Compliance Statement
API 641 - Stem Design

Introduction

Alloy Valves & Control Inc. (AVCO) actively seeks to test and improve our products and keep up to date with the ever changing market requirements. Fugitive emissions reduction is a primary concern for many markets around the world with much stricter guidance and governance.

As part of our continual product improvement and upon listening to our end users, we have been introducing API 641 certification and testing to our valve lines.

What is API 641

API 641 specifies the requirements and acceptance criteria for fugitive emissions type testing of quarter-turn valves based upon elements of EPA Method 21. The standard primarily focuses on the stem design and associated packing.

The AVCO Stem Design

AVCO's approach to valve design is to use a modular system sometimes referred to as the 'LEGO®' concept. This enables us to use standard parts across a wide variety of valves, thereby keeping inventory more simplified and spare parts storage much more flexible.

How does this Affect AVCO Valves

API 641 allows for other valves of the same quarter-turn design to be qualified provided they meet certain limitations based upon the type tested valve. These limitations are all centered around the stem design. Many of the AVCO valves share the same stem design and as such can be qualified under type testing.

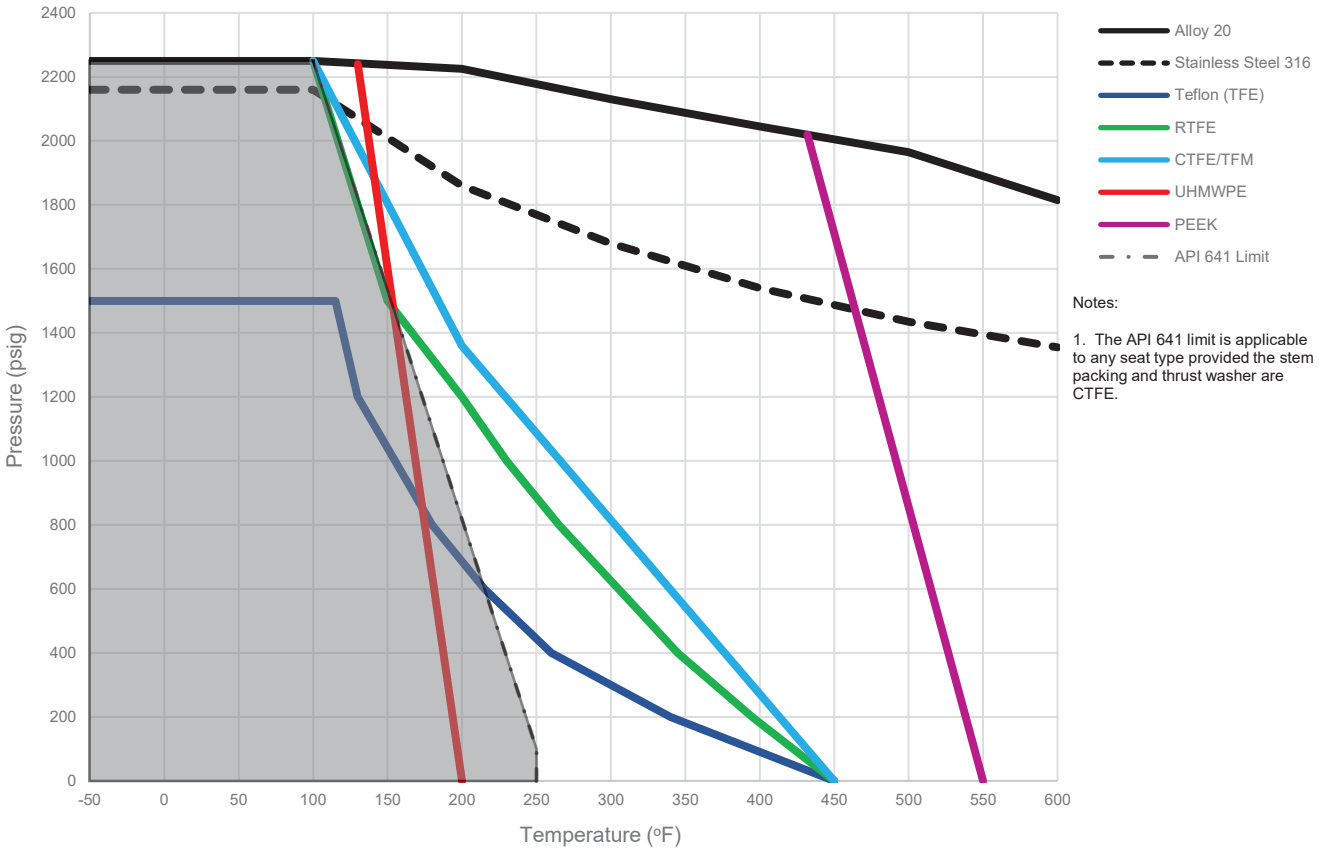
Which AVCO Valves are API 641 Certified

The IV1100 series instrumentation ball valve is fully certified and tested to API 641 as per the attached certificate on the last page of this document.

The allowable leakage rates for both static and dynamic leakage are 100 ppmv methane. The IV1100 series instrumentation ball valve achieved measured leakages no greater than 4 ppmv methane at any part of the test. Primarily the measured leakages were between 0 and 1 ppmv methane.

All IV1100 valve combinations using CTFE packing and within the API 641 pressure-temperature limits shown in the graph below are fully qualified within the same type testing certificate. The gray shaded area denotes the allowable conditions in which the valve can be used for API 641 requirements.

IV1100 Series - API 641 Pressure/Temperature Rating Graph



Notes:

1. The API 641 limit is applicable to any seat type provided the stem packing and thrust washer are CTFE.

Which other AVCO Valves use the API 641 Stem Design

The valves in the following table also use the same API 641 certified stem design as the IV1100 series instrumentation valve. The stem design for each of these valves would usually meet the specified limitations for type test approval as outlined in API 641, but the body construction differs between series. API 641 does not explicitly state that body construction forms part of the qualification procedure, but the body joints are monitored as part of the test.

While these valves are not covered by the IV1100 series instrumentation valve certificate, the stem design is identical and as such would have almost identical sealing performance.

What about other Stem Packing Materials

API 641 type testing is material specific, right down to the material supplier. Any change in material or supplier would require a new test. AVCO uses an established single source for all our stem seal washer materials to ensure product continuity, as these are an essential part of our valve design.

Due to the many combinations of stem seal (thrust and packing) washers, along with valve combinations, we feel it better to fully test the most common combinations to API 641.

For PTFE based stem seal washers (TFE, RTFE, TFM), AVCO has every confidence that these materials will perform very similar to the tested material (CTFE). Internal testing gives us confidence that PTFE based materials will meet the leakage criteria set out in API 641.

For PEEK stem seal washers, we also have every confidence based upon internal testing and field applications, but this is more difficult to justify as a 'qualification' because PEEK properties are very different to PTFE.

Conclusion

When considering API 641, AVCO has every confidence that all valves listed herein will pass type testing, especially as the listed valves share the exact stem design and also have resilient type materials for the stem seal washers.

We may not have all the listed valves fully certified per API 641, but the modular design gives enough confidence to know that these valves are very capable of meeting API 641 emissions. Further type testing per API 641 will be added based upon demand and common stem/valve/material combinations.

Valves with Identical API 641 Stem Design

Valve Series	Size Range
1100 Series	1/4" thru 2"
1500 Series	1/4" thru 2"
1700 Series	1/4" thru 2"
1800 Series	1/4" thru 2"
1900 Series	1/4" thru 2"
2100 Series	1/2" thru 2"
2500 Series	1/2" thru 2"
2700 Series	1/2" thru 2"
2800 Series	1/2" thru 2"
2900 Series	1/2" thru 2"

Copyright © 2023 Alloy Valves and Control Inc. All rights reserved. No part of this procedure may be used or reproduced in any manner whatsoever without written permission from AVCO

This brochure is general in nature and we reserve the right to alter dimensions, materials or make design improvements.

Yarmouth Research and Technology, LLC

API 641 TEST CERTIFICATE

Certificate Number:	223147A

Test Start Date:	8/7/2023
Test End Date:	8/10/2023

Customer Information	
Customer:	Alloy Valves and Control
Web Address:	www.avcovalve.com
Manufacturer Location:	3210 S. Susan Street, Santa Ana CA 92704

Valve Information			
Valve Size:	1/2"	Valve Pressure Class:	900
Valve Description:	1/2" Class 900 Instrumentation Valve		
Product Code:	IV133CCV-050-XS		
Assembly Drawing No.:	D26718		
API/ASME Design Standards:	ASME B16.34		
Stem Seal Description:	CTFE		
Body Seal Description:	Viton		

Test Results		
Test Specification:	API 641, First Edition, 2016	
Max. Allowable Stem Seal Leakage:	100	PPMv Methane
Number of Mechanical Cycles:	610	
High Temperature:	250	deg. F
Test Pressure at Ambient Temp.:	600 psig	
Test Pressure at High Temp.:	100 psig	
Did valve pass test requirements?	***YES***	

Valves of the same quarter-turn design as the test valve may be deemed to be qualified subject to paragraph 11 of the test specification.



Matthew J. Wasielewski, PE
President and Manager
Yarmouth Research and Technology, LLC
434 Walnut Hill Road
North Yarmouth, ME 04097 USA

