

TECHNICAL ISSUE

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LPG HOSE PERMEATION

Permeation of gas in rubber hose is a common occurrence but can also be often misunderstood. Permeating gas is generally observed when bubbles appear on the outer cover of the hose via the pin-pricks particularly when the hose is wet, however permeating gas can also travel down the reinforcement and escape out of the end of the hose at the fitting depending on the fitting attachment method.

This does not necessarily mean the hose is leaking gas or that excessive permeation may be occurring as other environmental factors such as temperature, humidity and the pressure inside the hose can influence the rate of permeation. As the temperature or pressure goes up, so does the rate of permeation which is why often on hot days when there has been rainfall, permeation can generally be seen at its greatest effect.

We* have done extensive testing on the effects of permeation and the effectiveness of pin pricking as we had seen the effects of this in many different ways over the years.

While pin pricking the cover is the most common method to allow the gas to escape from the hose, as this forces the normal permeation of gas to these areas, we have also discovered problems can occur when significant amounts of gas are able to enter the hose structure via the ends of the hose where the textile reinforcements are exposed.

It is important to first understand that due to the manufacturing process and the hose construction there is always small empty spaces between the inner tube, the reinforcements and the cover. These empty spaces are also areas where gas can travel to. When the hose is assembled with bolted or safety clamps as is common practice in many countries the gas can move outside the hose via the space between the two clamps, however when a hose is correctly swaged with crimp fittings (permanently attached fittings are a requirement of ASNZ/1869:2012), the ferrule will or can create an air tight area at the end of the hose.

When this occurs, the LPG is not able to be released from the hose, instead it accumulates, moving in a radial direction through the spaces in the reinforcements. Even if pin pricking is perfectly made on the outer cover it may not be enough to cope with both the combination of gas permeating from the inner tube and also the gas that is accumulating from the hose ends that has no escape.

While the adhesion between the layers is strong eventually the accumulation of gas inside the hose wall will cause detachment in the areas where it is at its weakest, resulting in a blister on the outer cover. When this occurs it is obviously a clear sign that the hose must be taken out of service.

Our extensive testing has discovered that to completely eliminate the possibility of blistering with crimped on fittings, while also aiding in the natural permeation of gas through the pin pricks it is best to drill a small hole in the hose ferrule to avoid the gas from going through the hose reinforcements and then becoming trapped. LPG by nature will always find the easiest route to escape, and this precautionary procedure is a simple method to allow the gas to do this and in the process avoid unnecessary and premature failures.