

## Why have Testo removed the Sight Glass from their Digital Manifold range?



The guidance is clear, if you are a refrigeration engineer and need to leak detect or undertake strength testing on a refrigeration system, **then you should not be using a refrigeration manifold with a sight glass.** This is the advice from the HSE - ('A Study of Current Working Practices for Refrigeration Field Service Engineers 2011') and the IOR (Institute of Refrigeration - 'Good Practice Guide 24').

So what is the issue with manifold sight-glasses? Is it really the case that it is not safe to use manifolds with sight-glasses when leak detecting or strength testing a system, or is it a classic example of the Health and Safety culture gone mad?

To assess properly why the advice has been issued we need to look a little at the history and attempt to understand the rationale behind the advice. A quick search on web forums for refrigeration/air con or even a conversation with experienced refrigeration engineers and it is not difficult to come across tales of those who have suffered injuries caused by exploding sight-glasses, the result of which can leave the victim with glass embedded in the hands, body and /or face.

**Most injuries, in fact, occur due to operator error rather than instrument failure;** the most common cause of the accident is over-pressurising of the system using OFN (Oxygen Free Nitrogen), less common, is the use of incorrect refrigerants or instrument (manifold) failure through a faulty sight glass. Whether these injuries are caused by user error, lack of training, or by instrument defect is to some extent irrelevant; the fact is, the injury has been caused by the sight-glass failing and the injury may not have occurred if the manifold used did not have a sight-glass. Although there are certainly examples of failing glasses and both anecdotal and reported injuries, it took a fatality in 2004 before refrigeration engineers' working practices were looked at in depth and for the HSE to issue guidance on best practice for the whole process of leak detection and strength testing, of which, the manifold and issue of sight-glasses is just one part.

Opinion on the benefits of using a manifold with a sight-glass is mixed. The sight glass is irrelevant for pressure and strength testing; obviously if using OFN there is no liquid to see anyway, however, many engineers will say the sight-glass is also not necessary for other applications where refrigerant is in the system, as the manifold sight-glass is only duplicating what the in-line sight glass shows anyhow. Other engineers claim that having a sight glass has clear benefit, because it allows the engineer to assess the condition of the refrigerant i.e. to see if it is contaminated and to check the refrigerant flow so see whether it has bubbles - this may indicate a low refrigerant level or the presence of a non-condensable gas (e.g. air) in the system while simultaneously being able to read the system pressures on the gauges. So, although the question of whether a sight-glass is necessary or not may be open to debate, the primary consideration should always be risk, and this should be minimised as far as possible. The response of leading Heat Exchange manufacturer GEA Denco is not un-typical: HSE Manager John Mc Closkey states, **"We have procedures in place, but we cannot put a manager on site with every engineer to ensure they follow the procedures correctly, so the only way to be sure of safety is to engineer out the risk"**



**Old:** Sight glass manifold



**New:** None Sight glass manifold



Testo is one manufacturer which has taken on board the guidance from the HSE and IOR in addition to customer demand for non-sight glass options. Testo Managing Director Chris Nicholson has said, “although as a company **Testo have never had an instance of a sight-glass failing and indeed, even in extensive destructive testing using pressures of over 400 bar, we were still unable to break one of our own sight-glasses**, we do recognise that in the industry there is a risk issue.

It would be fair to say, that to an extent we have been tarred with the same brush as manufacturers that may not have the same high testing and manufacturing standards as Testo. We recognise that a responsible manufacturer will seek to eliminate as much risk as possible from any activity and this is only right and proper.

If the regulatory bodies believe you should not pressure-test using an instrument that has a sight-glass, then it is up to us as a manufacturer to adapt to the market and make sure we are in a position to offer instruments that both adhere to the guidelines and provide what our customers are requesting”.

To meet this demand, **Testo have recently launched their successful 557 and 570 models with a non-sight glass option**. Removing the sight glass to conform to the guidelines on strength and tightness testing, now enables the engineer to have just one manifold which can be used for all aspects of refrigeration testing; for as well as being suitable for highly accurate strength and tightness testing, they are also suitable for measuring high and low pressures, temperature, calculation of the superheating and sub-cooling and even for accurately measuring vacuum when evacuating systems. **In addition, the 570 model will also measure oil pressure and current consumption as well as having the ability to log over a 48 hour period.**

## Summary

Opinions on the merits of using a manifold with a sight glass are divided; a strictly non-scientific study suggested an almost 50/50 split between those who can see the benefits and those that regard the glass as being of little more use than “watching the pretty bubbles go by”!

However, good practice and common sense dictate that if there is a potential risk and if it can be avoided without compromising the quality of the work or significantly adding to the cost, then it is logical that the low risk option is taken.

Traditional analogue non sight-glass manifolds have been in the market place for many years, however, it is only now that the more advanced and accurate digital models are starting to offer this option, improving choice and offering the end user all the benefits of an advanced digital manifold without the need to have a sight glass.

