TECHNICAL NOTE

How to Detect Leaks on the Backside of a Joint with the Protec P3000(XL)

LEAK RATE SIGNAL FOR FRONT SIDE OF A JOINT

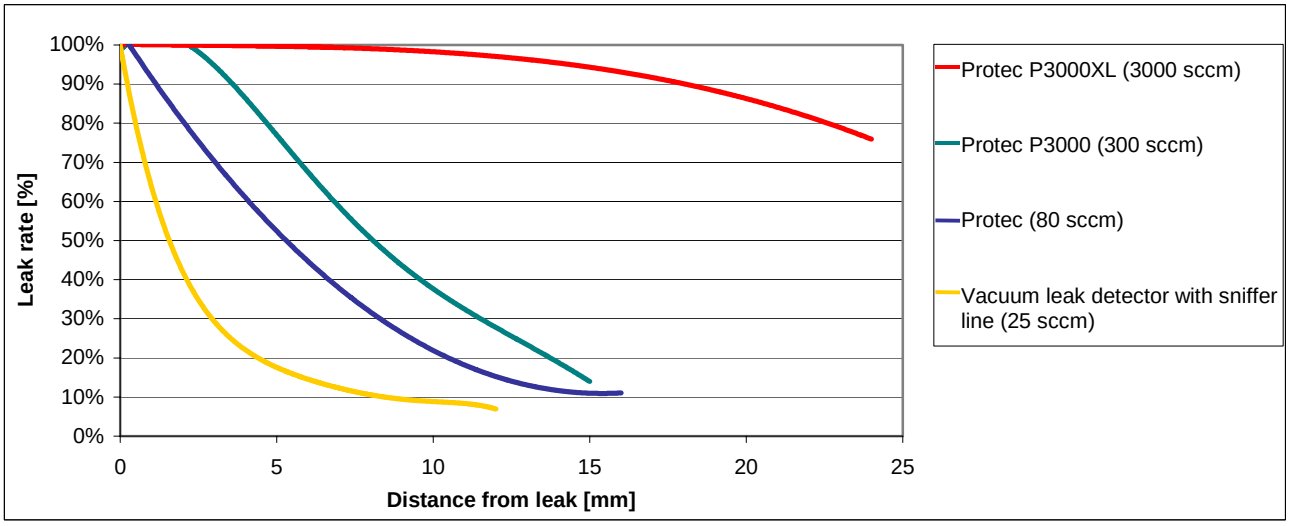
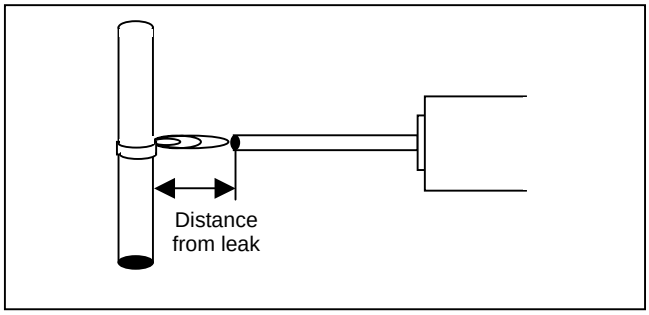


Fig. 1: Leak rate signal for leaks on front side of a joint

If a leak occurs on the front side of the joint the size of the leak rate signal strongly depends on the flow through the sniffer line. As indicated in Fig. 1 the Protec P3000XL with its high flow can detect leaks to their full size almost up to 10 mm (0.4 in.) away from the joint and will still detect about 70% of the leak rate signal in about 25 mm (1 in.) distance from the joint.

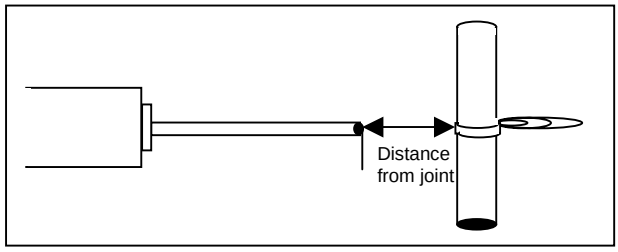


The Protec P3000 with its 300 sccm flow will detect reasonable signal (about 50% of the real leak rate) up to about 8 mm (0.3 in) distance from the joint whereas the Protec (obsolete!) detected 50% of the leak only up to 5 mm (0.2 in.). A standard vacuum leak detector with a typical sniffer line (25 sccm) will detect leaks reasonably well up to 2 mm away from the joint.

The above mentioned distance does not only apply to a perpendicular distance from a leak but also to a transversal distance, i.e. if you pass the sniffer tip along the potentially leaking location, you may detect the leak already when you are still quite some distance away from the real leak location with the Protec P3000XL. The Protec P3000 will show the next best behavior whereas a vacuum leak detector with standard sniffer line will almost only detect leaks when right on the leak.

LEAK RATE SIGNAL ON BACKSIDE OF A JOINT

If the leak is located on the back side of the joint, the sniffer line needs to make sure that the helium is taking in also with the tube itself as an obstacle in-between.



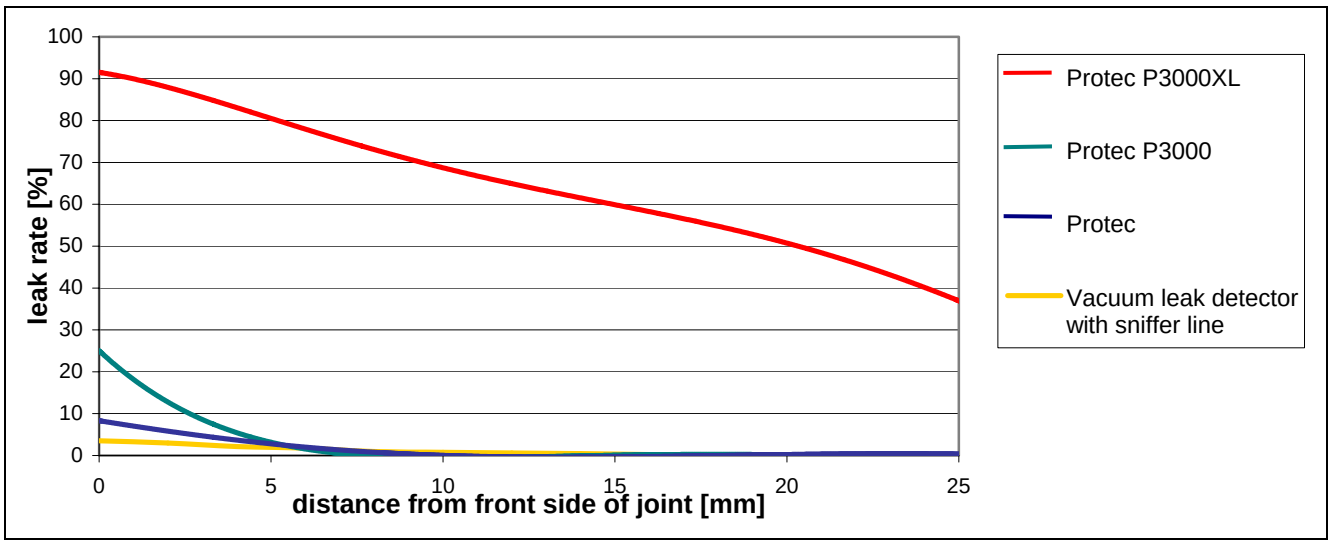


Fig. 2: Leak on backside of 6 mm (0.25 in) tube joint, leak size $2*10^{-5}$ mbarl/s helium (i.e. 5 g/a R134a)

Fig. 2 shows the detected leak rate signal for a 6 mm (0.25 in.) tube diameter and $2*10^{-5}$ mbarl/s helium leak (equivalent to 5 g/a R134a).

With the sniffer tip placed directly on the front surface of the joint, the Protec P3000XL will detect 90% of the correct leak rate signal. The Protec P3000 will show about 25% whereas the obsolete Protec and a vacuum leak detector with standard sniffer line will more or less not detect the leak at all.

The Protec P3000XL will still give reasonable leak rate signals (> 50%) even when being at about 20 mm (0.8 in.) from the joint.

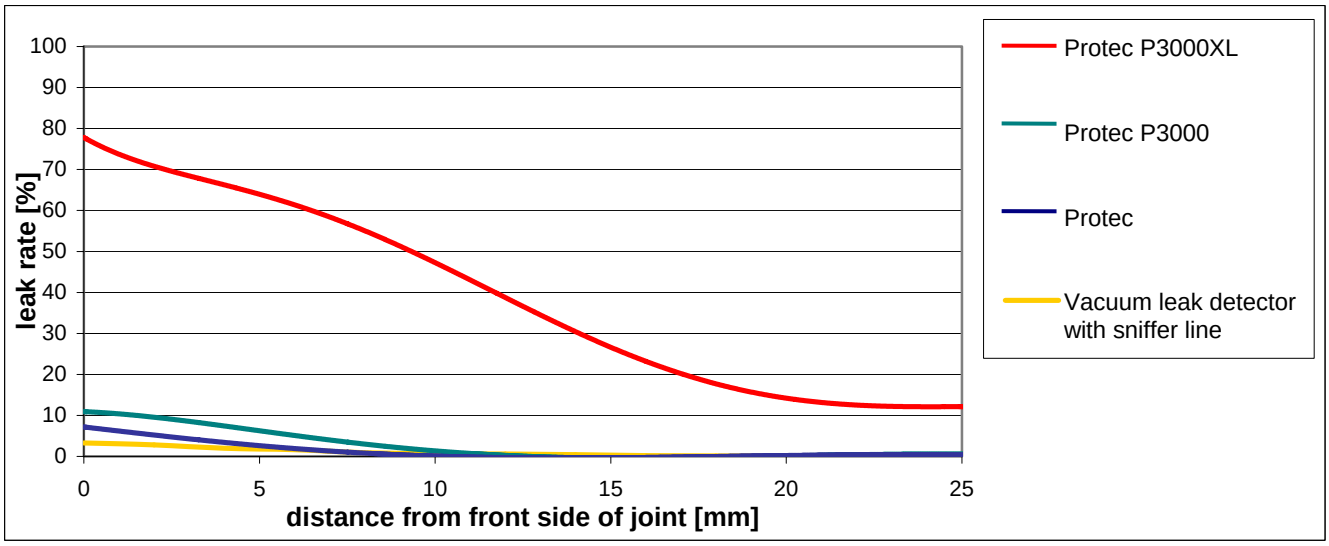


Fig. 3: Leak on backside of 11 mm (0.45 in) tube joint, leak size $2*10^{-5}$ mbarl/s (i.e. 5 g/a R134a)

Fig. 3 shows the detected leak rate signal for a larger 11 mm (0.45 in.) tube diameter and $2*10^{-5}$ mbarl/s helium leak (equivalent to 5 g/a R134a). With the sniffer tip placed directly on the front surface of the joint, the Protec P3000XL will detect 80% of the correct leak rate signal. The Protec P3000 will show about 12% whereas the obsolete Protec and a vacuum leak detector with standard sniffer line will more or less not detect the leak at all.

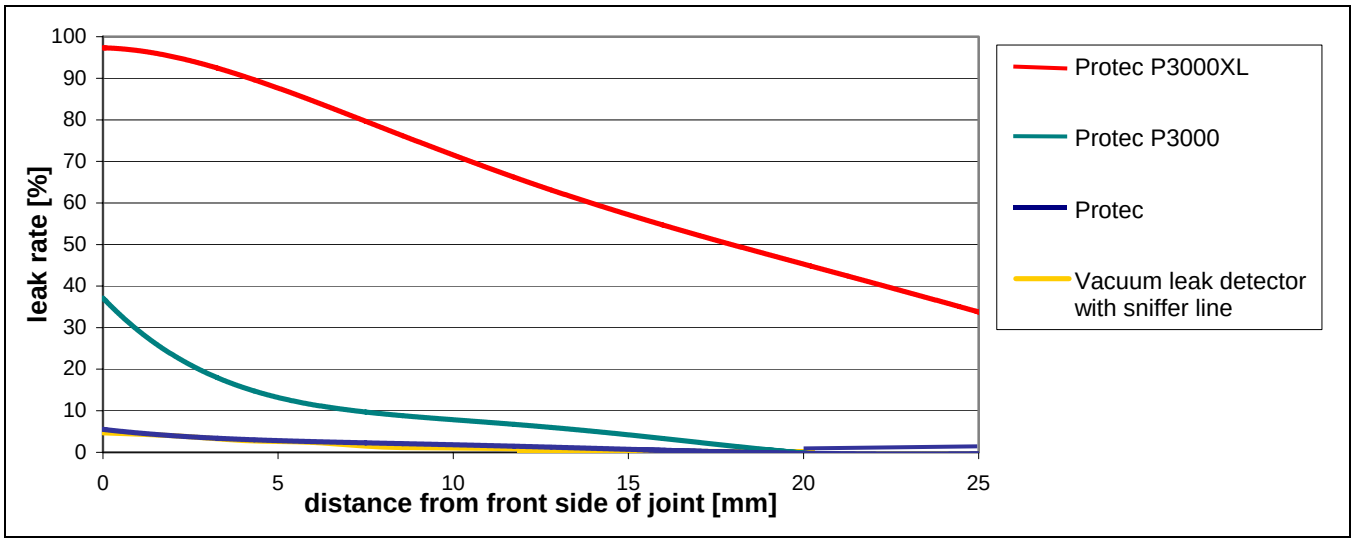


Fig. 4: Leak on backside of 6 mm (0.25 in.) tube joint, leak size 1*10^{-4} mbar l/s helium leak (i.e. 22 g/a R134a)

For a larger leak of 1*10^{-4} mbarl/s (approx. 22 g/a R134a) and a small tube of 6 mm (0.25 in) diameter the Protec P3000Xl will detect almost 100% right on the joint. The Protec P3000XL will still detect almost 50% at 20 mm (0.8 in.) distance from the joint. The Protec P3000 at 300 sccm flow will still detect 40% when right on the joint but the leak signal will decrease fast when placing the sniffer tip further from the joint. At approx. 2.5 mm (0.1 in) the leak rate signal has already dropped to about 20%. The obsolete Protec and a vacuum leak detector with standard sniffer line will almost not detect this leak, even when right on the joint.

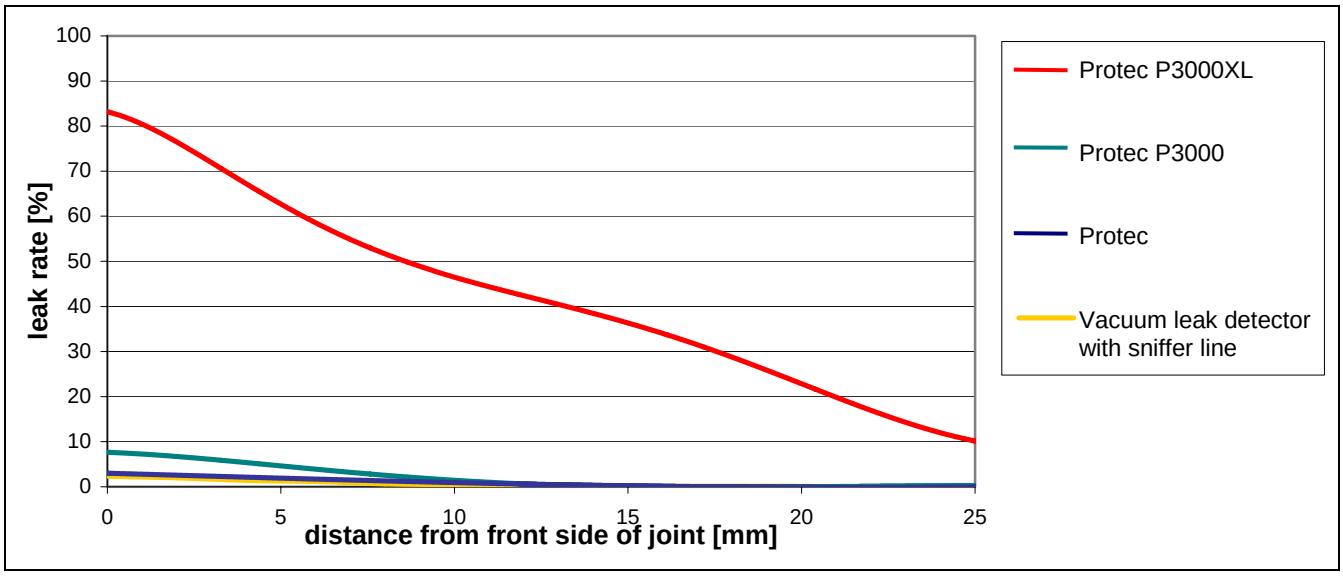


Fig. 5: Leak on backside of 11mm (0.45 in.) tube joint, leak size 1*10^{-4} mbar l/s helium leak (i.e. 22 g/a R134a)

For the larger leak and a larger tube of 11 mm (0.45 in.) diameter the Protec P3000XL will still detect almost 85% of the leak rate signal on the opposite side of the joint. The decrease in leak rate with distance from the joint will be faster than for the smaller diameter tube but the Protec P3000XL will still detect almost 50% of the leak rate at about 10 mm (0.4 in.) from the joint. The Protec P3000 will detect about 8% when right on the joint but leak rate signal will soon decrease to impractical levels with increasing distance. The obsolete Protec and a vacuum leak detector with sniffer line will more or less not detect the leak at all.

CONCLUSION

- The Protec P3000XL can detect leaks on the front side as well as the backside of the joint reliably and even at some distance from the leak.
- The Protec P3000 can detect leaks reliably on the front side for small and larger tube diameters as well as on the backside of the joint for smaller tube diameter. It can also detect leaks at some distance from the leak if the leak is on the front side of the joint.
- For both Protec P3000XL and Protec P3000 the size of the signal detect is influenced mainly by the tube diameter and not so much by the absolute size of the leak.
- The obsolete Protec could detect leaks on the front side of leak reliably and at some small distance from the leak if the leak is on the front side of the joint. The obsolete Protec could not detect leaks on the backside of a joint.
- A vacuum leak detector with a standard sniffer line (25 sccm) can detect leaks on the front side of a leak at a very close distance from the leak. It cannot detect leaks reliably at some distance from the leak and it can also not detect leaks on the backside of a joint at all.

Two Technology Place, East Syracuse, NY 13057 USA
Tel: +1.315.434.1100 Fax: +1.315.437.3803 E-mail: reachus@inficon.com

