TEST REPORT

Dong-A University
Technical Center for
High-Performance Valves
840 Hadan2-dong, Saha-gu, Busan-city, Korea
(Tel: +82 51-200-6546 Fax: +82 51 200-6598)

Certificate No.:
TCHPV-14-11-003

1. Client
   - Name : HSME Corporation
   - Address : 8, Hwajeonsandan 5-ro, GANGSEO-GU, BUSAN, SOUTH KOREA.
   - Person in charge : Seok-Tae, Hwang / QA Dept. (Manager)

2. Use of Report : Test & Analysis

3. Test Sample : Double Block and Bleed Valve (CLASS 600 - 2")

4. Date of Test : 2014. 11. 06

5. Test Meathod Used
   - API STANDARD 607:2010
   - KS B ISO 10497 : 2005

6. Testing Environment
   - Temperature : (17.1 ± 3.0) ℃
   - Relative Humidity : (47 ± 5) % R.H.

7. Test Result : Refer to the test result. (Page 2/3, 3/3)

Affirmation	Tested by Researcher Name : S.J. OH. (Signature)	Approved by Technical Manager Name : J.H.LEE (Signature)

The above test certificate is the accredited test results by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA.

2014. 11. 11.

Director of Dong-A University
Research Foundation for Industry-Academy Cooperation

Decide arbitrarily : Technical Center for High Performance Valves

* The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
This Test Report cannot be reproduced, except in full.

◆Test Result

1) Test : Double Block & Bleed Valve - Fire Safety Test

2) Test Method Used

2-1) API STANDARD 607:2010
Fire Test for Quarter-turn Valves and Valves Equipped with Nonmetallic Seats

2-2) KS B ISO 10497 : 2005
Testing of valves-Fire type testing requirement

3) Test Sample

3-1) Name : Double Block and Bleed Valve (CLASS 600 - 2")

3-2) Material : STAINLESS STEEL 316

3-3) Detail : Refer to the Attached DWG. (1of1)
DWG. NO. VD84-24-SS-SS-1R32C-F8N-E (2014.03.24.)
Block - Bleed - Block (Ball - OS & Y - Ball)

4) Result

① Fire Burn Test Record

Time Min:Sec	Upstream Pressure MPa	Flame Temp ℃		Body & Connector Temp ℃		Calorimeter Temp ℃	
		T1	T2	Bonnet	Body	T3	T4
05:00	7.4	321	651	1027	939	289	431
35:00	7.7	923	927	868	924	898	866
Average	7.6	895	915	899	901	807	805

Time Min:Sec	Sight Gauge In Vessel 192.4 mL/mm		Reading in Container 76.7 mL/mm	
	mm	mL	mm	mL
05:00	521	100240.4	0	0
35:00			2	153.4

② Cool Down Test Record

Time Min:Sec	Upstream Pressure MPa	Flame Temp ℃		Body & Connector Temp ℃		Calorimeter Temp ℃	
		T1	T2	Bonnet	Body	T3	T4
35:00	7.7	923	927	868	924	896	866
45:00	7.7	30	47	28	27	36	39

Time Min:Sec	Sight Gauge In Vessel 192.4 mL/mm		Reading in Container 76.7 mL/mm	
	mm	mL	mm	mL
35:00			2	153.4
45:00	519	99 855.6	2	153.4

③ High Pressure Test Record (After operational test)

Time Min:Sec	Upstream Pressure MPa	Flame Temp ℃		Body & Connector Temp ℃		Calorimeter Temp ℃	
		T1	T2	Bonnet	Body	T3	T4
48:00	7.7	61	50	22	21	27	24
53:00	7.7	42	31	23	22	27	23

Time Min:Sec	Sight Gauge In Vessel 192.4 mL/mm		Reading in Container 76.7 mL/mm	
	mm	mL	mm	mL
48:00	517	99 470.8		
53:00	516	99 278.4		

④ Fire Safe Test Result

Through-seat leakage ml/mim		External leakage ml/mim			
During the burn period		During burn and cool-down period		After operational test	
Permissible Leakage	Actual Leakage	Permissible Leakage	Actual Leakage	Permissible Leakage	Actual Leakage
800	5.11	200	9.62	50	38.48

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