

FUGITIVE EMISSION STANDARDS

ISO 15848

ISO 15848 regulation describes measurement, test and qualification procedures for fugitive emissions at industrial valves. The regulation is separated into ISO 15848-1 and ISO 15848-2. ISO 15848-1 is a classification system and a qualification procedures for type testing of valves. ISO 15848-2 specifies production acceptance test of valves for valve manufacturer.

TA-LUFT (VDI 2440)

The German Fugitive Emission Control Legislation refers in TA-Luft regulation to VDI 2440 for defining leakage rates, test and measuring methods.

FLANGE CONNECTIONS

According to TA-Luft and VDI 2440 flange connections must comply with maximum leakage rate of $10^{-4} \text{ mbar} \times l \text{ (s} \times \text{m)}$ at test pressure of 1 bar. VDI 2200 defines the selection, calculation, design and assembly of bolted flange connections as well as test procedures and refers to VDI 2440 regarding permissible leak rates. VDI 2200 also defines criteria for "Blow-out" safety test for gaskets. Aim of this Blow-out test is to avoid a sudden leakage through seal burst.

CLEAN AIR ACT

The Clean Air Act defines maximum leakage levels for flange connections, valves, pumps and agitators in the USA. Leakage test has to be done according to EPA Method 21 (sniffing method) with methane.

API 622

API 622, 2nd Edition is an international performance test for packing materials considering several factors such as temperature, pressure, thermal and mechanical cycling. 2nd Edition of API 622 defines 1510 mechanical cycles and 5 thermal cycles. High temperature test shall be performed from ambient temperature to 260°C (500 °F) and pressures from 0 to 600 psi (0 – 41 bar). Permissible leakage level is 100 ppm with test medium methane.

API 624

First edition of API 624 is a type testing of rising stem valves equipped with graphite packing for Fugitive Emissions. The standard covers rising and rising-rotating stem valves up to 24" diameter and has to be performed at original valves. The test procedure requires 310 mechanical cycles and three thermal cycles to 260°C (500 °F). Allowable leakage is 100 ppm maximum. It requires that the tested valve packing be previously tested according to API 622 and be suitable for use at service temperatures –29°C to +538°C (–20 °F to 1000 °F).

API 641

The API 641 test is one of three prevalent valve standards tests that evaluate fugitive emissions' performance over an accelerated life cycle. Of the three, the API 641 Standard is the most stringent type test for quarter-turn valves and covers different designs, temperature ratings and sealing components. To pass this critical test, valves must meet the demanding criteria of maximum leakage of 100 ppmv, while undergoing 610 cycles of the valve under extreme temperatures.

ISO 15848 TIGHTNESS CLASSES

Grade	Measured leakage rate	Remarks
A	$\leq 10^{-5} \text{ mg / (s} \times \text{m)}$	Typically achieved with bellow seals or equivalent spindle / shaft gasket system for swivel valves
B	$\leq 10^{-4} \text{ mg / (s} \times \text{m)}$	Typically achieved with packing system based on PTFE or elastomer materials
C	$\leq 10^{-2} \text{ mg / (s} \times \text{m)}$	Typically achieved with packing on flexible graphite basis

MAXIMUM LEAK RATES ACCORDING TO VDI 2440*

Temperature rate	Measured leakage rate
< 250°C	$\leq 10^{-4} \text{ mbar} \times l \text{ / (s} \times \text{m)}$
$\geq 250^\circ\text{C}$	$\leq 10^{-2} \text{ mbar} \times l \text{ / (s} \times \text{m)}$

*for harmful VOC's (Volatile Organic Compounds) for valves