

WALWORTH®
Since 1842



**SAFETY AND RELIEF BRONZE
CATALOG**

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YARMOUTH RESEARCH AND TECHNOLOGY



WALWORTH

WALWORTH is one of the world's most comprehensive industrial valve manufacturers. Founded in 19th century by James Walworth, the Company has consistently dedicated itself to improvements in design and manufacturing of an array of valves exceptionally suited for the world's fluid control sector. We satisfy all end use industries and comprehensive customer requirements by adhering to the most demanding quality standards.

WALWORTH relies on its broad experience in supplying valves to the petrochemical, oil & gas, petroleum, power generation, pulp and paper, cryogenic and geothermal industries, among others.

Over the years, Walworth has produced over 40,000 different types of products and serves as a global supplier to various markets utilizing the expertise of over 500 trained employees.

Our manufacturing system includes: utilization of Company directed raw material warehouses; modern and newly acquired specialized machinery; welding processes such as SMAW, GMAW, SAW, PAW; assembly testing for all low pressure, high pressure, and at low or high temperatures; painting and coating processes; export crating and shipment.

WALWORTH is capable of providing the world's most comprehensive industrial valve line to the North American, Central American, South American, European and African markets. WALWORTH is proud to meet and satisfy the precise demands of our customers throughout the world by providing a quality product, competitive cost, and excellent service.



WALWORTH VALUES

MISSION

WALWORTH manufactures and supplies world-class valves and components for the flow control industry through exceptional service, competitive pricing, and consistently, on-time deliveries.



VISION

To be the world leader of unparalleled valve manufacturing and supply, WALWORTH:

- Set the standard for product quality in the flow control industry.
- Exceed the service expectations of our customers.
- Forge enduring relationships with customers, team members, and community.
- Hire, develop, and retain experienced and dedicated team members.



WALWORTH ENGINEERING CONTROL

WALWORTH products are manufactured following the strict international standards recognized all over the world, such as API, ANSI, ASME, ASTM, MSS, NACE, AWWA, BSI, CSA, among others. Our Engineering team consistently monitors updates to these standards and incorporates any applicable changes that affect the design, regulations and/or performance of our products.

Our designs are made using the most advanced technology and equipment, finite elements, and CAD system programs to ensure proper assembly and performance. From conception to calculation to detailed drawings for manufacturers, WALWORTH is a leader in development of new products that meet the needs of the current valve market.”



WALWORTH QUALITY SYSTEM

Throughout the years, WALWORTH has developed its Quality System which is an integral part of our manufacturing policy. Our primary goal is to provide products that meet and exceed market standards. In this sense, WALWORTH is an ISO-9001 Audited and Certified Company that has achieved major certifications worldwide. Our system includes the selection of raw materials from approved vendors, and rigorous oversight of our manufacturing process that is vital to quality control. The use of serial numbers allows WALWORTH the ability to not only ensure the quality of components used but to monitor and trace the fabrication process as well.



Certificate API-6D No. 6D-0097 issued by American Petroleum Institute to apply on Gate valves, Plug valves, Ball valves and Check valves manufactured in accordance with API-6D specification.



Certificate API-6A No. 6A-0234 from American Petroleum Institute to apply on valves at PSI, 1 through 4.



Certificate ISO-9001 No. 0038 issued by American Petroleum Institute since April 1999.



Certificate as per PED 97/23/EC Module H to stamp CE products.



Certificate of Reliable Supplier No. 199/07 issued by CFE in accordance with ISO-9001 Quality Assurance System.



Certificate NMX-CC-9001 (Mexican Standards ISO-9001) No. 0552/2007 issued by PEMEX in accordance with ISO-9001 Quality Assurance System.

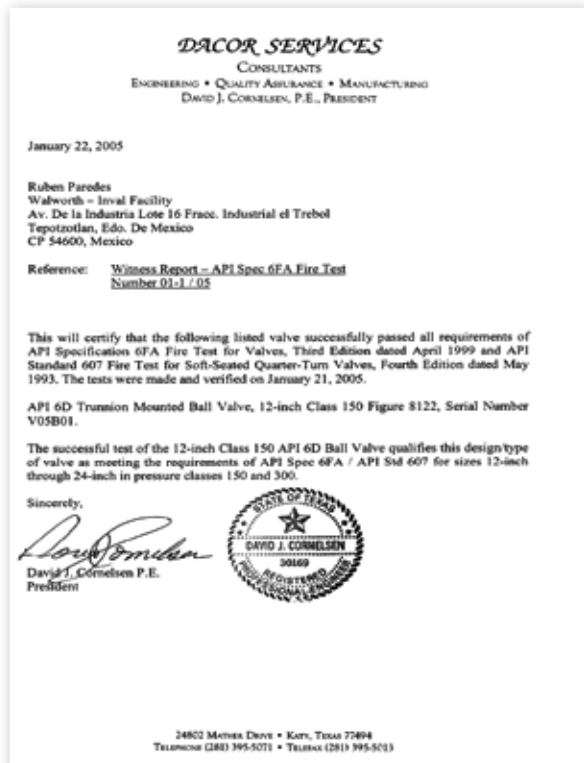
In addition to the Quality System Certifications, WALWORTH has been awarded with the following specific product certifications:



TA Luft Certificate (Fugitive Emission) Approval ISO-5211 Top Flange, Anti-Static Device.



Certificates of Ultra Low Fugitive Emissions No. 20985-3, 8 & 16 in accordance with ISO-15848-1 "Industrial Valves" - Measurement, Test and Qualification Procedures for Fugitive Emissions" "Part 1: Classification System and Qualification Procedures for Type Testing of Valves".



Fire Test Certificate No. 04/04 in accordance with API-6FA and API Standard API-607 for Trunnion Ball Valves in accordance with API-6D.





Emissions after 500 cycles at ambient and 350 °F issued by Yarmouth Research and Technology Lab for 3 inch Class 300 Gate Valve After 500 cycles the measurement result was less than 50 ppm.



Certificate API-594 No. 594-0007 issued by American Petroleum Institute to apply on Check Valves-Type A; Check Valves Type B manufactured in accordance with API-594 specification.



Emissions after 500 cycles at ambient and 350 °F issued by Yarmouth Research and Technology Lab for 8 inch Class 300 Gate Valve After 500 cycles the measurement result was less than 50 ppm.



API-600 Certificate No. 600-0109 issued by American Petroleum Institute to apply on Bolted Bonnet Steel Gate Valves manufactured in accordance with API-600 specification.



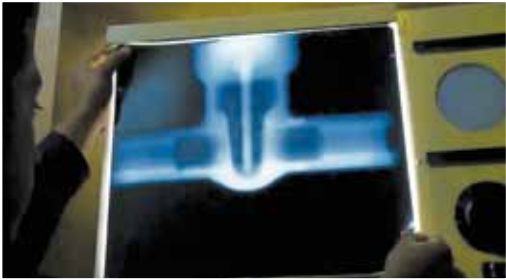
Emissions after 500 cycles at ambient and 350 °F issued by Yarmouth Research and Technology Lab for 16 inch Class 150 Gate Valve After 500 cycles the measurement result was less than 50 ppm.



API-602 Certificate No. 602-0024 issued by American Petroleum Institute to apply on Compact Steel Gate Valves, Compact Steel Globe Valves, and Compact Steel Check Valves manufactured in accordance with API-602 specification.

QUALITY CONTROL EQUIPMENT

In order to assure that WALWORTH products comply with international quality standards, in-house equipment is kept for monitoring control. Some of this equipment includes:



X-Ray Examination Equipment. WALWORTH has its own Ir-92 source in-house for the radiographic examination (RT) of castings from 0.100" up to 2 1/2" wall thickness to verify the soundness of the casting raw material.

PMI Equipment. A new generation of Positive Material Identification Equipment gives WALWORTH the capability to perform quick chemical analysis on incoming raw materials and on pieces after assembly, to certify that materials used were produced and assembled in accordance with WALWORTH's and our Customer's specifications.



Magnetic Particle Test. On a random basis for standard products or when a Customer requests MT Certification, WALWORTH has Magnetic Particle Test Equipment to perform on ferromagnetic materials.

Penetrant Test Examination. WALWORTH has the personnel and materials to perform PT examination by solvent removable or water washable techniques. NDT personnel are ASNT Certified.



Test Loop. A complete Laboratory Test loop exists for design validation of WALWORTH products. The test is performed at maximum design pressure, advances the valves from 3000 to 5000 cycles, and requires more than four months to complete.

Pressure Gradient Test Loop. This test exposes Plug valves to the extremes of both positive and negative pressure gradients to verify that the plug in a balanced plug design will prevent lock-up in the body.





Metrology Laboratory. WALWORTH developed a calibration and/or verification system in all of the equipment used in its facilities. This ensures our ability to trace measurements, control products, and comply with international standards.

Fire Test Facilities. WALWORTH has the facilities to perform fire tests in accordance with API requirements. The test exposes the valve to a fire flame at 1400 to 1800 °F (761 to 980 °C) to verify proper seal of the valve.



Low Fugitive Emissions Test. This test is performed when a Customer requires low fugitive emissions certification. Our Lab has its own LFE test equipment that is capable of measuring less than 20 ppm in both static and mechanical conditions at either ambient temperature or thermal cycle operations.

Ultrasonic Testing Equipment. Using ultrasonic techniques, we can detect sub surface flaws in materials and evaluate castings and forgings that cannot be radiographed. In addition, we utilize these techniques to measure the wall thickness of castings and forgings.



Tensile Test Equipment. We use this equipment to verify the mechanical properties of materials used for manufacturing. WALWORTH tests samples on a random basis even though we receive MTRs from our suppliers and foundries.

Hardness Test Equipments. - In both lab and shop tests, WALWORTH uses hardness tester equipment, such as Rockwell B, C Brinell or Vickers, to ensure compliance with specifications.



WALWORTH BRONZE PRESSURE SAFETY AND RELIEF VALVES

These valves work to release overpressure in a piping system or a vessel. WALWORTH offers these kinds of valves as a solution for the automatic release of pressure from boilers, pressure vessels or other systems when the pressure or temperature exceeds preset limits.

WALWORTH offers the following types of valves:

a) Safety Valves. A pressure safety valve is characterized by rapid opening and closing and normally used to relieve compressible fluids. These valves are made from Bronze and used for gas, air, and steam. Its main use is to relieve the pressure from systems such as boilers, autoclaves, compressors, steam generators, pressure vessels, bronze air or gas pipelines.

b) Relief Valves. A pressure relief valve characterized by gradual opening or closing, generally proportional to the increase or decrease in pressure system. This type of valve is typically made from Bronze and used on non-compressible fluids service. Its purpose is to release overpressure, protecting the equipment or system from damage. It is commonly used in tanks, pipelines or other vessels where a big relief capacity is not required.

WALWORTH offers this product line in the following materials:

- a) Bronze as per ASTM B62 grade 83600

Interior materials available:

- a) Brass (Copper C46400)
- b) Stainless Steel (SS304 & SS316)

Design Features

For Safety Valves (gas or steam service)

- Lateral discharge (to the pipeline, the recovery line, or the atmosphere)
- NPT male threaded input, in accordance with ANSI B1.20.1
- NPT female threaded output, in accordance with ANSI B1.20.1
- Minimum set pressure 15 psig (1.05 Kg./cm²)
- Maximum set pressure with steam 265 psig (18.63 Kg/cm²)
- Maximum set pressure with air or gas 300 psig (21.10 Kg/cm²) to 350 psig (24.61 Kg/cm²)
- Available in soft seat trim

For Relief Valves (non corrosive bronze liquid service)

- Lateral discharge (to the pipeline or the recovery line)
- NPT male threaded inlet connection, in accordance with ANSI B1.20.1
- NPT female threaded connection, in accordance with ANSI B1.20.1
- Minimum set pressure 5 psig (0.35 Kg./cm²)
- Maximum set pressure (except 3"): 300 psig (21.10 Kg./cm²), for 3": 150 psig (10.55 Kg/cm²)



Model 2B20
(WALWORTH STD.)

Model 2B10
(ASME SECT. VIII DIV. 1)

Product Range

Type	Size	Maximum Set Pressure	Ends
Bronze Safety Valves	1/2" to 2 1/2"	265 to 300 psig (steam) ¹ , 350 (air or gas)	Threaded NPT (male-female)
Bronze Relief Valves	1/2" to 3"	300 psig Except 3" which is 150 psig.	Threaded NPT (male-female)

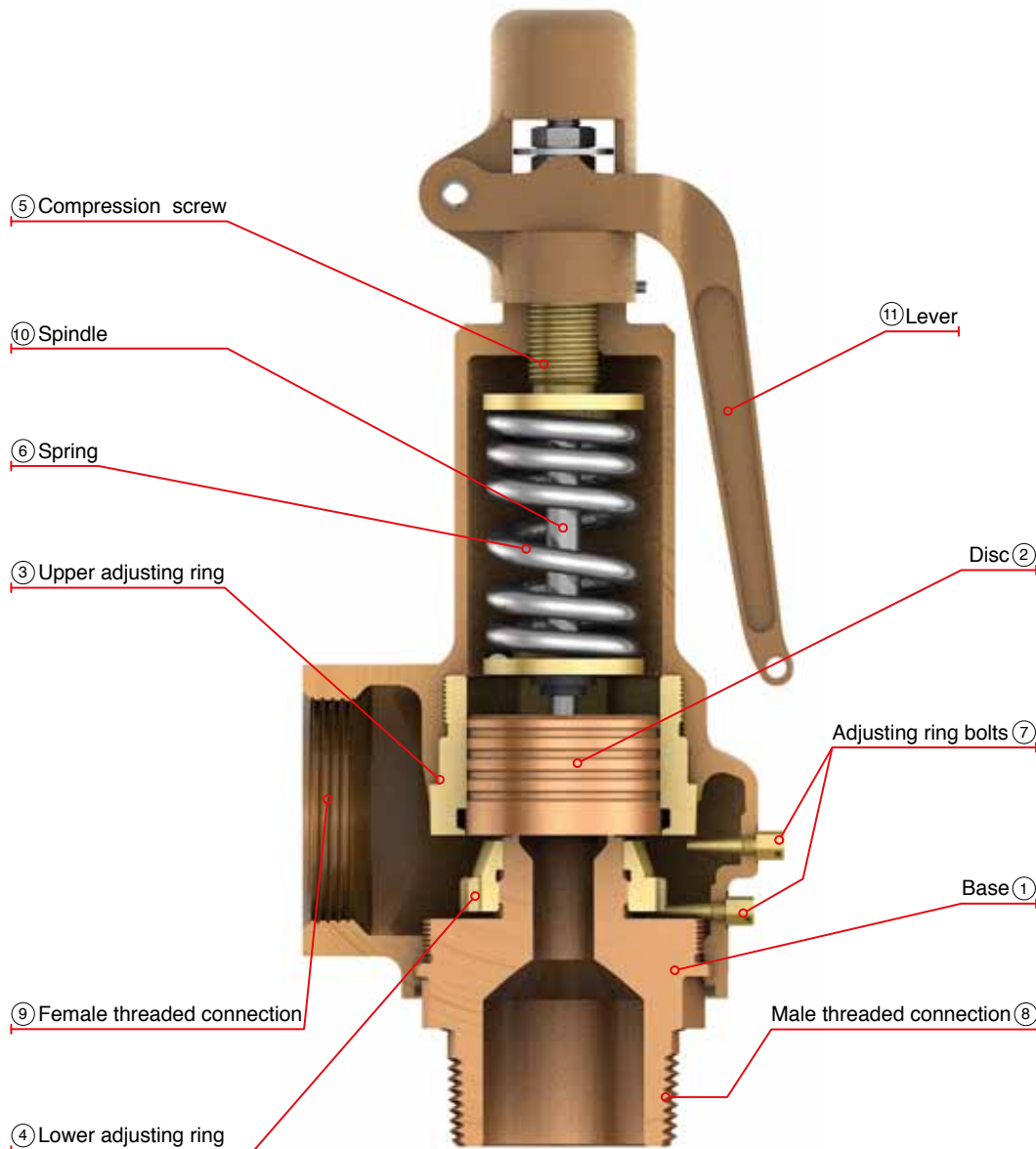
1. For set pressure greater than 265 psig please contact WALWORTH sales department.

WALWORTH BRONZE PRESSURE SAFETY VALVES

MODEL 2B10 AS PER ASME B & PVC SECTION VIII

Design Features

- ① Base. Designed according to the disc in order to keep the set pressure and valve hermeticism. This component complies with the input diameter given by the Standard.
- ② Disc. Ensures set pressure and hermeticism of the valve. Both, disc and base have polished finish on their seal areas to guarantee valve hermeticism.
- ③ Upper adjusting ring. It regulates the required shooting pressure of the valve (simmer) lower than 2% of the calibrating pressure.
- ④ Lower adjusting ring. It regulates required pressure to the close (blow down) lower than 10% of the calibrating pressure.
- ⑤ Compression screw. Its purpose is to adjust the spring and calibrate the valve. Its spheric end stabilizes and keeps aligned the components which work under pressure in its construction axis.
- ⑥ Spring. The spring is made from carbon steel coated with cadmium or zinc.
- ⑦ Adjusting ring bolts. The adjusting ring bolts immobilize each ring. This guarantees that the valve might not present any change in calibration due to a vibration or hit during operating process.
- ⑧ Inlet. NPT inlet male threaded connection as per ASME/ANSI B1.20.1.
- ⑨ Outlet. NPT outlet female threaded connection as per ASME/ANSI B1.20.1.
- ⑩ Spindle. It is designed to achieve the alignment of internal parts and for the manual operation of the valve.
- ⑪ Lever. The lever is designed in one piece to make operation of the valve easier. It is designed for manual operation in service and to verify the valve performance, it is recommended to operate it with a pressure minimum of 75% of the adjusting/calibration pressure in order to avoid seal areas damage.

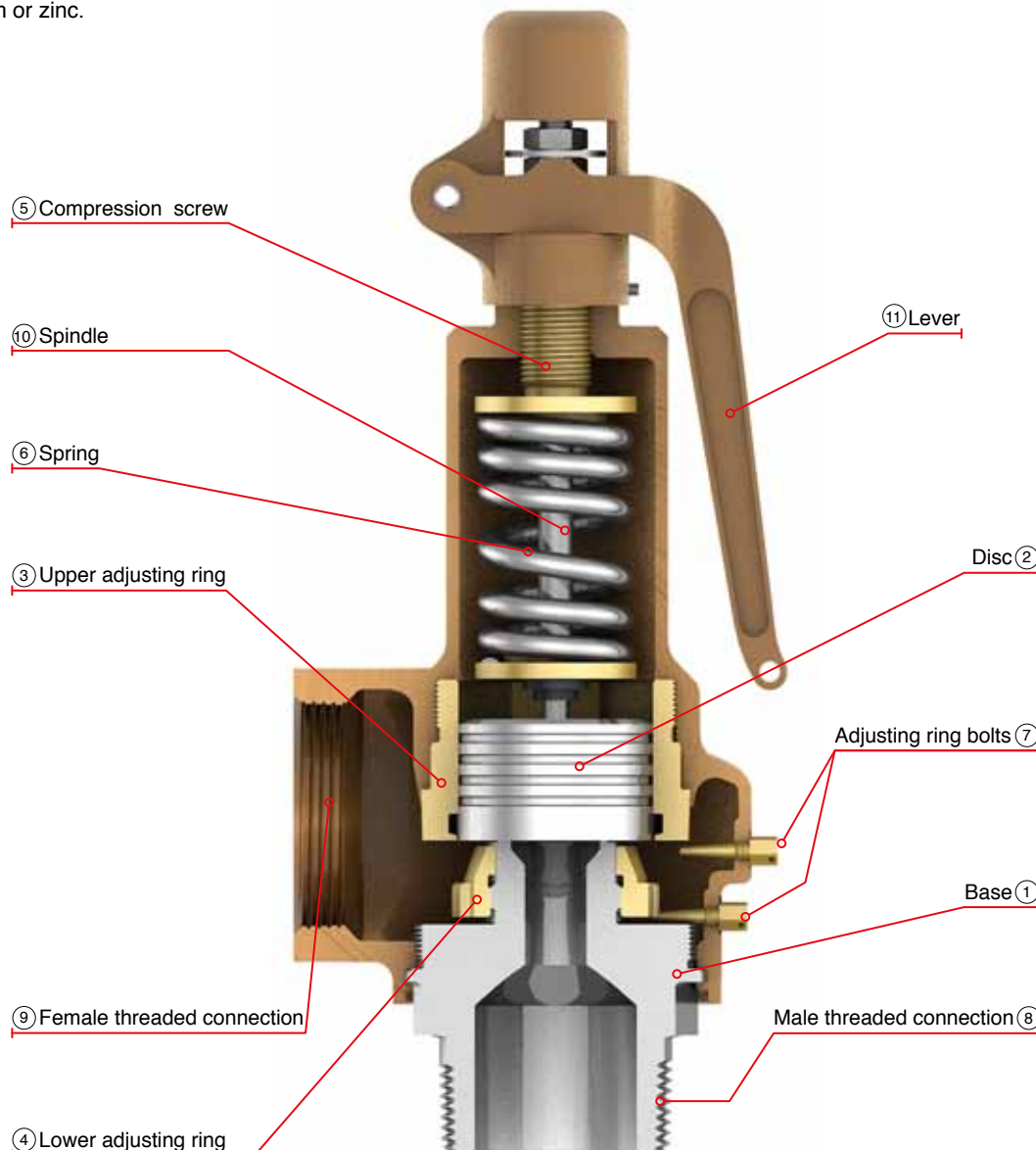


WALWORTH BRONZE PRESSURE SAFETY VALVES

MODEL 2B10-3 AS PER ASME B & PVC SECTION VIII

Design Features

- ① Base. Manufactured in stainless steel 304 or 316 type and designed according to the disc in order to keep the set pressure and valve hermeticism. This component complies with the input diameter given by the Standard.
- ② Disc. Manufactured in stainless steel 304 or 316 type, it ensures the set pressure and hermeticism of the valve. Both, the disc and base, have a polished finish on their seal areas to guarantee valve hermeticism.
- ③ Upper adjusting ring. It regulates required shooting pressure of the valve (simmer) lower than 2% of the calibrating pressure.
- ④ Lower adjusting ring. It regulates required pressure to the close (blowdown) lower than 10% of the calibrating pressure.
- ⑤ Compression screw. Its purpose is to adjust the spring and calibrate the valve. Its spheric end stabilizes and keeps aligned the components which work under pressure in its construction axis.
- ⑥ Spring. The spring is made from carbon steel coated with cadmium or zinc.
- ⑦ Adjusting ring bolts. The adjusting ring bolts immobilize each ring. This guarantees that the valve might not present any change in calibration due to a vibration or hit during operation process.
- ⑧ Inlet. NPT inlet male threaded connection as per ASME/ANSI B1.20.1.
- ⑨ Outlet. NPT outlet female threaded connection as per ASME/ANSI B1.20.1.
- ⑩ Spindle. 304 or 316 type, it is designed to achieve the alignment of internal parts and for the manual operation of the valve.
- ⑪ Lever. The lever is designed in one piece to make operation of the valve easier. It is designed for manual operation in service and to verify the valve performance, it is recommended to operate it with a pressure minimum of 75% of the adjusting/calibration pressure in order to avoid seal areas damage.



WALWORTH BRONZE PRESSURE SAFETY VALVES

MODELS 2B10 & 2B10-3 AS PER ASME B & PVC SECTION VIII

Design Features

- Safety valves for steam, gas or air service
- Lateral discharge (to the line of service)
- NPT male threaded inlet for pipeline as per ASME/ANSI B1.20.1.
- NPT female threaded outlet for pipeline as per ASME/ANSI B1.20.1.
- Sizes in between ½" and 2 ½"
- Minimum set pressure: 15 psig (1.05 Kg/cm²)
- Maximum set pressure (steam):
 2B10: 250 psig (17.58 Kg/cm²)
 2B10-3: 300 psig (21.10 Kg/cm²)
- For air or gas service it has to be added at a pressure of 50 psig (3.52 Kg/cm²).
- Maximum operating temperature:
 2B10: 406 °F (208°C)
 2B10-3: 420 °F (215°C)

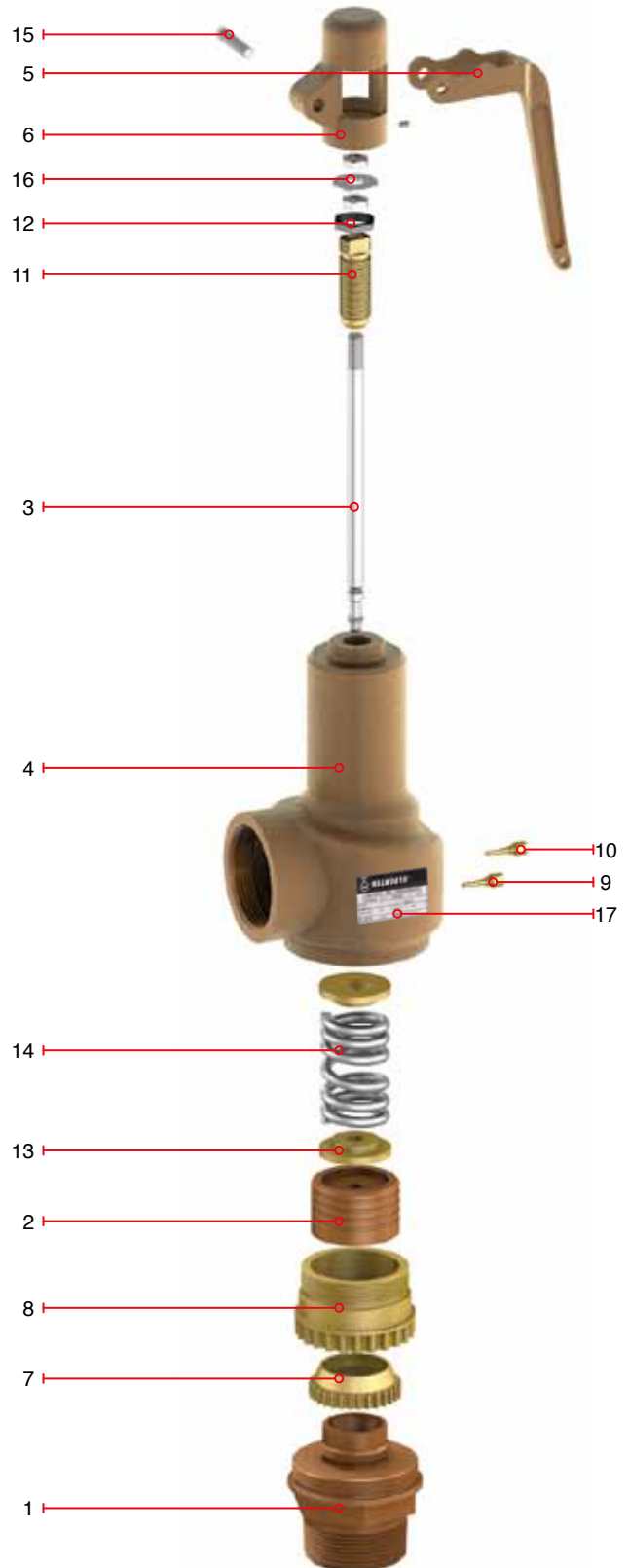
Regular Bill of Materials

Ref.	Description	2B10	2B10-3 (1) (2)
1	Base	Brass	304 Stainless Steel
2	Disc	Brass	304 Stainless Steel
3	Spindle	Carbon Steel	304 Stainless Steel
4	Body	Casted Bronze	Casted Bronze
5	Lever	Casted Bronze	Casted Bronze
6	Cap	Casted Bronze	Casted Bronze
7	Lower Adjusting Ring	Forged Brass	Forged Brass
8	Upper Adjusting Ring	Forged Brass	Forged Brass
9	Lower Adjusting Bolt	Brass	Brass
10	Upper Adjusting Bolt	Brass	Brass
11	Compression Screw	Brass	Brass
12	Compression Screw Nut	Brass	Brass
13	Spring Washers	Brass	Brass
14	Spring	Carbon Steel or Chrome Alloy	Carbon Steel
15	Lever Pin	Commercial	Commercial
16	Washer	Commercial	Commercial
17	ID Plate	Commercial	Commercial

(1) Available with 316 stainless steel (spindle, disc and base).

(2) Available with stainless steel spring.

(3) Soft seal design.

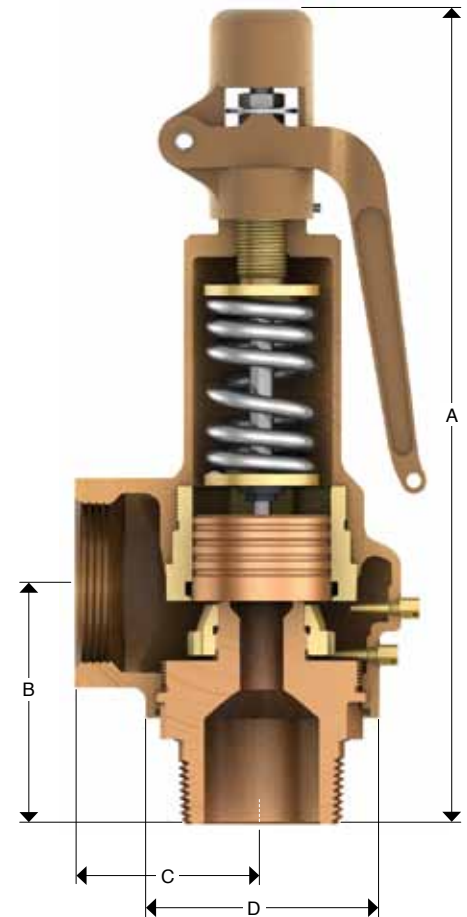


WALWORTH BRONZE PRESSURE SAFETY VALVES

MODELS 2B10 & 2B10-3 AS PER ASME B & PVC SECTION VIII

Dimensions and Weights

Size			A	B	C	D	Minimum mounting height	Weight (approx.)
in	mm	Units						
1/2	13	in	6 5/8	2 5/16	1 1/4	1 15/16	8 1/4	2.0 Lb
		mm	168.3	58.7	31.8	49.2	209.6	0.9 Kg
3/4	19	in	6 5/8	2 5/16	1 1/4	1 15/16	8 1/4	2.0 Lb
		mm	168.3	58.7	31.8	49.2	209.6	0.9 Kg
1	25	in	7	2 9/16	1 7/16	2 1/8	8 5/8	3.0 Lb
		mm	177.8	65.1	36.5	54.0	219.1	1.4 Kg
1 1/4	32	in	8 7/8	2 15/16	1 13/16	2 3/4	10 3/4	4.6 Lb
		mm	225.4	74.6	46.0	69.9	273.1	2.1 Kg
1 1/2	38	in	9 5/8	3 1/8	2 1/8	3 3/8	11 5/8	7.8 Lb
		mm	244.5	79.4	54.0	85.7	295.3	3.5 Kg
2	51	in	11 1/8	3 9/16	2 5/8	4 1/8	13 3/8	10.6 Lb
		mm	282.6	90.5	66.7	104.8	339.8	4.8 Kg
2 1/2	64	in	12 13/16	4 1/16	3 1/4	4 7/8	15 1/8	17.8 Lb
		mm	325.4	103.2	84.1	123.8	384.2	8.1 Kg



Technical Information

Model	Nominal Diameter		Orifice			N.P.T. end Connection		Maximum limit of pressure and temperature							
			Area		Designation	Inlet (Male)	Outlet (Female)	2B10 (1) (2)				2B10-3 (1) (3)			
	in	mm	in ²	mm ²				PSIG	Kg/cm ²	°F	°C	PSIG	Kg/cm ²	°F	°C
2B10 D	1/2	13	0.110	23.9	D	1/2"	3/4"	250	17.58	406	208	300	21.1	420	215.6
2B10 D	3/4	19	0.110	71.0	D	3/4"	3/4"	250	17.58	406	208	300	21.1	420	215.6
2B10 E	1	25	0.196	126.5	E	1"	1"	250	17.58	406	208	300	21.1	420	215.6
2B10 F	1 1/4	32	0.307	198.2	F	1 1/4"	1 1/4"	250	17.58	406	208	300	21.1	420	215.6
2B10 G	1 1/2	38	0.503	324.7	G	1 1/2"	1 1/2"	250	17.58	406	208	300	21.1	420	215.6
2B10 H	2	51	0.785	506.7	H	2"	2"	250	17.58	406	208	300	21.1	420	215.6
2B10 J	2 1/2	64	1.287	830.7	J	2 1/2"	2 1/2"	250	17.58	406	208	300	21.1	420	215.6

(1) Steam Service.

(2) 21.1 Kg/cm² (300 PSIG.) Air or gas service.

(3) 24.1 Kg/cm² (350 PSIG.) Air or gas service.

WALWORTH BRONZE PRESSURE SAFETY VALVES

ASME B & PVC SECTION I RATING - FOR MODELS 2B10 & 2B10-3

Relief capacity in pounds per hour of saturated steam at 3% overpressure or 2 psig whichever is greater; 90% of actual capacity.

Set pressure		Orifice Designation					
		D	E	F	G	H	J
		Relief area - sq. In.					
Psig	Kg/cm ²	0.110	0.196	0.307	0.503	0.785	1,287
15	1.05	157	281	440	721	1125	1844
20	1.41	182	325	509	835	1303	2135
25	1.76	207	369	578	948	1480	2426
30	2.11	232	413	648	1062	1657	2717
35	2.46	257	458	718	1176	1835	3008
40	2.81	282	502	787	1290	2012	3299
45	3.16	307	547	856	1403	2190	3590
50	3.52	331	591	926	1517	2367	3881
55	3.87	356	635	995	1631	2545	4172
60	4.22	381	679	1064	1744	2722	4463
65	4.57	406	724	1134	1858	2900	4754
70	4.92	431	769	1205	1974	3080	5051
75	5.27	457	815	1276	2091	3263	5351
80	5.62	482	860	1348	2208	3446	5650
85	5.98	508	906	1419	2326	3629	5950
90	6.33	534	952	1490	2443	3812	6250
95	6.68	560	997	1562	2560	3995	6550
100	7.03	585	1043	1634	2677	4178	6849
105	7.38	611	1088	1705	2794	4360	7149
110	7.73	637	1134	1777	2911	4543	7448
115	8.09	662	1180	1848	3028	4726	7748
120	8.44	688	1225	1919	3146	4909	8048
125	8.79	713	1271	1991	3263	5092	8348
130	9.14	739	1316	2063	3380	5275	8647
135	9.49	764	1363	2134	3497	5457	8947
140	9.84	790	1408	2206	3614	5640	9247
145	10.19	815	1454	2277	3731	5823	9547
150	10.55	841	1499	2348	3848	6005	9846
155	10.90	867	1545	2420	3965	6188	10146
160	11.25	893	1591	2491	4083	6371	10445
165	11.60	918	1636	2563	4200	6554	10745
170	11.95	944	1682	2635	4317	6737	11045
175	12.30	970	1727	2706	4434	6920	11345
180	12.66	995	1773	2777	4551	7102	11644
185	13.01	1021	1819	2849	4668	7285	11944
190	13.36	1046	1864	2920	4785	7468	12244
195	13.71	1072	1910	2992	4903	7651	12544
200	14.06	1097	1955	3064	5020	7834	12843
205	14.41	1123	2002	3135	5137	8017	13143
210	14.76	1148	2047	3206	5254	8199	13442
215	15.12	1174	2093	3278	5371	8382	13742
220	15.47	1200	2138	3349	5488	8565	14042
225	15.82	1226	2184	3421	5605	8747	14342
230	16.17	1251	2230	3493	5722	8930	14641
235	16.52	1277	2275	3564	5840	9113	14941
240	16.87	1303	2321	3635	5957	9296	15241
245	17.23	1328	2366	3707	6074	9479	15541
250	17.58	1354	2412	3778	6191	9662	15840
255	17.93	1379	2458	3850	6308	9844	16140
260	18.28	1405	2503	3921	6425	10027	16439
265	18.63	1430	2549	3993	6542	10210	16739

WALWORTH BRONZE PRESSURE SAFETY VALVES

ASME B & PVC SECTION VIII RATING - FOR MODELS 2B10 & 2B10-3

Relief capacity in pounds per hour saturated steam at 10% overpressure or 3 psig, whichever is greater; 90% of actual capacity.

Set pressure		Orifice Designation					
		D	E	F	G	H	J
		Relief area - sq. In.					
Psig	Kg/cm ²	0.110	0.196	0.307	0.503	0.785	1,287
15	1.05	163	290	454	744	1160	1903
20	1.41	187	334	523	857	1338	2194
25	1.76	212	378	592	971	1516	2485
30	2.11	237	422	662	1085	1693	2776
35	2.46	265	471	738	1210	1888	3095
40	2.81	292	520	815	1335	2083	3416
45	3.16	319	569	891	1460	2279	3736
50	3.52	346	617	967	1585	2474	4056
55	3.87	374	666	1043	1710	2669	4376
60	4.22	401	715	1120	1835	2864	4696
65	4.57	428	764	1196	1961	3059	5016
70	4.92	456	812	1273	2086	3254	5336
75	5.27	483	861	1349	2211	3450	5656
80	5.62	511	910	1426	2336	3645	5976
85	5.98	538	959	1502	2461	3840	6296
90	6.33	565	1007	1578	2586	4036	6616
95	6.68	593	1056	1654	2711	4231	6937
100	7.03	620	1105	1731	2836	4426	7256
105	7.38	647	1154	1807	2961	4621	7577
110	7.73	674	1202	1883	3086	4816	7897
115	8.09	702	1251	1960	3211	5012	8217
120	8.44	730	1300	2036	3337	5207	8537
125	8.79	757	1349	2113	3462	5402	8857
130	9.14	784	1397	2189	3587	5597	9177
135	9.49	811	1446	2265	3712	5792	9497
140	9.84	839	1495	2342	3837	5988	9817
145	10.19	866	1544	2418	3962	6183	10137
150	10.55	893	1592	2494	4087	6378	10457
155	10.90	921	1641	2570	4212	6574	10777
160	11.25	948	1690	2647	4337	6769	11098
165	11.60	976	1739	2723	4462	6964	11417
170	11.95	1003	1787	2800	4587	7159	11737
175	12.30	1030	1836	2876	4713	7354	12058
180	12.66	1058	1885	2953	4838	7550	12377
185	13.01	1085	1934	3029	4963	7745	12698
190	13.36	1112	1982	3105	5088	7940	13018
195	13.71	1140	2031	3181	5213	8135	13338
200	14.06	1167	2080	3258	5338	8330	13658
205	14.41	1195	2128	3334	5463	8525	13978
210	14.76	1222	2177	3410	5588	8721	14298
215	15.12	1249	2226	3487	5713	8916	14618
220	15.47	1276	2275	3563	5838	9112	14938
225	15.82	1304	2323	3640	5964	9307	15258
230	16.17	1331	2372	3716	6089	9502	15578
235	16.52	1358	2421	3792	6214	9697	15898
240	16.87	1386	2470	3869	6339	9892	16219
245	17.23	1413	2518	3945	6464	10087	16538
250	17.58	1441	2567	4021	6589	10283	16859
255	17.93	1468	2616	4097	6714	10478	17179
260	18.28	1495	2665	4174	6839	10673	17499
265	18.63	1523	2713	4250	6964	10868	17819

WALWORTH BRONZE PRESSURE SAFETY VALVES

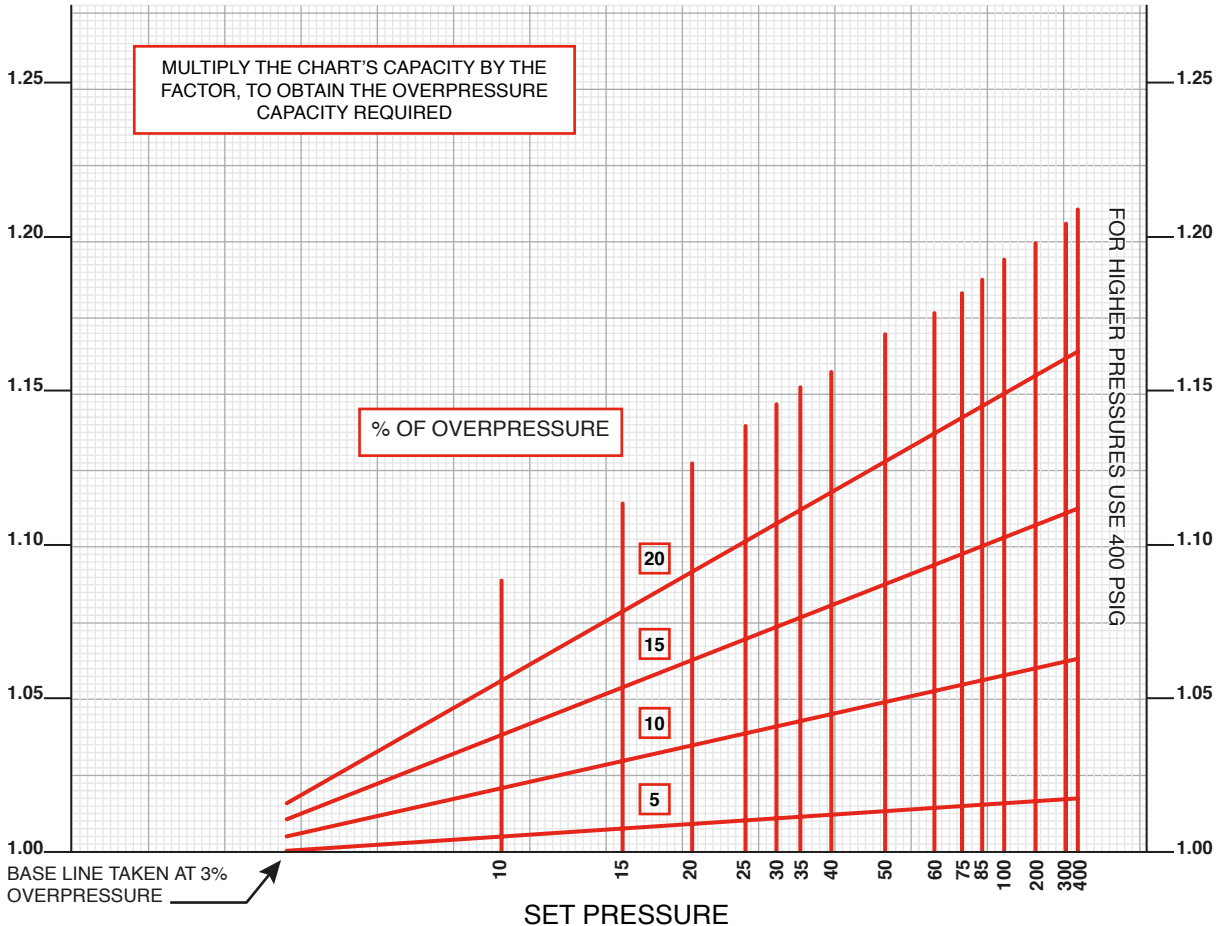
ASME B & PVC SECTION VIII RATING - FOR MODELS 2B10 & 2B10-3

Relief capacity in cubic feet per minute of air (15.6°C = 60°F) at 10% overpressure or 3 psig, whichever is greater.

Set pressure		Orifice Designation					
		D	E	F	G	H	J
		Relief area - sq. In.					
Psig	Kg/cm ²	0.110	0.196	0.307	0.503	0.785	1,287
15	1.05	58	103	161	265	413	677
20	1.41	67	119	186	305	476	781
25	1.76	75	134	211	346	539	884
30	2.11	84	150	235	386	602	988
35	2.46	94	167	263	431	672	1102
40	2.81	104	185	290	475	742	1216
45	3.16	113	202	317	520	811	1330
50	3.52	123	220	344	564	880	1444
55	3.87	133	237	371	609	950	1558
60	4.22	143	254	398	653	1019	1672
65	4.57	152	272	425	698	1089	1785
70	4.92	162	289	453	742	1158	1899
75	5.27	172	307	480	787	1228	2013
80	5.62	182	323	507	831	1297	2127
85	5.98	191	341	535	876	1367	2241
90	6.33	201	358	562	920	1436	2355
95	6.68	211	376	589	965	1506	2469
100	7.03	220	393	616	1010	1575	2583
105	7.38	230	410	643	1054	1645	2696
110	7.73	240	428	670	1099	1714	2810
115	8.09	250	445	697	1143	1784	2924
120	8.44	259	463	725	1188	1853	3038
125	8.79	269	480	752	1232	1922	3152
130	9.14	279	497	779	1277	1992	3266
135	9.49	289	515	806	1321	2062	3380
140	9.84	298	532	833	1366	2131	3494
145	10.19	308	549	860	1410	2201	3608
150	10.55	318	566	887	1455	2270	3722
155	10.90	328	584	915	1499	2339	3836
160	11.25	337	601	942	1544	2409	3950
165	11.60	347	619	969	1588	2479	4064
170	11.95	357	636	997	1633	2548	4178
175	12.30	367	653	1024	1677	2618	4292
180	12.66	376	671	1051	1722	2687	4406
185	13.01	386	688	1078	1766	2756	4519
190	13.36	396	706	1105	1811	2826	4633
195	13.71	406	723	1132	1856	2896	4747
200	14.06	415	740	1159	1900	2965	4861
205	14.41	425	757	1187	1945	3034	4975
210	14.76	434	775	1214	1989	3104	5089
215	15.12	445	792	1241	2034	3173	5203
220	15.47	454	809	1268	2078	3243	5317
225	15.82	464	827	1295	2123	3313	5431
230	16.17	473	844	1322	2167	3382	5545
235	16.52	484	862	1349	2212	3451	5659
240	16.87	493	879	1377	2256	3521	5773
245	17.23	503	896	1404	2301	3590	5887
250	17.58	512	914	1431	2345	3660	6001
255	17.93	523	931	1458	2390	3730	6115
260	18.28	532	948	1486	2434	3799	6229
265	18.63	542	965	1513	2479	3868	6342
270	18.98	551	983	1540	2523	3938	6456
275	19.33	561	1000	1567	2568	4007	6570
280	19.69	571	1018	1594	2612	4077	6684
285	20.04	581	1035	1621	2657	4146	6798
290	20.39	590	1052	1649	2701	4216	6912
295	20.74	600	1070	1676	2746	4285	7026
300	21.09	610	1087	1703	2791	4355	7140
305	21.44	620	1105	1730	2835	4424	7253
310	21.80	629	1122	1757	2880	4494	7367
315	22.15	639	1139	1784	2924	4563	7481
320	22.50	649	1156	1811	2969	4633	7595
325	22.85	659	1174	1839	3013	4702	7709
330	23.20	668	1191	1866	3058	4772	7823
335	23.55	678	1208	1893	3102	4841	7937
340	23.90	688	1226	1920	3147	4910	8051
345	24.26	698	1243	1948	3191	4980	8165
350	24.61	707	1261	1975	3236	5050	8279

WALWORTH BRONZE PRESSURE SAFETY VALVES

OVERPRESSURE FACTORS FOR AIR, STEAM OR GAS SERVICE VALVES



Correction factors for temperature given by the temperature for air and gas

°F	°C	Factor	°F	°C	Factor	°F	°C	Factor
0	-17.8	1.062	140	60.0	0.931	380	193.3	0.787
10	-12.2	1.051	160	71.1	0.916	400	204.4	0.778
20	-6.7	1.041	180	82.2	0.902	420	215.6	0.769
30	-1.1	1.030	200	93.3	0.888	440	226.7	0.760
40	4.4	1.020	220	104.4	0.874	460	237.8	0.752
50	10.0	1.009	240	115.6	0.862	480	248.9	0.744
60	15.6	1.000	260	126.7	0.849	500	260.0	0.737
70	21.1	0.991	280	137.8	0.838	550	287.8	0.718
80	26.7	0.981	300	148.9	0.828	600	315.6	0.701
90	32.2	0.972	320	160.0	0.817	650	343.3	0.685
100	37.8	0.964	340	171.1	0.806	700	371.1	0.669
120	48.9	0.947	360	182.2	0.796	750	398.9	0.656

(1) SG = Specific gravity

Correction factors of relative density given by the specific gravity for air and gas

SG	Factor	SG(1)	Factor	SG	Factor
0.07	3.770	0.75	1.155	1.40	0.845
0.08	3.530	0.80	1.117	1.50	0.817
0.09	3.333	0.85	1.085	1.60	0.791
0.10	3.160	0.90	1.055	1.70	0.768
0.20	2.240	0.95	1.025	1.80	0.745
0.30	1.825	1.00	1.000	1.90	0.725
0.40	1.580	1.05	0.975	2.00	0.707
0.50	1.414	1.10	0.955	2.50	0.633
0.55	1.350	1.15	0.933	3.00	0.577
0.60	1.290	1.20	0.913	3.50	0.535
0.65	1.240	1.25	0.895	4.00	0.500
0.70	1.195	1.30	0.877	4.50	0.471

WALWORTH BRONZE PRESSURE SAFETY VALVES

PIPE CAPACITY

The tight control of fluid handling is as important as correctly calculating the size of a safety valve. This size should be determined based on work performed and not by the size of the existing pipe. When the quantity of fluid that passes through a valve is not known, the maximum size of the valve can be determined by the capacity of the piping into the valve outlet.

Note: The capacity tables shown are a guide to select the size of the valves. However, there are several factors involved in the flow of fluids, which may affect the capacity of valves and pipes. It is impossible to get a table that takes into consideration all previous variants; however, the use of the accompanying tables provides capabilities very close to reality.

Note: Do not connect a line valve before or after a safety valve.

Pounds per hour saturated steam

Length of pipe equivalent to 240 diameters - Pressure drop 2 psig

Set pressure		Pipe diameter in inches									
Psig	Kg/cm ²	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	6
5	0.35	61	113	198	388	550	966	1,423	2,378	4,352	10,837
10	0.70	68	125	219	431	610	1,072	1,580	2,641	4,832	12,030
15	1.05	74	136	238	469	665	1,168	1,720	2,875	5,262	13,095
20	1.41	80	148	256	504	714	1,256	1,850	3,091	5,655	14,083
25	1.76	85	156	273	537	761	1,336	1,968	3,290	6,020	14,986
30	2.11	89	165	288	567	804	1,412	2,081	3,478	6,364	15,847
40	2.81	99	182	316	624	884	1,552	2,286	3,820	6,991	17,406
50	3.52	106	197	343	674	955	1,678	2,472	4,132	7,560	18,820
60	4.22	114	210	366	721	1,022	1,796	2,645	4,422	8,090	20,141
70	4.92	120	223	389	765	1,084	1,906	2,806	4,691	8,586	21,368
80	5.62	126	235	410	805	1,143	2,008	2,958	4,943	9,044	22,518
90	6.33	132	239	432	845	1,205	2,104	3,097	5,175	9,510	23,515
100	7.03	141	258	450	880	1,256	2,189	3,232	5,396	9,900	24,341
125	8.79	151	284	494	972	1,376	2,414	3,545	5,939	10,626	26,700
150	10.55	156	293	510	1,001	1,425	2,492	3,669	6,117	11,241	28,800

Pipes capacities in cubic feet per air minute

Length of pipe equivalent to 100 feet - Pressure drop 2 psig

Set pressure		Pipe diameter in inches									
Psig	Kg/cm ²	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	6
10	0.70	3	12	24	80	125	240	400	650	1300	4200
30	2.11	4	16	32	110	170	320	540	900	1800	5500
50	3.52	5	20	40	130	210	380	650	1100	2200	7000
80	5.62	6	24	43	160	250	480	770	1300	2600	8000
100	7.03	6.5	26	45	175	270	500	850	1400	2800	9000

WALWORTH BRONZE PRESSURE SAFETY VALVES

APPLICATION AND SELECTION

VALVE 2B10 & 2B10-3 AS PER ASME B & PVC SECT. VIII

Application

The most usual applications for WALWORTH safety valves are to relieve excess pressure in piping system and equipment, such as:

- Boilers
- Autoclave
- Compressors
- Steam generators
- Air pressure vessels
- Tankers carrying gas
- Air services or non-corrosive gas bronze

Selection

The proper selection of a safety valve depends greatly on the service for which it is designed, such as:

- Fluid handling
- Discharge type
- Pressure adjustment
- Operating temperature
- Required discharge capacity

Selection Example (find which valve must be chosen to protect the piping system)

It needs to protect a vessel containing air under pressure, with the following characteristics:

- Size (as per customer request)
- Fluid handling: air
- Discharge type: lateral (to the pipeline)
- Pressure adjustment: 10.5 Kg/cm² (150 Lb/in²)
- Operating temperature: 15.6°C (60°F)
- Required discharge capacity: 450 ft³/min

Solution

For the flow to handle discharge rate and pressure and temperature limits, we realize we need a valve 2B10(consult page 11). Now, to calculate the size of the valve we use the discharge capacity and pressure adjustment required, as follows:

1. In the table on page 18, find in the left column the required adjustment pressure 10.5 Kg/cm² (150 Lb/in²) and in that row find the immediate superior capacity required (450 ft³/min). In our case the immediately superior is 619 ft³/min, which corresponds to the column of hole E (0.196 in²).

2. In the table of Technical Information for valve 2B10, we can see that a hole E (0.196 in²) corresponds to a nominal size of 25 mm. (1"). Therefore, we must select a valve 2B10 of 1".

NOTE: For temperatures different to 15.6 °C (60 °F) and/or different overpressures than indicated in the tables, consult graphs and tables on page 19.

Required information for valve selection (example).

Size	Model	Set Pressure	Fluid Handling*	Overpressure*	Temperature*
1"	2B10-E	150 psig	Air	10%	60 °F

* To ensure the proper functioning of the valve, the Customer is required to provide the correct data; if not, WALWORTH shall consider the following features as standard.

1. Fluid: Air
2. Overpressure: 10%
3. Temperature: 15.6 °C (60 °F)

WALWORTH BRONZE RELIEF VALVES

MODEL 2B20 & 2B20-3 WALWORTH STD. (LIQUID SERVICE ONLY)

Design Features

- Relief valves for liquid service
- Lateral discharge (to the line of service)
- NPT male threaded inlet as per ASME/ANSI B1.20.1
- NPT female threaded outlet as per ASME/ANSI B1.20.1
- Sizes in between 1/2" and 3"
- Minimum set pressure: 5 psig (0.35 Kg/cm²)
- Maximum set pressure (except 3"): 300 psig (21.10 Kg/cm²); for 3" 150 psig (10.55 Kg/cm²)
- Maximum operating temperature: 208°C (406 °F)

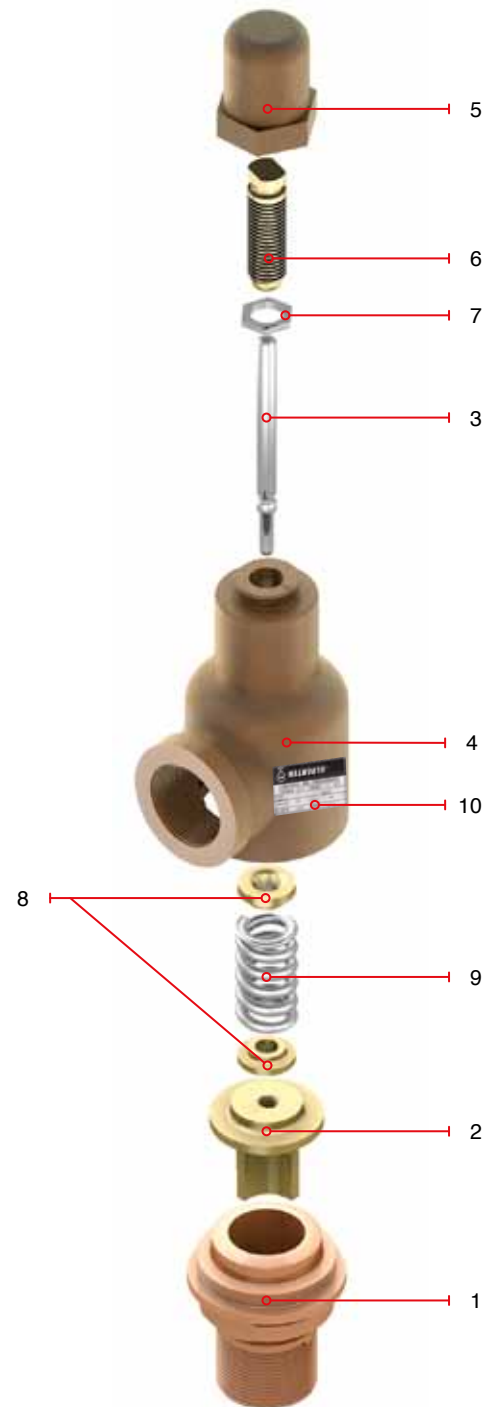
Regular Bill of Materials

Ref.	Description	2B20	2B20-3 (1) (2)
1	Base	Brass	304 Stainless Steel
2	Disc	Brass	304 Stainless Steel
3	Spindle	Carbon Steel	304 Stainless Steel
4	Body	Casted Bronze	Casted Bronze
5	Cap	Casted Bronze	Casted Bronze
6	Compression Screw	Brass	Brass
7	Compression Screw Nut	Brass	Brass
8	Spring Washers	Brass	Brass
9	Spring	Carbon Steel	Carbon Steel
10	ID Plate	Commercial	Commercial

(1) Available with 316 stainless steel (spindle, disc and base).
 (2) Available with stainless steel spring.

Technical Information

Model	Nominal diameter		N.P.T. connections		Maximum temperature pressure limits			
					2B20			
	in	mm	Inlet (male)	Outlet (female)	Psig	Kg/cm ²	°F	°C
2B20	1/2	13	1/2"	3/4"	300	21.1	406	207.8
2B20	3/4	19	3/4"	3/4"	300	21.1	406	207.8
2B20	1	25	1"	1"	300	21.1	406	207.8
2B20	1 1/4	32	1 1/4"	1 1/4"	300	21.1	406	207.8
2B20	1 1/2	38	1 1/2"	1 1/2"	300	21.1	406	207.8
2B20	2	51	2"	2"	300	21.1	406	207.8
2B20	2 1/2	64	2 1/2"	2 1/2"	300	21.1	406	207.8
2B20	3	76	3"	3"	150	10.5	406	207.8



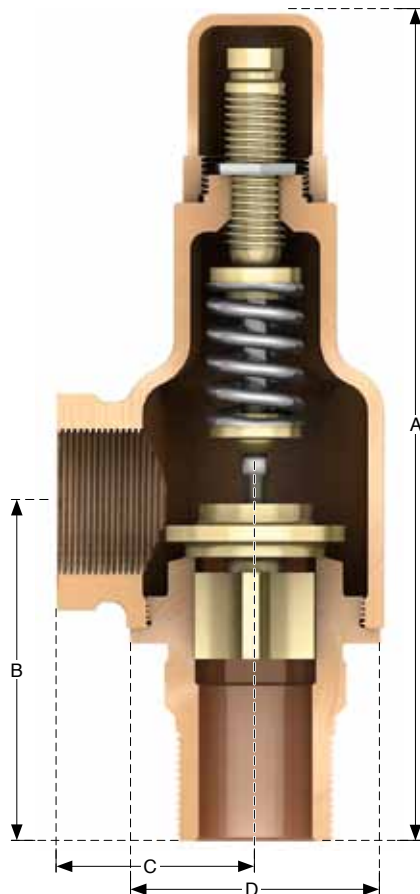
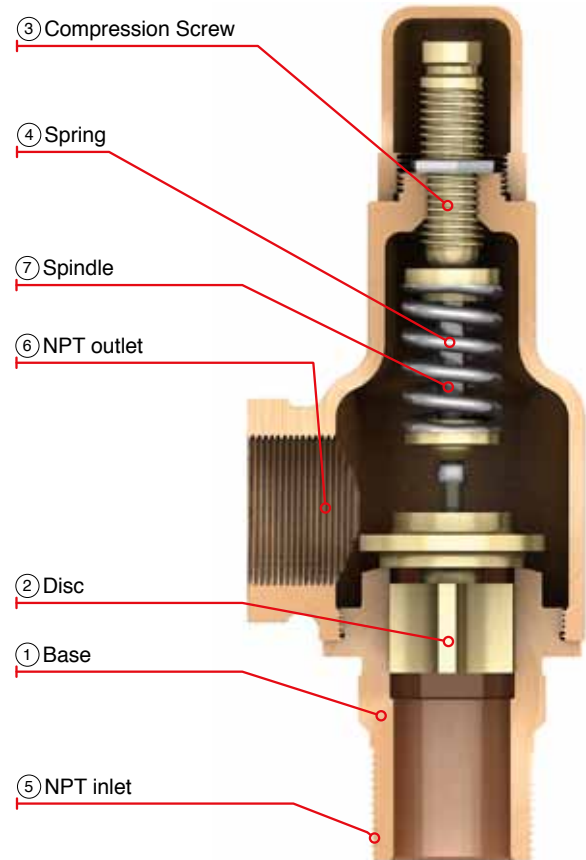
Note: in models 2B20 and 2B20-3 the trim adjustments apply the same as per models 2B10 y 2B10-3. For these models please refer to page 12.

WALWORTH BRONZE RELIEF VALVES

MODEL 2B20 & 2B20-3 WALWORTH STD. (LIQUID SERVICE ONLY)

Design Features

- ① Base. Designed according to the disc in order to ensure the set pressure and valve hermeticism.
- ② Disc. Ensures the operating pressure and hermeticism of the valve. Both, disc and base have a polished finish on their seal areas to guarantee valve hermeticism.
- ③ Compression screw. Its purpose is to adjust the spring and calibrate the valve. Its spheric end stabilizes and ensures alignment of components which work under pressure in their construction axis.
- ④ Spring. The spring is made from carbon steel coated with cadmium or zinc.
- ⑤ Inlet. NPT male threaded inlet connection as per ASME/ANSI B1.20.1.
- ⑥ Outlet. NPT female threaded outlet connection as per ASME/ANSI B1.20.1.
- ⑦ Spindle. It is designed to achieve the alignment of internal parts and for the manual operation of the valve. Its spheric end keeps the disc aligned over its construction axis in order to maintain the valve hermeticism.



Size and Weights

Size		Units	A	B	C	D	Minimum mounting height	Weight (aprox.)
in	mm							
1/2	13	in	5 9/16	2 3/8	1 5/16	1 11/16	6 7/8	1.3 Lb
		mm	141.3	60.3	33.3	42.9	174.6	0.6 Kg
3/4	19	in	5 9/16	2 3/8	1 5/16	1 11/16	6 7/8	1.3 Lb
		mm	141.3	60.3	33.3	42.9	174.6	0.6 Kg
1	25	in	6 9/16	2 11/16	1 5/8	2 1/8	8 1/8	2.3 Lb
		mm	166.7	68.3	41.3	54.0	206.4	1.0 Kg
1 1/4	32	in	7 9/16	2 15/16	2	2 9/16	9 1/4	3.5 Lb
		mm	192.1	74.6	50.8	65.1	234.9	1.6 Kg
1 1/2	38	in	8 5/16	3 5/16	2 1/8	2 7/8	10 1/4	4.5 Lb
		mm	211.1	84.1	54.0	73.0	260.4	2.0 Kg
2	51	in	10 1/2	3 7/8	2 11/16	3 13/16	12 3/4	9.5 Lb
		mm	266.7	98.4	68.3	96.8	323.9	4.3 Kg
2 1/2	64	in	12 3/8	4 5/8	3 1/8	4 13/32	15 3/8	17.0 Lb
		mm	314.4	117.5	79.4	340.5	390.5	7.7 Kg
3	76	in	12 11/16	6 1/16	3 1/2	5 3/16	15	24.0 Lb
		mm	322.3	154.0	89.0	131.8	381.0	10.9 Kg

WALWORTH BRONZE RELIEF VALVES

MODEL 2B20 & 2B20-3 WALWORTH STD. (LIQUID SERVICE ONLY)

Relief capacity in gallons of water per minute at 25% overpressure

Set pressure		Size (in)						
Psig	Kg/cm ²	1/2 & 3/4	1	1 1/4	1 1/2	2	2 1/2	3
5	0.35	4.4	7.3	13	21	38	52	72
10	0.70	6.2	10.5	18	29	53	73	102
15	1.05	7.6	12.8	22	36	65	90	125
20	1.41	8.8	14.8	26	41	76	103	144
25	1.76	9.8	16.5	29	46	85	115	161
30	2.11	10.7	18.1	32	50	93	126	177
35	2.46	11.6	19.6	34	55	100	137	191
40	2.81	12.4	20.9	36	58	107	146	204
45	3.16	13.2	22.2	39	62	114	155	217
50	3.52	13.9	23.4	41	65	120	163	229
55	3.87	14.5	24.5	43	68	126	171	239
60	4.22	15.2	25.6	45	71	131	179	250
65	4.57	15.8	26.7	46	74	137	186	260
70	4.92	16.4	27.7	48	77	142	194	271
75	5.27	17.0	28.7	50	80	147	200	280
80	5.62	17.5	29.6	52	82	152	207	289
85	5.98	18.0	30.5	53	85	156	213	297
90	6.33	18.6	31.4	55	87	161	219	306
95	6.68	19.1	32.3	56	90	165	225	314
100	7.03	19.6	33.1	58	92	170	231	322
105	7.38	20.1	33.9	59	95	174	237	331
110	7.73	20.5	34.7	60	97	178	242	339
115	8.09	21.0	35.5	62	99	182	247	346
120	8.44	21.5	36.3	63	101	186	253	354
125	8.79	21.9	37.0	64	103	190	258	361
130	9.14	22.3	37.7	66	105	193	263	368
135	9.49	22.8	38.5	67	107	197	268	375
140	9.84	23.2	39.2	68	109	200	273	382
145	10.19	23.6	39.8	69	111	204	278	389
150	10.55	24.0	40.6	71	113	208	283	396
155	10.90	24.4	41.2	72	115	211	288	-
160	11.25	24.8	41.8	73	117	214	293	-
165	11.60	25.2	42.5	74	119	218	298	-
170	11.95	25.6	43.2	75	120	221	303	-
175	12.30	25.9	43.7	76	122	224	308	-
180	12.66	26.3	44.4	77	124	227	313	-
185	13.01	26.7	45.0	78	126	231	318	-
190	13.36	27.0	45.6	79	127	234	323	-
195	13.71	27.4	46.2	80	129	237	328	-
200	14.06	27.7	45.8	81	130	239	333	-
205	14.41	28.1	47.4	82	132	243	338	-
210	14.76	28.4	48.0	83	134	245	343	-
215	15.12	28.8	48.5	84	135	249	348	-
220	15.47	29.1	49.2	85	137	251	353	-
225	15.82	29.4	49.7	86	138	254	358	-
230	16.17	29.9	50.3	87	140	257	363	-
235	16.52	30.1	50.7	88	142	260	368	-
240	16.87	30.4	51.3	89	143	263	373	-
245	17.23	30.7	51.8	90	145	265	378	-
250	17.58	31.0	52.4	91	146	268	383	-
255	17.93	31.3	52.9	92	147	270	388	-
260	18.28	31.6	53.4	93	149	273	393	-
265	18.64	31.9	53.9	94	150	275	398	-
270	18.99	32.2	54.4	94	151	278	403	-
275	19.34	32.5	54.9	95	153	280	408	-
280	19.69	32.8	55.4	96	154	283	413	-
285	20.04	33.1	55.9	97	156	285	418	-
290	20.39	33.4	56.4	98	157	288	423	-
295	20.75	33.7	56.9	99	158	290	428	-
300	21.10	34.0	57.4	100	159	293	433	-

WALWORTH BRONZE RELIEF VALVES

PIPE CAPACITY 2B20 & 2B20-3 WALWORTH STD. (LIQUID SERVICE ONLY)

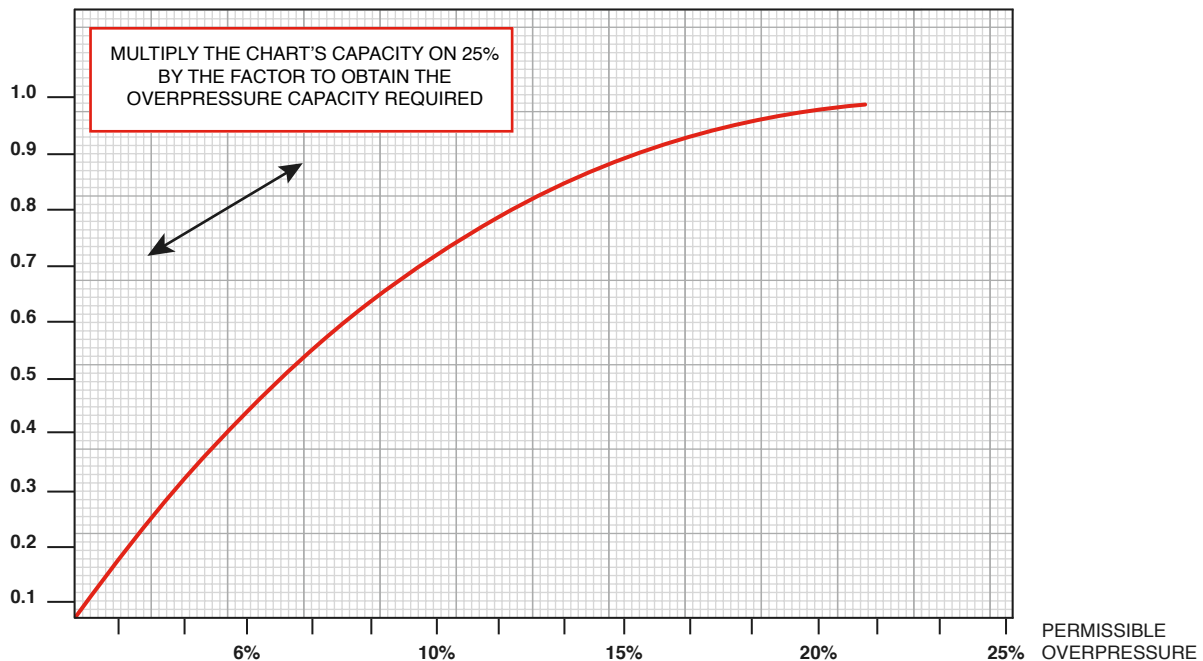
The tight control of fluid handling is as important as correctly calculating the size of a safety valve. This size should be determined based on work performed and not by the size of the existing pipe. When the quantity of fluid that passes through a valve is not known, the maximum size of the valve can be determined by the capacity of the piping into the valve outlet.

Note: The capacity tables shown are a guide for selecting the size of the valves. However, there are several factors involved in the flow of fluids, which may affect the capacity of valves and pipes. It is impossible to get a table that takes into consideration all previous variants; however, the use of the accompanying tables provides capabilities very close to reality.

Pipe capacities in gallons of water per minute based on maximum recommended speed

Piping size		Gallons per minute	Piping size		Gallons per minute
in	mm		mm	in	
1/2	13	2.5	2 1/2	64	94.0
3/4	19	6.0	3	76	155.0
1	25	10.0	4	102	320.0
1 1/4	32	22.0	6	152	830.0
1 1/2	38	38.0	8	203	1500.0
2	51	59.0	10	254	2450.0

Overpressure factors for liquids service relief valves



Application

WALWORTH relief valves are designed to protect equipment and processes against excess fluid pressure. The most usual applications are in tanks, pipelines and other containers where high capacity of relief is not required. These valves should be used in a non-corrosive liquid service bronze.

Selection

The proper selection of a safety valve depends greatly on the service for which it is designed, such as:

- Fluid handling
- Operating temperature.
- Pressure adjustment
- Required discharge capacity.

WALWORTH BRONZE RELIEF VALVES

APPLICATION AND SELECTION VALVE 2B20 & 2B20-3 WALWORTH STD. (LIQUID SERVICE ONLY)

Selection Example (find the valve model we most often use to protect the system)

It needs to protect a vessel containing air under pressure and have the following characteristics:

- Fluid handling: water
- Pressure adjustment: 8.79 Kg/cm² (125 lb/in²)
- Operating temperature: 15.6°C (60°F)
- Required discharge capacity: 75 gal/min
- Overpressure: 25%

Solution

For the flow to handle pressure and temperature limits, we realize we need a valve 2B20. To calculate the size of the valve we use the discharge capacity and pressure adjustment required, as follows:

In the table on page 24, find in the left column the required adjustment pressure: 8.79 Kg/cm² (125 Lb/in²); and in that row find the required capacity (75 gal/min) and select the immediate superior which in our case is 103 gal/min, corresponding to the column of the valve 1 1/2". Therefore, we must select a valve 2B20 of 1 1/2".

NOTE: To get capacities with overpressures different to 25%, view page 25.

Required information to select the proper valve (example)

Size	Model	Pressure adjustment	Fluid handling*	Overpressure*	Temperature*
38mm (1 1/2")	2B20	8.79 Kg/cm ² (125 psig)	Water	25%	15.6 °C (60 °F)

* To ensure the proper functioning of the valve, the Customer is required to provide the correct data; if not, WALWORTH shall consider the following features as standard.

1. Fluid: Water
2. Overpressure: 25%
3. Temperature: 15.6 °C (60 °F)

STEAM TESTING LABORATORY

Testing equipment

WALWORTH safety and relief bronze and steel valves are tested according to ASME Standard sections I and VIII which regulate boilers and pressure vessels building.

In WALWORTH, we are committed to our clients equipment, facilities and personnel safety, for this reason, we have implemented a steam testing laboratory in order to guarantee our safety and relief valves performance for steam service.



WALWORTH BRONZE RELIEF VALVES

TEMPERATURE CONVERSION TABLE

(-)273 to 22 °C		27 to 322 °C		327 to 622 °C		627 to 922 °C		927 to 1222 °C	
°C	°F	°C	°F	°C	°F	°C	°F	°C	°F
-273	-459.4	27	80.6	327.0	621	627	1161	927	1701
-268	-450.4	32.0	89.6	332.0	630	632	1170	932	1710
-263	-441.4	37.0	98.6	337.0	639	637	1179	937	1719
-258	-432.4	42.0	107.6	342.0	648	642	1188	942	1728
-253	-423.4	47.0	116.6	347.0	657	647	1197	947	1737
-248	-414.4	52.0	125.6	352.0	666	652	1206	952	1746
-243	-405.4	57.0	134.6	357.0	675	657	1215	957	1755
-238	-396.4	62.0	143.6	362.0	684	662	1224	962	1764
-233	-387.4	67.0	152.6	367.0	693	667	1233	967	1773
-228	-378.4	72.0	161.6	372.0	702	672	1242	972	1782
-223	-369.4	77.0	170.6	377.0	711	677	1251	977	1791
-218	-360.4	82.0	179.6	382.0	720	682	1260	982	1800
-213	-351.4	87.0	188.6	387.0	729	687	1269	987	1809
-208	-342.4	92.0	197.6	392.0	738	692	1278	992	1818
-203	-333.4	97.0	206.6	397.0	747	697	1287	997	1827
-198	-324.4	102.0	215.6	402.0	756	702	1296	1002	1836
-193	-315.4	107.0	224.6	407.0	765	707	1305	1007	1845
-188	-306.4	112.0	233.6	412.0	774	712	1314	1012	1854
-183	-297.4	117.0	242.6	417.0	783	717	1323	1017	1863
-178	-288.4	122.0	251.6	422.0	792	722	1332	1022	1872
-173	-279.4	127.0	260.6	427.0	801	727	1341	1027	1881
-168	-270.4	132.0	269.6	432.0	810	732	1350	1032	1890
-163	-261.4	137.0	278.6	437.0	819	737	1359	1037	1899
-158	-252.4	142.0	287.6	442.0	828	742	1368	1042	1908
-153	-243.4	147.0	296.6	447.0	837	747	1377	1047	1917
-148	-234.4	152.0	305.6	452.0	846	752	1386	1052	1926
-143	-225.4	157.0	314.6	457.0	855	757	1395	1057	1935
-138	-216.4	162.0	323.6	462.0	864	762	1404	1062	1944
-133	-207.4	167.0	332.6	467.0	873	767	1413	1067	1953
-128	-198.4	172.0	341.6	472.0	882	772	1422	1072	1962
-123	-189.4	177.0	350.6	477.0	891	777	1431	1077	1971
-118	-180.4	182.0	359.6	482.0	900	782	1440	1082	1980
-113	-171.4	187.0	368.6	487.0	909	787	1449	1087	1989
-108	-162.4	192.0	377.6	492.0	918	792	1458	1092	1998
-103	-153.4	197.0	386.6	497.0	927	797	1467	1097	2007
-98	-144.4	202.0	395.6	502.0	936	802	1476	1102	2016
-93	-135.4	207.0	404.6	507.0	945	807	1485	1107	2025
-88	-126.4	212.0	413.6	512.0	954	812	1494	1112	2034
-83	-117.4	217.0	422.6	517.0	963	817	1503	1117	2043
-78	-108.4	222.0	431.6	522.0	972	822	1512	1122	2052
-73	-99.4	227.0	440.6	527.0	981	827	1521	1127	2061
-68	-90.4	232.0	449.6	532.0	990	832	1530	1132	2070
-63	-81.4	237.0	458.6	537.0	999	837	1539	1137	2079
-58	-72.4	242.0	467.6	542.0	1008	842	1548	1142	2088
-53	-63.4	247.0	476.6	547.0	1017	847	1557	1147	2097
-48	-54.4	252.0	485.6	552.0	1026	852	1566	1152	2106
-43	-45.4	257.0	494.6	557.0	1035	857	1575	1157	2115
-38	-36.4	262.0	503.6	562.0	1044	862	1584	1162	2124
-33	-27.4	267.0	512.6	567.0	1053	867	1593	1167	2133
-28	-18.4	272.0	521.6	572.0	1062	872	1602	1172	2142
-23	-9.4	277.0	530.6	577.0	1071	877	1611	1177	2151
-18	-0.4	282.0	539.6	582.0	1080	882	1620	1182	2160
-13	8.6	287.0	548.6	587.0	1089	887	1629	1187	2169
-8	17.6	292.0	557.6	592.0	1098	892	1638	1192	2178
-3	26.6	297.0	566.6	597.0	1107	897	1647	1197	2187
2	35.6	302.0	575.6	602.0	1116	902	1656	1202	2196
7	44.6	307.0	584.6	607.0	1125	907	1665	1207	2205
12	53.6	312.0	593.6	612.0	1134	912	1674	1212	2214
17	62.6	317.0	602.6	617.0	1143	917	1683	1217	2223
22	71.6	322.0	611.6	622.0	1152	922	1692	1222	2232

DESIGN BASIS

All of WALWORTH's Valve Designs, when applicable, follow one or more of the following standards:

API Standards

American Petroleum Institute:

- **API 520** Sizing, Installation of Pressure-Relieving Devices in Refineries. Part I and II
- **API 521** Guide for Pressure-relieving and Depressurizing Systems
- **API 527** Seat Tightness of Pressure Relief Valves

ANSI Standards

National Standards Institute:

- **B 1.1** Unified Inch Screw Threads
- **B 1.20.1** Pipe Threads, General Purpose (Inch)

MSS Standards

Manufacturer's Standardization Society:

- **MSS SP-25** Standard marking system for valves, fittings, flanges and unions
- **MSS SP-55** Quality standard for steel castings for valves, flanges and fittings and other piping components - visual method for evaluation of surface irregularities

ASME B & PVC CODE

American Society of Mechanical Engineers:

- **SECTION I** Rules for Construction of Power Boilers
- **SECTION II** Materials-Part A-Ferrous Material Specifications
- **SECTION II** Materials-Part B-Nonferrous Material Specifications
- **SECTION V** Nondestructive Examination
- **SECTION VIII** Rules for Construction of Pressure Vessels Division 1 and 2

ASTM Standards

American Society for Testing and Materials:

- **ASTM A 276** Standard Specification for stainless and heat-resisting steel bars and shapes
- **B62** Standard Specification for Composition Bronze or Ounce Metal Castings
- **B283** Standard Specification for Copper and Copper-Alloy Die Forgings (Hot-Pressed)
- **B21** Standard Specification for Brass Rod, Bar, and Shapes



HOW TO ORDER

WALWORTH valves are designed using catalog figure numbers which describe their main characteristics. The valve identification system shown here is intended to assist our Customers in specifying the valve required and to avoid mistakes during manufacturing.



2B10 & 2B10-3 Models AS PER ASME B & PVC SECT. VIII

Size	Model	Set Pressure	Fluid handling*	Overpressure*	Temperature*
1"	2B10	150 psig	Air	10%	60 °F

Size	Model	Pressure adjustment	Fluid handling	Overpressure	Temperature
1/2"	2B10	Using Customer's specifications, consult adjustment pressure table depending on fluid service, shown in pages 16 to 18.	Steam= S	10%	Per customer's requirements.
3/4"					
1"	2B10-3		Gas= G		
1 1/4"			Air= A		
1 1/2"					
2"					
2 1/2"					

Note: Different overpressures from standard are available according to Customer's requirement.

2B20 & 2B20-3 Models WALWORTH STD. (Liquid service only)

Size	Model	Set Pressure	Fluid handling*	Overpressure*	Temperature*
1 1/2"	2B20	125 psig	Water	25%	60 °F

Size	Model	Set Pressure	Fluid handling	Overpressure	Temperature
1/2"	2B20	Per Customer's requirements consult adjustment pressure table depending on fluid service, shown in pages 24 to 25.	Water= W	25%	Per Customer's requirements.
3/4"					
1"	2B20-3		Non corrosive Bronze fluids= NCB		
1 1/4"					
1 1/2"					
2"					
2 1/2"					
3"					

Note: Different overpressures from standard are available according to Customer's requirement.

THE WALWORTH COMPANY GENERAL TERMS AND CONDITIONS

ACCEPTANCE: All quotations are for acceptance within 30 days from date of quotation unless extended in writing. In the event a purchase order is placed after this period of time. The WALWORTH Company reserves the right to quote base prices of all valves offered. All orders and contracts are subject to credit approval and acceptance by the WALWORTH Company.

FREIGHT: When prices are FOB point of shipment –no freight allowance, we will attempt to route shipments in the method which will result in the lowest cost unless otherwise instructed. All shipments will be freight charges collect except when stipulated on the purchase order, in which case you will be invoiced for all transportation charges. Delivery of material to a common carrier shall be considered to be delivery to Buyer and shall be at Buyer's risk thereafter. Claims of loss of or damage to material in transit shall be filed by the Buyer directly with the carrier.

PRICES: There will be added to all prices quoted sales, use, occupation or any other excise or similar tax which Seller may be required to pay or collect on or in connection with the sale. Seller shall be established by Federal, State or other government regulation with respect to the product(s) covered by the order which shall be lower than the price(s) specified in the order.

ESCALATION TERMS: Prices shown in this price schedule reflect the costs in effect at the time of publication. These prices will remain firm on all products with a quoted delivery of twenty-six (26) weeks or less. On products which have a scheduled delivery of more than twenty-six (26) weeks, the goods will be invoiced based on the applicable price sheet in effect at the time of shipment. In no event will the invoiced price be less than the price originally quoted.

PURCHASED COMPONENTS: (i.e. motors, gearing, etc.) Prices are quoted on supplier price in effect at time of quotation. Actual invoice Price will be adjusted in accordance with the supplier's escalation policy.

DEFERRED SHIPMENTS: If for any reason the customer desires to delay shipments more than 30 days after manufacturing is complete or to place a hold or stop to the order during the manufacturing cycle, The WALWORTH Company reserves the right to consider the order cancelled and to invoke cancellation charges per the schedule below.

CANCELLATION: After order acceptance by WALWORTH, items or completed orders may be cancelled and buyer will be charged for work performed, based on the following schedule:

- Five (5%) percent of prices of stock items.
- Ten (10%) percent of price of stock items ordered in quantities which exceed normal inventory levels.
- Five (5%) percent of prices prior to drawing submittal on made-to-order items.
- 15% after drawing approval, but prior to the start of castings.
- 30% to 50% during casting cycle, depending on the state of completion.
- 55% to 75% during machining and assembly operations, depending on the state of completion.
- 100% after final assembly and test.

REMITTANCES: Remittances must be made to the address indicated on the invoice.

CREDIT TERMS: As quoted. Invoices on balances overdue will be subject to a service charge of 11/2 % per month on such indebtedness.

DELIVERIES: Shipments and deliveries shall at all times be subject to the approval of Seller's Credit Department. If the Buyer shall fail to make any payments according to the terms of the contract, Seller may, in addition to and not in limitation of its other rights and remedies, at its option, cancel all or any part of Buyer's incomplete contracts with Seller or may defer shipments of deliveries under Buyer's contracts with Seller except upon receipt of satisfactory security or for cash shipment.

All schedule of shipments are estimated as closely as possible and Seller will use its best efforts to ship within the time scheduled, but does not guarantee to do so. Schedules commence with the date Seller receives authorization to proceed with order, subject to the provisions of the next sentence. The

order will not be released for manufacture until complete specifications and approved drawings (if drawing approval is required) are received at the plant of manufacture and the estimated schedule of shipment will commence with the date of such receipt.

Seller shall not be liable for any direct, indirect or consequential damage or loss caused by any delay in delivery, regardless of the cause of delay. Without limiting the generality of the foregoing, Seller assumes no responsibility for delays in delivery resulting from fire, flood, accidents, riots, strikes, transportation delays, labor or material shortages, existing or future laws, acts of any governmental authority, or any other cause beyond Seller's control. Items offered from stock are subject to prior sale.

INSPECTION: Final inspection and acceptance of products must be made at the plant of manufacture, unless otherwise provided in the order and/ or in agreed upon specifications. Prices do not include charges for special tests or inspections performed at the request of the Buyer, unless called for in the order and/or in agreed upon specifications.

RETURNS: Permission in writing and return tagging instructions must be obtained from Seller before any goods returned for credit or adjustment will be acceptance. Where returned goods are accepted, a minimum charge of 25% of the invoice price will be made, plus freight from both directions and costs of reconditioning the material for resale as new.

WARRANTY CERTIFICATE: WALWORTH, exhibits this product Warranty, for a 12 month period in operation or 18 months in storage, whatever comes first as of the date of product delivery.

WALWORTH, guarantees that products are fabricated according to quality, design and manufacturing standards and customer requirements as well. When the buyer expressly and in written confirms the non-compliance of such standards, WALWORTH is forced to comply with the repair, replacement or to issue the written authorization for the buyer or another agent, to replace or repair at no cost for the buyer, at WALWORTH fabrication costs, those parts confirmed as defective.

This warranty is valid when the material selection by the customer for the design, material arrangement (TRIM, bodies, ends, operation devices, etc.) internal and/ or external overlays had been the proper ones for the operation fluid. This warranty is applicable if operation and service conditions are maintained as per the requirements of the product.

To validate the Warranty, the user is responsible of performing the proper maintenance according to what is stated in the Operation and Maintenance Manual applicable to the product. WALWORTH, reserves the right to request the records (evidence) to confirm the correct maintenance.

WALWORTH obligations are limited and will be released of any responsibility when the products are altered, repaired or replaced without WALWORTH' s written authorization.

Except of what is stated in this document WALWORTH waives and excludes any other warranty expressed or implied, for loss, direct damage, indirect damage or consequential of other products, processes, installations or equipment of the buyer or end user, either partial or total, due to material defects and/or work and/or WALWORTH product design.

DESIGN, ETC: Seller reserves the right to change design, materials or specifications without notice. There will be a charge for modifying an order after it has been entered when such change or modification results in additional engineering or clerical work for either The WALWORTH Company or our suppliers.

MINIMUM CHARGE: Orders totaling less than \$100.00 USD net will be billed at a minimum charge of \$100.00 USD. Repair parts will be billed at a minimum charge of \$50.00 USD.

NOTE: We reserve the right to correct obvious clerical errors in quotations, invoices, and other contracts.



WALWORTH[®]

Since 1842



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