

Valves for oxygen service



Starting a new series in which we go behind the scenes to see where and how flow control equipment is made. For this article David Sear travelled to Helsinki, Finland, to meet up with Metso's Taija Hämäläinen.

Oxygen may be essential for life on earth but it can be very dangerous. We are used to living and working within an atmosphere containing roughly twenty one per cent oxygen, but if that figure starts to increase then the potential for hazardous situations shoots up. And pure oxygen – an unmissable gas in many industries – can react violently with grease and oil. Indeed practically all materials, including even metals, will burn in oxygen. This explains why valves designed for use in oxygen service have to meet two very important criteria. Firstly, they need to be absolutely leak free. And secondly, they must not contain materials that might cause the oxygen to ignite.

Given these factors it is hardly surprising that just a handful of companies actually manufacture valves for oxygen service. One supplier that does include such valves in its portfolio, however, is Metso. Indeed, the company has recently commissioned a brand new clean room facility at its Helsinki premises. This room is geared up for the assembly of valves destined for challenging applications such as oxygen service, according to Mrs. Hämäläinen. "I'm sorry but you cannot go inside as access is strictly limited to specially-qualified personnel. But as you can see the room has about 75m² of floor space and is fitted with an overpressure unit to keep out dust. The facility is entirely self-contained, boasting a three step Ultrasonic machine, an own test rig plus its own tools and equipment which are kept exclusively for use in this room only."

Monolithic body

Metso's latest valve for gaseous and liquid oxygen service was developed within just six months in close cooperation with customer Linde Group. Termed the BWX series, the valve is ideal for cryogenic applications and can handle LNG, nitrogen, hydrogen, etc. In essence the valve is a butterfly design but it does boast rather unique features – a monolithic body, a special plugged shaft to disc connection and a free floating seat.

Mrs. Hämäläinen explains: "on a typical valve the seat is fixed with a screwed flange ring to the body. However, bolted flange rings have the risk of leakage at the gasket to the pipeline. The further design features means that no bolts, pins, nuts or other fastening parts are necessary in the flow area and this minimizes an additional risk factor with oxygen, namely that parts might become loose due to vibration. Additionally this fact makes maintenance of the valve very easy and efficient. After loosening the external bolts the entire valve within the seat can be dis- and re-assembled without the need for any tools at all. To my knowledge this has not been done before."

And as well as being completely free of grease for assembly and FAT, the valve has no soft parts in its sealing system. "Soft parts are a risk in oxygen service because they can contain elements that might ignite. Fortunately with a metal-to-contact we are able to achieve the required tightness performance for oxygen service," comments Mrs. Hämäläinen.

Summing up, Mrs. Hämäläinen is confident of the potential for Metso's latest oxygen valve. "The market for oxygen valves is relatively small and fragmented. Users include refineries, steel mills, chemical plants, and even hospitals. But we are starting to see a growing demand for this valve which is very promising."



Taija Hämäläinen is Director, Neles and Mapag butterfly valves product center.