INSTRUCTIONS AND MAINTENANCE MANUAL

SAFETY AND RELIEF VALVES

MODELS 3-5111 AND 3-5161

MA-51/04

NOVEMBER 2020

MAIN DEFINITIONS

(UNE-EN ISO 4126-1)

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 of fluid after normal pressure conditions of service have been restored.

Pressure: The pressure unit used in this standard is the bar (1 bar = 10^5 Pa). It is quoted as gauge (relative to atmospheric pressure) or absolute as appropriate.

Set pressure: The predetermined pressure at which a safety valve under operating conditions commences to open.

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 attains the lift specified by the manufacturer, usually expressed as a percentage of the set pressure.

Re-seating pressure: The value of the inlet static pressure at which the disc re-establishes contact with the seat or at which the lift becomes zero.

Cold differential test pressure: The inlet static pressure at which a safety valve is set to commence to open on the test stand. This test pressure includes corrections for service conditions, e. g. back pressure and/or temperature.

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.

Built-up back pressure: The pressure existing at the outlet of a safety valve caused by flow through the valve and the discharge system.

Superimposed back pressure: The pressure existing at the outlet of a safety valve at the time when the device is required to operate.

Blowdown: The difference between the set and re-seating pressures, normally stated as a percentage of the set pressure of a safety valve.

Lift: The actual travel of the valve obturator away from the closed position.

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.

Flow Diameter: The diameter corresponding to the flow area.

INDEX

VALVULAS NACIONAL, S. A., recommends reading this Instruction Manual carefully. You will find here the minimum precautions to be taken into consideration before the installation of the safety-relief valves, so they work correctly.

VALVULAS NACIONAL, S. A., warrantees their safety-relief valves against all kind of manufacture flaws for a 12-month period from its installation or maximum 18 months after its delivery, considering the one that happens before. Furthermore, we decline all responsibilities derived from malfunctioning caused by an inaccurate installation, storage and / or handling by the buyer.

VALVULAS NACIONAL, S. A., will consider that any safety-relief valve with a non-original replacement installed, and / or where the certify seal is missing as void of any warranty.

Everything written inside a box or with bold letters should be observed with special caution, as its purpose is to avoid incurring in a faulty installation, and mainly, to prevent that someone manipulating the safety-relief valve may suffer any damage while operation.

VALVULAS NACIONAL, S. A., reserves itself the right to partially or totally modify the contents of this manual without previous notice.

1 - INTRODUCTION

The purpose of this manual is to offer all suitable information for a correct installation and maintenance of NACIONAL's safety-relief valves.

Safety-relief valves 3-5111 and 3-5161 are manufactured according to the requirements of Pressure Containers Directive 97/23/CE Category IV and 94/9/CE Directive (ATEX) Group II, Category 2.

All safety-relief valves are calculated and manufactured for a specific application. If a valve designed for a different application wants to be used, its suitability has to be checked.

A short-term supervision will probably be needed if the valve has been inaccurately installed, if there's contamination like thin metal foils or other kind of slag at the protected line, when its used for a duty different to the one it was designed to, or when the valve gets to the installation with a previous procedure failure in the test-bench.

2 - TRANSPORTATION AND STORAGE

The internal components of the safety-relief valve are accurately manufactured and assembled in such a way so they are constantly aligned.

An abrupt manipulation of the valve may damage the closing surfaces or produce misalign of the internal parts, causing leaks or malfunctioning. Therefore we recommend caution when handling the safety-relief valve.

The inlet and outlet connections of the valves should be protected (as done at the factory), before being shipped and / or transferred, to their final location. The closing surfaces are therefore protected and the entry of alien substances in the internal chamber of the valve is prevented.

If the valve has to be stored for a long period of time, do not remove the protections until its installation. Our recommendation is that the storage environment has to be clean, dry and protected from open-air. If that's not possible, the valve needs to be properly protected to avoid its wearing and tearing.

3 - INSTALLATION

A correct installation is essential for a good performance of the safety-relief valve.

Remove the adhesive protective discs or plastic plug from the inlet and outlet flange.

Before proceeding with the installation, the nameplate has to be checked to ensure that it's the proper valve. The seal cannot be broken (otherwise the set pressure and tightness will have to be checked again.) The valve has to be perfectly clean and no kind of dirt shall be seen inside the nozzle or inside the valve, if deemed necessary, a blowing should be performed.

The pipe, the connection flanges and the valve holders must be conscientiously clean. You should be perfectly sure that there are no alien bodies like particles from the gaskets, slag, dust, etc. which could get between the disc and the nozzle. It is imperative to make a blowing in order to absolutely clean the section that the valve is going to protect.

All fixing studs need to be uniformly tightened. In order to avoid the valve's body from deformation, the release pipe needs to be properly anchored.

Valves with bellows have a screwed hole at the bonnet (airing). If the fluids to be used with the valve are dangerous or polluting, in order to ensure a correct performance, this hole needs to be led to a safe place at atmospheric pressure.
¡¡ Never cover it !!

The valve needs to be assembled always in a vertical position. The inlet pipe to the valve, the one coming from the equipment or the installation, needs to be direct and as short as possible.

It is necessary to check that the diameter of the inlet pipe is bigger or at least equal to the diameter of the inlet connection to it.

Never point the valves outlets with gases or vapours to zones where there is danger to people.

In any kind of installation, it should be avoided to mount the safety-relief valve in positions where remnants could accumulate.

4 - ADJUSTING THE SET PRESSURE AND FEATURES

All valves manufactured and expedited by VALVULAS NACIONAL, have been carefully assembled and tested before they are expedited.
It is advisable to check the valve prior to its assembly in the installation in order to make sure that during transportation and handling the closing elements, and therefore the tightness, have not been damaged.

In case of excessive leaks, two or three pops should be realized. If the leak persists, the valves have to be revised.

In order to modify the set pressure in an already existent valve, the use of a properly selected spring is crucial.

Consult VALVULAS NACIONAL, for the check and / or supply of the spring and the new nameplate.

If a valve is set to a higher pressure than the original set pressure, the rupture of the spring could occur and a reduction of the distance between the spring coils, limiting the valves opening, and therefore, the relief flow would decrease. The “blowdown” would increase.

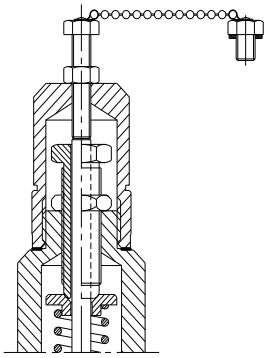
If set pressure is decreased, would be increased overpressure in the installation.

Before increasing the set pressure of already installed valve, be sure to verify that the new pressure is inside the nominal pressure range it is been designed for. Also, before decreasing the set pressure, it needs to be verified that required capacity with new set pressure is going to be enough to protect the container it is been for.

4.1 HYDROSTATIC TESTS

When the hydrostatic test of a container is required, it must be ensured that the safety-relief valve would not deteriorate.

When making the test upstream, the valve needs to be nullified, installing the test-gag in order to avoid its opening.



TEST-GAG

Once the hydrostatic test is finished, the lock screw needs to be replaced, otherwise the safety-relief valve would remain completely voided.

When the hydrostatic test is performed upstream, it has to be checked that the pressure that the valve will receive does not exceed the limitations of its design, mainly in those valves including bellows.

4.2 BLOWDOWN ADJUSTMENT

The blowdown pressure regarding the set pressure at the closing moment of the valve after the popping can be “adjusted” using the adjusting ring (7) mounted over the nozzle (4). (Check the drawing in page -8-).

In case the blowdown value should be adjusted, once the valve is assembled in the installation, proceed as follows:

- Unscrew the screw (14) which fixes the adjusting ring (7).

- Using a screwdriver turn the adjusting ring upwards until making contact with the disc holder (8), then turn it to the opposite direction so many grooves as Table 1 points out.

- In order to increase the blowdown (the valve will close itself at a very low inlet pressure) the adjusting ring has to be risen turning the grooves counter clockwise (from left to right).

- To decrease the blowdown (the valve will close itself at a very high inlet pressure) the adjusting ring has to be lowered turning the grooves clockwise (from right to left).

- Once the adjusting ring has been adjusted, the lock screw has to be assembled back, checking that the stud remains placed inside the adjusting ring‘s groove, fixing it to keep it from spinning, but free for its alignment.

5 - MAINTENANCE

If the valve has been working at an installation with fluids classified as dangerous or pollutant, decontamination has to be performed prior to its manipulation.
It is highly important to follow the disassembly sequence as described below, as any alteration may be dangerous for the worker who is manipulating the valve, due to the spring tension.

To achieve a correct valve operation, the use of original spare parts is essential.

5.1 ASSEMBLY AND DISASSEMBLY - VALVE 3-5111

To perform the assembly and disassembly operations check valve section drawings in page -8-.

5.1.1 DISASSEMBLY

Unscrew the cap (3).

If the valve has a lever, disassemble the lever (59), unscrew the holder (62) and unscrew the cap (53). Once the position of the release nut (43) is checked by measuring distance between the top side and the edge of the stem, loosen the capture (44) and disassemble it.

Before losing the spring (11), write down the distance between the top part of it to the edge of the stem. This will allow to place it in the same position assembled.

Unscrew the adjusting nut (13) and the adjusting screw (11) until all the tension in the spring is freed (10).

Once disassembled the bonnet (2) from the body (1), the spring (10) can be removed together with the spring button (15).

Never perform this operation unless there is full security that the spring tension has been completely eliminated.

Pulling from the stem (9), the guide (6), disc holder (8) and disc (5) can be removed from the body.
Unscrew the stem from the disc holder. To extract the stem from the disc holder, hold the disc holder vertically and clap it against a wooden surface, or similar, making the enough effort to close the disc retainer (16), leaving the disc outside its placement.

Disassemble the lock screw (14), unscrew the adjusting ring (7) from the nozzle (4), and dismount the nozzle from the body.

5.1.2 ASSEMBLY

Follow the disassembly instructions in reverse sequence without forgetting the generic parts of section 5.1.1.

Lightly grease the threaded parts.

5.2 ASSEMBLY AND DISASSEMBLY VALVE 3-5161

While assembling and disassembling this type of valve, special attention needs to be taken as the bellows is sensitive to brusqueness and could get distorted, which would cause valve malfunction.

5.2.1 DISASSEMBLY

Disassembly is performed exactly as for valve 3-5111 (see section 5.1.1), except for the bellows, that has to be done as follows:

Pulling from the stem (9), the spring (10) and the spring button (15) can be removed.

Turning the body, and if necessary, gently tap to remove the guide (6), the bellows (33) and the disc (5).

Threading a screw into the thread and pulling out, the disc (5), from the disc holder place can be removed. In this operation is really important to take precautions in order to do not damage the bellows (33).

5.2.2 ASSEMBLY

Follow the disassembly instructions in reverse sequence without forgetting the generic parts of section 5.1.2.

Make sure that the screwed hole from the bonnet (venting) is not covered. This is mandatory for the good performance of the valve.

5.3 RECONDITIONING THE CLOSING SURFACES

When the contact surface between nozzle and disc (the valve's closure) has some slight damage, it is enough with a simple lapping to leave it in optimal conditions.

To manually perform this operation it is required a foundry grey lapping dish or a flat and polished surface, like a glass disc.

Deposit over such surface a small layer of lapping paste in its different finishing degrees.

Place the piece perfectly flat over the lapping surface, apply some small and uniform pressure, perform a 8-shaped movement. When a lapping ring is used, the movement should be oscillating.

Disassembling the nozzle from the valve's body is advisable for a good lapping. If that's not feasible, or the surface is just slightly damaged, use the lapping ring. Bear in mind that an excess of paste might round of the nozzle's lips edges.

When the closing surface presents too many markings, they have to be eliminated with the lathe before proceeding with the lapping.
The lapping paste can be found in different grain sizes, from a coarse grain to a really thin one. Usually a middle-sized grain is used at the beginning and the final polish is done with the thinnest.

Table -2

GRAIN	DIMENSION (μ)	FINISH TYPE	PRODUCT
400	15 ÷ 21	MEDIUM	SILICON CARBIDE IN SUSPENSION
800	7,5 ÷ 10,5	SMOOTH	
1200	4 ÷ 6	POLISHED	DIAMOND POWDER IN SUSPENSION

Each time the paste's grain is changed the dish has to be thoroughly cleaned, mainly when the change is done from a thick to a thin grain.

The most important considerations in order to achieve a good finish are the following:

A) Cleaning of the lapping dish, the piece to be lapped, and the lapping paste.

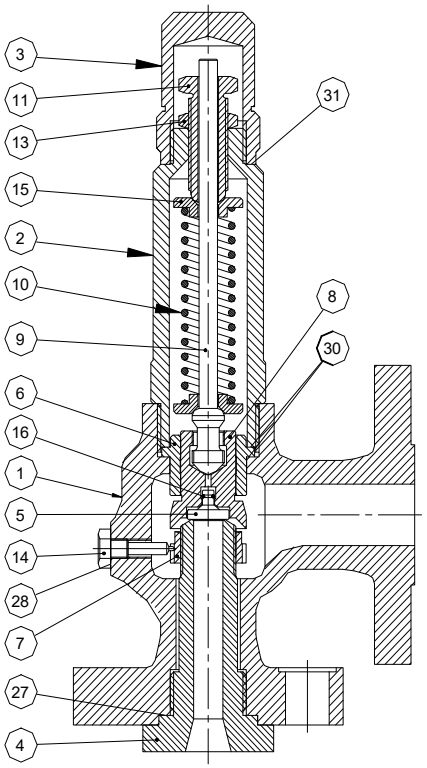
B) Plane surface for the lapping plate support.

C) A suitable lapping surface.

D) A uniform and smooth lapping movement (without vibrations or abruptness).

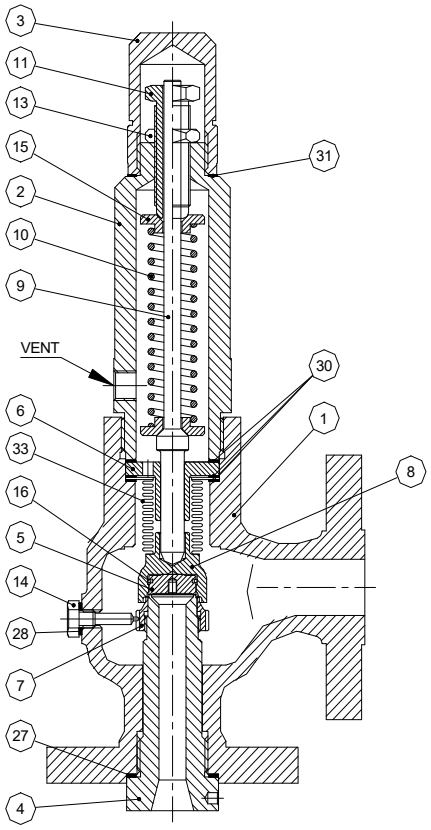
E) Choice of the lapping paste's grain type for an accurate finish.

3-5111 MODEL

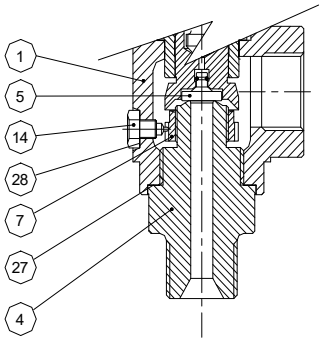


CONVENTIONAL VALVE

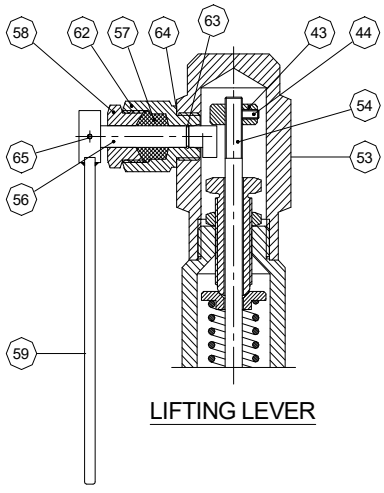
3-5161 MODEL



BALANCED VALVE



SCREWED CONNECTION



LIFTING LEVER

Nº	DESCRIPTION	Nº	DESCRIPTION	Nº	DESCRIPTION
1	BODY	13	NUT	53	PACKED CAP
2	BONNET	14	LOW SCREW	54	STEM
3	CAP	15	SPRING BUTTON	56	CAM SHAFT
4	NOZZLE	16	DISC RETAINER	57	PACKING
5	DISC	27	NOZZLE GASKET	58	PACKING GLAND
6	GUIDE	28	SCREW GASKET	59	LEVER
7	ADJUSTING RING	30	GUIDE GASKET	62	CAM SHAFT SUPPORT
8	DISC HOLDER	31	CAP GASKET	63	CAM SHAFT RETAINER
9	STEM	33	BELLOW	64	GASKET
10	SPRING	43	RELEASE NUT	65	PIN
11	ADJUSTING SCREW	44	BOLT		

6 – ADJUSTING THE SET PRESSURE AT THE TEST BENCH

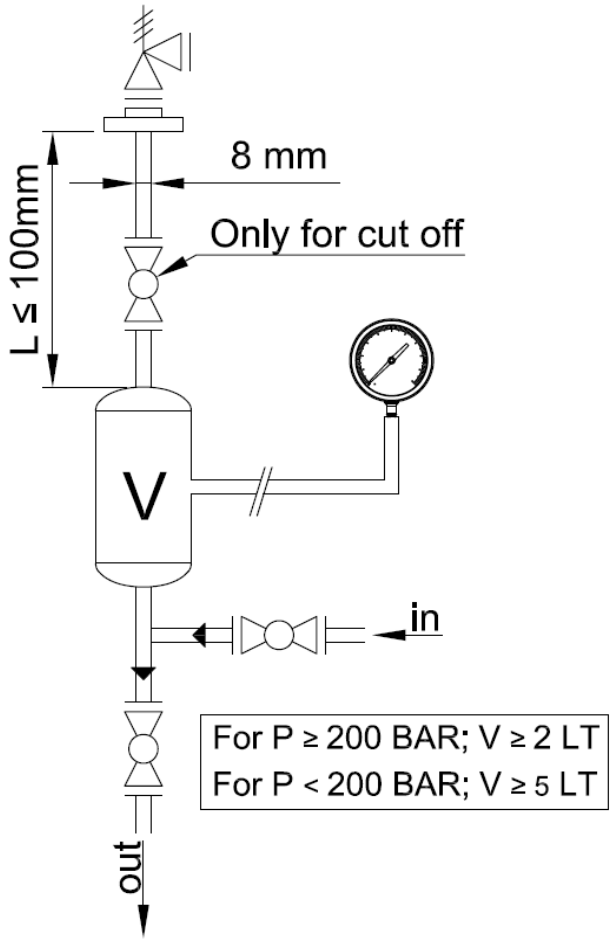
All tests and adjustments have to be performed by people who have received a proper technical training about how safety-relief valves work and the risks of the tests.
When valve has pressure, eyes and ears need to be covered.
When the valve has pressure, "DO NOT" stand in front of the outlet flange.

6.1 GASES AND VAPOURS

If a valve test bench is not available, the pressure adjusting test may be performed using a pressurized reservoir (bottle) with air or nitrogen, if possible, with a good shock-absorbing "mattress" to avoid damaging the closing areas of the valve when the popping is done.

The connection between the valve and the container must be preferably direct through a cut-off valve. The connection pipe must have a minimum inside diameter of 8 mm.

INFORMATIVE SKETCH



It is necessary to perform a good blowing of the connections and pipes. This has to be done prior to the placement of the valve, in order to avoid any dirt that could damage the closing zones.

The test can be performed in two different ways:

A) Increase the inlet pressure until a continuous discharge of fluid is detected, which can be identified by a whistle or unforeseen buzz.

B) Increase the valve's inlet pressure until the popping. To be able to get to this action the adjusting ring has to be placed touching the disc holder's bell, then it has to be lowered one or two grooves.

If the test if correctly done, the results of both tests will be practically identical.

Test (B) requires a container with a bigger volume and more attention when fixing the valve.

6.2 LIQUIDS

The test can be done with clean water at ambient temperature.

The test circuit must be purged and there must be no accumulation of gas inside the test system. The use a vacuum pump to depressurize the circuit before filling with the test liquid is recommended.

Usually an accumulation container is not needed, but a shock-absorbing lung (water/air) is essential if an alternative bomb is used.

Set pressure adjustment will be identified when water pours continuously from the outlet connection of the valve.

6.3 TEMPERATURE AND BACK PRESSURE CORRECTIONS

When a test bench at ambient temperature and atmospheric pressure is used, and the valve is destined to work with temperatures higher than 100 ºC, and / or a back pressure different to the atmospheric, a temperature and / or back pressure correction in the set pressure adjustment has to be done for conventional valves.

For balanced valves (those with bellows) only temperature correction will be done as back pressure is compensated with the bellows.

Correction factor shown in the table below has to be applied to the set pressure adjustment of those valves that are going to work with fluids at temperatures higher than 100 ºC.

WORK TEMPERATURE	INCREASE TO THE SET PRESSURE
UNTIL 100º C FROM 101º C TO 250º C FROM 251º C TO 500º C MORE THAN 500º C	0 % 2 % 3 % 5 %

Correction factor shown above has to be equally applied, even when the set pressure adjustment of that valve was corrected to compensate the back pressure effect in the release.

Therefore, the pressure to be used to test the valve in the test bench, called “Cold Differential Test Pressure”, is the inlet pressure which will open the valve in the test bench at ambient temperature and atmospheric pressure.

To perform an exact calculation of the cold differential test pressure, the pressure which will pop the valve in process, the increase for temperatures above 100 ºC, and back pressure different to atmospheric have to be taken in to account.

Examples of calculation of the cold set pressure adjustment in back pressure and temperature conditions:

A) DATA: Conventional valve (no bellows), set pressure 20 barg, process temperature 260 ºC, and constant back pressure 1 barg, used with vapours.

Adjusting the set pressure of the spring:

20 barg – 1 barg = 19 barg

From the temperature correction table we have to apply a correction factor of 3% (as temperature is between 251º and 500º C):

3 % of 19 barg = 0,57 barg (rounded 0,6 barg)

Cold set pressure adjustment for the valve to be adjusted at the bench will be:

19 barg + 0,6 barg = **19,6 barg**

B) DATA: Balanced valve (with bellows), set pressure 50 barg, process temperature 180 ºC, constant back pressure 1,5 barg, used with vapours.

Adjusting the set pressure of the spring:

50 barg, as it is a balanced valve (with bellows), the back pressure is not affected with the set pressure adjustment, therefore back pressure is not deducted.

From the temperature correction table, a correction factor of 2% as to be applied (as it’s between 101º and 250º C):

2% of 50 barg = 1 barg

Cold set pressure adjustment for the valve to be adjusted at the bench will be:

50 barg + 1 barg = **51 barg**

Is important to notice that in all cases (as it’s been shown in examples A and B), temperature used for calculations is inlet temperature in the valve, and that the set pressure adjustment will be always multiplied buy the temperature correction coefficient.

Cold set pressure adjustment = spring set pressure adjustment x % corrector

The procedure is always the same and applicable to all kind of valves.

6.4 POSITION OF THE ADJUSTING RING

To be able to reach the set pressure of the valve in test benches when flow is small, the adjusting ring has to be adjusted as it is shown below. Once the tests are done, position the ring as shown in Table 1.

Disassemble the screw (14), turn the adjusting ring (7) counter clockwise until it touches the disc holder’s bell (8), then lower 1 or 2 grooves clockwise to avoid such contact. This operation can be done through the outlet flange of the valve, or by using a screwdriver through the respective hole at the lock screw.

Once the ring is in position, assemble the screw paying attention so the nut (32) gets placed between the adjusting ring grooves. Once the screw is tightened check that the ring is fixed so it can’t turn, but free enough for it is self-alignment.

Never perform this operation with a valve that has pressure, as an accidental popping may harm anyone handling it.

6.5. SET PRESSURE REGULATION

If the valve opens itself at a lower or higher pressure other than the set pressure, the compression of the spring has to be adjusted, as shown below:

A) Disassemble the cap (3) or (50) if the valve has a lever.

B) Loosening the adjusting screw net (13), the adjusting screw will be released (11). Turning it clockwise the set pressure will be increased and turning it clockwise will decrease it.

C) Once the set pressure is adjusted, tighten the nut and assemble the cap.

Never adjust the set pressure when the valve has pressure, as the closing surfaces of the nozzle and disc could damage if they are turned.

7 - TIGHTNESS TEST

The tightness test will be done after adjusting the set pressure of that valve and using the same fluid.

Put the inlet pressure at 90 % of the set pressure.

Figure 1 shows the recommended method according to norm API-RP 527 to be used in tests for valves which will work with gas or vapour.

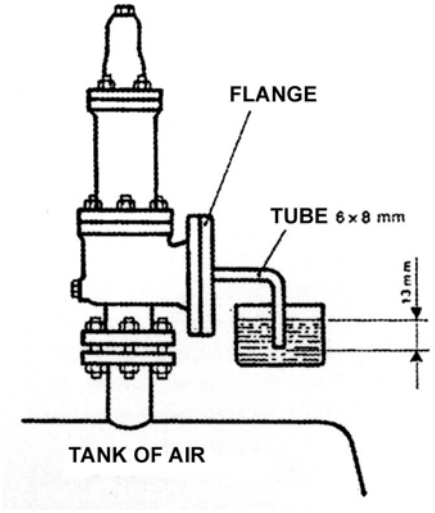


FIGURE 1

The outlet of the valve will be covered with a flange with a single outlet hole made by a pipe with a diameter smaller than 6 mm., and a wall of 1 mm., bended at 90º, with its edge plunged 12,7 mm. in a container with water. With an air pressure at the inlet of the valve equal to 90 % of the set pressure, the number of bubbles per minute produced has to be counted. This test is acceptable if the values indicated in figure 2 aren't surpassed; those are the values that API – RP 527 recommends.

VALVE SET PRESSURE Barg. AT 15,6º C	ADMISSIBLE BUBBLE LEAKS PER MINUTE	
	ORIFICES "C" TO "F"	ORIFICES "G" TO "T"
	DIAMETER ≤18mm	DIAMETER>18 mm
FROM 1 TO 69	40	20
TO 103	60	30
TO 130	80	40
TO 172	100	50
TO 207	100	60
TO 276	100	80
TO 385	100	100
TO 414	100	100

FIGURE 2

While performing this test, special attention has to be taken as the risk of any unforeseen popping exists due the test is done to conditions very close to the set pressure, which could be dangerous for anyone handling the valve.

7.1 EXCESSIVE LEAK

If the tightness has been correctly performed and the result is excessive leaks, the valve has to be disassembled to verify that there are no foreign bodies between the nozzle and the disc that might have harmed the closing surface.

If the leak is cause by dirt from contamination of the test fluid, cleaning the closing surface with cellulose paper or any other non abrasive material impregnated with dissolvent will be enough.

On the other hand, if the leak happens because the closing surface has been marked, it has to be lapped or even turned in the lath, depending on the depth of such marks.

8 - TEST MANOMETER

Pressure measurement will be done with manometers checked and calibrated periodically by "Quality Assurance Department", as indicated by norm ANSI B 40.1 Grade A.
The selection of the test manometer will be done considering that the set pressure has to be between the 25 % and 75 % of the lower part of the register an error will be acceptable if it is not higher than 1% of the measurement field.

9 – ATEX MARKING

The safety valves supplied for installation in potentially explosive atmospheres are compliant with Directive 94/9 EC (ATEX). They are classified within Group II, Category 2, and marked with a specifications plate that shows the following inscription:

II 2 G c TX

TX	TEMPERATURES RANGE T (ºC)
T1	300º<T≤450º
T2	200º<T≤300º
T3	135º<T≤200º
T4	100º<T≤135º
T5	85º<T≤100º
T6	T≤85º

9.1 SAFETY RECOMMENDATIONS

To avoid the risk of ignition, bear in mind the following points:

a) Prevent dust from accumulating on the valve casing.

b) It is absolutely important to keep the protective painting on the casing in good condition, owing to the fact that, if there is any friction or shock, the oxide would act as a high-risk source of ignition.

c) It is essential to make sure that the valve is not insulated from the earth connection of the installation, since the different layers of paint resulting from its maintenance create a plastic insulation on the valve that favors the accumulation of static electricity which, if not eliminated correctly, can produce radiant discharges that could lead to ignition.

d) When the valve has to be fitted to or removed from the installation, use tools that do not produce sparks from friction.

TABLE 1: POSITION OF THE ADJUSTING RING

(NOTCH NUMBER CORRECTION FROM THE CONTACT WITH THE DISC HOLDER)

SAFETY VALVES 3-5111 Y 3-5161

ORIFICE	SET PRESSURE Bar g.										
	> 0,5 ÷ 2,5	> 2,5 ÷ 6	> 6 ÷ 10	> 10 ÷ 16	> 16 ÷ 25	> 25 ÷ 40	> 40 ÷ 64	> 64 ÷ 100	> 100 ÷ 160	> 160 ÷ 250	> 250 ÷ 400
C	2	4	7	9	11	13	15	17	17	18	20
D	2	4	7	9	11	13	15	17	17	18	20
E	2	4	8	10	12	14	16	18	18	18	18

TABLE - 1 -

TABLE 2: DEFECTS, CAUSES → SOLUTIONS

DEFECT	POSSIBLE CAUSE	SOLUTION
Excessive leak	Dirt between nozzle and disc.	Make one or two pops and check. If the leak persists, internal components (trims) should be disassembled and cleaned.
	Marked or scratched closing surfaces.	Disassemble the valve and lap the nozzle and disc.
	Use of the valve with a fluid different to the one it was designed for.	Lap nozzle and disc with fine polish. (typical behavior of valves designed to be used with liquids and used with gases).
	The valve is not mounted vertically.	Correct the installation. Valve will always be assembled vertically.
	Set pressure too near to the operation pressure (when operation pressure is higher than 90 % of the set pressure, leaks may happen).	Increase the set pressure to get 10% of minimum differential. If that is not possible, the closing surface has to be modified. (to provide “stellite”, lap in an extremely fine degree, etc).
Discharge of the valve at a different pressure than the one it has been adjusted	Built-up back pressure.	In conventional valves check that the adjusting ring has the same size (or bigger) tans the outlet connection of the valve and / or there is no obstruction. The situable thing to do is to install “balanced” valves (those with bellows).
	Back pressure different to the initially specified.	Valve needs to be set again considering the real counter pressure value (Conventional valves).
	Loose adjusting ring nut.	Tighten firmly the nut once the valve has been adjusted again.
	Misalignment of the internal components of the valve.	Perform 2 or 3 poppings so the valve self-aligns itself.
Chattering (fast and cyclic opening and closing of the valve).	Excessive turbulences at the valve’s inlet.	Modify valve’s installation
	Adjusting ring (blow-down), wrongly positioned.	Verify that the adjusting ring is at the furthest position from the disc holder (lower part of the nozzle), for valves to be used with liquids. For those to be used with gases or vapors, adjust the ring according to the tables included in this manual.
	Discharge capacity is too small.	Verify that the adjusting ring is not obstructed or has an unsuitable length. Verify that the dimensioning of the valve is correct.
	Oversized valve.	Recalculate and install the proper size.
	Excessive pressure drop at valve inlet.	Increase blow-down placing the adjusting ring as closet to the disc holder’s bell as possible.
	Too small accumulation.	Distance the regulation ring from the disc holder’s bell.

TABLE -2-

Vivaldi 2-8
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