

Valve World Expo 2018: Everything sealed

For the most part, users of bellow valves will hardly have any worry lines. Quite on the contrary, they ought to be rather happy: bellow valves score high points in sealing and thereby help prevent energy losses. A great plus for plant operators in times of rising energy costs – and a reason why demand will rise.

Bellow valves often enough are an asset – whether for safety valves, control valves or shut-off valves. For some manufacturers, they even are a must as an additional part of the range. “In general, each valve can be made as a bellow valve and is also available on the market,” explains Olaf Schulenberg, head of research and development at Goetze KG Armaturen.

Demand on the rise

As bellow valves are hermitically sealed and no media can leak, demand is on the rise mostly in countries with high environmental standards. “As such the industrially most evolved countries have the greatest,” concludes Schulenberg. The trend is beneficial for companies offering bellow valves – demand is expected to continue rising, as requirements will become more demanding.

Leser is ready to meet demand, a company that also adds bellows to its safety valves, made up of a bellow and connection elements welded on above and below. “The assembly is installed between the body and the spring bonnet,” explains Leser. There, the bellow can make sure the valve functions safely, depending on operating situation. If sticky or corrosive media are used, it protects the movable inner parts and ensures that the valve can open and close itself reliably. “For hot media, it protects the spring from high temperatures, which would make it too soft”.

Protection from flow turbulences

Most bellow valves can even compensate back pressure, to a certain degree. “Within certain limits, most bellows can even compensate for back pressure building up near the safety valve outlet, changing the set pressure and thereby influencing the expulsion of the mass flow,” states Leser. It works with: “the back pressure acting upon the back of the disc

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Messe Düsseldorf GmbH
Postfach 10 10 06
40001 Düsseldorf
Messeplatz
40474 Düsseldorf
Germany


Telefon +49 (0) 2 11/45 60-01
Telefax +49 (0) 2 11/45 60-6 68
Internet www.messe-duesseldorf.de
E-Mail info@messe-duesseldorf.de


Geschäftsführung:
Werner M. Dornscheidt (Vorsitzender)
Hans Werner Reinhard
Joachim Schäfer
Bernhard Stempfle
Vorsitzender des Aufsichtsrates:
Thomas Geisel

Amtsgericht Düsseldorf HRB 63
USt-IdNr. DE 119 360 948
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exerts a force in the closing direction. The bellows has a surface opposite the valve seat that is equal in size to the seat area. The back pressure acts upon this surface, as well, generating a force acting in the opening direction and compensating the force that acts in the closing direction". As a special feature, Leser offers a bellows housing protection, "protecting the innermost parts against media turbulences during valve blow off. The shield reduces bellow vibration, extending the bellows' service life and delivering added value to our customers".

Manufacturers are continuously working on developing an optimal shut-off function for bellow valves. ARI Armaturen has opted to use a conically shaped marginal plug. The metal plug and seat design is an important factor, here the conical plug is made of hardened stainless steel. As the company claims, the reliable sealing due to the conical/ marginal plug significantly increases seat pressure and creates a longer service life. The fine-threaded stem also is a fundamental part of the "100% sealed technology".

Maintenance-free

Bellows are often mounted in isolation valves. "Due to the high number of more simple valves in plants alone, safety valves with bellows are most often used in plants," explains Olaf Schulenberg of Goetze KG Armaturen. "Stem sealing through a bellow offers the advantage of being maintenance-free in the case of manual stop valves," explains Tim Wallis, head of training and technical consulting at ARI-Armaturen. "In contrast to valves with classical stem sealing using stuffing box packing, periodic maintenance isn't necessary". The frequency of bellow in isolation valves doesn't mean exclusiveness. "Control valves and safety valves can also be fitted with a bellow sealed stem," underscores Tim Wallis. Here, however, the medium is decisive for the type of bellow.

Hermetically sealed

Bellows are often enough used with media such as dangerous gases or fluids. These may not escape as fugitive emissions, on no account. Bellows are increasing being used in plants that must fulfil the German clean air regulation TA-Luft – in most cases they have the matching certification.

Bellows are also important for the components themselves. “Bellows are always important when sliding parts, such as stem guides or the pressure spring in a safety valve have to be protected from a medium,” states Schulenberg of Goetze KG Armaturen. A further advantage is the hermetic sealing to the outside, as well as the ability to compensate higher actuator power thanks to back pressure on the valve outlet.

Saving twice

Qualities the operators of thermal oil plants, ammonia refrigeration and chemical process plants, as well as the petrochemical industry and the oil and gas sector appreciate. In the field of thermal oil or ammonia refrigeration plants a bellow sealed stem is required due to safety reasons and standards requirements, explains Tim Wallis of ARI-Armaturen.

Users of bellow valves save twice – thanks to the longer life-cycle and durability of the valve, and lower energy costs. The environment is also set to profit from the additional component mounted on the valve.

Size is a balancing act

When is a bellow valve correctly sized? “In general, it is always a balancing act to harmonise wall thickness and length of a bellow with the necessary flexibility, toughness and cycle ratio,” reports Olaf Schulenberg, Goetze KG Armaturen.

The material of choice always depends on the medium and application. According to Schulenberg, stainless steel 1.4571 is mainly used. Depending on application, use of thermoplastic materials such as PTFE or elastomers is becoming more frequent. “The latter, however, can hardly absorb forces on the outlet side and have the tendency to buckle”.

Tests and elaborate mounting

Quality naturally has its price. Manufacturing of bellow valves is more complex than that of other types of valves. “The bellow is tested for quality and mounting takes a while longer,” explains Tim Wallis, ARI-Armaturen. Often enough, adds Olaf Schulenberg, Goetze KG Armaturen, additional components are required, such as bonnet spacers for safety valves.

Tests and assessments are important key words for bellow valves. Manufacturers test them extensively. FABA valves made by ARI-Armaturen are examined for air leak rate 1 according to DIN 3230, as well as leak rate "A" in line with DIN EN 12266, as well as helium testing of the bellow. In addition, the bellow needs to withstand more than 10,000 cycles.

No worry lines

These tests make themselves paid for manufacturers of bellow valves. Demand for these reliable components is already increasing, and rising unit sales, accompanied by optimisations in manufacturing technology, contribute to lower costs for this type of valve. In turn, this once again drives demand. The outlook is great and ought to smooth worry lines on both the side of manufacturers, as well as end users.

Press Contact Valve World Expo 2018
Petra Hartmann-Bresgen, M.A.
Ulrike Osahon
Tel.: +49 (0)211 4560-541
Fax: +49 (0)211 4560 87 541
E-Mail: HartmannP@messe-duesseldorf.de