INTERNATIONAL STANDARD

# ISO 13331

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# Road vehicles — Filler pipes and openings of motor vehicle fuel tanks — Vapour recovery system

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*Véhicules routiers — Tuyaux et orifices de remplissage des réservoirs à carburant des automobiles — Système de récupération des vapeurs*

ISO 13331:1995
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INTERNATIONAL ISO

Reference number
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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.

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# Road vehicles — Filler pipes and openings of motor vehicle fuel tanks — Vapour recovery system

## 1 Scope

This International Standard ensures compatibility between new petrol-powered vehicle designs and refuelling vapour recovery nozzles — both active and passive systems — by their dimensions and specifications.

NOTE 1 The dimensions and specifications of this International Standard are based on SAE J1140.

This International Standard was developed primarily for passenger car and commercial vehicle applications but may be used in marine, industrial and similar applications where refuelling vapour recovery is required.

For national standards, see annex A.

## 2 Definitions

For the purposes of this International Standard, the following definitions apply.

**2.1 active vapour recovery system:** System whereby the vapour is extracted during fuel filling by a powered form of extraction, e.g. a vacuum pump. This system may require sealing of the filler pipe or may be the open type (not sealed).

**2.2 passive vapour recovery system:** System whereby the vapour leaving a fuel tank is emitted due to the volumetric displacement of the liquid fuel being added which relies on filler pipe sealing to prevent loss of vapour.

**2.3 filler pipe sealing surface:** That part of the filler pipe against which a certain type of recovery nozzle can effect a vapour-tight seal (see figure 1).

**2.4 nozzle test gauge:** Gauge with dimensions as shown in figure 6, used to establish the reference lines around which the filler pipe access zone is defined.

**2.5 reference plane:** Plane which contains the axial centreline of the filler pipe sealing surface, and is rotated into the direction which the manufacturer of the automobile has determined to be the orientation in which the nozzle is to be inserted.

**2.6 normal resting position of nozzle test gauge:** Gauge position when the following conditions are met.

**2.6.1** The gauge is inserted into the filler pipe, such that the axial centreline of the gauge lies in the reference plane.

**2.6.2** The locking ring of the gauge is located immediately to the inside (i.e. the vehicle tank side) of the locking lip.

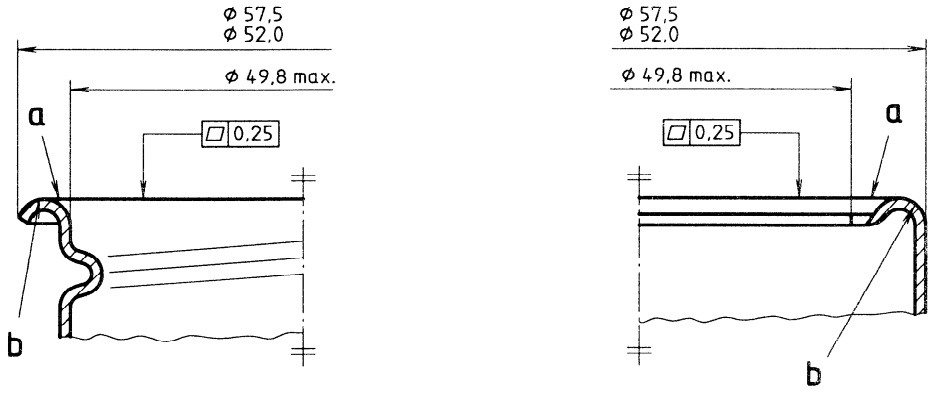
**2.6.3** Either the gauge locking ring rests upon the filler pipe wall, or the gauge shaft rests upon the locking lip as shown in figures 2 a) and 3 a), respectively.

**2.6.4** The fuel-dispensing end of the gauge, as indicated in figures 2 a) and 3 a), is in contact with a restraining point.

**2.7 insertion position of nozzle gauge:** Gauge position when the following conditions are met.

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Dimensions in millimetres




**Key**

a) Sealing surface

b) Convex

**Figure 1 — Filler pipe sealing surface**

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**2.7.1** The gauge is inserted into the filler pipe with the axial centreline of the gauge contained in the reference plane.

**2.7.2** The gauge locking ring rests on the upper surface of the locking lip so as to raise the gauge axis through the minimum angle (from the normal resting position) required to effect gauge insertion into the filler pipe as shown in figure 4.

**2.7.3** The fuel-dispensing end of the gauge, as indicated in figures 2 b) and 3 b), is in contact with a restraining point.

**2.8** $\alpha$ **angle:** Angle between the axial centreline of the nozzle test gauge [designated a in figures 2 a) and 3 a)] when in its normal resting position and the axial centreline of the filler pipe sealing surface [designated b in figures 2 a) and 3 a)], expressed in degrees.

$\alpha$ is considered a positive angle when the fuel-dispensing end of the gauge is pointing down relative to the axial centreline of the filler pipe sealing surface, as illustrated in figures 2 a) and 3 a).

**2.9** $\beta$ **angle:** Angle between the axial centreline of the nozzle test gauge [designated a in figures 2 b) and 3 b)] when in its insertion position, and the axial centreline of the filler pipe sealing surface [designated b in figures 2 b) and 3 b)], expressed in degrees.

$\beta$ is considered a positive angle when the fuel-dispensing end of the gauge is pointing down relative to the axial centreline of the filler pipe sealing surface, as illustrated in figures 2 b) and 3 b).

## 3 Specifications

**3.1** The filler pipe sealing surface shall meet the requirements of figure 1.

**3.2** An internal locking lip (see number 4 in figures 2 and 3) shall be provided around at least 100° of the inside circumference of the filler pipe. The locking lip shall be orientated such that it extends at least 35° to either side of the reference plane. The height of the lip shall not be less than 2,5 mm measured from the inside wall of the filler pipe nor less than 8,5 mm as measured from the outside wall of the filler pipe if the outside diameter of the filler pipe is between 52 mm and 57,5 mm (see figure 1). The depth of the lip shall be not less than 4 mm nor more than 13 mm into the filler pipe as measured in the reference plane, from the filler pipe sealing surface (designated n in figure 5, detail X).

**3.3** The filler pipe and all surrounding bumpers, body parts, and factory-installed accessories shall be designed and fabricated so that the filler pipe access

zone shall allow for insertion of a vapour recovery nozzle in at least one orientation within ± 90° of the upright or vertical position. Allowance shall be made for production tolerances as these are not included in the access zone. The access zone consists of three parts as specified in 3.3.1 to 3.3.3.

**3.3.1** A zone with an oval cross-section (see number 1 in figure 4) that is fixed relative to the face of the filler pipe and designed to accommodate the sealing portion of a vapour recovery nozzle. The offset A (designated f in figure 5, section A-A) is equal to $0{,}004\alpha^2 - 0{,}3\alpha + 2{,}0$, expressed in millimetres, if the nozzle test gauge locking ring rests on the filler pipe wall in its normal resting position as illustrated in figure 3 a). If the gauge shaft rests on the locking lip in its normal resting position as is illustrated in figure 3 a), then offset $A = 0{,}004\alpha^2 - 0{,}3\alpha + 0{,}11d$, expressed in millimetres, where $d$ is the depth of the locking lip measured from the plane of the filler pipe sealing surface (designated n in figure 5, detail X) in the reference plane, expressed in millimetres. Offset B (designated g in figure 5, section A-A) is equal to the number of degrees of angle $\beta \times 0{,}4$, expressed in millimetres. Offset B fails to exist for $\beta \leqslant 0$.

**3.3.2** A zone with a rectangular cross-section tapered at the bottom (see number 3 in figure 4), that is designed to accommodate the handle portion of a vapour recovery nozzle. This zone is the portion, shown in figure 4, within the lines defined by points C, D, E, F and G. The bottom line of this zone (line C-D) is positioned relative to reference line A as shown in figure 4. Reference line A is the nozzle test gauge centreline in the normal resting position as shown in figure 4.

The top of this zone (line G-F-E) is positioned relative to reference line B as shown in figure 4.

Reference line B is the nozzle test gauge centreline in the insertion position as shown in figure 4.

The centre P for the 190 mm, 240 mm and 306 mm radii, shown in figure 4, is located by finding the intersection point of the 306 mm radius arcs struck from points D and E, respectively.

**3.3.3** A transition zone (see number 2 in figure 4) consisting of a smooth blend from the rectangular zone to the oval zone. The top of this transition zone is the line G-J in figures 4 and 5, and the bottom of this zone is line A-C.

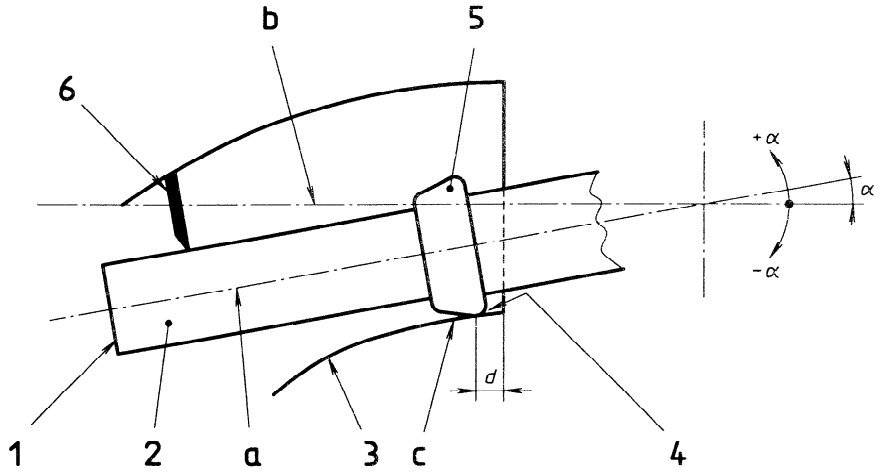
**3.4** The internal portions of the filler pipe shall be configured such that the nozzle test gauge can be inserted far enough into the filler pipe to allow entrance of its locking ring beyond the filler pipe locking lip, and to allow movement of the gauge to the normal resting position and back to the released position. An unleaded petrol restrictor shall be positioned so that the nozzle test gauge in the normal resting position penetrates the restrictor by at least 22,5 mm.

The internal portions of the filler pipe shall also be configured to hold the nozzle test gauge in a normal resting position such that the angle formed between the axial centreline of the nozzle test gauge and the axial centreline of the filler pipe sealing surface falls within the $\alpha$ angle from + 20° to −10° as shown in figures 2 a) and 3 a).

**3.5** As a minimum assurance against spillage, the filler pipe shall be orientated such that the axial centreline of the nozzle test gauge in the normal resting position forms an angle of not less than 30° with the horizontal plane, with the fuel-dispensing end pointing down.

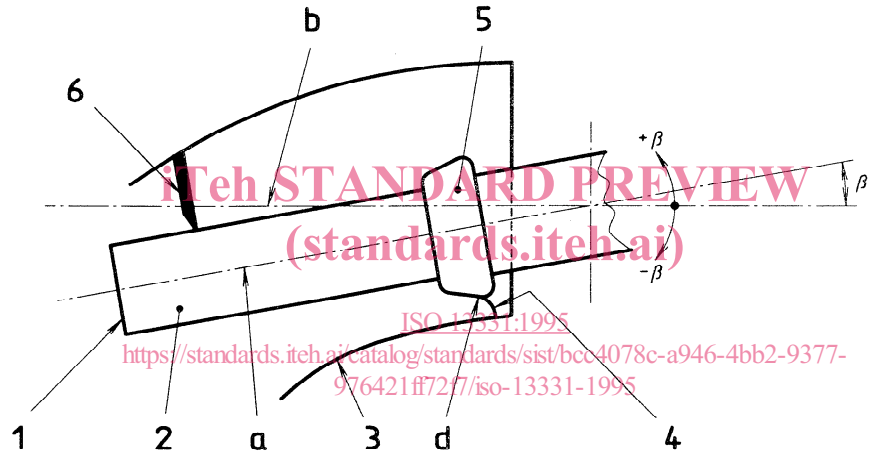
**3.6** Vapour outlet ports shall be positioned such as to permit vapour recovery regardless of the system applied (e.g. active or passive).

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NOTE — The angle α may fall within the range + 20° ⩾ α ⩾ −10°; the angle shown is a positive angle.

**a) Normal resting position**



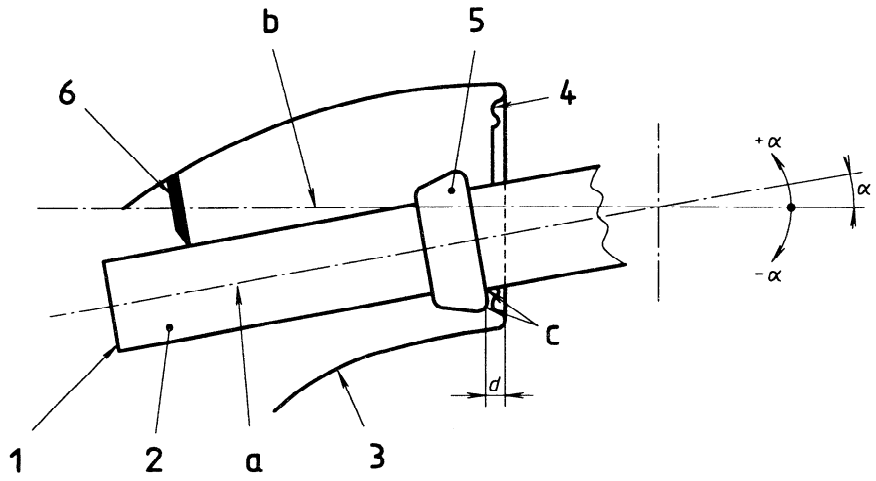

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**b) Insertion position**

**Key**

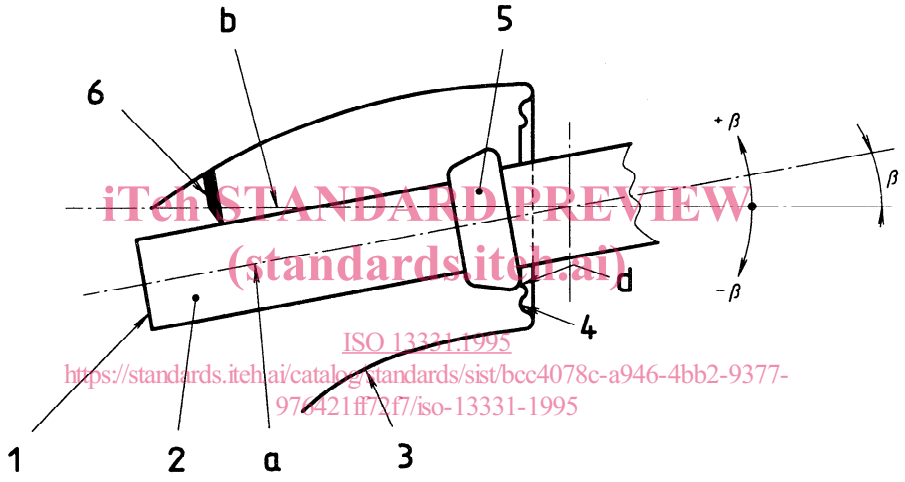
a reference line "A" (axial centreline of nozzle test gauge)
b axial centreline of filler pipe sealing surface
c locking ring rests upon the filler pipe wall
d locking ring rests on the upper surface of the locking lip
1 fuel-dispensing end
2 nozzle test gauge
3 filler pipe
4 locking lip
5 locking ring
6 restraining point (may be the no-lead restrictor, the top of the filler pipe or a baffle)

**Figure 2 — Nozzle positions for threaded type cap**




NOTE — The angle $\alpha$ may fall within the range $+20° \geqslant \alpha \geqslant -10°$; the angle shown is a positive angle.

**a) Normal resting position**




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**b) Insertion position**

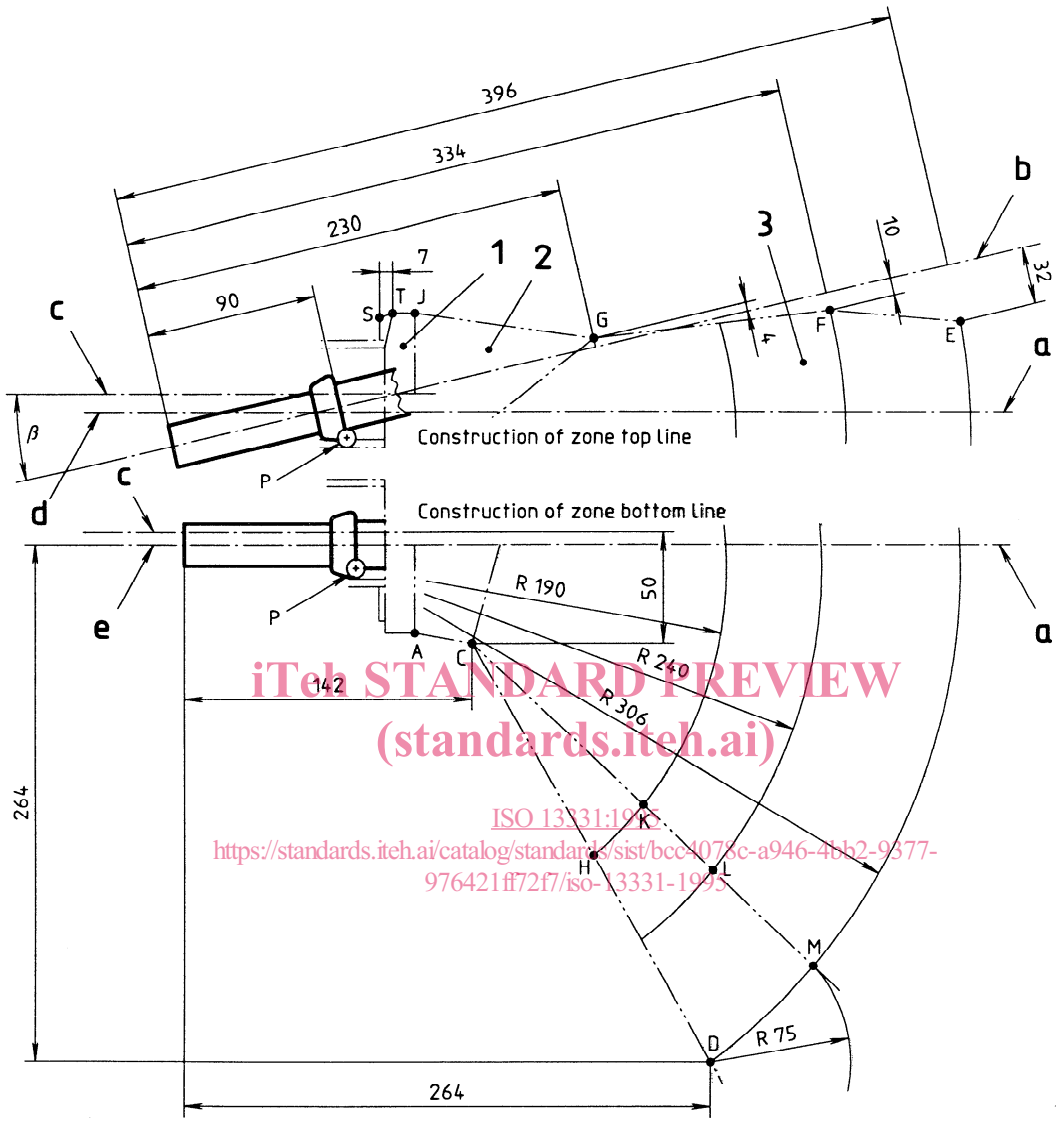
**Key**

a reference line "A" (axial centreline of nozzle test gauge)
b axial centreline of filler pipe sealing surface
c nozzle test gauge resting on locking lip (locking ring not touching filler pipe wall)
d locking ring rests on the upper surface of the locking lip
1 fuel-dispensing end
2 nozzle test gauge
3 filler pipe
4 locking ring
5 locking ring
6 restraining point (may be the no-lead restrictor, the top of the filler pipe or a baffle)

**Figure 3 — Nozzle positions for bayonet type cap**

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Dimensions in millimetres



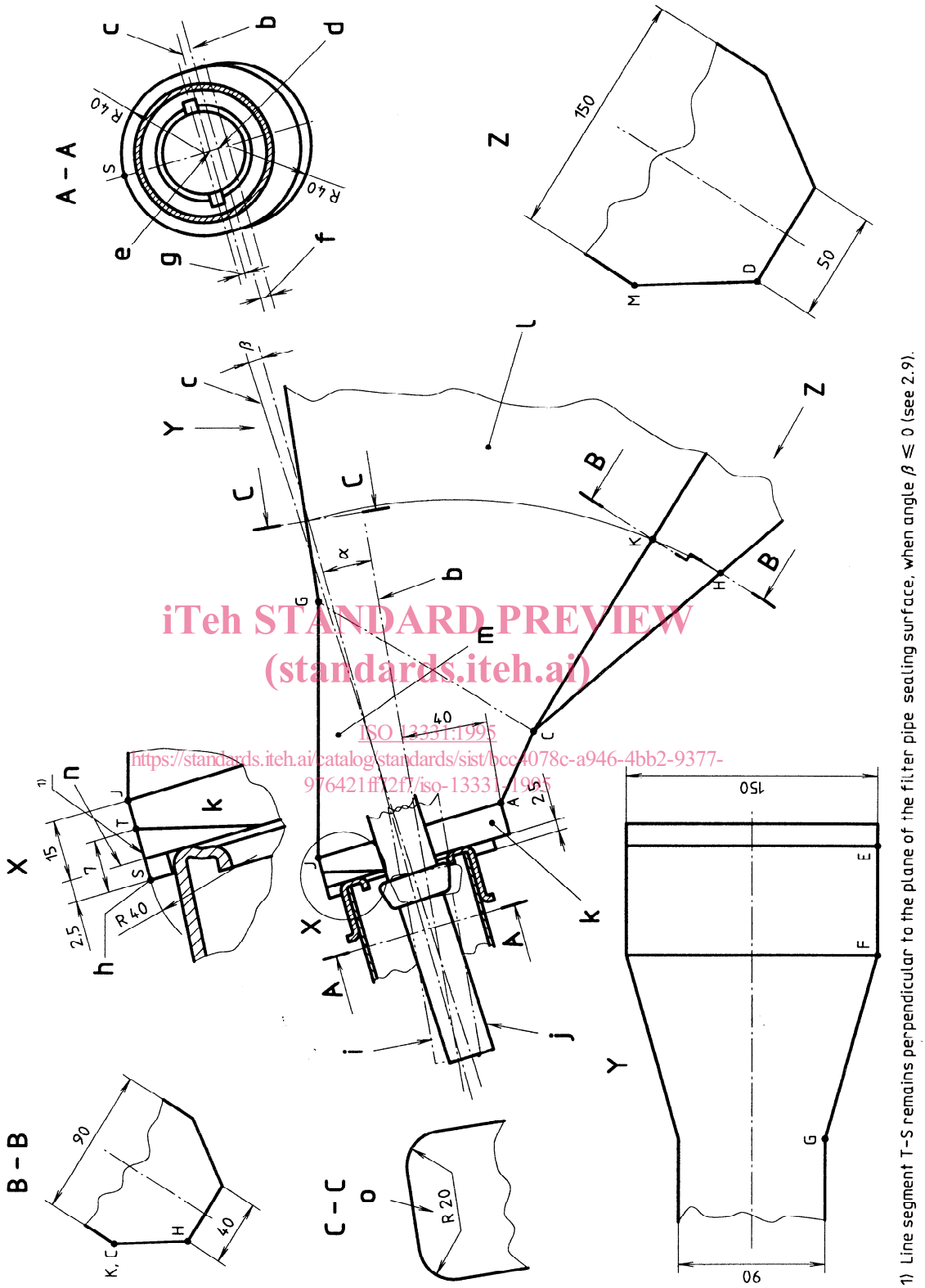

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**Key**

a reference line "A"
b reference line "B"
c centreline filler pipe sealing surface
d centreline nozzle test gauge insertion position
e centreline nozzle test gauge normal resting position
1 zone with an oval cross-section
2 transition zone
3 zone with a rectangular cross-section

**Figure 4 — Construction of filler pipe access zone**

Dimensions in millimetres




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1) Line segment T–S remains perpendicular to the plane of the filter pipe sealing surface, when angle $\beta \leqslant 0$ (see 2.9).