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ISO 15848-1 QUALIFICATION CERTIFICATE

Industrie Service

Certificate No.:253943 Rev.1

Ref. Test report No.:253942 Rev.1

We hereby certify that the valve below has passed the fugitive emission test successfully according to Class AH of ISO 15848-1: 2015 for a total of **1500** cycles.

Name of manufacturer	Antiwear (Suzhou) Industrial Intelligent Technology Co., Ltd.
Postal Address of manufacturer	No.988, Yuexiu Road, Fenhu Economic Development Zone, PC: 215200, Suzhou City, Jiangsu Province, P. R. China
Item	AB-1-T22-1500-RJ-01-C-16-W-C Ball Valve
Valve size	1"
Pressure rating	Class 1500
Stem size	Φ24 mm
Body/bonnet material	ASTM A182 F304
Seal material	PTFE and FKM
Valve assembly drawing no.	10020609 VER. 1.0

The tested valve covers performance class (para.6.6):

ISO FE AH – CO2 – SSA 0 – t(RT) – CL1500 – ISO 15848-1

Extension of qualification (in particular) to untested valves in accordance with paragraph 8 of ISO15848-1.

Other stem sizes qualified: 12 mm up to 48mm

Other pressure ranges qualified: Class 1500 and lower

This certificate must be read in conjunction with test report No.:253942 Rev.1

Shanghai, August 31, 2022
(Place, date)

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Industrie Service

Test Report

(Valve fugitive emission test according to ISO15848-1: 2015)

Certificate No. :253943 Rev.1
Test Report No.:253942 Rev.1

Applicant / Manufacturer: Antiwear (Suzhou) Industrial Intelligent Technology Co., Ltd.
No.988, Yuexiu Road, Fenhu Economic Development Zone,
PC: 215200, Suzhou City, Jiangsu Province, P. R. China

Inspection body: TÜV SÜD Industrie Service GmbH
Floor 3-13, No.151, Heng Tong Road, Shanghai, P. R. China

Lab of test: Hefei General Machinery & Electrical Products Inspection Institute
National Quality Supervision and Inspection Centre of Pump and Valve Products

Test Date: September 1-2, 2017

Description of valves: AB-1-T22-1500-RJ-01-C-16-W-C Ball Valve
Size: 1"
Pressure Rating: Class 1500
Drawing No.: 10020609 VER. 1.0

Test witnessed By: CHEN Guilin / TÜV SÜD Inspector

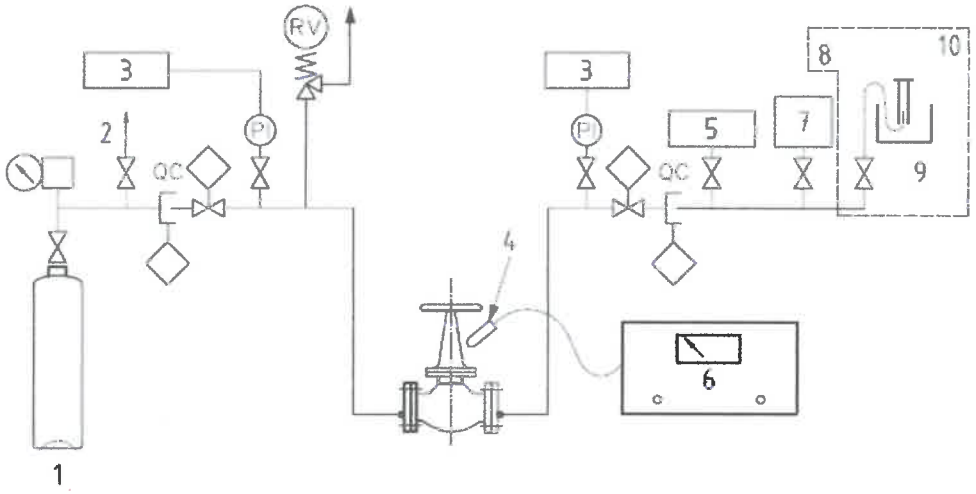
Test Report No.:253942 Rev.1

Inspection and Tests

1. Conformity of Equipment

The test equipment was verified by TÜV SÜD inspector according to requirements of ISO15848-1:2015 and found satisfactory. The detailed arrangement of the fugitive emission test equipment is shown below:

Figure 1 Typical stem seal leakage and body seal leakage measurement system with Sniffing Method



Key

QC quick coupling

1	helium gas supply	6	mass spectrometer
2	vent	7	flow rotameter
3	pressure recorder	8	hose
4	probe	9	measuring cylinder
5	gas flow meter	10	safe location (outside)

2. Document review

The specific product data file provided by the valve manufacturer includes:

a) cross sectional valve assembly drawing;
b) bill of valve material
c) stem or shaft seal description, dimension and specifications;
d) body seal description, dimension and specifications;
e) material specifications of stem or shaft seal components;
f) hydrostatic test certificate.

The above documents are reviewed with no objection.

3. Technical Data of Test Valve:

a) General description of test valve

Name of manufactuer	Antiwear (Suzhou) Industrial Intelligent Technology Co., Ltd.
Postal Address of manufactuer	No.988, Yuexiu Road, Fenhu Economic Development Zone, PC: 215200, Suzhou City, Jiangsu Province, P. R. China
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4. Visual and dimensional check of the test valve:

The test valve was chosen at random by the manufacturer in its workshop and submitted to the laboratory. The visual and dimensional check was performed according to drawing No.: 10020609 VER. 1.0 and results found satisfactory. The mark was verified on valve as following:

ATV	1"	1500	F304
Manufacturer` Brand	Size	Class	Material

The stem size was measured as Ø24mm.

Preparation of the test valve:

Before the fugitive emission test, the test valve was hydrostatic tested under 39MPa, the test showed no visible leakage or deformation. Then the valve was cleaned and dried, and packing was changed and retightened.

6.Calibration of test instrument

The test instrument was turned on, warmed up at the minimum time according to the requirements of the equipment manufacturer and calibrated with the standard calibrated leak 100% helium according to the procedure specified in Annex A, Para.A.1.4.2 of ISO15848-1:2015.

7.Fugitive emission test and measurement

The test valve was mounted on a test rig with the stem positioned vertical. And the fugitive emission test is carried out as per requirement of ISO15848-1:2015 Para.5.

7.1 Preliminary tests at room temperature (test 1)

The valve was pressurized with test fluid Helium to 24.8MPa according to manufacturer's requirements in the partly opened position, the temperature at locations "X"/"Y"/"Z" are measure and recorded as room temperature.

The stem seal and body seal leakage measurement were performed by the vacuum method and the sniffing method as described in ISO15848-1 Annex B.

The test results are as follows:

Test results of preliminary tests

Item	ISO15848-1 Required Value	Actual Value
Stem leakage (mbar.l/s)	≤$4.27x10^{-6}$	$2.7x10^{-6}$
Body seal leakage(ppmv)	≤50	1.08
The test results meet the requirements of ISO15848-1:2015.		

7.2 Mechanical cycle test at the room temperature (test 2/3/4/5/6)

A total of 1500 mechanical cycles was performed on the test valve while it was kept pressurized under a differential pressure of 24.8MPa according to the manufacturer's requirements at room temperature. The pressure should be improved and kept at 24.8MPa to measure the leakage, and then the leakage from the stem seal and from the valve body seal were both measured with following results:

Test results of final tests

Item	ISO15848-1 Required Value	Actual Value
Stem leakage (mbar.l/s)after 50 cycles	≤$4.27x10^{-6}$	$2.7x10^{-6}$
Stem leakage (mbar.l/s)after 100 cycles	≤$4.27x10^{-6}$	$4.0x10^{-6}$
Stem leakage (mbar.l/s)after 150 cycles	≤$4.27x10^{-6}$	$4.0x10^{-6}$
Stem leakage (mbar.l/s)after 200 cycles	≤$4.27x10^{-6}$	$2.7x10^{-6}$
Stem leakage (mbar.l/s)after 205 cycles	≤$4.27x10^{-6}$	$2.7x10^{-6}$
Body seal leakage(ppmv) after 205 cycles	≤50	1.08
Stem leakage (mbar.l/s)after 1000 cycles	≤$4.27x10^{-6}$	$2.7x10^{-6}$
Stem leakage (mbar.l/s)after 1500 cycles	≤$4.27x10^{-6}$	$3.2x10^{-6}$
Body seal leakage(ppmv) after 1500 cycles	≤50	1.28
The test results meet the requirements of ISO15848-1:2015.		

8. Post test examination

After all the above tests completed, the test valve was disassembled and all sealing components visually examined. It is found that no notable wear and any other significant observations.

9. Performance classes

As a result of the above tests, the test valve covered performance classes as follows:

ISO FE AH – CO2 – SSA 0 – t(RT) – CL1500 – ISO 15848-1

10.Extension of qualification to untested valves shall be according to ISO15848-1:2015 paragraph 8.

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Test Report No.:253942 Rev.1

We, hereby declare that I have checked test valve and witnessed the fugitive emission test on the tested valve according to ISO15848-1: 2015. The test results are as mentioned in this report.

TÜV SÜD Industrie Service GmbH

Chen Guilin

Date: August 31, 2022

Annexes:

1) Copy of Drawing No.: 10020609 VER. 1.0;
2) Test Report of Fugitive Emission Test No. 2017FM690A