

Leak testing of fabricated tubes and pipes

In this white paper, Huntingdon Fusion Techniques (HFT) outlines its offering of plugs, stoppers and dams to help those needing to perform leak testing on the tubes and pipes they fabricate.

The oil, gas, water, food and beverage, aerospace, power generation, construction and pharmaceutical industries all fabricate many thousands of metres of tubes and pipes every year and all joints need to be tested for leak tightness before release for use. This is particularly so in the nuclear sector where potential release of toxic compounds presents a health hazard. It's also a significant requirement in the aerospace industry where leaks could endanger life.

Hydrostatic testing is the safest and most common method employed for testing pipes and pressure vessels and this is normally undertaken using water. Pneumatic testing using compressed inert gas or air may be also used, but only under carefully controlled conditions. Failure during testing with water releases only nominal energy because water is almost incompressible. Discharge of compressed gas during pneumatic procedures can be dangerous, though, because of the possibility of a sudden release of large amounts of energy.

In principle, tests are simple operations. The pipe or vessel joint being examined is isolated and the test medium introduced and then pressurised. Leaks are detected either by measuring pressure fall with time, or by examining the vessel surface for visual evidence.

Selecting the optimum sealing technique prior to testing requires a sound knowledge of available products. The

operator needs to consider tube or pipe diameter, test pressure and possible contamination by the sealing equipment.

Products for sealing generally fall into two categories: mechanically expandable plugs and inflatable dams. Readily available products cover diameters between 12 and 2 000 mm but special versions have been developed to accommodate testing of smaller tubes and larger pipes. Access for pressurising is available through a standard fitting in all plugs and dams.

Expandable plugs

Plugs with nylon, steel and aluminium bodies are available from manufacturers such as Huntingdon Fusion Techniques. Sandwiched between each body is a flexible seal that can be expanded by applying a radial force through a manually operated machine screw/bar on the shaft. These seals are available in a variety of materials including nitrile, Viton, natural rubber and silicone. Specially braced plugs and double disc plugs are also available for use at higher pressures.

A comprehensive choice of nylon bodied plugs is available covering the range 12 to 150 mm diameter. These can even be made to meet customer colour preferences.

Aluminium test plugs are ideal for heavier duties and are available in the 38 to 900 mm size range. These are suitable for arduous environments such as immersion in chemicals and/or testing at higher



Aluminium test plugs.



Special purpose dams for the petrochemical industries.

temperatures.

Available in the size range 38 to 1 800 mm, steel test plugs are typically suitable for demanding applications such as long immersion in water, for use at higher temperatures or for contact with acidic or alkaline environments for which the nylon and aluminium plugs may be unsuitable.

Inflatable dams

As the diameter of expandable plugs increases, so too does their weight. For some applications where these plugs may be useful, they often become too heavy to handle with safety – the weight of a 1 800 mm diameter steel plug is 178 kg.

The solution then is to use inflatable dams, which can accommodate pipe diam-

eters of between 35 and 3 000 mm.

Huntingdon Fusion Techniques has a range of dams, each having a wide degree of flexibility with respect to diameter. The dams are capable of withstanding a temperature range between -40 and +70 °C and as high as 300 °C if heat-resistant covers are fitted.

These devices can be inflated quickly to sealing and working pressure and are resistant to most hydrocarbon gases and fluids. The dams are manufactured from a variety of materials depending on the application.

Generally, the length of inflatable dams ensures that the sealing area is very large compared with expanding plugs and this also ensures that tilting of such mechanical plugs, once inside the pipe, does not occur.

These dams can also be used to prevent build-up of debris and ingress of unwanted material or animals.

Inflation is carried out using a compressor or foot pump through an integrated valve system. An optional by-pass facility allows liquids or gases to enter the sealed volume following inflation. The by-pass is also used for draining after testing.

General purpose inflatable dams can accommodate the size range from 25 to 2 900 mm. They are available in cylindrical and spherical forms. Special purpose dams are available for service in petrochemical industries where resistance to a wide range of chemicals is required. Sizes range from 25 to 900 mm.

Inflatable solid rubber plugs and stoppers offer a large length to diameter ratio and are particularly useful where sealing against irregular surfaces is required. They can be used to seal pipes between 38 and 3 000 mm in diameter.

Low Profile (pancake style) stoppers are used when an insufficient length of pipe is available for the general purpose cylindrical and spherical and solid rubber dams. These are available in sizes from 152 to 2 235 mm and are heat resistant up to 90 °C.

Detailed technical information on HFT's plugs, stoppers and dams for leak testing is available in the online publication: *Inflatable Rubber Plugs from Huntingdon Fusion Techniques*.

www.huntingdonfusion.com



Inflatable solid rubber plugs and stoppers.



Nylon bodied expandable pressure test plugs.



Steel test plugs.

Low cost weld purging with Weld Purge Plugs™

Weld purging smaller tubes and pipes of different diameters can be challenging, especially when budgets are tight. Welders are often left to create their own homemade purging dams out of unsuitable materials such as foam, paper or cardboard.

Huntingdon Fusion Techniques (HFT®) has designed and developed clinically clean, white Nylon Weld Purge Plugs™ to provide an excellent barrier for weld purging at a very low cost.

Luke Keane, technical sales manager for HFT® says: "For welding nickel and titanium alloys and stainless steel tubes and pipe joints as well as stubs, elbows and tees, Weld Purge Plugs are a perfect product to seal holes and orifices for quality internal weld purging. They can also be used for weld purging small or odd diameter pipes where conventional inline pipe purging systems may not be practical."

Weld Purge Plugs are made from engineering quality nylon up to 152 mm in diameter and will not seize up, rust or corrode. A friction-reducing washer inserted between the top plate and wing nut provides easy expansion and release.

The low cost, lightweight Weld Purge Plugs are available in ready-made Weld Purging and Orbital Welding Kits containing the most common sizes of Purge Plugs used. Each kit has a strong robust ABS plastic case, with custom foam inlays for storage and quick location of the plugs where needed.

HFT also designs and manufactures a range of Tandem Weld Purging Systems in sizes from 25 mm to 2.23 m, producing oxide free welds time after time.

The Tandem Systems isolate a small volume either side of the weld to reduce inert gas costs and to bring the weld purging time down to a fraction of what it might take using other kinds of dams and unsuitable materials.

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An example of the bright surface finish on the inside of a pipe protected using HFT's Weld Purge Plugs.