



Safety Relief Valves

Process Control &
Safety Valve Solutions



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SHANGHAI THINKTANK PROCESS MANAGEMENT CO., LTD

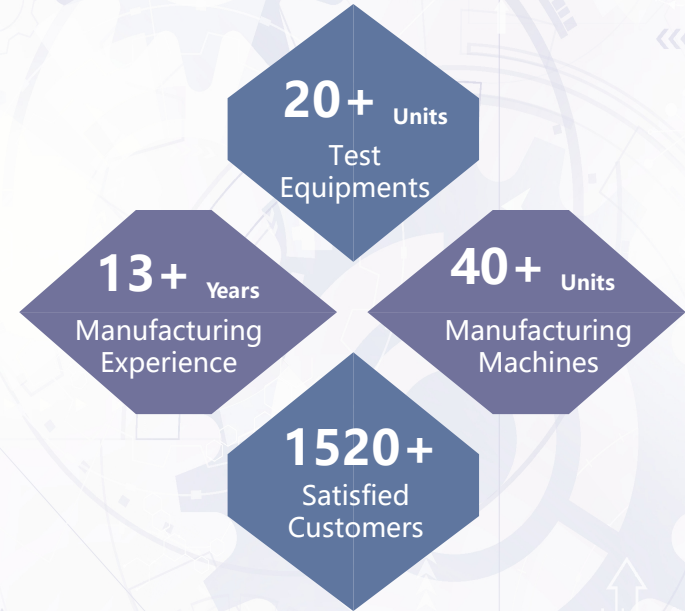
Applications

- 1 Oil & Gas
- 2 Power & Energy
- 3 Ship Building
- 4 LNG & LPG
- 5 Chemicals & Petrochemicals
- 6 Boiler Manufacturer
- 7 Process Industries

Quality Assurance

THINKTANK Safety Valve Overview

- Specialized manufacturer integrating R&D, production, and sales
- Designs & manufactures to GB, ANSI, API, DIN, JIS standards
- Certified: CE PED Module B + Module D
- Nominal sizes: DN10–DN600 (1/2"–24")
- Pressure ratings: PN6–PN420 (0.6–42.0 MPa), 150LB–2500LB
- Operating temperature range: -196°C to 570°C



Safety Valves Overview (1)



TT-A21H/W/F



TT-A27H



TT-A28H/Y



TT-A41H



TT-A47H



TT-A42Y



TT-A48Y



TT-A44Y



TT-A37H/A43H



TT-A38Y



TT-A42Y



TT-A41Y

Safety Valves Overview (2)



TT-A42F/AH42F



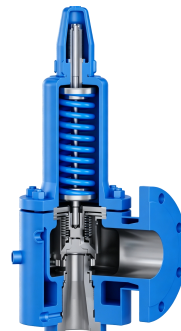
TT-AHN42F/WAHN42F



TT-A40Y



TT-WA42Y



TT-BWA42Y



TT-A48SH



TT-VA72W



TT-YA42H/802Y



TT-A46Y/F



TT-A68SB

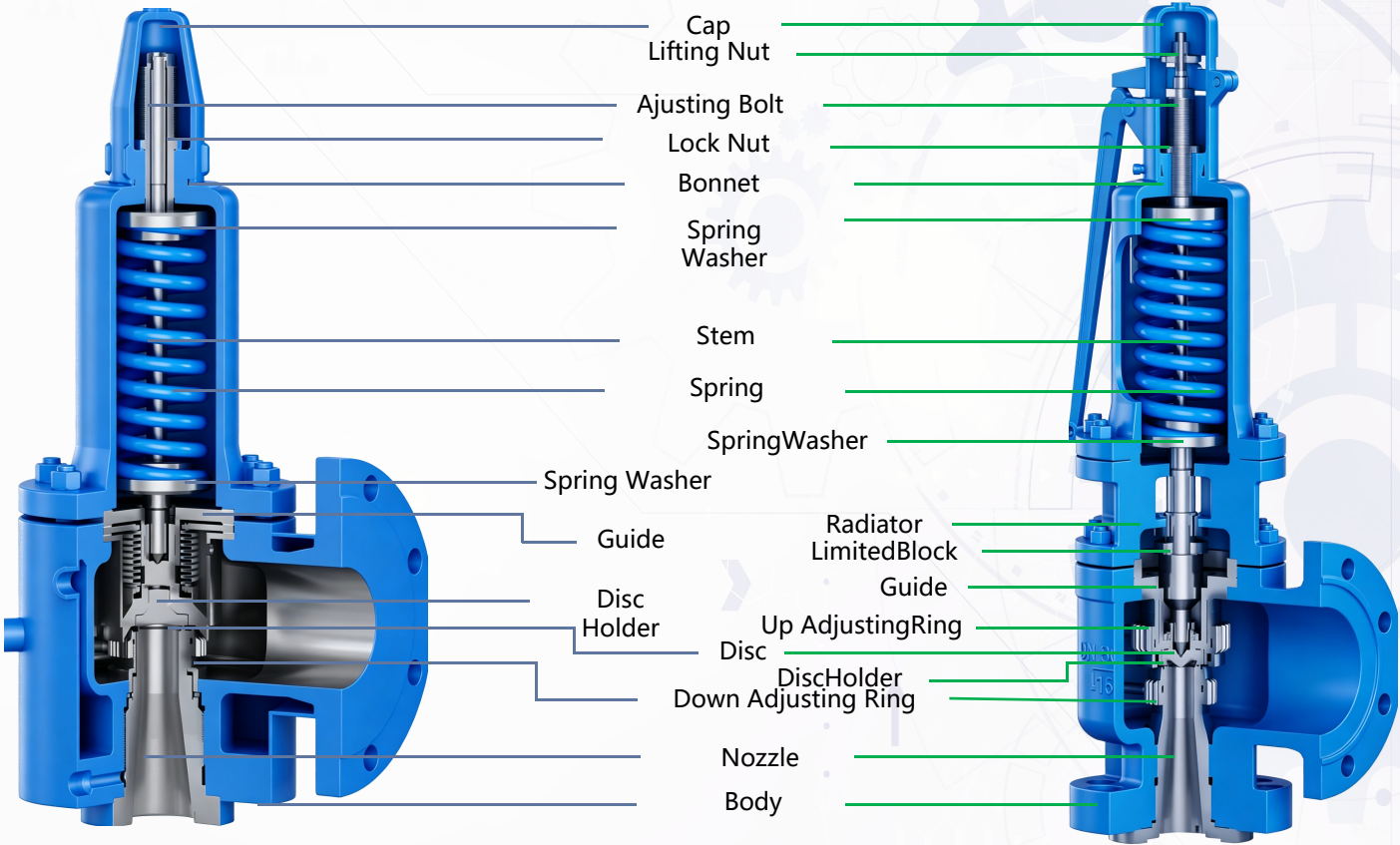


TT-A48SH



TT-A900

Main Parts



Main Parts

Parts Name	C	I	V	P	R	RL
Body	WCB	ZG15Cr1Mo	ZG15Cr1Mo1V / ZG20Cr1Mo1V	CF8 (304)	CF8M (316)	CF3M (316L)
Disc / Nozzle	20Cr13	06Cr19Ni10	06Cr19Ni10 / 17-4PH	06Cr19Ni10 (304)	06Cr17Ni12Mo2 (316)	022Cr17Ni12Mo2 (316L)
Disc Holder / Guide	20Cr13	06Cr19Ni10	06Cr19Ni10	06Cr19Ni10 (304)	06Cr17Ni12Mo2 (316)	022Cr17Ni12Mo2 (316L)
Bonnet	WCB	WCB	ZG15Cr1Mo	WCB / CF8	CF8	CF8
Spring	50CrVA	50CrVA / 30W4Cr2VA	50CrVA / 30W4Cr2VA	50CrVA with fluoropolymer coating / 304	50CrVA with fluoropolymer coating / 304	50CrVA with fluoropolymer coating / 304
Spindle	20Cr13	1Cr17Ni2	1Cr17Ni2	06Cr19Ni10	AISI 316	AISI 316L
Sealing Surface Material	Iron-based alloy	Cobalt-based alloy	Cobalt-based alloy	Cobalt-based alloy	Cobalt-based alloy	Cobalt-based alloy

Performance Specification Table

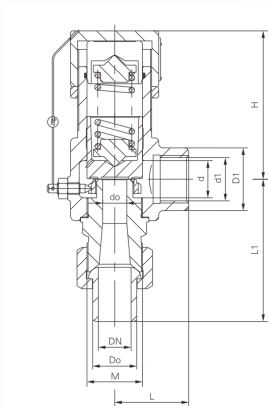
Applicable Medium	Shell Test Pressure PS (MPa)	Seal Test Pressure Pm (MPa)	Blowdown ΔP (MPa)	Discharge Pressure Pp (MPa)	Lift Height H (mm)
Safety valve for steam	—	90%Pk or the minimum reseating pressure, whichever is smaller	- When $P_k \leq 0.4$: $\Delta P \leq 0.04$ - When $P_k > 0.4$: $\Delta P \leq 10\%P_k$	$\leq 1.03P_k$	Full lift type: $\geq 1/4$ do Low lift type: $\geq 1/20$ do
Safety valve for air or other gases	1.5 PN	- When $P_k \leq 0.3$: $P_m = P_k - 0.03$ - When $P_k > 0.3$: $P_m = 90\%P_k$	- When $P_k \leq 0.2$: $\Delta P \leq 0.03$ - When $P_k > 0.2$: $\Delta P \leq 15\%P_k$	$\leq 1.1P_k$	Full lift type: $\geq 1/4$ do Low lift type: $\geq 1/20$ do
Safety valve for water or other liquids	—	- When $P_k \leq 0.3$: $P_m = P_k - 0.06$ - When $P_k > 0.3$: $P_m = 80\%P_k$	- When $P_k \leq 0.3$: $\Delta P \leq 0.06$ - When $P_k > 0.3$: $\Delta P \leq 20\%P_k$	$\leq 1.2P_k$	Full lift type: $\geq 1/4$ do Low lift type: $\geq 1/20$ do

Note

- P_k = Set pressure
- do = Orifice diameter

TT-A21H/W/F

Spring Low Lift Extenal Threaded Safety Valve



■ TT-A21H

- Suitable for equipment and pipelines handling air, ammonia, petroleum gas, and similar media.

- Operating temperature: $\leq 200^{\circ}\text{C}$.

■ TT-A21W

- Designed for equipment and pipelines conveying corrosive gases or liquids.

- Operating temperature: $\leq 200^{\circ}\text{C}$.

■ TT-A21F

- Applicable to equipment and pipelines handling liquefied gas, petroleum gas, and similar media.

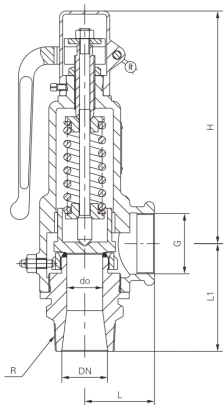
- Operating temperature: $\leq 80^{\circ}\text{C}$.

- Serves as an overpressure protection device.

Model	DN	Orifice do (mm)	d (mm)	Do (mm)	Thread M	Inlet Thread d1	D1 (mm)	L (mm)	L1 (mm)	H (approx., mm)
TT-A21H/W/F-16/25/40C/P/R	15	12	15	20	M27×1.5	G1/2"	30	35	81	74
	20	16	20	25	M33×1.5	G3/4"	34	40	87	81
	25	18	25	31	M39×1.5	G1"	44	52	100	105
TT-A21Y/W-64/100C/P/R	15	10	15	25	M36×1.5	G1"	44	52	100	105
	20	10	20	31	M39×1.5	G1"	44	52	100	105
	25	12	25	31	M42×1.5	G1"	44	52	100	105

TT-A27H/Y

Spring Low Lift External Threaded Safety Valve with Lever



■ TT-A27H

- Suitable for equipment and pipelines handling water, air, steam, and similar media.
- Operating temperature: $\leq 200^{\circ}\text{C}$.

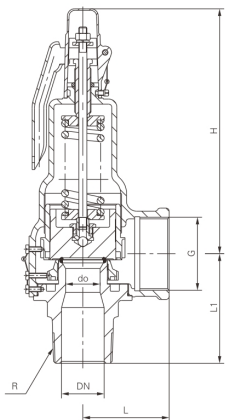
■ TT-A27Y-P/R

- Designed for equipment and pipelines handling corrosive media.
- Operating temperature: $\leq 200^{\circ}\text{C}$.
- Functions as an overpressure protection device.

DN	Orifice do (mm)	R (Thread)	L (mm)	L ₁ (mm)	G (Thread)	≈ H (mm)
15	10	1/2"	40	65	1/2"	135
20	15	3/4"	45	65	3/4"	140
25	20	1"	45	76	1"	155
32	25	1 1/4"	55	85	1 1/4"	170
40	32	1 1/2"	60	90	1 1/2"	310
50	40	2"	67	105	2"	322
65	50	2 1/2"	76	115	2 1/2"	344
80	65	3"	110	145	3"	395

TT-A28H/Y

Spring Full Lift Extenal Threaded Safety Valve with Lever



■ TT-A28H/Y

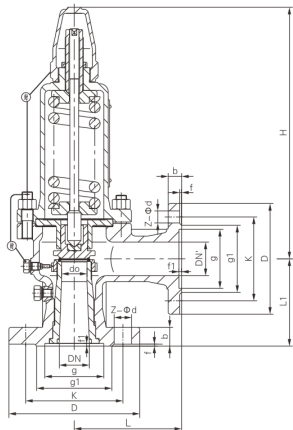
- Suitable for equipment and pipelines handling air, steam, water, and ammonia mixtures.
- Operating temperature: up to 200°C.

■ TT-A28Y-P/R

- Designed for equipment and pipelines handling corrosive media.
- Operating temperature: $\leq 200^{\circ}\text{C}$.
- Serves as an overpressure protection device.

DN	Orifice do (mm)	R (Thread)	G (Thread)	L (mm)	L ₁ (mm)	≈ H (mm)
15	10	1/2"	3/4"	42	55	136
20	12	3/4"	1"	45	60	136
25	15	1"	1 1/4"	52	68	153
32	20	1 1/4"	1 1/2"	65	80	224
40	25	1 1/2"	2"	75	95	225
50	32	2"	2 1/2"	85	108	242
65	40	2 1/2"	3"	110	145	242

TT-A41H Spring Low Lift Enclosed Safety Valve



■ TT-A41H

- Spring-loaded safety valve.
- Suitable for equipment and pipelines handling petroleum, air, water, and similar media.
- Operating temperature: $\leq 300^{\circ}\text{C}$.

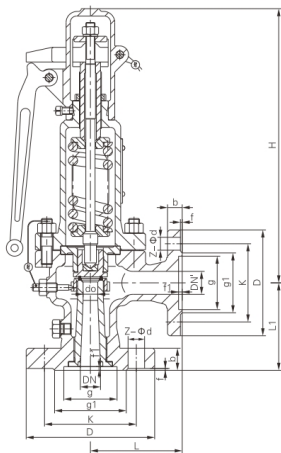
■ A41H-P/R

- Designed for equipment and pipelines handling corrosive media.
- Operating temperature: $\leq 200^{\circ}\text{C}$.
- Serves as an overpressure protection device.

PN	DN)	Orifice do (mm)	DN'	L (mm)	L ₁ (mm)	≈ H (mm)
PN16 / 25 / 40	20	15	20	100	85	275
	25	20	25	100	85	275
	32	25	32	115	100	285
	40	32	40	120	110	285
	50	40	50	135	120	355
	65	50	65	140	130	390
	80	65	80	160	135	394
	100	80	100	170	160	500
	125	100	125	190	190	570
	150	125	150	205	195	585
	200	150	200	240	230	710
PN64 / 100	250	200	250	350	320	905
	20	15	20	100	95	268
	25	20	25	100	95	268
	32	25	32	115	105	279
	40	32	40	135	115	330
	50	40	50	160	130	365
	65	50	65	175	160	503
	80	65	80	175	160	498
	100	80	100	190	180	530
	150	100	150	280	260	657

TT-A47H

Spring Low Lift Safety Valve with Lever

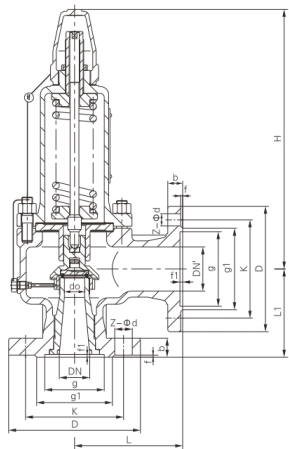


■ TT-A47H

- Applicable media: steam, air, and similar gases
- Maximum operating temperature: $\leq 350\text{ }^{\circ}\text{C}$
- Application: equipment or piping systems
- Function: overpressure protection

Nominal Pressure (PN)	Nominal Diameter (DN)	do	DN'	L	L _i	≈ H
PN16 / 25 / 40	20	15	20	100	85	298
	25	20	25	100	85	298
	32	25	32	115	100	310
	40	32	40	120	110	315
	50	40	50	135	120	377
	65	50	65	140	130	415
	80	65	80	160	135	420
	100	80	100	170	160	539
	125	100	125	190	190	624
	150	125	150	205	195	636
	200	150	200	240	230	772
	250	200	250	350	320	970
PN64 / 100	20	15	20	100	95	301
	25	20	25	100	95	301
	32	25	32	115	105	312
	40	32	40	135	115	366
	50	40	50	160	130	401
	65	50	65	175	160	570
	80	65	80	175	160	565
	100	80	100	190	180	597
	150	100	150	280	260	738

TT-A42Y Spring Full Lift Enclosed Safety Valve



■ TT-A42Y-C

- Applicable media: air, petroleum gas, liquids, and similar media
- Maximum operating temperature: $\leq 300^{\circ}\text{C}$
- Application: equipment or piping systems
- Function: overpressure protection

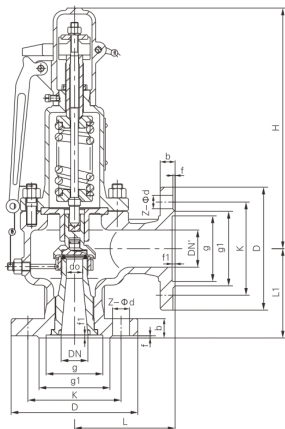
■ TT-A42Y-P/R

- Applicable media: corrosive media
- Maximum operating temperature: $\leq 200^{\circ}\text{C}$
- Application: equipment or piping systems
- Function: overpressure protection

Nominal Pressure (PN)	Nominal Diameter (DN)	do	DN'	L	L ₁	≈ H
PN16 / 25 / 40	20	15	25	110	95	281
	25	16	32	110	95	281
	32	20	40	115	100	285
	40	25	50	120	110	295
	50	32	65	135	120	305
	65	40	80	160	140	394
	80	50	100	170	135	406
	100	65	125	205	160	511
	125	80	150	210	190	586
	150	100	175	255	230	601
	200	125	250	305	260	734
	250	150	300	350	320	928
	300	200	400	370	350	1159
	350	250	500	375	415	1314
	400	280	500	395	415	1530
PN64 / 100	20	12	25	110	100	276
	25	16	32	110	100	276
	32	20	40	130	110	287
	40	25	50	135	120	292
	50	32	65	160	130	383
	65	40	80	175	160	497
	80	50	100	175	160	489
	100	65	125	195	195	562
	150	100	200	285	260	832

TT-A48Y

Spring Full Lift Safety Valve with Lever



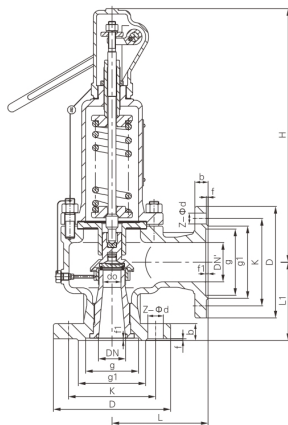
■ TT-A48Y

- Applicable media: steam, air, and similar media
- Maximum operating temperature: $\leq 350\text{ }^{\circ}\text{C}$
- Application: equipment or piping systems
- Function: overpressure protection

Nominal Pressure (PN)	Nominal Diameter (DN)	do	DN'	L	L ₁	≈ H
PN16 / 25 / 40	20	15	25	110	95	306
	25	16	32	110	95	306
	32	20	40	115	100	309
	40	25	50	120	110	323
	50	32	65	135	120	333
	65	40	80	160	140	420
	80	50	100	170	135	432
	100	65	125	205	160	553
	125	80	150	210	190	639
	150	100	200	255	230	654
	200	125	250	305	260	797
	250	150	300	350	320	998
	300	200	400	370	350	1246
	350	250	500	375	415	1494
	400	280	500	395	415	1780
PN64 / 100	20	12	25	110	100	305
	25	16	32	110	100	305
	32	20	40	130	110	318
	40	25	50	135	120	323
	50	32	65	160	130	415
	65	40	80	175	160	531
	80	50	100	175	160	541
	100	65	125	195	195	624
	150	100	200	285	260	903

TT-A44Y

Spring Full Lift Enclosed Safety Valve with Lever



■ TT-A44Y-C

- Applicable media: air, steam, petroleum, and similar media
- Maximum operating temperature: $\leq 300\text{ }^{\circ}\text{C}$
- Application: equipment or piping systems
- Function: overpressure protection

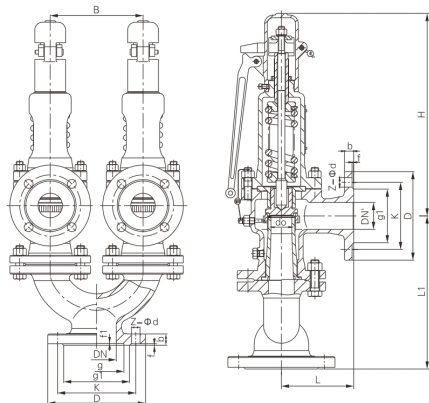
■ A44Y-P/R

- Applicable media: corrosive media
- Maximum operating temperature: $\leq 200\text{ }^{\circ}\text{C}$
- Application: equipment or piping systems
- Function: overpressure protection

Nominal Pressure (PN)	Nominal Diameter (DN)	do	DN'	L	L _i	≈ H
PN16 / 25 / 40	20	15	25	110	95	307
	25	16	32	110	95	307
	32	20	40	115	100	311
	40	25	50	120	110	330
	50	32	65	135	120	340
	65	40	80	160	140	426
	80	50	100	170	135	438
	100	65	125	205	160	557
	125	80	150	210	190	641
	150	100	175	255	230	656
	200	125	250	305	260	795
	250	150	300	350	320	995
	300	200	400	370	350	1263
	350	250	500	375	415	1711
	400	280	500	395	415	1780
PN64 / 100	20	12	25	110	100	306
	25	16	32	110	100	306
	32	20	40	130	110	325
	40	25	50	135	120	330
	50	32	65	160	130	421
	65	40	80	175	160	535
	80	50	100	175	160	545
	100	65	125	195	195	626
	150	100	200	285	260	899

TT-A37H/A43H

Dual Spring Safety Valve (Low Lift)



TT-A37H = 2 × TT-A47H + Y-type Junction
TT-A43H = 2 × TT-A47H + Y-type Junction

■ Use

- Suitable for equipment and pipelines handling steam, air, and similar media with a maximum operating temperature of $\leq 350^\circ\text{C}$.
- The valve automatically opens to relieve excess pressure and closes at the set pressure, ensuring safe operation.

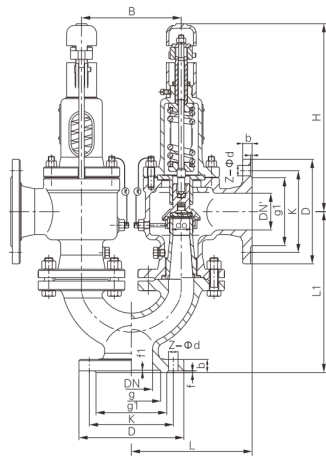
■ Description

- Two safety valves of the same model and size are installed on a Y-type junction.
- The nominal diameter refers to the inlet diameter of the Y-junction.

Type	DN	L	L ₁	B	DN'	do	≈ H
TT-A37H – PN16 / 25 / 40C	50	115	225	165	32	2×25	310
	80	140	310	205	65	2×50	415
	100	160	355	255	80	2×65	420
	125	170	400	275	100	2×80	540
	150	190	440	300	125	2×100	625
TT-A43H – PN16 / 25 / 40C	50	115	225	165	32	2×25	310
	80	135	285	190	50	2×40	380
	100	160	355	255	80	2×65	420
	125	170	400	275	100	2×80	540
	150	190	440	300	125	2×100	625

TT-A37H Nominal Diameter (DN)	50	80	100	125	150
Relevant TT-A47H Nominal Diameter (DN)	32	65	80	100	125
TT-A43H Nominal Diameter (DN)	50	80	100	125	150
Relevant TT-A47H Nominal Diameter (DN)	32	50	80	100	125

TT-A38Y Dual Spring Safety Valve (Full Lift)



TT-A38Y = 2 × TT-A48Y + Y-type

■ Use Junction

- Suitable for equipment and pipelines handling steam, air, and similar media with a maximum operating temperature of ≤ 350 °C.
- The valve automatically opens to relieve excess pressure and closes at the set pressure, ensuring safe operation.

■ Description

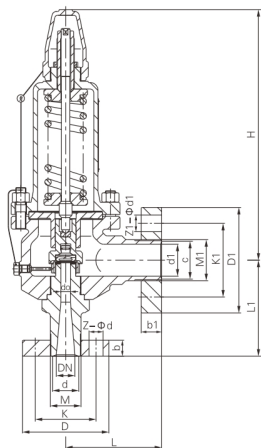
- Two safety valves of the same model and size are installed on a Y-type junction.
- The nominal diameter refers to the inlet diameter of the Y-type junction.

Type	DN	L	L _i	B	DN'	do	≈ H
TT-A38Y – PN16 / 25 / 40C	50	198	225	165	40	2×20	310
	80	230	285	190	65	2×32	335
	100	275	350	230	80	2×40	420
	150	343	400	275	125	2×65	555

TT-A38Y Nominal Diameter (DN)	50	80	100	150
Relevant TT-A48Y Nominal Diameter (DN)	32	50	65	100

TT-A42Y

Spring Full Lift Enclosed High Pressure Safety Valve



■ TT-A42Y-160 / 320C

- Applicable media: air, ammonia-hydrogen mixed gas, and similar media
- Maximum operating temperature: $\leq 200\text{ }^{\circ}\text{C}$
- Application: equipment and piping systems
- Function: overpressure protection

■ TT-A42Y-160P/R & A42Y-320P/R

- Applicable media: corrosive gases
- Maximum operating temperature: $\leq 200\text{ }^{\circ}\text{C}$
- Application: equipment and piping systems
- Function: overpressure protection

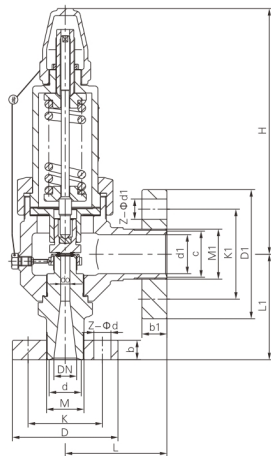
■ Flange Standard

- In accordance with JB/T 2769 standard

Type	DN	do	d	M	D	K	Z-φd	b	d ₁	C	M ₁	D ₁	K ₁	Z ₁ -φ _{d₁}	b ₁	L	L ₁	≈ H
TT-A42Y-160	15	8	20	M24× 2	95	60	3-18	20	29	37	M42× 2	115	80	4-18	22	95	100	263
	20	10	27	M33× 2	105	68	3-18	20	29	37	M42× 2	115	80	4-18	22	95	100	263
	25	12	28	M33× 2	105	68	3-18	20	40	47	M52× 2	165	115	6-26	28	135	130	314
	32	15	37	M42× 2	115	80	4-18	22	50	59	M64× 3	165	115	6-26	32	150	150	390
	40	20	47	M52× 2	165	115	6-26	28	65	74	M80× 3	200	145	6-29	40	180	165	495
	50	25	59	M64× 3	165	115	6-26	32	80	94	M100× 3	225	170	6-33	45	190	190	510
TT-A42Y-320	15	8	27	M33× 2	105	68	3-18	20	29	37	M42× 2	115	80	4-18	22	95	100	263
	20	10	32	M36× 2	110	75	3-18	22	29	37	M42× 2	115	80	4-18	22	95	100	263
	25	12	35	M42× 2	115	80	4-18	22	40	47	M52× 2	165	115	6-26	28	135	130	314
	32	14	41	M48× 2	135	95	4-22	25	50	59	M64× 3	165	115	6-26	32	150	150	390
	40	18	58	M64× 3	165	115	6-26	32	65	74	M80× 3	200	145	6-29	40	180	165	495
	50	23	70	M80× 3	200	145	6-29	40	80	94	M100× 3	225	170	6-33	45	190	190	510
TT-A42Y-400	32	15	41	M48× 2	135	95	4-22	25	50	59	M64× 3	165	115	6-26	32	150	150	397

TT-A41Y

Spring Low Lift Enclosed High Pressure Safety Valve



■ TT-A41Y-160 / 320C

- Applicable media: air, ammonia-hydrogen mixed gas, water, and similar media
- Maximum operating temperature: $\leq 200\text{ }^{\circ}\text{C}$
- Application: equipment and piping systems
- Function: overpressure protection

■ TT-A41Y-160P/R & A42Y-320P/R

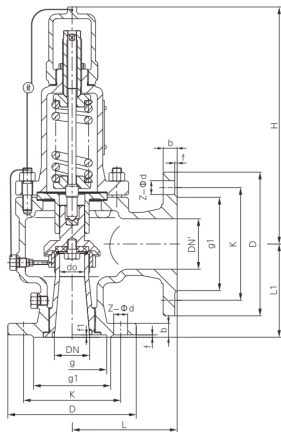
- Applicable media: corrosive gases or liquids
- Maximum operating temperature: $\leq 200\text{ }^{\circ}\text{C}$
- Application: equipment and piping systems
- Function: overpressure protection

■ Flange Standard

- In accordance with JB/T 2769 standard

Type	DN	do	d	M	D	K	Z-φd	b	d _i	C	M _i	D _i	K _i	Z _i -φd	b _i	L	L _i	≈ H
TT-A41Y-160	15	8	20	M24×2	95	60	3-18	20	29	37	M42×2	115	80	4-18	22	95	100	263
	20	10	27	M33×2	105	68	3-18	20	29	37	M42×2	115	80	4-18	22	95	100	263
	25	12	28	M33×2	105	68	3-18	20	40	47	M52×2	165	115	6-26	28	135	130	285
	32	15	37	M42×2	115	80	4-18	22	50	59	M64×3	165	115	6-26	32	130	135	285
	40	20	47	M52×2	165	115	6-26	28	65	74	M80×3	200	145	6-29	40	180	165	495
	50	25	58	M64×3	165	115	6-26	32	80	94	M100×3	225	170	6-33	45	190	190	510
TT-A41Y-320	15	8	27	M33×2	105	68	3-18	20	29	37	M42×2	115	80	4-18	22	95	100	263
	20	10	32	M36×2	110	75	3-18	22	29	37	M42×2	115	80	4-18	22	95	100	263
	25	12	35	M42×2	115	80	4-18	22	40	47	M52×2	165	115	6-26	28	135	130	285
	32	14	41	M48×2	135	95	4-22	25	50	59	M64×3	165	115	6-26	32	130	135	285
	40	18	58	M64×3	165	115	6-26	32	65	74	M80×3	200	145	6-29	40	180	165	495
	50	23	70	M80×3	200	145	6-29	40	80	94	M100×3	225	170	6-33	45	190	190	510

TT-A42F/AH42F LPG Safety Valve/Safety Reflux Valve



■ TT-A42F

- Applicable media: liquefied petroleum gas (LPG) and other similar non-corrosive media
- Operating temperature range: -29 °C to +80 °C
- Application: equipment and pipeline systems

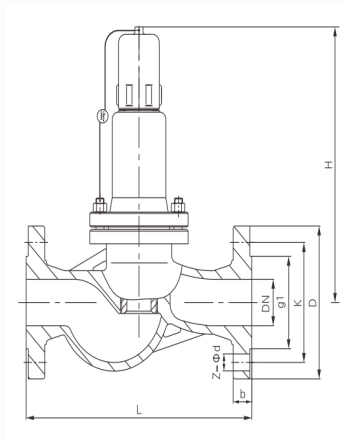
■ TT-AH41F

- Application: liquid backflow pipelines at the outlet of LPG storage tank pumps
- Function: overpressure protection
- When the internal pressure of the equipment or piping exceeds the allowable set pressure, the valve automatically opens for full discharge and closes again when the pressure returns to the set value, ensuring safe operation of the system.

Nominal Diameter (DN)	do	DN'	L	L _i	≈ H
20	15	25	110	95	281
25	16	32	110	95	281
32	20	40	115	100	285
40	25	50	120	110	295
50	32	65	135	120	305
65	40	80	160	140	394
80	50	100	170	135	406
100	65	125	205	160	511
125	80	150	210	190	586
150	100	175	255	230	601
200	125	250	305	260	734
250	150	300	350	320	928
300	200	400	370	350	1159
350	250	500	375	415	1314

TT-AHN42F/WAHN42F

Parallel Safety Reflux Valve



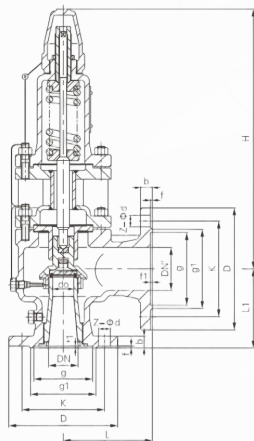
AHN42F-P18 and WAHN42F-P18 Safety Backflow Valves are designed for liquid backflow pipelines at the outlet of LPG storage tank pumps.

When the pump inlet pressure exceeds the specified set pressure, the valve automatically opens to provide a safe backflow function, ensuring the safe operation of the equipment and pipeline system.

DN	D	K	G _i	B	Z _i - φd	L	≈ H
40	150	110	85	16	4-18	200	346
50	160	125	100	16	4-18	230	346
65	180	145	120	20	4-18	290	440
80	195	160	135	20	8-18	310	540
100	215	180	155	22	8-18	350	570

TT-A40Y

Spring Full Lift Safety Valve with Enclosed Radiator



■ TT-A40Y-C

Suitable for services with a maximum operating temperature of $\leq 400\text{ }^{\circ}\text{C}$.

■ TT-A40Y-I

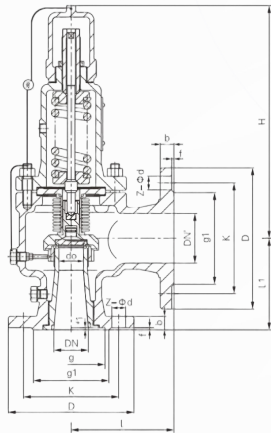
Suitable for services with a maximum operating temperature of $\leq 450\text{ }^{\circ}\text{C}$, handling media such as air, petroleum gas, and hydrogen–nitrogen mixed gases.

All TT-A40Y safety valves are installed on equipment or pipelines as an overpressure protection device (safety valve).

Nominal Pressure (PN)	Nominal Diameter (DN)	do	DN'	L	L _i	≈ H
16 / 25 / 40	20	15	25	110	95	360
	25	16	32	110	95	360
	32	20	40	115	100	365
	40	25	50	120	110	380
	50	32	65	135	120	400
	65	40	80	160	140	500
	80	50	100	170	135	512
	100	65	125	205	160	635
	125	80	150	210	190	710
	150	100	175	255	230	725
	200	125	250	305	260	880
64 / 100	20	12	25	110	100	355
	25	16	32	110	100	355
	32	20	40	130	110	375
	40	25	50	135	120	390
	50	32	65	160	130	495
	65	40	80	175	160	605
	80	50	100	175	160	615
	100	65	125	195	195	695
	150	100	200	285	260	995

TT-WA42Y

Bellows Back Pressure Balanced Full Lift Safety Valve



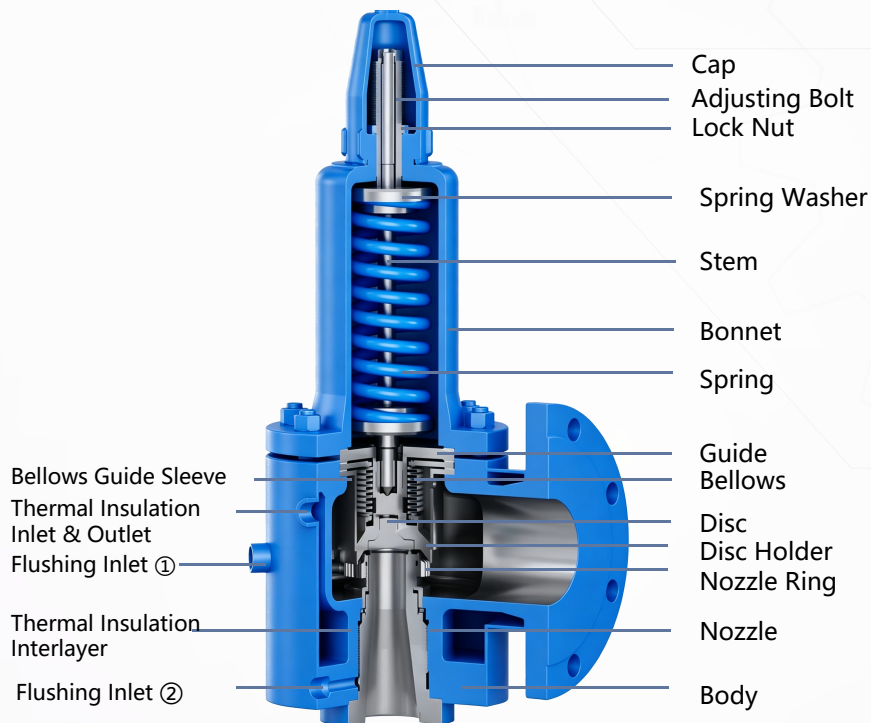
■ TT-WA42Y

This valve is suitable for equipment or piping systems with operating temperatures up to 300 °C, where variable back pressure exists and the handled media are toxic, flammable, or corrosive. It is used as an overpressure protection device (safety valve).

Nominal Diameter (DN)	do	DN'	L	L ₁	≈ H
20	15	25	110	95	281
25	16	32	110	95	281
32	20	40	115	100	285
40	25	50	120	110	295
50	32	65	135	120	305
65	40	80	160	140	394
80	50	100	170	135	406
100	65	125	205	160	511
125	80	150	210	190	586
150	100	175	255	230	601
200	125	250	305	260	734
250	150	300	350	320	928
300	200	400	370	350	1159
350	250	500	375	415	1314

TT-BWA42Y

Insulated Bellows Back Pressure Balanced Full Lift Safety Valve



■ Application

Designed as an insulated pressure safety valve for services requiring heat preservation in polyether, ethylene, urea (fertilizer), and similar process units.

■ Thermal insulation design

The valve body, including inlet and outlet flanges, is fully insulated to ensure effective heat retention.

Optional steam flushing / steam purging function can be provided for special service requirements.

■ Balanced bellows construction

Balanced bellows design ensures that fluctuating back pressure does not affect the set pressure.

The bellows isolates bonnet internals (spring and related components) from the process medium, providing effective corrosion protection.

■ Standard trim materials

Standard internals (disc and seat) are manufactured from austenitic stainless steel, with Stellite hardfacing applied to the sealing surfaces.

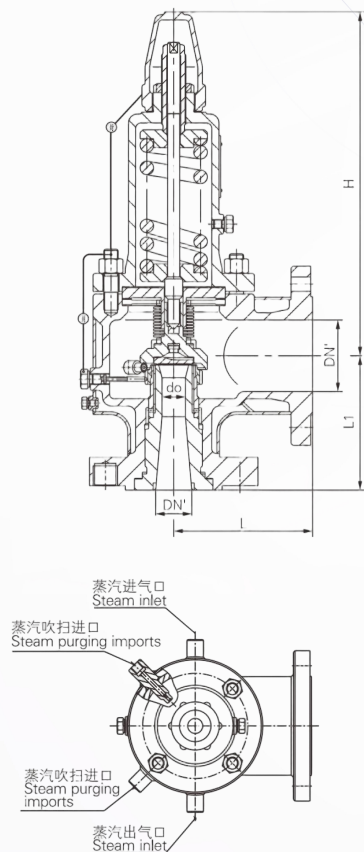
■ Optional materials for severe service

Internals can be supplied in Urea-grade 316L, duplex stainless steels, and special alloys including 0Cr25Ni6Mo3CuN, 00Cr25Ni6Mo2N, as well as super duplex stainless steels:
F51 (UNS S31803), F53 (UNS S32750), F55 (UNS S32760).

TT-BWA42Y

Insulated Bellows Back Pressure Balanced Full Lift Safety Valve

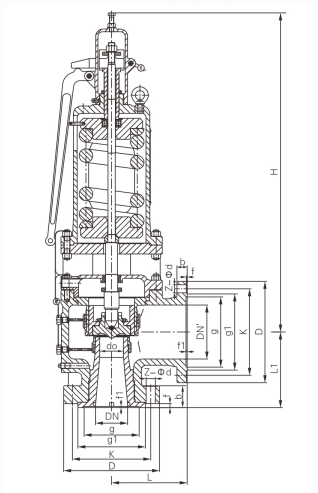
The TT-BWA42 type safety valve is intended for use in polymer, ethylene, and urea process units. The safety valve is equipped with a thermal insulation jacket and steam purging (blowing) connections, ensuring safe and reliable system operation.



Nominal Pressure (PN)	Nominal Diameter (DN)	do	DN'	L	L ₁	≈ H
PN 16 / 25 / 40	20	15	25 (32)	110	95	281
	25	16	32 (40)	110	95	281
	32	20	40 (50)	115	100	285
	40	25	50 (65)	120	110	295
	50	32	65 (80)	135	120	305
	65	40	80 (100)	160	140	394
	80	50	100 (125)	170	135	406
	100	65	125 (150)	205	160	511
	125	80	150 (200)	210	190	586
	150	100	175 (200)	255	230	601
	200	125	250 (300)	305	260	734
	250	150	300 (350)	350	320	928
	300	200	400 (450)	370	350	1159
	350	250	500 (600)	375	415	1314
PN 64 / 100	20	12	25 (32)	110	100	276
	25	16	32 (40)	110	100	276
	32	20	40 (50)	130	110	287
	40	25	50 (65)	135	120	292
	50	32	65 (80)	160	130	383
	65	40	80 (100)	175	160	479
	80	50	100 (125)	175	160	489
	100	65	125 (150)	195	195	562
	150	100	200 (250)	285	260	832

TT-A48SH

High Temperature & High Pressure Spring Full Lift Safety Valve



Nominal Pressure (PN)	Nominal Diameter (DN)	do	DN'	L	L ₁	≈ H
PN 16 / 25 / 40	25	15	32	110	95	395
	40	25	50	120	110	418
	50	32	65	135	120	525
	50	32	80	135	120	525
	80	50	100	170	135	675
	100	65	125	205	160	748
	100	65	150	205	160	748
	150	100	200	230	210	1135
	200	125	250	290	310	1230
PN 64 / 100	250	150	300	350	320	1285
	40	25	50	135	120	518
	50	32	65	160	130	625
	50	32	80	160	145	600
	80	50	100	175	160	740
	100	65	125	220	200	920
	100	65	150	220	200	920
	150	90	200	280	280	1128
TT-A48TH-100	200	125	250	300	295	1350
	250	150	350	370	390	1440
TT-A48TH-100	50	32	80	160	145	580
TT-A48SB-160	80	40	150	215	210	820

■ A48SH-C

Suitable for services with a maximum operating temperature of $\leq 425^{\circ}\text{C}$.

■ A48SH-I

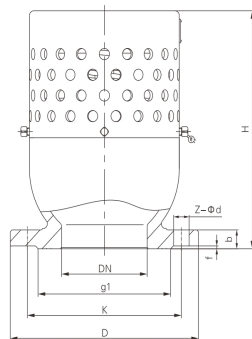
Suitable for services with a maximum operating temperature of $\leq 510^{\circ}\text{C}$.

■ A48SH-V

Suitable for steam and similar media with a maximum operating temperature of $\leq 550^{\circ}\text{C}$.

TT-A48SH are installed on equipment and piping systems as an overpressure protection device (safety valve).

TT-VA72W Vacuum Negative Pressure Safety Valve



■ Vacuum service

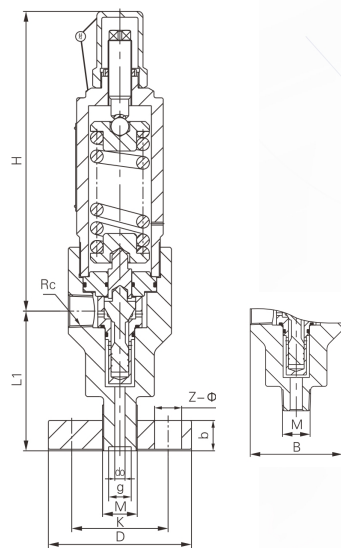
For vacuum systems: when the vacuum level inside the vessel or system exceeds the allowable limit, the valve opens automatically to admit air. When the vacuum is reduced to the preset value, the valve closes automatically, thereby ensuring the safe operation of the equipment and system.

■ Normally non-vacuum service

For normally non-vacuum systems handling corrosive media, such as absorption towers, distillation columns, storage tanks, and vessels. After steam purging or steam cleaning, if the vent valve does not open and the steam condenses, a vacuum may be generated. The installed valve automatically admits air, effectively preventing vacuum damage and ensuring equipment safety.

Nominal Diameter (DN)	D	K	G1	Z1 - Ød	B	F	≈ H
15	95	65	45	4-14	14	2	230
20	105	75	55	4-14	16	2	230
25	115	85	65	4-14	16	2	230
32	140	100	78	4-18	16	2	230
40	150	110	85	4-18	16	3	230
50	160	125	100	4-18	18	3	240
80	200	160	135	4-18	20	3	255
100	220	180	155	8-18	20	3	265
125	250	210	185	8-18	22	3	325
150	285	240	210	8-23	24	3	365
200	340	295	265	8-23	24	3	465
250	395	350	320	12-23	25	3	550

TT-YA42H/802Y Safety Relief Valve



TT-YA42H

Nominal Pressure (PN)	Nominal Diameter (DN)	B	D	Z, -Ød	M	do	K	L ₁	Rc	b	g	≈ H
PN160 / 250 / 400	10	95	105	4-18	M33×3	10	88	117	3/4"	25	20	248
	15	105	135	6-26	M48×3	15	95	140	1"	25	25	290
	20	135	200	6-29	M56×3	20	145	170	1½"	40	30	356
	25	140	200	6-29	M64×3	25	145	173	2"	40	38	440
	32	160	210	6-29	M64×3	32	155	181	2½"	40	40	520

TT-YA802Y

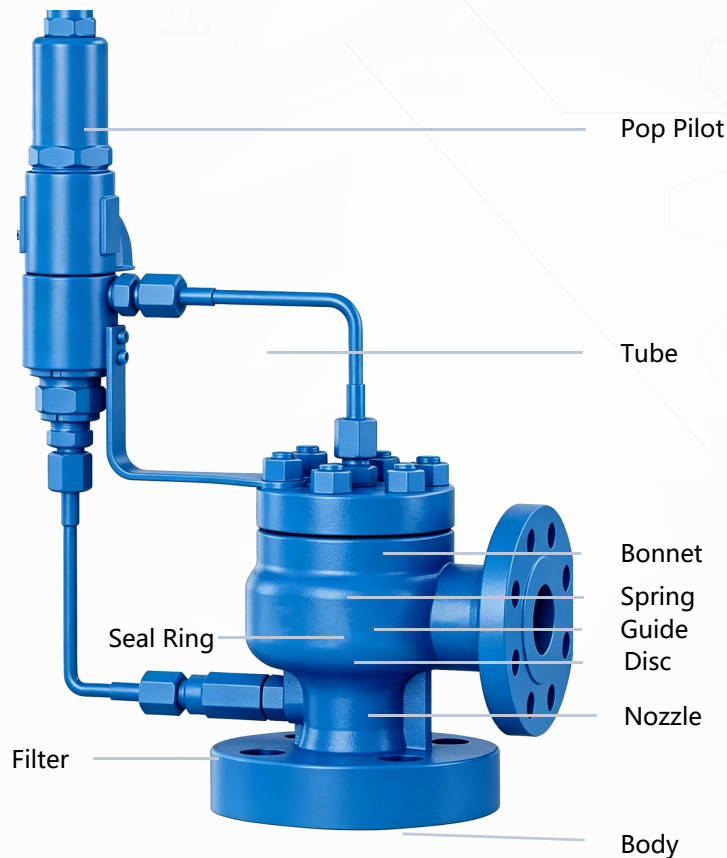
Type	Nominal Diameter (DN)	M	Rc	B	L ₁	≈ H
PN 600	15	1/2"	1/2"	105	90	280
	25	1"	1"	105	115	305

TT-YA42H and TT-YA802Y safety overflow valves are suitable for petroleum, chemical, and other liquid transmission pipelines with operating temperatures up to 200°C.

They are installed as overpressure protection devices for equipment and piping systems.

TT-A46Y/F

Pilot-Operated Safety Relief Valve



■ Advantage

- Allows the operating pressure to approach the set pressure of the safety valve.
- Soft-seat sealing ensures excellent tightness before and after valve popping.
- Valve operating performance and lift are not affected by back pressure.
- A small overpressure is sufficient to make the main valve reach full lift rapidly.
- Guided, non-flowing structural design minimizes the release of hazardous media, helping to prevent environmental pollution.
- Adjustable blowdown (reseating pressure differential).
- Enables online monitoring of the safety valve set pressure.

■ Performance

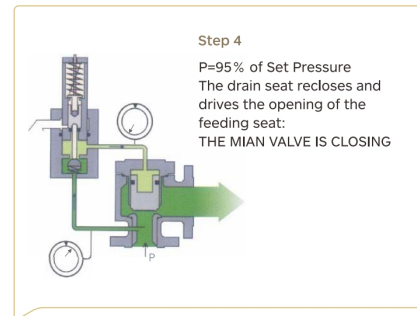
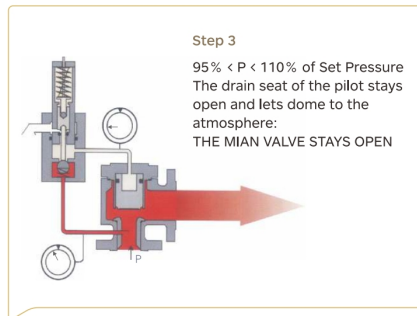
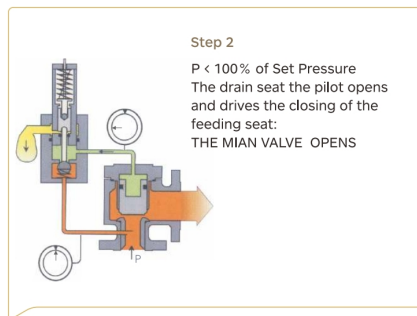
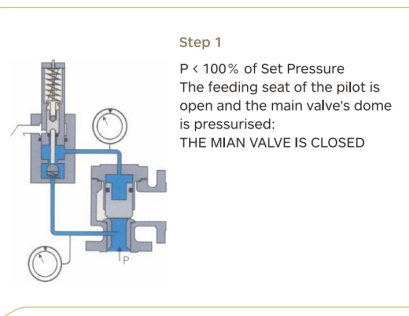
- Set Pressure Tolerance: $\leq \pm 3\%$
- Overpressure: $\leq 10\%$
- Blowdown: $\leq 10\%$
- Seat Tightness: In accordance with API Std 527

TT-A46Y/F Pilot-Operated Safety Relief Valve

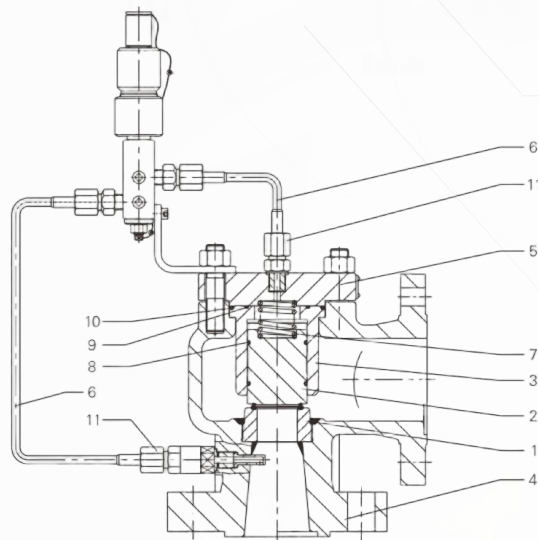
■ Applicable Standards

- **ISO 4126-4:** Safety valves for protection against excessive pressure —Part 4: Pilot-operated safety valves
- **API RP 520:** Sizing, Selection, and Installation of Pressure-Relieving Devices in Refineries
- **API Std 526:** Flanged Steel Pressure Relief Valves
- **API Std 527:** Seat Tightness of Pressure Relief Valves
- **ASME Boiler and Pressure Vessel Code (BPVC):** Section VIII, Division 1 — Rules for Construction of Pressure Vessels

■ Working Principle of Pilot-Operated Safety Valve



TT-A46Y/F Pilot-Operated Safety Relief Valve



The pilot-operated safety relief valve is a newly developed safety valve design. It is widely used in industries such as oil and natural gas, chemical processing, power generation, metallurgy, and municipal gas systems, and is considered an optimal overpressure protection device for pressurized equipment, vessels, and piping systems.

Its main advantage lies in the indirect actuation mechanism, where the spring acts directly on the pilot valve and indirectly on the main valve, significantly improving response sensitivity.

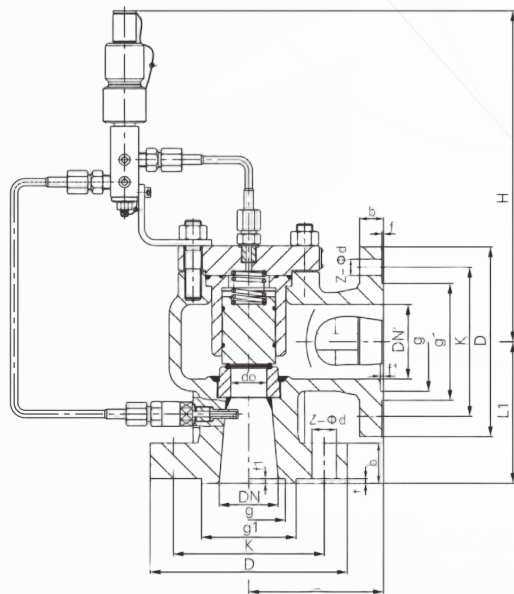
The main valve adopts a sleeve-guided piston design, providing high operating accuracy, excellent repeatability, high reseating pressure, and reliable tight shutoff performance.

The valve is capable of discharging against high back pressure, operates stably and reliably, and allows for online adjustment and calibration, making operation and maintenance convenient.

No.	Part Name	C	P	R	RL	L	CM
1	Nozzle	304	304	316	316L	304	MONEL
2	Disc Assembly	304 + F46	304 + F46	316 + F46	316L + F46	304 + F46	MONEL + F46
3	Guide	304	304	316	316L	304	MONEL
4	Body	WCB	CF8	CF8M	CF3M	LCB	WCB
5	Plate	Carbon Steel (C.St)	304	316	316L	304	Carbon Steel (C.St)
6	Dipper Tube	304	304	316	316L	304	316L
7	Spring	316	316	316	316	316	INCONEL
8-10	Seal Ring	FKM	FKM	FKM	FKM	FKM	FKM
11	Joint	304	304	316	316	304	316L

TT-A46Y/F

Pilot-Operated Safety Relief Valve



Nominal Pressure (PN)	Nominal Diameter (DN)	DN'	do	L	L ₁	≈ H
PN 16 / 25 / 40	25	32	15	110	95	355
	25	50	15	114	105	382
	32	40	20	115	105	382
	40	50	25	121	124	390
	50	65	32	135	120	430
	50	80	33	124	137	430
	65	80	40	160	140	440
	80	100	50	162	156	440
	100	125	65	205	160	455
	100	150	65	210	197	455
PN 64 / 100	150	200	100	241	240	488
	200	250	125	279	276	525
	25	32	15	110	100	372
	25	50	15	114	111	385
	32	40	20	130	110	398
	40	50	25	121	124	410
	50	65	32	160	130	445
	50	80	32	124	137	458
	65	80	40	175	160	485
	80	100	50	162	162	496
PN 160	100	125	65	195	195	520
	100	150	65	210	197	538
	150	200	100	241	246	638
	200	250	125	279	297	715
	25	50	13	121	126	445
	40	50	16	140	149	460
	50	80	32	171	167	490
	80	100	48	181	191	500
	100	150	60	233	249	540

ASME Safety Relief Valve



■ Applicable Standards

- ▶ ISO 4126-1 — Safety valves
- ▶ API RP 520 — Sizing, selection, and installation of pressure-relieving devices in refineries
- ▶ API Std 526 — Steel flanged end pressure relief valves
- ▶ API Std 527 — Seat tightness of pressure relief valves
- ▶ ASME Boiler and Pressure Vessel Code (BPVC), Section VIII, Division 1 — Rules for the construction of pressure vessels

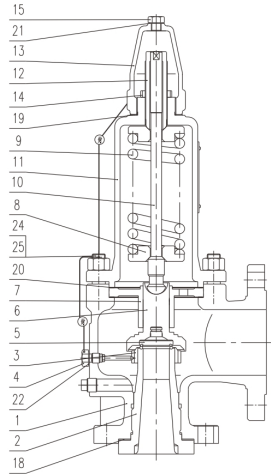
■ Performance

- ▶ Set pressure tolerance: $\leq \pm 3\%$
- ▶ Overpressure: $\leq 10\%$ (gas service) / $\leq 20\%$ (liquid service)
- ▶ Blowdown: $\leq 10\%$ (gas service) / $\leq 20\%$ (liquid service)
- ▶ Seat tightness: In accordance with API Std 527

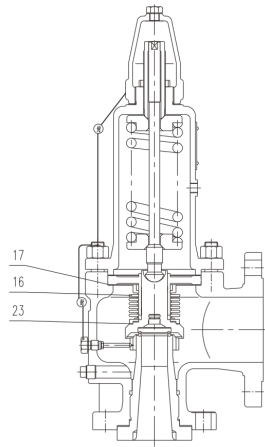
■ Features

- ▶ The nozzle and valve body are of a separable design, allowing easy maintenance and cost-effective servicing.
- ▶ The umbrella-type reaction disc effectively increases lifting force, enabling the disc to reach full lift rapidly at a relatively small overpressure, ensuring timely media discharge and reliable equipment protection.
- ▶ An adjusting ring allows for precise adjustment of blowdown (reseating pressure differential).
- ▶ Proper material selection and optimized clearances are applied to the reaction disc, guide sleeve, stem, and adjusting screw sleeve, ensuring smooth and stable disc movement.
- ▶ The sealing surfaces of the disc and nozzle are hardfaced with wear-resistant alloy, and precision machined, providing excellent tightness and extended service life.
- ▶ In balanced bellows safety valves, the bellows eliminates the influence of back pressure fluctuations on valve performance, while also protecting the spring and other internals from process media corrosion.
- ▶ The springs and bellows are manufactured from carefully selected materials, with high-quality fabrication processes, and are subjected to strict testing and inspection.

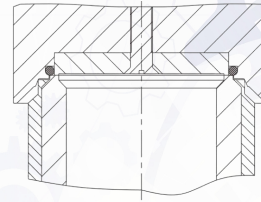
Construction ASME Safety Valve



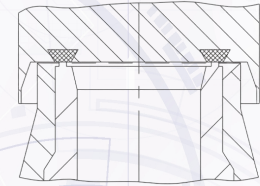
Coventional Type



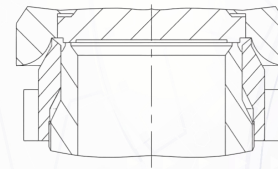
Balanced Bellow Type



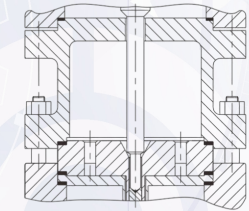
Resilient Seat with O-Ring



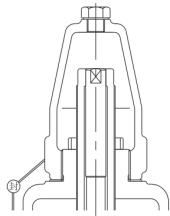
Resilient Seat with Padding



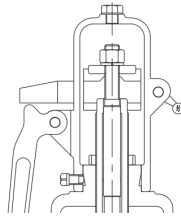
For Liquid Service



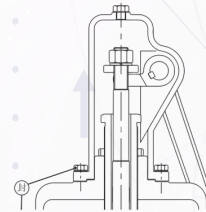
Cooling Chamber Design



Screwed with Plug



Lifting Lever with Plug



Packed Lifting Lever with Plug

Material Sheet ASME Safety Valve

Ref. No.	Part Name	C	CS	C6	C9	CM	CC	CB	L
1	Body	WCB	WCB	WC6	WC9	WCB	WCB	WCB	LCB
2	Nozzle	304	316	316	316	Monel	H.C.	H.B.	304
3	Nozzle Ring	CF8M	CF8M	CF8M	CF8M	CF8M	CF8M	CF8M	CF8M
4	Set Screw	304	304	304	304	304	304	304	304
5	Disc	304	316	316	316	Monel	H.C.	H.B.	304
6	Disc Holder	420	420	420	420	630	630	630	420
7	Guide	304	304	304	304	304	304	304	304
8	Spring Washer	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	420	420	420	Carbon Steel
9	Spring	Alloy Steel	Alloy Steel	Alloy Steel	Alloy Steel	Stainless Steel / Alloy Steel	Stainless Steel / Alloy Steel	Stainless Steel / Alloy Steel	Alloy Steel
10	Spindle	420	420	420	420	420	420	420	420
11	Bonnet	WCB	WCB	WCB	WCB	WCB	WCB	WCB	WCB
12	Adjusting Bolt	420	420	420	420	420	420	420	420
13	Cap	WCB	WCB	WCB	WCB	WCB	WCB	WCB	WCB
14	Adjusting Bolt Nut	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel
15	Plug	Carbon Steel	Carbon Steel	304	304	Carbon Steel	Carbon Steel	Carbon Steel	304
16	Bellows	316L	316L	316L	316L	316L	316L	316L	316L
17-23	Gaskets	Non-Asbestos	Non-Asbestos	Non-Asbestos	Non-Asbestos	Non-Asbestos	Non-Asbestos	Non-Asbestos	Non-Asbestos
24	Bolt	A193-B7	A193-B7	A193-B7	A193-B7	A193-B7	A193-B7	A193-B7	A193-B8
25	Nut	A194-2H	A194-2H	A194-7	A194-7	A194-2H	A194-2H	A194-2H	A194-8

Precautions and Installation Guidelines

ASME Safety Valve

◆ Storage

Safety valves are often stored at the installation site for several months prior to actual installation. Improper storage or protection may adversely affect the performance of the safety valve. Therefore, the valve shall be kept in its original shipping package until installation and stored in a dry, clean environment.

◆ Installation

To prevent damage to the valve during commissioning, all piping connections, valve inlet, and pressure-bearing components shall be thoroughly cleaned prior to installation. All foreign materials shall be completely removed.

◆ Inlet Piping

- The internal diameter of the inlet piping shall be equal to or larger than the valve inlet diameter.
- Under no circumstances shall the safety valve be installed on piping with an internal diameter smaller than the valve inlet connection.
- The inlet piping shall be kept as short as possible.

The valve shall be installed vertically on the inlet nozzle. Inlet flange bolts and stud bolts shall be tightened evenly to avoid excessive stress, which may cause inlet flange deformation or misalignment of internal valve components. Strict compliance with the above recommendations ensures proper valve operation.

◆ Outlet Piping

The discharge piping shall be as short and straight as possible, with a diameter at least equal to the valve outlet size, in order to minimize loads acting on the valve, including:

- Reaction forces during valve discharge
- Loads caused by discharge piping weight
- Vibration loads
- Static loads due to misalignment of discharge piping