



CERTIFICATE

Certificate of Conformity with Technical Requirements In: API STD 607 Eighth Edition, October 2022

Certificate No.: 304764

Ref. Test report No.: 304763

Name of Applicant / Manufacturer: Crane Ningjin Valve Co., Ltd.

Postal address: No.496 Jinglong Street, Ningjin County, Hebei, China 055550.

Name of Certificate Holder: Crane Ningjin Valve Co., Ltd.

Koroška cesta 55 Muta 2366 Slovenia.

Juan Ruiz de Alarcón # 313 Complejo Industrial Chihuahua 31109 México.

We hereby certify that the fire test on below plates have been conducted at the laboratory designated manufacturer and witnessed by TÜV SÜD inspector according to requirements of API STD 607 Eighth Edition, October 2022. The testing results of valve meet the requirements of API STD 607 Eighth Edition, October 2022.

1. Description of Test Valve :

Type of Test Valve	Crane-Xomox Soft Seated Ball valve
Description of Test Valve	Xomox FK K21F Ball valve
Valve Size (NPS)	2
Pressure Rating (ANSI Class)	Class 150
Mass of Test Valve (Kgs)	11.6 kg
Valve Body Material	ASTM A216 WCB

2. Qualified Range of Valves :

Type	Crane-Xomox Soft Seated Ball valves
Description of Valves	Xomox FK K21F, FK K23F Ball valves
Qualified Pressure Ratings (Class) (according to API 607 Table 4)	Class 150, Class 300
Qualified Sizes (NPS) (according to API 607 Table 3)	2 and below; 2 ½"; 3; 4
Mass of Qualified Valves (Kgs) with Different Ends (according to API 607 Para.7.1, e)	Greater than the tested valve or not less than 75% of the test valve
Qualified Valve Material	According to API 607 7.2

Remark: The technical data of tested valve see back of this certificate appendix 1.

This certificate is issued according to API STD 607 Eighth Edition, October 2022, based upon the result of testing report on above mentioned test valve. The additional plates qualification shall be limited to similar plates of same basic design and construction as the test valve and of the same nonmetallic materials with respect to the seat-to-closure member seal, seat-to-body seal, stem seal, and body joint seal according to API STD607 Eighth Edition, October 2022, Paragraph 7.

Ke WANG

Beijing, Mar.15, 2024

(Place, date)

**TÜV SÜD Certification and Testing (China) Co., Ltd.
Beijing Branch**

M Building, No.7 Wangjing Zhonghuan Nanlu, Chaoyang District,
Beijing, 100102, P.R. China.

Tel.: +86(0) 10 6590-6186, Fax.: +86(0) 10 6590-6182

Appendix 1:



Certificate No.: 304764

Ref. Test Report No.: 304763

Name of Applicant / Manufacturer: Crane Ningjin Valve Co., Ltd.

Name and postal address: No.496 Jinglong Street, Ningjin County, Hebei, China 055550.

Technical Data of Test Valve

1. Type of Test Valve: 2" Xomox FK K21F Ball valve

2. Description of Test Valve:

Type of Test Valve	Crane-Xomox Soft Seated Ball valve
Description of Valve	Xomox FK K21F Ball valve
Pressure Class	Class 150
Valve Size, NPS	NPS 2
Structural length	ASME B16.10
Flange connection	ASME B16.5
Mass of Test Valve (Kgs)	11.6 kg

3. Details of Test Valve:

Part Name	Materials
Body	A216 WCB
Ball	A182 F316 (1.4408); 316Ti (1.4571)
Stem	F51, A479 UNS S31803 (1.4462)
Packing gland	F51, A479 UNS S31803 (1.4462)
Packing ring	Graphite
Self energized lip seal	PTFE-Carbon+Graphite filled/AISI 301 (1.4310)
Seat	TFM
Body gasket	PTFE/Graphite/316Ti
Stud	A193 Gr.B7
Heavy hex nut	A194 Gr.2H
SX Steam seal	TFM
Support ring	A479 316Ti (1.4571); 316 (1.4401)
Hand lever-set	CF8M (1.4408)
Locking pin with ring	AISI 316 (1.4401)
Anti-static spring	AISI 301 (1.4310)
Guide bushing	PTFE-Carbon filled
Design Drawing No.:	2"-CL150-WCB

Beijing, Mar.15, 2024

(Place, date)

Ke WANG

**TÜV SÜD Certification and Testing (China) Co., Ltd.
Beijing Branch**

M Building, No.7 Wangjing Zhonghuan Nanlu, Chaoyang District,
Beijing, 100102, P.R. China.
Tel.: +86(0) 10 6590-6186, Fax.: +86(0) 10 6590-6182



Test Report

(Valve fire test according to API STD 607 Eighth Edition, October 2022.)

Certificate No.: 304764
Test Report No.: 304763

Applicant / Manufacturer : Crane Ningjin Valve Co., Ltd.

No.496 Jinglong Street, Ningjin County, Hebei, China 055550.

Inspection body : TÜV SÜD Certification and Testing (China) Co., Ltd. Beijing Branch

M Building, No.7 Wangjing Zhonghuan Nanlu, Chaoyang District,
Beijing, 100102, P.R. China.

Lab of test: Dongying Industrial Product Inspection & Metrology Verification Center

National Quality Inspection & Analysis Center for Petroleum Equipment
and Products (Shandong).

Test Date: Mar.11, 2024

Description of valves: Type: Xomox FK Softed Seated Ball valve

Size: 2"

Pressure Rating: Class 150

Drawing No.: 2" -CL150-WCB

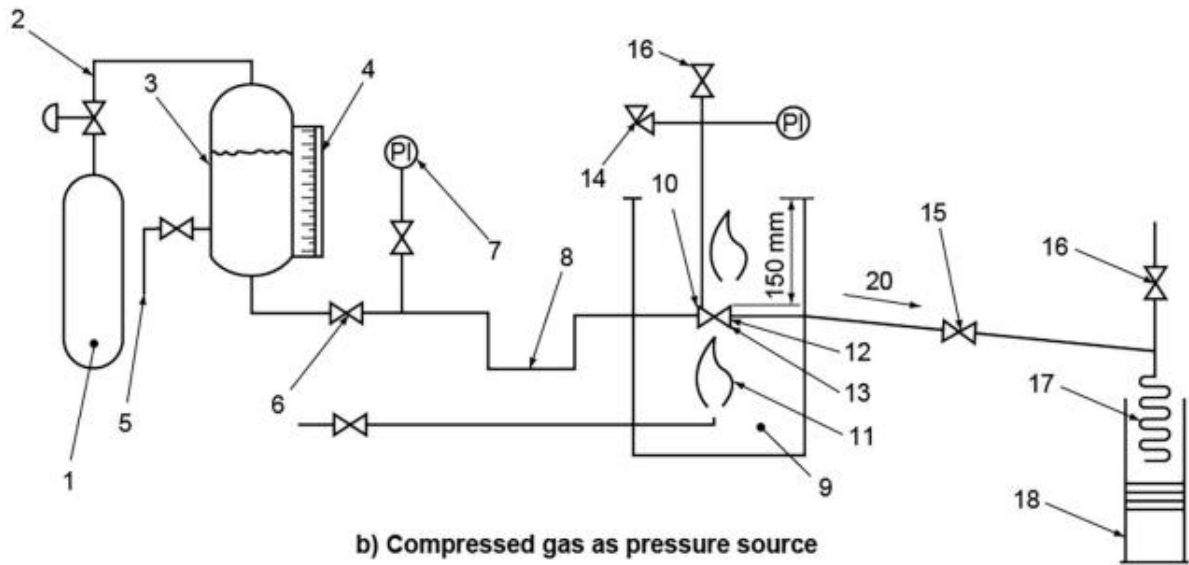
Test Witnessed By: Ke WANG / TÜV SÜD Inspector

Inspection and Tests

1. Conformity of Equipment

The test equipment was verified by TÜV SÜD inspector according to requirements of API STD 607 Eighth Edition, October 2022, Para.5.3 and found satisfactory. The detail arrangement of the fire-test equipment is shown below:

Figure 1. Typical Fire-Test System Using Compressed gas as the Pressure Source



Key:

- | | | |
|----------------------------------|----------------------------------------------------------------------|----------------------|
| 1. pressure source | 8. piping arranged to provide vapor trap | 15. shut-off valve |
| 2. pressure regulator and relief | 9. enclosure for test | 16. vent valve |
| 3. vessel for water | 10. test valve mounted horizontally with stem in horizontal position | 17. condenser |
| 4. calibrated sight gauge | 11. fuel gas supply and burners | 18. container |
| 5. water supply | 12. calorimeter cubes | 19. check valve |
| 6. shut-off valve | 13. flame environment and body thermocouples | 20. slope |
| 7. pressure gauge | 14. pressure gauge and relief valve | 21. clearance: 150mm |



2. Calibration of measurement and test instrument

The measurements and test instruments have been properly calibrated such as pressure gauge, thermocouples, etc. the calibration certificates were verified by inspector for test instrument and device.

3. Technical Data of Test Valve:

a) Description of test valve

Type of Test Valve	Crane-Xomox Soft Seated Ball valve
Description of Valve	Xomox FK K21F Ball valve
Pressure Class	Class 150
Valve Size, NPS	2"
Structural length	ASME B16.10
Flange connection	ASME B16.5

b) Details of technical data on test valve

Part Name	Materials
Body	A216 WCB
Ball	A182 F316 (1.4408); 316Ti (1.4571)
Stem	F51, A479 UNS S31803 (1.4462)
Packing gland	F51, A479 UNS S31803 (1.4462)
Packing ring	Graphite
Self energized lip seal	PTFE-Carbon+Graphite filled/AISI 301(1.4310)
Seat	TFM
Body gasket	PTFE/Graphite/316Ti
Stud	A193 Gr. B7
Heavy hex nut	A194 Gr.2H
SX Stem seal	TFM
Support ring	A479 316Ti(1.4571); 316(1.4401)
Hand lever-set	CF8M(1.4408)
Locking pin with ring	AISI 316(1.4401)
Anti-static spring	AISI 301(1.4301)
Guide bushing	PTFE-Carbon filled
Design Drawing No.:	2"-CL150-WCB



4. Visual and Dimensional Check on Test Valves:

The test valve was chosen at random by the manufacturer in workshop and submitted to the laboratory. The visual and dimensional check was performed according to drawing No.: 2"-CL150-WCB and results found satisfactory. The mark was verified on valve as following:

<u>XOMOX</u>	<u>CF8M</u>	<u>2 in</u>	<u>150</u>	<u>WCB</u>	<u>F51</u>	<u>NS00042</u>
Manufacturer` Brand	Ball material	Size	Class	Body Material	Stem Material	Serial No.

5. Document Review:

The chemical and mechanical test report of main parts of test valve were reviewed and found satisfactory. The inspection record for hydrostatic shell test, hydrostatic seat test and steam backseat test after assembly for test valve were reviewed and found result satisfactory.

6. Preparation before Testing:

- 6.1 The thermocouples and calorimeters were installed properly according to Figure 3 in API 607. Two thermocouples were located to measure the flame environment temperature. Two thermocouples were located to measure the valve body temperature. Two calorimeter cubes were located as appropriate position.
- 6.2 The test system including test valve (part 10) was cleaned through by water before testing. All air was properly purged from test valve and testing system by water.
- 6.3 The test system then was pressurized to 2.74MPa after the test valve and system upstream of valve have been completely full of water and system downstream of the test valve have been completely empty of water. The system and test valve were carefully checked for leakage when the test pressure was held at 2.74MPa. No leakage was found on system and test valve.

7. Fire Test:

The fire test was conducted according to API STD 607 Eighth Edition, October 2022, Section 5. The pressure of the system upstream was kept 0.2MPa, the fire ignited. The flame temperature reached 750°C within 2 minutes after ignition. The test pressure and temperature were maintained at 0.2MPa during the fire test. The temperature and pressure were recorded at every 30s on record instrument by the operators.

The system and test valve were cooled below 100°C within 5 minutes by shower nozzles after 30 minutes burn period. The loss of water weight in vessel was measured by weighing scale and water in calibrated container (part 18) were read and recorded. The test result is shown as below.

Test result of fire test

Item	API 607 Required value	Actual value
Test Pressure (MPa)	0.2MPa	0.2MPa
Test Temperature	750-1000°C	800-900°C
Through-seat Leakage during burn period acc. to API 607 Table 1	≤ 200 mL/min	38 mL/min
External Leakage during burn and cool down periods acc. to API 607 Table 1	≤ 50 mL/min	14 mL/min
Time required for valve to cool to 100°C	≤ 10min	5min
Conclusion: the test result is satisfactory according to API 607.		



8. Low-pressure Test:

The test valve was cooled below 100°C within 5 minutes after completing the fire test. The low pressure test was conducted according to API STD 607 Eighth Edition, October 2022. Para. 5.6.15 and 6.4. The test result was recorded as below.

Test result of low pressure test

Item	API 607 Required value	Actual value
Test Pressure (MPa)	0.2MPa	0.2MPa
Test Temperature	7°C	
Test time	5min	
Through-seat Leakage after cool down period acc. API 607 Table 1	≤ 80 mL/min	10 mL/min
Conclusion: the test result is satisfactory according to API 607.		

After completing the static leakage tests, close the shut-off valve, operate the test valve against the low test pressure at 0.2MPa to the fully open position and then to the fully closed position. Open the shut-off valve. Allow the system to stabilize for a five-minute period, and once completed, record in the test report the through-seat leakage over a five-minute time period. The test result was recorded as below.

Test result of low pressure test

Item	API 607 Required value	Actual value
Test Pressure (MPa)	0.2MPa	0.2MPa
Test Temperature	7°C	
Test time	5min	
Through-seat Leakage after cool down period acc. API 607 Table 1	≤ 80 mL/min	8 mL/min
Conclusion: the test result is satisfactory according to API 607.		

9. Operational Test:

The operational test was conducted according to API STD 607 Eighth Edition, October 2022. Para.5.6.17 and 6.6. The upstream pressure was increased to 1.47MPa and the test valve was fully opened against the high test pressure differential to vent the piping and test valve body cavity to remove air or steam. The downstream shut-off valve was then closed and the system pressure was increased to and maintain at 1.47MPa. Then measured and recorded external leakage for a period of 5 minutes after valve was in the open position at high test pressure. The test result was recorded as below.

Test result of operational test

Item	API 607 Required value	Actual value
Test Pressure (MPa)	1.47MPa	1.47MPa
Test Temperature	7°C	
Test time	5min	
External Leakage after operational test acc. to API 607 Table 1	≤ 50 mL/min	9 mL/min
Conclusion: the test result is satisfactory according to API 607.		



Test Report No.: 304763

The undersigned, hereby declare that I have checked test valve and witnessed the fire test on the test valve according to API STD 607 Eighth Edition, October 2022. The test result is satisfactory.

**TÜV SÜD Certification and Testing (China) Co., Ltd.
Beijing Branch**

A handwritten signature in black ink that reads 'Wang Ke'.

Ke WANG

Date: **Mar.15, 2024**

Annexes:

- 1) Copy of Drawing No.: 2"-CL150-WCB;
- 2) Copy of Fire Test Report No.: 2024(JX)GXYZB01162.



CERTIFICATE

Certificate of Conformity with Technical Requirements In: API STD 607 Eighth Edition, October 2022

Certificate No.: 310951
Ref. Test report No.: 310950

Name of Applicant / Manufacturer: Crane Ningjin Valve Co., Ltd.
Postal address: No.496 Jinglong Street, Ningjin County, Hebei, China 055550.

Name of Certificate Holder: Crane Ningjin Valve Co., Ltd.
Koroška cesta 55 Muta 2366 Slovenia.
Juan Ruiz de Alarcón # 313 Complejo Industrial Chihuahua 31109 México.

We hereby certify that the fire test on below plates have been conducted at the laboratory designated manufacturer and witnessed by TÜV SÜD inspector according to requirements of API STD 607 Eighth Edition, October 2022. The testing results of valve meet the requirements of API STD 607 Eighth Edition, October 2022.

1. Description of Test Valve :

Type of Test Valve	Crane-XOMOX Soft Seated Ball valve
Description of Test Valve	XOMOX FK21F-T Ball valve
Valve Size (NPS)	8
Pressure Rating (ANSI Class)	Class 150
Mass of Test Valve (Kgs)	167 kg
Valve Body Material	ASTM A216 WCB (1.0619)

2. Qualified Range of Valves :

Type	Crane-XOMOX Soft Seated Ball valves
Description of Valves	XOMOX FK21F-T, FK23F-T, Ball valves
Qualified Pressure Ratings (Class) (according to API 607 Table 4)	Class 150, Class 300
Qualified Sizes (NPS) (according to API 607 Table 3)	8 and larger
Mass of Qualified Valves (Kgs) with Different Ends (according to API 607 Para.7.1, e)	Greater than the tested valve or not less than 75% of the test valve
Qualified Valve Material	According to API 607 7.2

Remark: The technical data of tested valve see back of this certificate appendix 1.

This certificate is issued according to API STD 607 Eighth Edition, October 2022, based upon the result of testing report on above mentioned test valve. The additional plates qualification shall be limited to similar plates of same basic design and construction as the test valve and of the same nonmetallic materials with respect to the seat-to-closure member seal, seat-to-body seal, stem seal, and body joint seal according to API STD607 Eighth Edition, October 2022, Paragraph 7.

Ke WANG

Beijing, Aug.20, 2024

(Place, date)

TÜV SÜD Certification and Testing (China) Co., Ltd.
Beijing Branch

M Building, No.7 Wangjing Zhonghuan Nanlu, Chaoyang District,
Beijing, 100102, P.R. China.
Tel.: +86(0) 10 6590-6186, Fax.: +86(0) 10 6590-6182

Appendix 1:



Certificate No.: 310951

Ref. Test Report No.: 310950

Name of Applicant / Manufacturer: Crane Ningjin Valve Co., Ltd.

Name and postal address: No.496 Jinglong Street, Ningjin County, Hebei, China 055550.

Technical Data of Test Valve

1. Type of Test Valve: 8" XOMOX FK21F-T Ball valve

2. Description of Test Valve:

Type of Test Valve	Crane-XOMOX Soft Seated Ball valve
Description of Valve	XOMOX FK21F-T Ball valve
Pressure Class	Class 150
Valve Size, NPS	NPS 8
Structural length	ASME B16.10
Flange connection	ASME B16.5
Mass of Test Valve (Kgs)	167 kg

3. Details of Test Valve:

Part Name	Materials
Body	A216 WCB (1.0619)
Ball	A351 CF8M (1.4408); 316Ti (1.4571)
Stem	F51, A479 UNS S31803 (1.4462)
Packing gland	A479 316Ti (1.4571); 316 (1.4401)
Packing	Graphite
Spring energized lip seal	PTFE-Carbon+Graphite filled/AISI 301 (1.4310)
Seat	TFM
Body gasket	PTFE/Graphite/316Ti
Stud	A193 Gr.B7
Heavy hex nut	A194 Gr.2H
SX Steam seal	TFM
Support ring	A479 316Ti (1.4571); 316 (1.4401)
Hex sock. Head cap screw	A193 Gr.B8M Cl.2
Parallel key	316ss/316Ti (A4/1.4571)
Anti-static spring	AISI 301 (1.4310)
Guide bushing	PTFE-Carbon filled
Design Drawing No.:	49 245 12 025a

Beijing, Aug.20, 2024

(Place, date)

Ke WANG

**TÜV SÜD Certification and Testing (China) Co., Ltd.
Beijing Branch**

M Building, No.7 Wangjing Zhonghuan Nanlu, Chaoyang District,
Beijing, 100102, P.R. China.
Tel.: +86(0) 10 6590-6186, Fax.: +86(0) 10 6590-6182



Test Report

(Valve fire test according to API STD 607 Eighth Edition, October 2022.)

Certificate No.: 310951
Test Report No.: 310950

Applicant / Manufacturer : Crane Ningjin Valve Co., Ltd.

No.496 Jinglong Street, Ningjin County, Hebei, China 055550.

Inspection body : TÜV SÜD Certification and Testing (China) Co., Ltd. Beijing Branch

M Building, No.7 Wangjing Zhonghuan Nanlu, Chaoyang District,
Beijing, 100102, P.R. China.

Lab of test: Dongying Industrial Product Inspection & Metrology Verification Center

National Quality Inspection & Analysis Center for Petroleum Equipment
and Products (Shandong).

Test Date: Aug.13, 2024

Description of valves: Type: XOMOX FK21F-T Ball Valve

Size: 8"

Pressure Rating: Class 150

Drawing No.: 49 245 12 025a

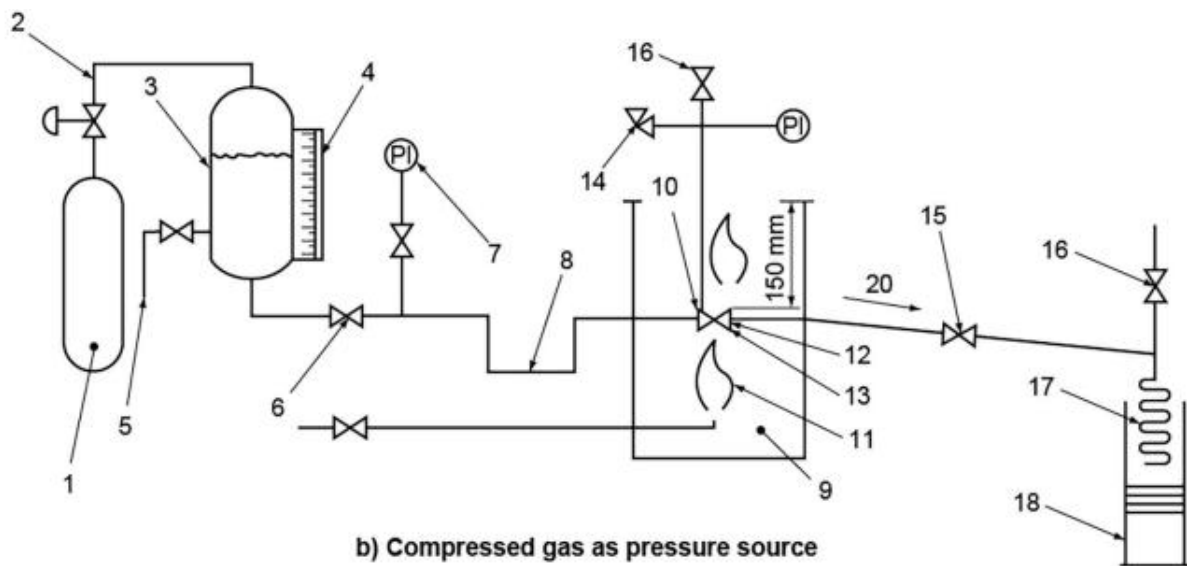
Test Witnessed By: Ke WANG / TÜV SÜD Inspector

Inspection and Tests

1. Conformity of Equipment

The test equipment was verified by TÜV SÜD inspector according to requirements of API STD 607 Eighth Edition, October 2022, Para.5.3 and found satisfactory. The detail arrangement of the fire-test equipment is shown below:

Figure 1. Typical Fire-Test System Using Compressed gas as the Pressure Source



Key:

- | | | |
|----------------------------------|----------------------------------------------------------------------|----------------------|
| 1. pressure source | 8. piping arranged to provide vapor trap | 15. shut-off valve |
| 2. pressure regulator and relief | 9. enclosure for test | 16. vent valve |
| 3. vessel for water | 10. test valve mounted horizontally with stem in horizontal position | 17. condenser |
| 4. calibrated sight gauge | 11. fuel gas supply and burners | 18. container |
| 5. water supply | 12. calorimeter cubes | 19. check valve |
| 6. shut-off valve | 13. flame environment and body thermocouples | 20. slope |
| 7. pressure gauge | 14. pressure gauge and relief valve | 21. clearance: 150mm |



2. Calibration of measurement and test instrument

The measurements and test instruments have been properly calibrated such as pressure gauge, thermocouples, etc. the calibration certificates were verified by inspector for test instrument and device.

3. Technical Data of Test Valve:

a) Description of test valve

Type of Test Valve	Crane-XOMOX Soft Seated Ball valve
Description of Valve	XOMOX FK21F-T Ball valve
Pressure Class	Class 150
Valve Size, NPS	8"
Structural length	ASME B16.10
Flange connection	ASME B16.5

b) Details of technical data on test valve

Part Name	Materials
Body	A216 WCB (1.0619)
Ball	A351 CF8M (1.4408); 316Ti (1.4571)
Stem	F51, A479 UNS S31803 (1.4462)
Packing gland	A479 316Ti (1.4571); 316 (1.4401)
Packing	Graphite
Spring energized lip seal	PTFE-Carbon+Graphite filled/AISI 301(1.4310)
Seat	TFM
Body gasket	PTFE/Graphite/316Ti
Stud	A193 Gr. B7
Hex hex nut	A194 Gr.2H
SX Stem seal	TFM
Support ring	A479 316Ti(1.4571); 316(1.4401)
Hex sock. Head cap screw	A193 Gr.B8M Cl.2
Parallel key	316ss/316Ti (A4)1.4571
Anti-static spring	AISI 301(1.4301)
Guide bushing	PTFE-Carbon filled
Design Drawing No.:	49 245 12 025a



4. Visual and Dimensional Check on Test Valves:

The test valve was chosen at random by the manufacturer in workshop and submitted to the laboratory. The visual and dimensional check was performed according to drawing No.: 49 245 12 025a and results found satisfactory. The mark was verified on valve as following:

<u>XOMOX</u>	<u>CF8M</u>	<u>8"</u>	<u>150</u>	<u>WCB</u>	<u>F51</u>	<u>NS00596</u>
Manufacturer` Brand	Ball material	Size	Class	Body Material	Stem Material	Serial No.

5. Document Review:

The chemical and mechanical test report of main parts of test valve were reviewed and found satisfactory. The inspection record for hydrostatic shell test, hydrostatic seat test and steam backseat test after assembly for test valve were reviewed and found result satisfactory.

6. Preparation before Testing:

- 6.1 The thermocouples and calorimeters were installed properly according to Figure 3 in API 607. Two thermocouples were located to measure the valve body temperature. Three calorimeter cubes were located as appropriate position.
- 6.2 The test system including test valve (part 10) was cleaned through by water before testing. All air was properly purged from test valve and testing system by water.
- 6.3 The test system then was pressurized to 2.74MPa after the test valve and system upstream of valve have been completely full of water and system downstream of the test valve have been completely empty of water. The system and test valve were carefully checked for leakage when the test pressure was held at 2.74MPa. No leakage was found on system and test valve.

7. Fire Test:

The fire test was conducted according to API STD 607 Eighth Edition, October 2022, Section 5. The pressure of the system upstream was kept 0.2MPa, the fire ignited. The flame temperature reached 750°C within 2 minutes after ignition. The test pressure and temperature were maintained at 0.2MPa during the fire test. The temperature and pressure were recorded at every 30s on record instrument by the operators.

The system and test valve were cooled below 100°C within 6 minutes by shower nozzles after 30 minutes burn period. The loss of water weight in vessel was measured by weighing scale and water in calibrated container (part 18) were read and recorded. The test result is shown as below.

Test result of fire test

Item	API 607 Required value	Actual value
Test Pressure (MPa)	0.2MPa	0.2MPa
Test Temperature	750-1000°C	800-960°C
Through-seat Leakage during burn period acc. to API 607 Table 1	≤ 800 mL/min	12 mL/min
External Leakage during burn and cool down periods acc. to API 607 Table 1	≤ 200 mL/min	0 mL/min
Time required for valve to cool to 100°C	≤ 10min	6min

Conclusion: the test result is satisfactory according to API 607.



8. Low-pressure Test:

The test valve was cooled below 100°C within 6 minutes after completing the fire test. The low pressure test was conducted according to API STD 607 Eighth Edition, October 2022. Para. 5.6.15 and 6.4. The test result was recorded as below.

Test result of low pressure test

Item	API 607 Required value	Actual value
Test Pressure (MPa)	0.2MPa	0.2MPa
Test Temperature	24-32°C	
Test time	5min	
Through-seat Leakage after cool down period acc. API 607 Table 1	≤ 320 mL/min	0 mL/min
Conclusion: the test result is satisfactory according to API 607.		

After completing the static leakage tests, close the shut-off valve, operate the test valve against the low test pressure at 0.2MPa to the fully open position and then to the fully closed position. Open the shut-off valve. Allow the system to stabilize for a five-minute period, and once completed, record in the test report the through-seat leakage over a five-minute time period. The test result was recorded as below.

Test result of low pressure test

Item	API 607 Required value	Actual value
Test Pressure (MPa)	0.2MPa	0.2MPa
Test Temperature	24-32°C	
Test time	5min	
Through-seat Leakage after cool down period acc. API 607 Table 1	≤ 320 mL/min	0 mL/min
Conclusion: the test result is satisfactory according to API 607.		

9. Operational Test:

The operational test was conducted according to API STD 607 Eighth Edition, October 2022. Para.5.6.17 and 6.6. The upstream pressure was increased to 1.47MPa and the test valve was fully opened against the high test pressure differential to vent the piping and test valve body cavity to remove air or steam. The downstream shut-off valve was then closed and the system pressure was increased to and maintain at 1.47MPa. Then measured and recorded external leakage for a period of 5 minutes after valve was in the open position at high test pressure. The test result was recorded as below.

Test result of operational test

Item	API 607 Required value	Actual value
Test Pressure (MPa)	1.47MPa	1.47MPa
Test Temperature	24-32°C	
Test time	5min	
External Leakage after operational test acc. to API 607 Table 1	≤ 200 mL/min	0 mL/min
Conclusion: the test result is satisfactory according to API 607.		



Test Report No.: 310950

The undersigned, hereby declare that I have checked test valve and witnessed the fire test on the test valve according to API STD 607 Eighth Edition, October 2022. The test result is satisfactory.

**TÜV SÜD Certification and Testing (China) Co., Ltd.
Beijing Branch**

A handwritten signature in black ink that reads 'Wang Ke'.

Ke WANG

Date: Aug.20, 2024

Annexes:

- 1) Copy of Drawing No.: 49 245 12 025a;
- 2) Copy of Fire Test Report No.: 2024(JX)GSYZB01155.



CERTIFICATE

Certificate of Conformity with Technical Requirements In: API STD 607 Eighth Edition, October 2022

Certificate No.: 310953

Ref. Test report No.: 310952

Name of Applicant / Manufacturer: Crane Ningjin Valve Co., Ltd.

Postal address: No.496 Jinglong Street, Ningjin County, Hebei, China 055550.

Name of Certificate Holder: Crane Ningjin Valve Co., Ltd.

Koroška cesta 55 Muta 2366 Slovenia.

Juan Ruiz de Alarcón # 313 Complejo Industrial Chihuahua 31109 México.

We hereby certify that the fire test on below plates have been conducted at the laboratory designated manufacturer and witnessed by TÜV SÜD inspector according to requirements of API STD 607 Eighth Edition, October 2022. The testing results of valve meet the requirements of API STD 607 Eighth Edition, October 2022.

1. Description of Test Valve :

Type of Test Valve	Crane-XOMOX Soft Seated Ball valve
Description of Test Valve	XOMOX FK21F-T Ball valve
Valve Size (NPS)	8
Pressure Rating (ANSI Class)	Class 150
Mass of Test Valve (Kgs)	184 kg
Valve Body Material	ASTM A351 CF8M (1.4408)

2. Qualified Range of Valves :

Type	Crane-XOMOX Soft Seated Ball valves
Description of Valves	XOMOX FK21F-T, FK23F-T, Ball valves
Qualified Pressure Ratings (Class) (according to API 607 Table 4)	Class 150, Class 300
Qualified Sizes (NPS) (according to API 607 Table 3)	8 and larger
Mass of Qualified Valves (Kgs) with Different Ends (according to API 607 Para.7.1, e)	Greater than the tested valve or not less than 75% of the test valve
Qualified Valve Material	According to API 607 7.2

Remark: The technical data of tested valve see back of this certificate appendix 1.

This certificate is issued according to API STD 607 Eighth Edition, October 2022, based upon the result of testing report on above mentioned test valve. The additional plates qualification shall be limited to similar plates of same basic design and construction as the test valve and of the same nonmetallic materials with respect to the seat-to-closure member seal, seat-to-body seal, stem seal, and body joint seal according to API STD607 Eighth Edition, October 2022, Paragraph 7.

Ke WANG

Beijing, Aug.20, 2024

(Place, date)

**TÜV SÜD Certification and Testing (China) Co., Ltd.
Beijing Branch**

M Building, No.7 Wangjing Zhonghuan Nanlu, Chaoyang District,
Beijing, 100102, P.R. China.

Tel.: +86(0) 10 6590-6186, Fax.: +86(0) 10 6590-6182

Appendix 1:



Certificate No.: 310953

Ref. Test Report No.: 310952

Name of Applicant / Manufacturer: Crane Ningjin Valve Co., Ltd.

Name and postal address: No.496 Jinglong Street, Ningjin County, Hebei, China 055550.

Technical Data of Test Valve

1. Type of Test Valve: 8" XOMOX FK21F-T Ball valve

2. Description of Test Valve:

Type of Test Valve	Crane-XOMOX Soft Seated Ball valve
Description of Valve	XOMOX FK21F-T Ball valve
Pressure Class	Class 150
Valve Size, NPS	NPS 8
Structural length	ASME B16.10
Flange connection	ASME B16.5
Mass of Test Valve (Kgs)	184 kg

3. Details of Test Valve:

Part Name	Materials
Body	A351 CF8M (1.4408)
Ball	A351 CF8M (1.4408); 316Ti (1.4571)
Stem	F51, A479 UNS S31803 (1.4462)
Packing gland	A479 316Ti (1.4571); 316 (1.4401)
Packing	Graphite
Spring energized lip seal	PTFE-Carbon+Graphite filled/AISI 301 (1.4310)
Seat	TFM
Body gasket	PTFE/Graphite/316Ti
Stud	A193 Gr.B8M Cl.2
Heavy hex nut	A194 Gr.8M
SX Steam seal	TFM
Support ring	A479 316Ti (1.4571); 316 (1.4401)
Hex sock. Head cap screw	A193 Gr.B8M Cl.2
Parallel key	316SS/316Ti (A4/1.4571)
Anti-static spring	AISI 301 (1.4310)
Guide bushing	PTFE-Carbon filled
Hex head screw	316SS (A4-70)
Design Drawing No.:	49 245 12 032

Wang Ke

Ke WANG

Beijing, Aug.20, 2024

(Place, date)

**TÜV SÜD Certification and Testing (China) Co., Ltd.
Beijing Branch**

M Building, No.7 Wangjing Zhonghuan Nanlu, Chaoyang District,
Beijing, 100102, P.R. China.
Tel.: +86(0) 10 6590-6186, Fax.: +86(0) 10 6590-6182



Test Report

(Valve fire test according to API STD 607 Eighth Edition, October 2022.)

Certificate No.: 310953
Test Report No.: 310952

Applicant / Manufacturer : Crane Ningjin Valve Co., Ltd.

No.496 Jinglong Street, Ningjin County, Hebei, China 055550.

Inspection body : TÜV SÜD Certification and Testing (China) Co., Ltd. Beijing Branch

M Building, No.7 Wangjing Zhonghuan Nanlu, Chaoyang District,
Beijing, 100102, P.R. China.

Lab of test: Dongying Industrial Product Inspection & Metrology Verification Center

National Quality Inspection & Analysis Center for Petroleum Equipment
and Products (Shandong).

Test Date: Aug.12, 2024

Description of valves: Type: XOMOX FK21F-T Ball Valve

Size: 8"

Pressure Rating: Class 150

Drawing No.: 49 245 12 032

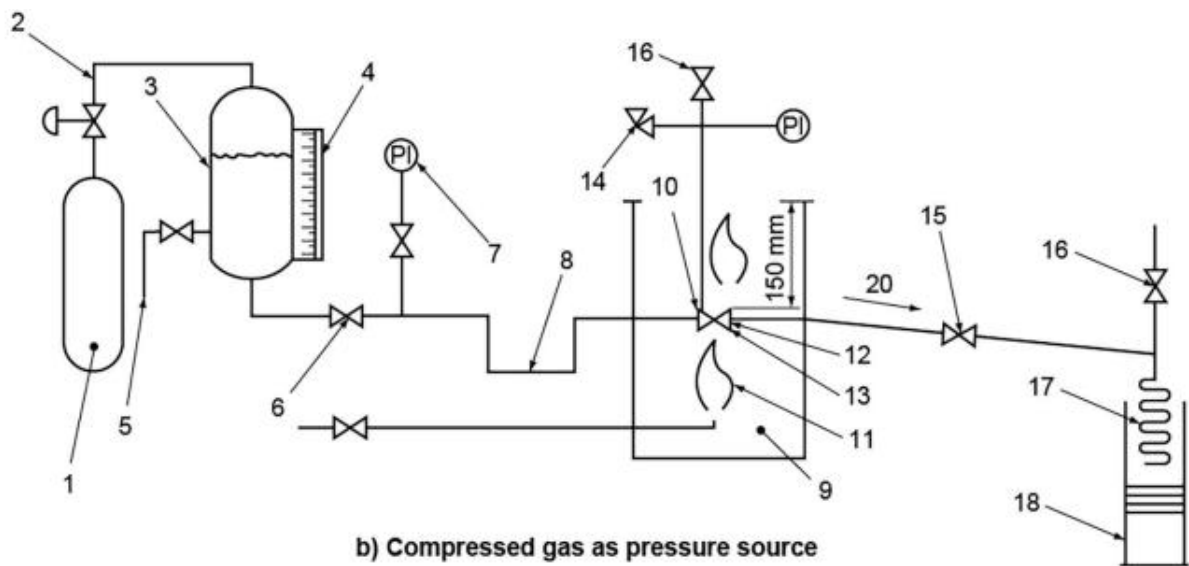
Test Witnessed By: Ke WANG / TÜV SÜD Inspector

Inspection and Tests

1. Conformity of Equipment

The test equipment was verified by TÜV SÜD inspector according to requirements of API STD 607 Eighth Edition, October 2022, Para.5.3 and found satisfactory. The detail arrangement of the fire-test equipment is shown below:

Figure 1. Typical Fire-Test System Using Compressed gas as the Pressure Source



Key:

- | | | |
|----------------------------------|----------------------------------------------------------------------|----------------------|
| 1. pressure source | 8. piping arranged to provide vapor trap | 15. shut-off valve |
| 2. pressure regulator and relief | 9. enclosure for test | 16. vent valve |
| 3. vessel for water | 10. test valve mounted horizontally with stem in horizontal position | 17. condenser |
| 4. calibrated sight gauge | 11. fuel gas supply and burners | 18. container |
| 5. water supply | 12. calorimeter cubes | 19. check valve |
| 6. shut-off valve | 13. flame environment and body thermocouples | 20. slope |
| 7. pressure gauge | 14. pressure gauge and relief valve | 21. clearance: 150mm |



2. Calibration of measurement and test instrument

The measurements and test instruments have been properly calibrated such as pressure gauge, thermocouples, etc. the calibration certificates were verified by inspector for test instrument and device.

3. Technical Data of Test Valve:

a) Description of test valve

Type of Test Valve	Crane-XOMOX Soft Seated Ball valve
Description of Valve	XOMOX FK21F-T Ball valve
Pressure Class	Class 150
Valve Size, NPS	8"
Structural length	ASME B16.10
Flange connection	ASME B16.5

b) Details of technical data on test valve

Part Name	Materials
Body	A351 CF8M (1.4408)
Ball	A351 CF8M (1.4408); 316Ti (1.4571)
Stem	F51, A479 UNS S31803 (1.4462)
Packing gland	A479 316Ti (1.4571); 316 (1.4401)
Packing	Graphite
Spring energized lip seal	PTFE-Carbon+Graphite filled/AISI 301(1.4310)
Seat	TFM
Body gasket	PTFE/Graphite/316Ti
Stud	A193 Gr.B8M Cl.2
Hex hex nut	A194 Gr.8M
SX Stem seal	TFM
Support ring	A479 316Ti(1.4571); 316(1.4401)
Hex sock. Head cap screw	A193 Gr.B8M Cl.2
Parallel key	316SS/316Ti (A4)1.4571
Anti-static spring	AISI 301(1.4301)
Guide bushing	PTFE-Carbon filled
Hex head screw	316SS (A4-70)
Design Drawing No.:	49 245 12 032



4. Visual and Dimensional Check on Test Valves:

The test valve was chosen at random by the manufacturer in workshop and submitted to the laboratory. The visual and dimensional check was performed according to drawing No.: 49 245 12 032 and results found satisfactory. The mark was verified on valve as following:

<u>XOMOX</u>	<u>CF8M</u>	<u>8"</u>	<u>150</u>	<u>CF8M</u>	<u>F51</u>	<u>NS00597</u>
Manufacturer` Brand	Ball material	Size	Class	Body Material	Stem Material	Serial No.

5. Document Review:

The chemical and mechanical test report of main parts of test valve were reviewed and found satisfactory. The inspection record for hydrostatic shell test, hydrostatic seat test and steam backseat test after assembly for test valve were reviewed and found result satisfactory.

6. Preparation before Testing:

- 6.1 The thermocouples and calorimeters were installed properly according to Figure 3 and Figure 4 in API 607. Two thermocouples were located to measure the valve body temperature. Three calorimeter cubes were located as appropriate position.
- 6.2 The test system including test valve (part 10) was cleaned through by water before testing. All air was properly purged from test valve and testing system by water.
- 6.3 The test system then was pressurized to 2.66MPa after the test valve and system upstream of valve have been completely full of water and system downstream of the test valve have been completely empty of water. The system and test valve were carefully checked for leakage when the test pressure was held at 2.66MPa. No leakage was found on system and test valve.

7. Fire Test:

The fire test was conducted according to API STD 607 Eighth Edition, October 2022, Section 5. The pressure of the system upstream was kept 0.2MPa, the fire ignited. The flame temperature reached 750°C within 2 minutes after ignition. The test pressure and temperature were maintained at 0.2MPa during the fire test. The temperature and pressure were recorded at every 30s on record instrument by the operators.

The system and test valve were cooled below 100°C within 6 minutes by shower nozzles after 30 minutes burn period. The loss of water weight in vessel was measured by weighing scale and water in calibrated container (part 18) were read and recorded. The test result is shown as below.

Test result of fire test

Item	API 607 Required value	Actual value
Test Pressure (MPa)	0.2MPa	0.2MPa
Test Temperature	750-1000°C	800-940°C
Through-seat Leakage during burn period acc. to API 607 Table 1	≤ 800 mL/min	16 mL/min
External Leakage during burn and cool down periods acc. to API 607 Table 1	≤ 200 mL/min	0 mL/min
Time required for valve to cool to 100°C	≤ 10min	6min
Conclusion: the test result is satisfactory according to API 607.		



8. Low-pressure Test:

The test valve was cooled below 100°C within 6 minutes after completing the fire test. The low pressure test was conducted according to API STD 607 Eighth Edition, October 2022. Para. 5.6.15 and 6.4. The test result was recorded as below.

Test result of low pressure test

Item	API 607 Required value	Actual value
Test Pressure (MPa)	0.2MPa	0.2MPa
Test Temperature	24-32°C	
Test time	5min	
Through-seat Leakage after cool down period acc. API 607 Table 1	≤ 320 mL/min	0 mL/min
Conclusion: the test result is satisfactory according to API 607.		

After completing the static leakage tests, close the shut-off valve, operate the test valve against the low test pressure at 0.2MPa to the fully open position and then to the fully closed position. Open the shut-off valve. Allow the system to stabilize for a five-minute period, and once completed, record in the test report the through-seat leakage over a five-minute time period. The test result was recorded as below.

Test result of low pressure test

Item	API 607 Required value	Actual value
Test Pressure (MPa)	0.2MPa	0.2MPa
Test Temperature	24-32°C	
Test time	5min	
Through-seat Leakage after cool down period acc. API 607 Table 1	≤ 320 mL/min	0 mL/min
Conclusion: the test result is satisfactory according to API 607.		

9. Operational Test:

The operational test was conducted according to API STD 607 Eighth Edition, October 2022. Para.5.6.17 and 6.6. The upstream pressure was increased to 1.43MPa and the test valve was fully opened against the high test pressure differential to vent the piping and test valve body cavity to remove air or steam. The downstream shut-off valve was then closed and the system pressure was increased to and maintain at 1.43MPa. Then measured and recorded external leakage for a period of 5 minutes after valve was in the open position at high test pressure. The test result was recorded as below.

Test result of operational test

Item	API 607 Required value	Actual value
Test Pressure (MPa)	1.43MPa	1.43MPa
Test Temperature	24-32°C	
Test time	5min	
External Leakage after operational test acc. to API 607 Table 1	≤ 200 mL/min	0 mL/min
Conclusion: the test result is satisfactory according to API 607.		



Test Report No.: 310952

TÜV SÜD
Beijing Branch

The undersigned, hereby declare that I have checked test valve and witnessed the fire test on the test valve according to API STD 607 Eighth Edition, October 2022. The test result is satisfactory.

**TÜV SÜD Certification and Testing (China) Co., Ltd.
Beijing Branch**

A handwritten signature in black ink that reads 'Wang Ke'.

Ke WANG

Date: Aug.20, 2024

Annexes:

- 1) Copy of Drawing No.: 49 245 12 032;
- 2) Copy of Fire Test Report No.: 2024(JX)GSYZB01154.



CERTIFICATE

Certificate of Conformity with Technical Requirements In: API STD 607 Eighth Edition, October 2022

Certificate No.: 310955

Ref. Test report No.: 310954

Name of Applicant / Manufacturer: Crane Ningjin Valve Co., Ltd.

Postal address: No.496 Jinglong Street, Ningjin County, Hebei, China 055550.

Name of Certificate Holder: Crane Ningjin Valve Co., Ltd.

Koroška cesta 55 Muta 2366 Slovenia.

Juan Ruiz de Alarcón # 313 Complejo Industrial Chihuahua 31109 México.

We hereby certify that the fire test on below plates have been conducted at the laboratory designated manufacturer and witnessed by TÜV SÜD inspector according to requirements of API STD 607 Eighth Edition, October 2022. The testing results of valve meet the requirements of API STD 607 Eighth Edition, October 2022.

1. Description of Test Valve :

Type of Test Valve	Crane-XOMOX Soft Seated Ball valve
Description of Test Valve	XOMOX FK21F Ball valve
Valve Size (NPS)	4
Pressure Rating (ANSI Class)	Class 150
Mass of Test Valve (Kgs)	35.6 kg
Valve Body Material	ASTM A216 WCB (1.0619)

2. Qualified Range of Valves :

Type	Crane-XOMOX Soft Seated Ball valves
Description of Valves	XOMOX FK21F, FK23F, Ball valves
Qualified Pressure Ratings (Class) (according to API 607 Table 4)	Class 150, Class 300
Qualified Sizes (NPS) (according to API 607 Table 3)	4, 5, 6, 8
Mass of Qualified Valves (Kgs) with Different Ends (according to API 607 Para.7.1, e)	Greater than the tested valve or not less than 75% of the test valve
Qualified Valve Material	According to API 607 7.2

Remark: The technical data of tested valve see back of this certificate appendix 1.

This certificate is issued according to API STD 607 Eighth Edition, October 2022, based upon the result of testing report on above mentioned test valve. The additional plates qualification shall be limited to similar plates of same basic design and construction as the test valve and of the same nonmetallic materials with respect to the seat-to-closure member seal, seat-to-body seal, stem seal, and body joint seal according to API STD607 Eighth Edition, October 2022, Paragraph 7.

Ke WANG

Beijing, Aug.20, 2024

(Place, date)

**TÜV SÜD Certification and Testing (China) Co., Ltd.
Beijing Branch**

M Building, No.7 Wangjing Zhonghuan Nanlu, Chaoyang District,
Beijing, 100102, P.R. China.

Tel.: +86(0) 10 6590-6186, Fax.: +86(0) 10 6590-6182

Appendix 1:



Certificate No.: 310955

Ref. Test Report No.: 310954

Name of Applicant / Manufacturer: Crane Ningjin Valve Co., Ltd.

Name and postal address: No.496 Jinglong Street, Ningjin County, Hebei, China 055550.

Technical Data of Test Valve

1. Type of Test Valve: 4" XOMOX FK21F Ball valve

2. Description of Test Valve:

Type of Test Valve	Crane-XOMOX Soft Seated Ball valve
Description of Valve	XOMOX FK21F Ball valve
Pressure Class	Class 150
Valve Size, NPS	NPS 4
Structural length	ASME B16.10
Flange connection	ASME B16.5
Mass of Test Valve (Kgs)	35.6 kg

3. Details of Test Valve:

Part Name	Materials
Body	A216 WCB (1.0619)
Ball	A351 CF8M (1.4408); 316Ti (1.4571)
Stem	F51, A479 UNS S31803 (1.4462)
Packing gland	A479 316Ti (1.4571); 316 (1.4401)
Packing	Graphite
Spring energized lip seal	PTFE-Carbon+Graphite filled/AISI 301 (1.4310)
Seat	TFM
Body gasket	PTFE/Graphite/316Ti
Stud	A193 Gr.B7
Heavy hex nut	A194 Gr.2H
SX Steam seal	TFM
Support ring	A479 316Ti (1.4571); 316 (1.4401)
Hex bolt	A193 Gr.B8M Cl.2
Locking pin with ring-set	AISI 316 (1.4401)
Anti-static spring	AISI 301 (1.4310)
Guide bushing	PTFE-Carbon filled
Hand lever-set	CF8M (1.4408)
Tail	A216 WCB (1.0619)
Design Drawing No.:	49 245 09 026

Wang Ke

Beijing, Aug.20, 2024

(Place, date)

Ke WANG

**TÜV SÜD Certification and Testing (China) Co., Ltd.
Beijing Branch**

M Building, No.7 Wangjing Zhonghuan Nanlu, Chaoyang District,
Beijing, 100102, P.R. China.
Tel.: +86(0) 10 6590-6186, Fax.: +86(0) 10 6590-6182



Test Report

(Valve fire test according to API STD 607 Eighth Edition, October 2022.)

Certificate No.: 310955
Test Report No.: 310954

Applicant / Manufacturer : Crane Ningjin Valve Co., Ltd.

No.496 Jinglong Street, Ningjin County, Hebei, China 055550.

Inspection body : TÜV SÜD Certification and Testing (China) Co., Ltd. Beijing Branch

M Building, No.7 Wangjing Zhonghuan Nanlu, Chaoyang District,
Beijing, 100102, P.R. China.

Lab of test: Dongying Industrial Product Inspection & Metrology Verification Center

National Quality Inspection & Analysis Center for Petroleum Equipment
and Products (Shandong).

Test Date: Aug.14, 2024

Description of valves: Type: XOMOX FK21F Ball Valve

Size: 4"

Pressure Rating: Class 150

Drawing No.: 49 245 09 026

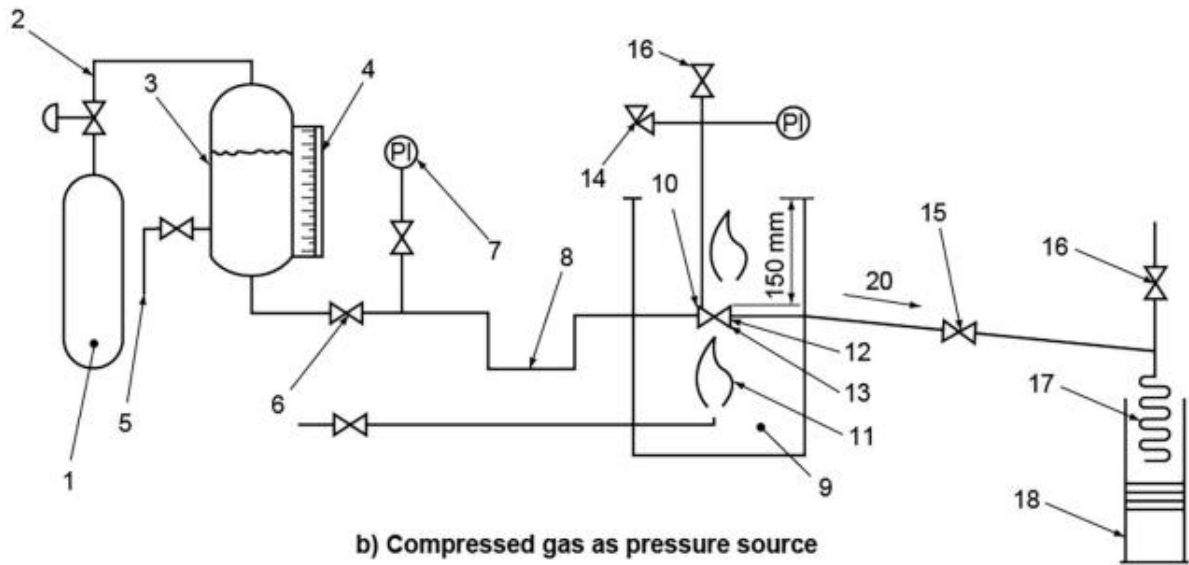
Test Witnessed By: Ke WANG / TÜV SÜD Inspector

Inspection and Tests

1. Conformity of Equipment

The test equipment was verified by TÜV SÜD inspector according to requirements of API STD 607 Eighth Edition, October 2022, Para.5.3 and found satisfactory. The detail arrangement of the fire-test equipment is shown below:

Figure 1. Typical Fire-Test System Using Compressed gas as the Pressure Source



Key:

- | | | |
|----------------------------------|----------------------------------------------------------------------|----------------------|
| 1. pressure source | 8. piping arranged to provide vapor trap | 15. shut-off valve |
| 2. pressure regulator and relief | 9. enclosure for test | 16. vent valve |
| 3. vessel for water | 10. test valve mounted horizontally with stem in horizontal position | 17. condenser |
| 4. calibrated sight gauge | 11. fuel gas supply and burners | 18. container |
| 5. water supply | 12. calorimeter cubes | 19. check valve |
| 6. shut-off valve | 13. flame environment and body thermocouples | 20. slope |
| 7. pressure gauge | 14. pressure gauge and relief valve | 21. clearance: 150mm |



2. Calibration of measurement and test instrument

The measurements and test instruments have been properly calibrated such as pressure gauge, thermocouples, etc. the calibration certificates were verified by inspector for test instrument and device.

3. Technical Data of Test Valve:

a) Description of test valve

Type of Test Valve	Crane-XOMOX Soft Seated Ball valve
Description of Valve	XOMOX FK21F Ball valve
Pressure Class	Class 150
Valve Size, NPS	4"
Structural length	ASME B16.10
Flange connection	ASME B16.5

b) Details of technical data on test valve

Part Name	Materials
Body	A216 WCB (1.0619)
Ball	A351 CF8M (1.4408); 316Ti (1.4571)
Stem	F51, A479 UNS S31803 (1.4462)
Packing gland	A479 316Ti (1.4571); 316 (1.4401)
Packing	Graphite
Spring energized lip seal	PTFE-Carbon+Graphite filled/AISI 301(1.4310)
Seat	TFM
Body gasket	PTFE/Graphite/316Ti
Stud	A193 Gr. B7
Hex nut	A194 Gr.2H
SX Stem seal	TFM
Support ring	A479 316Ti(1.4571); 316(1.4401)
Hex bolt	A193 Gr.B8M Cl.2
Locking pin with ring-set	AISI 316 (1.4401)
Anti-static spring	AISI 301 (1.4301)
Guide bushing	PTFE-Carbon filled
Hand lever-set	CF8M (1.4408)
Tail	A216 WCB (1.0619)
Design Drawing No.:	49 245 09 026



4. Visual and Dimensional Check on Test Valves:

The test valve was chosen at random by the manufacturer in workshop and submitted to the laboratory. The visual and dimensional check was performed according to drawing No.: 49 245 09 026 and results found satisfactory. The mark was verified on valve as following:

<u>XOMOX</u>	<u>CF8M</u>	<u>4"</u>	<u>150</u>	<u>WCB</u>	<u>F51</u>	<u>NS00574</u>
Manufacturer` Brand	Ball material	Size	Class	Body Material	Stem Material	Serial No.

5. Document Review:

The chemical and mechanical test report of main parts of test valve were reviewed and found satisfactory. The inspection record for hydrostatic shell test, hydrostatic seat test and steam backseat test after assembly for test valve were reviewed and found result satisfactory.

6. Preparation before Testing:

- 6.1 The thermocouples and calorimeters were installed properly according to Figure 3 in API 607. Two thermocouples were located to measure the flame environment temperature. Two thermocouples were located to measure the valve body temperature. Two calorimeter cubes were located as appropriate position.
- 6.2 The test system including test valve (part 10) was cleaned through by water before testing. All air was properly purged from test valve and testing system by water.
- 6.3 The test system then was pressurized to 2.74MPa after the test valve and system upstream of valve have been completely full of water and system downstream of the test valve have been completely empty of water. The system and test valve were carefully checked for leakage when the test pressure was held at 2.74MPa. No leakage was found on system and test valve.

7. Fire Test:

The fire test was conducted according to API STD 607 Eighth Edition, October 2022, Section 5. The pressure of the system upstream was kept 0.2MPa, the fire ignited. The flame temperature reached 750°C within 2 minutes after ignition. The test pressure and temperature were maintained at 0.2MPa during the fire test. The temperature and pressure were recorded at every 30s on record instrument by the operators.

The system and test valve were cooled below 100°C within 5 minutes by shower nozzles after 30 minutes burn period. The loss of water weight in vessel was measured by weighing scale and water in calibrated container (part 18) were read and recorded. The test result is shown as below.

Test result of fire test

Item	API 607 Required value	Actual value
Test Pressure (MPa)	0.2MPa	0.2MPa
Test Temperature	750-1000°C	810-930°C
Through-seat Leakage during burn period acc. to API 607 Table 1	≤ 400 mL/min	11 mL/min
External Leakage during burn and cool down periods acc. to API 607 Table 1	≤ 100 mL/min	0 mL/min
Time required for valve to cool to 100°C	≤ 10min	5min
Conclusion: the test result is satisfactory according to API 607.		



8. Low-pressure Test:

The test valve was cooled below 100°C within 5 minutes after completing the fire test. The low pressure test was conducted according to API STD 607 Eighth Edition, October 2022. Para. 5.6.15 and 6.4. The test result was recorded as below.

Test result of low pressure test

Item	API 607 Required value	Actual value
Test Pressure (MPa)	0.2MPa	0.2MPa
Test Temperature	24-32°C	
Test time	5min	
Through-seat Leakage after cool down period acc. API 607 Table 1	≤ 160 mL/min	0 mL/min
Conclusion: the test result is satisfactory according to API 607.		

After completing the static leakage tests, close the shut-off valve, operate the test valve against the low test pressure at 0.2MPa to the fully open position and then to the fully closed position. Open the shut-off valve. Allow the system to stabilize for a five-minute period, and once completed, record in the test report the through-seat leakage over a five-minute time period. The test result was recorded as below.

Test result of low pressure test

Item	API 607 Required value	Actual value
Test Pressure (MPa)	0.2MPa	0.2MPa
Test Temperature	24-32°C	
Test time	5min	
Through-seat Leakage after cool down period acc. API 607 Table 1	≤ 160 mL/min	0 mL/min
Conclusion: the test result is satisfactory according to API 607.		

9. Operational Test:

The operational test was conducted according to API STD 607 Eighth Edition, October 2022. Para.5.6.17 and 6.6. The upstream pressure was increased to 1.47MPa and the test valve was fully opened against the high test pressure differential to vent the piping and test valve body cavity to remove air or steam. The downstream shut-off valve was then closed and the system pressure was increased to and maintain at 1.47MPa. Then measured and recorded external leakage for a period of 5 minutes after valve was in the open position at high test pressure. The test result was recorded as below.

Test result of operational test

Item	API 607 Required value	Actual value
Test Pressure (MPa)	1.47MPa	1.47MPa
Test Temperature	24-32°C	
Test time	5min	
External Leakage after operational test acc. to API 607 Table 1	≤ 100 mL/min	0 mL/min
Conclusion: the test result is satisfactory according to API 607.		



Test Report No.: 310954

The undersigned, hereby declare that I have checked test valve and witnessed the fire test on the test valve according to API STD 607 Eighth Edition, October 2022. The test result is satisfactory.

**TÜV SÜD Certification and Testing (China) Co., Ltd.
Beijing Branch**

A handwritten signature in black ink that reads 'Wang Ke'.

Ke WANG

Date: Aug.20, 2024

Annexes:

- 1) Copy of Drawing No.: 49 245 09 026;
- 2) Copy of Fire Test Report No.: 2024(JX)GSYZB01156.



CERTIFICATE

Certificate of Conformity with Technical Requirements In: API STD 607 Eighth Edition, October 2022

Certificate No.: 310957

Ref. Test report No.: 310956

Name of Applicant / Manufacturer: Crane Ningjin Valve Co., Ltd.

Postal address: No.496 Jinglong Street, Ningjin County, Hebei, China 055550.

Name of Certificate Holder: Crane Ningjin Valve Co., Ltd.

Koroška cesta 55 Muta 2366 Slovenia.

Juan Ruiz de Alarcón # 313 Complejo Industrial Chihuahua 31109 México.

We hereby certify that the fire test on below plates have been conducted at the laboratory designated manufacturer and witnessed by TÜV SÜD inspector according to requirements of API STD 607 Eighth Edition, October 2022. The testing results of valve meet the requirements of API STD 607 Eighth Edition, October 2022.

1. Description of Test Valve :

Type of Test Valve	Crane-XOMOX Soft Seated Ball valve
Description of Test Valve	XOMOX FK21F Ball valve
Valve Size (NPS)	4
Pressure Rating (ANSI Class)	Class 150
Mass of Test Valve (Kgs)	35.6 kg
Valve Body Material	ASTM A351 CF8M (1.4408)

2. Qualified Range of Valves :

Type	Crane-XOMOX Soft Seated Ball valves
Description of Valves	XOMOX FK21F, FK23F, Ball valves
Qualified Pressure Ratings (Class) (according to API 607 Table 4)	Class 150, Class 300
Qualified Sizes (NPS) (according to API 607 Table 3)	4, 5, 6, 8
Mass of Qualified Valves (Kgs) with Different Ends (according to API 607 Para.7.1, e)	Greater than the tested valve or not less than 75% of the test valve
Qualified Valve Material	According to API 607 7.2

Remark: The technical data of tested valve see back of this certificate appendix 1.

This certificate is issued according to API STD 607 Eighth Edition, October 2022, based upon the result of testing report on above mentioned test valve. The additional plates qualification shall be limited to similar plates of same basic design and construction as the test valve and of the same nonmetallic materials with respect to the seat-to-closure member seal, seat-to-body seal, stem seal, and body joint seal according to API STD607 Eighth Edition, October 2022, Paragraph 7.

Ke WANG

Beijing, Aug.20, 2024

(Place, date)

**TÜV SÜD Certification and Testing (China) Co., Ltd.
Beijing Branch**

M Building, No.7 Wangjing Zhonghuan Nanlu, Chaoyang District,
Beijing, 100102, P.R. China.

Tel.: +86(0) 10 6590-6186, Fax.: +86(0) 10 6590-6182

Appendix 1:



Certificate No.: 310957

Ref. Test Report No.: 310956

Name of Applicant / Manufacturer: Crane Ningjin Valve Co., Ltd.

Name and postal address: No.496 Jinglong Street, Ningjin County, Hebei, China 055550.

Technical Data of Test Valve

1. Type of Test Valve: 4" XOMOX FK21F Ball valve

2. Description of Test Valve:

Type of Test Valve	Crane-XOMOX Soft Seated Ball valve
Description of Valve	XOMOX FK21F Ball valve
Pressure Class	Class 150
Valve Size, NPS	NPS 4
Structural length	ASME B16.10
Flange connection	ASME B16.5
Mass of Test Valve (Kgs)	35.6 kg

3. Details of Test Valve:

Part Name	Materials
Body	A351 CF8M (1.4408)
Ball	A351 CF8M (1.4408); 316Ti (1.4571)
Stem	F51, A479 UNS S31803 (1.4462)
Packing gland	A479 316Ti (1.4571); 316 (1.4401)
Packing	Graphite
Spring energized lip seal	PTFE-Carbon+Graphite filled/AISI 301 (1.4310)
Seat	TFM
Body gasket	PTFE/Graphite/316Ti
Stud	A193 Gr.B8M Cl.2
Heavy hex nut	A194 Gr.8M
SX Steam seal	TFM
Support ring	A479 316Ti (1.4571); 316 (1.4401)
Hex bolt	A193 Gr.B8M Cl.2
Locking pin with ring-set	AISI 316 (1.4401)
Anti-static spring	AISI 301 (1.4310)
Guide bushing	PTFE-Carbon filled
Hand lever-set	CF8M (1.4408)
Tail	A351 CF8M (1.4408)
Design Drawing No.:	49 245 09 024

Wang Ke

Beijing, Aug.20, 2024

(Place, date)

Ke WANG

**TÜV SÜD Certification and Testing (China) Co., Ltd.
Beijing Branch**

M Building, No.7 Wangjing Zhonghuan Nanlu, Chaoyang District,
Beijing, 100102, P.R. China.

Tel.: +86(0) 10 6590-6186, Fax.: +86(0) 10 6590-6182



Test Report

(Valve fire test according to API STD 607 Eighth Edition, October 2022.)

Certificate No.: 310957
Test Report No.: 310956

Applicant / Manufacturer : Crane Ningjin Valve Co., Ltd.

No.496 Jinglong Street, Ningjin County, Hebei, China 055550.

Inspection body : TÜV SÜD Certification and Testing (China) Co., Ltd. Beijing Branch

M Building, No.7 Wangjing Zhonghuan Nanlu, Chaoyang District,
Beijing, 100102, P.R. China.

Lab of test: Dongying Industrial Product Inspection & Metrology Verification Center

National Quality Inspection & Analysis Center for Petroleum Equipment
and Products (Shandong).

Test Date: Aug.14, 2024

Description of valves: Type: XOMOX FK21F Ball Valve

Size: 4"

Pressure Rating: Class 150

Drawing No.: 49 245 09 024

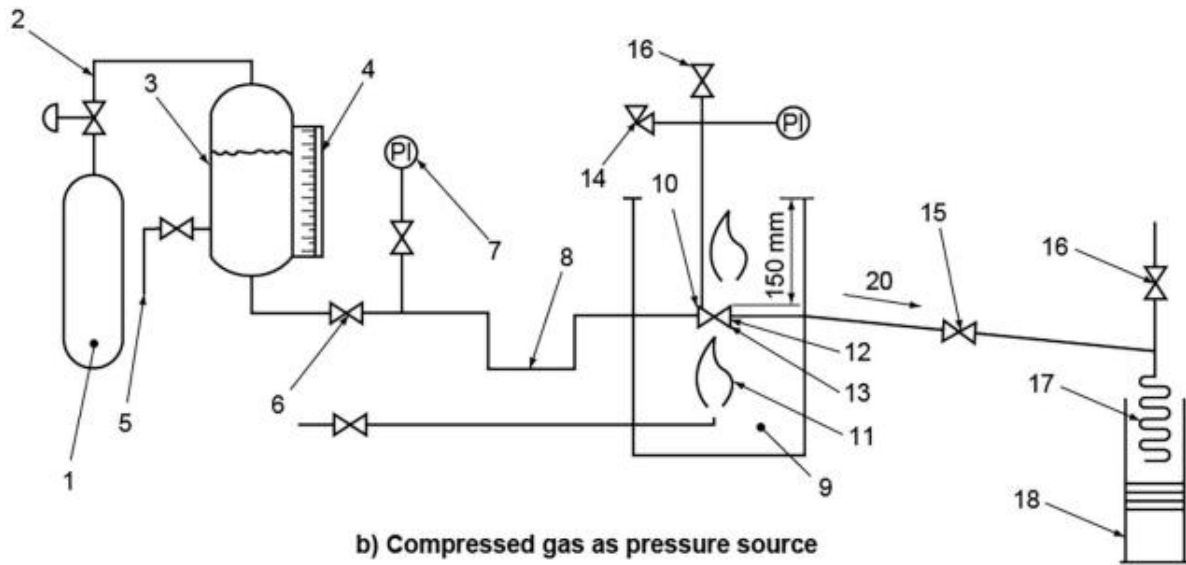
Test Witnessed By: Ke WANG / TÜV SÜD Inspector

Inspection and Tests

1. Conformity of Equipment

The test equipment was verified by TÜV SÜD inspector according to requirements of API STD 607 Eighth Edition, October 2022, Para.5.3 and found satisfactory. The detail arrangement of the fire-test equipment is shown below:

Figure 1. Typical Fire-Test System Using Compressed gas as the Pressure Source



Key:

- | | | |
|----------------------------------|----------------------------------------------------------------------|----------------------|
| 1. pressure source | 8. piping arranged to provide vapor trap | 15. shut-off valve |
| 2. pressure regulator and relief | 9. enclosure for test | 16. vent valve |
| 3. vessel for water | 10. test valve mounted horizontally with stem in horizontal position | 17. condenser |
| 4. calibrated sight gauge | 11. fuel gas supply and burners | 18. container |
| 5. water supply | 12. calorimeter cubes | 19. check valve |
| 6. shut-off valve | 13. flame environment and body thermocouples | 20. slope |
| 7. pressure gauge | 14. pressure gauge and relief valve | 21. clearance: 150mm |



2. Calibration of measurement and test instrument

The measurements and test instruments have been properly calibrated such as pressure gauge, thermocouples, etc. the calibration certificates were verified by inspector for test instrument and device.

3. Technical Data of Test Valve:

a) Description of test valve

Type of Test Valve	Crane-XOMOX Soft Seated Ball valve
Description of Valve	XOMOX FK21F Ball valve
Pressure Class	Class 150
Valve Size, NPS	4"
Structural length	ASME B16.10
Flange connection	ASME B16.5

b) Details of technical data on test valve

Part Name	Materials
Body	A351 CF8M (1.4408)
Ball	A351 CF8M (1.4408); 316Ti (1.4571)
Stem	F51, A479 UNS S31803 (1.4462)
Packing gland	A479 316Ti (1.4571); 316 (1.4401)
Packing	Graphite
Spring energized lip seal	PTFE-Carbon+Graphite filled/AISI 301(1.4310)
Seat	TFM
Body gasket	PTFE/Graphite/316Ti
Stud	A193 Gr.B8M Cl.2
Hex nut	A194 Gr.8M
SX Stem seal	TFM
Support ring	A479 316Ti(1.4571); 316(1.4401)
Hex bolt	A193 Gr.B8M Cl.2
Locking pin with ring-set	AISI 316 (1.4401)
Anti-static spring	AISI 301 (1.4301)
Guide bushing	PTFE-Carbon filled
Hand lever-set	CF8M (1.4408)
Tail	A351 CF8M (1.4408)
Design Drawing No.:	49 245 09 024



4. Visual and Dimensional Check on Test Valves:

The test valve was chosen at random by the manufacturer in workshop and submitted to the laboratory. The visual and dimensional check was performed according to drawing No.: 49 245 09 024 and results found satisfactory. The mark was verified on valve as following:

<u>XOMOX</u>	<u>CF8M</u>	<u>4"</u>	<u>150</u>	<u>CF8M</u>	<u>F51</u>	<u>NS00575</u>
Manufacturer` Brand	Ball material	Size	Class	Body Material	Stem Material	Serial No.

5. Document Review:

The chemical and mechanical test report of main parts of test valve were reviewed and found satisfactory. The inspection record for hydrostatic shell test, hydrostatic seat test and steam backseat test after assembly for test valve were reviewed and found result satisfactory.

6. Preparation before Testing:

- 6.1 The thermocouples and calorimeters were installed properly according to Figure 3 in API 607. Two thermocouples were located to measure the flame environment temperature. Two thermocouples were located to measure the valve body temperature. Two calorimeter cubes were located as appropriate position.
- 6.2 The test system including test valve (part 10) was cleaned through by water before testing. All air was properly purged from test valve and testing system by water.
- 6.3 The test system then was pressurized to 2.66MPa after the test valve and system upstream of valve have been completely full of water and system downstream of the test valve have been completely empty of water. The system and test valve were carefully checked for leakage when the test pressure was held at 2.66MPa. No leakage was found on system and test valve.

7. Fire Test:

The fire test was conducted according to API STD 607 Eighth Edition, October 2022, Section 5. The pressure of the system upstream was kept 0.2MPa, the fire ignited. The flame temperature reached 750°C within 2 minutes after ignition. The test pressure and temperature were maintained at 0.2MPa during the fire test. The temperature and pressure were recorded at every 30s on record instrument by the operators.

The system and test valve were cooled below 100°C within 5 minutes by shower nozzles after 30 minutes burn period. The loss of water weight in vessel was measured by weighing scale and water in calibrated container (part 18) were read and recorded. The test result is shown as below.

Test result of fire test

Item	API 607 Required value	Actual value
Test Pressure (MPa)	0.2MPa	0.2MPa
Test Temperature	750-1000°C	800-900°C
Through-seat Leakage during burn period acc. to API 607 Table 1	≤ 400 mL/min	11 mL/min
External Leakage during burn and cool down periods acc. to API 607 Table 1	≤ 100 mL/min	0 mL/min
Time required for valve to cool to 100°C	≤ 10min	5min

Conclusion: the test result is satisfactory according to API 607.



8. Low-pressure Test:

The test valve was cooled below 100°C within 5 minutes after completing the fire test. The low pressure test was conducted according to API STD 607 Eighth Edition, October 2022. Para. 5.6.15 and 6.4. The test result was recorded as below.

Test result of low pressure test

Item	API 607 Required value	Actual value
Test Pressure (MPa)	0.2MPa	0.2MPa
Test Temperature	24-32°C	
Test time	5min	
Through-seat Leakage after cool down period acc. API 607 Table 1	≤ 160 mL/min	0 mL/min
Conclusion: the test result is satisfactory according to API 607.		

After completing the static leakage tests, close the shut-off valve, operate the test valve against the low test pressure at 0.2MPa to the fully open position and then to the fully closed position. Open the shut-off valve. Allow the system to stabilize for a five-minute period, and once completed, record in the test report the through-seat leakage over a five-minute time period. The test result was recorded as below.

Test result of low pressure test

Item	API 607 Required value	Actual value
Test Pressure (MPa)	0.2MPa	0.2MPa
Test Temperature	24-32°C	
Test time	5min	
Through-seat Leakage after cool down period acc. API 607 Table 1	≤ 160 mL/min	0 mL/min
Conclusion: the test result is satisfactory according to API 607.		

9. Operational Test:

The operational test was conducted according to API STD 607 Eighth Edition, October 2022. Para.5.6.17 and 6.6. The upstream pressure was increased to 1.43MPa and the test valve was fully opened against the high test pressure differential to vent the piping and test valve body cavity to remove air or steam. The downstream shut-off valve was then closed and the system pressure was increased to and maintain at 1.43MPa. Then measured and recorded external leakage for a period of 5 minutes after valve was in the open position at high test pressure. The test result was recorded as below.

Test result of operational test

Item	API 607 Required value	Actual value
Test Pressure (MPa)	1.43MPa	1.43MPa
Test Temperature	24-32°C	
Test time	5min	
External Leakage after operational test acc. to API 607 Table 1	≤ 100 mL/min	0 mL/min
Conclusion: the test result is satisfactory according to API 607.		



Test Report No.: 310956

The undersigned, hereby declare that I have checked test valve and witnessed the fire test on the test valve according to API STD 607 Eighth Edition, October 2022. The test result is satisfactory.

**TÜV SÜD Certification and Testing (China) Co., Ltd.
Beijing Branch**

A handwritten signature in black ink that reads 'Wang Ke'.

Ke WANG

Date: **Aug.20, 2024**

Annexes:

- 1) Copy of Drawing No.: 49 245 09 024;
- 2) Copy of Fire Test Report No.: 2024(JX)GSYZB01157.



CERTIFICATE

Certificate of Conformity with Technical Requirements In: API STD 607 Eighth Edition, October 2022

Certificate No.: 310959

Ref. Test report No.: 310958

Name of Applicant / Manufacturer: Crane Ningjin Valve Co., Ltd.

Postal address: No.496 Jinglong Street, Ningjin County, Hebei, China 055550.

Name of Certificate Holder: Crane Ningjin Valve Co., Ltd.

Koroška cesta 55 Muta 2366 Slovenia.

Juan Ruiz de Alarcón # 313 Complejo Industrial Chihuahua 31109 México.

We hereby certify that the fire test on below plates have been conducted at the laboratory designated manufacturer and witnessed by TÜV SÜD inspector according to requirements of API STD 607 Eighth Edition, October 2022. The testing results of valve meet the requirements of API STD 607 Eighth Edition, October 2022.

1. Description of Test Valve :

Type of Test Valve	Crane-XOMOX Soft Seated Ball valve
Description of Test Valve	XOMOX FK21F Ball valve
Valve Size (NPS)	2
Pressure Rating (ANSI Class)	Class 150
Mass of Test Valve (Kgs)	23.678 kg
Valve Body Material	ASTM A351 CF8M (1.4408)

2. Qualified Range of Valves :

Type	Crane-XOMOX Soft Seated Ball valves
Description of Valves	XOMOX FK21F, FK23F, Ball valves
Qualified Pressure Ratings (Class) (according to API 607 Table 4)	Class 150, Class 300
Qualified Sizes (NPS) (according to API 607 Table 3)	2 and below; 2 ½", 3, 4
Mass of Qualified Valves (Kgs) with Different Ends (according to API 607 Para.7.1, e)	Greater than the tested valve or not less than 75% of the test valve
Qualified Valve Material	According to API 607 7.2

Remark: The technical data of tested valve see back of this certificate appendix 1.

This certificate is issued according to API STD 607 Eighth Edition, October 2022, based upon the result of testing report on above mentioned test valve. The additional plates qualification shall be limited to similar plates of same basic design and construction as the test valve and of the same nonmetallic materials with respect to the seat-to-closure member seal, seat-to-body seal, stem seal, and body joint seal according to API STD607 Eighth Edition, October 2022, Paragraph 7.

Ke WANG

Beijing, Aug.20, 2024

(Place, date)

**TÜV SÜD Certification and Testing (China) Co., Ltd.
Beijing Branch**

M Building, No.7 Wangjing Zhonghuan Nanlu, Chaoyang District,
Beijing, 100102, P.R. China.

Tel.: +86(0) 10 6590-6186, Fax.: +86(0) 10 6590-6182

Appendix 1:



Certificate No.: 310959

Ref. Test Report No.: 310958

Name of Applicant / Manufacturer: Crane Ningjin Valve Co., Ltd.

Name and postal address: No.496 Jinglong Street, Ningjin County, Hebei, China 055550.

Technical Data of Test Valve

1. Type of Test Valve: 2" XOMOX FK21F Ball valve

2. Description of Test Valve:

Type of Test Valve	Crane-XOMOX Soft Seated Ball valve
Description of Valve	XOMOX FK21F Ball valve
Pressure Class	Class 150
Valve Size, NPS	NPS 2
Structural length	ASME B16.10
Flange connection	ASME B16.5
Mass of Test Valve (Kgs)	23.678 kg

3. Details of Test Valve:

Part Name	Materials
Body	A351 CF8M (1.4408)
Ball	A351 CF8M (1.4408); 316Ti (1.4571)
Stem	F51, A479 UNS S31803 (1.4462)
Packing gland	A479 316Ti (1.4571); 316 (1.4401)
Packing ring	Graphite
Self energized lip seal	PTFE-Carbon+Graphite filled/AISI 301 (1.4310)
Seat	TFM
Body gasket	PTFE/Graphite/316Ti
Stud	A193 Gr.B8M Cl.2
Heavy hex nut	A194 Gr.8M
SX Steam seal	TFM
Support ring	A479 316Ti (1.4571); 316 (1.4401)
Locking pin with ring	AISI 316 (1.4401)
Anti-static spring	AISI 301 (1.4310)
Guide bushing	PTFE-Carbon filled
Hand lever-set	CF8M (1.4408)
Tail	A351 CF8M (1.4408)
Design Drawing No.:	49 245 06 073

Wang Ke

Beijing, Aug.20, 2024

(Place, date)

Ke WANG

**TÜV SÜD Certification and Testing (China) Co., Ltd.
Beijing Branch**

M Building, No.7 Wangjing Zhonghuan Nanlu, Chaoyang District,
Beijing, 100102, P.R. China.
Tel.: +86(0) 10 6590-6186, Fax.: +86(0) 10 6590-6182



Test Report

(Valve fire test according to API STD 607 Eighth Edition, October 2022.)

Certificate No.: 310959
Test Report No.: 310958

Applicant / Manufacturer : Crane Ningjin Valve Co., Ltd.

No.496 Jinglong Street, Ningjin County, Hebei, China 055550.

Inspection body : TÜV SÜD Certification and Testing (China) Co., Ltd. Beijing Branch

M Building, No.7 Wangjing Zhonghuan Nanlu, Chaoyang District,
Beijing, 100102, P.R. China.

Lab of test: Dongying Industrial Product Inspection & Metrology Verification Center

National Quality Inspection & Analysis Center for Petroleum Equipment
and Products (Shandong).

Test Date: Aug.14, 2024

Description of valves: Type: XOMOX FK21F Ball Valve

Size: 2"

Pressure Rating: Class 150

Drawing No.: 49 245 06 073

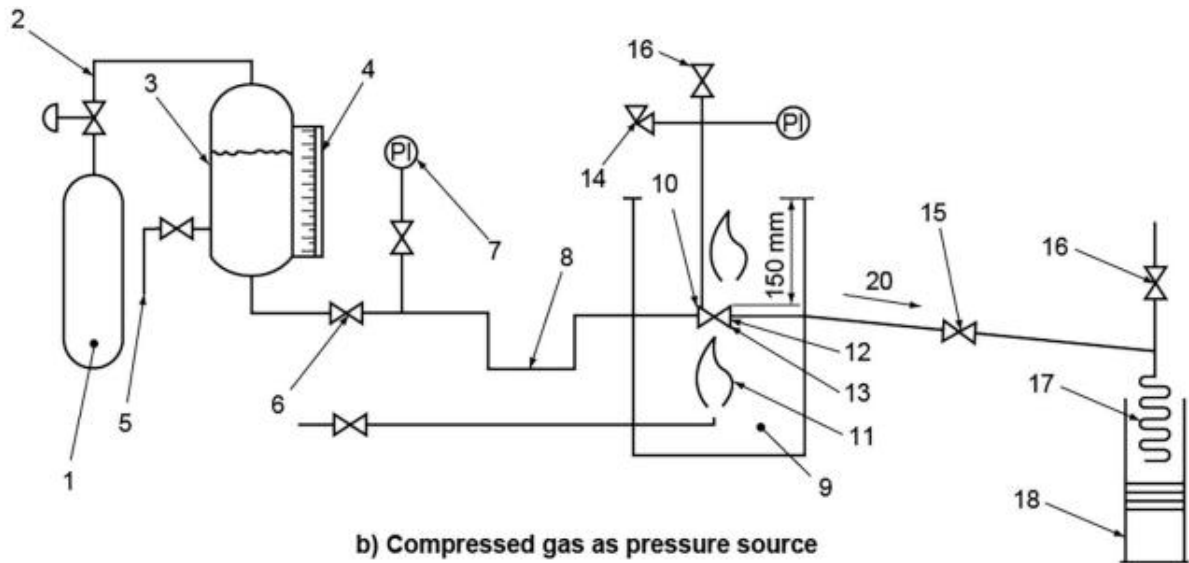
Test Witnessed By: Ke WANG / TÜV SÜD Inspector

Inspection and Tests

1. Conformity of Equipment

The test equipment was verified by TÜV SÜD inspector according to requirements of API STD 607 Eighth Edition, October 2022, Para.5.3 and found satisfactory. The detail arrangement of the fire-test equipment is shown below:

Figure 1. Typical Fire-Test System Using Compressed gas as the Pressure Source



Key:

- | | | |
|----------------------------------|----------------------------------------------------------------------|----------------------|
| 1. pressure source | 8. piping arranged to provide vapor trap | 15. shut-off valve |
| 2. pressure regulator and relief | 9. enclosure for test | 16. vent valve |
| 3. vessel for water | 10. test valve mounted horizontally with stem in horizontal position | 17. condenser |
| 4. calibrated sight gauge | 11. fuel gas supply and burners | 18. container |
| 5. water supply | 12. calorimeter cubes | 19. check valve |
| 6. shut-off valve | 13. flame environment and body thermocouples | 20. slope |
| 7. pressure gauge | 14. pressure gauge and relief valve | 21. clearance: 150mm |



2. Calibration of measurement and test instrument

The measurements and test instruments have been properly calibrated such as pressure gauge, thermocouples, etc. the calibration certificates were verified by inspector for test instrument and device.

3. Technical Data of Test Valve:

a) Description of test valve

Type of Test Valve	Crane-XOMOX Soft Seated Ball valve
Description of Valve	XOMOX FK21F Ball valve
Pressure Class	Class 150
Valve Size, NPS	2"
Structural length	ASME B16.10
Flange connection	ASME B16.5

b) Details of technical data on test valve

Part Name	Materials
Body	A351 CF8M (1.4408)
Ball	A351 CF8M (1.4408); 316Ti (1.4571)
Stem	F51, A479 UNS S31803 (1.4462)
Packing gland	A479 316Ti (1.4571); 316 (1.4401)
Packing ring	Graphite
Spring energized lip seal	PTFE-Carbon+Graphite filled/AISI 301(1.4310)
Seat	TFM
Body gasket	PTFE/Graphite/316Ti
Stud	A193 Gr.B8M Cl.2
Hea hex nut	A194 Gr.8M
SX Stem seal	TFM
Support ring	A479 316Ti(1.4571); 316(1.4401)
Locking pin with ring	AISI 316 (1.4401)
Anti-static spring	AISI 301 (1.4301)
Guide bushing	PTFE-Carbon filled
Hand lever-set	CF8M (1.4408)
Tail	A351 CF8M (1.4408)
Design Drawing No.:	49 245 06 073



4. Visual and Dimensional Check on Test Valves:

The test valve was chosen at random by the manufacturer in workshop and submitted to the laboratory. The visual and dimensional check was performed according to drawing No.: 49 245 06 073 and results found satisfactory. The mark was verified on valve as following:

<u>XOMOX</u>	<u>CF8M</u>	<u>2"</u>	<u>150</u>	<u>CF8M</u>	<u>F51</u>	<u>NS00595</u>
Manufacturer` Brand	Ball material	Size	Class	Body Material	Stem Material	Serial No.

5. Document Review:

The chemical and mechanical test report of main parts of test valve were reviewed and found satisfactory. The inspection record for hydrostatic shell test, hydrostatic seat test and steam backseat test after assembly for test valve were reviewed and found result satisfactory.

6. Preparation before Testing:

- 6.1 The thermocouples and calorimeters were installed properly according to Figure 3 in API 607. Two thermocouples were located to measure the flame environment temperature. Two thermocouples were located to measure the valve body temperature. Two calorimeter cubes were located as appropriate position.
- 6.2 The test system including test valve (part 10) was cleaned through by water before testing. All air was properly purged from test valve and testing system by water.
- 6.3 The test system then was pressurized to 2.66MPa after the test valve and system upstream of valve have been completely full of water and system downstream of the test valve have been completely empty of water. The system and test valve were carefully checked for leakage when the test pressure was held at 2.66MPa. No leakage was found on system and test valve.

7. Fire Test:

The fire test was conducted according to API STD 607 Eighth Edition, October 2022, Section 5. The pressure of the system upstream was kept 0.2MPa, the fire ignited. The flame temperature reached 750°C within 2 minutes after ignition. The test pressure and temperature were maintained at 0.2MPa during the fire test. The temperature and pressure were recorded at every 30s on record instrument by the operators.

The system and test valve were cooled below 100°C within 5 minutes by shower nozzles after 30 minutes burn period. The loss of water weight in vessel was measured by weighing scale and water in calibrated container (part 18) were read and recorded. The test result is shown as below.

Test result of fire test

Item	API 607 Required value	Actual value
Test Pressure (MPa)	0.2MPa	0.2MPa
Test Temperature	750-1000°C	800-970°C
Through-seat Leakage during burn period acc. to API 607 Table 1	≤ 200 mL/min	9 mL/min
External Leakage during burn and cool down periods acc. to API 607 Table 1	≤ 50 mL/min	0 mL/min
Time required for valve to cool to 100°C	≤ 10min	5min
Conclusion: the test result is satisfactory according to API 607.		



8. Low-pressure Test:

The test valve was cooled below 100°C within 5 minutes after completing the fire test. The low pressure test was conducted according to API STD 607 Eighth Edition, October 2022. Para. 5.6.15 and 6.4. The test result was recorded as below.

Test result of low pressure test

Item	API 607 Required value	Actual value
Test Pressure (MPa)	0.2MPa	0.2MPa
Test Temperature	24-32°C	
Test time	5min	
Through-seat Leakage after cool down period acc. API 607 Table 1	≤ 80 mL/min	0 mL/min
Conclusion: the test result is satisfactory according to API 607.		

After completing the static leakage tests, close the shut-off valve, operate the test valve against the low test pressure at 0.2MPa to the fully open position and then to the fully closed position. Open the shut-off valve. Allow the system to stabilize for a five-minute period, and once completed, record in the test report the through-seat leakage over a five-minute time period. The test result was recorded as below.

Test result of low pressure test

Item	API 607 Required value	Actual value
Test Pressure (MPa)	0.2MPa	0.2MPa
Test Temperature	24-32°C	
Test time	5min	
Through-seat Leakage after cool down period acc. API 607 Table 1	≤ 80 mL/min	0 mL/min
Conclusion: the test result is satisfactory according to API 607.		

9. Operational Test:

The operational test was conducted according to API STD 607 Eighth Edition, October 2022. Para.5.6.17 and 6.6. The upstream pressure was increased to 1.43MPa and the test valve was fully opened against the high test pressure differential to vent the piping and test valve body cavity to remove air or steam. The downstream shut-off valve was then closed and the system pressure was increased to and maintain at 1.43MPa. Then measured and recorded external leakage for a period of 5 minutes after valve was in the open position at high test pressure. The test result was recorded as below.

Test result of operational test

Item	API 607 Required value	Actual value
Test Pressure (MPa)	1.43MPa	1.43MPa
Test Temperature	24-32°C	
Test time	5min	
External Leakage after operational test acc. to API 607 Table 1	≤ 50 mL/min	0 mL/min
Conclusion: the test result is satisfactory according to API 607.		



Test Report No.: 310958

TÜV SÜD
Beijing Branch

The undersigned, hereby declare that I have checked test valve and witnessed the fire test on the test valve according to API STD 607 Eighth Edition, October 2022. The test result is satisfactory.

**TÜV SÜD Certification and Testing (China) Co., Ltd.
Beijing Branch**

A handwritten signature in black ink that reads 'Wang Ke'.

Ke WANG

Date: Aug.20, 2024

Annexes:

- 1) Copy of Drawing No.: 49 245 06 073;
- 2) Copy of Fire Test Report No.: 2024(JX)GSYZB01158.