

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

REPORT OF THIRD-PARTY INSPECTION

Report No. & Version:	316767, Rev 00	Floor 3-13, No.151, Heng Tong Road, Shanghai, P. R. China Tel.: +86(0) 21 6141 0123 Fax: +86(0) 21 6140 8600 Internet: www.tuvsud.cn		
Project Number:	7482561343	Email: ye.shen@tuvsud.com		
Applicant:	FX FLOW CONTROL BV	The Report may only be quoted in full. Any use for advertising purposes must be granted in writing.		
Address:	Upscale Digital Pump and Valve Industrial Park, Qiaoxia Town, Yongjia County, Wenzhou City, Zhaijang Province	The test results refer exclusively to the units under test.		
Manufacturer:	FX FLOW CONTROL BV			
Address:	Upscale Digital Pump and Valve Industrial Park, Qiaoxia Town, Yongjia County, Wenzhou City,			
Contact Person:	Mr. Yan			
Inspection Place:	Wenzhou City, Zhejiang province, China.			
Inspector:	Jeff Cheng			
Department:	IS			

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Revisions

Revision	Date	Changes
00	2024.12.30	First version
1	1	1

This report supersedes any previous revisions.





Product/Article List

Item No.	Commodity Description	Drawing Number	Quantity	Product Serial Number	Remarks
7	NPS 10 900LB, Trunnion Ball Valve,	10"Q347N-900LB-1	1	FX2412-S1	1
	RF, Body: A105N, Bi-directional				

Nature of Inspection: 1. Design Validation Testing

This is to report that we, TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch at the request of FX FLOW CONTROL BV conducted the following inspections according to SPE 77/300-2022.

1. Inspection Summary

As per the manufacturer's arrangement, TÜV SÜD inspector Mr. Jeff Cheng visited Wenzhou Haichuan Inspection and Test Co. Ltd. to carry out the design validation testing for above list valve, the results were acceptable.

2. Personnel Met

- Mr. Qu Zhaoquan—Test Engineer--Haichuan
- Mr. Jeff Cheng --Inspector--TÜV SÜD

3. Reference Documents and Standard

- Drawing: 10"Q347N-900LB-1
- SPE 77/300-2022
- ASME B16.34

4. Inspection Activities

4.1 Pre-test condition check

- ☆ The inspector verified calibration status of all gauges & test equipment engaged in the test course. All instruments certificates were provided for review & they were all in valid periods.
- \diamond Verified the sampled valve for testing as per provided drawing.
- The test medium was Nitrogen & Helium. Analysis certificate of test medium-Helium was reviewed & accepted with purity more than 97%.
- Verified the test rig arrangement basically conform to SPE 77/300 C.2.5, instrumentation general arrangement for TAT. Proper thermocouples' number & type was verified prior to testing & were arranged respectively for environment, body & near closure member.
- Verified the testing sample valve position that is compliance with the requirement of the Annexure reference clauses of SPE 77/300 C2.12 table.

4.2 Test course



As per the design temperature range of the valves on the drawings, -29~120°C for ball valve and -29~120°C for test temperature, as per the design temperature range of the valves, according to SPE 77/300, C.3.2, test sequences no. 8 was applied for the test course of the ball valve.

4.3 TAT Process

4.3.1 Initial ambient test

- ♦ Considering the valve size is 10inch, 75x mechanical cycles at 100% DP for run-in have been applied for the ball valve;
- LP (2bar) seat leakage test for both side has been performed & no leak bubbles were observed in 5mins. BTO torque and ETC torque have been recorded at the 1st mechanical cycle & with 4 additional cycles followed.
- Incremental pressure seat leakage test for both side has been performed (35%, 70% & 110% DP) & no leak bubbles were observed in 5min for each step. After each step, one cycle was followed as specified. ETC torque of each step was recorded for ball valve.
- Shell/body test was performed at 110% DP & the duration time was 15mins according to table C.10 & dynamic & static FE testing followed at 100% DP. Before FE leakage detecting, 17x cycles for ball valve as specified. The test results of shell & FE were acceptable. No pressure dropped during shell test & FE results in the acceptable range for Cl. B. Soap water was sprayed on the body of ball valve & no bubble was observed.
- ✤ High pressure seat leakage test for both side has been performed at 100% DP & no leak bubbles were observed in 5mins. BTO torque was recorded when cycling. ETC torque was recorded for ball valve.
- 4.3.2 Elevated Temp. Test
 - ♦ When the final test temperature (+120°C, with 5% or ±15°C variation which is less applicable) achieved & stably maintained, elevated temperature test was performed for sample valve as follow steps.
 - LP (2bar) seat leakage test for both side has been performed & no leak bubbles were observed in 5mins. BTO torque have been recorded at the 1st mechanical cycle & with 4 additional cycles followed.
 - Incremental pressure seat leakage test for both side has been performed (33%, 66% & 100% DP) & no leak bubbles were observed in 5mins for each step. After each step, one cycle was followed as specified. ETC torque of each step was recorded for ball valve.
 - Shell/body test was performed at 100% DP & the duration time was 15mins according to table C.10 & dynamic & static FE testing followed. Before FE leakage detecting, 18x cycles for ball valve as specified. The test results of shell & FE were acceptable. No pressure dropped during shell test & FE results in the acceptable range for Cl. B.
 - High pressure seat leakage test for both side has been performed at 100% DP & no leak bubbles were observed in 5mins. BTO torque have been recorded when cycling. ETC torque was recorded for ball valve.

4.3.3 Low Temp. Test

- ♦ When the final test temperature (-29°C, with 5% or ±15°C variation which is less applicable) achieved & stably maintained, elevated temperature test was performed for sample valve as follow steps.
- LP (2bar) seat leakage test for both side has been performed & no leak bubbles were observed in 5mins. BTO torque have been recorded at the 1st mechanical cycle & with 4 additional cycles followed.
- Incremental pressure seat leakage test for both side has been performed (35%, 70% & 110% DP) & no leak bubbles were observed in 5mins for each step. After each step, one cycle was followed as specified. ETC

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torque of each step was recorded for ball valve.

- Shell/body test was performed at 110% DP & the duration time was 15mins according to table C.10 & dynamic & static FE testing followed. Before FE leakage detecting, 17x cycles for ball valve as specified. The test results of shell & FE were acceptable. No pressure dropped during shell test & FE results in the acceptable range for Cl. B.
- ↔ High pressure seat leakage test for both side has been performed at 100% DP & no leak bubbles were observed in 5mins. BTO torque have been recorded when cycling. ETC torque was recorded for ball valve.
- 4.3.4 Final ambient test
 - ✤ Final ambient test was performed after the valve temperature recovered to environment temperature.
 - LP (2bar & 7bar) seat leakage tests for both side has been performed, no leak bubbles were observed in 5mins, before test, the ETC torgue were checked and record.
 - High pressure seat leakage test for both side has been performed at 100% DP & no leak bubbles were observed in 5mins. BTO torque have been recorded when cycling. ETC torque was recorded for ball valve
- 4.3.5 Post-test inspection

After all the TAT courses finished, the valve was later disassembled & no excessive wearing or damage was found out for internal seal parts.

5 Measuring & Testing Equipment

See test table below

6 Results and conclusions

Acceptable

7 Overall order status

N/A

8. Annexes:

- 1) Copy of Drawing No.: 10"Q347N-900LB-1
- 2) Copy of Test Record of TAT No.: HCT2024VB06723

Testing table as below:



Test details for NPS 10 900LB Trunnion Ball Valve (Bi-directional)						
Initial ambient test						
Test pressure & duration	Test type	Cycles	Actual measuring	Acceptance criteria	Conclusion	
153.2bar	Max. DP Run-in test	75	Smooth	Smooth operation	Accepted	
2bar/5min (Side A)	LP seat	1+4	0	0ml/min	Accepted	
2bar/5min (Side B)	LP seat	1+4	0	0ml/min	Accepted	
Side A	Torque test BTO/ETC	1 st of 5	7.6N.m/9.2N.m	≪44.1N.m	Accepted	
Side B	Torque test BTO/ETC	1 st of 5	5.8N.m/8.5N.m	≪44.1N.m	Accepted	
54bar/5min (Side A)	35%DP seat	1	0ml/min	0ml/min	Accepted	
107bar/5min (Side A)	70%DP seat	1	0ml/min	0ml/min	Accepted	
168.6bar/5min (Side A)	110%DP seat	1	0ml/min	0ml/min	Accepted	
54bar/5min (Side B)	35%DP sea	1	0ml/min	0ml/min	Accepted	
107bar/5min (Side B)	70%DP seat	1	0ml/min	0ml/min	Accepted	
168.6bar/5min (Side B)	110%DP seat	1	0ml/min	0ml/min	Accepted	
168.6bar/10min	Shell test, 110%DP	1	0	0	Accepted	
154bar	FET (He)	17	See below	See below	Accepted	
154bar/5min (Side A)	HP seat	1	0ml/min	0ml/min	Accepted	
154bar/5min (Side B)	HP seat	1	0ml/min	0ml/min	Accepted	
Side A	Torque test BTO/ETC	1	8.5N.m/29.1N.m	≪44.1N.m	Accepted	
Side B	Torque test BTO/ETC	1	7.8N.m/33.6N.m	≪44.1N.m	Accepted	
Position	Static/dynamic	mbar*l/s	Allowable leakage	mbar*l/s	Conclusion	
Body seal	2.07E-07	mbar*l/s	2.40E-05	mbar*l/s	Accepted	
Stem packing	2.27E-07	mbar*l/s	1.60E-05	mbar*l/s	Accepted	
Stem	8.61E-07/1.09E-06	mbar*l/s	1.33E-04	mbar*l/s	Accepted	
@120°C, elevated temperature test						
Test pressure & duration	Test type	Cycles	Actual measuring	Acceptance criteria	Conclusion	
2bar/5min (Side A)	LP seat	1+4	0	0ml/min	Accepted	



2bar/5min (Side B)	LP seat	1+4	0	0ml/min	Accepted
Side A	Torque test BTO/ETC	1 st of 5	8.9N.m/13.7N.m	≪44.1N.m	Accepted
Side B	Torque test BTO/ETC	1 st of 5	9.2N.m/12.7N.m	≪44.1N.m	Accepted
41.8bar/5min (Side A)	33%DP seat	1	0ml/min	0ml/min	Accepted
84.4bar/5min (Side A)	66%DP seat	1	0ml/min	0ml/min	Accepted
126.7bar/5min (Side A)	100%DP sea	1	0ml/min	0ml/min	Accepted
41.8bar/5min (Side B)	33%DP seat	1	0ml/min	0ml/min	Accepted
84.4bar/5min (Side B)	66%DP seat	1	0ml/min	0ml/min	Accepted
126.7bar/5min (Side B)	100%DP seat	1	0ml/min	0ml/min	Accepted
126.7bar/10min	Shell test, 100%DP	1	0	0	Accepted
126.7bar	FET, 100%DP (Helium)	18	See below	See below	Accepted
126.7bar/5min (Side A)	HP seat	1	0	0ml/min	Accepted
126.7bar/5min (Side B)	HP seat	1	0	0ml/min	Accepted
Side A	Torque test BTO/ETC	1	11.0N.m/31.2N.m	≪44.1N.m	Accepted
Side B	Torque test BTO/ETC	1	10.3N.m/30.1N.m	≪44.1N.m	Accepted
Position	Static/dynamic	mbar*l/s	Allowable leakage	mbar*l/s	Conclusion
Body seal	3.54E-06	mbar*l/s	2.40E-05	mbar*l/s	Accepted
Stem packing	2.15E-06	mbar*l/s	1.60E-05	mbar*l/s	Accepted
Stem	1.69E-05/6.63E-05	mbar*l/s	1.33E-04	mbar*l/s	Accepted
	@-29°C,	low temperatur	e test		
Test pressure & duration	Test type	Cycles	Actual measuring	Acceptance criteria	Conclusion
2bar/5min (Side A)	LP seat	1+4	0	≤0ml/min	Accepted
2bar/5min (Side B)	LP seat	1+4	0	≤0ml/min	Accepted
Side A	Torque test BTO/ETC	1 st of 5	9.5N.m/11.7N.m	≪44.1N.m	Accepted
Side B	Torque test BTO/ETC	1 st of 5	10.7N.m/11.9N.m	≪44.1N.m	Accepted
54bar/5min (Side A)	35%DP seat	1	0ml/min	0ml/min	Accepted
108bar/5min (Side A)	70%DP seat	1	0ml/min	0ml/min	Accepted
169bar/5min (Side A)	110%DP seat	1	0ml/min	0ml/min	Accepted
54bar/5min (Side B)	35%DP seat	1	0ml/min	0ml/min	Accepted

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69.4bar/5min (Side B)	70%DP seat	1	0ml/min	0ml/min	Accepted
169bar/5min (Side B)	110%DP seat	1	0ml/min	0ml/min	Accepted
168.6bar/15min	Shell test, 110%DP	1	0	0	Accepted
153.5bar	FET (He)	17	See below	See below	Accepted
153.5bar/5min (Side A)	HP seat	1	0ml/min	≤0ml/min	Accepted
153.5bar/5min (Side B)	HP seat	1	0ml/min	≤0ml/min	Accepted
Side A	Torque test BTO/ETC	1	10.7N.m/40.0N.m	≪44.1N.m	Accepted
Side B	Torque test BTO/ETC	1	11.6N.m/39.2N.m	≪44.1N.m	Accepted
Position	Static/dynamic	mbar*l/s	Allowable leakage	mbar*l/s	Conclusion
Body seal	1.63E-05	mbar*l/s	2.40E-05	mbar*l/s	Accepted
Stem packing	1.38E-05	mbar*l/s	1.60E-05	mbar*l/s	Accepted
Stem	6.21E-06/9.80E-06	mbar*l/s	1.33E-04	mbar*l/s	Accepted
	Final amb	ient temperatu	re test		
Test pressure & duration	Test type	Cycles	Actual measuring (ml/min)	Acceptance criteria (ml/min)	Conclusion
2bar/5min (Side A)	LP seat	0	0	0ml/min	Accepted
2bar/5min (Side B)	LP seat	0	0	0ml/min	Accepted
7bar/5min (Side A)	LP seat	0	0	0ml/min	Accepted
7bar/5min (Side B)	LP seat	0	0	0ml/min	Accepted
154bar/5min (Side A)	100%DP seat	1	0	0ml/min	Accepted
154bar/5min (Side B)	100%DP seat	1	0	0ml/min	Accepted
Side A	Torque test BTO/ETC	1	10.3N.m/24.4N.m	≪44.1N.m	Accepted
Side B	Torque test BTO/ETC	/	9.5N.m/23.0N.m	≪44.1N.m	Accepted
Post-test inspection					
No excessive wearing or damage was found out for internal seal parts.					

Spanghal Branch 14



Inspected by: Jeff Cheng

Signature: Leff. Cheng

Date: Dec. 30, 2024

Reviewed by: Wang Zhongxiang

Signature:

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Date: Dec. 30, 2024