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1 Pressure test

1.1 Scope

Inspection shall be in accordance with
API 598. Examination by the manufacturer shall be as specified in API 598.

1.2 General

1.2.1 Valves designed to permit emergency or supplemental introduction of an injectable sealant to the seat area shall be tested with the injection system empty and not in use, except for lubricated plug valves.
1.2.2 When a liquid is used as the test fluid, the valve shall be essentially free from trapped air during the test.
1.2.3 Required protective coatings, such as paint, which can mask surface defects, shall not be applied to any surface before inspection or pressure testing. (Phosphatizing and similar chemical conversion processes used to protect valve surfaces are acceptable even if applied before the tests, provided that they will not seal off porosity.)
1.2.4 When closure testing valves, the valve manufacturer's test procedure shall ensure that excessive force is not used to close the valve. The applied force may be determined from the appropriate figures in MSS SP-91[12] and shall be made available to the purchaser or testing facility upon request. The use of a supplemental leveraging device to aid in achieving a passing leakage rate is acceptable provided that the applied force does not exceed the manufacturer's documented value. Where the manufacturer does not document or otherwise make available the maximum permissible force for valve closure, the test procedure shall restrict the use of supplemental leveraging devices.

1.3 Test location

Pressure test perform in the shop valve manufacturer.

1.4 Test equipment

The equipment used to perform the required pressure test shall not apply external forces that affect seat leakage.

1.5 Test required

The pressure tests listed in Table 1 shall be performed on each valve in accordance with written procedures that comply with this standard.

Table1 REQUIRED ORESSURE TEST

Test Description	Size	ASME Class	Valve Type					
			Gate	Globe and Parallel Slide Gate	Plug	Check	Floating Ball	Butterfly and Trunnion Mounted Ball
Shell	All	All	Required	Required	Required	Required	Required	Required
Backseat[a]	All	All	Required	Required	NA	NA	NA	NA
Low-pressure closure	DN (NPS) ≤ DN 100 (NPS 4)	Class ≤ 1500	Required	Optional[b]	Required[f]	Optional[b]	Required	Required
		Class > 1500	Optional[b]		Optional[b]			Optional[b]
	DN (NPS) > DN 100 (NPS 4)	Class ≤ 600	Required		Required[f]			Required
		Class > 600	Optional[b]		Optional[b]			Optional[b]
High-pressure closure[c]	DN (NPS) ≤ DN 100 (NPS 4)	Class ≤ 1500	Optional[b,e]	Required[d]	Optional[b,e,f]	Required	Optional[b,e]	Optional[b,e]
		Class > 1500	Required		Required			Required
	DN (NPS) > DN 100 (NPS 4)	Class ≤ 600	Optional[b,e]		Optional[b,e,f]			Optional[b,e]
		Class > 600	Required		Required			Required

NA Not applicable

[a] The backseat test is required for all valves that have the backseat feature, except for bellows seal valves.

[b] When an "optional" test is specified by the purchaser, the test shall be performed in addition to the required tests.

[c] The high-pressure closure test of resilient-seated valves may degrade subsequent sealing performance in low-pressure service.

[d] For power-operated and manually operated gear actuated globe valves, including nonreturn type globe valves, the high-pressure closure test shall be performed at 110 % of the design differential pressure used for sizing of the operator.

[e] A high-pressure closure test is required for all valves specified to be double block and bleed (DBB) valves, unless specified otherwise by the purchaser.

[f] For lubricated plug valves, the high-pressure closure test is mandatory and the low-pressure closure test is optional.

1.6 High & low-pressure Closure Test

1.6.1 Material selection is according to (table2).

Table2 MATERIAL

L	ASME B16.34 GROUP	Material		
1	3.3	B 160 Gr. No.2201	B 162 Gr 2201	
2	3.2	B 160 Gr. No.2200	B 161 Gr. No. 2200	B 162 Gr .NO. 2200
		B 163 Gr. No.2200		
3	1.6	A 355 Gr. P1	A 387 Gr. 12CL.1	A 387 Gr.2CL2
		A 691 Gr1/2 CR	A 369 Gr FP1	A 387 Gr.2CL.1
4	2.3	A 182 Gr. F 304 L	A 240 Gr 304 L	A 312 Gr TP 304L
		A 479 Gr. 304 L	A 182 Gr. 316L	A 240 Gr. 316L
		A 312 Gr. TP 316 L	A 479 Gr. 316 L	
	3.1	A 351 Gr. CN 7M	B 463 Gr. NO. 8020	B 468 Gr. NO. 8020
		B 473 Gr. NO. 8020	B 462 Gr. NO.8020	B 464 Gr. NO. 8020
	3.4	B 127 Gr. NO 4400	B 164 Gr.NO 4400	B 165 Gr. NO 4400
		B 564 Gr. NO 4400	B 163 Gr.NO 4400	B 164 Gr. NO 4400
	3.15	B 407 Gr. NO 8810	B 408 Gr.NO 8810	B 409 Gr. NO 8810
		B 564 Gr. NO 8810	A 494 Gr. N- 12 MV	A 494 Gr. CW 12 MV
5	1.4	A 106 Gr. B	A 515 Gr. 60	A 675 Gr. 60
		A 672 Gr. B 60	A 350 Gr. LF 1	A 516 Gr. 60
		A 696 Gr. B	A 672 Gr. C 60	
	1.8	A 335 Gr. P11	A 369 Gr. FP 11	A 387 Gr. 11CL.1
		A 691 Gr. 1CR	A 335 Gr. P12	A 369 Gr. FP 12
		A 387 Gr.22 CL .2	A 691 Gr. $1\frac{1}{4}$ CR	A 335 Gr. P5B
		A 369 Gr.FP 22	A387 Gr. 22 CL 1	A 691 Gr. $2\frac{1}{4}$CR
	1.12	A 355 Gr. P5	A 369 Gr. FP5	A 387 Gr. 5CL.2
		A 691 Gr. 5 CR	A 335 Gr. P5B	A 387 Gr. CL.1
6	3.11	B 625 Gr. NO 8904	B 649 Gr. NO 8904	B 677 Gr. NO 8904
7	2.6	A 240 Gr. 309S	A 351 Gr. CH 8	A 351 Gr.CH 20
		A 358 Gr. 309H	A 312 Gr. TP 309H	A 240 Gr. 309H
	2.7	A 182 Gr. F 310H	A 312 Gr. TP 310H	A 358 Gr.310H
		A 479 Gr .310S	A 240 Gr. 310S	A 351 Gr. CK 20
		A 240 Gr. 310H	A 479 Gr. 310H	
	2.12	B 581 Gr. NO 6985	B 582 Gr.NO 6985	B 620 Gr.NO 8320
		B 622 Gr. NO 6985	B 622 Gr.NO 8320	B 621 Gr.NO 8320
8	1.3	A 672 Gr. B 62	A 515 Gr. 65 A 675 GR. 65	A 672 Gr.C 65
		A 203 Gr. A	A 352 Gr. LCB	A 518 Gr.65
	1.5	A 182 Gr.F1	A 204 Gr.A	A 352 Gr. LC 1
		A 691 Gr.CM-70	A 204 Gr.A	A 217 Gr. WC 1

9	2.1	A 182 Gr. F 304	A 132 Gr.TP 304	A 385 Gr. 304
		A 430 Gr. FP 304 H	A 182 Gr. F 304 H	A 312 Gr. 304 H
		A 376 Gr. TP 304	A 479 Gr. 304	A 240 Gr. 304
		A 351 Gr. CF3	A 376 Gr. TP 304 H	A 479 Gr. 304 H
		A 240 Gr. 304 H	A 351 Gr. CF 8	A 430 Gr. FP 304
	2.2	A 182 Gr. F 316	A 312 Gr. TP 316	A 351 Gr. CF 814
		A 430 Gr. FP 316	A 182 Gr. F 316 H	A 312 Gr. TP 316 H
		A 351 Gr. CF 8M	A 430 Gr. FP 316 H	A 240 Gr. 316
		A 312 Gr. TP 317	A 358 Gr. 316	A 479 Gr. 316
		A 240 Gr. 316 H	A 351 Gr. CF3 A	A 376 Gr. TP 316
		A 479 Gr. 316 H	A 240 Gr.317	A 351 Gr. CF3M
		A 376 Gr. TP 316 H	A 351 Gr.CG8H	
	2.4	A 182 Gr. F 321	A 312 Gr. TP 321	A 376 Gr. TP 321
		A 430 Gr. FP 321	A 182 Gr.F 321 H	A 312 Gr.TP 321 H
		A 376 Gr. TP 321H	A 479 Gr.321	A 420 Gr. 321
		A 240 Gr.321 H	A 479 Gr. 321 H	A 430 Gr.FP 321 A 358 Gr. 321
	2.5	A 182 Gr. F 347	A 240 Gr. 348	A 351 Gr.CF8C
		A 430 Gr. FP 347	A 182 Gr. F 347 H	A 240 Gr. 348 H
		A 358 Gr. 347	A 430 Gr. FP 347 H	A 182 Gr. F 348
		A 312 Gr.TP 347	A 376 Gr. TP 347	A 479 Gr. 348
		A 182 Gr. F 348 H	A 312 Gr. TP 347	A 376 Gr. TP347 H
		A 479 Gr. 347 H	A 240 Gr. 347	A 312 Gr. TP 348
		A 376 Gr.TP 348 A 479 Gr.348	A240 Gr.347H A 312 Gr.TP 348H	A479 Gr.348H
	3.6	B564 Gr.NO8800 B409 Gr.NO8800	B 408Gr.NO8800 B 163 Gr.NO 8800	
	3.10	B 599 Gr.NO 8700	B 672 Gr. NO 8700	
	3.14	B 581 Gr.NO 6007	B 582 Gr.NO 6007	B 622 Gr.NO 6007
	3.16	B 511 Gr.NO 8330	B 535 Gr.NO 8330	B 536 Gr.NO 8330
10	1.1	A 105/ A 515 Gr.70	A 675 Gr.70	A 672 Gr. B70
		A 216 Gr. WCB	A 516 GR. 70	A 696 Gr. C
		A672 Gr. C70	A 350 GR. LF2	A537 CL. 1
11	1.2	A 106 Gr. C	A 203 Gr. B	A350 Gr. LF3
		A 352 Gr. LC3	A203 Gr. B	A 216 Gr. WCC
		A 352 Gr.LC 2	A352 Gr. LCC	
	1.7	A 691 Gr. CM-75	A204 Gr.C	A 217 Gr. WC4
		A 217 Gr. WC5	A 182 Gr. F2	
	1.9	A 182 Gr. F 11 CL.2	A 217 Gr.WC6	A 387 Gr. 11 CL.2
		A 739 Gr. B 11	A 182 Gr. F 12 CL.2	
	1.10	A 182 Gr F 22 CL.3 A 217 Gr.WC9	A 387 Gr.22 CL.2	A 739 Gr.B22
	1.11	A 182 Gr. F21	A 302 Gr. B	A 302 Gr. D
		A 537 CL. 2 A 302 Gr. A	A 302 Gr. C	A 387 GR.21 CL
	1.13	A 182 Gr.F5	A182 Gr. F5A	A217 Gr. C5
	1.14	A 182 Gr. F9	A217 Gr. C12	
	2.8	A 182 Gr.F44 A 182GR.F53	A 240GR.S31254	A 351GR.CK3MCUN
		A 182 Gr.F51	A 240 GR.S31803	A 240 GR. S32750
		A 479 Gr. S31254	A 479 GR.S 31803	A 479 GR. S 32750
		A 312 Gr. S31254	A 789 GR. S 31803	A 789 GR. S 32750
		A 358 Gr. S31254	A 790 GR.S 31803	A 790 GR. S 31750
	3.5	B 163 Gr. NO 6600	B 167 GR.NO 6600	B 564 GR. NO 6600
		B 166 Gr. NO 6600		
	3.7	B 333 Gr. NO 10665	B 355 Gr.NO 10665	B 622 Gr.NO 10665
	3.8	B 333 Gr.NO 10001	B 434 Gr.NO 10003	B 564 Gr.NO 10276 B 575 Gr.NO 10276
		B 335 Gr.NO 10001	B 443 Gr.NO 6625	B 573 Gr.NO 10003 B 622 Gr.NO 6455
		B 423 Gr.NO 8825	B 446 Gr.NO 6625	B 574 Gr.NO 64558 B 622 Gr.NO 10001
		B 424 Gr.NO 8825	B 564 Gr.NO 6625	B 574 Gr.NO 10276 B 622 Gr.NO 10276
		B 425 Gr.NO 8825	B 364 Gr.NO 8825	B 575 Gr.NO 6455
	3.9	B 433 Gr.NO 6002	B 372 Gr.NO 6002	B 622 Gr.NO 6002
	3.13	B 564 Gr.NO 8031	B 581 Gr.NO 6975 B 582 Gr.NO 6975	B 622 Gr.NO 6975
		B 625 Gr.NO 8031	B 622 Gr.NO 8031	B 649 Gr.NO 8031

1.6.2 The high and low-pressure closure test for all ball valves (see Table3.)

1.7 Test fluid

1.7.1 For shell, high-pressure closure tests, the test fluid shall be air and water liquid, the test fluid temperature shall be within the range 5°C to 40°C.

1.7.2 For the low-pressure test fluid shall be air or inert gas.

1.7.3 For testing of austenitic stainless steel valves, water with chloride content not exceeding 50 ppm shall be used.

Table3 pressure test

PVRC	Class	150		300		600		900		1500		2500	
	Test	Shell test	Leakage test	Shell test	Leakage test	Shell test	Leakage test	Shell test	Leakage test	Shell test	Leakage test	Shell test	Leakage test
	Type	Psi Bar	Psi Bar	Psi Bar	Psi Bar	Psi Bar	Psi Bar	Psi Bar	Psi Bar	Psi Bar	Psi Bar	Psi Bar	Psi Bar
1	API 598 ASME B 16.34	150 10	110 7	375 25	275 19	725 50	550 37	1100 75	800 55	1800 125	1325 92	3000 207	2200 152
	API 6D	425 29	309 21	1100 76	800 55	2175 150	1600 110	3250 224	2400 166	5400 372	4000 276	9000 621	6600 455
2	API 598 ASMEB 16.34	225 15	155 11	550 38	400 28	1100 75	800 55	1625 112	1200 82	2700 187	2000 137	4500 311	3300 228
	API 6D	425 29	309 21	1100 76	800 55	2175 150	1600 110	3250 224	2400 166	5400 372	4000 276	9000 621	6600 455
3	API 598 ASMEB 16.34	350 24	250 18	900 62	650 45	1800 125	1325 90	2675 184	1975 136	4450 306	3275 225	7400 510	5425 374
	API 6D	425 29	309 21	1100 76	800 55	2175 150	1600 110	3250 224	2400 166	5400 372	4000 276	9000 621	6600 455
4	API 598 ASMEB 16.34	350 24	275 19	900 63	675 46	1800 45	1325 92	2700 187	2000 137	4500 311	3300 225	7500 518	5500 380
	API 6D	425 29	309 21	1100 76	800 55	2175 150	1600 110	3250 224	2400 166	5400 372	4000 276	9000 621	6600 455
5	API 598 ASMEB 16.34	375 26	275 19	925 64	700 47	1875 130	1375 94	2775 192	2050 141	4650 320	3400 235	7725 532	5675 391
	API 6D	425 29	309 21	1100 76	800 55	2175 150	1600 110	3250 224	2400 166	5400 372	4000 276	9000 621	6600 455
6	API 598 ASME B 16.34	375 26	275 19	975 67	725 49	1925 133	1425 98	2900 199	2125 146	4825 332	3550 244	8025 553	5875 406
	API 6D	425 29	309 21	1100 76	800 55	2175 150	1600 110	3250 224	2400 166	5400 372	4000 276	9000 621	6600 455
7	API 598 ASME B 16.34	400 27	300 20	1025 70	750 52	2025 140	1500 103	3025 209	2225 153	5050 348	3700 255	8400 580	6175 425
	API 6D	425 29	309 21	1100 76	800 55	2175 150	1600 110	3250 224	2400 166	5400 372	4000 276	9000 621	6600 455
8	API 598 ASMEB 16.34	400 28	300 21	1050 72	775 53	2100 144	1550 106	3150 216	2300 159	5225 359	3825 264	8700 600	6375 439
	API 6D	425 29	309 21	1100 75	800 55	2175 149	1600 110	3250 224	2400 164	5400 372	4000 276	9000 621	6600 455
9	API 598 ASMEB 16.34	425 29	325 21	1100 75	800 55	2175 149	1600 110	3250 224	2400 164	5400 372	4000 274	9000 621	6600 456
	API 6D	425 29	309 21	1100 76	800 55	2175 150	1600 110	3250 224	2400 166	5400 372	4000 276	9000 621	6600 455
10	API 598 ASMEB 16.34	450 30	325 22	1125 77	825 57	2225 154	1650 113	3350 230	2450 169	5575 384	4100 282	9275 639	6800 469
	API 6D	425 29	309 21	1100 76	800 55	2175 150	1600 110	3250 224	2400 166	5400 372	4000 276	9000 621	6600 455
11	API 598 ASMEB 16.34	450 30	325 22	1125 78	825 57	2250 156	1650 114	3375 233	2475 171	5625 388	4125 285	9375 647	6875 475
	API 6D	425 29	309 21	1100 76	800 55	2175 150	1600 110	3250 224	2400 166	5400 372	4000 276	9000 621	6600 455

Low pressure closure test		
VALVE	API 598	Api 6D
All size and class	4-7 (bar) / 60-100 (psi)	5.5 ± 0.7 (bar) / 80 ± 10 (psi)

1.8 Test Duration

For each type of test, the required test pressure shall be maintained for at least the minimum time specified in (Table 4).

Table4 DURATION 6

Valve size (NPS)	Shell test			Backseat test		Leakage test		
	API 598 Check valve other valves (API STD 594)		API 6D	API 598	API 6D	API 598 Check valve (API STD 594)	API 598 Other valves	API 6D
<2	60	15	-	15	-	60	15	-
2	60	15	120	15	120	60	15	120
2½ - 4	60	60	120	60	120	60	60	120
6	60	60	300	60	300	60	60	300
8-10	60	120	300	60	300	60	120	300
12	60	120	900	60	300	60	120	300
14-18	60	300	900	60	300	120	120	300
>20	60	300	1800	60	300	120	120	300

1.9 Test Leakage

1.9.1 For shell tests, visually detectable leakage through the pressure boundary walls and any fixed body joint is not permitted.

1.9.2 For both the low-pressure closure test and the high-pressure closure test, visual evidence of leakage through the disc, behind the seat rings, or past the shaft seals (of valves that have this feature) is not permitted and structural damage is not permitted. (Plastic [permanent] deformation of resilient seats and seals is not considered structural damage.) The allowable rate for leakage of test fluid at the seat-sealing surface interface, for the duration of the tests, is listed in (Table5.)

Table5 LEAKAGE

Valve size (NPS)	Shell test			Backseat test		Leakage test		
	API 598 Check valve other valves (API STD 594)		API 6D	API 598	API 6D	API 598 Check valve (API STD 594)	API 598 Other valves	API 6D
<2	60	15	-	15	-	60	15	-
2	60	15	120	15	120	60	15	120
2½ - 4	60	60	120	60	120	60	60	120
6	60	60	300	60	300	60	60	300
8-10	60	120	300	60	300	60	120	300
12	60	120	900	60	300	60	120	300
14-18	60	300	900	60	300	120	120	300
>20	60	300	1800	60	300	120	120	300

C: The maximum permissible leakage rate shall be 48 drop per minute per inch of nominal pipe size

D: The maximum permissible leakage rate shall be 1.5 standard cubic feet (0.042 cubic meters) of gas per hour per inch of nominal pipe size.

1.10 cleaning after test

- Cleaning shell and flange

- Half opening of valve

- Cleaning with pressure air.

2 Repairs of Defects

2.1 Defects in the shell of a cast or forged, carbon or alloy steel valve that are revealed by inspection or testing shall be repaired as permitted by the most nearly applicable ASTM cast or forged material specification listed in ASME B16.34.

2.2 Excessive standard leakage is eliminated by re-lapping of ball with seats in to shop vendor.

3 Valve Certification and Retesting

3.1 Certificate of Compliance

When specified by the purchaser, the valve manufacturer shall submit to the purchaser a certificate of compliance as required in the purchase order or testing in the presence of the ordering agent.

3.2 Retesting

A completed valve does not require retesting unless inspection by the purchaser is specified in the purchase order. This retesting may be waived by the purchaser's inspector upon written certification by the manufacturer that the valve has been inspected, tested, and examined for conformance with the requirements of this standard.

Painted valves need not have paint removed for retesting. Stored valves shall be commercially cleaned before retesting and before shipment.

THE PROCEDURE TESTS CERTIFICATE

	Pressure tests certificat		ARYA MABNA PAYESH	
Valve Description :		Size and class :	QTY:	Date :
Order NO :		Contract NO :	TAG NO :	
Serial NO :		Drawing NO :		

tests	acceptance criteria	test results	comments
Hydrostatic shell test pressure Duration Body leak Bonnet-cover leak Stem leak		P =____bar t =____min OK OK OK	
Operational torque test Valve differential pressure (Break to open case) Side A pressurized Side B pressurized Without pressure		ΔP =____bar ____Nm ____Nm ____Nm	
High pressure closure test(water) Pressure Duration Side A Side B		P =____bar t =____mn Leak rate:____ Leak rate:____	
Low pressure closure test(gas) Pressure Duration Side A Side B		P =____bar t =____mn Leak rate:____ Leak rate:____	
High pressure closure test(gas) Pressure Duration Side A Side B		P =____bar t =____mn Leak rate:____ Leak rate:____	
Satisfactory : Ok			

Manufacturer Inspection	Customer Inspection
Name And signature :	Name And signature :

copies for : QC , DOC CODE :F11-P-QC-01/00