

Ask the Expert

The Ask The Expert column gives readers the opportunity to have their valve concerns addressed, find out the answers to their pressing valve challenges and ask for feedback on application issues. If you have a questions that you need answered, please feel free to contact s.bradley@kci-world.com with the email subject: Ask The Expert.

If you are an individual with extensive valve expertise that you believe the Valve World readership could benefit from, please contact our Editor-in-Chief to become a future featured Expert.

This month our Expert is Phil Mahoney - Manager of Research & Development, Stationary – A.W. Chesterton.



Q What is a backseat in a valve and what is it for?

A A valve backseat is a design feature found on almost all gate (and some globe) isolation (on-off) valves, and it is a legacy feature added to valve designs at the turn of the 20th century and eventually included in valve standards much later. It is basically a sealing arrangement where a feature is machined on the valve stem with a mating sealing surface on the inside of valve bonnet. When the valve is fully opened, the valve stem 'back seats' against the bonnet and closes off pressure to the stuffing box. This essentially serves as a backup to the primary seal on the valve which is most often a stuffing box sealed with compression packing. The intent of the design was to allow a user to re-pack a valve on-line without having to shut down the system in which the valve was being used; the user would backseat the valve, loosen the gland bolts, pull back the gland and remove the packing set, install a new set, tighten the gland and then take the valve off the back seat.

Q How are the back seats tested for sealing ability?

A API 598, section 6.2, describes the pressure test of the backseat to be done as part of the valve inspection and testing process for production valves. The procedure is pretty basic; the valve is fully opened and tightened on the backseat. The packing gland is either loosened so there is no gland load on the packing (or there is the option to run the test with no packing installed). With the valve ends sealed (typically in a hydrostatic test unit), the valve is pressurized with water and monitored for leakage coming past the backseat. The requirement is no leak at the rated pressure for the valve

at 100°F, and the required test duration under pressure is 15 seconds for valves $\leq 2"$ and 60 seconds for all others.

API 6D "Pipeline Valves", section 10.2, is similar in intent, but with a few differences. The test pressure is 1.1 times that of the valve rating at 100°F calls for, and the test durations are longer ($\leq 4"$ is 2 minutes, $\geq 6"$ is 5 minutes). The test pressure is first applied with the valve off the backseat, the stem is monitored for visible leakage, and then the valve is put on backseat and monitored for visible leakage.

Q If the backseat doesn't leak during the test, then is it acceptable to re-pack a valve on the back seat?

A Generally speaking, that's not the case. As noted above, the backseat testing is only done with water at ambient temperature. That does not

demonstrate leak tightness for all services the valve could be utilized in, i.e. high temperature service, hazardous or toxic gases etc. A number of the API standards have language that cautions against the indiscriminate use of the backseat. Not all the standards have the same language shown below (i.e. API 6D), but the message here is clear.

- API 600, "Steel Gate Valves and Butt-welding Ends, Bolted Bonnets", section 5.8.9, states "A back seating arrangement is a requirement for all gate and globe valves and, as such, is not meant to imply a manufacturer's recommendation for its use for the purpose of adding or replacing packing while the valve is under pressure".
- API 589, "Valve Inspection & Testing" section 6.2.3, states

"the successful completion of the backseat test shall not be construed as recommendation by the valve manufacturer that, while the valve is pressurized, the valve may be repacked or packing may be replaced."

While a backseat is typically a requirement per industry standards for most gate and some globe valve designs, their use is really something that should be avoided unless absolutely necessary and other options to effect a seal are exhausted (including drilling and tapping operations). If re-packing on a back seat is the only option left to repair a leak, then it should only be done after consulting the valve manufacturer and the plant's documented maintenance and safety protocols.

