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BRITISH STANDARD

Specification for steel and aluminium access cover systems with over 1 m clear opening

ICS 13.060.01

British Standards

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 24, an inside back cover and a back cover.

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Foreword

Publishing information

This British Standard is published by BSI and came into effect on 29 August 2008. It was prepared by Technical Committee B/505, Wastewater engineering. A list of organizations represented on this committee can be obtained on request to its secretary.

Relationship with other publications

This standard is complementary to BS EN 124, which specifies requirements for gully tops and manhole tops with a clear opening up to and including 1 m, for use in vehicular and pedestrian areas.

The 1994 edition of EN 124 does not include requirements for the slip/skid resistance of manhole tops or gully tops. However, European Commission mandate M/118 "Wastewater engineering products", given to CEN under the EU Construction Products Directive (89/106/EEC) for a "harmonized" European Standard for manhole tops and gully tops, requires the skid resistance of covers for manhole tops to be included as a performance characteristic. This is being addressed in the current revision of EN 124:1994, to which the United Kingdom is contributing under the supervision of B/505. Accordingly B/505 gratefully acknowledges the contributions made by the Health and Safety Executive, the County Surveyors' Society and the Highways Agency to the development of the provisions for slip/skid resistance in this British Standard.

Information about this document

For an enquiry or order to be fully understood it is essential that the manufacturer be given the information set out in Annex A.

Attention is drawn to the fact that cover systems under the scope of this British Standard are intended only to facilitate access to underground chambers.

Product certification/inspection/testing

Users of this British Standard are advised to consider the desirability of third-party certification/inspection/ testing of product conformity with this British Standard. Users seeking assistance in identifying appropriate conformity assessment bodies or schemes may ask BSI to forward their enquiries to the relevant association.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

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Introduction

Products under the scope of this British Standard are normally bespoke and so it is inappropriate for the evaluation of conformity to be verified by systematic examination of the extent to which they fulfil specified requirements. Therefore, although type tests are specified for all requirements, they fall into three categories.

1. Calculation in accordance with established method (e.g. structural performance).
2. Evaluation of a particular material or design element (e.g. slip/skid or sealing).
3. Measurement (e.g. design dimensions).

Some requirements (e.g. design dimensions) are absolute, in that every product needs to conform to the specified requirement.

1 Scope

This British Standard specifies requirements for access cover systems manufactured from steel or aluminium and with a clear opening greater than 1 m for installations within areas subject to pedestrian and/or slow moving vehicular traffic, for use as covers over chambers and ducts.

NOTE For clear openings up to 1 m, BS EN 124 applies.

This standard establishes definitions; materials; design; structural performance; technical documentation; installation and operating guidance notes; warning notes; testing requirements; verification and marking of such access cover systems.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS EN 1991, *Eurocode 1: Actions on structures*

BS EN 1993, *Eurocode 3: Design of steel structures*

BS EN 1999, *Eurocode 9: Design of aluminium structures*

BS EN 287-1, *Qualification test of welders – Fusion welding – Part 1: Steels*

BS EN 287-2, *Approval testing of welders for fusion welding – Part 2: Aluminium and its alloys*

BS EN 571-1, *Non-destructive testing – Penetrant testing – Part 1: General principles*

BS EN 1386, *Aluminium and aluminium alloys – Tread plate – Specifications*

BS EN 1418, *Welding personnel. Approval testing of welding operators for fusion welding and resistance weld setters for fully mechanized and automatic welding of metallic materials*

BS EN 10025, *Hot rolled products of structural steels*

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BS EN 10056, *Specification for structural steel equal and unequal angles*

BS EN 10088, *Stainless steels*

BS EN 10130, *Cold-rolled low-carbon steel flat products for cold forming – Technical delivery conditions*

BS EN 10210-1, *Hot finished structural hollow sections of non-alloy and fine grain steels – Part 1: Technical delivery conditions*

BS EN 10219-1, *Cold formed welded structural hollow sections of non-alloy and fine grain steels – Part 1: Technical delivery conditions*

BS EN 13036-4, *Road and airfield surface characteristics – Test methods – Part 4: Method for measurement of slip/skid resistance of a surface – The pendulum test*

BS EN ISO 1461, *Hot dip galvanized coatings on fabricated iron and steel articles – Specifications and test methods*

BS EN ISO 14554, *Quality requirements for welding – Resistance welding of metallic materials*

BS EN ISO 15609, *Specification and qualification of welding procedures for metallic materials – Welding procedure specification*

DD ENV 12633, *Method of determination of unpolished and polished slip/skid resistance value*

3 Terms and definitions

For the purpose of this standard, the following terms and definitions apply.

3.1 access cover
single plate capable of being removed from a frame, or hinged to a frame, allowing access to an underground chamber

3.2 frame
fixed part of the access cover system that houses the cover

3.3 access cover system
assembly of removable or hinged access cover elements supported by a removable structural frame allowing clear access to a chamber or similar

3.4 access cover element
constituent part of the access cover system which may include all or any of the following: the frame, the removable cover, the removable support beams, the support pockets, the hinged cover, the lift assist mechanism, the seals and the locks

3.5 safety grid
protective frame below an access cover or access cover element which allows visual inspection of the chamber but provides protection against falls of persons or materials

3.6 clearance
the gap between two adjacent access covers

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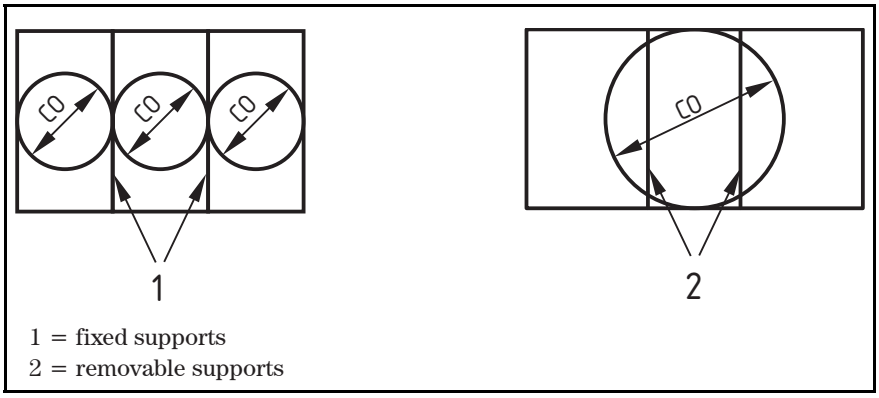
3.7 clear opening (CO)

the diameter of the largest circle that can be inscribed within the clear area of the frame

NOTE The clear opening is shown in Figure 1.

Figure 1 **Clear opening**



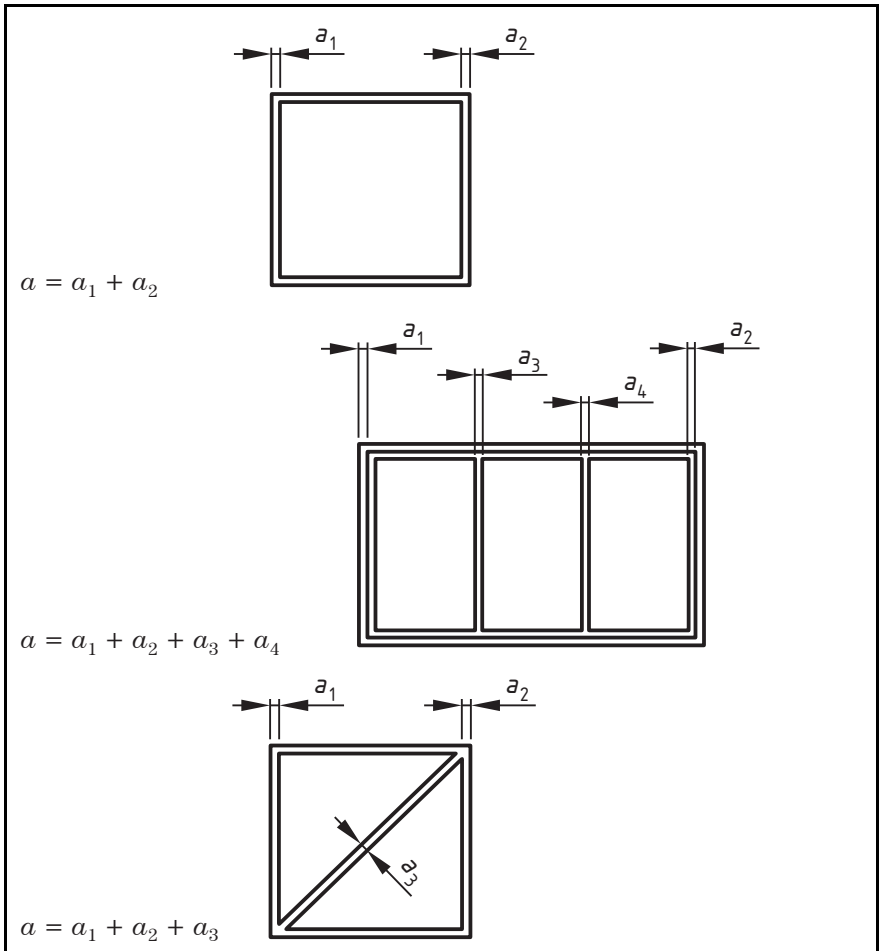
1 = fixed supports
2 = removable supports

3.8 total clearance

the sum of the maximum individual clearances between adjacent elements of the frame and access covers in any one direction

NOTE The total clearance is shown in Figure 2.

Figure 2 **Total clearance**



Key

a = total clearance where a_1, a_2, a_3, a_4, etc., are the individual clearances

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3.9 span
distance between centres of adjacent supports

3.10 airtight cover
access cover system capable of preventing the passage of odours at normal atmospheric pressure

3.11 watertight cover
access cover system capable of preventing the ingress of water

3.12 pressure tight cover (hydraulic surcharge)
access cover system capable of resisting hydraulic pressure from within the chamber

3.13 normal conditions
wet, rarely dry conditions and a slightly aggressive chemical environment, i.e. normal conditions for domestic sewage and treated industrial effluent, and for most natural soils and groundwater

NOTE A "wet, rarely dry" condition for concrete surfaces subject to long term water contact and a "slightly aggressive chemical environment" are defined in EN 206-1 as classes XC2 and XA1 respectively. More severe environments are also defined. If more severe conditions are expected, additional requirements for corrosion protection may be necessary, see Annex A.

3.14 debris gasket
integral element within the cover assembly to prevent or limit the ingress of detritus that may otherwise prevent the operation of the cover

3.15 PSRV
polished slip resistance value

NOTE This value is also used in relation to skid resistance.

3.16 USRV
unpolished slip resistance value

NOTE This value is also used in relation to skid resistance.

3.17 macrotextured surface
area of an access cover system with a distinct raised pattern or studding, which is produced by casting, rolling or machining the face of the area

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4 Materials

4.1 General

Access cover systems shall be suitable for use in normal conditions.

NOTE 1 If covers are to be used in more aggressive/severe conditions, additional requirements for corrosion protection may be necessary.

NOTE 2 If sealed covers are to be used in more aggressive/severe conditions, special requirements for the durability of the seal may be necessary.

Access covers, frames and all structural elements shall be made from any of the following materials:

a) aluminium conforming to **4.2**;

b) mild steel conforming to **4.3**;

c) stainless steel conforming to **4.4**.

Operating systems for lift assistance and security locks may be made from additional materials; however, such materials shall have durability and corrosion properties compatible with those of the access cover and frame.

4.2 Aluminium alloy access cover systems

Aluminium access cover systems for use in normal conditions shall be fabricated from aluminium EN-AW 5052 or marine grade aluminium grade 5086-H34 and 6063-T5, 6063-T6 conforming to BS EN 1386 (see Annex A).

Where aluminium access cover systems are to be used in contact with other metals or cementitious materials, corrosion protection shall be applied to the aluminium surface (see **4.6.4**).

NOTE See BS 8118 for aluminium in contact with concrete.

4.3 Mild steel access cover systems

Mild steel access cover systems shall be fabricated from steel conforming to BS EN 10025, BS EN 10210-1, BS EN 10219-1, BS EN 10130 or BS EN 10056.

Mild steel access cover systems shall be made resistant to corrosion in accordance with **4.6**, unless specified otherwise by the purchaser (see Annex A).

4.4 Stainless steel access cover systems

Stainless steel access cover systems shall be fabricated from austenitic stainless steel grades 1.4301 or 1.4401, conforming to BS EN 10088.

If the stainless steel surface is given a decorative finish the treatment shall not be detrimental to the corrosion or slip resistance of the stainless steel.

NOTE For normal conditions no surface corrosion protection system is required for stainless steel. Post fabrication finishing processes are permitted, providing they do not provoke corrosion.

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4.5 Dissimilar metals in combination with each other

Where the use of dissimilar metals in combination with each other could affect the corrosion or structural performance of an access cover system, a durable isolating medium shall be used to prevent contact of the dissimilar metals.

4.6 Corrosion protection

4.6.1 General

Corrosion protection, where specified (see Annex A), shall apply to all access cover systems.

NOTE Additional coatings may be applied for aesthetic purposes. Such coatings can give a degree of corrosion protection.

4.6.2 Hot dip galvanizing (mild steel)

Corrosion resistance of mild steel shall be achieved by hot dip galvanizing in accordance with BS EN ISO 1461. All sharp edges resulting from galvanizing shall be removed.

After the hot dip galvanizing process it might be necessary to straighten the cover or frame, to overcome any distortion induced during the galvanizing process. This straightening process shall not affect the integrity of the coating or the structural stability of the cover.

4.6.3 Weld protection of stainless steel

Corrosion resistance of welds in stainless steel shall be achieved by a passivation process.

Prior to passivation all parts shall be inspected for the presence of contaminants such as grease, oil, lubricants, forming compound, cutting fluids, wax markings as well as metallic residue and other contaminants which would affect the passivation process. Such contaminates shall be removed before passivation.

NOTE Passivation is the spontaneous formation of a hard non-reactive surface film that inhibits further corrosion. This layer is usually an oxide or nitride that is a few atoms thick.

The passivation process comprises the total immersion of the component(s) in NaOH and citric acid followed by immersion in nitric acid (up to 20% at 49 °C) and finally followed by a water rinse. This process will restore the film, remove metal particles, dirt, and welding generated compounds (ex. oxides).

4.6.4 Aluminium in contact with cementitious materials

Aluminium in contact with cementitious materials shall be protected against corrosion by the application of a barrier coating.

NOTE See BS 8118-1 and BS 8118-2 for more information.

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5 Design

5.1 Clear opening

The clear opening of each access cover system shall be declared in millimetres (see Annex A).

5.2 Span

The maximum span of each access cover system shall be declared in millimetres.

5.3 Clearances

The maximum clearances between adjacent covers and each cover and the frame shall be as follows.

a) For an access cover system comprising one or two covers, the total clearance shall be equal to or less than 9 mm.

b) For an access cover system comprising of three or more covers each of which is secured to the frame, the clearance between adjacent covers and each cover and frame shall be equal to or less than 5 mm.

c) For an access cover system comprising of three or more covers not secured to the frame, a secured cover or design feature shall be provided at a suitable position to prevent the total clearance from exceeding 16 mm at any location within the frame boundary.

d) For a hinged access cover system the clearance on the hinged side between the cover and frame shall be equal to or less than 16mm.

5.4 Hinged access cover systems

In a hinged access cover system the hinges shall be fixed to the frame and the cover using either a mechanical fastener or welding techniques.

The hinge mechanism shall not protrude above the top surface of the access cover.

Where the hinge has a structural function, the hinge and its fixing shall be designed in accordance with Clause **6**.

NOTE 1 Proprietary mechanisms may be used to hinge the cover to the frame.

NOTE 2 The purchaser may specify that hinges are not visible from the top of the cover (see Annex A).

5.5 Seatings

5.5.1 Seating faces

The seating faces of the cover to frame shall be designed to ensure stability and quietness in use. When the cover is in the closed position the gap between the seating faces shall not exceed 2 mm.

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5.5.2 Gaskets

If a gasket is incorporated in the design of an access cover system it shall not perform a load-bearing function.

5.6 Lifting and staying of covers

5.6.1 Lifting by operatives

An access cover system shall be designed such that the maximum force to be exerted by any individual operative in opening the cover shall not exceed 25 kg at any point of the opening sequence.

5.6.2 Lift assistance

Hinged cover(s) shall be fitted with a means of lift assistance such as springs, gas struts or motors that enable a safe, reliable, and counterbalanced operation.

Hinged covers shall not spring open erratically when any catch is released and shall be prevented from slamming shut during any closure operation.

Reference shall be made to the means of cover lift assistance in the installation guidance notes in accordance with Annex C.

The location of the means of lift assistance shall ensure minimal obstruction to the area of the opening.

NOTE For certain applications there might be restrictions in the use of oil-filled struts (see Annex A).

5.6.3 Stays

Hinged cover(s) shall be fitted with a positive stay mechanism to prevent the unintentional closure of the cover and keep it stable whilst in the open position.

The positive stay mechanism shall engage automatically when the cover is opened to 95° or more, unless specified otherwise by the purchaser.

The positive stay mechanism shall be capable of resisting a minimum horizontal force of 250 kg applied to the centre of the uppermost edge of the cover in either direction.

Where appropriate the positive stay mechanism shall be capable of resisting a wind load on the open cover in accordance with BS EN 1991.

The positive stay mechanism shall be fitted with a release device to permit safe closure of the cover by an operator.

The operation of the positive stay mechanism and its release device shall not be affected by temperature variations at the place of intended use.

5.6.4 Security of infill

For an infilled access cover system any infill material shall be securely fixed to the cover such that it does not become dislodged when the cover is in the open position. Where a cover is designed to be infilled by others (see Annex A), adequate provision shall be made to allow secure fixing of the infill to the tray.

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5.6.5 Temporary installation clamp and notice

Where a cover is designed to be infilled by others (see Annex A) and the lifting mechanism is pre-calibrated to ensure a counterbalanced operation of the access cover system following installation of the infill, a means of clamping the cover to the frame shall be provided for use during the installation process.

Danger notices warning of a potential explosive opening of the unfilled cover shall be securely fixed to the access cover system.

5.7 Vertical alignment

5.7.1 Trip hazard

The alignment of the cover to the frame shall be such as to minimize any trip hazard. Any vertical step between the edge of the cover and the frame shall not exceed 3 mm.

NOTE The fabrication of larger covers can introduce distortion during the welding process.

5.7.2 Flatness of cover surface

The upper surface of each cover and frame shall be flat within a tolerance of 1% of the diagonal of a rectangular cover or 1% of the diameter of a circular cover. The surface of the cover shall not be concave.

5.8 Slip/skid resistance

The upper surface of each cover shall have been tested in accordance with Annex B to verify its ability to resist slipping or skidding. Each product shall be accompanied with technical documentation that declares the polished slip resistance value (PSRV) in accordance with the test in Annex B. The PSRV shall be greater than 40.

NOTE 1 For covers to be used in highways or other vehicular trafficked locations a higher PSRV may be required (See Annex A)

NOTE 2 Guidance on the relationship between the risk of slipping and the PSRV is given in Table 1.

Table 1 **Polished Slip/skid Resistance Values**

Classification (risk of slipping by an able bodied person) of cover	**Polished Slip/skid Resistance Value 4'S' Slider (PSRV)**
High	< 25
Moderate	25 – 35
Low	35 – 65
Extremely low	> 65

5.9 Sealing and drainage of access cover systems

5.9.1 Watertight access cover systems

A watertight access cover system shall be capable of resisting 100 mm head of water above the upper surface of the cover when tested in accordance with the Water Ingress Test in **7.10.2**. Water loss from the underside of the cover shall not exceed 5 ml/m of seal in 24 hr.

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5.9.2 Airtight access cover systems

An airtight access cover system shall be capable of resisting an air pressure of +10 mb gauge (+100 mm water gauge) from below the cover when tested in accordance with the Air Tightness Test in **7.10.3**. The air pressure below the access cover system shall not drop by more than 0.1 mb/m of seal (1 mm water gauge/m of seal) in 15 min.

5.9.3 Pressure tight access cover systems (hydrostatic surcharge)

A pressure tight access cover system shall be capable of resisting the internal hydrostatic pressure specified by the purchaser, with its covers remaining fixed in the frame when subject to such pressure.

Fixing anchors shall be attached to the frame to permit adequate fixing of the frame to the chamber structure to resist the pressure specified by the purchaser when installed.

NOTE Access cover systems designed to resist hydrostatic surcharge may be subject to low volume leakage. If the purchaser requires the cover and frame to be watertight it should be specified at the time of purchase, see Annex A.

5.9.4 Drainage of frames

Where an access cover system is intended for use at a location where it could get wet, the frame shall be designed to facilitate the flow of any water that accumulates within it to a dedicated drainage point. Where such water cannot be drained into the chamber, a suitable coupling shall be fitted to the outside of the frame to permit the fixing of external pipework. In the instances where such water is required to drain into the chamber, a dedicated non-return valve shall be fitted to prevent odours escaping through the drain.

All joints of the frame shall be fully welded to prevent the escape of water.

NOTE The position of the drain is dependent upon the application, see Annex A.

5.9.5 Debris gasket

Where a debris gasket is specified by the purchaser (see Annex A) it shall be capable of preventing particulate matter entering the gap between the cover and the frame. The gasket shall be made of a material which is appropriate to its condition of use.

5.10 Access security

The level of protection for access security shall be specified by the purchaser (see Annex A).

If tamper-proof latches are specified by the purchaser, the latches shall not be capable of being opened by objects readily accessible to children.

NOTE 1 The level of protection required for access security varies depending upon whether it is intended for child safety or to resist malicious intent.

NOTE 2 Guidance to purchasers on the level of protection and appropriate testing is given in LPS 1175 published by the Loss Prevention and Certification Board (LPCB).

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5.11 Welding

The specification and qualification of welding procedures for covers shall conform to BS EN ISO 15609.

The fabrication of fusion welded component parts of an access cover system shall be undertaken by a welder approved by the procedures in BS EN 287-1 for steel systems, and in BS EN 287-2 for aluminium alloy systems.

The fabrication of resistance welded metallic components shall conform to the quality requirements of BS EN ISO 14554.

The approval testing of welding operators for fusion welding and of resistance weld setters for fully mechanized and automatic welding of metallic materials shall conform to BS EN 1418.

Welds shall be tested to BS EN 571-1.

5.12 Safety grids

A safety grid to protect an operative against falling shall be incorporated within the opening area, unless otherwise specified by the purchaser.

The safety grid shall have the facility to be removed and/or hinged to allow access to the chamber. Where the grid is removable it shall not be possible to replace the cover without first replacing the grid.

If a safety grid is supplied as a separate component intended for site assembly, a warning note shall be attached to each safety grid in accordance with Annex C.

The safety grid shall be capable of withstanding a 140 kg (± 1 kg) mass applied over an area of 300 mm × 200 mm (± 1 mm) and dropped from a height of 2 m (± 10 mm) onto any point on the grid.

Where the safety grid is of a hinged design, the maximum force to be exerted by any individual operative to open it shall not exceed 25 kgF. The safety grid shall not permit a 100 mm (± 1 mm) diameter sphere through any aperture.

If no safety grid is incorporated in the access cover system then the warning “No Safety Grid” shall be marked on the surface of each cover in accordance with Clause **8**.

5.13 Frame fixings

A means of fixing the frame to the chamber shall be provided. The frame shall be capable of withstanding a horizontal load of 250 kg acting at any point on the frame when fixed to the chamber.

Where it is necessary to facilitate structural fixing of the frame to the chamber, the manufacturer shall make adequate provision for this in the design of the frame. The design of structural fixings shall take account of the internal stresses and the external loads imposed upon the fixings: for example, torsional stresses induced by lifting mechanisms, wind loads from open covers, vehicular braking or acceleration, etc., as well as the structural nature of the chamber below.

Access cover systems shall be supplied with installation instructions and guidance notes in accordance with Annex C.

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5.14 Cover lifting points (keyways)

A non-hinged cover shall be designed to be lifted with a mechanical aid.

Suitable lifting points situated on the upper surface of the cover shall be provided. The position of the lifting points shall be such that they enable a balanced lift when the cover is removed. There shall be at least two lifting points per cover. Each of the lifting points shall be capable of withstanding the pull force when lifting the cover.

The minimum design lifting force per lifting point shall be 250 kg in the vertical plane or half the mass of the cover and frame, whichever is the greater.

5.15 Installation lifting points

Suitable installation lifting points, evenly distributed such that they enable a balanced lift when the cover and frame are installed, shall be provided. Such lifting points shall be capable of withstanding 1.2 times the mass of the access cover system and shall ensure that there is no structural detriment throughout the lifting sequence. Assembly and installation instructions shall be provided in accordance with Annex C.

5.16 Structural beam support pockets

Structural beam support pockets, if supplied, shall, wherever possible, be fixed to the access cover frame. Where structural support pockets are provided as separate components to the access cover frame and are not ultimately intended to be fixed to it, the manufacturer shall attach a warning note to each structural support in accordance with Annex C.

6 Structural performance

6.1 Structural design of access cover systems

The structural design of each access cover system shall be in accordance with BS EN 1993 for a steel system and BS EN 1999 for an aluminium system.

6.2 Loads on covers

The design loading for an access cover system (see Annex A) shall be in accordance with BS EN 1991 and shall take account of any loads induced by the operation of the access cover system, e.g. cover lift assistance systems can generate torsional loads.

6.3 Deflection under load

The deflection of any element of an access cover system under the action of the external applied load shall not exceed 1/150 of the span.

NOTE Deflection may need to be further restricted to avoid the cracking of finishes applied to infilled covers.

6.4 Fixing of structural supports

Guidance notes on the installation and fixing of structural supports shall be provided to the purchaser for use by the installer, in accordance with Annex C.

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7 Verification

7.1 General

Type tests shall be performed to show conformity with this British Standard. It is permissible for tests previously performed in accordance with the provisions of this standard (same product, same characteristic(s), material, test method, etc.) to be taken into account. In addition, type tests shall be performed at the beginning of the production of a new access cover system or at the beginning of a new method of production where this might affect the specified characteristics.

All products shall be visually inspected for defects which would impair the product's fitness for use.

7.2 Clear opening

The clear opening, in accordance with **5.1,** shall be verified by measurement to an accuracy of ± 1 mm and recorded by the manufacturer's documentation.

7.3 Span

The span, in accordance with **5.2,** shall be verified by measurement to an accuracy of ± 1 mm and recorded by the manufacturer's documentation.

7.4 Total clearance

The total clearance, in accordance with **5.3**, shall be verified by measurement to an accuracy of ± 1 mm.

7.5 Hinges

The fixing of hinges, in accordance with **5.4,** shall be verified by inspection. If the hinge has a structural function then its fixing arrangement shall be verified in accordance with Clause **6**.

7.6 Seatings

The gap between the seating and faces, in accordance with **5.5**, shall be verified by the insertion of a feeler gauge.

7.7 Lifting of hinged covers

The opening angle of the cover(s) in accordance with **5.6.3** shall be measured to an accuracy of 1°.

7.8 Flatness

The flatness of the cover to frame in accordance with **5.7.2** shall be measured to an accuracy of 3 mm.

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7.9 Slip/Skid resistance

The slip/skid resistance in accordance with **5.8** shall be determined by the procedure described in Annex B.

7.10 Drainage and sealing of covers

7.10.1 General

Each seal configuration shall be type-tested to comply with the requirements of **5.9**.

7.10.2 Water ingress test

This type test shall be carried out on each configuration, or change of configuration of sealing arrangement to prevent the ingress of water.

a) Watertight access cover systems in accordance with **5.9.1** shall be tested by subjecting the system to 100 mm of water pressure for a period of 24 hr.

b) The apparatus shall be set up similar to that in Figure 3.

c) The test shall be carried out on a sample access cover and frame specially made for the purpose, with over 1 m clear opening.

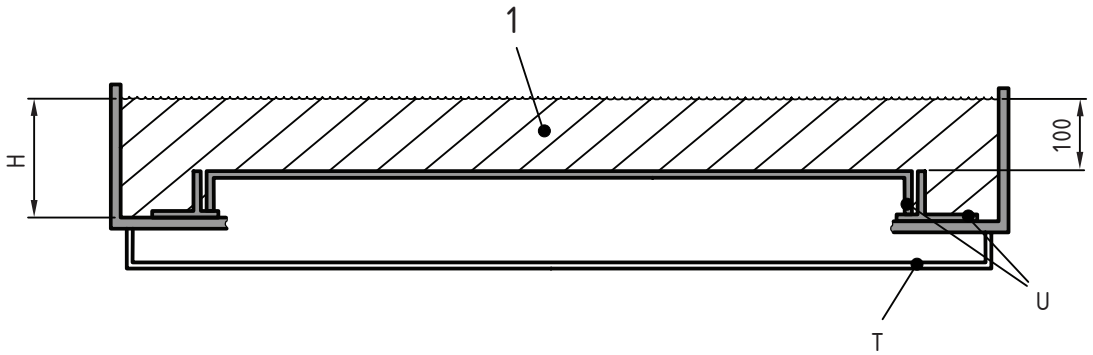
d) A fully welded water retaining collar shall be mounted and sealed on to the top of the frame.

e) The test frame shall sit flat on a surface and checked with a spirit level.

f) The cover shall be fitted in accordance with the manufacturer's instructions.

g) Water shall be filled to a level of 100 mm above the cover and left for a period of 24 hr. After that period the volume of any water which has penetrated the seal and has been collected in the drip tray shall be measured in a measuring cylinder and reported.

Figure 3 **Typical apparatus for the water ingress test**



Key
1 = Water
H = Height of frame + 100 mm
U = Cover and frame under test
T = Drip tray

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7.10.3 Air tightness test

This type test shall be carried out on each configuration, or change of configuration of sealing arrangement to maintain air tightness. Airtight access systems in accordance with **5.9.2** shall be tested by subjecting a specific sample to an air pressure of 10 mb above atmospheric pressure for three periods of 15 min duration.

a) The apparatus shall be set up similar to that in Figure 4.

b) The test shall be carried out on a sample access cover and frame specially made for the purpose, with over 1 m clear opening.

c) The frame shall be mounted and sealed onto the top of a fully welded skirt, at least 225 mm deep.

d) The water bath shall be filled with water to 20 mm below the seal under test and the cover shall be fitted in accordance with the manufacturer's instructions.

e) Air shall be injected below the access cover system and brought to a pressure of 10 mb gauge (100 mm water gauge) (± 5%) and left under pressure for 15 min (± 1 min).

f) After that period the manometer or pressure gauge shall be read and reported.

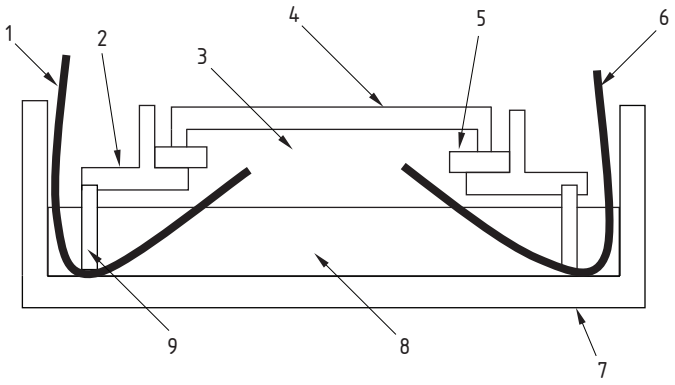
g) Release the pressure.

h) Paragraphs e), f) and g) shall be repeated after 24 hr, and repeated again after one week.

i) The assembly shall be left totally undisturbed between tests.

NOTE The uplifting (floating) force exerted on a 1 m square cover system under test will be 1 kN (approx 100 kg force) and it is therefore recommended that the total mass of the test access cover system and skirt exceeds 150 kg.

Figure 4 **Typical apparatus for air-tightness test**



Key

1 = Pipe for connection to manometer
2 = Frame
3 = Entrapped air at 10 mb
4 = Cover
5 = Airtight seal under test
6 = Air pipe and valve for pressurizing entrapped air
7 = Water bath
8 = Water 200 mm deep
9 = 225 mm skirt welded to frame

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8 Marking

Access cover systems shall be marked with the following information.

a) The identifier of this British Standard BS 9124:2008[1)].

b) The category of loaded area in accordance with BS EN 1991.

c) The resistance to hydraulic surcharge in bar (where applicable).

d) The name and/or identification mark of the manufacturer.

e) Product identification (name and/or catalogue number).

f) Each element over 25 kg shall be marked with its mass in kilograms.

g) The words "Warning: no safety grid" (where applicable).

NOTE Additional markings relating to the intended application by the user and the mark of a certification body may also be applied.

All markings of covers or frames shall be clear and permanent.

Markings a), b), c), d) and e) shall be applied either to the top or the underside of each cover. Markings f) and g) shall be applied to the top of each cover. Marking f) shall be applied to an easily visible surface of all other applicable elements.

Where possible all markings shall be stamped directly into the metal. It is permissible for alternative methods of marking such as riveting, bolting, chemical adhesives or welding to be employed. Such methods shall not represent any additional trip hazard on the surface of the access cover system.

1) Marking BS 9124:2008 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with third-party certification of conformity.

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Annex A (informative) Information to be supplied in an enquiry or order

The following particulars cover essential details required by the manufacturer so that an enquiry or order can be fully understood.

Particular	Reference
a) Conditions other than normal conditions at the place of installation	**3.13**, **4.3**
b) Material:	
• aluminium alloy	**4.2**
• mild steel	**4.3**
• stainless steel	**4.4**
c) Whether an aluminium alloy system is to be in contact with concrete at the place of installation	**4.2**
d) Whether corrosion protection is required	**4.6.1**
e) Clear opening	**5.1**
f) Whether any hinges shall be not visible from the top of the cover	**5.4**
g) Whether there is any restriction on the use of oil-filled struts	**5.6.2**
h) Whether a cover is to be infilled by others	**5.6.4**, **5.6.5**
i) Whether a minimum PSRV greater than 40 is required for covers to be used in highways or other vehicular trafficked locations	**5.8**
j) Whether the access cover system is to be provided with sealing for it to be:	
• watertight	**5.9.1**
• airtight	**5.9.2**
• pressure tight	**5.9.3**
k) Whether the place of installation may get wet	**5.9.4**
l) Whether a debris gasket is required	**5.9.5**
m) The level of protection for access security	**5.10**
n) Bespoke design loading	**6.2**

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Annex B (normative) Test to determine the USRV and PSRV of access cover systems

B.1 Principle of the test

The measurement of PSRV and USRV on a specimen shall be made using proprietary pendulum friction test equipment to evaluate the frictional properties of the specimen. The pendulum friction test equipment incorporates a spring loaded slider made of a standard rubber attached to the end of the pendulum. On swinging the pendulum, the frictional force between the slider and test surface is measured by the reduction in length of the swing using a calibrated scale.

The PSRV shall be determined by subjecting one or two locations on the surface of the access cover under test to a polishing process and then testing them with the pendulum friction test equipment. The selection of those locations shall be determined by carrying out the USRV procedure.

B.2 Apparatus

The following apparatus shall be used.

- Pendulum friction test equipment in accordance with DD ENV 12633, Annex A.
- A circular wooden disk of 50 mm diameter and minimum 12 mm thickness fitted with handle and faced with rubber of 3 mm minimum thickness.
- Air-floated or water-washed emery flour, all of which passes a 53 μm test sieve.
- De-ionized or distilled water.

B.3 Calibration of pendulum friction test equipment

The pendulum friction test equipment shall be recalibrated at least every three years. This shall be carried out by a recognized calibration laboratory in accordance with BS EN 13036-4.

B.4 Selection of test cover material

A representative sample shall be selected and tested from each surface pattern design and from each material of manufacture.

B.5 Test procedure

B.5.1 Validation and conditioning of the pendulum test equipment

The condition of the pendulum test equipment shall be validated according to the procedure for checking the state of a pendulum tester as described in DD ENV 12633, Annex B.

If the validation results are outside the range of the standard surface, the used slider shall be conditioned in accordance with DD ENV 12633, Annex A. After this conditioning, if the validation results are still outside the range of the standard surface, the apparatus shall be investigated and the results may be recalibrated.

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The pendulum test equipment shall be conditioned for a period of at least 30 minutes prior to the commencement of the test. The test equipment, test specimen and slider, shall be kept at a temperature of 20 ± 2 °C, during this time.

B.6 Stage 1 – Procedure to determine USRV

B.6.1 Preparation of sample

Surface irregularities, dust or other contaminants shall be removed from the sample under test, prior to testing.

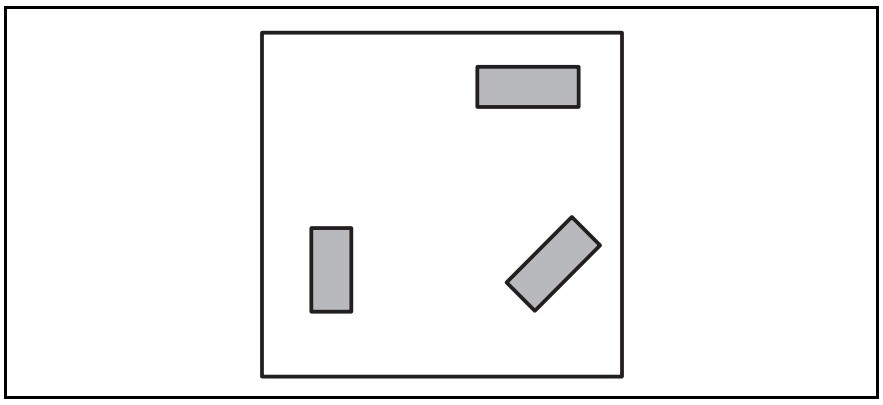
B.6.2 Location of test areas

The test shall take place within a 0.5 m × 0.5 m grid as shown in Figure B.1.

NOTE If it is clear that surface patterning varies across the test area, additional tests might be necessary to take this into account.

Testing shall be carried out at the three test locations as shown in Figure B.1, i.e. two shall be parallel to the major axes of the cover and one at an angle of 45° to the major axes.

Figure B.1 **Test locations**



B.6.3 Setting up

The setting up of the pendulum, its zeroing and method of measurement shall be undertaken as described in DD ENV 12633. In addition, the base of the pendulum tester shall be weighted with a suitable material of mass > 6 kg and < 10 kg to arrest any possible movement during testing.

B.6.4 Checking strike distance

Where the surface patterning of the cover does not enable a pendulum strike distance of 126 mm to be achieved (i.e. slider in contact with cover material at start and end of strike distance), a length of less than 126 mm may be chosen. In this case, the actual strike distance shall be recorded, and the values obtained after testing shall be modified by a correction factor. The correction factor shall be determined by reference to standard test materials. Such reference materials shall be tested using the same strike distance as on the sample and also using the standard distance of 126 mm. The correction factor shall be the ratio of the two results.

NOTE Float glass plate and 300 grit waterproof silicon carbide paper have been found to be suitable reference materials.

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B.6.5 Measuring the value of each specimen

The height of the pendulum arm shall be checked and adjusted so that in traversing the specimen, the rubber slider is in contact with it over the whole width of the slider and over the specified sweep length. The upper surfaces of the specimen and the rubber slider shall then be wetted just in front of the centre of the test location at a rate of 3 l/min applied immediately before each swing of the pendulum, being careful not to disturb the slider from its set position.

The pendulum and pointer shall then be released from the horizontal position and the pendulum arm caught on its return swing, before it touches the test specimen a second time. The position of the pointer on the scale shall be recorded. This is the pendulum test value. This operation shall be repeated five times at each of the three locations shown in Figure B.1, rewetting the specimen each time. The last three of the five readings shall be recorded for each test location.

The mean value of the last three of the five readings shall be determined for each test location according to Figure B.1. This shall be the slip/skid value for each location. The mean of the two lowest slip/skid values shall be calculated.

B.6.6 Calculation of USRV for stage 1

The mean value of the last three of the five readings shall be determined for each test location. This shall be the USRV for each location. If the difference between the highest and the lowest USRV is greater than eight units, another three positions shall be tested (making six in all), and USRV determined as described above.

NOTE The USRV of the whole sample is the mean pendulum value obtained on the three (or six) locations before polishing.

B.7 Stage 2 – procedure to determine PSRV

B.7.1 Accelerated polishing procedure

The sample shall be polished in accordance with the following procedure. If the USRV for each test location differs by no more than three units, any one single location may be selected for the polishing process. However, if individual test locations show results of > 3 units, the locations corresponding to the maximum and minimum values shall be selected.

The test area shall be wetted, dusted with the emery flour and then subjected to polishing by hand, using the rubber faced disk operated in circular movements applying slight downward pressure. Care shall be taken to ensure that the whole of the area that is swept by the slider on the pendulum friction test equipment is subjected to polishing.

For access covers with a macrotextured surface, the test area shall be re-wetted and re-dusted with emery flour after 30 s of polishing.

B.7.2 Measuring the value

After 60 ± 5 s of polishing, the emery flour shall be washed from the test area and the test procedure described in **B.6.5** shall be carried out at each of the locations that have been polished. The resulting values shall be recorded.

The procedure is repeated until three successive 60 s polishing cycles give readings within two units of each other, i.e. an equilibrium state of polish is obtained.

B.8 Calculation and reporting of the PSRV results

The mean value of the last three of the five readings shall be determined for each polished test location. This shall be the PSRV for each location, measured to the nearest one unit on the scale. The PSRV for the access cover shall be the mean of the values from the individual test areas, and shall be recorded and reported as such.

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Annex C (normative) Guidance notes and warning notes for the installation and operation of access cover systems

C.1 General

Printed guidance notes illustrating the produc's installation or operational preclusions, other characteristics of product operation and any maintenance requirements shall be supplied to the purchaser of the access cover system for use by the installer and operator.

C.2 Structural support pockets

C.2.1 Structural beam support pockets, if supplied, are fixed to the access cover frame wherever possible in order to ensure structural integrity by reducing the likelihood of incorrect support pocket installation.

Where structural support pockets are provided as separate components to the access cover frame and are not ultimately intended to be fixed to it, the manufacturer shall attach a warning note to each structural support pocket indicating that it should be fixed to a structure capable of withstanding the design load of the cover.

C.2.2 The warning note shall specifically exclude the installation of structural supports by bolting them into mortar joints, unless the integrity of such structural support systems has been previously and clearly established as being suitable for the intended loads.

The warning note shall also contain the following notice: "When assessing the suitability of fixing separate structural support pockets, it is important that consideration is given to the likely deflection of the access cover system. Any deflection might change the intended stress (in the fixing) from shear to tensile, thus providing a tendency to pull the fixing from its installed location."

C.2.3 Whichever installation method is adopted, the manufacturer shall provide the installer with appropriate installation guidance notes for each separate type of fixing arrangement supplied.

C.3 Fixing of access cover systems with cover lift assistance

Where a hinged access cover contains lift assistance or other mechanisms that are likely to impart significant torsional stresses in the frame and hence potential torsional distortion of the installed product, suitable provisions will have been be made in the frame fixing arrangements for such an eventuality. Reference shall therefore be made to these arrangements in the installation guidance notes provided with the product.

Suitable advance notice and/or installation guidance shall be provided by the manufacturer of the access cover system of any fixing design requiring special construction arrangements, e.g. support recesses in the chamber, etc.

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C.4 Site assembly and operation of safety grids

If safety grids are supplied as one or more separate components intended for site assembly, a warning note shall be attached to each safety grid indicating its intended fitting arrangement. In these circumstances, the access cover installation guidance notes shall also give guidance on the intended fitting arrangements and operation of the safety grid.

*NOTE Each access cover system has to be supplied with a safety grid unless specifically instructed otherwise by the purchaser (see **5.12**).*

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Bibliography

Standards publications

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 8118, *Structural use of aluminium*

BS EN 124, *Gully tops and manhole tops for vehicular and pedestrian areas – Design requirements, type testing, marking, quality control*

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