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Test Report about the Check of the Untightness of the Shaft Seal of a Butterfly Valve according to DIN EN ISO 15848-1: 2015-11

Valve manufacturer:	müller coax ag Gottfried-Müller-Str. 1 74670 Forchtenberg
Butterfly valve nominal diameter:	DN 150
Nominal pressure class of the butterfly valve:	ANSI class 300 (PN 50)
Test temperature:	400 °C
Type:	801154
Serial no:	SN16-010136
Shaft diameter:	32 mm
Date of the test:	27. and 28.07.2016
Authorised person:	Dipl.-Ing. Michael Stengel
Test result:	The tightness of the shaft seal with the specified helium leakage rate smaller than $1{,}78 \times 10^{-4}$ mbar l s^{-1} per mm of shaft diameter was checked and approved. The butterfly valve is therefore classified to the following performance class: **ISO FE CH-C01-SSA0-t400°C-CL300-ISO 15848-1**

Date: 2016-07-28

Our reference:
IS-DD1-HBR/st

Document:
test report SN16-010136_20160728.docx

This document consists of 3 Pages.
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The test results refer exclusively to the units under test.

Heilbronn, 28.07.2016

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Test parameters: The test was done in accordance with DIN EN ISO 15848-1 (Industrial valves - Measurement, test and qualification procedures for fugitive emissions – Part 1: Classification system and qualification procedures for type testing of valves (ISO 15848-1:2015) with parameters as follows

Deviations:
- No testing of the leakage on the body seal in accordance to no. 5.1.5.2 of the mentioned standard
- No inspection after the test in accordance to no. 5.2.4.10
- No markings and signs of the valve in accordance to no. 6.6
- The specifications in accordance to no. 7 of the standard are used for this report as far as the tests have been done

Measuring of the leakage rate: Vacuum procedure as described in appendix A of DIN EN ISO 15848-1 with helium (99,996 %)

Measuring equipment:
Mass spectrometer manufacturer Pfeiffer Vacuum GmbH
Type ASM 340
Ser.-Nr. HLD1302932
Calibration with a calibrated leak by capillary principle at the value $3x10^{-4}$ mbar l/s
Sensitivity $5x10^{-12}$ mbar l/s

Test procedures:
tightening torque of the screws of the stuffing box: 25 Nm
neccessary torque for mechanical cycles before and after the tests: 70 Nm
(all measured with torque wrenches)
Test pressure 6,0 bar
Ambient temperature 27 °C

Leakage test no. 1: $2,7x10^{-4}$ mbar l/s
Measured leakage rate per mm shaft- Ø: $8,4x10^{-6}$ mbar l/s
(in accordance to no. 5.2.4.4 of the standard at ambient temperature)

Afterwards motor-operating 50 mechanical cycles (movement of the shaft from totally opened to totally closed and back)

Leakage test no. 2. $2,7x10^{-4}$ mbar l/s
Measured leakage rate per mm shaft- Ø: $8,4x10^{-6}$ mbar l/s
(in accordance to no. 5.2.4.5 of the standard at ambient temperature)

Afterwards heating up of the valve to 400 °C

Leakage test no. 3 $5,2x10^{-4}$ mbar l/s
Measured leakage rate $1,6x10^{-5}$ mg s^{-1} m^{-1}
(in accordance to no. 5.2.4.6 of the standard at 415°C)

Afterwards motor-operating 50 mechanical cycles

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Leakage test no. 4	$5{,}2 \times 10^{-4}$ mbar l/s
Measured leakage rate	$1{,}6 \times 10^{-5}$ mg s^{-1} m^{-1}
(in accordance to no. 5.2.4.7 of the standard at 411°C)	

Afterwards cooling down of the valve to ambient temperature

Leakage test no. 5	$1{,}9 \times 10^{-4}$ mbar l/s
Measured leakage rate	$5{,}9 \times 10^{-6}$ mg s^{-1} m^{-1}
(in accordance to no. 5.2.4.8 of the standard at ambient temperature)	

Afterwards motor-operating 50 mechanical cycles

Leakage test no. 2	$1{,}9 \times 10^{-4}$ mbar l/s
Measured leakage rate	$5{,}9 \times 10^{-6}$ mg s^{-1} m^{-1}
(in accordance to no. 5.2.4.5 of the standard at ambient temperature)	

Afterwards heating up of the valve to 400 °C

Leakage test no. 3	$3{,}1 \times 10^{-4}$ mbar l/s
Measured leakage rate	$9{,}7 \times 10^{-6}$ mg s^{-1} m^{-1}
(in accordance to no. 5.2.4.6 of the standard at 410°C)	

Afterwards motor-operating 50 mechanical cycles

Leakage test no. 4	$3{,}2 \times 10^{-4}$ mbar l/s
Measured leakage rate	$1{,}0 \times 10^{-5}$ mg s^{-1} m^{-1}
(in accordance to no. 5.2.4.7 of the standard at 411°C)	

Afterwards cooling down of the valve to ambient temperature
and motor-operating 5 mechanical cycles

Leakage test no. 6	$1{,}8 \times 10^{-4}$ mbar l/s
Measured leakage rate	$5{,}6 \times 10^{-6}$ mg s^{-1} m^{-1}
(in accordance to no. 5.2.4.9 of the standard at ambient temperature)	

The recorded leakage rate measured by the helium mass spectrometer during the tests was determined after reaching a steady state.

A re-tightening of the seal at the shaft was not carried out during the entire test.

An inspection after the tests showed no anomalies of the tightening seals.