

5100

■ The Company

A Strategic Alliance between Nacional Safety Valves and BS&B Pressure Safety Management

One of the most expansive markets to be found in the world today revolves around protecting industrial processes from damages caused by overpressure. To better serve this important need, the industry leaders of Nacional Safety Valves and BS&B Pressure Safety Management have teamed together to provide a “total solution approach” to overpressure relief needs. Through a strategic alliance, Nacional Safety Valves and BS&B Pressure Safety Management offers a variety of overpressure relief devices including safety valves, buckling pin valves, and rupture disk devices. The two companies will continue to operate as separate entities.

Both Nacional Safety Valves and BS&B Pressure Safety Management are established companies with decades of overpressure protection experience. Nacional has been designing and producing safety valves according to most recognized international standards for over four-decades. BS&B Pressure Safety Management has proven itself as a leading supplier of overpressure relief devices with a comprehensive portfolio of products and services that meet and exceed rigorous industry standards for quality and reliability.



As part of the strategic agreement established in 2017, BS&B Pressure Safety Management offers spring-loaded pressure relief valves manufactured by Nacional, under the combined brand name, “Nacional BS&B”. Nacional distributes a portfolio of overpressure relief devices supplied by BS&B Pressure Safety Management including rupture disk devices, safety relief valves, buckling pin valves, flame arresters, explosion protection, and wireless instrumentation.

About BS&B Pressure Safety Management

BS&B Pressure Safety Management is a solution provider company dedicated to supplying safety devices and systems according to customer defined application conditions. The company’s rich history spans more than 80-years with the BS&B name being well known for its innovative solutions in personal and property protection against dangerous overpressurizations and explosions within industrial settings. BS&B’s integrated solutions have been time tested and fine-tuned to deliver maximum value and greater efficiencies to individual engineering processes.

About Válvulas Nacional

VALVULAS NACIONAL, S.A. was established in Spain in 1976. The main target was to provide safety relief valves to the petrochemical and chemical industries emerging in Spain at that time. VALVULAS NACIONAL, S.A., has been designing and producing safety valves according to most recognized international standards and certifications: API 526 & 527, ASME B16.34 & ASME VIII DIV. 1, NB “UV” Stamps, ASTM and the European Directives 2014/68/EU (PED), PED Module B+D, 24/34 EU (ATEX), TR – CU, GOST U, and GOST TDS. The production process is accredited by ISO 9001.



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■ General Features

Safety and Relief Valve 5100

Model 5100, is an angular type safety valve at 90° between the inlet and the outlet connections, full nozzle and direct action and spring loaded, with pop action and full lift.

Design

- Valve body is an angular type at 90° between inlet and outlet flanges. In flange version, flanges are casted (not welded). Its large internal capacity and smooth section changes help reducing turbulences. Therefore, fluid evacuation discharge is improved.
- Full nozzle type, guided and screwed to body, enabling perfect alignment and easy disassembling
- Disc is separate from disc-holder, for that reason its repair or change is improved and a better selection of materials can be performed
- Guide has a large push rod guide area to prevent premature damage, ensuring perfect alignment with all internals
- Bellows are performed so its average area is equal to orifice area thus achieving perfect valve balance and consequently perfect operation against variable back pressures. Its meticulous design enables maximum pressures and temperatures to be supported achieving a high degree of elasticity.
- Springs are designed with an experimented highly reliable calculation software and manufactured with the ideal material qualities for the process conditions, ensuring elasticity and accurate repetition of valve opening.
- They are used interchangeably as safety or relief valves, both in gases and liquids. Their use is typical as thermal expansion valves and they are also used to release small flows.
- They are constructed with threaded and flanged connections, in this case flanges are integral, although they can also be manufactured with butt welding and socket-welding connections. Upon request, they allow the installation of different accessories such as manual operation lever, test-gag, O-Ring, heated jacket, etc.
- This catalogue reflects standard valves. Upon request, our technical department can design special applications. The safety valve is an automatic direct action accessory whose function is to relief excessive overpressures in the recipients and installations that protects. Its main characteristics, allowing is its sudden fluid discharge with complete and fast opening (pop) Automatic valve opening is produced because of the additional push provided by the overpressure of the fluid itself helping to overcome spring resistance. Once the installation has recovered its normal service condition, the valve closes again.
- Safety valve behaviour is totally different according to whether the fluid it works with on the installation is in gas or liquid phases. To achieve good valve functioning and correct dimensioning, this model was designed with internals for working with gas (Type-51G□) or liquid (Type-51L□).

Codes and Standards

Valves have been designed and manufactured in compliance with the following directives, codes and standards:

European Directive:	2014/68/UE (PED)
European Directive:	2014/34/UE (ATEX)
Design:	EN ISO 4126-1 / ASME XIII
Certifications:	PED MODULE B+D / ASME "UV" y NB"
Pressure and Temperature Limits:	ASME B16.34
Tests:	API-527 and ASME B16.34
Quality System:	EN ISO 9001:2015
Materials:	ASME/ASTM and EN

Size and Rating

NPT Threaded according to ASME B1.20.1

Sizes: ½"x ¾" up to 1"x1"

BSPP Threaded according to ISO 228-1

Sizes: ½"x ¾" up to 1"x1"

ASME Flanged according to ASME B16.5

Sizes: ½"x 1" up to 1"x1"

Rating: 150# up to 2500#

EN Flanged according to EN 1092-1

Sizes: DN15x25 up to DN25x25

Rating: PN10 up to PN320

Codification System

Example Code:

51 G C 1 D 1 A A B 2 X

1st

2nd

3rd

4th

5th

6th

7th

8th

9th

10th

11th

1st DIGIT: Valve model

2nd DIGIT: Work fluid state

G: Gas and Vapour

L: Liquid

3rd DIGIT: Valve Type

C: Conventional

F: Bellows

4th DIGIT: Inlet nominal size

5th DIGIT: Orifice Size

6th DIGIT: Outlet nominal size

7th DIGIT: Inlet Rating

1: ASME 150

2: ASME 300

3: ASME 600

4: ASME 900

5: ASME 1500

6: ASME 2500

A: PN-10

B: PN-16

C: PN-25

D: PN-40

E: PN-63

F: PN-100

G: Gas M

H: Gas H

I: NPTM

J: NPTH

X: OTHERS

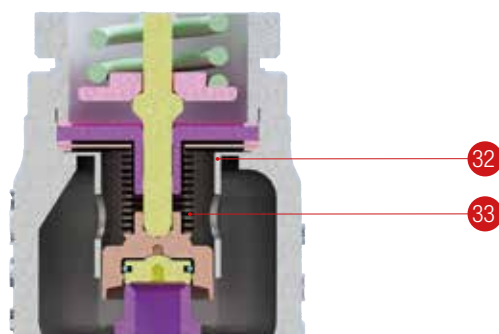
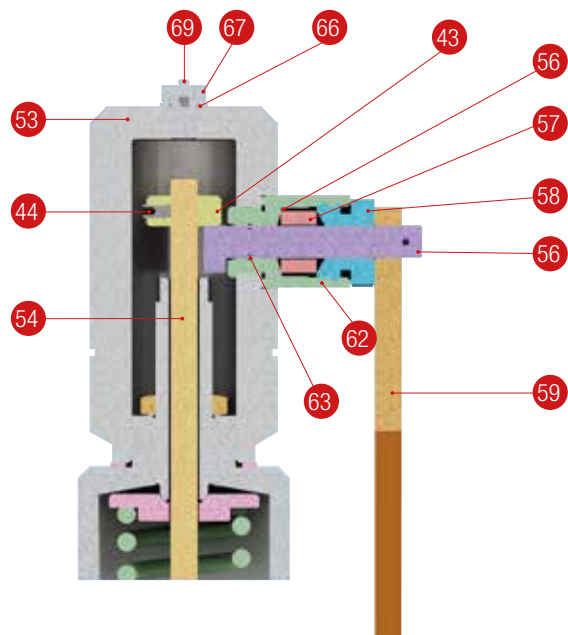
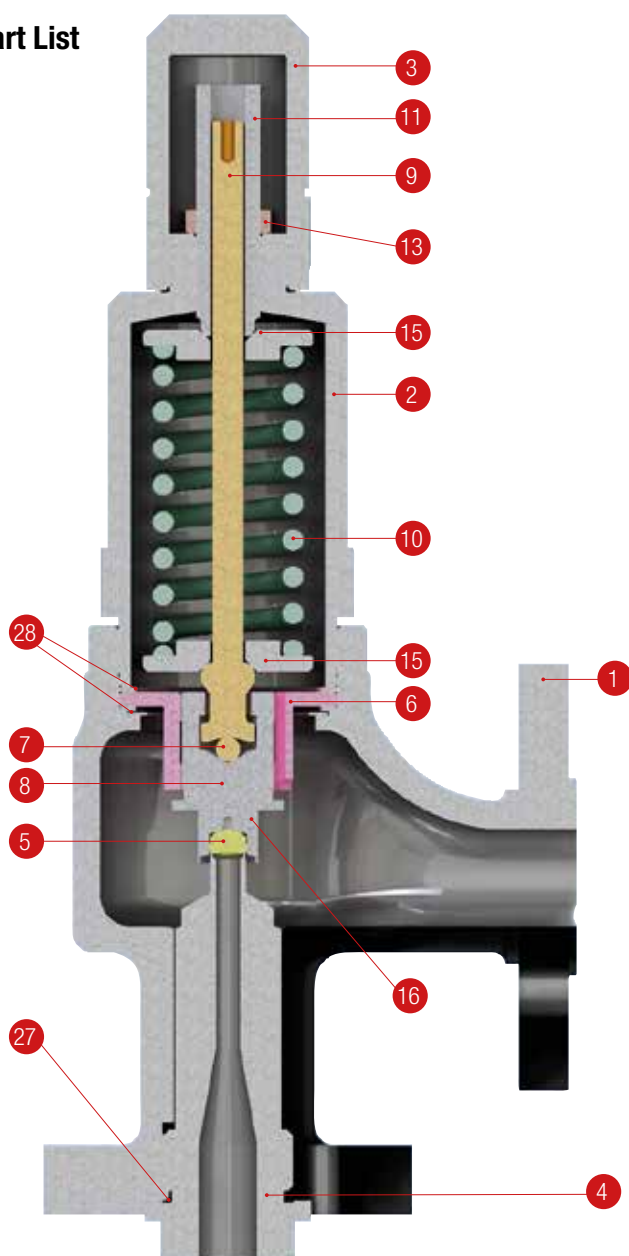
8th DIGIT: Outlet rating (same as 7th)

9th DIGIT: Standard quality materials

10th DIGIT: Materials - 1 subclass

11th DIGIT: Standard Accesories

Part List



Technical Information / Operating Technical Performance Table

SAFETY VALVE MODEL 5100			
SERVICE		GAS/SAT.STEAM	LIQUID
REDUCED DISCHARGE COEFFICIENT Kdr (1) (2)		0,864 (3)	0,750 (4)
BLOWDOWN	MAX.	10% (5)	15% (6)
BACKPRESSURE	CONVENTIONAL	10%	
	BELLOWS (7)	30%	
MINIMUM SET PRESSURE	ASME XIII (barg)	1,0	
	EN ISO 4126-1 (barg)	0,5	

(1) Or 0,2 bar, the highest value, according to ASME XIII and EN ISO 4126-1

(2) Certificate tested in laboratory

(3) $K_{dr}=0,90 \cdot K_d$. K_d gas/sat. steam 0,960 with 10% overpressure tested in laboratory.

(4) $K_{dr}=0,90 \cdot K_d$. K_d gas/sat. steam 0,833 with 10% overpressure tested in laboratory.

(5) Or 0,3 bar, the highest value.

(6) Or 0,45 bar, the highest value.

(7) Backpressure values with which the coefficient does not change.

■ Bill of Materials

	CLASS	A	B	C	E
ITEM	DENOMINATION	-29°C to 232°C	233°C to 400 °C	40°C to 538°C	-268°C to 400 °C
1	BODY	1.0619	1.0619	1.7357	1.4408
2	BONNET	1.0460 (9)	1.0460 (9)	1.4401	1.4401
2A	OPEN BONNET	1.0460 (9)	1.0460 (9)	1.4401	1.4401
3	CAP	1.0460 (9)	1.0460 (9)	1.4401	1.4401
4	NOZZLE	SEE SUBCLASS			
5	DISC				
6	GUIDE	1.4401	1.4401	1.4401	1.4401
7	SPHERE	AISI 420-C	AISI 420-C	AISI 420-C	AISI 420-C
8	DISC HOLDER	1.4006 (8)	1.4006 (8)	1.4006 (8)	1.4401 (10)
9	STEM	1.4021 (8)	1.4021 (8)	1.4021 (8)	1.4401
10	SPRING	50CRV4 A.C.	2.4669	2.4669	1.4401 (4)
11	ADJUSTING SCREW	1.4401	1.4401	1.4401	1.4401
13	NUT	1.4401	1.4401	1.4401	1.4401
14	LOCK SCREW				
15	SPRING BUTTON	1.4401	1.4401	1.4401	1.4401
16	ELASTIC RING	1.4401	1.4401	1.4401	1.4401
27	GASKET	Compressed Fibers	Graphite + 316 S.S. (2)		Compressed Fibers
28	GASKET	Compressed Fibers	Graphite + 316 S.S. (2)		Compressed Fibers
32	PROTECTOR BELLOWS	1.4401	1.4401	1.4401	1.4401
33	BELLOWS	1.4571 (5)	1.4571 (5)	1.4571(5)(6)	1.4571 (5)
43	BRACKET	1.0460 (9)	1.0460 (9)	1.0460 (9)	1.4401
44	SET BOLT	DIN 913-A4	DIN 913 - A4	DIN 913 - A4	DIN 913 - A4
48	OPEN CAP LEVER	1.0460 (9)	1.0460 (9)	1.4401	1.4401
53	LEVER CAP	1.0460 (9)	1.0460 (9)	1.4401	1.4401
54	LEVER STEM	1.4401	1.4401	1.4401	1.4401
56	LEVER SHAFT	1.4401	1.4401	1.4401	1.4401
57	PACKING	Braid Graphite			
58	PACKING NUT	1.0460 (9)	1.0460 (9)	1.4401	1.4401
59	PACKED LEVER	A.C. (9)	A.C. (9)	A.C. (9)	A.C. (9)
62	SHAFT BRACKET	1.0460 (9)	1.0460 (9)	1.4401	1.4401
63	ELASTIC RING	1.4401	1.4401	1.4401	1.4401
64	GASKET	Compressed Fibers (1)			
65	SPIRAL PIN	DIN 7343-A2	DIN 7343 -A2	DIN 7343-A2	DIN 7343-A2
66	GASKET	Compressed Fibers (1)			
67	TEST GAG	DIN 933-A4	DIN 933-A4	DIN 933-A4	DIN 933 - A4
69	CHAIN	A.C. (9)	A.C. (9)	A.C. (9)	A.C. (9)
70	TEST-GAG SCREW	DIN 933-A4	DIN 933-A4	DIN 933-A4	DIN 933-A4
SUBCLASS		1	2	3	4
4	NOZZLE	1.4401	1.4401 + ST	1.4401 + ST	1.4401
5	DISC	1.4401	1.4542	1.4401 + ST	1.4542

(1) T>232°C Graphite material

(2) T<-29°C Graphite material

(3) Optional: Made of equivalent bar material

(4) T>300°C Inconel X-750 material (tempered)

(5) Endings made of S.S. 316L

(6) T>450°C Inconel 625 material

(7) H900 Condition, hardness between 40 ÷ 47 HRc. For temperatures > -30°C.

H1150-M Condition, hardness between 27 ÷ 30 HRc. For temperatures < -30°C.

(8) Tempered and annealed a 45 ÷ 50 HRc

(9) Zinc plated electrolytic treatment

(10) For steam service or T ≥ 233°C with Gas / Liquid, use A479 XM-19

Connections



| MALE



| FEMALE

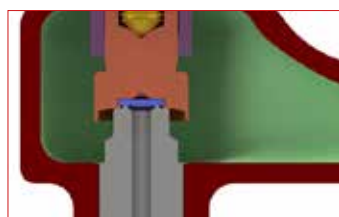


| SOCKET WELDING



| BUTT WELDING

Accessories



| O-RING



| LEVER



| TEST-GAG

70



| HEATING JACKET

General dimensions and set pressure ranges

SET PRESSURE RANGE (barg)								
Orifice (Ømm)	Outlet	51GC	51GC (Open Bonnet)	51GF Bellows Mat: "316Ti S.S"	51GF Bellows Mat: "Inc. 625"	51LC	51LF Bellows Material "316Ti S.S"	51LF Bellows Mat: " Inc.625"
C	3/4"	1 ÷ 430	1 ÷ 430	N/A	N/A	0,75 ÷ 430	N/A	N/A
	1"			N/A	N/A		N/A	N/A
D	1"	0,5 ÷ 290	0,5 ÷ 290	N/A	N/A	0,5 ÷ 290	N/A	N/A
E	1"	0,5 ÷ 200	0,5 ÷ 200	5 ÷ 112	5 ÷ 125	0,5 ÷ 200	5 ÷ 110	5 ÷ 110

Orifice (Ømm)	Flow Area (inch ²)	Flow Area (cm ²)	Flow Diameter (mm.)	LIFT(mm.) GAS / STEAM	LIFT(mm.) LIQUID
C	0,048	0,310	Ø 6,3	1,8	2,2
D	0,122	0,785	Ø 10	3	3,5
E*	0,196	1,267	Ø12,7	3,8	4,5

(*) The minimum lift in liquid service for set pressure up to 21,1 barg is 6 mm

5100 - FLANGED ASME B16.5				
Orifice (Ømm)	Rating Class In x Out	Set Pressure Range (barg)	Inlet Size	Outlet Size
C	150 X 150	1,0 ÷ 19,7	½" x 1"	¾" x 1"
	300 X 150	19,7 ÷ 51	¾" x 1"	
	600 X 150	51 ÷ 102	1" x 1"	
	900 X 300	102 ÷ 153	½" x 1"	¾" x 1"
	1500 X 300	153 ÷ 255	¾" x 1"	
	2500 X 300	255 ÷ 430	½" x 1"	
D	150 X 150	1,0 ÷ 19,7	¾" x 1"	1" x 1"
	300 X 150	19,7 ÷ 51		
	600 X 150	51 ÷ 102		
	900 X 300	102 ÷ 153	¾" x 1"	¾" x 1"
	1500 X 300	153 ÷ 255		
(*)E	150 X 150	1,0 ÷ 19,7	¾" x 1"	1" x 1"
	300 X 150	19,7 ÷ 51		
	600 X 150	51 ÷ 102		
	900 X 300	102 ÷ 153	¾" x 1"	¾" x 1"

(*) Only "E" Orifice has bellows option. Minimum set pressure for bellows = 5 barg

5100 - FLANGED EN 1092-1				
"Orifice (Ø mm)"	"Rating Class In x Out"	Set Pressure Range (barg)	Inlet Size	Outlet Size
C	PN16 x PN16	1,0 ÷ 16	DN15 x DN25 DN20 x DN25 DN25 x DN25	DN15 x DN25
	PN63 x PN16	16 ÷ 63		
	PN100 x PN16	63 ÷ 100		
	PN160 x PN40	100 ÷ 160	DN15 x DN25	DN15 x DN25
	PN250 x PN40	160 ÷ 250		
	PN320 x PN40	250 ÷ 320	DN15 x DN25	DN15 x DN25
	PN400 x PN40 (**)	255 ÷ 400		
D	PN16 x PN16	1,0 ÷ 16	DN20 x DN25 DN25 x DN25	DN20 x DN25
	PN63 x PN16	16 ÷ 63		
	PN100 x PN40	63 ÷ 100		
	PN160 x PN40	100 ÷ 160	DN20 x DN25	DN20 x DN25
	PN250 x PN40	160 ÷ 250		
(*) E	PN16 x PN16	1,0 ÷ 16	DN20 x DN25 DN25 x DN25	DN20 x DN25
	PN63 x PN16	16 ÷ 63		
	PN100 x PN40	63 ÷ 100		
	PN160 x PN40	100 ÷ 160	DN20 x DN25	DN20 x DN25

(*) Only "E" Orifice has bellows option. Minimum set pressure for bellows = 0,5 MPa [5 barg]

(**) Available on request

5100 - THREADED (MALE (INLET) - FEMALE (OUTLET))			
Orifice (Ømm)	Set Pressure Range (barg)	Inlet Size	Outlet Size
C	1,0 ÷ 19,7	½" x ¾" ÷ 1" ¾" x ¾" ÷ 1" 1" x 1"	¾" x 1"
	19,7 ÷ 51		
	51 ÷ 102		
	102 ÷ 153		
	153 ÷ 255		
	255 ÷ 430	¾" x ¾" ÷ 1" 1" x 1"	1" x 1"
D	1,0 ÷ 19,7	¾" x 1" 1" x 1"	¾" x 1"
	19,7 ÷ 51		
	51 ÷ 102		
	102 ÷ 153		
	153 ÷ 255		
	255 ÷ 290	1" x 1"	1" x 1"
(*)E	1,0 ÷ 19,7	¾" x 1" 1" x 1"	¾" x 1"
	19,7 ÷ 51		
	51 ÷ 102		
	102 ÷ 153		
	153 ÷ 200	1" x 1"	1" x 1"

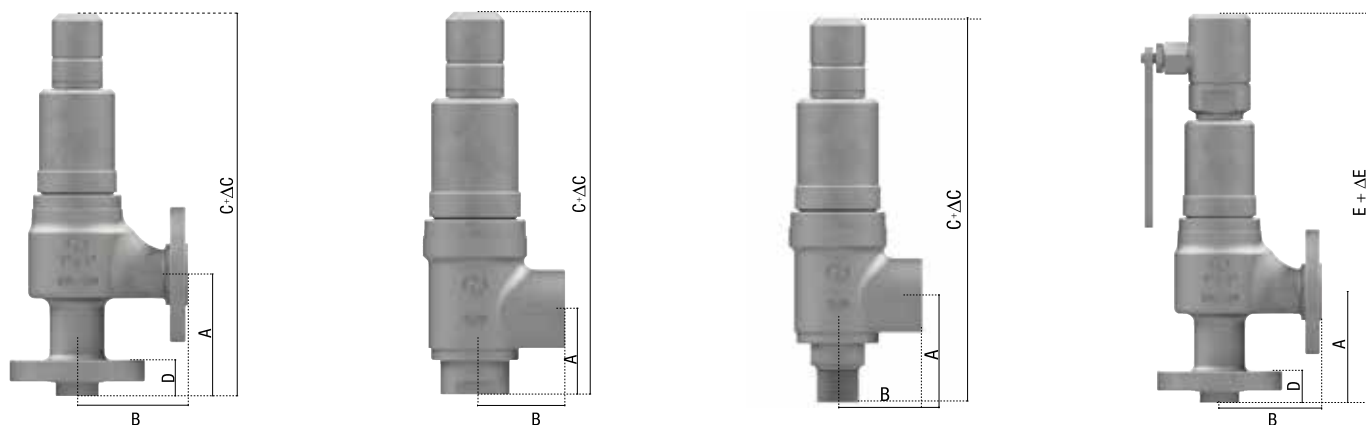
(*) Only "E" Orifice has bellows option. Minimum set pressure for bellows = 5 barg

5100 - THREADED (FEMALE (INLET) - FEMALE (OUTLET))			
Orifice (Ømm)	Set Pressure Range (barg)	Inlet Size	Outlet Size
C	1,0 ÷ 19,7	½" x ¾" ÷ 1" ¾" x ¾" ÷ 1" 1" x 1"	¾" x 1"
	19,7 ÷ 51		
	51 ÷ 102		
	102 ÷ 153		
	153 ÷ 255		
	255 ÷ 430	¾" x ¾" ÷ 1"	1" x 1"
D	1,0 ÷ 19,7	½" x 1" ¾" x 1" 1" x 1"	¾" x 1"
	19,7 ÷ 51		
	51 ÷ 102		
	102 ÷ 153		
	153 ÷ 255		
(*)E	255 ÷ 290	1" x 1"	1" x 1"
	1,0 ÷ 19,7	¾" x 1" 1" x 1"	¾" x 1"
	19,7 ÷ 51		
	51 ÷ 102		
	102 ÷ 153	1" x 1"	1" x 1"
	153 ÷ 200		

(*) Only "E" Orifice has bellows option. Minimum set pressure for bellows = 5 barg

■ Dimensions

			INLET	ORIFICIES	OUTLET	MODEL 5100 (Conventional)						
						General Dimensions (mm.)					Std.	Lever
						A	B	C	D	E	Weight (Kg.)	
FLANGED CONNECTIONS	DIN	INLET PN-16÷40 OUTLET PN16	DN15	C	DN25	99	90	321	26	354	6,5	7,7
			DN20	C, D, E					28			
			DN25						30			
		INLET PN-63÷100 OUTLET PN40	DN15	C	DN25	109	90	331	32	364		
			DN20	C, D, E								
			DN25									
	INLET PN160 OUTLET PN40	DN15	C	DN25	109	90	331	30	364	7,5	8,7	
	INLET PN-250÷320 OUTLET PN40	DN15	C	DN25	109	90	331	36	364			
	INLET PN400 OUTLET PN40	DN15	C	DN25	AVAILABLE UPON REQUEST							
	ASME	INLET 150÷600# OUTLET 150#	1½"	C	1"	99	90	321	30	354	6,5	7,7
			¾"	C, D, E								
			1"									
		INLET 900# OUTLET 300#	1½"	C	1"	109	90	331	34	364	7,5	8,7
			¾"	C, D, E					37			
		INLET 1500# OUTLET 300#	1½"	C	1"	109	90	331	34	364		
			¾"	C, D					37			
		INLET 2500# OUTLET 300#	1½"	C	1"	111	90	418	42	451	10,5	11,7
THREADED CONNECTIONS		NPT / GAS	M / H	1½"	C	¾" 1"	81	64	302	-	335	4,6
	¾"											
	¾"			C, D, E	1"	81	64	302	-	335		
	1"											
	H / H		1½"	C	¾" 1"	46	64	267	-	300	4,4	5,6
			¾"									
			1½"	D	1"	46	64	267	300			
			¾"									
			1"							61		
			¾"	E	1"	46	64	267	300			
	1"	61	64						282	305		



		Set Pressure Range [barg]						Exit Size
Orifice	Vented	Fluid	Up to	From	Up to	From	Up to	
C	ALL	Liquid	31,9	32,0	58,9	86,0	430,0	3/4" 1"
		Gas & Steam	14,89	14,90	43,00	-	-	3/4"
			13,29	13,30	35,59	35,60	430,0	1"
D	ALL	Liquid	25,9	26,0	68,9	69,0	290,0	1"
		Gas & Steam	40,9	41,0	119,0	120,0	290,0	
E	ALL	Liquid	18,9	19,0	55,9	60,0	200,0	1"
	OPEN + BELLOW		20,9	21,0	55,9	56,0	110,0	
	CLOSED	Gas & Steam	33,9	34,0	97,4	97,5	200,0	
	OPEN		18,1	18,2	453,0	454,0	200,0	
	OPEN + BELLOW		20,3	20,4	49,9	50,0	120,0	
		ΔC, ΔE	0 mm.	50 mm.		85 mm.		

DEFINITIONS (EN ISO 4126-1)

- **Blowdown:** The difference between actual popping pressure of a pressure relief valve and actual reseating pressure expressed as a percentage of set pressure or in pressure units.
- **Built-up back pressure:** The pressure existing at the outlet of the safety valve caused by fl ON through the valve and the discharge system
- **Coefficient of discharge:** The value of actual flowing capacity (from tests).
- **Cold differential test pressure:** The inlet static pressure at which a pressure relief valve is adjusted to open on the test stand. This test pressure includes corrections for service conditions of superimposed back pressure and/or temperature.
- **Flow area:** The minimum cross-sectional flow area (but not the curtain area) between inlet and nozzle which is used to calculate the theoretical flow to discharge
- **Lift:** The diameter corresponding to the flow area.
- **Maximum allowable pressure:** The maximum pressure for which the equipment is designed as specified by the manufacturer.
- **Overpressure:** A pressure increase over the set pressure, at which the safety valve achieves the lift specified by manufacturer, usually expressed as a percentage of the set pressure.
- **Pressure:** The pressure unit used in this standard is the bar (1 bar = 105 Pa). It is quoted as gauge (relative to atmospheric pressure) or absolute as appropriate.
- **Relieving pressure:** The pressure used for the sizing of the safety valve which is greater than or equal to the set pressure plus the overpressure.
- **Re-seating pressure:** The value of decreasing inlet static pressure at which the valve disk re-establishes contact with the seat or at which lift becomes zero
- **Safety valve:** Valve which automatically, without the assistance of any energy other than that of the fluid concerned, discharges a quantity of the fluid so as to prevent a predetermined safe pressure being exceeded and which is designed to re-close and prevent further flow or fluid after nominal pressure conditions of service have been restored.
- **Set pressure:** The value of increasing inlet static pressure at which a pressure relief device displays one of the operational characteristics as defined under opening pressure, popping pressure, start-to-leak pressure, burst pressure, or breaking pressure. (The applicable operating characteristic for a specific device design is specified by the device manufacturer).
- **Superimposed back pressure:** The static pressure existing at the outlet of a pressure relief device at the time the device is required to operate. It is the result of pressure in the discharge system from other sources.

- The safety valve is an automatic direct action accessory whose function is to relief excessive overpressures in the recipients and installations that protects. Its main characteristics, allowing is its sudden fluid discharge with complete and fast opening (pop).
- Automatic valve opening is produced because of the additional push provided by the overpressure of the fluid itself helping to overcome spring resistance. Once the installation has recovered its normal service condition, the valve closes again.
- The data contained in this catalogue are indicative. Válvulas Nacional, S. A., reserves the right to change this catalogue without notice. Always check the specification sheets.



GLOBAL LEADER FOR PRESSURE SAFETY MANAGEMENT

RUPTURE DISK DEVICES



CUSTOM ENGINEERED PRODUCTS



SPECIALTY VALVES



INDUSTRIAL EXPLOSION PROTECTION



TANK PROTECTION



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