

SAPAG

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IMPORTANT NOTICE

Do not install a SAPAG safety valve before reading and understanding the following instructions. SAPAG cannot be responsible for situations resulting from a poor knowledge by the installer or the user of the present instructions.

Each safety valve has been designed for a particular application corresponding to the information as included onto its nameplate and indicated on the test report supplied with the valve. The installer shall make sure that the safety valve he is to install is the one which has been designed for this application at this location. The tag of the safety valve must be checked and compared to its location, and the Set Pressure of the valve compared to the Design Pressure of the equipment. The Set Pressure of a safety valve as indicated on its nameplate cannot exceed the Design Pressure of the vessel on which it is installed. The Cold Differential Test Pressure as indicated on the nameplate may exceed the Design Pressure of the vessel by no more than 5%, only when the safety valve has to operate at elevated temperature.

SAPAG has delivered a safety valve corresponding to the service conditions as known when the order was registered. The materials used for the components are in accordance with SAPAG standard bills of materials. The materials have been selected together with the buyer within the various possibilities as offered by the SAPAG catalogue. For the main pressure retaining components these materials are certified in accordance with EN 10204 3.1.B.

SAPAG cannot be responsible for accelerated damages to components caused by corrosion or chemical attack by substances constituting or not the process fluid beyond reasonably foreseeable limits and provided the presence of these substances were clearly stated when the equipment was ordered.

The nature, the phase, the viscosity, the temperature of the fluid and all other relevant data taken into consideration by SAPAG are those known at the time of the request for quotation. SAPAG cannot be responsible for a safety valve operational accident resulting in the fact that one or several data wandered away from what was specified in the order.

The installation of a safety valve, as it relates to the inlet and outlet pressure drop, as well as the drainage of the exhaust piping, shall be in accordance with these instructions.

A safety valve is normally closed and should open only to overcome exceptional upset conditions. However the unexpected opening, full or partial, of a safety valve is an event that needs to be considered; the installer shall therefore connect the outlet port of the safety valve to a system allowing the flow to be piped away to an appropriate location. The installer shall consider the following dangers:

- The blast from the safety valve discharge;
- The potential leakage from the safety valve exhaust of lethal, noxious or polluting substances;
- The temperature (elevated or cryogenic) of the exhausted fluid, and the warm-up or cool down of the connected exhaust pipe work;
- The loud noise generated by the safety valve when it opens.

The safety valves are supplied adjusted, sealed and gagged.

IT IS MANDATORY TO REMOVE THE GAG AFTER INSTALLATION AND BEFORE USE.

The adjustments of the valves are protected by seals. Breaking the seals will engage the responsibility of the personnel doing it. When the seals are broken, SAPAG cannot bear any responsibility for a valve adjustment carried out without its formal agreement.

The adjustment or modification of a safety valve setting can only be performed by competent and trained personal using an appropriate test installation fitted with accurate and calibrated pressure measuring equipment.

Further to any setting modification of a safety valve, a new nameplate, showing the new setting value and the identification of the authority having performed the adjustment must be affixed onto the valve.

0. Valve identification

Each valve is identified by a nameplate showing, in addition to the CE mark, the following information:

- Name and address of the manufacturer: SAPAG, Armentières, France;
- Year and month of manufacture;
- Type of safety valve;
- Serial number;
- Set pressure;
- Cold Differential Test Pressure;
- Dimensions and rating of inlet and outlet connections;
- When applicable: the valve tag number.

The value of the Cold Differential Test Pressure is also stamped on the edge of the outlet flange.

The serial number of the valve is stamped on the bonnet flange edge.

1. Storage

The safety valves must be stored away from dust, moisture or weathering.

The valve openings are protected by taps. These taps should remain in place until the valve is installed.

The safety valve must be handled with care.

The gag on the top of the safety valve can be used as a lifting hook.

2. Installation

- 2.1 The vessel and the piping must be absolutely clean and free from any foreign matter before installing the safety valve.
- 2.2 The pressure drop between the protected vessel and the safety valve should not exceed 3% of the set pressure of the valve. The safety valve must be installed in the upright position, the spring on the top side.
- 2.3 The pressure drop of the exhaust piping should not exceed 10% of the set pressure.
- 2.4 Clean the connections on which the valve is to be installed using an appropriate solvent.
- 2.5 Check the dimensions of the ports of the safety valve in comparison to the piping connections. The inlet and outlet connections are most of the time different; the inlet NPS is smaller than the outlet NPS, so that installation of the safety valve in the wrong position is impossible.
- 2.6 Bring the valve carefully to its location.
- 2.7 Remove the port taps and clean up the orifices with an appropriate solvent.
- 2.8 Check piping cleanness.
- 2.9 Fit the connecting gaskets if any and put the safety valve in position.
- 2.10 Connect the valve to the piping, commencing by the inlet.
- 2.11 Make sure that the connecting piping does not induce detrimental stresses on the safety valve body.
- 2.12 It is very important that the body of the valve is not continuously filled by a stagnating fluid, due to either the discharge medium, or the weather, or caused by the discharge of other pressure relieving or safety devices connected to the same header. It is mandatory to design the exhaust piping in such a way that the body is never filled in by a stagnating fluid.

3. Operation

- 3.1 The safety valve is supplied with a GAG. This GAG blocks the valve into the closed position. **WITH THE GAG IN PLACE THE SAFETY VALVE CANNOT OPEN.**
- 3.2 The safety valve must remain gagged if an hydraulic test has to be performed with the valve in place. SAPAG recommends that, whenever possible, the hydraulic test is performed without the safety valve, replacing it during the test procedure by a blank tap; if it is impossible, then the hydraulic test may be performed with the safety valve in place, with its gag.
The gag is normally hand tighten only; excessive tightening may damage the safety valve trim.
- 3.3 After completion of the hydraulic test, and before use, **THE GAG MUST BE REMOVED AND REPLACED BY THE PLUG (17) AND THE GASKET (18) supplied with the safety valve.**
- 3.4 The set pressure tolerance is +/- 3%.
The Maximum operating Pressure should not exceed 90% of the set pressure.

- The safety valve is adjusted to be tight at 90% of the set pressure.
- 3.5 The safety valves are set at ambient temperature. For elevated service temperature, a correction as per table 1 shall apply.

Table 1: temperature correction

| Service temperature | Temperature correction |
|----------------------------------|------------------------|
| ≤ 120°C (250°F) | none |
| 121°C to 538°C (250°F to 1000°F) | +3% |
| > 538°C (>1000°F) | +5% |

- 3.6 *Cold Differential Test Pressure change*
The Cold Differential Test Pressure may be changed by +/- 5% from the pressure marked on the nameplate.
When the CDTP is to be modified it is necessary to change the marking accordingly and to affix a new nameplate showing the modified pressure value as well as the identification of the authority proceeding to the modification.
If the CDTP has to be modified beyond above limitation, consult the factory.
- 3.7 *Use of the lifting lever*
If the safety valve is fitted with a lifting lever, it may be used to check periodically the valve operation.
To check the valve operation, the pressure underneath the disc shall not be less than 75% of the set pressure.
- 3.8 *Operation failures*
Operation failures can be solved by applying information as per table 2.

4. Maintenance

Dismantling, maintenance, assembly and setting shall be performed only by trained and skilled operators using adequate equipment and calibrated measure tools.

The guarantee provided by SAPAG covers maintained and repaired safety valves only if the components, if replaced, are either SAPAG components or components certified by SAPAG.

The safety valves returned from the site to the maintenance shop should before any maintenance routine be decontaminated by appropriate media in order to preserve the health of the operators.

After overhaul, each safety valve shall be thoroughly and individually inspected and sealed by an individual authorized by the user. The individual performing the sealing of the safety valve shall fill in the corresponding Test Report and show his identification on the inspected valve. The valve shall be identified by an additional nameplate showing the authority proceeding to the adjustment.

- 4.1 *Dismantling (see Appendix A)*
- Remove the cap (3) and gasket (19).
 - Measure and record the dimension between the top of the adjusting screw (15) and the topside of the adjusting screw nut (16).
 - Loosen the nut (16) and the adjusting screw (15).
 - Loosen the stop screw (9) and its gasket (21).
 - Remove the nozzle (4).
 - Remove the guide (8) from the nozzle (4).
 - Remove the spindle (11), the spring and its washers (22+23).
 - Remove the ring from the disc holder (6).
 - For O-ring or PTFE seats, remove the seat.
- 4.2 *Inspection*
- Check the spring for corrosion.
 - Check all guiding surfaces.
 - Check swivels: spindle/disc holder, disc holder/disc.
 - Check the seats: disc (5) and nozzle (4).
- 4.3 *Repair*
- Lap the seats of the nozzle (4) and of the disc (5). For PTFE or O ring seats, replace seat or O-ring.
 - NEVER lap the disc (5) against the nozzle (4).
 - In case of damage, the disc (5) and nozzle (4) can be re-machined according to appendix B.

4.4 *Assembly*

- a. Use a new set of gaskets (20-21-19).
- b. All components must be clean and dry.
- c. Except for Oxygen service, all threads and spring load seating surfaces shall be lubricated using appropriate lubricant to avoid seizure. The guiding surfaces must be kept absolutely dry.
- d. The disc holder (7) and guide (8) shall be kept absolutely clean and dry.
- e. Insert carefully the disc (5) and the disc retainer (6) into the disc holder (7).
- f. Assemble the elastic ring (10) into the groove in the disc holder (7).
- g. Screw the spindle (11) into the disc holder (6).
- h. Insert this sub assembly into the guide (8).
- i. Assemble the spring (23) and washers (22) on the spindle (11).
- j. Maintain the disc holder (7) in the upper position by pulling the spindle (11) while screwing the guide (8) onto the nozzle (4).
- k. Screw and tighten the sub assembly with its gasket (20) into the body (1).
- l. Screw the adjusting screw (15) in until the initial dimension is reached.

4.5 *Setting and test*

- a. Put the valve on an appropriate test stand.
The test medium shall be either clean oil free compressed air or de-mineralized water with corrosion inhibitor for valves on liquid service.
- b. Increase the pressure underneath the disc and check the opening pressure.
The pressure measurement accuracy must be 1% or better.
- c. To properly adjust the valve, use the adjusting screw (15). Before turning the adjusting screw (15) drop the pressure below 50% of the specified set pressure and prevent the spindle from rotating with a wrench or a screwdriver.
- d. When the specified set pressure has been reached, pop the valve three to four times to check its regularity.
- e. Tighten the adjusting screw nut (16) and fit the cap (3) and its gasket (19).
- f. Check the tightness at 90% of the set pressure using a recognized standard, such as API 527.
- g. Seal the valve, identify the valve with a plate showing the authority conducting the adjustments.

5. In service supervision of safety valves

As safety accessories, the safety valves shall be carefully supervised and this supervision needs to be documented. SAPAG recommend that procedures as described (but not limited to) below be applied by the user in order to preserve the safety of the equipment, reduce the maintenance costs and be conform to the regulatory rules.

- 5.1. Data file: the user should maintain a data file showing the data relevant to each safety valve: identification, technical characteristics, flow rate, operation manual.
- 5.2. Maintain a Log book of all operations performed on a particular safety valve: inspection, periodic check, test reports.
- 5.3. Maintain statistics about consumption of spare parts.

Note on periodicity of outage:

this periodicity is a function of numerous factors related to the operation: nature of the fluid, environment, pressure level as compared to the set pressure, temperature, installation set up, number of openings etc...so that it is impossible to specify a priori an optimum periodicity. The user shall have to establish this periodicity based on his own experience and his level of requirements.

Table 2: trouble shooting

| Trouble | Cause | Solution |
|---------------------------|---|---|
| Leakage | Foreign matters on seats Seats damaged | Pull the lift lever Repair the valve |
| Chattering | Flow not sufficient Excessive back pressure | Check inlet pressure drop Check outlet pressure drop |
| The valve does not open | The gag is still in place | Remove the gag |
| The valve opens too often | The set pressure is too close to the operating pressure | Increase the set pressure |
| The valve opens too often | The temperature is higher than expected | Increase the set pressure or change spring material |

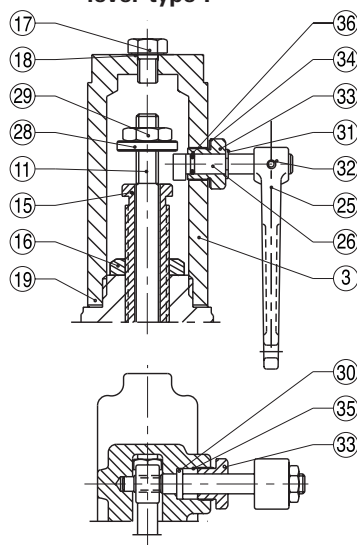
Parts list

| Ref | Designation |
|-----|---------------------|
| 1 | Body |
| 3 | Cap |
| 4* | Nozzle # |
| 5* | Disc # |
| 6 | Disc retainer |
| 7 | Disc holder |
| 8 | Guide |
| 9 | Stop screw |
| 10 | Elastic ring |
| 11 | Spindle |
| 15 | Adjusting screw |
| 16 | Adjusting screw nut |
| 17 | Cap plug |
| 18* | Cap plug gasket |
| 19* | Cap gasket |
| 20* | Body gasket |
| 21* | Stop screw gasket |
| 22 | Spring washer |
| 23* | Spring |
| 25 | Lever |
| 26 | Axle |
| 27 | Fork |
| 28 | Lift nut |
| 29 | Jam nut |
| 30 | Ring |
| 31 | Elastic ring |
| 32 | Pin |
| 33 | Bushing |
| 34 | Bushing gasket |
| 35 | Packing |
| 36 | O-ring |
| 37 | Nameplate |
| 38 | Flanges |

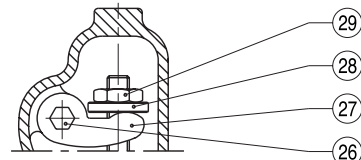
* spare parts

stellite on request

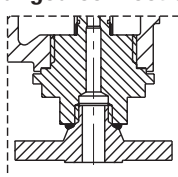
Screwed cap & packed lever type F



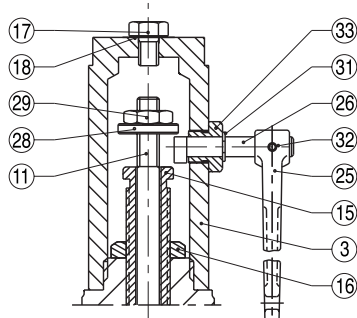
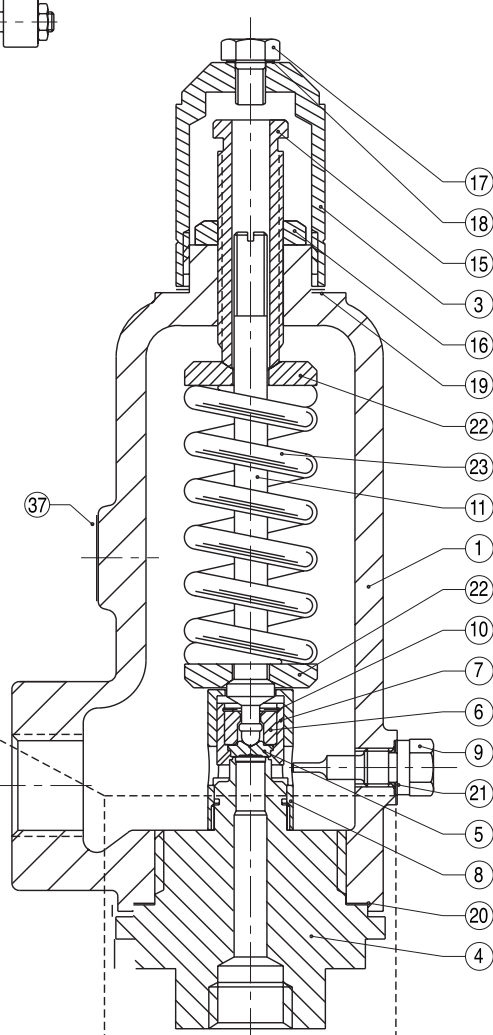
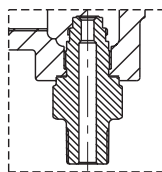
Screwed cap type A



Flanged connections

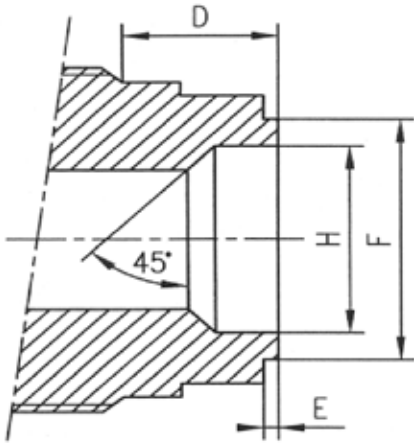


Male inlet

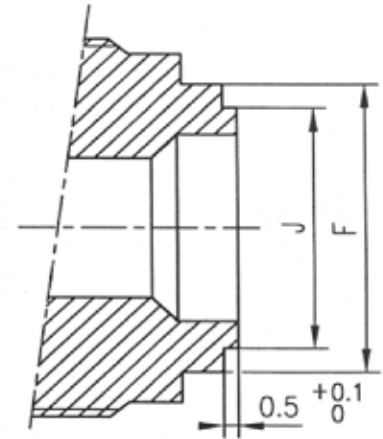
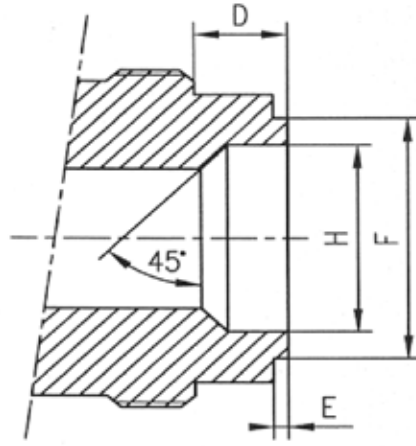


Screwed cap & plain lever type C

Re-machining of the disc and nozzle seats



Nozzle seat

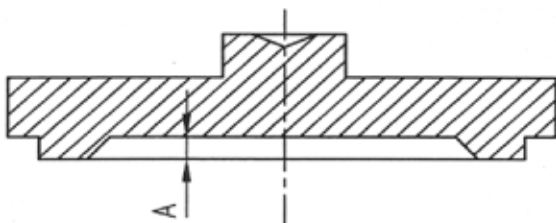


Pressure < 30bar

Dimensions (mm)

| Type | Orifice | D mini | H ₀ ^{+0.05} | E ^{±0.1} | F | J |
|------|---------|--------|---------------------------------|-------------------|-------------------------|--------------------------|
| 5785 | 1 | 4,8 | 9,9 | 1,0 | 11.2 ^{+0/-0.1} | 10.45 ^{+0.1/-0} |
| 5780 | 2 | 4,8 | 10,3 | 1,0 | 12.0 ^{+0/-0.1} | 10.85 ^{+0.5/-0} |
| 5780 | 3 | 12,7 | 14,65 | 1,5 | 16.7 ^{+0/-0.1} | 15.25 ^{+0.1/-0} |
| 5780 | 4 | 23,8 | 21,7 | 1,5 | 24.1 ^{+0/-0.1} | 22.55 ^{+0.1/-0} |

* Not applicable for series 5790



Disc

Dimensions

| Type | Orifice | A mini (mm) |
|------|---------|-------------|
| 5785 | 1 | 0,25 |
| 5780 | 2 | 0,25 |
| 5780 | 3 | 0,25 |
| 5780 | 4 | 0,25 |