## Ask the Expert

**The *Ask The Expert* column will give 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 question 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 to become a future featured Expert.**

**This month our Experts are Eric Allen – LDAR, Consent Decree, HON at Sage Environmental Consulting and Greg Cole – Engineer & Scott Boyson – Business Development Manager for A.W. Chesterton Company.**

### Q We understand that the API 624 standard will be mandatory for API cast valves and API forged valves. What about the other valves in my plant?

**A** That is correct. The API 624 low-emission (or low-e) valve standard was published by API earlier this year. This standard will likely be a mandatory requirement for API 600 cast and API 602 forged valve. Those updated standards will likely be published in early 2015 and require API 624 as a mandatory requirement. However, there is a need in the market for all valves to deliver low emissions.

While standards do their best to anticipate market trends they are often a reflection of the current market need and therefore follow the market rather than lead the market. As there are many other valve types in the market beyond API cast and forged valves, this question is very common as plants seek similar approaches for their other valves.

Currently, the API 624 standard covers graphitic packing in rising and rising/rotating stem valves. The standard requires the use of API 622 low-e graphitic packing. Work is being done to create a new standard for quarter-turn valves such as ball and butterfly valves but it is still early in its development. It is still not clear how PTFE sealed rising stem valves will be addressed.

All of these standards use methane as a test fluid to better simulate actual performance in hydrocarbon-based services or applications. Helium is commonly used in other test standards, including ISO 15848-1. Due to the differences between the helium and methane molecules, there is no accepted method for determining a correlation between helium and methane leakage measurements. As a result, the US EPA requires the use of methane as the test fluid for low-e testing.

As it stands right now there are no other test standards established by API to evaluate the performance of valves not covered by the API 624 or upcoming quarter turn test standard for fugitive emissions. According to the US EPA, testing for low-e valves shall use generally accepted engineering principles to test a low-e valve.

Proactive valve manufacturers have tested their valves using methane as a test fluid and using the thermal and mechanical cycles that are similar to existing tests such as API 622 and API 624. An example of a recent test on a metal seated ball valve operated for 1500 mechanical cycles on with three thermal temperature cycles operated at 500 F and 600 psig with methane. API 622 packing was used and EPA Method 21 leakage measurements were under 10 ppm.

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**Q For some valves such as control valves and API 6D valves, it's not clear that there will ever be a specific methane-based standard. What are my options with those valves?**

**A** While there is some hope that these valves will also have methane test standards to reference, the wait may be a long one. Control valves are often considered engineered valves and do not easily fit into API standards. Again, the marketplace is looking for generally accepted engineering testing on methane for emissions. Progressive control valve manufacturers are beginning to understand this need and have begun testing to meet the US EPA guidelines for low-e valves. The scope of ISO 15848-1 was meant to cover a vast possibility of conditions in various industries and may not be representative of the actual conditions typically seen in VOC services. By combining best practices from API methane based valve testing and ISO 15848-1 high mechanical cycle testing, a best practice test protocol can be established.

An example of a recent control valve test is to operate the control valve for 100,000 strokes while measuring using EPA method 21 to detect methane emissions on a valve operating at 600 psig. Methane emissions of less than 100 ppm are required throughout the test. Hence, mechanical cycles, thermal cycles and stroke length are similar to those found in ISO 15848-1 which is often referenced for control valves. The API 624 standard is used to define the process temperature and pressure and test protocols for use with flammable methane fluid.

The sealing element temperature limit is based on actual temperature measurements between process fluid temperature and sealing element temperature. The actual temperature the sealing material is subjected to is a function of many variables and is dependent on the design of the valve. As the sealing material is further removed from the main process stream, the actual conditions that the sealing material will experience may be less severe. A thermal isolation system can be used with the sealing element to increase the application temperature range of the valve configuration.

End-users are also asking for emission standardization work to begin on upstream valves and manufacturers are beginning to respond to their demands. In valves such as API 6A and 6D, numerous sealing systems are used. Early work has started to address this and it remains to be seen how valve type testing and sealing element testing will be treated.

**Q Can I use a manufacturer's methane-based testing to determine low emission performance?**

**A** The US EPA, through formal enforcement action, has not defined specific test methods to be used to determine low-e performance. Instead, the EPA has only stated that a valve be tested "pursuant to generally-accepted good engineering practices" to not leak greater than 100 ppm, or the manufacturer provide a written guarantee that the valve will not leak greater than 100 ppm for a period of 5 years. Therefore, when an appropriate methane based test standard does not currently exist, generally accepted good engineering practices shall apply.

When making a determination as to whether a manufacturer's test methodology is suitable to determine low-e performance when an appropriate test standard does not apply, a few suggestions can be made. It is recommended to use a methane-based test method that uses EPA Method 21 to detect leakage. Furthermore, it is recommended that other factors of the test, such as temperature, cycling, and process pressure, align with the requirements of other accepted test methods (such as API 622 and 624). Although this approach can lead to much ambiguity, the forward-looking manufacturers have already begun to address methane based emissions performance to help plants achieve their operational, reliability, and environmental compliance goals.