

International Standard



6718

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Bursting discs and bursting disc devices

Disques de rupture et dispositifs à disque de rupture

First edition — 1985-09-01

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 6718:1985

<https://standards.iteh.ai/catalog/standards/sist/f4f871fa-ed7d-49d3-87b4-cb03fda77129/iso-6718-1985>

UDC 621.646.8

Ref. No. ISO 6718-1985 (E)

Descriptors : pressure equipment, safety devices, safety valves, bursting discs, components, specifications, tests, burst tests, marking, packing.

Price based on 20 pages

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 6718 was prepared by Technical Committee ISO/TC 185, *Safety devices for protection against excessive pressure*.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 6718:1985

<https://standards.iteh.ai/catalog/standards/sist/f4f871fa-ed7d-49d3-87b4-eb03fda77129/iso-6718-1985>

Contents

	Page
1 Scope and field of application	1
Section one : General	
2 Definitions	1
3 Selection	2
4 Application	3
5 Installation	4
6 Discharge capacity	4
7 Information to be supplied by the user	5
<u>ISO 6718:1985</u>	
Section two : Components of bursting disc devices	
8 Bursting discs	6
9 Bursting disc holder	6
10 Back pressure supports	8
11 Temperature shields	10
12 Stiffening rings	10
13 Gaskets	10
Section three : Protection from corrosion	
14 General	11
Section four : Inspection and testing	
15 Inspection	12
16 Testing	12
Section five : Marking and identification	
17 Marking	13
18 Packaging	13

Section six : Test certificates

19 Details required 14

Annex

Discharge capacity 15

Tables

1 Number of bursting discs to be tested 12

2 Properties of gases 17

Figures

1 Conventional domed bursting disc with angle seat 7

2 Conventional domed bursting disc with flat seat 7

3 Flat bursting disc 7

4 Slotted lined bursting disc 7

5 Reverse domed bursting disc 7

6 Replaceable element bursting disc 8

7 Monobloc bursting disc recessed on the outlet side 8

8 Monobloc bursting disc recessed on the inlet side 8

9 Monobloc bursting disc recessed both sides 8

10 Capsule/insert bursting disc holder 9

11 Full diameter bursting disc holder 9

12 Full diameter bursting disc holder 9

13 Union bursting disc holder 9

14 Plug/screw bursting disc holder 9

15 Compressibility factor Z as a function of reduced pressure
and reduced temperature 18

16 Discharge function 19

17 Correction factors for liquid dynamic viscosity 20

iTeh STANDARD PREVIEW
(standards.iteh.ai)

<https://standards.iteh.ai/catalog/standards/sist/f4871fa-ed7d-49d3-87b4-eb031da77129/iso-6718-1985>

Bursting discs and bursting disc devices

1 Scope and field of application

This International Standard specifies requirements for bursting disc devices which may be used to protect pressure vessels, pipelines or other enclosures from excessive pressure or vacuum. They are designed to burst or vent when the pressure differential across the disc exceeds a predetermined value at a predetermined temperature.

iTeh STANDARD PREVIEW Section one: General (standards.iteh.ai)

2 Definitions

For the purpose of this International Standard, the following definitions apply:

2.1 bursting pressure:¹⁾ The value of the pressure differential across the disc at which a bursting disc device functions.

2.2 specified bursting pressure:¹⁾ The pressure, quoted with a coincident temperature, specified by the user or his agent when defining the disc requirement.

2.3 average bursting pressure: The arithmetic average value, at the coincident temperature of the test bursts carried out on a batch of discs.

2.4 coincident temperature (bursting pressure): The temperature used in conjunction with a bursting pressure.

2.5 operating temperature: The average temperature of the disc and the surrounding parts during normal operation.

2.6 bursting tolerance: The maximum variation of test results in equal positive and negative quantities or percentages related to the average bursting pressure. When a zero manufacturing range is stated, the tolerance shall be applied directly to the specified bursting pressure.

2.7 manufacturing range: A range of pressure within which the average bursting pressure of a batch of bursting discs shall fall in order to be acceptable for a particular application as agreed between the disc manufacturer and the purchaser.

2.8 performance tolerance: A range of pressure in positive and negative quantities or percentages which includes both manufacturing range and bursting tolerance at a coincident temperature, which shall be applied directly to the specified bursting pressure.

2.9 foil: The sheet or strip used for the manufacture of metallic bursting discs.

2.10 batch: A group of bursting discs of the same type, size, average bursting pressure and coincident temperature, manufactured from material of the same identity and properties made as a single group.

2.11 bursting disc device: A non-reclosing pressure relief device actuated by differential pressure and designed to function by the bursting or venting of the bursting disc.

2.12 bursting disc assembly: The complete assembly of components which are installed in the bursting disc holder to perform the desired function.

1) The words maximum and minimum may be used with these terms.

2.13 bursting disc: The pressure-containing and pressure-sensitive element of a bursting disc device.

2.14 bursting disc holder: That part of a bursting disc device which retains the bursting disc assembly in position.

2.15 back pressure: The static pressure existing at the outlet of a bursting disc device at the time the device is required to operate. It is the result of pressure in the discharge system from other sources or as a result of vacuum on the upstream side.

2.16 back pressure support: That component of a bursting disc assembly which prevents the failure of the disc due to back pressure differential. A back pressure support which is intended to prevent the failure of the disc when the system pressure falls below atmospheric pressure is sometimes referred to as a vacuum support.

2.17 baffle plate: A plate attached to vent side of a bursting disc device or system to redirect discharge and/or reduce recoil.

2.18 muffled outlet: A component of a bursting disc device which disperses the discharge.

2.19 stiffening ring: An integral component of the bursting disc assembly used primarily for the stiffening of fragile discs.

2.20 coating: A layer of metallic or non-metallic material applied by brush, spray, dipping, fluidized bed or other similar method to components of a bursting disc device.

2.21 lining: An additional sheet or sheets of material forming part of the bursting disc assembly or holder. The lining may be metallic or non-metallic.

2.22 plating: A metal layer applied to a disc or holder by a plating process.

2.23 excess flow valve: A device which permits limited flow. When this flow is exceeded the valve closes.

2.24 conventional domed bursting disc: A bursting disc which is domed in the direction of the bursting pressure and designed to fail in tension.

See figures 1 and 2.

2.25 slotted lined bursting disc: A conventional domed bursting disc made up of two or more layers, one of which is slit or slotted so as to reduce its strength and to control the bursting pressure of the bursting disc.

See figure 4.

2.26 reverse domed bursting disc: A bursting disc which is domed against the direction of the bursting pressure and designed to fail by buckling, bending or shearing forces.

See figure 5.

2.27 graphite bursting disc: A bursting disc manufactured in graphite and designed to fail by bending or shearing forces.

2.28 temperature shield: A device which protects a bursting disc from excessive temperature.

2.29 bursting disc device discharge area: The area which is the geometric minimum cross-sectional flow area of the bursting disc device which is used to calculate the theoretical flow capacity of the bursting disc device.

NOTE — Possible reduction of the cross-section, for example by back pressure supports, catching devices or parts of the bursting disc which remain after bursting, has to be considered.

2.30 bursting disc device discharge capacity: The rate at which a bursting disc device can discharge fluid after bursting or venting of the bursting disc.

2.31 independent authority: That authority which, in the country concerned, bears responsibility for all aspects of surveillance of tests, checking of calculations and certification of bursting disc discharge capacities.

2.32 service life: The time period beginning at the installation of a bursting disc assembly and ending at either replacement or burst.

2.33 operating pressure: The pressure to which the bursting disc is exposed during normal operation.

2.34 inspection authority: The independent authority or association which verifies compliance with this International Standard.

3 Selection

3.1 Bursting discs are differential pressure devices, and therefore the pressure on each side of the disc shall be taken into account.

3.2 As highly stressed components, bursting discs have a limited service life and may require replacing at regular intervals. The frequency of replacement depends upon the type and material of the disc, corrosive nature of the environment, operating temperature and operating pressure and their fluctuations, ratio of operating pressure to minimum bursting pressure, resistance to creep and fatigue and other operating conditions.

3.3 Bursting disc devices are frequently required to work in corrosive environments where corrosion may cause premature failure of the disc. Materials likely to be affected by corrosion may be protected by coating, plating, lining or other suitable means which shall be supplied only by the bursting disc device manufacturer (see clause 14).

3.4 Selection of the appropriate disc material depends upon the chemical and physical conditions that will be met on each side of the bursting disc when it is in service (see clause 8).

3.5 To function properly, bursting discs, and back pressure supports where required, shall be installed in accordance with the recommendations of the disc manufacturer.

3.6 The bursting pressure of a bursting disc according to its material and type varies with temperature. Generally a bursting disc operating at high temperatures has a lower bursting pressure than at room temperature; a bursting disc operating at below room temperatures has a higher bursting pressure than that at room temperature.

When a bursting disc is specified with a bursting pressure at a coincident temperature to protect a system, the bursting disc may not give the necessary protection at a lower temperature. The system has to be considered with regard to the bursting pressures of the disc over the temperature range of the system.

When requested by the user or his agent, data regarding the variation of bursting pressure according to the temperature for a batch of bursting discs shall be provided by the manufacturer.

Bursting discs may be protected from excessive temperature by suitable location, temperature shield or by other means. It is essential that the bursting temperature of the bursting disc shall be known when it is designed.

3.7 The manufacturer's advice should be sought when selecting a bursting disc for a particular application.

3.8 When reverse domed bursting discs are required for liquid relief the bursting disc manufacturer shall be consulted.

4 Application

4.1 Subject to the requirements of national or other regulations, bursting discs may be used either as the sole safety device or in conjunction with safety valves.

4.2 In order that bursting discs may function satisfactorily :

- a) the maximum bursting pressure shall be in accordance with 4.4;
- b) the bursting disc device discharge area formed when a bursting disc has burst or vented shall comply with 6.1.

4.3 The use of a bursting disc as a pressure-relieving device may be preferred in the following cases :

- a) where pressure rise may be so rapid that the inertia of a safety valve would be a disadvantage;
- b) where even minute leakage of the fluid cannot be tolerated under normal conditions;
- c) where service conditions may involve deposition which could render a safety valve inoperative;
- d) where cold service conditions could prevent a safety valve from operating.

4.4 Where a bursting disc alone is used as the relieving device, its maximum bursting pressure at the coincident temperature shall comply with the appropriate standard covering the system to be protected.

4.5 The selection of bursting discs for use on vessels which may be involved with extremely rapid and uncontrolled changes in pressure requires special consideration not covered by this International Standard.

4.6 Bursting discs may be used in combination with safety valves as permitted by the appropriate standards. The application of the discs shall not adversely affect the operation of the safety valve nor result in excess pressure to the system.

4.6.1 Bursting disc devices in combination with safety valve(s) may be used in the following cases:

- a) in series to protect the safety valve against corrosion, fouling or service conditions which may affect the safety valve performance;
- b) in series to prevent leakage;
- c) in series to prevent total loss of contents from the pressure system following venting of the bursting disc;
- d) in parallel as an additional safeguard.

4.6.2 A bursting disc device may be installed before the inlet of a safety valve if the following requirements are met:

- a) The maximum bursting pressure at the coincident temperature complies with the appropriate standard for the system being protected.
- b) If the discharge capacity and the operating characteristics of the particular combination of safety valve and bursting disc device have been established by test in accordance with national standards or regulations, the test results shall be used.
- c) Where a combination has not been tested:
 - the bursting disc device discharge area shall be such as to satisfy the safety valve inlet piping pressure drop requirements stated in the appropriate national standard,
 - the bursting disc device discharge area shall be not less than 80 % of the nominal area of the safety valve inlet,
 - the flow capacity of such a combination shall be assumed to be no greater than 80 % of the rated relieving capacity of the safety valve alone.
- d) The space between the bursting disc and safety valve shall be provided with a means for monitoring any pressure build-up. This cavity may also be vented by means of an excess flow valve.

NOTE — Bursting discs, being pressure differential devices, will require a higher system pressure to burst the disc if pressure builds up in the space between the bursting disc and safety valve which will occur should leakage develop in the bursting disc due to corrosion or other cause.

e) In situations where fragmentation or release of bursting disc material may occur, the installation shall be designed so that parts or particles of the bursting disc cannot render the safety valve inoperative nor reduce the flow area of the safety valve.

4.6.3 A bursting disc device may be installed after the outlet of a safety valve if the following requirements are met:

- a) The safety valve is so designed that its operating characteristics shall not be adversely affected by the bursting disc installed.
- b) The system shall be designed so that the safety valve opens at its set pressure. The space between the safety valve disc and the bursting disc shall be vented or drained to prevent pressure build-up.
- c) The maximum bursting pressure of the disc at the coincident temperature plus any pressure in the discharge piping does not exceed:
 - the pressure permitted by the safety valve manufacturer,
 - the design pressure of any pipe or fitting between the safety valve and bursting disc,
 - the pressure permitted by the appropriate national standard.
- d) In installations where fragmentation or release of bursting disc material may occur, the system shall be designed so that the performance of the safety valve is not impaired and adequate venting is provided.
- e) On bursting, the bursting disc discharge area does not affect the discharge capacity and the operating characteristics of the safety valve.
- f) The contents of the protected system are clean fluids, free from gumming or fouling matter, so that accumulation in the space between the safety valve inlet and the bursting disc (or in any other outlet that may be provided) does not obstruct the outlet.

NOTE — A bursting disc assembly on the discharge side of a safety valve should not be replaced while there is any possibility of the safety valve opening.

4.6.4 A bursting disc device may be installed both before and after a safety valve provided that the requirements of 4.6.2 and 4.6.3 are taken into consideration.

4.6.5 A bursting disc device fitted in parallel with a safety valve as an additional safeguard, such as to protect the system against the consequence of a rapid rise in pressure, shall be specified to burst at a pressure not exceeding that specified in the appropriate national standards or regulations.

4.6.6 A bursting disc device may be fitted in series with a second bursting disc device. In such cases the system shall be designed in accordance with the following:

- a) The space between the two bursting discs shall be large enough to ensure the correct functioning of the discs.
- b) The space between the bursting discs shall be provided with a means for monitoring any pressure build-up. This cavity may also be vented by means of an excess flow valve.

5 Installation

5.1 A bursting disc device should be placed as close as possible to the space it is intended to protect, taking into account pressure pulses, temperature conditions, etc. The discharge system shall be of ample size and as straight and as short as possible, terminating in such a way as to avoid dangerous or damaging conditions arising on venting.

5.2 Bursting disc devices should be mounted so that they are accessible for replacement and protected from accidental damage. Consideration should be given to the effects of weather, including freezing of the discharge pipe and possible corrosion from the atmosphere.

5.3 Adequate precautions shall be taken to prevent deposition on the pressure side of the disc and in the part leading to it of sublimates or other solids that could affect the safe operation of the bursting disc.

Casual liquid or foreign matter shall, for similar reasons, be prevented from accumulating on the vent side of the bursting disc and within the discharge pipe.

The application of an additional protective film or coating to an installed bursting disc is not allowed, except when approved by the manufacturer since this may considerably affect the bursting pressure of the disc.

5.4 The user shall ensure that provision is made to absorb the effect of reaction forces on the vessel and associated pipework which will arise when the disc bursts or vents.

5.5 If the bursting of a disc can discharge a flammable fluid, the danger of ignition in the outlet pipe shall be considered and appropriate measures taken to minimize the hazard.

5.6 Bursting discs shall be examined for defects immediately before installation and care shall be taken during assembly, particularly with thin bursting discs.

5.7 In situations where fragmentation or release of bursting disc material may occur, any piping beyond the bursting disc shall be so designed that it shall not be obstructed by fragments from the bursting disc device.

5.8 The manufacturer's installation instructions shall be followed strictly, in particular the directional arrow, bolting torque instructions and the reference to the use of gaskets. If the components are assembled incorrectly or the bursting disc device is installed incorrectly, the bursting disc may burst or vent at a system pressure higher or lower than that expected.

6 Discharge capacity

6.1 The discharge capacity of a bursting disc, used as the primary relief device, shall be sufficient to discharge the maximum quantity of fluid that can be generated or supplied to a pressure system whilst preventing the pressure from exceeding the pressure permitted by standards covering the system to be protected.

6.2 A method of calculating discharge capacities is given in the annex.

7 Information to be supplied by the user

It is recommended that the following minimum information, if known, be supplied by the user with every enquiry, to assist the manufacturer in specifying the most suitable bursting disc device for a particular application.

7.1 Application details

- a) Description of the vessel, equipment or system to be protected, vessel design code where appropriate.
- b) Intended application of the bursting disc device. State if the device is required to operate as the primary relief device, secondary relief device, for safety valve isolation or in some other capacity.
- c) Performance specification and relative position of any safety valves or other safety devices fitted to the equipment or system.
- d) The fluid which may come in contact with any part of the bursting disc device; physical properties of the fluid, for example gas, vapour, liquid or solid; wet or dry, at all stages of the process (including venting); chemical properties of the fluid which may affect bursting disc performance.
- e) All conditions of temperature and pressure (including back pressure) to which the bursting disc may be subjected. Rate and frequency of pressure changes, if applicable.

7.2 Bursting disc operating details

- a) Maximum specified bursting pressure and coincident temperature.
- b) Minimum specified bursting pressure and coincident temperature.
- c) Rate of pressure change to bursting pressure, where appropriate.

- d) Bursting disc device theoretical discharge capacity, required to prevent accumulated pressure exceeding allowed maximum.
- e) Minimum bursting disc device discharge area required through the bursting disc device discharge area.
- f) Materials which the user from knowledge of the process regards as suitable for consideration in the selection of the bursting disc material.
- g) Materials which may not be used for safety, corrosion or other reasons.

7.3 Installation details

- a) Physical location of bursting disc device in system, preferably in the form of a sketch.
- b) Method of fitting bursting disc device in system (for example between flanges, direct fitting to one flange, direct weld to outlet).
- c) Inlet pipe diameter to bursting disc and outlet pipe diameter from bursting disc, including flange size, rating, type and specification or other fixing details (for example thread specification and size).
- d) Type and preferred material of bursting disc holder; see clause 9.
- e) Form and finish of external mating surfaces if required other than to the manufacturer's standard.

7.4 Special details

- a) Inspection and certification requirements additional to those defined in this International Standard.
- b) Special features required in the bursting disc device (for example excess flow valve, pressure monitoring device, jacking bolts, lifting rings).
- c) Special features of application not stated elsewhere.

Section two : Components of bursting disc devices

8 Bursting discs

8.1 Materials

All materials including linings, coatings and platings used for the manufacture of bursting discs shall have uniform properties suitable for the working environment in which the bursting discs are to be used. The material in the final form shall be free from defects which may lead to premature failure.

8.2 Conventional domed bursting discs

Conventional domed bursting discs are domed in the direction of the subsequent applied bursting pressures. Bursting discs shall be domed by a means sufficient to cause a permanent set such that no further plastic flow will occur initially when the bursting disc is subjected to its intended operating conditions. They burst or vent in tension and comprise the following types :

- conventional simple domed (see figures 1 and 2);
- conventional slotted lined (see figure 4);
- other types of conventional domed bursting discs are allowed providing that they meet the requirements of this International Standard.

8.3 Reverse domed bursting discs

Reverse domed bursting discs are those domed against the direction of the bursting pressure (see figure 5) and are designed to fail by buckling under pressure. They include the following types.

- Reverse domed discs with knife blades. This type of bursting disc opens by being cut during reversal of the dome. Knife blades may be any configuration which will open the bursting disc to satisfy the requirements of clause 6.
- Reverse domed discs having lines of weakness (without knife blades). This type of bursting disc opens by having lines of weakness, such that when the dome reverses at the bursting pressure, the disc opens along these lines.
- Reverse domed discs having slip or tear-away design (without knife blades). This type of bursting disc vents by being expelled downstream from the holder. A catching device may be provided.
- Others. Other types of reverse domed bursting discs may be used providing they meet the requirements of this International Standard.

8.4 Graphite bursting discs

Graphite bursting discs are designed to fail by bending or shearing forces.

Graphite bursting discs are normally flat (see figure 6) and are designed such that upon bursting a full bore opening is obtained.

8.4.1 Replaceable element bursting disc

Holders are required for use with replaceable element bursting discs. Figure 6 shows a typical replaceable element bursting disc.

8.4.2 Monobloc bursting disc

This bursting disc is installed directly between flanges, no separate holders being required. Three typical monobloc designs are illustrated.

Figure 7 shows a design in which the bursting pressure shall only be applied to the flat face of the monobloc bursting disc.

Figure 8 shows a similar bursting disc but the design is such that the bursting pressure shall only be applied into the recess.

For this type of bursting disc, the bore of the vent side mounting local to the disc shall follow the manufacturer's instructions. Normally this bore will be greater than the inside diameter of the recess.

Figure 9 is typical of designs where the bursting disc has a recess on both sides and in which the bursting pressure shall only be applied into the smaller recess.

8.4.3 Others

Other types of graphite discs may be used providing they meet the requirements of this International Standard.

8.5 Other designs

Other designs, including flat bursting discs (see figure 3), are allowed providing that they meet the requirements of this International Standard.

9 Bursting disc holder

9.1 Materials

The material(s) of the bursting disc holder shall be as agreed between the manufacturer and purchaser. The use of corrosion-resistant material(s) for the vent side is recommended because corrosion of this part of the bursting disc holder may cause damage to the disc, leading to premature failure when pressure is applied.

9.2 Design

9.2.1 The bursting disc holder has a substantial influence on the bursting pressure and the correct operation of the disc; it shall adequately secure and support the disc in operation. Each bursting disc shall be used only with its correctly designed and manufactured disc holder.

A bursting disc holder when installed shall apply, or transmit, a clamping load sufficient to ensure the correct operation of the bursting disc.

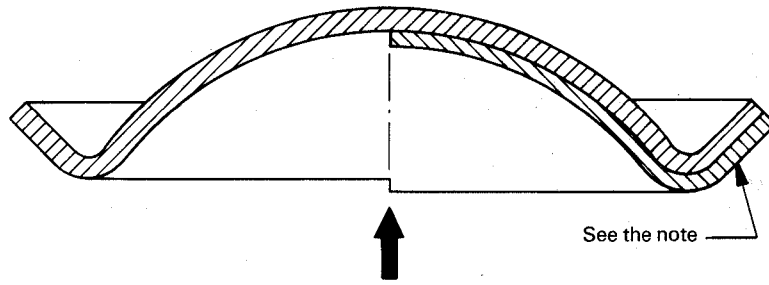


Figure 1 — Conventional domed bursting disc with angle seat

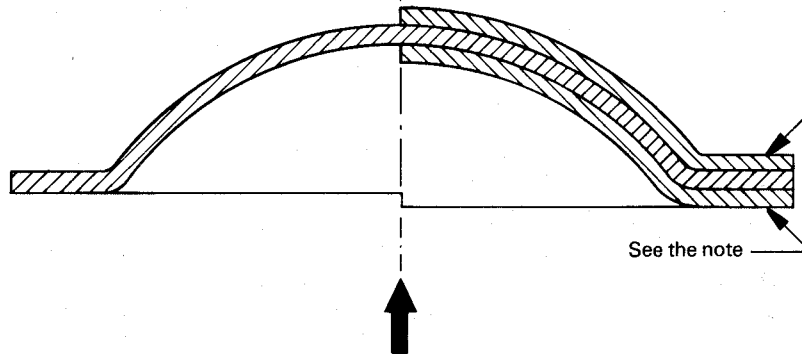


Figure 2 — Conventional domed bursting disc with flat seat



ISO 6718-1985
<https://standards.iteh.ai/catalog/standards/sist/f4f871fa-ed7d-49d3-87b4-eb03fda77129/iso-6718-1985>

Figure 3 — Flat bursting disc

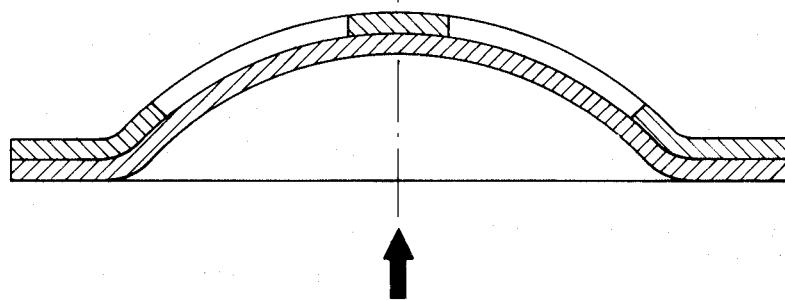


Figure 4 — Slotted lined bursting disc

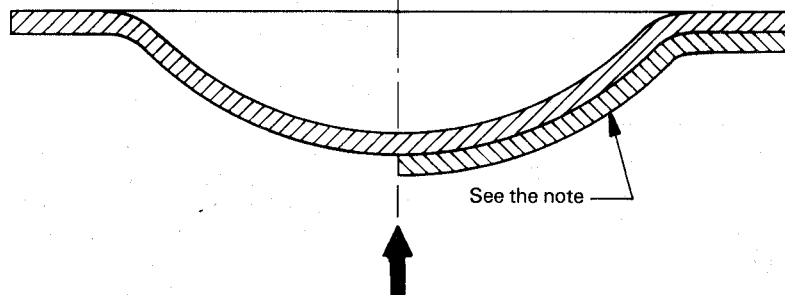


Figure 5 — Reverse domed bursting disc

NOTE — Bursting disc types may be multilayered.