

IndustrialValves

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Changes are taking place in valve testing practices: New technologies and established procedures

BERND NAUMANN

Valve testing is crucial for ensuring the safety and efficiency of industrial systems. In sectors such as chemical production, power generation, and water management, valve functionality must be regularly tested to identify and mitigate potential hazards early on. Safety valves, in particular, are subject to stringent testing standards to ensure reliable operation. Adhering to legal regulations and guidelines, such as the Pressure Equipment Directive (PED), DIN EN 12266, as well as international ASME and API standards, not only ensures safety but also strengthens the competitiveness of companies.

Technological innovations in the valve testing area

The valve industry is evolving rapidly, driven by technologies like IoT, Big Data, and cloud computing, which add intelligence and automation to the field. Smart valves offer features such as remote control, autonomous adaptation, and fault diagnosis, enhancing efficiency and energy savings. New materials capable of withstanding extreme conditions lead to valves with longer service lives and reduced maintenance requirements. Digitalization further increases demand for automated valves, which improve control and monitoring accuracy.

Meeting heightened reliability and safety requirements in demanding applications has intensified the need for advanced testing standards. Standards such as ISO 5208 and API 598 outline precise testing methods and acceptance criteria for various valve types. While cutting-edge approaches like prototype cycles and digital twins offer advanced functionality and durability testing under realistic conditions, traditional methods – such

as pressure and leak testing – remain indispensable.

Testing methods and the importance thereof for safety

Leak testing ensures that undesirable substances do not escape. This increases operational reliability, and extends the service life of the valve by protecting it from corrosion and other damaging influences. Leaks can also cause financial

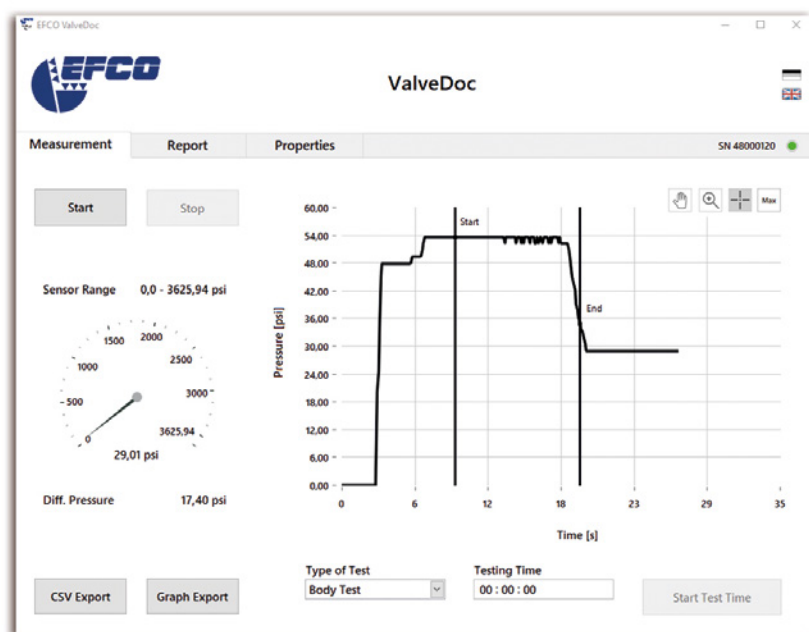


Figure 1: The EFCO VALVE-DOC is a mobile system (hardware and software) for recording, analysing and documenting valve tests.

Source: EFCO Maschinenbau GmbH

Source: EFCO Maschinenbau GmbH



Figure 2: The horizontal test bench PS-H20A with automatic test sequence is suitable for shut-off valves with nominal diameters from DN 15 to 150.

losses for the operator, which makes leak testing all the more important.

The actuation pressure test ensures that the safety valve opens at a certain pre-defined pressure. This pressure, which is known as the actuation pressure, is the point at which the valve starts to release the medium to avoid dangerous overpressure. The test ensures that the calibration of the valve is correct, and the valve will function reliably when the need arises.

Regular testing makes it possible to detect potential defects or signs of wear at an early stage. This in turn makes it possible for necessary repairs or maintenance work to be carried out before a failure occurs, which could reduce the service life of the valve and cost the operator a great deal of time and money. After a valve has been repaired, testing provides the confirmation that it is ready for use again.

Customized solutions and service offers

EFCO Maschinenbau GmbH can provide a wide range of solutions for the processing and testing of industrial valves, usable both stationary in workshops and mobile on site. The test systems from EFCO are designed to test, verify, and document the functionality and leak tightness of valves and other containers under different conditions. Test pressures of 1,380 bar (20,000 psi) and above are used, with the test objects securely and reliably held in the clamping devices provided for this purpose.

A crucial aspect in the development of such test systems is a precise adaptation to the specific needs of the customers, whereby ease of use, robustness, and outstanding reliability are of particular importance.

EFCO has determined that the industry often lacks comprehensive advice before investing in a test bench, and there is also a lack of ongoing support after the purchase. In many cases, the systems have not been adapted to the actual customer needs in the best possible way, meaning that the full potential thereof is not utilized in practice. To counteract this problem, we at EFCO attach great importance to providing comprehensive and individual advice, which ensures that each system is tailored to the customer's specific



Figure 3: The vertical test bench PS-300 with automatic test sequence, slide-in carriage, proportional control and protective housing is suitable for shut-off valves with nominal diameters from DN 50 to 400.

needs in the best possible way. Even after the test benches have been installed and commissioned, EFCO supports its customers with a comprehensive service package to ensure that the test systems have maximum efficiency and longevity.

Creativity and listening are crucial for finding the ideal solution for certain challenges. To tackle an issue effectively, it is important for it to be fully understood and clearly formulated. Customers often use makeshift solutions for quite some time before finding a partner who develops innovative ideas beyond the usual standard solutions. Regarding this, EFCO has developed various test benches that are specifically tailored to the testing of very specific valves and components. As part of another project, we developed an automated marking system which permanently marks tested valves immediately after they have passed the test. The integration of the marking system led to a significant increase in efficiency and minimized the risk of errors during production.

The future of valve testing

Automation is becoming an essential part of traditional valve testing. Highly automated test systems, specifically designed for series production testing, are increasingly important and can be seamlessly integrated into existing production processes. As valve test benches and computer systems become more interconnected,

Source: EFCO Maschinenbau GmbH

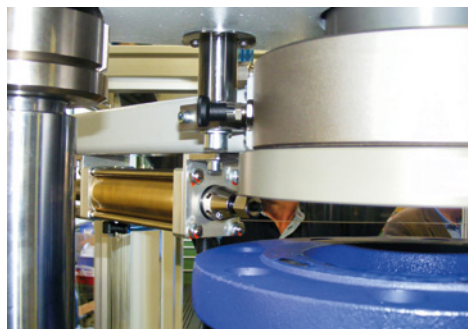


Figure 4: Automatic labelling unit for the fitting tested with the PS-H20A.

their complexity grows, and digital measurement data processing makes software increasingly critical. EFCO relies on close, ongoing customer collaboration to meet evolving and dynamic demands.

The emergence of hydrogen as a potential future energy source also brings challenges for the valve industry. The fittings that are used in hydrogen applications must fulfil very strict material requirements, since hydrogen can penetrate the crystal lattice of metals and make them brittle. Not only do the materials and seals of the fittings must withstand the special conditions, but the test benches also have to function reliably under these demanding environmental conditions. EFCO reacted to this development at an early stage. All the test systems that test with gas are already "H₂ Ready" and can perform tests with forming gas and appropriate detectors. Test systems that have been specially designed for hydro-

gen applications are an integral part of EFCO's testing technology.

The delivery and commissioning of a new test system, whether it is a made-to-measure special solution or a test bench consisting of standard modules, is not the end of the collaboration. At EFCO, customer support extends over the entire life cycle of the test systems, from commissioning to regular maintenance and modernization — all over the world. To ensure that the systems are long-lasting and reliable, EFCO provides not only maintenance but also conversions, which help to conserve resources and safeguard the long-term performance of the test systems. Our test benches are often used for more than 25 years and can be adapted to current requirements through modernization.

The valve industry is more diverse than ever nowadays. As well as providing the essential test systems, it is becoming

increasingly important to do justice to this diversity. New materials and advanced sensor technologies will significantly shape and change the test bench market over the coming years. These developments require flexible and innovative testing technology which adapts to the ever-increasing demands of the industry.

Precise and reliable testing technology remains crucial for the quality and safety of valves, particularly during times of technological change.

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