Local Manufacture Means Quick Lead Times

In our June Newsletter we spoke about how locally manufactured product meant better lead times for the customer. Often, purchasing items from overseas means lead times in the order of 8 weeks minimum, but in the case of made-to-order items it can be more realistically 14 to 16 weeks before the product arrives into Australia.

In late August we were approached by a customer who needed a foam induction system provided to them in a hurry. Within a week, our TFP-4 Turbine Proportioner had been assembled and delivered to site.

We try wherever possible to stock parts for all of our products which allows us to meet strict deadlines when they arise. In this instance, the customer had a working foam system substantially faster than our competitors could offer.

Proportioning System Testing

We recently heard from a customer who was seeing erratic results from their foam proportioner testing, we felt that we should look further into this topic in this newsletter.

The most important question to ask when planning a foam commissioning test is "When should I take the foam samples?".

There is no simple rule for this, it depends on the following:

- What type of foam proportioning system you are testing
- The water supply behaviour when you start the foam system
- Where your sampling point is in relation to the proportioner
- The start-up state of the system.

Water Supply Behaviour

Different proportioning systems respond to changes in water supply differently. For line proportioner systems (in-line inductors), the proportioners over-proportion at lower inlet pressures and under-proportion at higher inlet pressures. They only proportion accurately within a narrow band of their design pressure (less than +/- 100 kPa). Balanced pressure systems on the other hand show the opposite behaviour and may under proportion at low water inlet pressures.

Consequently, it is important to consider how the water supply will behave on system start-up. If the system pressure is maintained by a jockey pump and the pumps need to start, there will be a period of time on start-up where there is low pressure/low flow. You need to allow time for the pumps to get up to speed before taking any foam samples.

Dry pipe or wet pipe systems

Proportioners are not proportioning at their steady state condition when filling dry system pipes. With the exception of line proportioner systems, when filling dry pipes the flows are substantially higher than their normal operating condition which can result in incorrect proportioning until the pipe is filled. In the case of line proportioner systems, the proportioner determines the system flow rate but until the pipe is filled, the proportioner back pressure is very low. Taking an early sample for a line proportioner system can give a false positive result and may be used to pass systems that are incorrectly designed.

Any questions about this email or other Orion products and services?

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eNewsletter

October 2020

Fire Engineering Pty Limited

Proportioning system behaviour

On system start-up, proportioners will not immediately start proportioning correctly and there will be some delay between them reaching the stable operating condition and the proportioning rate stabilising. Line proportioners should reach equilibrium fairly quickly, balance pressure systems may have a short delay, however we are not aware of any test data on this issue. A computer-based system, such as those used on fire trucks can see a substantial delay (up to around 40 seconds) before they stabilise.

For line proportioner systems, the result will depend on whether the tank is full at the time of testing, or near empty. The proportioning rate for a line proportioner system declines as the tank empties and should be a minimum of 3% when the tank is empty (refer to our December 2019 newsletter for more details on this). This means that the proportioning rate when the tank is full should be above the middle of the allowed proportioning range for a reasonable tank height (i.e. greater than 3.4% for a 3% system). This means that if you are achieving 3.0% proportioning with a full foam tank, then you will be under-proportioning as the foam tank level declines.

Sampling point

The position of the sampling point in relation to the proportioner is also critical. The sampling point should not be closer than 10 pipe diameters downstream from a proportioner, poor mixing of the foam concentrate in the water may occur close to the proportioner.

There is a transit time for correctly proportioned foam to reach the sampling point. Clearly, from this analysis, it is not sufficient to take a foam sample as soon as foam appears at the sampling point.

The required delay from system start-up to when the sample(s) should be taken is calculated as:

Sampling Time Delay = Pump Start up time + Proportioner response time + Pipe filling time + Foam solution transit time from proportioner to sampling point.

Since we don't usually know all of these times accurately there is an element of luck in picking the sampling time delay. One way to reduce your risk of taking an incorrect sample is to add and additional delay (say 30 seconds extra).

The Orion standard test procedure calls for taking a minimum of 3 foam samples (or more) after the calculated sampling time, each sample is taken a minimum of 15 seconds apart.

The acceptance criteria for a proportioning result is then that the last 2 samples (or all 3) be similar (+/– 0.2%) indicating that the foam proportioning system has stabilised. It is quite common for the 1st sample to be quite different.

This method is more reliable than other methods and reduces retesting time, making it the lowest cost method.

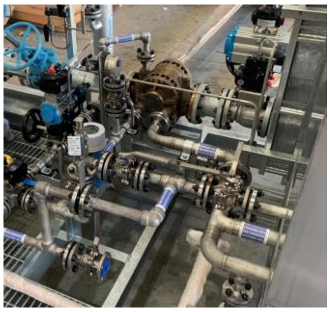
If you need any advice on how to test your foam system, please get in touch using the contact details below.

Work continuing through Covid-19

2020 is continuing to be a busy year at Orion. With projects ranging from complete skid packages, new monitor systems, and manufacture of our usual products we have managed to keep busy throughout the year so far.

At the same time, we've been busy with our R&D and are currently working on a few improvements to our existing products as well as some additions to our current range, which we are excited to share with you in the coming months.



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eNewsletter

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Fire Engineering Pty Limited

A New Fluorine Free Foam

Fluorine free foams are a relatively new technology and there is a lot of product development yet to be done. To date fluorine free foams have not been particularly well formulated for sea water use.

To date, most fluorine free foams have been based on anionic surfactants, resulting in significantly lower performance when used with sea water. A new 3x3 polar solvent fluorine free foam is now available that provides excellent performance with both fresh water and sea water.

Our Polar-tech 3x3 is an amphoteric surfactant based F3 foam for both hydrocarbon and polar solvent use at 3% proportioning.

When tested against the EN 1568 suite of specifications, Polar-tech 3x3 achieves maximum performance ratings with sea water and with fresh water and also passes IMO 1312 for hydrocarbons and polar solvents (ethanol).

Specification	Fresh Water	Sea Water
EN 1568-3 Heptane	1A	1A
EN 1568-4 Acetone	1A	1A
EN 1568-4 IPA	1A	1A

As with other AR-F3 foams, Polar-tech 3x3 is a high viscosity concentrate but that is readily managed with good engineering of foam proportioning systems.

Fluorine Free Foam Storage

Fluorine foams are substantially different to fluorosurfactant foams in many ways. Before treating them the same way as we have treated other foams we should stop and think about the differences.

Fluorosurfactant based foam concentrates produce foams that are very different to the new fluorine free foams.

Fluorosurfactant foams appear to be much more tolerant of the foam properties than fluorine free foams, foam properties are considered much more critical for F3 foams to work effectively, while fluorosurfactant foams could be applied at relatively low expansions (4:1) and short drain times.

Some research was carried out in the early 80's (Dimaio & Lange) with fluorosurfactant foams using poor quality water. They were found to be reasonably tolerant of oily water. No similar research exists for F3 foams.

F3 foams are known to degrade much faster on contact with fuel than fluorosurfactant foams. All foams aren't the same, we need to challenge our assumptions.

The use of sealer-oil in the foam tank

One area where some consideration of the differences may be important is the use of 'sealer' oil on top of foam concentrates in storage tanks. This has been used in the past to prevent air from oxidising protein-based foams or to prevent high viscosity foams from dehydrating on the surface and forming a hard crust, which ultimately blocks proportioners. Firstly, this is generally not required if you have a well-designed foam tank.

Sealer oil is a hydrocarbon oil (mineral oil or paraffin oil). While it has been used for many decades with fluorosurfactant foams without any obvious problems, it is not necessarily safe to use with F3 foams. If you use it, you are taking a significant risk.

We have first-hand experience of 'sealer oil' that contaminated F3 foam, which resulted in the foam expansion and drain time being dramatically reduced by the contamination. A substantial amount of foam concentrate was rendered unusable as a result. Sealer oil contamination is detrimental to F3 foam properties.

While sealer oil might be a cheap fix for a less than ideal foam tank design when using fluorosurfactant foams, it could be a very expensive option for fluorine free foams.

Foam Tank Material

On a similar note, we have written about the risks of polyethylene foam tanks in our October 2017 Newsletter. The majority of the poly tanks are not well designed and would need sealer oil to prevent drying out of the top layer of the F3 foam. This is one reason for not using poly tanks.

The second problem with polyethylene tanks is that you need to use cross linked high-density polyethylene (XLHDPE) for a tank that will last 10 years or more. Most poly tanks use linear low-density polyethylene (LLDPE) which will probably stress crack on contact with foam concentrates within a few years. There is a new Hexathene version of polyethylene that seems to be popular for foam tanks. This is still a linear low-density poly ethylene but provides 'more' chemical resistance and 'improved' stress cracking resistance. The product data sheet states that there is a possibility of stress cracking when used to store detergents (foam concentrates).

Stress cracking isn't defeated by using heavier duty LLDPE tanks, thicker tanks just take longer to fail.

Your foam concentrate is a significant investment, is it worth the risk? Good engineering may cost more initially, but over the longer term it makes good economic sense.

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