

### What Is A Bursting / Rupture Disc ?

A bursting disc, also known as a rupture disc is an 'engineered weak spot' in a pressurised system which will burst at a predetermined pressure and temperature.

It functions in a manner similar to the way a fuse functions in an electrical system.

A bursting disc is used as a non-reclosing, fail-safe element to protect a system from overpressure damage or imploding due to excessive positive or vacuum pressures in liquid or gaseous systems.

Government regulations require all pressurised systems to be protected by a pressure relieving device (or devices) having a total relieving area great enough to prevent the pressure from rising more than 10% above the maximum allowable working (design) pressure of the system.

A relief valve is the first device that comes to mind for handling this problem. However, relief valves are not always reliable. They have moving parts and precision machined surfaces which must interact perfectly. The machining, assembly and setting of relief valves are all subject to human error. Also, exposure of the working parts to the media that might be corrosive, sticky or gummy can prevent the valve from functioning properly when needed, particularly at extremes of temperature.

A bursting disc, on the other hand is the ultimate in simplicity with no moving parts. It depends solely on the known strength of the material of its diaphragm to function. It is a weak spot in the system which must burst at a predetermined pressure which is well below the burst pressure (design pressure) of the system it is protecting. It cannot be adjusted or tampered with in any way that will increase the pressure at which it will burst. There are no moving parts which might corrode or become inoperable due to exposure to 'dirty media'. When it bursts, there is an instantaneous opening that prevents further pressure rise.

A bursting disc can be used as a primary relief device, a secondary relief device and also in combination with a safety relief valve. (See diagrams attached showing some examples of Bursting Disc installations ).

What is a bursting disc? It is the most dependable device available for the protection of your pressure vessel, your personnel, your plant and your business against the disastrous effects of uncontrolled pressure build up.

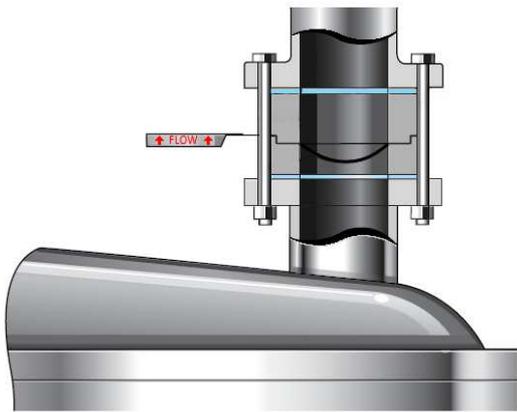
# Some Examples of Industries that use Bursting Discs



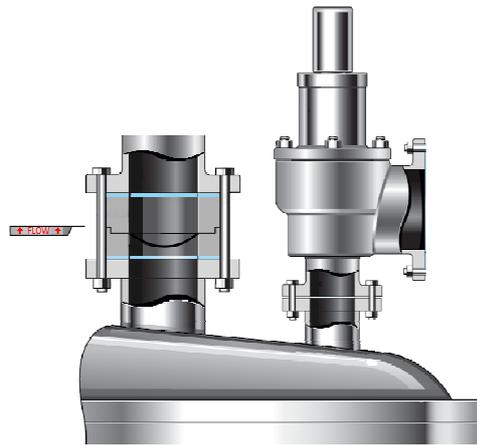
- PHARMACEUTICAL
- ENGINEERING
- HIGH PRESSURE EQUIPMENT
- CHEMICAL PRODUCTION & MANUFACTURING
- CRYOGENIC INDUSTRY ( SPECIALITY GASES )
- OIL & GAS PRODUCTION & REFINING
- OFF SHORE ( DRILLING, OIL & GAS )
- MINING
- BREWERIES
- ELECTRICAL GENERATING INDUSTRY
- TRANSPORTATION ( TRUCKING, SHIPPING, RAIL )
- AVIATION & AEROSPACE
- AUTOMOTIVE INDUSTRY
- HEATING AND VENTILATION
- PAINT MANUFACTURING
- ADHESIVE MANUFACTURERS
- PULP & PAPER MILLS
- WATER & SEWAGE PROCESSING
- AGRICULTURAL INDUSTRY ( AGROCHEMICAL MANUFACTURING )
- FOOD & BEVERAGE INDUSTRY
- TEXTILE INDUSTRY
- FIRE PROTECTION INDUSTRY ( FIRE EXTINGUISHERS, TANK FARMS )

# Examples of Typical Bursting Disc Installations

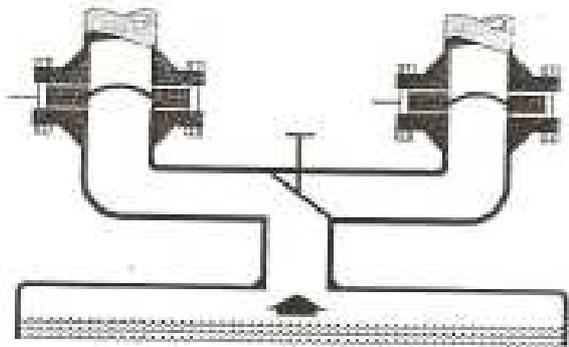
## PRIMARY Relief



## SECONDARY Relief

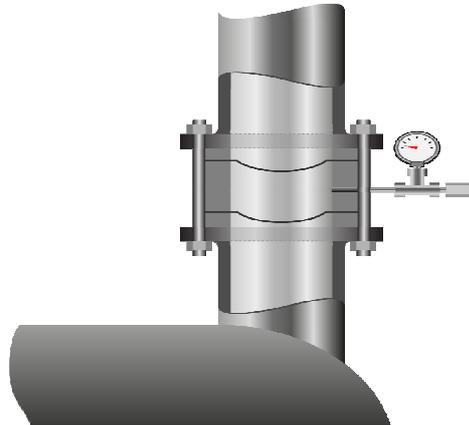


## In Parallel ( Change-Over )



## Double Disc Assembly

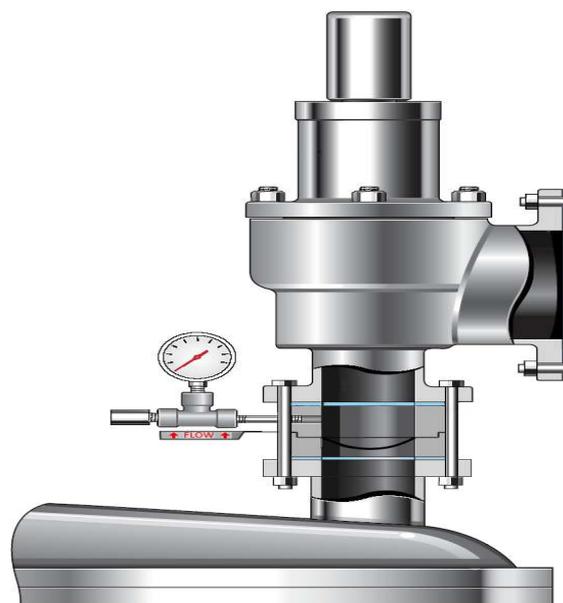
1. Extended duty and enhanced safety in corrosive and toxic
2. Elimination of back pressure effects
3. Fast acting high capacity valve



## In Series with Safety Relief Valve ( SRV )

### Features ;-

1. Disc creates a Zero Leakage Barrier. Preventing leakage past valve seat, eliminating product loss and fugitive emission
2. Protects the valve from corrosive or viscous media, thus reducing maintenance costs
3. Disc can be made from exotic material and valve from standard materials if required
4. Enables simpler valve maintenance



## Specifying a Bursting Disc

When specifying a Bursting Disc, it is important to be aware that although the disc has a Rated Burst Pressure, it also has a 'Total Performance Burst Tolerance' and also an 'Operating Ratio'.

The Burst Tolerance and Operating Ratio will vary, depending on the disc type / design and also the burst pressure requested.

To get a good service life from the bursting disc, and to prevent pre-mature failures or nuisance bursts, please see example below ;-

### **Operating Ratio**

- The Operating Ratio can vary from 50 to 95 % of the Discs' minimum Rated Burst Pressure, depending on which type / design of Bursting Disc is being used
- The Operating Ratio relates to a manufacturers' recommendation that the disc does not see a system working / operating pressure that exceeds the recommended operating ratio
- Any pressure cycles that exceed this Operating Ratio will stress the Disc membrane and could cause fatigue to the disc membrane, which could result in premature failures.
- Example : If the Disc being used has an Operating Ratio of 90 % & has a Rated Burst Pressure of 5 Barg @ 22°C, with a Total Performance Burst Tolerance of +/- 10 %. This would mean the Min / Max burst pressure for this disc would be : Min 4.5, to Max 5.5 Barg @ 22°C.  
With the Operating Ratio of the Disc being 90% of the Minimum Rated Burst Pressure, this means the Disc should not be subjected to a System Operating Pressure of more than 4.05 Barg ( Example : 5 Barg, Less 10 % Burst Tolerance, Multiplied by 90 % = 4.05 Barg ).

## How Long Will A Bursting Disc Last ?

Bursting discs are made from very thin materials that have been selected by actual trial and not by calculation. As a result, the strength is exactly what is required and there is no 'corrosion allowance' or other safety factor. The service life of the disc depends on many factors which could cause the disc to burst prematurely, some of these being;-

- **Pulsating conditions**

A bursting disc can become fatigued in pulsating type conditions. Some disc designs are better than others for this type of duty i.e. 'Reverse Acting' (Reverse Buckling) type discs.

- **Temperature effect**

Temperature can have an effect on the burst pressure of the disc. For example, if the bursting disc is ordered at a particular pressure and temperature. Any temperature variance in the process conditions will effect the burst pressure of the disc. It will be progressively weaker as the temperature rises and progressively stronger as the temperature decreases. The effect will vary depending on disc design and materials.

- **Corrosion conditions**

It is important that the material for the disc is checked to be compatible with the service duty. Any corrosion of the disc membrane will effect the burst pressure of the disc. A bursting disc can be made from a variety of materials. E.g. 316ss, Nickel, Inconel, Monel, Aluminium, Hastelloy-C276, Tantalum, and Graphite etc.

- **Uneven or Over Torqueing of the disc assembly**

Not all disc assemblies are non-torque sensitive. Incorrect torqueing can result in the disc not bursting within it's specified burst range.

- **Orientation of the bursting disc assembly**

It is very important that the bursting disc and holder assembly are installed in the correct way. If the disc or the complete assembly is installed upside down, the bursting disc could be many times stronger than the actual burst pressure stamped on the disc tag. The results of the disc not bursting when required could be disastrous. There are 'FLOW ARROWS' on both the disc tag and the holder tag showing the direction of the flow to assist with the correct orientation of the disc and holder assembly.

- **Handling and Storage**

It is very important that the discs are stored and handled correctly. The membranes of the discs are very delicate. Any damage to the dome or seat of the disc while storing, handling or installing the disc will affect the burst pressure. Many disc designs are designed to be 'Fail Safe' and will fail low if the dome is damaged. Also some single membrane design discs, which are made to withstand full vacuum conditions, will fail under vacuum conditions if the membrane/dome of the disc is damaged in transit or installation.

The cost of replacing a disc that has burst prematurely can be very high, particularly if the system must be shut down to do it. Accordingly, we recommend all discs be replaced periodically even if they appear to be in good condition. A convenient time to do this would be when the system is shut down for other reasons.

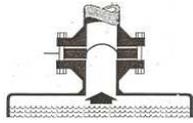
# Bursting Disc Assembly Specification Sheet

To assist us with specifying a Bursting Disc assembly best suited for your application, please answer questions below :-

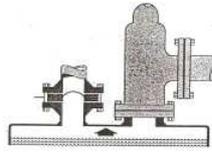
Date : Company Name: Contact Name:

Telephone No. : Email : Enquiry Ref :

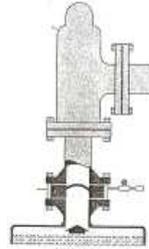
## Typical Bursting Disc Installations



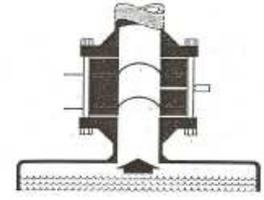
Primary



Secondary



In series with SRV



Double Disc Assembly

Installation Tag Number / Identification Code	
Is Bursting Disc installed as a : Primary, Secondary, or In Series with SRV	
Design Code : PED EN-4126-2 / ASME VIII or other	
Quantity of Bursting Discs required	
Quantity of Bursting Disc Holders required	
Disc size Required ( Nominal Bore Size )	
Burst pressure & Temperature for the Disc	
Max Operating Pressure & Temp. the Disc will see in service	
Will disc be subjected to any vacuum conditions ( If yes, how much vacuum )	
Will disc be subjected to any Back Pressure ( If yes, how much ? )	
Will disc be subjected to cycling conditions	
M.A.W.P. of Vessel which is to be protected	
Is fragmentation of the Bursting Disc allowed?	
Acceptable materials for the Bursting Disc	
Acceptable materials for the Bursting Disc Holder	
Medium in contact with the Bursting Disc on process side	
Medium in contact with the Bursting Disc on vent side	
Media state ( i.e. Liquid, GAS, or Vapour )	
Flange Rating / facing required for the Disc / Holder assembly	
<b>Accessories</b>	
Burst Disc Indicator required ? – Yes / No	
Excess Flow Gauge required ? – Yes / No	
Pressure Gauge required ? – Yes / No	
Pipe Guard Cover required ? Yes / No	
<b>If Disc Sizing &amp; Flow Calculations are required, we will require the following information :-</b>	
Process Media Name	
Please state if it is a Gas / Vapour or Liquid Service	
Molecular Weight / Specific Gravity	
Viscosity	
Ratio of specific heats	
Compressibility Factor	
Mass Flow Rate required through the Bursting Disc Assembly	
<b>Any other information which you think might help us in selecting the bursting disc assembly :-</b>	