

Safety Devices

When a gate valve during the service is closed, due to body - bonnet cavity, a part of the medium is trapped in a closed chamber (Fig. E1). If the medium is a liquid with high thermal expansion coefficient (ex. water) during the heating of the fluid the evaporation can rise the pressure in this chamber over the maximum admissible working pressure for the valve. This fact is very dangerous and can cause several damages to the body structure and to the gaskets. Further, the operation of the valve in this situation can be very difficult and sometime also impossible because the high pressure in the cavity block the wedge in the closed position.

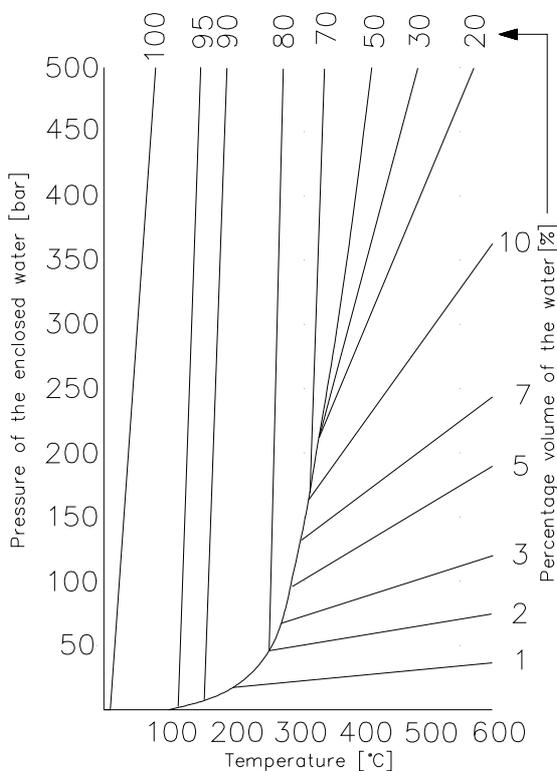


Fig. E2

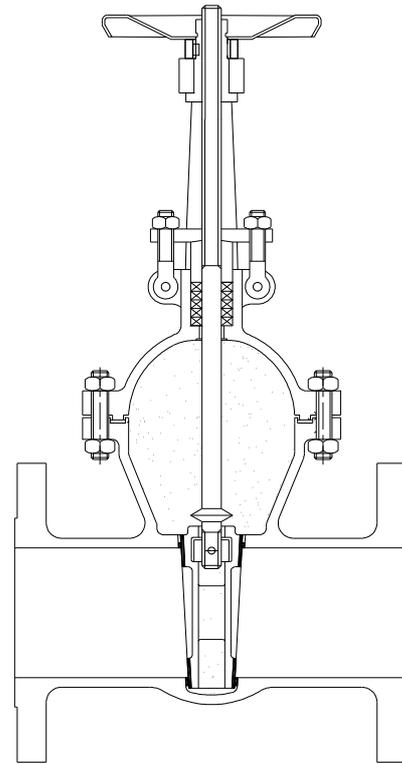


Fig. E1

This situation typically, but not only, can happen for valves used for steam and for liquid gases applications (cryogenic service).

The rise of the developing pressure is a function of the percentage of filling of the chamber with liquid and of the temperature (see the diagram in Fig. E2 valid for water). For a constant percentage of water a little increasing of the temperature cause a quick rise of the pressure in the closed chamber.

In such cases the gate valves shall be always provided with an appropriate safety device that equalise the pressure in the closed chamber.

Normally this safety device consists in two alternative solutions:

- 1) connecting the body - bonnet cavity with the upstream side with a hole in a side of the wedge (Fig. E3): in this way the overpressure is discharged directly in the system avoiding any external leakage, therefore in this way the valve can be used only for unidirectional service (because is guaranteed the full tightness in one direction only);
- 2) connecting the body - bonnet cavity with a small safety valve that can discharge the overpressure at the external but maintaining the valve tightness in both directions (Fig. E4); in this case the output side of the safety valve shall be appropriately connected with a discharge pipe to avoid any possible hazard for the people.

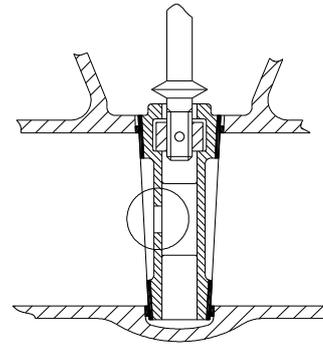


Fig. E3

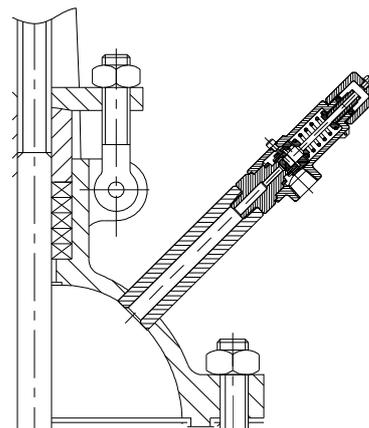


Fig. E4

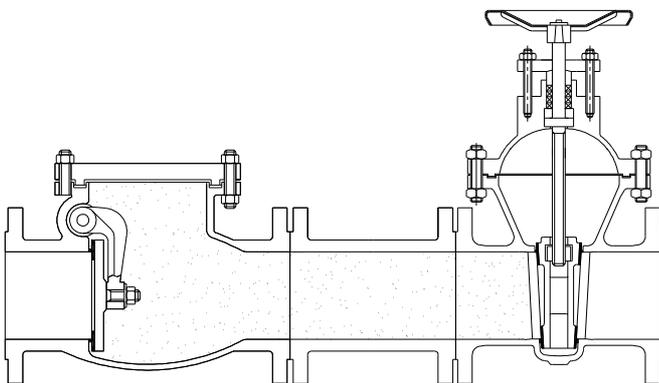


Fig. E5

The choice of the correct method is depending on the specific application. In such situations please contact always RT for a correct choice. The same problem can occur also with a swing check valve due to presence of a shut-off valve at the upstream side. In this case the closed cavity is formed by the pipe between the swing check valve and the shut - off valve (Fig. E5). In this situation the swing check valve or the pipeline shall be provided with a safety valve.