

As seen in Process Heating Magazine:

Extremely Low Maintenance Bellows-Sealed Valves Are for the Long Run



Picture walking into a processing plant and seeing a chain-link perimeter fence set up around a control valve. Then you see that the valve itself, the floor, and the ceiling are all covered in a quarter inch of black tar from the hot oil that had been leaking from it. Intermittently, 450°F hot oil is shooting out of the valve like a water fountain. You might ask: Why not just fix the valve?

In this instance, the facility had replaced the gland-packed valve time and time again. What the company failed to realize—and that none of the current employees knew—was that

replacing it with a bellows-sealed valve could have alleviated the leak long before.

ARI's Sterling Gustin had been visiting this facility on another matter entirely when he noticed the perimeter fence inside the plant. It turns out that the fence had been erected and the forklift path rerouted to keep employees safe. This leak had become a part of the facility's standard operating procedure (SOP) and was written into the safety guidelines. The plant manager (PM) asked what it would take to get something like this fixed and was flabbergasted to find

that they spend more on the cleanup alone than how much a new bellows-sealed valve would cost!

To think that a plant running thermal oil as part of its process could spend so much money on cleanup annually is disconcerting, to say the least. And this does not even consider the costs involved with shutting down the process, purchasing an abundance of thermal oil that should never have leaked out of the system in the first place, a heap of gland-packed valves that were doomed to fail in a few months' time, and making a leaking valve a part of a facility's SOP. However, without being educated about the types of valves that work best for thermal process oils, how could this plant's employees have known?

To avoid a scenario like this in your plant, it is important to do the research. With temperatures as high as 450°F, you are going to want to keep the oil within the system, avoiding safety hazards to employees as well as hazardous emissions. There are a range of bellows-sealed valves from which to choose, and below you

will find a sampling. But first, just what is a bellows-sealed valve?

DEFINING BELLOWS

There are two main types of bellow: the formed bellow and the welded bellow. Formed-type bellows are made from rolling a flat sheet (thin-wall foil) into a tube, which is then longitudinally fusion-welded. This tube is then mechanically or hydro-



statically formed into a bellow with rounded and widely spaced folds. The welded leaf-type bellow is made by welding washer-like plates of thin metal together at both the inner and outer circumference of the washers, like plates. A welded leaf bellow has more folds per unit length as compared to formed bellows. Thus, for the same stroke length, formed bellows are two to three times longer than their welded-leaf counterparts.

The multi-ply bellow design is preferred for handling higher-pressure fluids and has generally two or three plies of the metal wall. A two-ply bellow can increase its pressure

rating by 80 percent to 100 percent as compared to a single-ply bellow of the same thickness. Alternatively, if a single-ply bellow of a thickness equivalent to a pressure rating of a two-ply bellow is used, the stroke length is reduced. Therefore, a multi-ply bellow design offers an advantage over a single-ply bellow.

A bellows is shaped like an accordion with one of the end caps removed, and a stem that can move up and down runs down through it. All the fluid in one side of the bellows is stuck on that side of the bellows, so even as the stem moves down, because it's attached to the bellows, the bellows is squeezing or expanding—meaning that there's no place for the fluid to cross through. It is completely contained. The bellows at ARI Valve are made from formed double-walled rolled stainless steel. They have enough elasticity to move the range of the stem.

At ARI Valve, this type of sealed valve was designed specifically for thermal oil applications—not for simply fugitive emissions, as most bellows-sealed valves are that have



been put into hot oil applications. The bonnet and hand wheel are designed to dissipate heat, as is the bell design of the bellows. This entraps air, which is a very good insulator—think of a wool sweater or down parka. Each of these has many little air pockets that create the insulation.

ARI's manual shut-off or globe valves can be safely operated with the hand wheel at elevated temperatures without the need for insulated protective gloves!

NOT JUST FOR THERMAL OIL APPLICATIONS

Although ARI's bellows-sealed valves were designed primarily for thermal oil applications, this is not their only use. They are also used for chemical applications, liquid metals, and other processes that can run the risk of hazardous gases.

Gustin says they have many customers who find the bellows type of seal on a valve to be so reliable that they even use them for steam and hot-water applications. Except for applications that are too hot—like molten salt, for instance—an intact

bellows-sealed valve can save a plant substantial money in the long run.

Also, environmental standards worldwide are getting more stringent day by day, which can make it difficult for companies to expand within existing premises. With the use of bellows-sealed valves, expansion without additional environmental damage is possible.

To reiterate, once a bellows-sealed valve is installed, there is nothing more that needs to be done. And when this seal has reached the end of its life, the gland-packed part of the valve continues to keep the media within the valve, offering enough time for the failed bellows-sealed valve to be replaced. These hassle-free valves are designed to be very low-maintenance, and some would even say maintenance-free. Gustin says most of his customers inspect the valve every six months and add a little grease once or twice a year to keep the valves easy to open and close.

It is important to keep in mind that it is not the process application that determines how long these bellow seals will last, but rather the

environment in which they're being used. If the valve is treated well and it is not overtightened or over-opened, etc., they can last 20 years. If there is dirt or particles in the fluid, however, the valve may not last as long. It is also important that the maintenance team not crank down or torque down on them

So, to ensure that these valves last as long as possible, it comes down to plant practices and how the facility manages them. Realistically, it is very simple: Only use your hands to open

and close the valves. Some people will want to use a crank bar, but the added pressure is not necessary. As soon as the valve is twisted just a bit too far, you hear a "crunch." Everything might seem fine—except now the valve will start to leak.

These valves are designed to be easily turned by hand; however, if a valve has been sitting for years, there is a little grease nipple right underneath the handwheel, so all that is needed a little pump of grease and it's good to go again.



ARI Valve Corporation

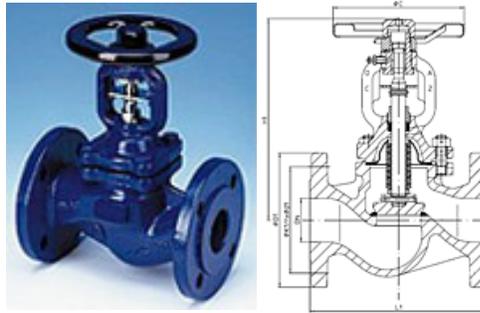
www.arivalve.com

800-933-8845

A SAMPLING OF BELLOWS-SEALED VALVES

These hassle-free and user-friendly bellows valves are available in a range of sizes for a variety of industries. In addition to those listed here, you can contact ARI Valve to find the right bellows-sealed valve for your application. [Click here](#) visit their website; [email them](#), or call 800-933-8845.

ARI-FABA® ANSI Plus Stop Valves Class 150 with Flanges



Stop valve with bellows seal; maintenance-free; globe valve with flanges

Features

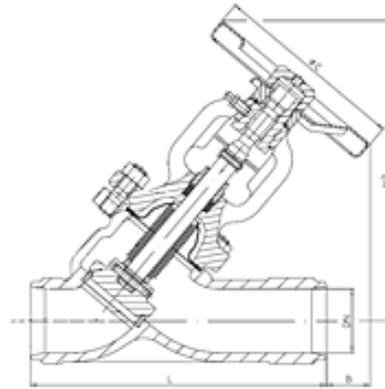
- Double wall bellow seal as standard
- Size 1/2 inch – 3-inch spindle with fine thread as standard
- Lubricating nipple as locking device as standard
- Spindle with bellows seal
- Secondary sealing; gland packing
- Position indicator as standard
- Non-rising handwheel
- Non-rotation lock for each nominal diameter
- External spindle thread
- Spindle with rolled thread
- Hardened seat and plug

Possible Applications

- Industry
- Power stations
- Flue gas purification plant
- Processing technology
- Gas supply
- Vapor facilities
- Heat transfer oil
- Recycling facilities
- Vacuum plant
- Ammonia
- Hot water
- Heating plant
- District heating
- Cooling and freezing systems
- General plant manufacturing
- Steam systems
- Other applications on request

Item # 34.066 (DN 250) ARI-FABA® Plus Stop Valves

Y-Pattern- PN 25 Bar with Butt Weld Ends



Stop valve with bellows seal; maintenance-free; globe valve with butt-weld ends

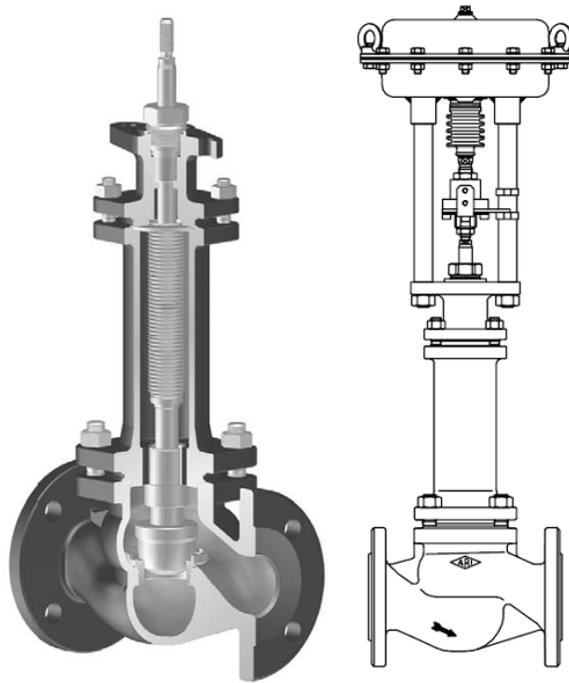
Features

- DIN-DVGW-registration
- Test approvals TU.A/TUV.AR 186-00
- TRB 801 No. 45
- Double wall bellow seal as standard
- Size 1/2 inch - 3 inch spindle with fine thread as standard
- Lubricating nipple as locking device as standard
- Spindle with bellows seal
- Secondary sealing; gland packing
- Position indicator as standard
- Non-rising handwheel
- Non-rotation lock for each nominal diameter
- External spindle thread
- Spindle with rolled thread
- Hardened

Possible Applications

- Industry
- Powerstations
- Flue gas purification plant
- Processing technology
- Gas supply
- Vapor facilities
- Heat transfer oil
- Recycling facilities
- Vacuum plant
- Ammonia
- Hot water
- Heating plant
- District heating
- Cooling and freezing systems
- General plant manufacturing
- Steam systems
- Other applications on request

Item # 35.471 (DN 25) DP 32, STEVI® 471-ANSI Straight through Control Valves with Flanges, Shaft-guided Plug and Pneumatic Actuator DP 32-34



Straight-through control valve with post guided plug 1 to 8 inch

Features

- Reversible pneumatic actuator
- Actuator with rolling diaphragm
- Air supply pressure max. 87 psi
- Stem protection by bellow
- Maintenance-free O-ring sealing
- Assembly of additional devices acc. to DIN IEC 60534-6

Possible Applications

- Refrigerant
- Cooling Water
- Warm water
- Hot water
- Heat Transfer oil
- Steam
- Gas
- Other applications on request

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