

# New Standards & Editions Changes for Fugitive Emissions Compliance & Valve Requirements

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## New Standards & Editions Changes for Fugitive Emissions Compliance & Valve Requirements

**The standards below for reference that will be discussed are the following.**

**API 599 7th Edition 2013** – Metal Plug Valves – Flanged, Threaded, and Welding Ends

**API 600 13th Edition 2015** – Steel Gate Valves- Flanged and Butt-welding Ends, Bolted Bonnets

**API 602 10th Edition 2015** – Steel Gate, Globe, and Check Valves for Sizes NPS 4 (DN 100) and Smaller for the Petroleum and Natural Gas Industries

**API 603 8th Edition 2013** – Corrosion-resistant, Bolted Bonnet Gate Valves – Flanged and Buttwelding Ends

**API 608 5th Edition 2012** – Metal Ball Valves – Flanged, Threaded, and Welding Ends

**API 609 8th Edition 2016** – Butterfly Valves: Double-flanged, Lug- and Wafer-type

**API RP621 3rd Edition 2010** – Reconditioning of Metallic Gate, Globe, and Check Valves

**API 622 2nd Edition 2011** – Type Testing of Process Valve Packing for Fugitive Emissions

**API 623 1st Edition 2013** – Steel Globe Valves – Flanged and Butt-welding Ends, Bolted Bonnets

**API 624 1st Edition 2014** – Type Testing of Rising Stem Valves Equipped with Graphite Packing for Fugitive Emissions

**API 641 1st Edition 2016** – Type Testing of Quarter-turn Valves for Fugitive Emissions

**ISO 15848-1- Industrial valves** – Measurement, test and qualification procedures for fugitive emissions

**TA Luft-VDI:2440**



## New Standards & Editions Changes for Fugitive Emissions Compliance & Valve Requirements

- New standards and updated editions of existing standards continue to be introduced, ever increasing the valve types and valve testing requirements to meet fugitive emissions.
- The most widely accepted standards organizations for fugitive emissions initiatives with regard to valves are API and ISO with extended requirements from end users (user specific testing requirements) and TA Luft specifications.
- Globally, API and ISO either independent or congruent are considered minimum compliance standards.
- End user specifications and TA Luft may be required but in many cases to a lesser extent.
- There have been and continue to be compliance and non-compliance nuances to not only successful testing that include but are not limited to:
  - a) Timely completion of all testing for all standards
  - b) The need/requirement to following any new standards or updated editions standards relative to fugitive emissions

## New Standards & Editions Changes for Fugitive Emissions Compliance & Valve Requirements

- Current/Recently updated valve standards, especially those managed by API have begun to include the fugitive emissions standards testing as a requirement in each valve standard.
- The question is often asked does a valve have to be tested for fugitive emissions to be an API 600 or API 602 and the answer is a resounding YES!
- **In 2015, new editions for both API 600 and API 602 were published requiring API 624 fugitive emissions testing.**
- API 624 published in 2014 requires valve stem packing testing to API 622 in it's totality, which includes weight loss and corrosion. **Not Just Leakage Testing**

Steel Gate Valves—Flanged and Buttwelding Ends, Bolted Bonnets

API STANDARD 600  
THIRTEENTH EDITION, JANUARY 2015  
EFFECTIVE DATE: JULY 2015

API  
AMERICAN PETROLEUM INSTITUTE

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Gate, Globe, and Check Valves for Sizes DN 100 (NPS 4) and Smaller for the Petroleum and Natural Gas Industries

API STANDARD 602  
TENTH EDITION, MAY 2015  
API MONOGRAM PROGRAM EFFECTIVE DATE: NOVEMBER 10, 2015

API  
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## New Standards & Editions Changes for Fugitive Emissions Compliance & Valve Requirements

- In addition, API 624 also specifies valve sizes and pressure classes to be tested for API 603 and API 623. API 603 & API 623 do not yet mandate API 624 compliance as required in API 600 & API 602.
- However, API 603 & API 623 are currently under revision and API 624 compliance is expected to be included in the new editions of these standards.
- There are some valve manufacturers that have already or are currently testing their API 603 and API 623 valves to API 624.
- API 624 testing includes both gate and globe valves from  $\frac{3}{4}$ " (DN80) to 20" (DN500) and pressure classes from 150 (PN20) to 1500 (PN250).

### Type Testing of Rising Stem Valves Equipped with Graphite Packing for Fugitive Emissions

API STANDARD 624  
FIRST EDITION, FEBRUARY 2014

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## New Standards & Editions Changes for Fugitive Emissions Compliance & Valve Requirements

- The 3rd edition of API 622 is currently under revision by appointed Task Group and will have changes to include the same leakage requirements as API 624.
- API 624 requires a maximum leakage rate of 100 ppm and no packing adjustments (no re-torque) throughout the complete test.
- There are a small number of packing manufacturers that have already passed API 622 testing to the same requirements as API 624 with maximum leakage rates of <100 ppm and no packing adjustments (no re-torque).
- Also, there are some end users that require a maximum leakage rate of 50 ppm or less. It is possible that a maximum leakage of 50 ppm will become the requirement for both API 622 and API 624 in the not too distant future, as the US EPA begins to look to lower the allowable rate in some areas of the US to <50 ppm.

## New Standards & Editions Changes for Fugitive Emissions Compliance & Valve Requirements

- The new edition (3<sup>rd</sup> edition) of API 622 will include 1/8" cross section testing in addition to the current 1/4" cross section already required as standard.
- The purpose of adding to 1/8" cross section testing is to help substantiate the suitability of the most commonly used packing cross section for the manufacture of API 602 valve designs.
- A second test fixture for the 1/8" packing cross section has been added into the new edition of API 622 to accommodate the testing of 1/8" cross section packing.

## New Standards & Editions Changes for Fugitive Emissions Compliance & Valve Requirements

- API 622 testing includes three additional tests that are equally important, but required to be able to provide a complete API 622 test report.
  1. Weight Loss
  2. High Temperature Corrosion Test
  3. Ambient Corrosion Test
- The weight loss test has specific requirements by packing type
- The corrosion testing is very important, but does not have specific requirements to validate.
- These tests are extremely important, actually critical tests that are often overlooked during evaluation of packing manufacturers and valves for the Low E market.
- Acceptance of a compliant cycle test without an understanding of the required Corrosion and Weight Loss testing is a very high risk mistake and would actually lead you to accepting incomplete test results.
- Inferior Weight Loss and Corrosion Testing can contribute to leakage.
- These include direct path leakage from metal corrosion pitting in the packing box or stem.
- Weight loss equates to packing volume loss, which directly causes torque load loss.



## New Standards & Editions Changes for Fugitive Emissions Compliance & Valve Requirements

- API 641 for 1/4 turn valves was published in October of 2016.
- While, there are similarities with API 624, API 641 takes a very different approach to valve qualification with higher and lower stem seal material temperature ratings.
- Additionally, API 622 compliant packing is only required if the primary stem seal is graphite.
- Three groups each for higher and lower pressure ratings provide the qualification of the different stem seal material temperature ratings, totaling six different testing groups.
- The higher and lower pressure and temperature ratings are 41.1 bar and 260°F, respectively.

Type Testing of Quarter-turn  
Valves for Fugitive Emissions

API STANDARD 641  
FIRST EDITION, OCTOBER 2016

 API  
AMERICAN PETROLEUM INSTITUTE

# New Standards & Editions Changes for Fugitive Emissions Compliance & Valve Requirements

- Below A, B & C groups for  $\geq 260^{\circ}\text{C}$ .

Table 1-Valve Groups: Valve Temperature Rating  $\geq 260^{\circ}\text{C}$  (500  $^{\circ}\text{F}$ )

Valve pressure rating at 260 $^{\circ}\text{C}$ (500 $^{\circ}\text{F}$ ) is $\geq 41.1$ barg (600 psig)	Valve pressure rating at 260 $^{\circ}\text{C}$ (500 $^{\circ}\text{F}$ ) is $< 41.1$ barg (600 psig) and $\geq 6.89$ barg (100 psig)	Valve with a temperature rating $\geq 260^{\circ}\text{C}$ (500 $^{\circ}\text{F}$ ) and does not comply with the requirements of Group A or Group B
Group A (see 8.7.1)	Group B (see 8.7.2)	Group C (see 8.7.3)
NOTE Valves with a pressure rating less than 6.89 barg (100 psig) at ambient temperature are outside the scope of this standard.		

# New Standards & Editions Changes for Fugitive Emissions Compliance & Valve Requirements

- Below D, E & F groups for < 260°C.

Table 2-Valve Groups: Valve Temperature Rating < 260 °C (500 °F)

Valve pressure rating at its maximum-rated temperature is $\geq 41.1$ barg (600 psig)	Valve pressure rating at its maximum-rated temperature is < 41.1 barg (600 psig) and $\geq 6.89$ barg (100 psig)	Valve with a temperature rating < 260 °C (500 °F) and does not comply with the requirements of Group D or Group E
Group D (see 8.8.1)	Group E (see 8.8.2)	Group F (see 8.8.3)
NOTE Valves with a pressure rating less than 6.89 barg (100 psig) at ambient temperature are outside the scope of this standard.		

## New Standards & Editions Changes for Fugitive Emissions Compliance & Valve Requirements

- For the higher and lower temperatures Groups A & D  $\geq 41.1$  bar, Groups B & E  $< 41.1$  bar and  $\geq 6.89$  bar and Groups C & F for any different than other groups.
- Currently, no valve standards require API 641. However, the 8th Edition of API 599 and the 6th Edition of API 608 are under revision by appointed Task Group and API 641 will be required.
- There were changes made to API 600 & API 602 other than the addition of API 624 Low E testing.
- The following is a general overview of the changes made to latest editions of these standards.

## New Standards & Editions Changes for Fugitive Emissions Compliance & Valve Requirements

### API 600

- Pipe Size Range Increased from DN600(24") to DN1050(42")
- Larger than DN600(24") Flanges ASME B16.47 Series A or B
- Welding ends max 0.23% carbon and CE=0.43
- New Table 3 minimum bore for DN800(32") to DN1050(42")
- Bonnet gland bolting retention
- Tapped test opening purchase order specified
- Spiral wound gasket tongue and groove without centering ring
- Other gasket facings approved by purchaser
- Except Class 150, gasket cannot extend beyond inner edge of bolt holes
- No sealing compounds on gasket surfaces only light lubricant
- Pressure seal bonnet design to MSS SP-144 Style B
- MSS SP-91 or maximum rim pull for stem strength
- Manually operated valves minimum stem and nut thread engagement 1.5 stem  $\varnothing$
- Base material wedge and seat ring equal to body or stem material
- DN650(26") and larger minimum must have hard faced wedge and body guides
- Nickel trims 19A,19B,19C, 20, 20A,20B,20C and 21 added

## New Standards & Editions Changes for Fugitive Emissions Compliance & Valve Requirements

### API 602

- ISO references removed
- Butt weld ends replaced with ASME B16.25 reference and update figure
- Bonnet joint gasket updated to bolted and the 3 different types of gaskets composite (corrugated), composite-metal (spiral wound) and metal added
- Body bonnet joints threaded secured by seal welding added
- Removed trims 1 & 2
- Trims 19, 20, 21 added
- Note added for Stellite 21
- Note added for HF trim equivalent corrosion and pressure-temperature rating
- Table 13 alternative trims updated
- Forged bar added for body and bonnet
- Annex F purchaser information added “Normative” and notes including MR 0103
- Annex G valve material combinations updates

## New Standards & Editions Changes for Fugitive Emissions Compliance & Valve Requirements

- The number of standards changes keep growing with both new standards and new editions of standards
- These continue to increase the overall valve compliance requirements making it mandatory for careful review and understanding.
- No valve manufacturer can meet these requirements simply by making a claim they do.
- Users must carefully verify all of the new requirements with extreme diligence and continual monitoring of manufacturers included in their AML's.
- Users must require documentation from valve manufacturers to verify valves have been tested and meet all requirements, which includes the required packing testing documentation.
- Globalization of valve standards continues to create challenges with regard to valve design and manufacturing processes due to the variability and lack of harmony in the standards from Global Region to Global Region.

## New Standards & Editions Changes for Fugitive Emissions Compliance & Valve Requirements

- The release of both new editions of standards and new standards is ushering in a new era of increased valve performance that is actually being driven by the need to meet Low E mandates and other ever evolving standards requirements.