

**ITIS B.V.**

Columbusweg 64
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www.itis-nl.com

Test certificate
202000519-C004 rev. 1

API 641 QUALIFICATION CERTIFICATE

This certificate is to certify that the valve below has passed the requirements for fugitive emission and operability according to standard: API standard 641, first edition, October 2016 "Type Testing of Quarter-turn Valves for Fugitive Emissions".

Test valve details

Manufacturer location 1 : Armature d.o.o.
Address : Koroška Cesta 55, SI/2366 Muta, Slovenia
Manufacturer location 2 : Friedrich Krombach GmbH
Address : Postfach 1130, 57202, Kreuztal, Germany
Manufacturer location 3 : Crane Ningjin Valve Co.
Address : Jing Long St. 496, 055550 Ningjin, China
Product name : Krombach® TUFSEAT™ Performance Series Metal Seated Ball Valve with High Temperature Trim
Nominal size : DN150
Pressure rating : Class 300
Valve Type : Ball valve
Design standard : ASME B16.34
Drawing number : 4924311024 Rev. 0, Date: 20-11-2020
Serial number : 133843
Body material : A216 WCB (1.0619)
Stem material : A276 431 (1.4057)
Body gasket material : Spiral Wound, 316Ti Windings, Graphite filler
Actuator : Pneumatic provided by Crane

Approved signatory

A. Floor

A. Floor

29-04-2021

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Test certificate
202000519-C004 rev. 1

According to API 641, section 11, the specified range for covering other valves is:

Description	Tested valve	Scope
API 641 Valve group	Group A	Group A
Stem Diameter	50mm	25mm up to 75mm
Stack height	21mm	15.75mm up to 26.25mm
Stem motion	¼ turn stem	¼ turn stem
Stem Seal Material primary	Graphite	Graphite
Stem Seal Material secondary	Graphite	Graphite
Stem primary seal brand	James Walker	James Walker
Stem secondary seal brand	Klinger Kempchen	Klinger Kempchen

Disclaimer: Under no circumstances ITIS B.V. can be held responsible applying the above mentioned covering range

This certificate refers to the above mentioned test valve. This certificate does not imply assessment of the production of the valves. This certificate is only valid in conjunction with the full ITIS BV test report number 202000519-R004 rev. 1.

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Valve stem seal information



Manufacturer 1 : James Walker
Stem seal description : Graphite ring
Model/Type : Supagraf Premier
Manufacturer 2 : Klinger Kempchen
Stem seal description : Graphite ring
Model/Type : Rivatherm Super 2E2
Included in API 622 scope : No
Stem seal material primary : Graphite
Stem seal material secondary : Graphite
Number of rings primary seal : 4
Number of rings secondary seal : 4
Gland torque : 16Nm at start of the test
Outer stem seal dimension (OD) : 60mm
Inner stem seal dimension (Od) : 50mm
Stack Height : 21mm
Stem seal chamber depth : 29.0mm

Requirements and limits

API 641 Valve group : Group A
Ambient temperature (T_a) : 15°C to 40°C
Elevated temperature [T_e] : 260°C ±5%
Amount of operational cycles : 610 cycles
Amount of thermal cycles : 3 thermal cycles
Stem orientation : Vertical
Maximum allowable leak rate : 100 ppmv (measurement according to EPA Method 21)
Test pressure [P_a] : 41.4barg ±5%
Test pressure [P_e] : 41.4barg ±5%

Manufacturer published torque values

Running torque : 640.0Nm
Closing torque : 640.0Nm
Maximum operating pressure : 8.0barg

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Test results

Test	Mechanical cycles (total)	Temperature valve body (T)	Test pressure (P)	Tested parts	Results (ppmv)	Uncertainty leakage measurement	Date	Pass / Fail
1	0	T _a	41.4barg	Body seals	5	semi-quantitative	16-02-2021	Pass
	0			Stem seal	5			Pass
	100			Stem seal	4			Pass
	101			Stem seal	4			Pass
2	101	260°C	41.4barg	Stem seal	5	semi-quantitative	17-02-2021	Pass
	200			Stem seal	32			Pass
	201			Stem seal	36			Pass
3	201	T _a	41.4barg	Stem seal	9	semi-quantitative	18-02-2021	Pass
	300			Stem seal	7			Pass
	301			Stem seal	8			Pass
4	301	260°C	41.4barg	Stem seal	18	semi-quantitative	18-02-2021	Pass
	400			Stem seal	26			Pass
	401			Stem seal	26			Pass
5	401	T _a	41.4barg	Stem seal	5	semi-quantitative	19-02-2021	Pass
	500			Stem seal	5			Pass
	501			Stem seal	5			Pass
6	501	260°C	41.4barg	Stem seal	29	semi-quantitative	19-02-2021	Pass
	600			Stem seal	40			Pass
	601			Stem seal	42			Pass
7	601	T _a	41.4barg	Stem seal	5	semi-quantitative	22-02-2021	Pass
	610			Stem seal	5			Pass
	610			Body seals	5			Pass

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Torque measurements					
Cycle	Tested part	Results	Uncertainty	Date	Pass / Fail
First mechanical cycle	Running torque	5.0barg	±0.08bar	10-02-2021	Pass
Last mechanical cycle	Running torque	4.6barg	±0.08bar	15-02-2021	Pass

Cycling duration

Total time for the valve to perform 610 mechanical cycles (full stroke) was approximately 1.7 hours (10 seconds per cycle).

Covering range

According to section 11 of API standard 641, First Edition October 2016, type testing of quarter-turn valves for fugitive emissions, the qualification range mentioned in section 11 may be used to qualify valves of the same quarter-turn design as the test valve if the criteria from points 11.1.1 to 11.1.8 are met.

Description	Tested valve	Scope
API 641 Valve group	Group A	Group A
Stem Diameter	50mm	25mm up to 75mm
Stack height	21mm	15.75mm up to 26.25mm
Stem motion	¼ turn stem	¼ turn stem
Stem Seal Material primary	Graphite	Graphite
Stem Seal Material secondary	Graphite	Graphite
Stem primary seal brand	James Walker	James Walker
Stem secondary seal brand	Klinger Kempchen	Klinger Kempchen

Disclaimer: Under no circumstances ITIS B.V. can be held responsible applying the above mentioned covering range

Conclusion and remarks

The valve meets the requirements for Fugitive Emission and operability stated in API Standard 641, first edition, October 2016 'Type Testing of Quarter-turn Valves for Fugitive Emissions. No notable wear, deformations or damaging was detected on the sealing components during the visual inspection after the strip-down on the valve.



Reason of revision

Changing of the manufacturer location 1 from Slovakia to Slovenia.

This test report documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI). The test result(s) and conclusion(s) in this report related to the sample(s) tested as described herein and must not be used to claim product certification. This test report may not be reproduced in whole or in part, without written approval of ITIS B.V. The test meets the requirements of ISO 9001: 2015 as verified and certified by TÜV SÜD Management Service GmbH, certificate number: 12 100 43628 TMS.

The test laboratory has not been responsible for the sampling stage (sample has been provided by the client). Test results stated in this report apply to the samples as received.

Applied decision rule: Measurements are reported as "Pass" – If the measurement results are within (or below) the specification limit when the measurement with its (upper) uncertainty limit is taken into account".

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A. Floor	29-04-2021	

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Test certificate
202000519-C002 rev. 1

API 641 QUALIFICATION CERTIFICATE

This certificate is to certify that the valve below has passed the requirements for fugitive emission and operability according to standard: API standard 641, first edition, October 2016 "Type Testing of Quarter-turn Valves for Fugitive Emissions".

Test valve details

Manufacturer location 1 : Armature d.o.o.
Address : Koroška Cesta 55, SI/2366 Muta, Slovenia
Manufacturer location 2 : Friedrich Krombach GmbH
Address : Postfach 1130, 57202, Kreuztal, Germany
Manufacturer location 3 : Crane Ningjin Valve Co.
Address : Jing Long St. 496, 055550 Ningjin, China
Product name : Krombach® TUFSEAT™ Performance Series Metal Seated Ball Valve with High Temperature Trim
Nominal size : DN200
Pressure rating : Class 300
Valve Type : Ball valve
Design standard : ASME B16.34
Drawing number : 4924312016 Rev. 0, Date: 05-11-2020
Serial number : 131042
Body material : A216 WCB (1.0619)
Stem material : A276 431 (1.4057)
Body gasket material : Spiral Wound, 316Ti Windings, Graphite filler
Actuator : Pneumatic provided by Crane

Approved signatory

A. Floor

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29-04-2021

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Test certificate
202000519-C002 rev. 1

According to API 641, section 11, the specified range for covering other valves is:

Description	Tested valve	Scope
API 641 Valve group	Group A	Group A
Stem Diameter	70mm	35mm up to 140mm
Stack height	30mm	22.5mm up to 37.5mm
Stem motion	¼ turn stem	¼ turn stem
Stem Seal Material primary	Graphite	Graphite
Stem Seal Material secondary	Graphite	Graphite
Stem primary seal brand	James Walker	James Walker
Stem secondary seal brand	Klinger Kempchen	Klinger Kempchen

Disclaimer: Under no circumstances ITIS B.V. can be held responsible applying the above mentioned covering range

This certificate refers to the above mentioned test valve. This certificate does not imply assessment of the production of the valves. This certificate is only valid in conjunction with the full ITIS BV test report number 202000519-R002 rev. 1.

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Valve stem seal information

Manufacturer 1 : James Walker
Stem seal description : Graphite ring
Model/Type : Supagraf Premier
Manufacturer 2 : Klinger Kempchen
Stem seal description : Graphite ring
Model/Type : Rivatherm Super 2E2
Included in API 622 scope : No
Stem seal material primary : Graphite
Stem seal material secondary : Graphite
Number of rings primary seal : 4
Number of rings secondary seal : 4
Gland torque : 350Nm at start of the test
Outer stem seal dimension (OD) : 86mm
Inner stem seal dimension (Od) : 70mm
Stack Height : 30mm
Stem seal chamber depth : 36.0mm

Requirements and limits

API 641 Valve group : Group A
Ambient temperature (T_a) : 15°C to 40°C
Elevated temperature [T_e] : 260°C \pm 5%
Amount of operational cycles : 610 cycles
Amount of thermal cycles : 3 thermal cycles
Stem orientation : Vertical
Maximum allowable leak rate : 100 ppmv (measurement according to EPA Method 21)
Test pressure [P_a] : 41.4barg \pm 5%
Test pressure [P_e] : 41.4barg \pm 5%

Manufacturer published torque values

Running torque : 1260.0Nm
Closing torque : 1260.0Nm
Maximum operating pressure : 8.0barg

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Test results

Test	Mechanical cycles (total)	Temperature valve body (T)	Test pressure (P)	Tested parts	Results (ppmv)	Uncertainty leakage measurement	Date	Pass / Fail
1	0	T _a	41.4barg	Body seals	5	semi-quantitative	26-01-2021	Pass
	0			Stem seal	5			Pass
	100			Stem seal	5			Pass
	101			Stem seal	5			Pass
2	101	260°C	41.4barg	Stem seal	6	semi-quantitative	27-01-2021	Pass
	200			Stem seal	5			Pass
	201			Stem seal	5			Pass
3	201	T _a	41.4barg	Stem seal	5	semi-quantitative	28-01-2021	Pass
	300			Stem seal	5			Pass
	301			Stem seal	6			Pass
4	301	260°C	41.4barg	Stem seal	9	semi-quantitative	28-01-2021	Pass
	400			Stem seal	6			Pass
	401			Stem seal	9			Pass
5	401	T _a	41.4barg	Stem seal	5	semi-quantitative	29-01-2021	Pass
	500			Stem seal	5			Pass
	501			Stem seal	5			Pass
6	501	260°C	41.4barg	Stem seal	5	semi-quantitative	29-01-2021	Pass
	600			Stem seal	5			Pass
	601			Stem seal	6			Pass
7	601	T _a	41.4barg	Stem seal	5	semi-quantitative	01-02-2021	Pass
	610			Stem seal	5			Pass
	610			Body seals	32			Pass

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Torque measurements					
Cycle	Tested part	Results	Uncertainty	Date	Pass / Fail
First mechanical cycle	Running torque	6.2barg	±0.08bar	26-01-2021	Pass
Last mechanical cycle	Running torque	6.3barg	±0.08bar	01-02-2021	Pass

Cycling duration

Total time for the valve to perform 610 mechanical cycles (full stroke) was approximately 6.1 hours (36 seconds per cycle).

Covering range

According to section 11 of API standard 641, First Edition October 2016, type testing of quarter-turn valves for fugitive emissions, the qualification range mentioned in section 11 may be used to qualify valves of the same quarter-turn design as the test valve if the criteria from points 11.1.1 to 11.1.8 are met.

Description	Tested valve	Scope
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Stem secondary seal brand	Klinger Kempchen	Klinger Kempchen

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Conclusion and remarks



The valve meets the requirements for Fugitive Emission and operability stated in API Standard 641, first edition, October 2016 'Type Testing of Quarter-turn Valves for Fugitive Emissions. No notable wear, deformations or damaging was detected on the sealing components during the visual inspection after the strip-down on the valve.

Reason of revision

Changing of the manufacturer location 1 from Slovakia to Slovenia.

This test report documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI). The test result(s) and conclusion(s) in this report related to the sample(s) tested as described herein and must not be used to claim product certification. This test report may not be reproduced in whole or in part, without written approval of ITIS B.V. The test meets the requirements of ISO 9001: 2015 as verified and certified by TÜV SÜD Management Service GmbH, certificate number: 12 100 43628 TMS. The test laboratory has not been responsible for the sampling stage (sample has been provided by the client). Test results stated in this report apply to the samples as received.

Applied decision rule: Measurements are reported as "Pass" – If the measurement results are within (or below) the specification limit when the measurement with its (upper) uncertainty limit is taken into account".

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 A. Floor  A. Floor 29-04-2021	

CERTIFICATE

No. 30429301aE/SW/19.05.2021

The valve with the brand name

**Krombach TUFSEAT Performance
Series with High Temperature Trim
NPS 3" / Class 300**

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of the manufacturer

**Friedrich Krombach GmbH
Marburger Str. 364
D – 57223 Kreuztal**

was tested according to API 641 (dated Oct. 2016). The following sealing systems were used:

stem sealing:

- 1 pc. Sealing system Tier 2; dimensions: \varnothing 38 x \varnothing 28 x 26 mm,
- 1 pc. SX stem seal; dimensions: \varnothing 39.9 x \varnothing 28.5 x 12 mm.

body sealing:

- 1 pc. Spiral wound gasket Graphite / 316Ti; material: Graphite + 316Ti; manufacturer: Donit Tesnit d.o.o.; dimensions: \varnothing 138 x \varnothing 126 x 2.5 mm.

In the laboratory of amtec a test was conducted under the following test conditions:

test no.:	20-360	
temperature:	RT / 260	°C
test pressure:	41.4 / 41.4	bar
medium:	CH4	
mechanical cycles:	610	pcs.
stem motion:	90	°
stem diameter:	28	mm

The maximal with the flame ionisation detector measured concentration during the test with 610 mechanical cycles and 3 thermal cycles was **38 ppmv** for the stem sealing. The concentration for the body sealing was maximum **3 ppmv**. All detected concentrations were less than the maximal allowed 100 ppmv, so the valve **passed** the test.

This qualification can be extended to untested valves if the criteria listed in chapter 11 of the API 641 are fulfilled. This certificate is only valid in combination with the test report 3042931/a and the herein defined boundary conditions.

amtec Advanced Measurement Messtechnischer Service GmbH Lauffen, 19.05.2021

Dipl.-Ing. S. Weiler
Test Engineer

Dipl.-Ing. F. Herkert
Head of Laboratory