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TESTING REQUIREMENTS FOR PLUG VALVE ACCORDING TO API 6A

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1.0 SCOPE

This procedure covers the "in-plant" engineering test requirements per API 6A, 20th Edition, for new Plug Valve manufactured by SARA SAE PVT Limited.

2.0 REFERECNCE STANDARD

The testing of the Plug Valve is carried out as per requirements mentioned under clause 10.5.4.2.8 of API 6A, 20th Edition.

3.0 QUALITY CONTROL TEST REQUIREMENTS

3.1 HYDROSTATIC PRESSURE TEST

3.1.1 General Instructions/Requirements:

(a) Water or water with additives is used as the testing fluid.

(b) All testing shall be done prior to painting

(c) The hydrostatic body test is the first test performed.

(d) The test pressure is not applied as a differential pressure across the closure of the mechanism.

(e) Timing is taken into account after the test pressure has reached and allowed to stabilize, the equipment and pressure monitoring gauge have been isolated from the pressure source, and the external surfaces of the body have been thoroughly dried

(f) Test is conducted prior to the addition of body filler grease. Lubrication applied during assembly is acceptable.

(g) A chart recorder shall be used on all hydrostatic tests. The records shall identify the recording device and shall be dated and signed.

NOTE: Pressure shall be considered stabilized when the change rate is ***no more than 5% of the testing pressure per hour or 500 psi/hour (3.5 MPa/hour), whichever is less***. (See Table 1 for shorter holding period).

3.1.2 Hydrostatic Body Test Procedure

Assemble valve sufficiently to completely seal pressure containing components. For hydrostatic testing purposes only, non-pressure containing components may be omitted or substituted as necessary to ensure a complete pressure seal

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3.1.2.1 FOR PSL-1 & PSL-2:

Valve shall be in partially open condition during the test.

3.1.2.1.1. Apply primary pressure to the shell as per requirements stated in TABLE-2 and hold for a period of 3 minutes.

3.1.2.1.2. Reduce the pressure to Zero.

3.1.2.1.3 Apply secondary pressure to the shell and hold for a period of 3 minutes

3.1.2.2 FOR PSL-3 & PSL-4:

Valve shall be in partially open condition during the test.

3.1.2.2.1. Apply primary pressure to the shell as per requirements stated in TABLE-2 and hold for a period of 3 minutes.

3.1.2.2.2. Reduce the pressure to Zero.

3.1.2.2.3 Apply secondary pressure to the shell and hold for a period of 15 minutes

3.1.2.2 Acceptance Criteria:

The equipment shall show no visible leakage under the test pressure. Leakage by the thread during the hydrostatic testing of a threaded wellhead member when joined with a threaded test fixture is permissible above the working pressure of the thread

3.1.3 Hydrostatic Seat Test Procedure

3.1.3.1 FOR PSL-1:

3.1.3.1.1 Apply hydrostatic seat test pressure, equal to the **rated working pressure**, to each side of the plug with the other side open to the atmosphere. (Refer TABLE-2)

3.1.3.1.2 Holding period shall be at least 3 minutes

3.1.3.1.3 Reduce the pressure to Zero

3.1.3.1.4 Test shall be carried out for a minimum of two times.

3.1.3.2 FOR PSL-2:

3.1.3.2.1 Apply hydrostatic seat test pressure, equal to the **rated working pressure**, to each side of the plug with the other side open to the atmosphere. (Refer TABLE-2)

3.1.3.1.2 Holding period shall be at least 3 minutes

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3.1.3.1.3 Open the valve while under full differential pressure

3.1.3.1.4 Test shall be carried out for a minimum of three times

3.1.3.3 FOR PSL-3 & PSL-4:

3.1.3.3.1 Seat test requirements for PSL-3 & PSL-4 shall be identical to the requirements for PSL-2, with addition that this hydrostatic seat test requires the second and third holding periods to be extended to a minimum of 15 minutes.

3.1.3.4 Acceptance Criteria:

No visible leakage shall occur during each hold period.

3.2 ADDITIONAL REQUIREMENTS FOR PSL-3

3.2.1 PSL 3-G Gas Body Test

3.2.1.1 Test shall be conducted at ambient temperatures using Nitrogen as the test medium.

3.2.1.2 The equipment shall be completely submerged in a water bath during testing.

3.2.1.3 The valve shall be in partially open position during the test.

3.2.1.4 The gas body shell shall be conducted at a test pressure **equal to the rated working pressure of the valve.**

3.2.1.5 The pressure holding period shall not be less than 15 minutes.

3.2.2 PSL 3-G Gas Seat Test

3.2.2.1 Apply gas pressure on each side of the plug with the other side open to the atmosphere.

3.2.2.2 Test shall be conducted at ambient temperatures using Nitrogen as the test medium.

3.2.2.3 The equipment shall be completely submerged in a water bath during testing.

3.2.2.4 Testing shall consist of two, monitored holding periods.

3.2.2.5 The primary test pressure shall first be applied and held for 15 minutes. **Primary test pressure is equal to the rated working pressure.**

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3.2.2.6 The pressure shall then be reduced to Zero and secondary pressure shall be applied, which shall be 2.0 MPa or 300PSI. Pressure shall be held for 15 minutes.

3.2.2.7 The valve shall be fully opened and fully closed between tests.

3.2.3 Acceptance Criteria:

No visible bubbles shall appear in the water bath during the holding period. A maximum **reduction of the gas test pressure of 2.0 MPa (300 PSI) for the primary test and 0.2 MPa (30 PSI) for secondary test is acceptable,** as long as there are no visible bubbles in the water bath during the holding period.

3.3 ADDITIONAL REQUIREMENTS FOR PSL-4

3.3.1 PSL 4-G Gas Body Test

3.3.1.1 Test shall be conducted at ambient temperatures using Nitrogen as the test medium.

3.3.1.2 The equipment shall be completely submerged in a water bath during testing.

3.3.1.3 The valve shall be in partially open position during the test.

3.3.1.4 The gas body shell shall be conducted at a test pressure **equal to the rated working pressure of the valve.**

3.3.1.5 The pressure holding period shall not be less than 15 minutes.

3.3.2 PSL 4-G Gas Seat Test

3.3.2.1 Apply gas pressure on each side of the plug with the other side open to the atmosphere.

3.3.2.2 Test shall be conducted at ambient temperatures using Nitrogen as the test medium.

3.3.2.3 The equipment shall be completely submerged in a water bath during testing.

3.3.2.4 Testing shall consist of two, monitored holding periods.

3.3.2.5 The primary test pressure shall first be applied and held for 60 minutes. **Primary test pressure is equal to the rated working pressure.**

3.3.2.6 The pressure shall then be reduced to Zero and secondary pressure shall be applied, which shall be **greater than 5% and less than 10% of the rated working pressure**. Pressure shall be held for 60 mins.

3.3.2.7 The valve shall be fully opened and fully closed between tests.

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3.3.3 Acceptance Criteria:

No visible bubbles shall appear in the water bath during the holding period. A maximum **reduction of the gas test pressure of 2.0 MPa (300 PSI) for the primary test and 0.2 MPa (30 PSI) for secondary test is acceptable,** as long as there are no visible bubbles in the water bath during the holding period.

TABLE 1
ALLOWABLE CHANGE RATE FOR PRESSURE STABILIZATION

TESTING PRESSURE PSI (MPa)	ALLOWABLE CHANGE RATE (5% of Testing Pressure per Hour or 500 psi (3.5 MPa) per Hour)			
	PER HOUR Psi (MPa)	5 MIN. psi (MPa)	10 MIN. psi (MPa)	15 MIN. psi (MPa)
1,000 (6.9)	-50 (-0.3)	-5 (-0.03)	-9 (-0.06)	-13 (-0.09)
2,000 (13.8)	-100 (-0.7)	-9 (-0.06)	-17 (-0.12)	-25 (-0.17)
3,000 (20.7)	-150 (-1.0)	-13 (-0.09)	-25 (-0.17)	-38 (-0.26)
4,000 (27.6)	-200 (-1.4)	-17 (-0.12)	-34 (-0.23)	-50 (-0.34)
5,000 (34.5)	-250 (-1.7)	-21 (-0.14)	-42 (-0.29)	-63 (-0.43)
6,000 (41.4)	-300 (-2.1)	-25 (-0.17)	-50 (-0.34)	-75 (-0.52)
10,000 (69.0)	-500 (-3.5)	-42 (-0.29)	-83 (-0.57)	-125 (-0.86)
15,000 (103.4)	-500 (-3.5)	-42 (-0.29)	-83 (-0.57)	-125 (-0.86)
22,500 (155.0)	-500 (-3.5)	-42 (-0.29)	-83 (-0.57)	-125 (-0.86)

TABLE NO. 2

PRESSURE TABLE

WORKING PRESSURE / PRIMARY PRESSURE (+5%, -0%) PSI (MPa)		SHELL TEST PRESSURE / SECONDARY PRESSURE (+5%, -0%) PSI (MPa)	
1,000 (6.9)	+50 (0.3), -0	2,000 (13.8)	+100 (0.7), -0
2,000 (13.8)	+100 (0.7), -0	4,000 (27.6)	+200 (1.4), -0
3,000 (20.7)	+150 (1.0), -0	6,000 (41.4)	+300 (2.1), -0
5,000 (34.5)	+250 (1.7), -0	7,500 (51.7)	+375 (2.6), -0
10,000 (69.0)	+500(3.5), -0	15,000 (103.4)	+750 (5.2), -0
15,000 (103.4)	+750 (5.2), -0	22,500 (155.0)	+1125 (7.8), -0

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