

SERVICE LIFE OF BURSTING DISCS**INTRODUCTION**

It is fundamental to the safety of pressure equipment that any associated pressure relief device/pressure relief system is capable of protecting the equipment from excessive pressure.

Under service conditions, the pressure relief device or pressure relief system can be affected such that the original performance is no longer maintained. This can be caused by, for example, corrosion, fouling and/or other service conditions. It can also depend on the design of the pressure relief devices, their materials of construction, the service conditions and the environment to which they are subjected.

It is therefore important to establish the interval between the inspections of the pressure relief device or the replacement period. In some cases, the interval between inspection will be subject to regulatory requirement.

Bursting disc safety devices, dependant upon the application, can require special consideration. When put into service and subjected to the service conditions the

characteristics of the bursting disc can change until, after a period of time, the bursting disc will no longer function within the specified requirements and may burst under normal operating pressure. For some applications, it can be necessary to determine the likely period of time for this to take place and to establish a replacement period. The factors that may influence the replacement period are given below, as well as some guidance with regards to methods of establishing the recommended replacement period.





HOW TO GET PROPER PERFORMANCE AND MAXIMUM SERVICE LIFE FROM BURSTING DISCS?

To obtain maximum service life of installed bursting disc devices, follow the below general rules:

1. Install bursting discs according to recommended practices. Clear and detailed instructions are furnished with each shipment of bursting discs that leaves the factory.
2. Do not subject bursting discs to service conditions that exceed those for which they were selected.
3. Change out bursting discs on a regular schedule.

SPECIAL TIPS

1. Install discs properly!

Follow the instructions carefully when installing bursting discs. Cocked flanges and overtorquing can crush and separate the thin metal disc or plastic seal and cause leakage or premature disc failure. Undertorquing can result in disc slippage, and could also cause leakage and premature disc failure.

Each bursting disc type has a specific, detailed instruction sheet. The instructions are included with each shipment of bursting discs. It is important to follow the recommended torque provided in the instruction sheet.

2. Keep flange seating surfaces clean!

Flange surfaces in contact with bursting discs are critical. They must be free of rust, scale, product deposit or other foreign material. Check seating surfaces of all bursting disc holders for smoothness before installing new or replacement bursting discs. If surfaces are pitted to the extent that leakage could occur, consult factory.

Do not re-machine surfaces without instructions and approval from Fike!

3. Watch for corrosion!

Make sure that the bursting discs selected/installed are compatible from corrosion standpoint with product and atmospheric environment to which they will be exposed. Frequent inspection of a disc in service can detect early appearance of corrosion. It may be possible to substitute disc metal or apply lining material that has better corrosion-retarding properties.



Excessive corrosion on downstream side of disc indicates atmospheric environment may be more severe than the process itself.

4. Use vacuum supports wisely!



Vacuum supports serve several purposes. If there is a remote chance that vacuum can occur in the system, and the selected disc type is not designed to withstand vacuum, vacuum supports should be considered. Vacuum supports are also commonly used to protect thin bursting discs in handling before and during installation.

NOTE: Standard supports are designed to withstand full vacuum (backpressure differential of 1 barg). If backpressure differential can exceed this, consult factory for special design of vacuum support.

Dimpling or “turtle backing” sometimes occurs even when a support is used. This usually indicates movement of the disc membrane away from the support because of higher operating pressure than the disc was built to withstand. It may be necessary to change operating conditions, use a disc type with a higher pressure rating, or form a bursting disc and vacuum support combination to a crown contour that will eliminate separation during normal operation.

5. Handle discs with extreme care!

Bursting discs that are damaged in shipment, handling or during installation will fail prematurely. If there is any damage observed to the seating surface of the disc or holder or to the prebulged area of the disc, it shall not be used!

FACTORS INFLUENCING THE SERVICE LIFE OF BURSTING DISCS

A bursting disc safety device is a non-reclosing pressure relief device which typically comprises a bursting disc, which is the pressure-containing and pressure-sensitive part designed to open by bursting, and a bursting disc holder.

There are many factors that can affect the service life of the bursting disc; appropriate consideration at the time where the most suitable disc type is selected can largely reduce the impact of these parameters.

→ Pulsating Pressures and Water Hammer Effect

The bursting disc assembly is to be located so that the bursting disc is as far away from sources of pulsating pressure as convenient. Even centimetres will make considerable difference in the magnitude of pulsation to which the bursting disc is exposed.

For water hammer effect in liquid systems, locate a gas surge chamber under disc or extend a vertical line a few centimetres to the disc to act as a surge chamber. A bursting disc will react and burst in a few milliseconds of overpressure; therefore water hammer effect can burst a disc without pressure surge showing up on some types of pressure recording equipment.



→ Flush-Mount Safety Head Prohibits Product Build-up on Bursting Disc

Flush-mounted bursting disc assemblies prohibit product build-up on the bursting disc surface. These units are designed to be fitted in a vessel wall with the bursting disc flush with the interior wall.

REPLACEMENT PERIOD

The replacement period of a bursting disc should not exceed the predicted period of time after which the bursting disc will no longer function within the specified requirements. Once established the replacement period should not be exceeded without further consideration of past experience and all conditions of use. There may be applications where it is safe to leave the bursting disc in service until it bursts under normal operating pressure.

1. An appropriate replacement period should be established before a bursting disc is put into service. Typically Fike will recommend as a minimum that the installed bursting disc will be inspected annually and replaced at this inspection point. This replacement period can be increased based on satisfactory operating experience or decreased where experience has proved unsatisfactory.

In establishing the replacement period the influence of a number of factors needs to be considered, including the following:

- a. type of bursting disc;
 - b. materials of construction;
 - c. operating ratio;
 - d. coincident temperatures of the bursting disc;
 - e. service conditions to which the bursting disc is subjected
2. Where corrosion, fouling and other service conditions are not known and cannot be predicted with a degree of accuracy the initial replacement period should be such as not to compromise safety.
 3. Of importance is correct handling and installation of the bursting disc components. Poor installation, incorrect torqueing (where relevant) and mechanical damage can have an immediate effect upon the replacement period.
 4. Methods of determining the replacement period. The following are typical methods that can be used to determine an appropriate replacement period for a given installation. Best suitable method for a specific installation may differ from others due to individual conditions of use.



→ **Case 1: Use of manufacturer's data**

Manufacturers are familiar with mechanical loading, stress levels and operating ratios under different operating conditions and the limitations of their particular designs and materials. They can have data including analytical and test (cyclic, corrosion) and historical records, which can be used. However these data are often derived from laboratory conditions, not always reflecting the harsh conditions that may exist in the real industrial arena. Therefore this basis of information shall be used with the required amount of reservations.

→ **Case 2: Use of user's records**

The purchaser/user can be familiar with the use of the particular type and material of bursting disc under comparable service conditions and can have records (operating, inspection, monitoring and historical) which can be used.

→ **Case 3: Testing of bursting discs after a period of service**

After a period of service, the bursting disc is carefully removed, properly packaged and returned to the manufacturer for examination and testing.

Dimensional changes, evidence of corrosion, leak-tightness (where appropriate), bursting pressure and any other pertinent details are recorded. By comparison with the original records for the bursting discs, adjustments can be made to the recommended replacement period.

→ **Case 4: Testing under simulated conditions**

A number of bursting discs of the same type, model, size, material and specified bursting requirements as those to be used are tested under conditions which simulate those expected in service. Changes in characteristics over a period of time or the period of time ending in the bursting of the bursting disc are recorded and the data used to establish the replacement period.

Consult Fike for assistance in determining possible root causes for disc failure and assistance in determining optimal replacement periods for installed bursting discs.