

FPSOs – Driving Demand for Lighter Valve Technology

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As a result of the drive by energy companies around the globe to extract oil and gas from increasingly remote locations, the use of floating production, storage and offloading (FPSO) vessels is increasing. There are 19 FPSOs currently in operation in African offshore fields – the joint largest presence in the world along with the North Sea.

This trend for floating facilities is fuelling demand for technology that is lighter and less bulky, allowing it to be used onboard vessels where weight and space are of the essence. It is vital, however, that any weight or space-saving measures do not come at the expense of safety. In response to this challenge, Oliver Valves has worked to develop lighter and more compact equipment which is still reliable and robust.

Double block and bleed valves

For any offshore oil or gas extraction process to be carried out safely, reliable valves are of elemental importance, governing flow rates and providing guaranteed isolation from flammable substances normal during normal operation but especially during emergency or maintenance procedures.

Following the publication of the 1990 Cullen report into the Piper Alpha disaster of two years earlier, a number of fundamental changes were made to improve safety in offshore processes. Among these reforms was a rule making it compulsory that all isolation valves used in the process had to be double blocking – with two separately operated valves and a bleed valve between them – to minimise any risk of failure.

Today, the majority of all valves used in the oil extraction process – not just isolate valves – are double block and bleed (DBB) systems.

In response to the report, Oliver Twinsafe patented the Twinsafe valve – a double block and bleed system housed within a single, standard length valve.

The system has been developed and improved over the years, and the valves are now used by nearly all of the world's leading oil companies, including Petrobras and Petronas. Despite this, there are firms in emerging markets such as Africa and the Far East that are encountering the benefits of DBB systems for the first time.

Safety benefits

Traditionally, in order to create a double block and bleed system, pipeline engineers would install two standard isolation ball valves and a separate facility for bleeding the cavity between the two. The Twinsafe valve replaces this with a single cartridge unit in many installations in the single valve length specified by ASME B16.10.

Incorporating the three valves into a single housing increases the safety of the system by removing connections between separate units, reducing the number of potential leak paths.

The unit incorporates two separate ball valves, delivering 100% tight shut-off using either plastic soft seats or heavy duty metal-to-metal seats coated with a tungsten or chrome carbide-based coating.

The volume of the cavity between the valves is also significantly reduced in the single unit system, allowing operators to evacuate the space and establish a safe isolation more quickly – a major benefit in emergency scenarios. The reduction in volume of the material removed from the valve also means less waste, reduced handling, lower costs and easier disposal and less potential environmental impact.

Operational advantages

A result of increasingly advanced extraction methods is that space is at a premium. One of the key advantages of the Twinsafe design is that the whole system has the same face-to-face length as a standard single isolate valve, as specified in API 6D and ASME B16.10.

Not only does this mean the system can easily be installed into an existing pipeline without any re-working, but also that the space required for a double block and bleed system is reduced by more than half, freeing up space for other equipment, with of course considerable topside weight savings.

In addition, because the valves are full bore, they offer a negligible flow turbulence or pressure difference when open and also allow the pipeline to be pigged.

The Olowi Oilfield, Gabon

In 2009 a leading exploration, development and production company launched a project to extract oil and gas from the Olowi field off the coast of Gabon. The project involved an FPSO facility acting as a production centre for four wellhead platforms, and an existing vessel, was to be used in the operation.

As part of a drive to ensure that safety provisions were as comprehensive as possible, it was required to replace all of the single isolate units on the floating facility with double block and bleed valves. Clearly, weight and space were both major concerns, and it was therefore essential that the new equipment was installed with a minimum of additional components and pipe work.

A large number of valves were to be replaced – more than 150 in total – and, given the scale of the upgrade, the traditional method of installing additional single isolate units was unfeasible as it would have approximately doubled the weight and space required for the system.

Oliver Valves supplied 161 Twinsafe valves with bore sizes ranging from 1in to 10in. The valves were flange mounted with a range of ANSI class 900lb and 1500lb fittings. The standard length of Twinsafe valves meant that the existing single ball valves could simply be replaced with a cartridge double block and bleed unit, with no need for any additional pipe work.

Increasing sophistication

In order to reach some of the planet's more inaccessible offshore oil reserves – including those currently being prospected off the coast of Africa – extraction methods are becoming lighter and more sophisticated. This is accelerating the rate of adoption of innovative valve technology by oil and gas companies around the world as they increasingly recognise the benefits on offer.