ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

ISO 15848-1 QUALIFICATION CERTIFICATE

TÜV SÜD Industrie Service

Certificate No.: 285043
Ref. Test report No.: 285044

We hereby certify that the valve below has passed the fugitive emission test successfully according to Class AH of ISO15848-1:2015+Amd.1:2017 for a total of **1500** cycles.

Name of manufactuer	Wuxi Coreline Valve Co., Ltd.
Postal Address of manufactuer	No.210, Xinyuan Road, Ehu Industrial Park, Xishan District, PC:214116, Wuxi City, Jiangsu Province, P. R. China
Item	DN32R 2000psi Ball Valve
Valve size	DN32R
Pressure rating	2000psi(PN138)
Stem size	Φ11 mm
Body/bonnet material	ASTM A351 CF8M
Stem seal material	Viton O-Ring + PTFE+25%Carbon Fiber V-Packing
Valve assembly drawing no.	1312304407 Rev.0

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

ISO FE AH - CO2 - SSA0 - tRT –PN138 – ISO 15848-1

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

Other stem sizes qualified: 5.5 mm up to 22 mm

Other pressure ranges qualified: PN138 and lower

This certificate must be read in conjunction with test report No.: 285044

Chen Guilin

TÜV SÜD Industrie Service GmbH

Shanghai, June 5, 2022
(Place, date)

Guilin Chen
TÜV SÜD Industrie Service GmbH
Westendstr. 199
80686 München Germany

TÜV SÜD Industrie Service GmbH
Shanghai Office
Floor 3-13, No.151, Heng Tong Road,
Shanghai 200070 P. R. China

Tel.: +86 21 6141-0123
Fax: + 86 21 6140-8600

TÜV SÜD Industrie Service GmbH
Shanghai Office
Floor 3-13, No.151, Heng Tong Road,
Shanghai 200070 P. R. China

Industrie Service

Test Report

(Valve fugitive emission test according to ISO15848-1: 2015+Amd.1:2017)

Certificate No. :285043
Test Report No.:285044

Applicant / Manufacturer: Wuxi Coreline Valve Co., Ltd.

No.210, Xinyuan Road, Ehu Industrial Park, Xishan District,

PC:214116, Wuxi 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: Zhejiang Rock Mechanical Inspection and Testing Co., Ltd.

Test Date: May 3-4, 2022

Description of valves: DN32R 2000psi Ball Valve

Size: DN32R

Pressure Rating:2000psi(138bar/20℃)

Drawing No.: 1312304407 Rev.0

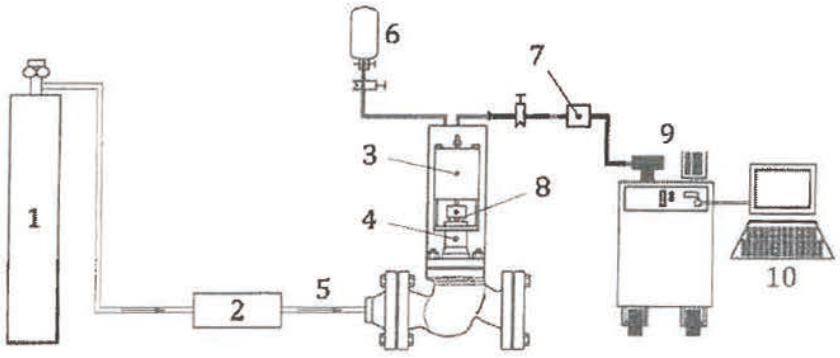
Test Witnessed By: WANG Zhilin / TÜV SÜD Inspector

Inspection and Tests

1. Conformity of Equipment

The test equipment was verified by TÜV SÜD inspector according to requirements of ISO15848-1:2015+Amd.1:2017 and found satisfactory. The detailed arrangement of the fugitive emission test equipment is shown below:

Figure 1 Typical stem seal leakage measurement system with Vacuum Method

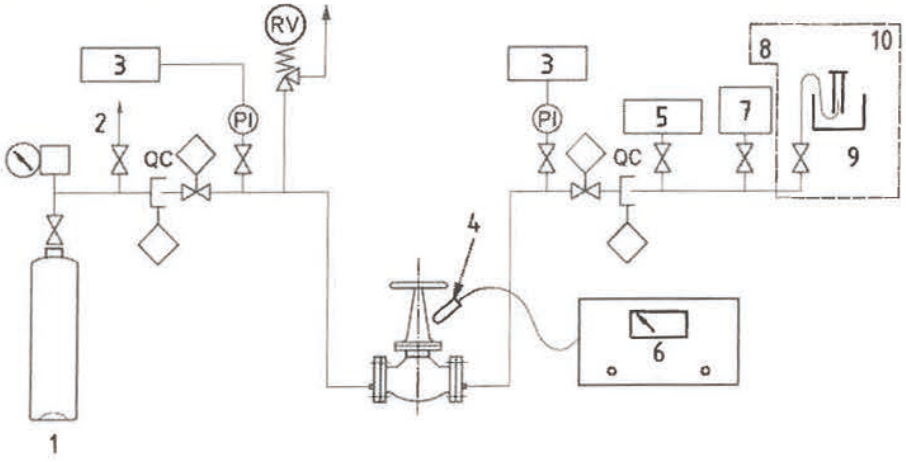


Key

1	helium at 97 % purity	6	standard calibrated leak
2	pressure control	7	vacuum breaker (optional)
3	actuator	8	tested stem sealing
4	vacuum	9	helium mass spectrometer
5	helium	10	data acquisition

2.

Figure 2 Typical 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)

3. 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.

4. Technical Data of Test Valve:

a) General description of test valve

Name of manufactuer	Wuxi Coreline Valve Co., Ltd.
Address of manufactuer	No.210, Xinyuan Road, Ehu Industrial Park, Xishan District, PC:214116, Wuxi City, Jiangsu Province, P. R. China
Item	DN32R 2000psi Ball Valve
Valve size	DN32R
Pressure rating	2000psi(PN138)
Stem size	Φ11 mm
Body/bonnet material	ASTM A351 CF8M
Stem seal material	Viton O-Ring + PTFE+25%Carbon Fiber V-Packing
Valve assembly drawing no.	1312304407 Rev.0

5. 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.: 1312304407 Rev.0 and results found satisfactory. The mark was verified on valve as following:

--	DN32R	2000	CF8M
Manufacturer` Brand	Size	psi	Material

The stem size was measured as Ø11mm.

6. Preparation of the test valve:

Before the fugitive emission test, the test valve was hydrostatic tested under 3000psi the test showed no visible leakage or deformation. Then the valve was cleaned and dried.

7. 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+Amd.1:2017.

8. 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+Amd.1:2017 Para.5.

8.1 Preliminary tests at room temperature (test 1)

The valve was pressurized with test fluid Helium to 138bar 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 leakage measurement was performed by the Vacuum method as described in ISO15848-1 Annex A. The body seal leakage measurement was performed by 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)	$\leq 1.95 \times 10^{-6}$	1.25×10^{-8}
Body seal leakage(ppmv)	≤50	0.03
The test results meet the requirements of ISO15848-1:2015+Amd.1:2017.		

8.2 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 138bar according to the manufacturer's requirements at room temperature. The pressure should be improved and kept at 138bar 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	$\leq 1.95 \times 10^{-6}$	1.26×10^{-7}
Stem leakage (mbar.l/s)after 100 cycles	$\leq 1.95 \times 10^{-6}$	4.56×10^{-7}
Stem leakage (mbar.l/s)after 150 cycles	$\leq 1.95 \times 10^{-6}$	9.47×10^{-8}
Stem leakage (mbar.l/s)after 200 cycles	$\leq 1.95 \times 10^{-6}$	8.89×10^{-8}
Stem leakage (mbar.l/s)after 205 cycles	$\leq 1.95 \times 10^{-6}$	5.13×10^{-8}
Body seal leakage(ppmv) after 205 cycles	≤50	0.04
Stem leakage (mbar.l/s)after 1000 cycles	$\leq 1.95 \times 10^{-6}$	5.26×10^{-7}
Stem leakage (mbar.l/s)after 1500 cycles	$\leq 1.95 \times 10^{-6}$	2.07×10^{-7}
Body seal leakage(ppmv) after 1500 cycles	≤50	0.19
The test results meet the requirements of ISO15848-1:2015+Amd.1:2017		

9. 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.

10. Performance classes

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

ISO FE AH – CO2 – SSA0 – tRT – PN138 – ISO 15848-1

11. Extension of qualification to untested valves shall be according to ISO15848-1:2015+Amd.1:2017 paragraph 8.

TÜV SÜD Industrie Service GmbH
Shanghai Office
Floor 3-13, No.151, Heng Tong Road,
Shanghai 200070 P. R. China

Industrie Service

Test Report No.: 285044

We, hereby declare that I have checked test valve and witnessed the fugitive emission test on the tested valve according to ISO15848-1:2015+Amd.1:2017. The test results are as mentioned in this report.

TÜV SÜD Industrie Service GmbH

Wang Zhilin

Date: June 5, 2022

Annexes:

1) Copy of Drawing No.: 1312304407 Rev.0;
2) Test Report of Fugitive Emission Test No. ROCKB202204005.

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

ISO 15848-1 QUALIFICATION CERTIFICATE

Industrie Service

Certificate No.: 285039

Ref. Test report No.: 285040

We hereby certify that the valve below has passed the fugitive emission test successfully according to Class AH of ISO15848-1:2015+Amd.1:2017 for a total of **1500** cycles.

Name of manufactuer	Wuxi Coreline Valve Co., Ltd.
Postal Address of manufactuer	No.210, Xinyuan Road, Ehu Industrial Park, Xishan District, PC:214116, Wuxi City, Jiangsu Province, P. R. China
Item	DN32R 2000psi Ball Valve
Valve size	DN32R
Pressure rating	2000psi(PN138)
Stem size	Φ9.8 mm
Body/bonnet material	ASTM A216 WCB
Stem seal material	Viton O-Ring + PTFE+25%Carbon Fiber V-Packing
Valve assembly drawing no.	1300304407 Rev.1

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

ISO FE AH – CO2 – SSA0 – tRT – PN138 – ISO 15848-1

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

Other stem sizes qualified: 4.9 mm up to 19.6 mm

Other pressure ranges qualified: PN138 and lower

This certificate must be read in conjunction with test report No.: 285040

TÜV SÜD Industrie Service GmbH

Shanghai, June 5, 2022
(Place, date)

Guilin Chen
TÜV SÜD Industrie Service GmbH
Westendstr. 199
80686 München Germany

TÜV SÜD Industrie Service GmbH
Shanghai Office
Floor 3-13, No.151, Heng Tong Road,
Shanghai 200070 P. R. China

Tel.: +86 21 6141-0123
Fax: + 86 21 6140-8600

TÜV SÜD Industrie Service GmbH
Shanghai Office
Floor 3-13, No.151, Heng Tong Road,
Shanghai 200070 P. R. China

Industrie Service

Test Report

(Valve fugitive emission test according to ISO15848-1: 2015+Amd.1:2017)

Certificate No. :285039
Test Report No.:285040

Applicant / Manufacturer: Wuxi Coreline Valve Co., Ltd.
No.210, Xinyuan Road, Ehu Industrial Park, Xishan District,
PC:214116, Wuxi 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: Zhejiang Rock Mechanical Inspection and Testing Co., Ltd.

Test Date: March 29-30, 2022

Description of valves: DN32R 2000psi Ball Valve
Size: DN32R
Pressure Rating:2000psi(PN138)
Drawing No.: 1300304407 Rev.1

Test Witnessed By: WANG Zhilin / TÜV SÜD Inspector

TÜV SÜD Industrie Service GmbH
Shanghai Office
Floor 3-13, No.151, Heng Tong Road,
Shanghai 200070 P. R. China

Industrie Service

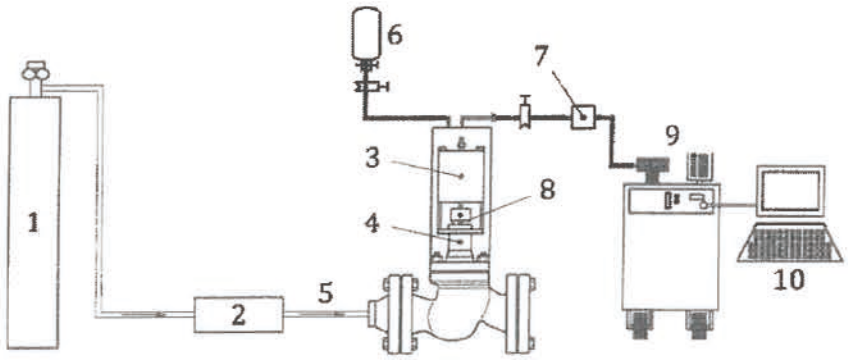
Test Report No.:285040

Inspection and Tests

1. Conformity of Equipment

The test equipment was verified by TÜV SÜD inspector according to requirements of ISO15848-1:2015+Amd.1:2017 and found satisfactory. The detailed arrangement of the fugitive emission test equipment is shown below:

Figure 1 Typical stem seal leakage measurement system with Vacuum Method

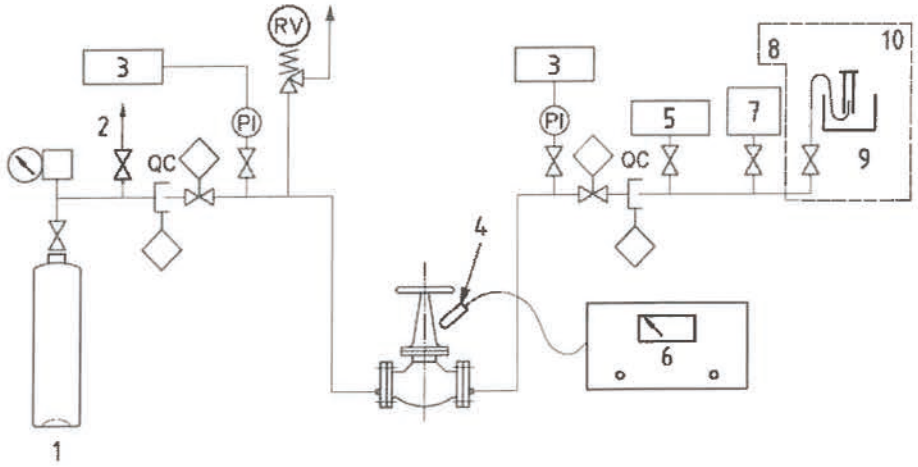


Key

1	helium at 97 % purity	6	standard calibrated leak
2	pressure control	7	vacuum breaker (optional)
3	actuator	8	tested stem sealing
4	vacuum	9	helium mass spectrometer
5	helium	10	data acquisition

2.

Figure 2 Typical 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)

3. 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.

4. Technical Data of Test Valve:

a) General description of test valve

Name of manufactuer	Wuxi Coreline Valve Co., Ltd.
Address of manufactuer	No.210, Xinyuan Road, Ehu Industrial Park, Xishan District, PC:214116, Wuxi City, Jiangsu Province, P. R. China
Item	DN32R 2000psi Ball Valve
Valve size	DN32R
Pressure rating	2000psi(PN138)
Stem size	Φ9.8mm
Body/bonnet material	ASTM A216 WCB
Stem seal material	Viton O-Ring + PTFE+25%Carbon Fiber V-Packing
Valve assembly drawing no.	1300304407 Rev.1

5. 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.: 1300304407 Rev.1 and results found satisfactory. The mark was verified on valve as following:

--	DN32R	2000psi	WCB
Manufacturer' Brand	Size	psi	Material

The stem size was measured as Ø9.8mm.

6. Preparation of the test valve:

Before the fugitive emission test, the test valve was hydrostatic tested under 207Bar, the test showed no visible leakage or deformation. Then the valve was cleaned and dried.

7. 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+Amd.1:2017.

8. 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+Amd.1:2017 Para.5.

8.1 Preliminary tests at room temperature (test 1)

The valve was pressurized with test fluid Helium to 138bar 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 leakage measurement was performed by the Vacuum method as described in ISO15848-1 Annex A. The body seal leakage measurement was performed by 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)	≤$1.74x10^{-6}$	$3.76x10^{-8}$
Body seal leakage(ppmv)	≤50	0.08
The test results meet the requirements of ISO15848-1:2015+Amd.1:2017.		

8.2 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 138bar according to the manufacturer's requirements at room temperature. The pressure should be improved and kept at 138bar 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	≤$1.74x10^{-6}$	2.45×10^{-8}
Stem leakage (mbar.l/s)after 100 cycles	≤$1.74x10^{-6}$	4.88×10^{-8}
Stem leakage (mbar.l/s)after 150 cycles	≤$1.74x10^{-6}$	9.94×10^{-8}
Stem leakage (mbar.l/s)after 200 cycles	≤$1.74x10^{-6}$	1.44×10^{-7}
Stem leakage (mbar.l/s)after 205 cycles	≤$1.74x10^{-6}$	1.69×10^{-7}
Body seal leakage(ppmv) after 205 cycles	≤50	0.08
Stem leakage (mbar.l/s)after 1000 cycles	≤$1.74x10^{-6}$	$6.86x\ 10^{-8}$
Stem leakage (mbar.l/s)after 1500 cycles	≤$1.74x10^{-6}$	1.48×10^{-7}
Body seal leakage(ppmv) after 1500 cycles	≤50	0.12
The test results meet the requirements of ISO15848-1:2015+Amd.1:2017		

9. 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.

10. Performance classes
As a result of the above tests, the test valve covered performance classes as follows:
ISO FE AH – CO2 – SSA0 – tRT – PN138 – ISO 15848-1

11. Extension of qualification to untested valves shall be according to ISO15848-1:2015+Amd.1:2017 paragraph 8.

TÜV SÜD Industrie Service GmbH
Shanghai Office
Floor 3-13, No.151, Heng Tong Road,
Shanghai 200070 P. R. China

Industrie Service

Test Report No.: 285040

We, hereby declare that I have checked test valve and witnessed the fugitive emission test on the tested valve according to ISO15848-1:2015+Amd.1:2017. The test results are as mentioned in this report.

TÜV SÜD Industrie Service GmbH

TÜV SÜD Industrie Service GmbH

WANG Zhilin

Date: June 5, 2022

Annexes:

1) Copy of Drawing No.: 1300304407 Rev.1;
2) Test Report of Fugitive Emission Test No. ROCKB202203024-1.