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International Standard



2733

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

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**Vitreous and porcelain enamels — Apparatus for testing with acid and neutral liquids and their vapours**

*Émaux vitrifiés — Appareil pour essai avec des liquides acides ou neutres et leurs vapeurs*

Second edition — 1983-12-01

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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 developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized 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.

International Standard ISO 2733 was developed by Technical Committee ISO/TC 107, *Metallic and other non-organic coatings*.

This second edition was submitted directly to the ISO Council, in accordance with sub-clause 6.11.2 of part 1 of the Directives for the technical work of ISO. It cancels and replaces the first edition (i.e. ISO 2733-1973), which had been approved by the member bodies of the following countries :

|                     |                       |                |
|---------------------|-----------------------|----------------|
| Australia           | Italy                 | Sweden         |
| Egypt, Arab Rep. of | Japan                 | Switzerland    |
| France              | Netherlands           | Thailand       |
| Germany, F. R.      | New Zealand           | Turkey         |
| Hungary             | Poland                | United Kingdom |
| India               | Portugal              | USSR           |
| Ireland             | Romania               |                |
| Israel              | South Africa, Rep. of |                |

No member body had expressed disapproval of the document.

# Vitreous and porcelain enamels — Apparatus for testing with acid and neutral liquids and their vapours

## 1 Scope and field of application

This International Standard specifies the apparatus to be used for testing the resistance of flat surfaces of vitreous and porcelain enamels to attack by solutions such as acid and neutral liquids and their vapours.

This apparatus permits the determination of the resistance of vitreous and porcelain enamels to the liquid and vapour phases of the corrosive medium within one testing period.

## 2 References

ISO 43, *Vulcanized rubbers — Determination of hardness (Hardness between 30 and 85 IRHD)*.

ISO 718, *Laboratory glassware — Methods of thermal shock tests*.

ISO 3585, *Glass plant, pipeline and fittings — Properties of borosilicate glass 3.3*.

ISO 4799, *Laboratory glassware — Condensers*.

## 3 Apparatus

The testing apparatus (see figure 1) consists of a cylinder (see figure 2) (3.1) with two adjacent supports with standard sockets for holding a reflux condenser (3.2), on one side and a thermometer (3.3) for measuring the temperature of the vapour chamber on the other.

Two test specimens form the top and bottom of the cylinder. One of them may be replaced by a glass plate (3.12) as required. The cylinder (3.1) with the specimens is supported between two triangular plates (see figure 3) (3.4) locked at the corners by three screw bolts (3.7), three wing nuts (3.6) and three hexagonal nuts (3.5). A synthetic fibres washer (3.8) is fixed between the triangular plates (3.4) and each specimen. The specimens are sealed against the ground edges of the cylinder (3.1) with packing rings [4 a) or 4 b)], the material of which is dependent on the type of test solution.

When testing specimens cut from an enamelled article, the packing rings [4 a) or 4 b)] are replaced by protective envelopes (see figure 4) [4 c)] in which the specimens are placed.

The apparatus is heated externally by a heater (3.10) placed upon the lower half of the cylinder (3.1).

The testing apparatus is composed of the following parts :

**3.1 Cylinder** (see figure 2), of borosilicate glass 3.3 complying with the requirements of ISO 3585. In case of testing the cylinder according to ISO 718, it shall pass the test without breaking at a difference in temperature of at least 120 °C.

**3.2 Reflux condenser**, for example a Liebig-West condenser (see ISO 4799) with a nominal jacket length of 400 mm and standard ground joint, preferably of borosilicate glass 3.3 complying with the requirements of ISO 3585.

**3.3 Thermometer**, with standard ground joint, a range of 0 to 250 °C and a graduation interval of 1 °C, preferably of borosilicate glass 3.3 according to ISO 3585.

**3.4 Two triangular plates**, of surface-protected steel, shown in figure 3.

**3.5 Three hexagonal nuts**, with a thread fitting the screw bolt.

**3.6 Three wing nuts**, with a thread fitting the screw bolt.

**3.7 Three screw bolts**, of corrosion-resistant steel.

**3.8 Two synthetic fibres washers**, resistant to acid and water at 140 °C.

**3.9 Two packings**, specified in clause 4.

**3.10 Heater**, 500 W, of heat-conducting alloy covered with heat-insulating material, having dimensions such that the upper rim of the heater is 95 mm from the lower edge of the cylinder and the heater does not touch the packing.

**3.11 Heat-control device**, for example rheostat, variable transformer, electronic control equipment.

**3.12 Glass plate**, of borosilicate glass 3.3 complying with the requirements of ISO 3585, having a diameter of 105 mm, as cover or bottom of the cylinder (3.1), if required.

#### 4 Packing

The method of packing the specimens towards the ground edges of the cylinder depends on the type of specimen and the type of test solution. The International Standard for the test method in question specifies which of the three following types of packing should be used during testing.

##### a) Packing A

Compressed fibre washers: 100 mm external diameter,  $79 \pm 1$  mm internal diameter, 2 mm thick, covered with a plastics material resistant to hydrochloric acid at 140 °C (for example polytetrafluorethene).

##### b) Packing B

Packing ring: 100 mm external diameter,  $80 \begin{smallmatrix} 0 \\ -0,3 \end{smallmatrix}$  mm internal diameter, 2 to 3 mm thick, consisting of rubber, with hardness 70 IRHD according to ISO 48, resistant to citric acid and water at 140 °C (for example chloroprene).

##### c) Packing C

Protective envelope shown in figure 4, consisting of rubber with hardness 70 IRHD according to ISO 48, resistant to citric acid and water at 140 °C (for example chloroprene).

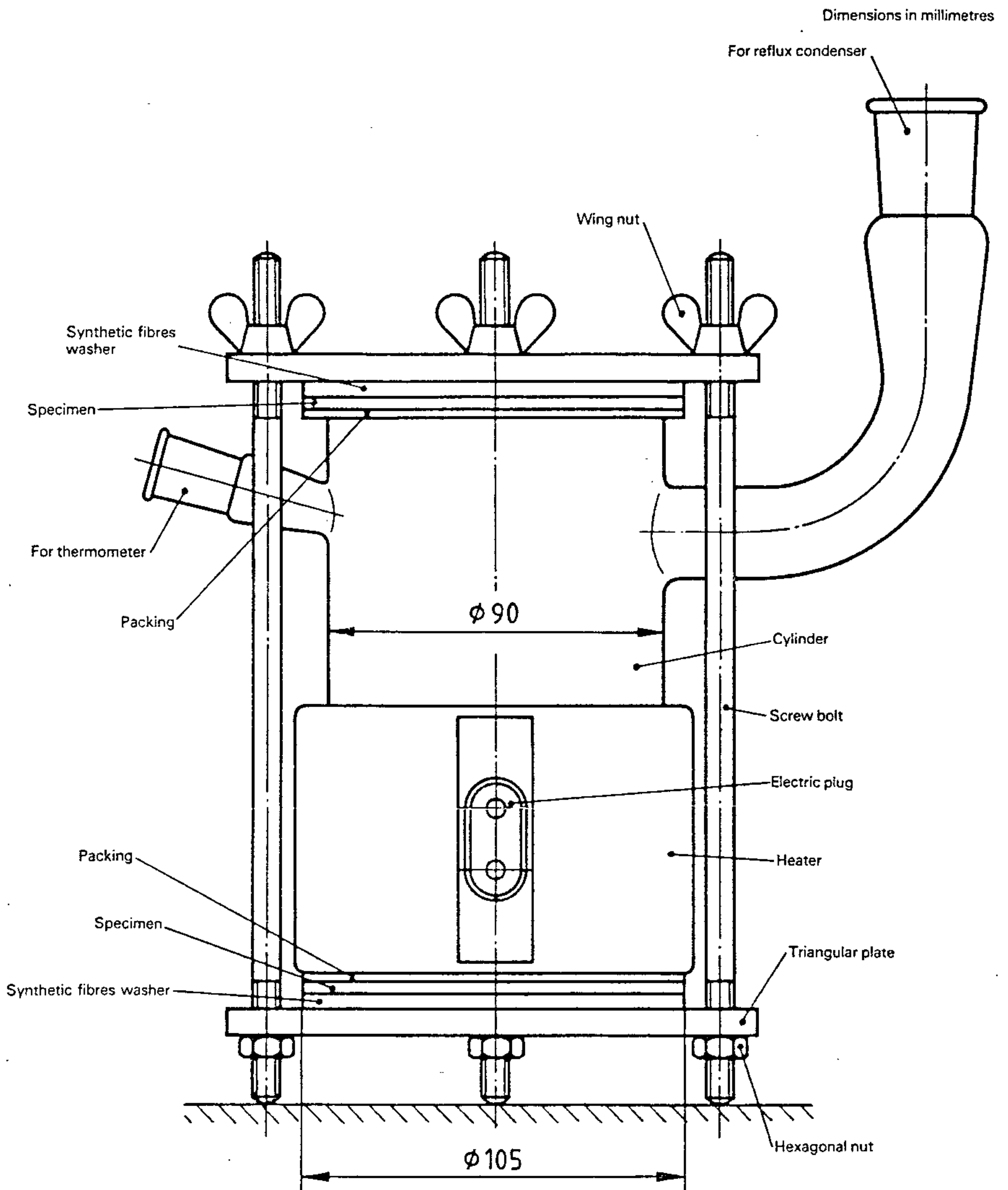


Figure 1 – Testing apparatus

Dimensions in millimetres

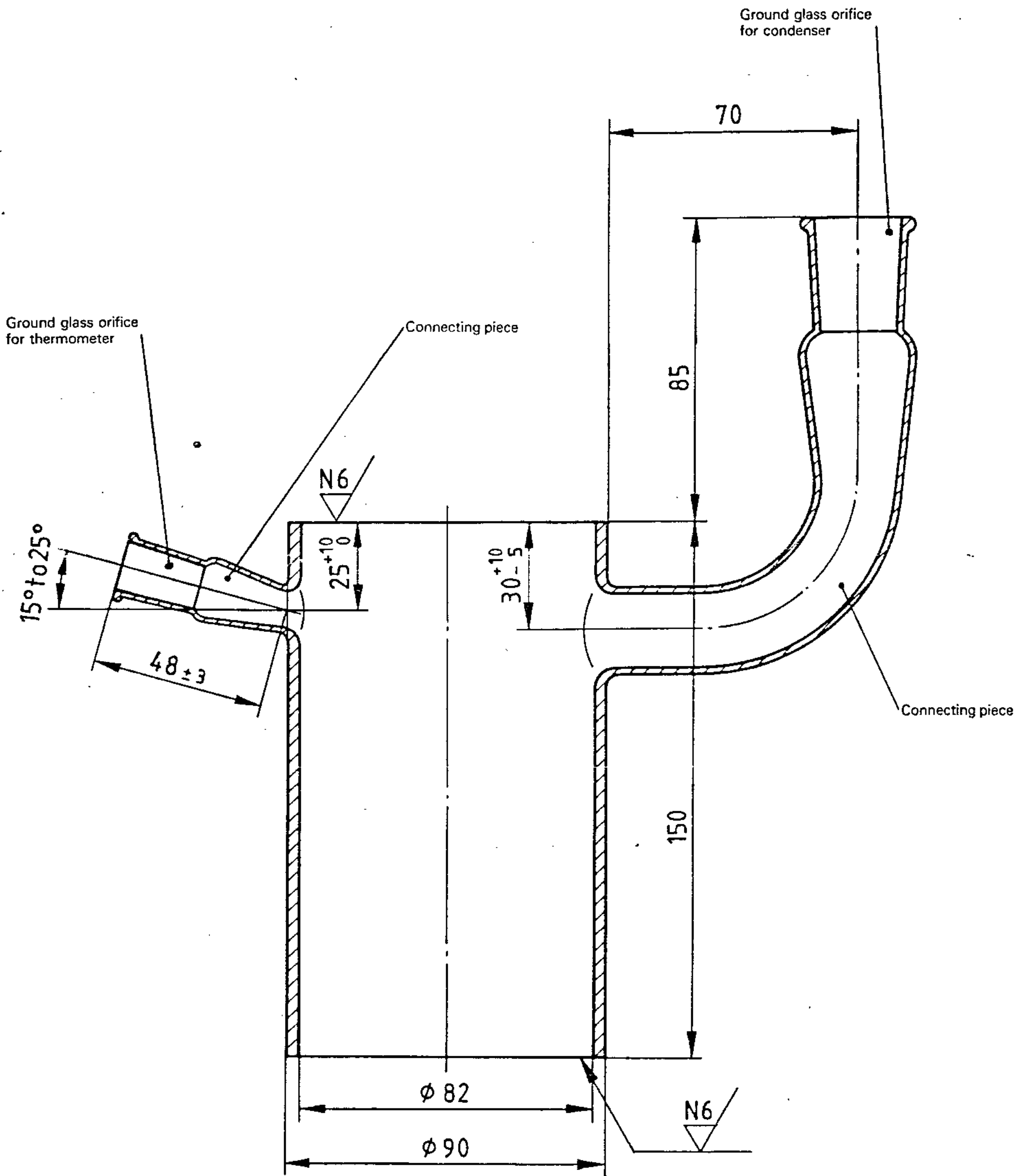


Figure 2 – Cylinder

Dimensions in millimetres

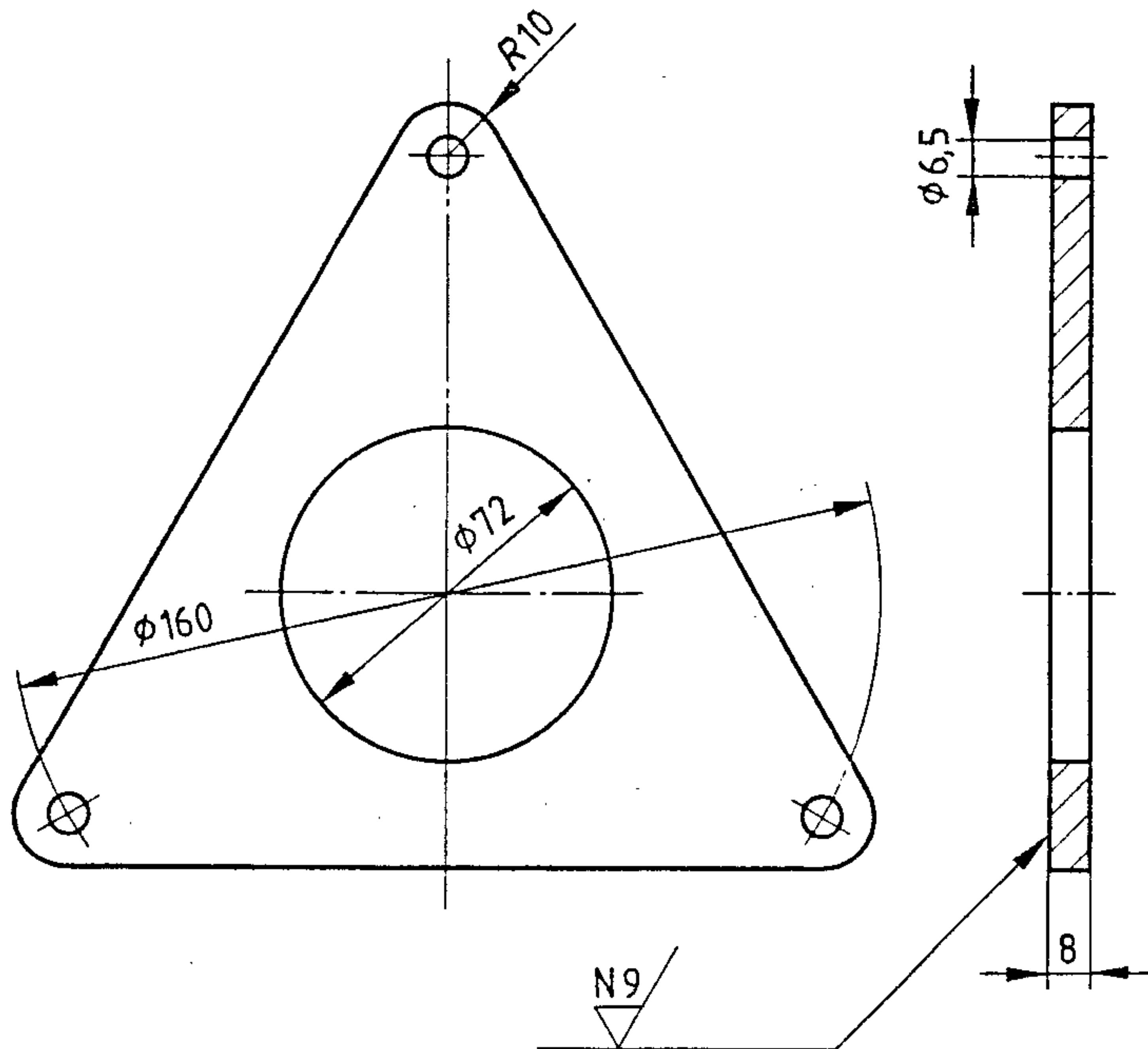


Figure 3 — Triangular plate

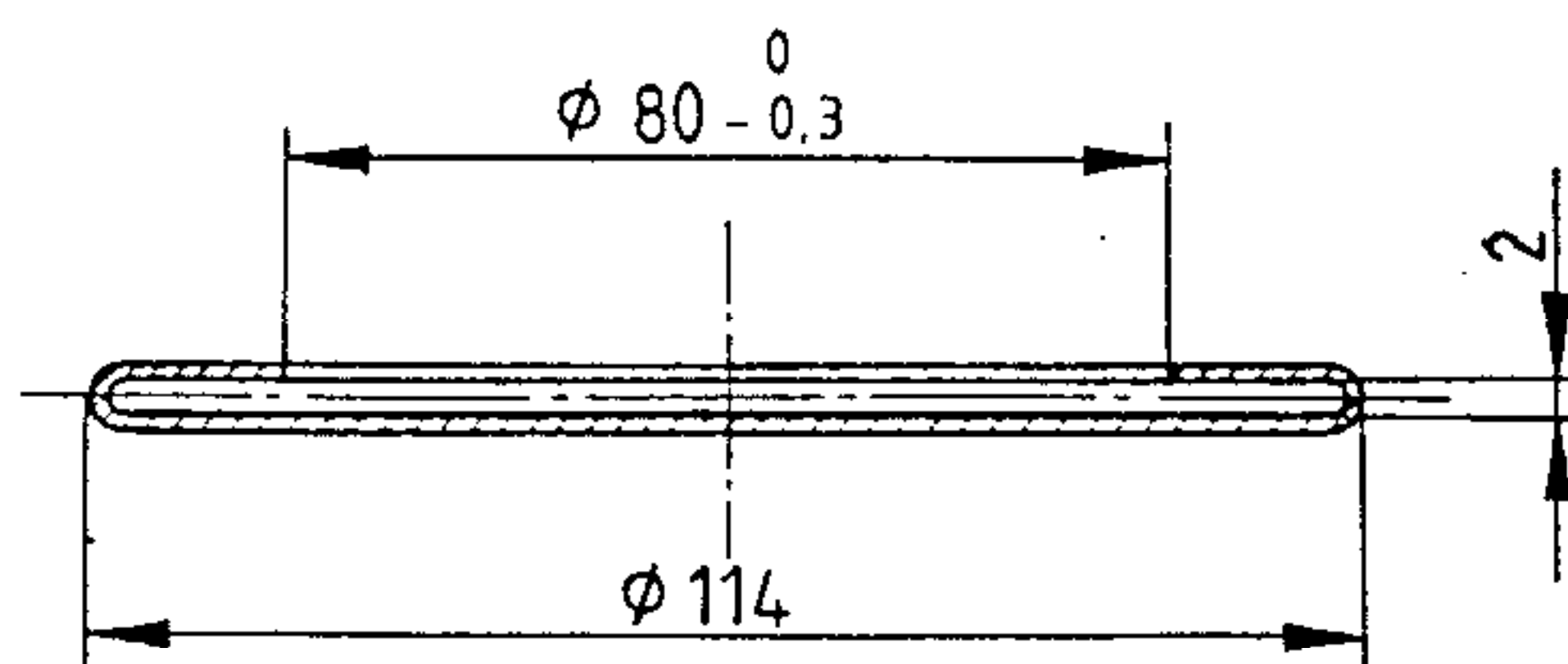


Figure 4 — Protective envelope