
Components for containment enclosures —

Part 1:

Glove/bag ports, bungs for glove/bag ports,
enclosure rings and interchangeable units

Composants pour enceintes de confinement —

*Partie 1: Ronds de gant et de sac, obturateurs de ronds de gant et de sac,
bagues d'enceintes et éléments interchangeables à distance*

ISO 11933-1:1997

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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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 11933-1 was prepared by Technical Committee ISO/TC 85, *Nuclear energy*, Subcommittee SC 2, *Radiation protection*.

ISO 11933 consists of the following parts, under the general title *Components for containment enclosures*

- *Part 1: Glove/bag ports, bungs for glove/bag ports, enclosure rings and interchangeable units*
- *Part 2: Gloves, welded bags, gaiters for remote-handling tongs and manipulators*
- *Part 3: Transfer systems such as plain doors, double doors for leaktight transfer, airlock chambers, leaktight connections for waste drums*

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Introduction

A great number of leaktight mechanical components for containment enclosures are presently offered on the market. These components:

- may have different geometric dimensions;
- may require holes of different diameters for attachment on the containment enclosure wall;
- may be attached to this wall by different methods;
- may use different mounting systems for their associated leaktight elements, such as gloves, welded bags, bungs, transfer systems.

These components are generally not mutually compatible, but nevertheless often have the same performance level; therefore it was not possible to select only one system as the International Standard.

As a consequence, the aim of this part of ISO 11933 is to present general principles of design and use, and to fully describe the different existing systems in order to:

- avoid new parallel systems based on identical principles and differing only in details or geometric dimensions;
- make possible interchangeability between existing equipment;
- demonstrate consistency among the various parts of the same system such as the basic elements (described in ISO 11933-1), the elements associated with leaktightness (described in ISO 11933-2), or the transfer systems (described in ISO 11933-3).

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Components for containment enclosures —

Part 1: Glove/bag ports, bungs for glove/bag ports, enclosure rings and interchangeable units

1 Scope

This part of ISO 11933 specifies the designation and characteristics of the various components for containment enclosures which are fixed to the containment enclosure wall or which can be used in conjunction with the lead shielding units described in ISO 7212 and ISO 9404 and used in the construction of containment enclosures for protection against ionizing radiation.

These components may also be used alone, without any shielded enclosure. In addition, some similar units are included which can be used with or without shielding, but not in conjunction with units given in ISO 7212 and ISO 9404.

The units covered by this part of ISO 11933 are:

- glove/bag ports,
- bungs for glove/bag ports,
- enclosure rings,
- interchangeable units which are either leaktight ejectable units (support rings for gloves, welded bags, gaiters for remote-handling tongs and for manipulators, circular windows) or rigid plugs or securing units (securing rings),

Independent systems which do not use the same support ring are described separately in this part of ISO 11933 (support rings for manipulator and tong gaiters and for circular windows and rigid plugs).

The associated leaktight components (gloves, welded bags, gaiters for remote-handling tongs and for manipulators) are described in ISO 11933-2.

Transfer systems (plain doors, double doors, airlock chambers, leaktight connections for waste drums) are dealt with in ISO 11933-3.

Accessories for the ventilation of containment enclosures such as filters and traps, pressure regulators and safety valves, are dealt with in ISO 11933-4.

Penetrations for electrical and fluid circuits will be described in ISO 11933-5.

The elements constituting the framework of containment enclosures (metallic walls, framework, transparent panels) are dealt with in ISO 10648-1.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 11933. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 11933 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

- | | |
|------------------|--|
| ISO 7212:1986, | <i>Enclosures for protection against ionizing radiation - Lead shielding units for 50 mm and 100 mm thick walls.</i> |
| ISO 9404-1:1991, | <i>Enclosures for protection against ionizing radiation – Lead shielding units for 150 mm, 200 mm and 250 mm thick walls – Part 1: Chevron units of 150 mm and 200 mm thickness.</i> |

- ISO 10648-1:1996, *Containment enclosures - Part 1: Design principles.*
- ISO 10648-2:1994, *Containment enclosures - Part 2: Classification according to tightness and associated checking methods.*
- ISO 11933-2: –¹⁾ *Components for containment enclosures - Part 2: Gloves, welded bags, gaiters for remote-handling tongs and for manipulators.*
- ISO 11933-3: –¹⁾ *Components for containment enclosures - Part 3: Transfer systems such as plain doors, double doors for leaktight transfer, airlock chambers, leaktight connections for waste drums.*

3 Definitions

For the purposes of this part of ISO 11933, the following definitions apply:

3.1 glove port or bag port: Plastic or metal profiled flange with grooves, fitted on containment enclosures or glove box walls using threaded components or by welding or bonding. They can receive directly a glove or another flexible component terminating with a bead or a snap ring of the same diameter.

Bag ports can be of larger diameter to allow transfer of larger components.

3.2 enclosure ring: Plastic or metal profiled ring which is mounted on containment enclosures or glove box walls using threaded components or by welding or bonding. The ring is used to allow fitting of interchangeable leaktight units mounted on a support ring (e.g. gloves, rigid plugs).

Interchangeability of these ejectable units is achieved by using an ejecting device of appropriate dimensions and operating mode. This device allows ejection of each worn leaktight component by pushing it into the enclosure and replacing it with a new component of the same diameter, without breaking the leaktightness.

3.3 support ring: Plastic or metallic interchangeable unit with grooves, which is mounted in an enclosure ring, and equipped with a glove or other plastic component, terminated with a snap ring, a bead or a lip seal of same diameter.

3.4 interchangeable elements: Parts of components of containment enclosures which may be exchanged with one another or replaced

- either manually by, mounting, dismounting or substitution operations (for example, threaded enclosure rings which may be replaced by threaded glove ports of the same diameter);
- or by a remote-controlled operation and/or using an automatic or manual ejecting device (for example, support rings equipped with gloves, welded bags, tong or manipulator gaiters, bungs or rigid plugs).

These elements are designed in such a way that their replacement of one by another

- does not reduce the containment enclosure tightness;
- and does not need any modification or replacement of the containment enclosure wall.

1) To be published.

3.5 ejectable elements: Components of containment enclosures which may be exchanged by a remote-controlled operation, generally through the use of an appropriate mechanical device. The new element takes the place of the old one, pushing it into the containment enclosure by a simple translatory motion.

These components are installed on enclosure rings such as support rings equipped with gloves, welded bags, gaiters for tongs or manipulators, circular windows, rigid plugs, etc.

They are designed in such a way that the leaktightness between the parts attached to the wall (enclosure rings) and the mobile parts (ejectable elements) is never broken during the exchange operation.

These operations are fully described in this part of ISO 11933.

4 Designation

4.1 General designation

The designation of a component for containment enclosures consists of its name written in full, the reference to this part of ISO 11933 and the reference number.

The reference number consists of a four digit number fixed by the Series Allocation defined in table 1 here after. It shall be followed by one or several alphanumerical codes characterizing the mounting procedure and/or the material of construction.

4.1.1 Series allocation

Series allocation corresponding to the component described in this part of ISO 11933 are given in table 1. The differentiation between the various types of components in the same family is explained in clauses 7 and 8.

4.1.2 Alphabetical codes corresponding to the mounting procedures

The equipment can be mounted on the enclosure wall by different techniques.

The letter codes for the mounting procedure of the fixed component are the following:

- B for bonded types,
- W for welded types,
- T for threaded types²⁾.

4.1.3 Alphabetical codes corresponding to the construction materials

The equipment can be manufactured using different materials.

The letter codes for the material used are the following:

- M for polymethyl methacrylate (PMMA),
- V for polyvinyl chloride (PVC),
- X for stainless steel,
- A for light alloy,
- C for polycarbonate (PC),
- E for polyethylene (PE),
- P for polypropylene (PP),
- S for glass.

In this part of ISO 11933, widely used materials will be designated by their standard abbreviations as listed above.

²⁾ In this design, the containment unit is secured by an independent threaded ring.

Table 1 - Series allocation

Containment units	Series	Clause or subclause
Glove/bag ports	1000 - 1019	5
Bungs for glove/bag ports	1020 - 1099	6
Enclosure rings of:		
- type 1	1100 - 1119	7.2
- type 2	1120 - 1129	7.3
- type 3 ¹⁾	1000 - 1019	7.4
Interchangeable units:		
• Ejectable support rings of:		
- type 1	1130 - 1149	8.2
- type 2	1150 - 1159	8.3
- type 3 for gaiters	1160 - 1169	8.4
- type 3 for circular windows	1170 - 1179	8.4
• Rigid plugs of:		
- type 1	1200 - 1219	8.2
- type 2	1220 - 1229	8.3
- type 3	1230 - 1239	8.4
• Circular windows of:		
- type 2	1240 - 1249	8.3
• Securing rings of:		
- type 1	1250 - 1269	8.2
- type 2	1270 - 1279	8.3
1) Enclosure rings of type 3 consist in fact of glove/bag ports having a profile corresponding to that in figures 1c, 2c or 5. They have the corresponding reference numbers 1001, 1005, 1007 and 1008.		

4.2 Designation - Examples and explanation

4.2.1 Glove/bag port reference numbers

Designation example:

ISO Glove/bag port 1002 T G 2 X s

The last digit of the reference number indicates the useful internal diameter of the glove/bag port, in accordance with table 2.

Table 2 - Correlation between the reference numbers and the useful diameters of glove/bag port

Useful diameter, <i>U</i> mm	156	180	186	200	249	254 (10")	330	340	400
Reference number	1000	1001	1002	1003	1004	1005	1006	1007	1008

The alphanumeric code indicates the following information:

The first code letter indicates the mounting procedure as explained in 4.1.2.

The second code letter indicates the glove or bag attachment system:

- D for double (both attachment methods),
- G for glove or bag fixed directly to the grooves,
- R for attachment via ejectable ring.

The second code digit indicates the number of external grooves per port (1, 2 or 3)³⁾.

The next code letter indicates the material of manufacture as explained in 4.1.3.

The last code letter (optional) indicates a particular type of glove/bag port:

- c for ports with internal centring ring (see figure 7c),
- s for ports with a longer flange intended for use behind shielding (see figure 7 e).

4.2.2 Bungs for glove/bag port reference numbers

Designation example:

ISO Bung for glove/bag port with single clamp plate 1032 X

The third digit of the reference number is allocated according to the type of bung selected as follows:

- bung with mechanical expansion: 2 (see 6.2),
- bung with single clamp plate: 3 (see 6.3.1),
- bung with single clamp plate and flange: 4 (see 6.3.2),
- bung with single clamp plate and inner centring ring: 5 (see 6.3.3),
- bung with single clamp plate and single hinge: 6 (see 6.3.4),
- bung with single clamp plate and double hinge: 7 (see 6.3.5),
- bung with a clip and a single hinge: 8 (see 6.4).

The last digit of the reference number corresponds to the last digit of the reference number of the glove/bag ports on which the bung is mounted and then to a given useful internal diameter as stated in table 2 (for example the following units: bung 1032 X and glove/bag port 1002 T 2 X, have the same useful diameter of 186 mm).

The alphanumeric code includes a letter indicating the material of construction (see 4.1.3).

4.2.3 Enclosure ring reference numbers

Designation example:

ISO Enclosure ring 1102 A

The last digits of the reference number correspond to the last digit of the reference number of the ejectable support ring onto which it can be mounted (e.g. ISO Enclosure ring 1102 A can accept an ejectable support ring equipped with a glove referenced ISO Support ring 1132 E).

NOTE 1: When the enclosure ring is used in conjunction with a standard shielding unit (see ISO 7212 and ISO 9404) we can find, **but not in every case**, a corresponding reference number for the two associated elements (see table 10).

3) When the number 1 is used, in fact it corresponds to 1 external groove and to 2 internal grooves.

NOTE 2: Certain enclosure rings have the same design as glove/bag ports; these rings retain the same designation as described in 4.2.1.

The code letter indicates the material of manufacture (see 4.1.3).

4.2.4 Reference numbers for interchangeable ejectable and securing units

Designation example:

ISO Support ring 1132 E.

The last digit of the reference number corresponds to the last digit of the reference number of the associated enclosure ring (see 4.2.3) onto which the interchangeable unit of interest is mounted (e.g., support ring 1132 E may be mounted in enclosure ring 1102 A).

The code letter indicates the material of manufacture (see 4.1.3).

5 Glove/bag ports

5.1 General

5.1.1 Various categories of glove/bag ports

There are three categories of glove/bag ports:

- a) glove/bag ports for direct attachment of gloves or bags,
- b) glove/bag ports designed to receive ejectable support rings for gloves, bags, gaiters for remote-handling tongs and manipulators or any other ejectable device,
- c) glove/bag ports designed as mixed systems which may receive gloves or bags either directly or using an ejectable support ring.

These three categories of glove/bag ports may be bonded or welded or threaded onto the wall of the containment enclosure.

5.1.2 Different types of glove/bag ports

There are three types of glove/bag ports:

- a) bonded ports (see figure 1),
- b) welded ports (see figure 2),
- c) ports threaded by an independent ring (see figure 3)⁴.

The port type is chosen according to the technique used, the kind of product handled and the required leaktightness of the enclosure.

5.1.2.1 Bonded ports

Bonded ports are generally manufactured from PMMA (or possibly PC or PVC). These types of port are generally only fitted on plastic walls of similar material and are not reusable.

It is important for all bonded surfaces to be continuous and smooth on the "hot" side for ease of decontamination.

4) Threaded system with an independent ring (not directly threaded onto the containment wall).

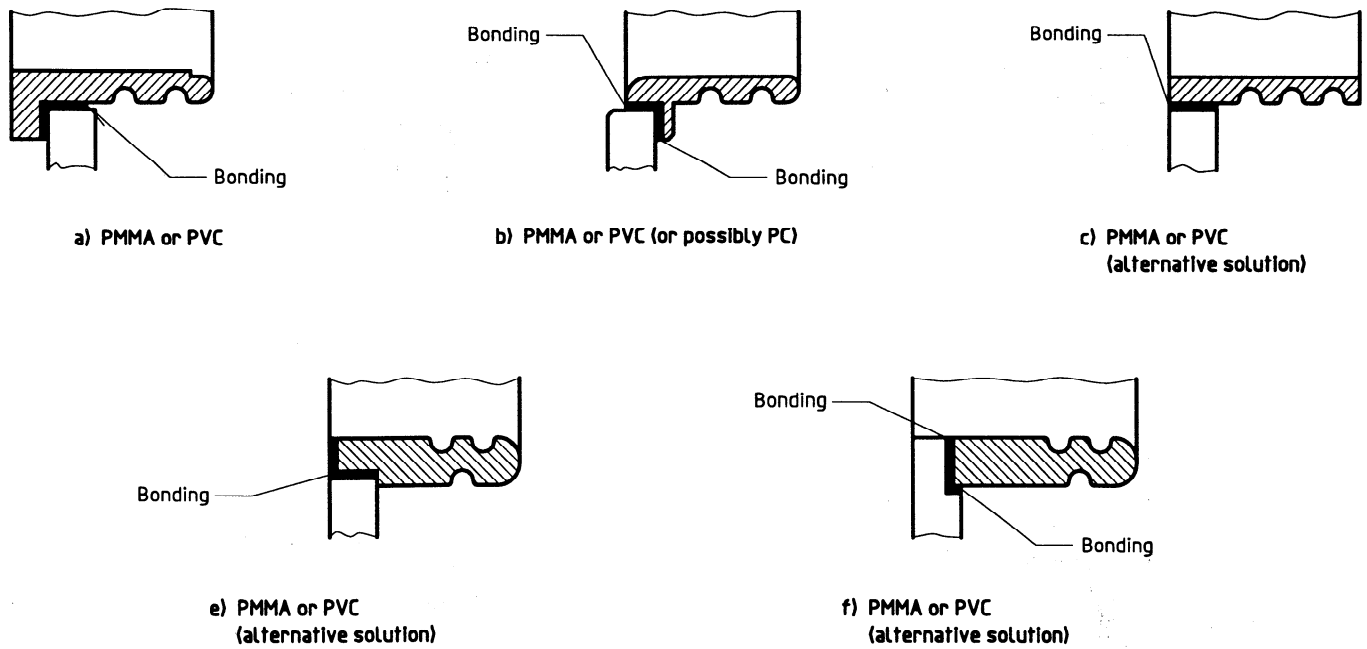


Figure 1 - Bonded ports - Different solutions

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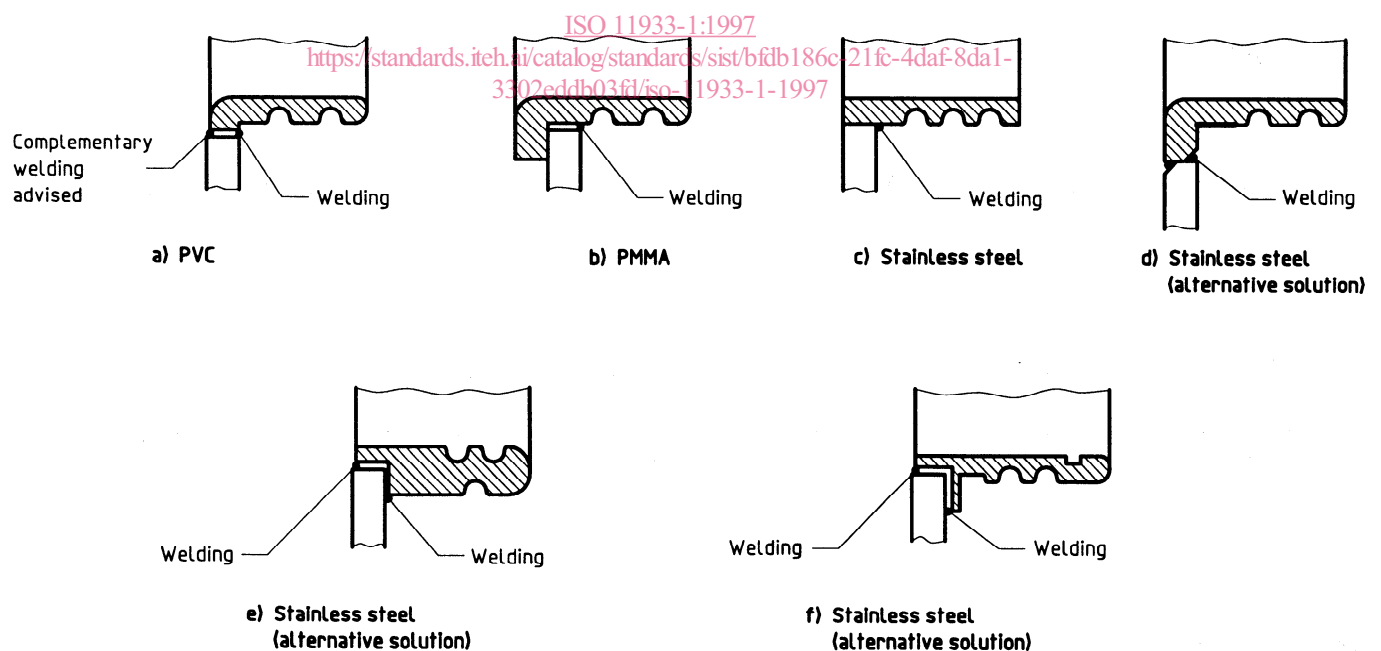


Figure 2 - Welded ports - Different solutions

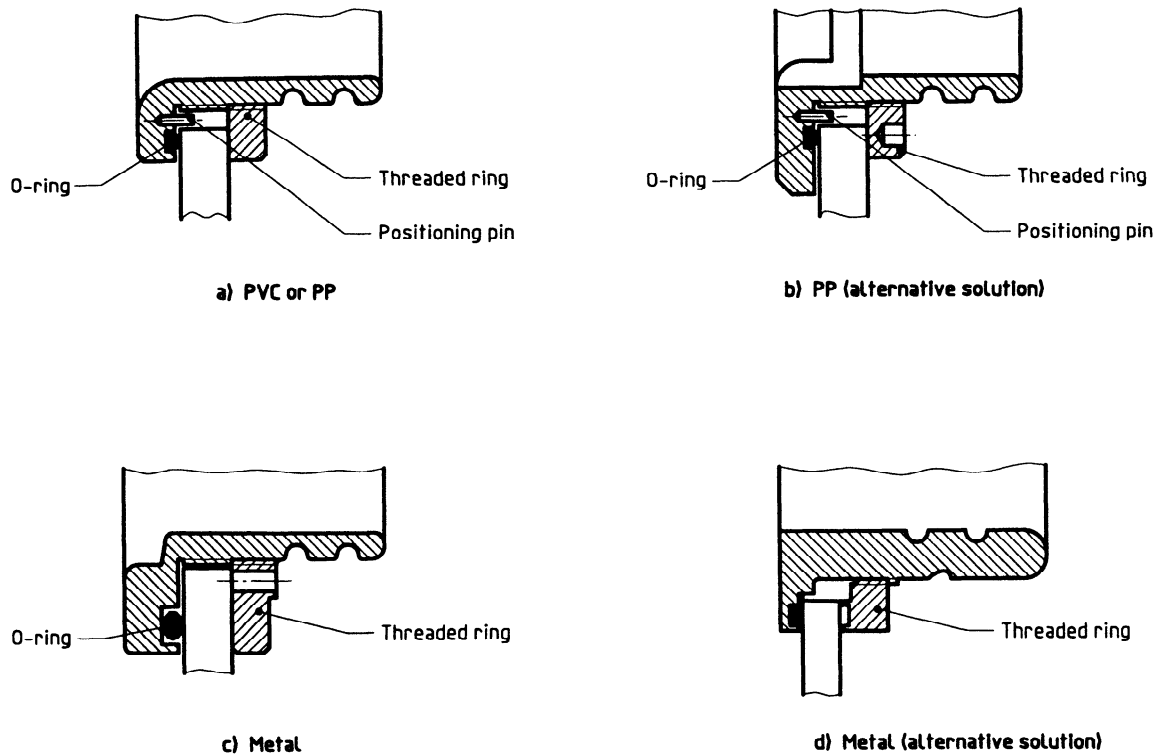


Figure 3 - Threaded ports - Alternative solutions

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5.1.2.2 Welded ports

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Welded ports are generally manufactured from PMMA, PVC or stainless steel.

It is important for all welded surfaces to be continuous and smooth on the "hot" side for ease of decontamination.

5.1.2.3 Threaded ports

These are made of metal or plastic materials and fit on any type of enclosure wall.

The port is passed through the enclosure wall and secured by an independent threaded ring. A device is required to secure the ring to prevent any loosening during use.

5.2 Glove/bag port assembly

5.2.1 PMMA ports are bonded (or welded) to walls of similar material. When additional ports are fitted on containment enclosures in use, the adhesive and the bonding (or welding) process shall be selected in accordance with the manufacturer's instructions.

5.2.2 PVC ports may be welded or threaded; PP ports may be threaded.

Welded ports should preferably be welded to the inside and the outside enclosure wall surfaces as well (see figure 2b).

Threaded ports may be fitted onto any enclosure wall of 13 mm thickness or less ; they include a positioning pin (see figure 3a). The surface finish of the sealing surface of the wall shall be better than 0,3 mm in order to ensure correct tightness of the port.

5.2.3 Metal ports (light alloy or stainless steel) may be welded or threaded.

Stainless steel ports are welded onto stainless steel walls,

Threaded ports shall meet the same requirements as plastic ports (described above).

5.3 Glove/bag port design

The usual profiles have two (see figures 4 and 7) or three (see figures 5 and 8) external grooves depending on the mounting procedure for gloves or bags given in ISO 11933-2.

There is a special glove/bag port profile with one external and two internal grooves (see figures 6 and 9). In this system, gloves or bags are kept in position with two inner O-rings. The complete mounting procedure is described in ISO 11933-2.

There are special glove ports with supplementary shielding which allow equipment to be posted into the enclosure. These ports have longer flanges (see figure 7e).

Other glove ports allow gloves to be mounted either directly on two external grooves or indirectly using an ejectable support ring (see figures 9a and 9b).

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5.4 Requirements related to the construction of glove/bag ports

Glove/bag ports may include on their internal side a groove (figure 7d) to accommodate bungs with clamp plates (see clause 6) and/or threaded holes to accommodate bungs with hinges.

Surfaces in contact with gloves and the inside of the enclosure shall be accessible for decontamination, the corners being rounded to protect gloves from tearing and facilitate decontamination (minimum radius: 0,5 mm).

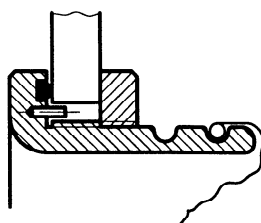


Figure 4 — Glove/bag port with 2 external grooves

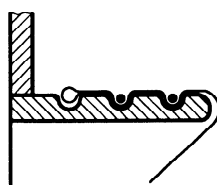


Figure 5 — Glove/bag port with 3 external grooves

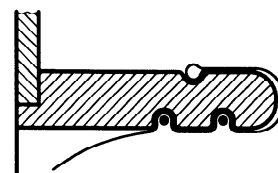


Figure 6 — Glove/bag with port with 1 external groove and 2 internal grooves

Dimensions in millimetres

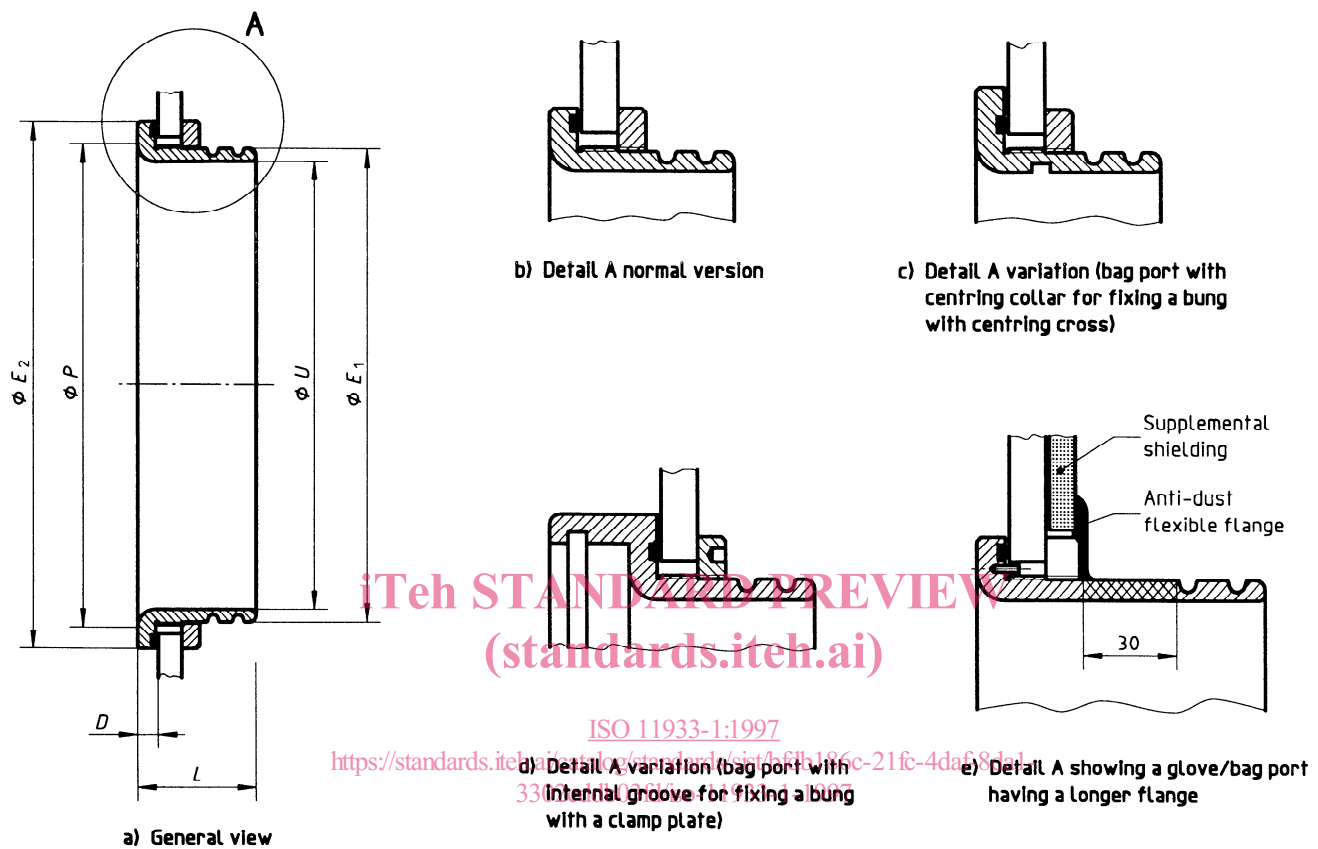


Figure 7 - Examples and dimensions of threaded glove/bag ports having two external grooves

Dimensions in millimetres

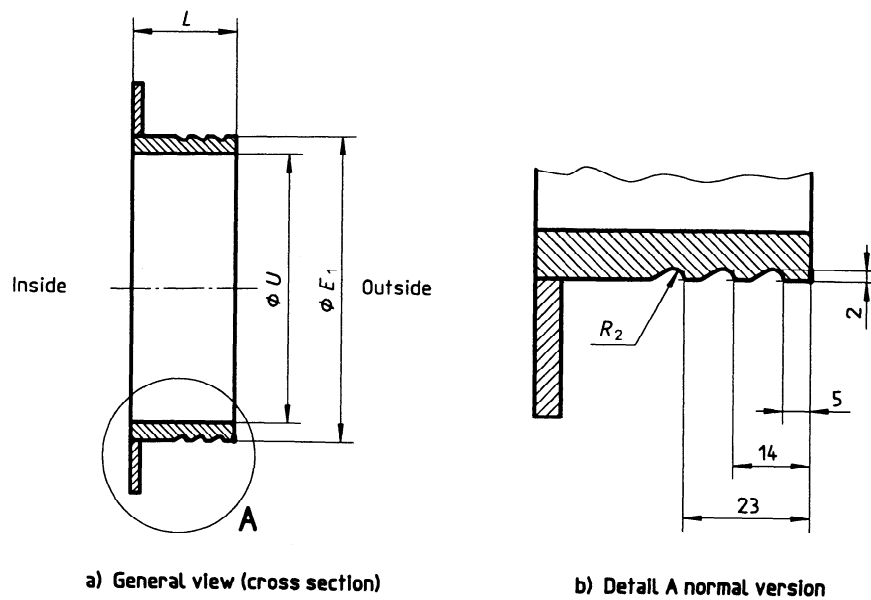


Figure 8 - Example and dimensions of bonded or welded glove/bag ports having three external grooves

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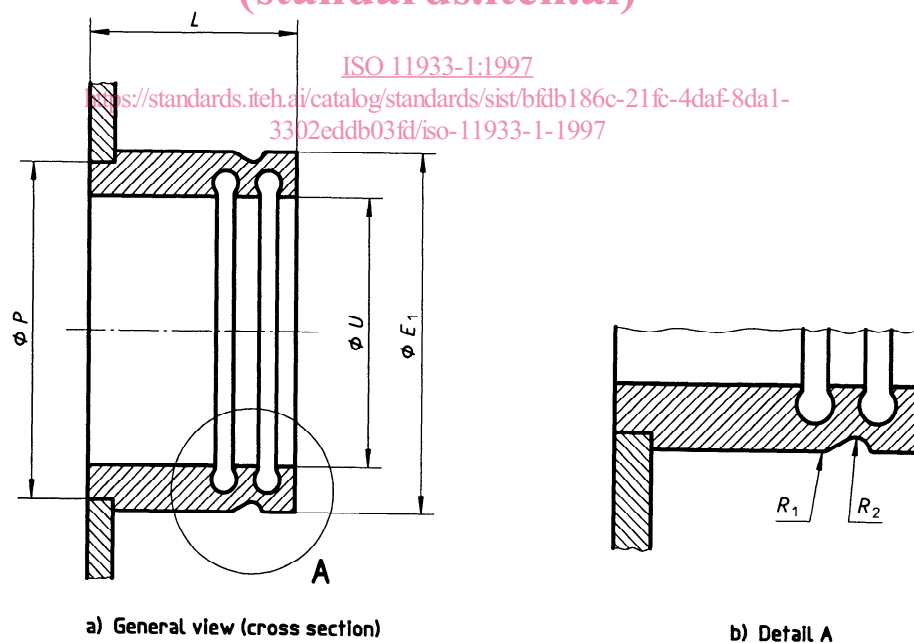


Figure 9 - Example and dimensions of welded glove/bag port having two internal and one external groove