Fike | White Paper

Use of Rupture Discs in Combination with Relief Valves

1. Pressure Control Versus Pressure Relief

Since the earliest days of the industrial revolution, industrial processes working under other than atmospheric pressures (both overpressure and vacuum) typically will require (mandatory) measures to assure a safe operation. National and transnational legislations are developed and in place to assure that the required safety levels are not breached and the environment and investments are safe.

As a first line of defence, pressure control systems are typically used. These systems monitor the pressure developments in the process equipment and timely interact with the process control system to limit the pressure to acceptable levels. Control and/or monitoring devices, which are not a necessary part of a safety system, are usually excluded from safety design standards since they are typically active in advance of a safety system. They also may combine other activities related to the process and cannot always be considered as dedicated safety systems. The efficiency of these pressure control systems depends on input received from instrumentation devices and require extensive and validated reliability analysis, based on probability of failure on demand (PFD) or safety integrity level (SIL) assessment. As in most cases, pressure control systems may not assure the required level of reliability in all service conditions; the use of (last-line of defence) pressure relief systems is often required. In cases where the pressure control systems would fail to achieve the required pressure safety levels, these dedicated protection devices safeguard the installation when the critical pressure threshold is reached. Figure 1 illustrates the correlation between pressure control and monitoring systems, and pressure relief systems.

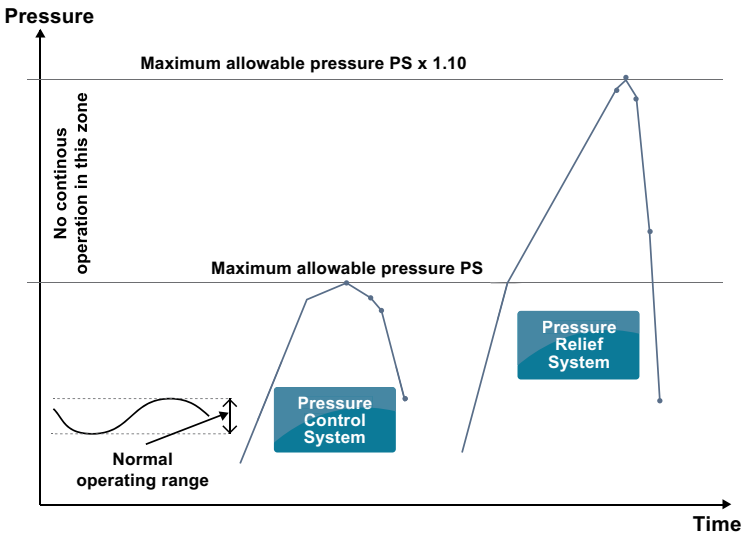
It is essential to not only consider the pressure relieving device but the complete pressure relief system, so as not to reduce the relieving capacity or adversely affect the proper operation of the pressure relieving devices. Operating problems – where observed - within pressure relief systems, frequently result from incorrect selection of the appropriate device or from improper handling, incorrect installation or lack of maintenance.

A risk assessment and determination of all possible upset condition scenarios which could potentially lead to unacceptable and dangerous pressures needs to be done with sufficient attention and based on experience in running the process. A multi-disciplinary group of experts may be required to collect the necessary information.

To attain the required safety against pressure risks the industry has been using pressure relief devices. Such pressure relief devices are categorized as reclosing and non-reclosing types, and both offer unique characteristics which make them a viable selection for the design engineer.

This document will focus on pressure relief devices only.

Figure 1: Relationship between Control & Monitoring and Safety Systems



2. Relief Device Options

The industry has worked traditionally with (reclosing) relief valves or (non-reclosing) rupture (or bursting) disc devices to achieve pressure relief action. Both types are accepted for use as independent primary relief devices, protecting the installations against unallowable pressures.

Reclosing pressure relief devices, commonly referred to as safety relief valves (SRV), pressure relief valves (PRV) or relief valves (RV), are designed to provide opening for relief at the selected set pressure. This allows for the overpressure to evacuate and then the valve recloses when the pressure drops below an acceptable level. Safety or pressure relief valves come as spring-operated or as pilot-operated units.

To protect installations against unacceptable vacuum pressures, the use of reclosing vacuum relief valves (VRV) or breather valves may be considered. Again these devices will open and allow for atmospheric pressure to be re-established when the set-to-open vacuum pressure is reached.

Rupture disc devices are often preferred to achieve instant and unrestricted pressure relief (both overpressure and vacuum pressure). They consist of a calibrated (metallic or graphite) membrane which ruptures when the set pressure is achieved. After activation the membrane remains open, resulting in a complete discharge of the pressure in the installation.

The main properties of these fundamental protection devices are shown on Table 1.

Table 1: Rupture Discs versus Relief Valves

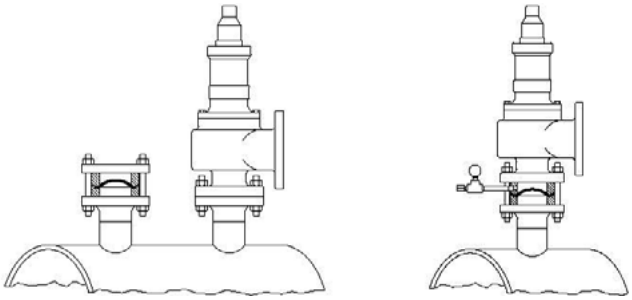
PROPERTIES	RUPTURE DISC	RELIEF VALVE
Complexity of device	Low	High
Investment Cost	Low	High
After activation	Replace	Reset
Protection against Overpressure	Yes	Yes
Protection against Vacuum Pressure	Yes	No
Mounting Position Restrictions	None	Vertical only
Installation Cost	Low	High
Maintenance Cost	Low	High
Requires Regular Recalibration	None	Yes
Affected by Back Pressure	Yes	Yes
Operational Testing Possible	None	Yes
Leak tight	Yes	No
Selection of Materials of Construction	Large	Limited
Size range	Large	Limited
Change of Set Pressure	None	Yes
Suitable for Gas/ Liquid/2-Phase	Yes	No
Reaction Time	Low	High
Unrestricted Opening	Yes	No

Depending on the equipment to be protected and required performance, reclosing and non-reclosing devices are complementary and offer unique advantages and restrictions. The appropriate selection and preference must be determined by the design engineer or user depending on the specific application needs.

3. Combinations of RD & RV

Often, using rupture discs in combination with relief valves offers the best solution. Such combinations can be either in parallel or in series, offering the user a combination of features which provides the "best of both worlds". The design engineer or safety specialist needs to carefully consider which combination provides the targeted features, while keeping the consequences in balance.

Figure 2: Typical RD & RV Combinations



Parallel Use *In-Series Use*

Case 1: Rupture Disc in Parallel with Relief Valve

When used in parallel, the main objective is to allow for the relief valve to handle the overpressure situation, bleed the pressure until an acceptable, reduced pressure is achieved and allow for the process to continue. Where the overpressure cannot be effectively reduced by the relief valve (due to malfunction, blockage or in case of excessive generation of pressures) the pressure may continue to rise until the (higher) set pressure of the rupture disc is reached. Upon activation the rupture disc provides an additional/ back-up relief path for the overpressure, resulting in a safe situation.

When using rupture discs and relief valves in parallel, a suitable margin of set pressure needs to be introduced to avoid premature failure of the rupture disc. This requires that the set to open pressure of the relief valve be below the burst pressure range of the bursting disc, with a suitable margin. Legislative requirements for pressure limitation, and size determination, range from:

- Sizing of the secondary relief devices (the rupture disc) to be such that the pressure does not exceed 116% of the equipment design pressure (ASME Section VIII Division 1, § UG-125 (c) (1)) up to
- Maximum achieved overpressure not to exceed 110% of the equipment design pressure (European Pressure Equipment Directive 93/23/EC; EN 764-7 § 6.1.4).

WHY?
- **Creates added safety**
- **Achieve required discharge capacity**

BENEFITS/CONSIDERATIONS:
- **Higher safety**

ENGINEERING STANDARDS:
- **Sizing/set pressures to be in line with legislation in place and with common engineering practices**

Case 2: Rupture Disc in Series with Relief Valve

Rupture disc devices may also be installed upstream or downstream of relief valves, each geometry offering its particular benefits for the user.

A. Rupture disc upstream of Relief Valve:

The use of rupture discs upstream with relief valves is a common practice to achieve one or more of the following:

1. Prevent plugging of the relief valve
2. Prevent corrosion of the relief valve internals
3. Prevent leakage through the relief valve
4. Allow for in-situ testing of the relief valve

<u>Prevent plugging or gumming of the relief valve</u>
Through the selected use of suitably designed rupture discs, product build up or polymerization can be limited. Most relief valves are, due to their geometry of inlet, are not suitable for use with media that create a build-up layer, resulting in the inability of the relief valve to open. The use of an upstream rupture disc reduces the need for regular inspection, maintenance or cleaning (increased productivity) and the reliability of safety.

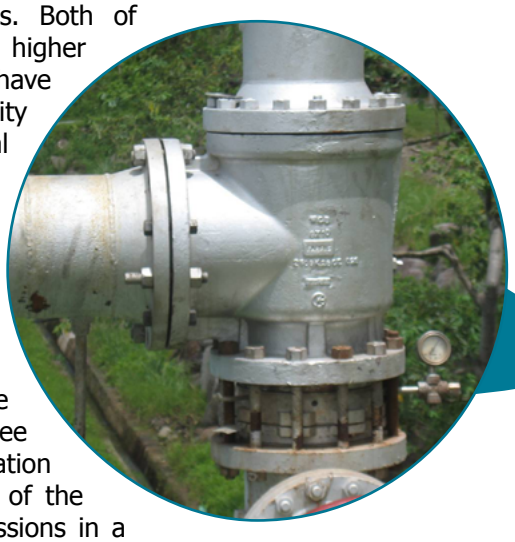
Prevent corrosion of the relief valve internals

When the process media requires specific corrosion resistant materials to be used, it can reduce the relief valve options and/or have a substantial impact on cost and delivery time of the valve and its spare parts. By installing a high alloy material rupture disc upstream of the relief valve, the valve is physically isolated from the process. Exposure to the process media is restricted to the overpressure event only, after which the rupture disc must be replaced and the valve cleaned/refurbished. Until this emergency event occurs, the relief valve remains in pristine conditions, not affected by the process.

This allows for the use of "standard" material relief valves and related spare parts, resulting in substantial cost savings at the initial investment and spares, a wider range of potential suppliers of relief valves and shorter equipment lead times.

Prevent leakage through the relief valve

Most spring operated relief valves rely on special metal-to-metal sealing surfaces and spring load applied, in order to achieve leak tightness. This inevitably results in some leakage which increases as the operating pressure approaches the valve set pressure. Relief valve leakage rates are addressed in industry standards and acceptable leakage rates are defined (API 576). Where such leak rates are unacceptable (for example for environmental reasons/restrictions, toxic nature of product or to avoid loss of valuable process media) the user can choose soft-seated relief valves or pilot-operated relief valves. Both of these options require higher investments and may still have restrictions such as availability of suitable O-ring material with sustained performance characteristics when exposed to process, pilot-valve leakage and corrosion or plugging, etc. By concept, rupture discs offer improved leakage rates and designs are available with virtually leak-free constructions. The installation of rupture discs upstream of the relief valve eliminates emissions in a simple and cost-effective manner.



Allow for in-situ testing of relief valve

The acceptable use of relief valves to protect installations is linked to the need for periodic calibration of these safety devices. Depending on the local legislative requirements such calibration may be required annually. Since process shutdown and removal of the relief valve from the process equipment is required for such calibration testing – often to be done at a special test institute or qualified service centres - important economic reasons exist to try to extend the calibration intervals. Longer calibration intervals may be allowed for by the supervising authorities if the user provides evidence of unaffected set pressure over time. This can be achieved by regular testing of the relief valve "in-situ", e.g. without removing the relief valve from the installation, and demonstrating its unchanged performance. By installing a rupture disc upstream of the relief valve a limited volume is created, allowing for controlled introduction of pressure between rupture disc and the valve inlet from the outside. This pressure (possibly combined with special "pulling force"-test and measuring equipment applied to the valve spindle to overcome the spring force and keeping the relief valve in closed condition) can be measured and registered as evidence of acceptable valve performance. The relative cost related to adding the rupture disc device is generally far less than the loss of production time and need for removal and re-assembling of the relief valve.

When selecting a rupture disc upstream of a relief valve the following needs to be considered:

- The rupture disc is not allowed to interfere with the relief valve operation, e.g.
  - No fragmentation of the rupture disc is allowed as such loose parts may obstruct the valve orifice or restrict the valve from reclosing.
  - Sufficient distance needs to be available for the rupture disc to open without blocking the relief valve nozzle. This may need special attention: for example, after opening a single petal rupture disc may extend beyond the height of the holder and reach into the inlet section of the relief valve.
  - To assure proper functioning of the relief valve the rupture disc device is to be "close-coupled" with the relief valve, therefore assuring that the pressure drop during flow at the inlet of the relief valve does not exceed 3% as required. In most cases this restricts the distance between the rupture disc and relief valve inlet to 5 pipe diameters maximum. This situation is again often achieved by installing the rupture disc device directly upstream of the relief valve. Longer distances between the rupture disc and relief valve – for example by introducing pipe sections or spacers - may result in the creation of reflective pressure waves upon opening of the rupture disc. This phenomenon may result in undesired re-closing of the rupture disc or even fragmentation and should be avoided.
- Since the rupture disc, like the relief valve, is a device that reacts to differential pressure between the upstream and downstream side, measures need to be taken to avoid that any unnoticed pressure increase occurs in the closed cavity between the rupture disc and relief valve inlet. Most industry standards and related legislations require that the pressure in the cavity is either monitored and/or vented to atmosphere. This is commonly achieved through the use of a so-called tell-tale assembly consisting of pressure gauge or indicator, try cock and free vent. Specific considerations are listed below:
  - If the space is otherwise closed then a pressure gauge alone should not be considered suitable. This approach relies on plant personnel to periodically check each gauge to insure that pressure build up has not occurred. This could easily result in an unsafe situation existing for hours, days or even weeks at a time.
  - A pressure switch or transmitter that provides an alarm in the control room is a more appropriate indication method.
  - A pressure gauge along with a pressure switch or transmitter is often a better choice so not only the control room is notified, but the maintenance personnel also have visibility to the elevated pressure condition prior to breaking loose the pipe flanges.
  - In some cases the space is not vented. In others, venting to atmosphere, catch tank, or collection header may be desired. It is common in these cases to use an excess flow valve (a type of check valve) on the venting line. At very low flow conditions, as in the case of thermal expansion of trapped air, the check ball allows the fluid to vent. When the disc ruptures, the excess flow valve closes to prevent fluid loss through the vent.
  - The use of a break wire or other flow sensitive burst indication devices alone are not considered suitable unless they are capable of detecting leakage through the rupture disc.
  - No one configuration is ideal for all applications. The corrosiveness or toxicity of the media is often what drives how this space is monitored and vented.

When installing rupture disc devices upstream (at the inlet) of relief valves, the size of the rupture disc should be a least the same nominal size of the inlet of the relief valve. Additionally the rated relief capacity of the relief valve, as stated by the relief valve manufacturer, is to be reduced by 10% or alternatively– reduced to the certified combination capacity value (where the specific combination has been capacity tested and certified by a recognized third party). See Table 2.

Table 2: Certified Combination Capacity Values of Fike Rupture Discs

RUPTURE DISC MODEL	VALVE MODEL	MIN. SIZE (IN)	MIN. BURST PRESSURE IN MIN. SIZE (PSIG)	CERTIFIED COMBINATION CAPACITY FACTOR
Poly-SD CS	Consolidated Dresser 1900E-2, 1900-30E-2	1	125	.989
Poly-SD DH		1	32	.989
SRL		1	27	.994
SRX		1	95	.978
Poly-SD DH	Consolidated Dresser 1900, 1900-30, 1900-35	1.5	28	.994
HOV		2	25	.976
MRK		1	53	.979
SRX		1.5	95	.971
SRL		1.5	28	.986
Axius		1.5	15	.988
Atlas		1.5	117	.980
Poly-SD	Consolidated Dresser 3900	2	55	.989
HOV		2	30	.985
Poly-SD CS	Farris 2600, 2600S	1	125	.958
Poly-SD DH		1	32	.999
Poly-SD		2	83	.974
SRL		1	27	.996
SRX		1	95	.969
MRK		3	34	.983
Axius		1	15	1.00
Atlas		1	198	.998
MRK	Anderson Greenwood Crosby JOS-E, JBS-E	1	60	.977
Axius		1	15	.987
Poly-SD CS		1	124	.970
Poly-SD DH		1	32	.997
SRL		1	27	.979
SRX		1	95	.996
MRK	Anderson Greenwood Crosby 223/423/623/923	1	88	.991
MRK	Anderson Greenwood Crosby 273/473/576/673/973	1.5	62	.988

The set pressure of the rupture disc device is to be set in accordance with the applicable legislative standards and guidelines:

- ASME VIII Division 1 UG-127 footnote 52 says: "….result in opening of the valve coincident with the bursting of the rupture disk." For combination capacity testing, ASME UG-132(a)(4)(a) says: "The marked burst pressure shall be between 90% and 100% of the marked set pressure of the valve."
- API RP520 paragraph 2.3.2.2.2 states: "…the specified burst pressure and set pressure should be the same nominal value."
- EN ISO4126-3 paragraph 7.2 says: "The maximum limit of bursting pressure…shall not exceed 110% of the… set pressure or a gauge pressure of 0.1 bar, whichever is greater…" and "The minimum limit…should not be less than 90% of the…set pressure."

While all statements are slightly different, the basic guidance is the same: keeping the rupture disc specified burst pressure and relief valve set pressure at the same nominal value (ignoring tolerances) meets the intent of each of the standards and is relatively easy to implement.

There may be special cases where it is desirable to have these pressures significantly different; in these cases the user should carefully evaluate both the rupture disc and relief valve function to insure that there are no adverse effects on performance.

Sizing and Marking:

The process of sizing the relief valve is exactly the same for a combination of rupture disc with relief valve as it is for a stand-alone relief valve, except the addition of the combination capacity factor (CCF). This factor represents the ratio of the capacity of the combination to the capacity of the valve alone.

CCF = Capacity of the Combination / Capacity Stand-alone Relief Valve

The default CCF (Fd according to EN/ISO 4126-3) for most codes is 0.90 (in other words, the combination is assumed to have a capacity equal to 90% of the relief valve rated capacity, if nothing more is known about the actual capacity). EN ISO 4126-3 adds an additional condition on the use of the default CCF and requires that the petal(s) of the rupture disc be fully contained within the holder after rupture in order to use the default CCF; otherwise a tested or certified value must be used.

CCF values higher than 0.90 may be used in certain cases where specific testing has been done with a particular combination of rupture disc and relief valve type. This is often referred to as a "certified" combination capacity factor (CCCF).

The methods for establishing the CCCF vary based on the applicable code and are summarized as follows:

ASME:

- Testing must be done by an authorized testing laboratory and results registered with the National Board of Boiler and Pressure Vessel Inspectors
- Testing of only one size is required to establish a CCCF for a range of sizes
- Testing with the smallest size and minimum corresponding pressure covers all higher pressures in that size and all sizes larger

EN ISO 4126-3:

- No certifying body or laboratory requirements
- One size method and three size method are accepted
- One size method is applicable to all combinations of the same size and design of rupture disc and relief valve equal to or above the tested pressure
- Three size method is applicable to all combinations of the same design of rupture disc and relief valve in all sizes equal to or greater than the smallest tested size; and pressures equal to or greater than the appropriate minimum pressure for the size

Both ASME and EN/ISO have requirements for establishing nameplate marking to reflect the capacity (or combination capacity factor) of the combination, model and manufacturer of both the rupture disc and relief valve. Although these are requirements of both ASME and EN/ISO this nameplate is rarely supplied because the components are generally purchased independently with neither manufacturer aware of the other.

WHY?
- **Creates added safety**
- **Reduce cost of ownership & investment**

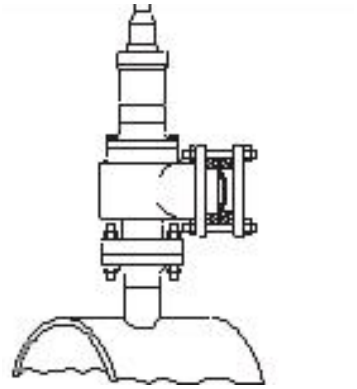
BENEFITS/CONSIDERATIONS:
- **Higher reliability and cost savings**
- **Reduction of emission**

B. Rupture disc downstream of relief valve

The primary reasons for applying rupture discs downstream of pressure relief valves are:

- Prevent corrosion of relief valve
  - Prevent fouling or sticking of the relief valve
- Prevent variable superimposed backpressure from affecting relief valve
- Detect opening or leakage of relief valve

Figure 3: Rupture Disc at Relief Valve Outlet



Prevent fouling/plugging of the relief valve:
Where relief systems are vented into a common header, the risk exists that blow-down material may enter into the vent side of the installed relief valves. Where such vented media can result in either corrosion or polymerization, the external side of the relief valve mechanism may be affected resulting in failure to operate when required. By installing a rupture disc device with suitable properties at the downstream side of the relief valve, vented media is isolated from the relief valve, therefore avoiding such effects, increasing the reliability of the safety system and reducing the need for inspection and maintenance. To ensure that the downstream rupture disc will not impede the proper performance of the relief valve the burst pressure of the rupture disc should be as low as possible, whereas the provided minimum net flow area of the rupture disc needs to be as at least as large as the relief area of the relief valve outlet.

Prevent corrosion of the relief valve internals:
To avoid corrosion and the resulting need for inspection, maintenance and repair of the relief valve, the use of a downstream rupture disc can be considered. The set pressure of this rupture disc needs to be low enough not to affect the proper performance of the upstream relief valve.

Prevent back pressure from affecting relief valve performance:
Where back pressure can be present the effects on the performance of the relief valve needs to be considered. This can be done by selecting relief valve attributes such as balanced metallic bellows or using pilot-operated relief valves. Such selections will have an economic impact and result in the need for additional spare parts and/or maintenance. As an alternative, the use of downstream rupture disc devices installed at the relief valve outlet, prevents the relief valve from being exposed to back pressure.

Detect the leakage or activation of relief valve:
By detecting the rupture of the downstream rupture disc device – often done by means of burst detectors used as an integral part of the rupture disc – the plant operators can be informed about the upset condition leading to blow off. Where the interspaces between the relief valve outlet and rupture disc is monitored, the leakage of the relief valve can be detected and emissions avoided.

The use of rupture discs at the downstream side of relief valves is relatively unknown but offers an array of benefits and possibilities to the plant owner. The acceptable use of this combination has to comply with following sizing and set pressure requirements:

1. The minimum net flow area of the rupture disc device installed at the relief valve outlet needs to be equal or larger than the relief valve outlet relief area.

2. The burst pressure of the rupture disc needs to be as low as practical to reduce any effect on the relief valve performance.

3. Where applicable, the selected rupture disc needs to be capable of withstanding the back pressures expected from the effluent handling system.

4. The opening of the rupture disc shall not impede with the relief valve opening or performance.

5. The system design shall consider the adverse effects of any leakage through the relief valve or through the rupture disc to ensure performance and reliability.

6. The relief valve may not fail to open at the expected opening pressure regardless of any backpressure that may accumulate between the relief valve outlet and the rupture disc. The space between the relief valve outlet and the rupture disc shall be vented, drained or suitable means shall be provided to ensure that an accumulation of pressure does not affect the proper operation of the relief valve. Venting, pressure monitoring, and selection of low rupture disc burst pressures are commonly used to meet these requirements.

7. The bonnet of a balanced bellows-type relief valve shall be vented to prevent accumulation of pressure in the bonnet and affecting relief valve set pressure.

WHY?
- **Creates added safety**
- **Reduce cost of ownership and investment**

BENEFITS/CONSIDERATIONS:
- **Higher safety**
- **Cost savings**

ASME SECTION VIII, DIVISION 1 VS EN ISO 4126-3:
Compare and contrast the various requirements within the two major standards on the subject. Note the requirements of API RP520 are taken directly from ASME Section VIII, Division 1.

REQUIREMENT	ASME SECT. VIII, DIV. 1 (API)	EN ISO 4126-3	COMMENTS
Definition of a RD/PRV combination	None	Rupture disc is within 5 pipe diameters of the inlet of the PRV	If the RD is not within 5 pipe diameters then a combination capacity factor is not applicable.
3% rule	Pressure drop between the vessel and PRV inlet including the effect of the rupture disc shall not exceed 3% of the valve set pressure at valve nameplate flowing conditions.	Pressure drop between the vessel and PRV inlet including the effect of the rupture disc shall not exceed 3% of the set pressure of the valve at maximum flowing conditions.	The difference between flowing at nameplate capacity or some other maximum could be significant. i.e. what if the PRV is set well below the MAWP but sized to prevent exceeding 110% of MAWP. It may be impossible to meet the ISO requirements in this situation.
Certified Combination Capacity Factor	One size method applicable to all sizes equal to and larger than the tested combination	One size method for a single size or three size method to be applied to a family	Pursuit of the ISO 3 size combination capacity factors is cumbersome due to the cost and logistics. With a default of 0.9 the pay-back on 3 size testing is minimal.
Protrusion of petals into valve	No specific requirement	Petals shall not protrude into the PRV inlet unless the influence of the petals on the capacity and performance of the PRV has been assessed and proven to meet the requirements of Clause 7. (Combination Performance)	Both codes use language prohibiting the RD to impair the performance of the PRV. The ISO document seems to take a firm stand on the petal protrusion issue but points to Clause 7 which allows a default CCF (Fd) of 0.9.
Documentation of the combination	Nameplate marking for the combination provided by the User, PRV mfr, RD mfr, or vessel mfr.	Supplier of the combination shall provide the nameplate, certification, assy & installation instructions…taking into account the results of a hazards analysis.	In both codes there are gaps in these requirements. In practice these requirements are rarely followed.

4. Conclusions

Pressure relief solutions are common in industry processes to assure that the investments are protected and a safe working environment is created. Most commonly used devices to offer pressure safety are selected on the basis of specific requirements for the applications. Relief valves and rupture (bursting) discs are mostly specified, each offering their specific features and considerations and providing the system designer viable solution choices.

The use of rupture discs in combination with relief valves can be done in several geometries and combinations. These configurations offer a wide range of benefits to the user; environmental, cost reduction, emission control, higher safety/reliability levels and improved performance of the plant safety systems are a direct result. Process system designers need to evaluate the individual effects and make a selection of what geometry works best for the individual plant requirements. Industry standards and legislations are in place to assure that safe solutions are effectively used. In most applications the combined solution of rupture discs and relief valves offer more value for more benefits – a true definition of "more for more".

Where needed pressure relief specialists are available to assist in determining the best way forward. (See www.fike.com)

Additional Important Technical Readings Available:

Fike Technical Bulletin TB8103
Fike Technical Bulletin TB8105
Fike Technical Bulletin TB8100

Frequently Asked Questions

Q1 Can a composite rupture disc with a fluoropolymer (or other elastomer) seal or a scored rupture disc with a fluoropolymer liner be used at the inlet of a relief valve?

A1 When a disc with a fluoropolymer seal or liner bursts the fluoropolymer breaks apart and discharges out of the relief valve. However, there is a chance that the fluoropolymer will hang up and become trapped in the valve seat when it re-closes, resulting in a leak. Since re-closing is often an important part of the relief valve performance, the conservative answer is no. If leak-tight re-closing is not important for the application then this type of rupture disc may be acceptable.

Q2 I am using the default combination capacity factor of 0.90 to determine the capacity of my combination. Do I have to also worry about the relief valve inlet line loss calculation? It seems like I'm being penalized twice for using the rupture disc.

A2 Yes, ASME Code Interpretation VIII-1-98-43 requires that the rupture disc be considered when calculating the inlet line loss.

Q3 How do I manage the difference in rupture disc burst pressure and the relief valve set pressure given the manufacturing range, rupture tolerance and set pressure tolerance?

A3 The easiest way is to specify the rupture disc and pressure relief valve at the same nominal pressure and order the rupture disc with zero manufacturing range. The resulting differences in set pressure tolerances are insignificant.

Q4 The certified combination capacity factor that I want to use was based on a 1" @ 45 psig test series but my application is for a 4" @ 25 psig. Can I still use this CCCF even though it is at a lower pressure than what was tested?

A4 No. The minimum set pressure tested during certification tests is the minimum pressure that may be used for all sizes equal to and larger than the size tested. The established CCCF cannot be used for pressures lower than tested in the same size and the CCCF cannot be used for any sizes smaller than the test series size regardless of pressure.

Roger Bours
Pressure Relief Sales Manager

Roger Bours, MSc, has been the Pressure Relief Sales and Product Manager for Fike Corporation's European base in Herentals, Belgium for nearly 30 years. Roger is extremely knowledgeable in pressure relief solutions for a wide range of applications and industries. He specializes in engineered solutions with extended knowledge in industry needs and requirements.

Roger is the author on multiple technical papers, white papers and articles, and regularly conducts workshops on pressure relief applications, requirements and issues.

He is active in international standardization committees, including:

- ISO TC185 "Pressure Relief Devices" (Belgian representative since 1986)
- CEN0 TC 69 WG10 SG2 "Bursting Disc Devices" (Belgian representative since 1990)
- CEN TC 69 WG10 SG3 "Bursting Disc Devices in Combination with Safety Relief Valves" (Convenor since 1996)
- CEN TC 305 WG3 "Explosion Venting Devices & Systems" (Belgian representative since 1998)

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