Ingolf's insight

Do end-users really care about fugitive emission, or do they only want cheaper valves?

Part 4

In the first part of this article I asked the following question: Is the situation different today than back in the 1990´s? The answer was: Yes and No. One of the things I did not mention, which is the best thing that happened is the *'Certified low-leaking valves packing technology'* in accordance with the EPA (United States Environmental Protection Agency), tested in accordance with API 622, that has a maximum allowable leak-rate of 100 ppm. Yes, the situation is improving! The *Certified low-leaking valve packing technology* requires a written guarantee that the valve packing technology will not leak above 100 ppm for five years. This is a step in the right direction so, yes, **packing technology** has improved tremendously over the last two decades. The packing itself will not leak for the next 5 years. But what about the valve? What about the wear and tear of the packing material from the operation of the valve, with a coarse spindle surface? What about poor tolerances on the valve parts? The API 622 specifies a test stand which will use a 1/4 "(6.3 mm) packing, the test stand itself is equipped with a spindle 25.4 mm + 0.0/-0.2 mm with a surface finish of 0.40 – 0.80 µm Ra. The packing groove ID is specified to 38.1 mm +0.25/-00 with a surface finish 3.20 µm Ra + 1.25/-0.625 µm. The groove ID 38.1 – stem OD 25.4 : 2 = 6.35 mm cross-section on the groove. This is in compliance with Fig. 12 (see Part 3 in Valve World June 2013) recommendations from one packing manufacturer. The packing technology is fine but if there are no specifications and demands regarding the valve packing box dimensions and tolerances within all sizes and pressure rates, the valve manufacturer is free to produce cheap valves with poor tolerances and it will be up to the end-user to control all the dimensions when repacking a valve.

Fig. 15 indicates 6 measures on the stuffing box, where the most important measures are 1) depth of the bonnet groove 2) ID in the bonnet groove 3) OD on the spindle and 6) compression height of the packing compression ring. Measures 4 and 5 are important too, with regards to the packing extrusion illustrated in Figs. 13 and 14 (see Part 3 in Valve World June 2013). To be able to get the benefit from the *Certified low-leaking valve packing technology*, you must treat the packing correctly. You have to position the low density braid to fit the dimensions of the packing groove within 0.1 mm. You have to cut the packing braid in 45° angles, at the right length, with a packing cutter, illustrated in Fig. 16. You have to install the packings with the cut angle as illustrated in Fig. 17, so the split will be closed. You should install the packing split with 120° between them. Personnel working with the valves need to be trained in how to repack valves. It will not help to use even the best packing

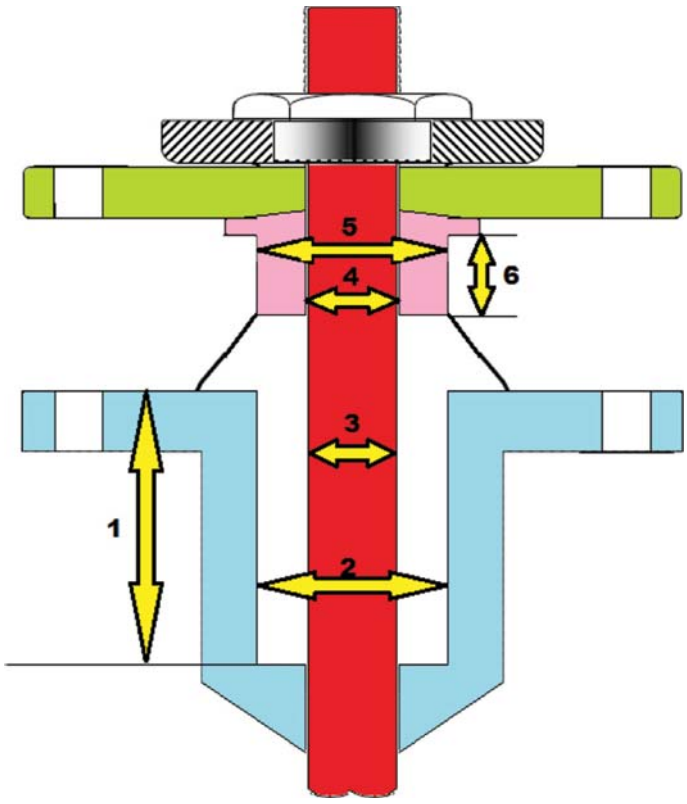

Figure 15.

material, if it is used in the wrong manner due to lack of competence.
If you are using die formed high density Grafoil rings, the packing can still conform to the *Certified low-leaking valve packing technology* requirement. So, the packing itself is OK, now it boils down to the dimensions indicated in Fig. 15 and the tolerances on the parts indicated in Fig. 12. The next goal could be standardisation of the construction itself, making the six measures illustrated in Fig. 15 identical within the same dimensions and pressure range. If the measures and tolerances were correct, you could choose between Chevron rings, die formed or braided packings in the same valve. Currently that is not a possibility. You could not replace graphite packings, with a stack of Chevron rings into a wedge gate or a globe valve. The surface finish and packing groove dimensions are not within the tolerances needed by Chevron rings.
If the dimensions and tolerances were as requested in this article, you could use less force when compacting compressible packings. By using less compression, the result would be less friction and less wear with an expanded lifetime.

Figure 16.

Figure 17.

What is in the end-users interest? Answer: Better valves, safer valves, valves with lower fugitive emission, valves within *Certified low-leaking valve technology*. I think the end user really does care about fugitive emission, but some of them want cheaper valves too. Better valves with standardized stuffing box parts will unfortunately lead to some price increase on the valves. **But with better valves (not only better packings), we all will become winners.**

ingolf@valve.no
www.valve.no