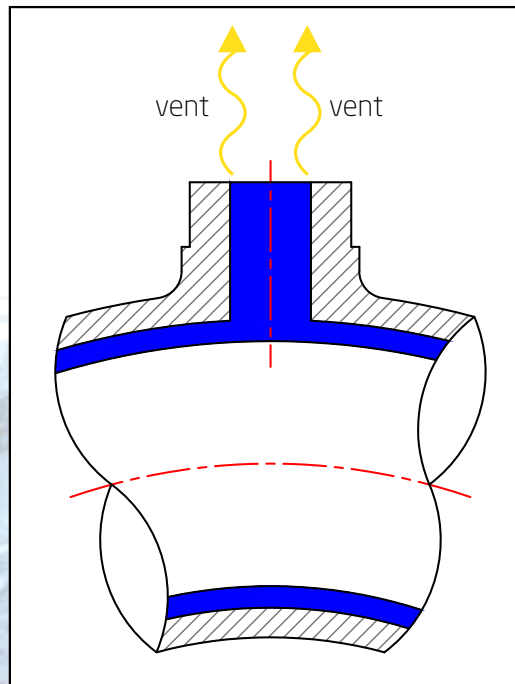
PTFE Lined Spools and Fittings [a]

CRP as standard provides 5mm vent holes versus the more traditional 3mm (1/8"). These are much more effective being less likely to get blocked by paint, steel corrosion or the crystallisation of permeant media and therefore prevent catastrophic failure through liner collapse. Vent holes are placed on one side of spools only and the holes are positioned to make the routing of venting through insulation jackets simple.



PFA Lined Fittings [b]

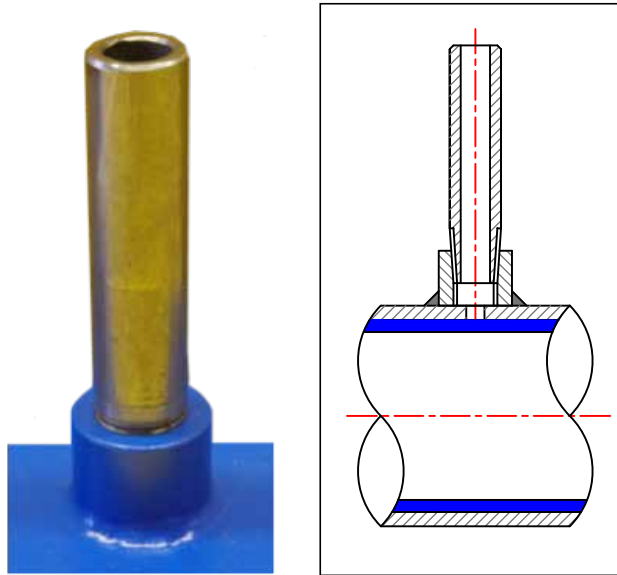
The injection port on a PFA fitting works as a vent in its own right, with a route to atmosphere around the circumference of the PFA.



Non-Permeant Duty Insulated Line

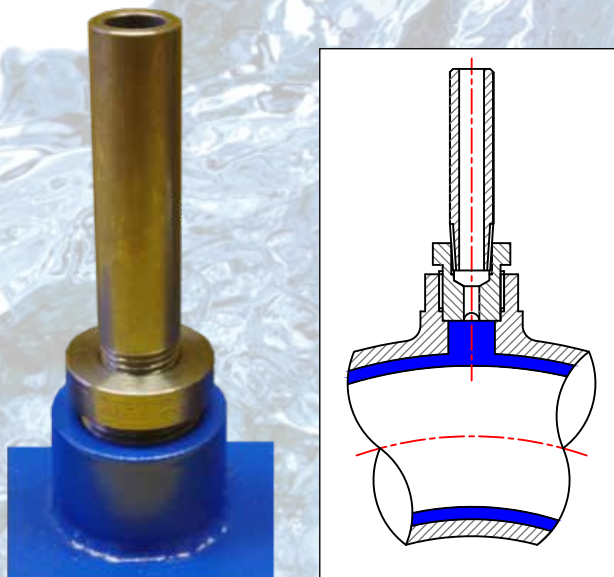
PTFE Lined Pipe Spools and Fittings [c]

A simple threaded $\frac{1}{4}$ " BSPP half coupling is welded over each 5mm vent hole and a carbon steel taper threaded pipe is provided to screw into this. The assembled length is 70mm but special lengths can be supplied.



PFA Lined Fittings [d]

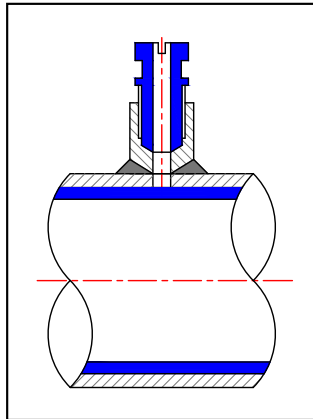
A steel reducer is fitted to the PFA injection boss of the fitting and a carbon steel taper threaded pipe is provided to screw into this. The reducer has a cross slot in a flat bottomed base to provide a route from the lining/steel boundary to atmosphere. The assembled length is 85mm, but special lengths can be supplied.



Non-Permeant Duty Uninsulated Line

PTFE Lined Pipe Spools and Fittings [e]

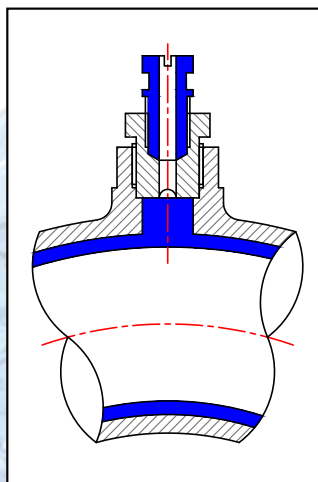
A purpose made 5mm hole vent boss is welded to the pipe, with a tapered internal geometry to prevent any dead space arising in the assembly. Into this is fitted a PTFE vent plug, with a screwdriver slot for fixing and a drip lip to prevent potentially corrosive liquor vented from the plug running back along the outside of the plug and corroding the vent boss.



This is designed to accept a 5mm PTFE tube for carrying any corrosive liquor to somewhere more harmless to the plant.

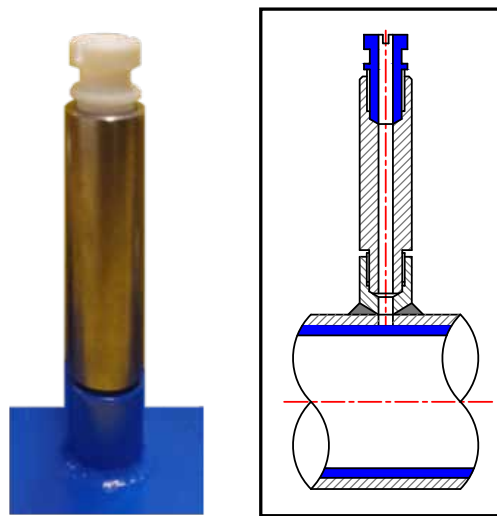
PFA Lined Fittings [f]

The injection port on a PFA lined fitting works as a vent in its own right, with a route to atmosphere around the circumference of the PFA. No other measures are required as permeation through PFA lined fittings is none or very limited. For those customers requiring support for the PFA injection boss a steel adaptor is fitted to the injection port incorporating a flat bottom and cross slot in the base. This prevents the vent route from sealing and avoids dead space within the fitting. A PTFE vent plug is fitted to this adaptor. This design therefore manages permeation if present, together with providing mechanical support for the PFA injection boss.



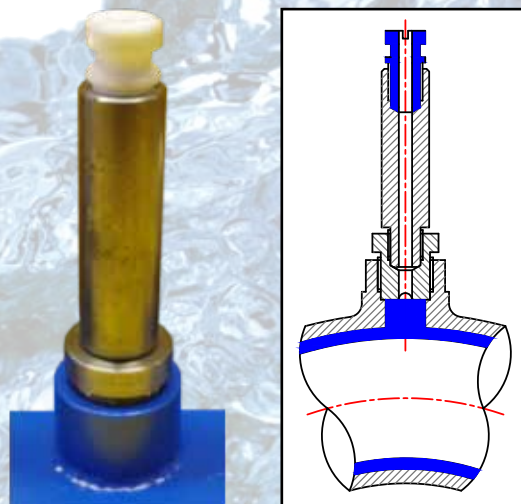
PTFE Lined Pipe Spools and Fittings [g]

A purpose made 5mm hole vent boss is welded to the pipe, with a tapered internal geometry to prevent any dead space arising in the assembly. A steel vent extension is fitted with the same geometry as the vent boss. Into this is fitted a PTFE vent plug, with a screwdriver slot for fixing and a drip lip to prevent potentially corrosive liquor vented from the plug running back along the outside of the plug and corroding the vent boss. The assembled length of the steel vent extension is 80mm but special lengths can be supplied.



PFA Lined Fittings [h]

A steel adaptor is fitted to the injection port and incorporates a flat bottom and cross slot in the base. The new adaptor has a 5mm hole to prevent blockage. A vent extension with a 5mm hole is fitted and the new style PTFE vent plug with 5mm hole, drip lip mounted above. The assembled length of the steel vent extension is 90mm but, special lengths can be supplied.



Variable Angle Vent [i]

It is not always possible to direct the vents on lined piping away from walkways, stairwells or open floors. Also vents are often positioned pointing upwards which can allow atmospheric moisture to pool in the hole. This can assist corrosion and cause staff to think they have a process leak when they don't. To resolve these a vent has been developed which simply clips onto the top of the PTFE vent plug and can be directed in any particular direction with a simple twist. Again, this is designed to accept a 5mm PTFE tube for carrying any corrosive liquor to somewhere more harmless to the plant.

