

Fugitive Emission (FE) Solutions

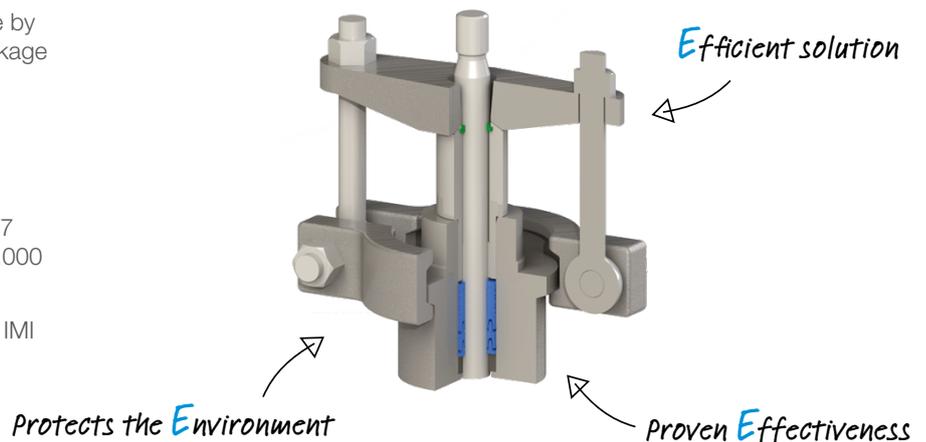
Industry Driven Fugitive Emission
Packing Solutions

Fugitive Emission (FE) Solutions

Fugitive Emissions (FE) are identified as the loss of volatile organic compounds (VOC). In industrial plants the common sources of fugitive emissions are equipment leaks, flaring, evaporation and spills. Valves account for approximately 60% of the total plant emissions. In refineries this value can increase to 70% and may come only from 1% of the total installed valves*. For this reason across industries there is an emphasis on effective fugitive emission valve stem packing designs and specific standards to regulate the testing and certification of different packing solutions. The leading industrial standard for FE testing is ISO 15848-1. Shell SPE 77-300 actually refers to ISO 15848 with regards to the testing of control valves. The standard fugitive emissions packing solutions available by IMI CCI and the 3rd party certification level are summarised on the adjacent page.

IMI CCI EEEasy-Seal™

- > Protects the environment and the work place by providing ISO Class AM fugitive emission leakage protection
- > An efficient solution that can be installed in a compact packing box without the need for external live loading
- > Proven effective. ISO 15848-1:2015+A1:2017 3rd party certification is available for CC1 20,000 cycles, (-46°C to +200°C), Class AM
- > Available as an upgrade solution for installed IMI CCI 100D, 900 and 800 series product lines



IMI CCI EEEasy-Seal™ (Fire safe)

- > Successfully fire safe tested against API 6FA and ISO 10497
- > Successfully PR2 tested per API 6A Annex F
- > Proven effective. ISO 15848-1:2015+A1:2017 3rd party certification is available for C01 205 cycles, temperature range -46°C to +200°C, Class AH
- > Additionally certified for ISO 15848-1:2015+A1:2017 3rd party CC1 20,000 cycles, temperature range -46°C to +150°C, Class CH



Choosing the appropriate FE solution

When specifying the fugitive emission certification level and procedure it is important to understand your application, tightness level required and the appropriate test fluid medium.

What valve types are more susceptible to fugitive emission leakage?

Control valves are among the prevalent valve types which contribute to fugitive emissions in an industrial setting. In particular rising stem control valves are much more susceptible to leakage compared to rotary motion valves due to the stem motion.

What is the difference between live loading via external springs and pressure energised seals?

Live loading via external springs can lead to significant additional friction and may affect the valve resolution. Typically the live load applied via external springs is for a much higher load than the internal hydraulic pressure. The seals are forcibly compressed against the stem and the seal contact area is quite high. The EEEasy-Seal™ packing set is live loaded via internal spring and utilises the internal hydraulic pressure to optimally energise the seal. The resulting seal contact area is per design and is low friction. An external live loaded spring energised packing set may also require more maintenance and monitoring at site which is a special concern on unmanned platforms or vibration sensitive systems.

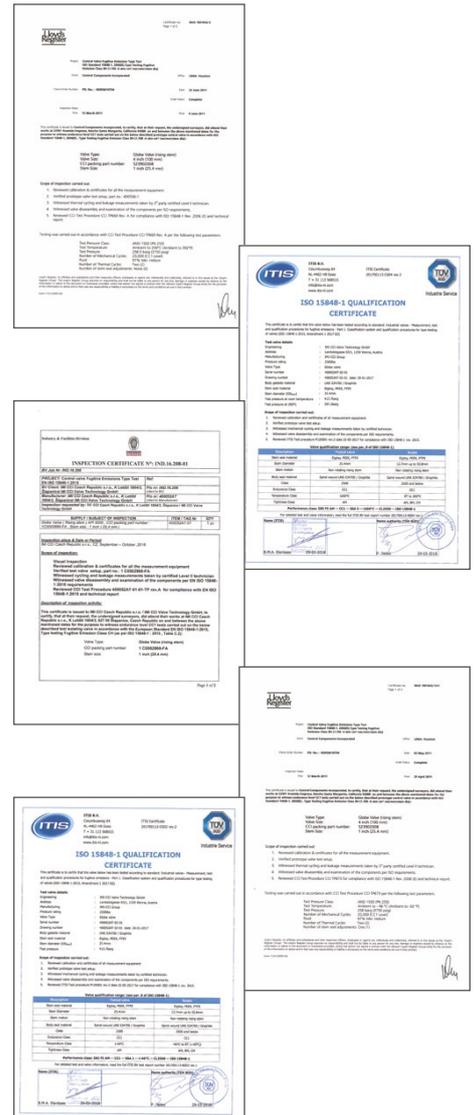
What endurance class should I choose for my application?

Since control valves are expected to regularly modulate ISO-15848-1 CC1 Endurance class, 20,000 cycles, is an appropriate requirement to ensure packing

wear will not affect the leakage level for a reasonable period of time. 205 cycles, ISO-15848 CO1 is typically specified for On-Off applications like choke valves. These valves are not in modulating service and will not experience a high number of cycles during normal service.

Which medium is acceptable for the prototype test fluid?

In oil & gas plants the process medium is typically a mixture of hydrocarbons or a defined hydrocarbon. For this reason testing with methane is appropriate. Methane has a molecular weight of 16 g/mol and is the most common hydrocarbon type in industrial applications and is one of the lightest hydrocarbon gases. For example H₂S, with a molecular weight of 34 g/mol is a much heavier molecule, therefore if a certification is made with methane then plant personnel can be confident that larger, dangerous molecules like H₂S will not leak. (Note: Literature and testing shows that testing with helium, molecular weight of 4 g/mol, will typically result in a higher leakage class result due to permeation of the helium molecules through the seal material. This is especially evident for high endurance tests, 20,000 cycles.)



IMI CCI fugitive emission certification

Fugitive emission packing overview*

Packing type	Live loading	Temperature range		Max. pressure rating	Endurance class	Leakage class**1
LiveSeal® B	External spring	-46°C	200°C	ASME 1500	CC1 (20,000 cycles)	BH
		-46°C	200°C	ASME 2500	CC1 (20,000 cycles)	AM
EEEasy-Seal™	Internal spring	5°C	40°C	ASME 2500	CC1 (20,000 cycles)	BH
		-46°C	121°C	API 15,000	CC1 (20,000 cycles)	AM
		-46°C	200°C	API 10,000	CO1 (205 cycles)	AH
EEEasy-Seal™ (Fire-safe)	Internal spring	5°C	150°C	API 10,000	CC1 (20,000 cycles)	CH
		-46°C	121°C	API 15,000	CO1 (205 cycles)	AH

*Prototype test results have been made on a production valve **Leakage class designation H indicates test fluid helium

†Leakage class designation M indicates test fluid methane

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