



# BURSTING DISC TECHNOLOGY

## Frequently Asked Questions

### **RUPTURE DISC, RUPUTURE DISK, BURSTING DISC - IS THAT ALL THE SAME?**

The simple answer to this question is "YES". All designations above are valid names for the same kind of pressure protection device. It depends on the manufacturer which term is used. Most manufacturers have a clear preference and only use one of the terms.

### **WHAT IS A BURSTING DISC?**

A bursting disc is a pressure protection device that protects pressurised containers (e.g. gas cylinders) or equipment (e.g. pumps) from harmful overpressure or negative pressure. This is done by the defined opening of the bursting element in the range of milliseconds when a critical pressure situation is reached. The concealed medium (gas or fluid) escapes through the resulting opening, which immediately relieves the system.

### **IS A BURSTING DISC ALWAYS A DISC?**

The terms "rupture disc" and "bursting disc" are common generic terms for bursting elements of various types such as discs, caps or curved membranes. Even if the bursting element is mounted in a socket or housing (screw-in solution, plug), the terms "rupture disc" or "bursting disc" are often used.

### **WHAT IS THE "NOMINAL PRESSURE" OF A BURSTING DISC?**

In the case of a bursting disc, "nominal pressure" means the intended pressure at which the disc opens (ruptures). The nominal pressure is always supplemented by a tolerance, e.g.  $\pm 10\%$ . This creates a corridor in which the bursting disc must open as intended.

### **WHAT DOES THE BURST PRESSURE OF A BURSTING DISC DEPEND ON?**

The burst pressure of a bursting disc depends on the following factors:

- Material
- Material properties
- Material thickness
- Diameter of the opening
- Burst geometry
- Temperature



### **WHICH MATERIALS ARE USED TO MAKE BURSTING DISCS?**

Our bursting discs are usually made of corrosion-resistant materials such as stainless steel, nickel, nickel-based materials (e.g. Inconel or Hastelloy), tantalum or in combination with corrosion-resistant plastics such as FEP and PTFE.

### **WHY ARE THERE SO MANY TYPES OF MATERIAL?**

The requirements that are placed on pressure protection devices in practice are manifold. It is not only the required burst pressures that differ. The specific properties of the media to be protected and other factors, such as special ambient temperatures, also result in individual characteristics that must be taken into account. Thanks to the different materials or raw materials, that are available to us we can respond accurately and meet the different requirements. That way, an optimal solution can be found for almost every application and secure protection can be guaranteed.

### **IS THE BURST PRESSURE OF THE BURSTING DISC THE SAME AT ANY TEMPERATURE?**

Due to the physical properties of the materials used, the burst pressure of a bursting disc changes depending on the temperature. As the temperature increases, the response pressure decreases. Different materials respond differently to temperature changes, e.g. nickel versus stainless steel. The different material properties can be used appropriately when selecting bursting discs.

### **HOW LOUD IS THE BURST OF A BURSTING DISC?**

The sound level of the burst depends largely on the pressure, the medium and the opening diameter. The spectrum ranges from a silent "plop" to an extremely loud bang.

### **WHAT IS THE DIFFERENCE BETWEEN A BURSTING DISK AND A SAFETY OR PRESSURE RELIEF VALVE?**

A safety or pressure relief valve is a protective device that opens automatically when the response pressure is reached and provides pressure relief by letting the medium off into the atmosphere. When the pressure drops below the response pressure, the valve closes automatically again. With a bursting disc system, the relief cross-section remains permanently open after triggering and the bursting disc must be replaced. Pressure relief valves are used where recurring overpressure is assumed (normal case). Bursting discs, on the other hand, are intended for systems where overpressure is an unplanned exception that must be protected.

### **WHAT ARE SHUT-OFF DISCS AND BURSTING FOILS?**

The function or determination of shut-off discs and bursting foils differ from that of bursting discs. A shut-off disc is a bursting disc that acts as a pressure protection device on the one hand and is, on the other hand, mechanically opened (punctured) by the system or user in certain situations in order to release the concealed medium for a defined purpose. A bursting foil, on the other hand, is not a pressure protection device. It is only used to enclose a medium in a pressure-free environment (container). As soon as the system is pressurised (as intended), the foil bursts and the medium can escape.



Shut-off discs and bursting foils are used, for example, in foam fire extinguishers. The main chamber of the container contains the extinguishing foam, which is retained by a bursting foil. In addition, the extinguisher contains a CO<sub>2</sub> cartridge, which is protected with a shut-off disc. When the extinguisher is used, this puncture disc is opened by the initial actuation of the extinguishing lever. The gas then flows into the main container and thus pressurises it. This tears the bursting foil so that the foam can be used for extinguishing.

### **HOW BIG ARE BURSTING DISCS AND HOW THICK?**

The size and thickness of a bursting disc depends on the particular application. The smallest bursting discs have a diameter of a few millimetres, the largest measure over one meter. The thickness ranges from a few micrometres (µm) to a few millimetres.

### **WHICH PRESSURES CAN BE PROTECTED?**

Bursting discs from Wehberg Safety can help secure pressures ranging from 3 up to 7,000 bar. (43 up to 100,000 psi).

### **WHAT SHOULD BE TAKEN INTO ACCOUNT WHEN PROTECTING HOT, TOXIC OR DIRTY MEDIA?**

In the case of hot, toxic or dirty media, the plant operator must ensure a controlled discharge of the medium in the event of a burst by means of suitable devices such as pipes and collecting containers. With our [Hybrid System® products](#), Wehberg Safety offers standard solutions for precisely this field of application.

### **ARE THERE STANDARDS FOR BURSTING DISCS AND PRESSURE VESSELS?**

Pressure systems, pressure vessels, safety valves and bursting disc equipment are subject to technical regulations and rules which constantly need to be adapted to the latest state of technology. Important standards in this field are:

- 2014/68/EU; Pressure Equipment Directive; Publisher: European Union
- DIN EN ISO 4126-2, Safety devices for protection against excessive pressure - part 2: Bursting disc Facilities; Publisher: Technical Committee ISO/TC 185 "Safety devices for protection against excessive pressure"
- AD 2000; Rules on the European pressure equipment Directive; Publisher: Association of TÜV e.V. (VdTÜV), Germany
- CGA S-1.1; Pressure Relief Device Standards; Publisher: Compressed Gas Association, USA

### **DOES A BURSTING DISC LAST FOREVER?**

The service life of a bursting disc depends on the pressure level in practical use. A bursting disc that is not normally exposed to pressure or only exposed to low pressure compared to the nominal pressure is very long-lasting. Increased continuous pressure and, in particular, load alternations, lead to material fatigue. Plant operators must therefore set appropriate intervals for the replacement of bursting discs depending on the individual conditions in order to avoid unintended triggering below the actual nominal pressure due to fatigue.



### **WHAT IS THE TIGHTNESS OF A FITTED BURSTING DISC AND HOW IS THIS ENSURED?**

Bursting discs from Wehberg Safety can help achieve helium tightness of up to  $1 \times 10^{-09}$  mbar l/s. This also applies to screwed, mounted and pressed versions. With our high-quality test equipment, we are able to carry out appropriate measurements, up to 100% tests, depending on customer requirements.

### **HOW IS THE BURSTING STRENGTH OF A BURSTING DISC TESTED?**

Sample burst tests are performed during the production cycle of bursting discs. The type and scope are defined in the above-mentioned standards and regulations. Depending on the scope of an order or the size of a batch, a certain amount of test parts must be pressurised using a calibrated test device and brought to rupture.

### **WHAT IS A BURSTING DISC SAFETY DEVICE UND WHICH TECHNICAL REQUIREMENTS DOES IT HAVE TO MEET?**

Safety devices for protection against excessive pressure utilizing bursting discs are called "bursting disc safety devices" according to ISO 4126-2:2019.

A bursting disc safety device must be fitted with a bursting disc, whose material is unaffected by the protected medium or by an industrial atmosphere.

The clamping force is created by torque wrenches when necessary. The device must be designed in such a way that the bursting disc has a concentric seat, can be fitted to parallel faces, and is not damaged in pressure areas in which it merely bulges. Furthermore, it must be protected against the disc fixing coming loose.

Bursting disc safety devices must be tight against the atmosphere until they respond (open) in the range of operating temperatures. They must release the required cross-section when the disc bursts.