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SPECIFICATION FOR

CAST MANHOLE COVERS, ROAD GULLY GRATINGS AND FRAMES

FOR DRAINAGE PURPOSES

BRITISH STANDARD INSTITUTION

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SPECIFICATION FOR

CAST MANHOLE COVERS, ROAD GULLY GRATINGS AND FRAMES

FOR DRAINAGE PURPOSES

BS 497 : 1967

Price 20/- net

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* Tables of approximate metric equivalents are also provided.

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THIS BRITISH STANDARD, having been approved by the Hardware and Ironmongery Industry Standards Committee and endorsed by the Chairman of the Building Divisional Council, was published under the authority of the General Council on 31st May, 1967.

First published, July, 1933.
First revision, December, 1945.
Second revision, July, 1952.
Third revision, May, 1967.

The Institution desires to call attention to the fact that this British Standard does not purport to include all the necessary provisions of a contract.

In order to keep abreast of progress in the industries concerned, British Standards are subject to periodical review. Suggestions for improvements will be recorded and in due course brought to the notice of the committees charged with the revision of the standards to which they refer.

A complete list of British Standards, numbering over 4000, fully indexed and with a note of the contents of each, will be found in the British Standards Yearbook, price 15s. The BS Yearbook may be consulted in many public libraries and similar institutions.

This standard makes reference to the following British Standards:

BS 592. Carbon steel castings for general engineering purposes.
BS 907. Dial gauges for linear measurement.
BS 916. Black bolts, screws and nuts.
BS 1452. Grey iron castings.
BS 1610. Methods for the load verification of testing machines.
BS 3100. Steel castings for general engineering purposes.

British Standards are revised, when necessary, by the issue either of amendment slips or of revised editions. It is important that users of British Standards should ascertain that they are in possession of the latest amendments or edition.

The following BSI references relate to the work on this standard:
Committee reference HIB/16 Draft for comment D65/7940

CO-OPERATING ORGANIZATIONS

The Hardware and Ironmongery Industry Standard Committee, under whose supervision this British Standard was prepared, consists of representatives of the following Government departments and scientific and industrial organizations:

Aluminium Federation
*British Ironfounders' Association
British Lock and Latch Manufacturers' Association
British Plastics Federation
*British Waterworks Association
Copper Development Association
*Greater London Council
Guild of Architectural Ironmongers
*Institution of Municipal Engineers
Metal Window Association
Metropolitan Police
*Ministry of Public Building and Works
*Ministry of Technology—Building Research Station
National Brassfoundry Association
*National Federation of Builders' and Plumbers' Merchants
National Federation of Building Trades Employers
National Federation of Ironmongers
*Royal Institute of British Architects
The Royal Institution of Chartered Surveyors
Zinc Development Association

The Government departments and scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

Association of London Borough Engineers and Surveyors
Association of Public Health Inspectors
British Mechanical Engineering Federation
British Steel Founders' Association
British Valve Manufacturers' Association
County Surveyors Society
Electricity Council, the Generating Board and the Area Boards in England and Wales
Gas Council
Institute of Works and Highways Superintendents
Institution of Civil Engineers
Institution of Gas Engineers
Ministry of Transport
Ministry of Transport—Road Research Laboratory
National and Midland Ironfounders' Association
Post Office
Water Companies' Association
Individual manufacturers

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BRITISH STANDARD SPECIFICATION FOR

CAST MANHOLE COVERS, ROAD GULLY GRATINGS AND FRAMES, FOR DRAINAGE PURPOSES

FOREWORD

This British Standard for cast manhole covers, road gully gratings and frames was first issued in 1933 and revised in 1945 and 1952. As a result of experience gained through the application of the standard over a further period of years certain modifications have been incorporated in the present revised issue.

In this revision the loading test requirements have been amended. The Committee responsible for the preparation of the [illegible]ion accepted the fact that manufacturers only tested representative samp[illegible] the manhole covers and gratings produced and have introduced a clause for sampling a consignment for testing purposes. A new clause to cover testing procedure has also been inserted and an appendix, giving details of the testing procedure to be adopted, has been added. The clause covering grading has also been amended to provide classes related to ' approximate wheel loads ' and the method of listing ' types ' has been simplified. To avoid ambiguity, gully gratings Grades A and B have been re-classified as Grades D and E. The old Grade C kerb type gully cover and frame design has been modified and strengthened to withstand a standard duty (Grade E) loading.

Other changes have also been introduced, e.g.

(1) The deletion of the lamphole cover and frame.

See Amdt. No. 2.

(2) A new Grade ' A ' 27 in (~~626~~ 685 mm) ventilating double triangular manhole cover.

(3) The re-introduction of the heavy duty cast steel gully grating.

(4) Improved designs of the gully gratings, gully covers and frames in Grade E (see above).

(5) A new design for light duty recessed covers and frames.

(6) The introduction of a system of identification numbers.

(7) A number of dimensional revisions.

NOTE 1. In place of the customary but incorrect use of the pound as a unit for force, the unit called the pound-force (abbreviation lbf) has been used in this standard. It is the force which, when acting on a body of mass one pound, gives it an acceleration equal to that of standard gravity.

NOTE 2. The figures in British units are to be regarded as the standard. The metric conversions are approximate. More accurate conversions should be based on the tables in BS 350, ' Conversion factors and tables '.

SPECIFICATION

1. GENERAL

1.1 Scope

This British Standard specifies requirements for:

(1) Cast iron manhole covers, inspection covers and frames.

(2) Cast iron and cast steel road gully gratings, and cast iron gully covers and frames.

The standard is divided into four sections, as follows:

Section 1 specifies general requirements applicable to the articles covered in Sections 2 and 3.

Section 2 deals with cast iron manhole covers, inspection covers and frames.

Section 3 deals with road gully gratings, covers and frames.

Section 4 contains figures and tables of dimensions and includes details of keyholes and keys.

1.2 Materials

1.2.1 *Cast iron units.* The metal used for the manufacture of castings included in this specification shall be suitable for the method of manufacture and shall be of a quality not less suitable than that specified in BS 1452, Grade 10*.

1.2.2 *Cast steel (heavy duty) gully grating units* shall be manufactured in Grade A quality as specified in BS 592†.

1.2.3 *Bolts for Grade A double triangular covers and Grade D grating* shall be mild steel, suitably protected against corrosion‡. Bolts shall be hexagon headed, complying with BS 916§, ¾ inch in diameter, of suitable length, each complete with a hexagon nut. They shall be threaded only part way to prevent undue tightening of the components.

1.3 Manufacture and workmanship

All covers, gratings and frames shall be cleanly cast and shall be free from airholes, sand holes, cold shuts and chill. They shall be neatly dressed and carefully fettled. All castings shall be free from voids, whether due to shrinkage, gas inclusions or other causes.

* BS 1452, ' Grey iron castings '.
† BS 592, ' Carbon steel castings for general engineering purposes '. (Included in BS 3100, ' Steel castings for general engineering purposes '.)
‡ If specified by the purchaser, non-ferrous bolts shall be supplied.
§ BS 916, ' Black bolts, screws and nuts '.

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1.4 Dimensions

The dimensions of the various types of cover, grating and frame shall conform to those specified in Figs. 1–14, as appropriate. The amount of draw in pattern may slightly affect the measurements given. A choice of sizes is included in some of the tables.

Covers shall have a raised chequer design on the top surface to provide an adequate non-slip grip. This design may include lettering to indicate the owner and/or the manufacturer. The lettering shall be of a size that will assist in forming a non-slip surface.

Where a chequer pattern is shown in the drawings accompanying the tables in this standard it shall not be regarded as specifying a particular design.

Where the drawings indicate non-ventilating types of cover and where ventilating types of cover are ordered the covers shall be strengthened sufficiently to ensure that they are capable of passing the appropriate loading test.

1.5 Weights of units

The weights of the cast units shall be as given in Appendix B, with a tolerance of ± 5 per cent.

1.6 Protective coating

All cast units, unless otherwise ordered, shall be supplied coated with a tar or bitumen based composition.

The coating shall be smooth and tenacious, shall not flow or chip when exposed to temperatures of between 32°F (0°C) and 145°F (62·8°C).

1.7 Sampling for loading test compliance and cost of tests

The manufacturer shall test sample units by the method and to the requirement specified in 1.8 for test loading at the rate of one article in every 50 of each type and size manufactured. In the event of any one of the articles in the batch of 50 tested failing to meet the requirements of this standard, the articles in the batch shall be deemed not to comply with the requirements of the standard unless individually tested. The manufacturer shall keep records of the results of all tests and shall make these available to the purchaser on request.

If the purchaser requires additional tests to be carried out this shall be stated in his enquiry and order. The manufacturer shall provide every facility for the purchaser to select such samples as he may require from a consignment prior to delivery and the tests shall be carried out in the presence of the manufacturer and the purchaser, or his representative, if he so desires.

The cost of each additional test unless otherwise specified shall be borne:

(1) by the purchaser in the event of the result meeting the requirements of this standard;

(2) by the manufacturer in the event of the result not meeting the requirements of this standard.

1.8 Loading test

Manhole covers and road gully gratings shall be deemed to comply with the loading test requirements of this standard if, when tested in accordance with the procedures described in Appendix A, the following requirements are satisfied:

(1) *Cast iron units* sustain the specified load (see Section 3) for a period of 30 seconds without fracture,

(2) *Cast steel units* do not show a permanent set greater than 0·05 in, after removal of the test loads.

Recessed covers shall be tested before filling with concrete.

1.9 Inspection

The manufacturer shall afford all reasonable facilities for carrying out inspection during the course of manufacture. Should the purchaser desire to witness the tests specified in 1.8, he shall inform the manufacturer accordingly and the latter shall give reasonable notice of the date or dates on which the tests will be carried out. The purchaser shall, if he so desires, be enabled to carry out inspection on covers, gratings and frames prior to the application of any coating.

1.10 Certificate

The purchaser shall, on request, be supplied with a certificate in respect of each delivery certifying that the articles comply with the requirements of this specification.

1.11 Marking

All covers, gratings and frames shall have clearly cast thereon the number of this British Standard, and the appropriate grade, e.g. ' BS 497, Grade A ', and such other markings as may be agreed between the manufacturer and the purchaser.

NOTE. The mark BS 497 on or in relation to the product is a claim by the manufacturer that it complies with the requirements of the standard.

The British Standards Institution is the owner of the registered certification trade mark shown below. This mark can be used only by manufacturers licensed under the certification mark scheme operated by the BSI. The presence of this mark on or in relation to a product is an assurance that the goods have been produced to comply with the requirements of the British Standard under a system of supervision, control and testing operated during manufacture and including periodical inspection at the manufacturer's works in accordance with the certification mark scheme of the BSI.

Further particulars of the terms of licence may be obtained from the Director, British Standards Institution, 2 Park Street, London, W.1.

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2. MANHOLE COVERS AND FRAMES

2.1 Grades

British Standard manhole covers and frames shall be graded as follows:

Grade A. Heavy duty covers, for use in carriageways and capable of bearing wheel loads up to 11¼ tons (11·43 tonnes).

Grade B. Medium duty covers for use where heavy commercial vehicles would be exceptional (e.g. in domestic accesses, verges, footways and cycle tracks).

Grade C. Light duty inspection covers in situations inaccessible to wheeled vehicles.

2.2 Types

British Standard manhole covers and frames shall be of the following types:

Grade A. Double triangular as shown in Figs. 1 and 3.
Single triangular as shown in Fig. 2.

Grade B. Circular as shown in Fig. 4.
Rectangular as shown in Fig. 5.

Grade C. Rectangular and square as shown in Figs. 6 to 9.

2.3 Test loads

The loads and the diameters of the bearing blocks for the purpose of the test specified in 1.8 shall be as shown in Table A:

TABLE A. TEST LOADS FOR MANHOLE COVERS

Grade of cover (in cast iron)	Test load		Diameter of block	
	tonf	tonnef	in	mm
Grade A	35	35·56	12	304·8
Grade B	5	5·08	4	101·6
Grade C	1	1·016	12	304·8

3. ROAD GULLY GRATINGS, COVERS AND FRAMES

3.1 Grades

British Standard road gully gratings, covers and frames shall be graded as follows:

Grade D. Heavy duty gully gratings and frames for use in carriageways and capable of bearing wheel loads up to 11¼ ton (11·43 tonnes).

Grade E. (1) Medium duty gully gratings and frames for use in roads carrying only normal commercial vehicles (14 ton (14·22 tonnes) gross weight).

(2) Kerb type gully covers and frames.

3.2 Types

British Standard road gully gratings, covers and frames shall be of the following types:

Grade D. Double triangular as shown in Figs. 10 and 11.

Grade E. (1) Straight-bar for level roads and for gradients under 1 in 50, as shown in Fig. 12.

(2) Storm-bar for roads having gradients 1 in 50 and steeper, as shown in Fig. 13.

(3) Kerb type as shown in Fig. 14.

NOTE. The purchaser shall provide the manufacturer with all necessary details of the kerb profile. Gully covers and frames made to a design agreed between the purchaser and manufacturer are permissible provided that the resulting gully cover passes the appropriate loading test satisfactorily and the external dimensions of the frame comply with the requirements of this British Standard.

3.3 Test loads

The loads and the diameters of the bearing blocks for the purpose of the test specified in 1.8 shall be as shown in Table B.

TABLE B. TEST LOADS FOR GULLY GRATINGS

Grade of grating	Test load		Diameter of block	
	tonf	tonnef	in	mm
(In cast iron)				
Grade D	35	35·56	8	203·2
Grade E	15	15·24	8	203·2
(In cast steel)*				
Grade D	15	15·24	8	203·2

* See 1.8(2).

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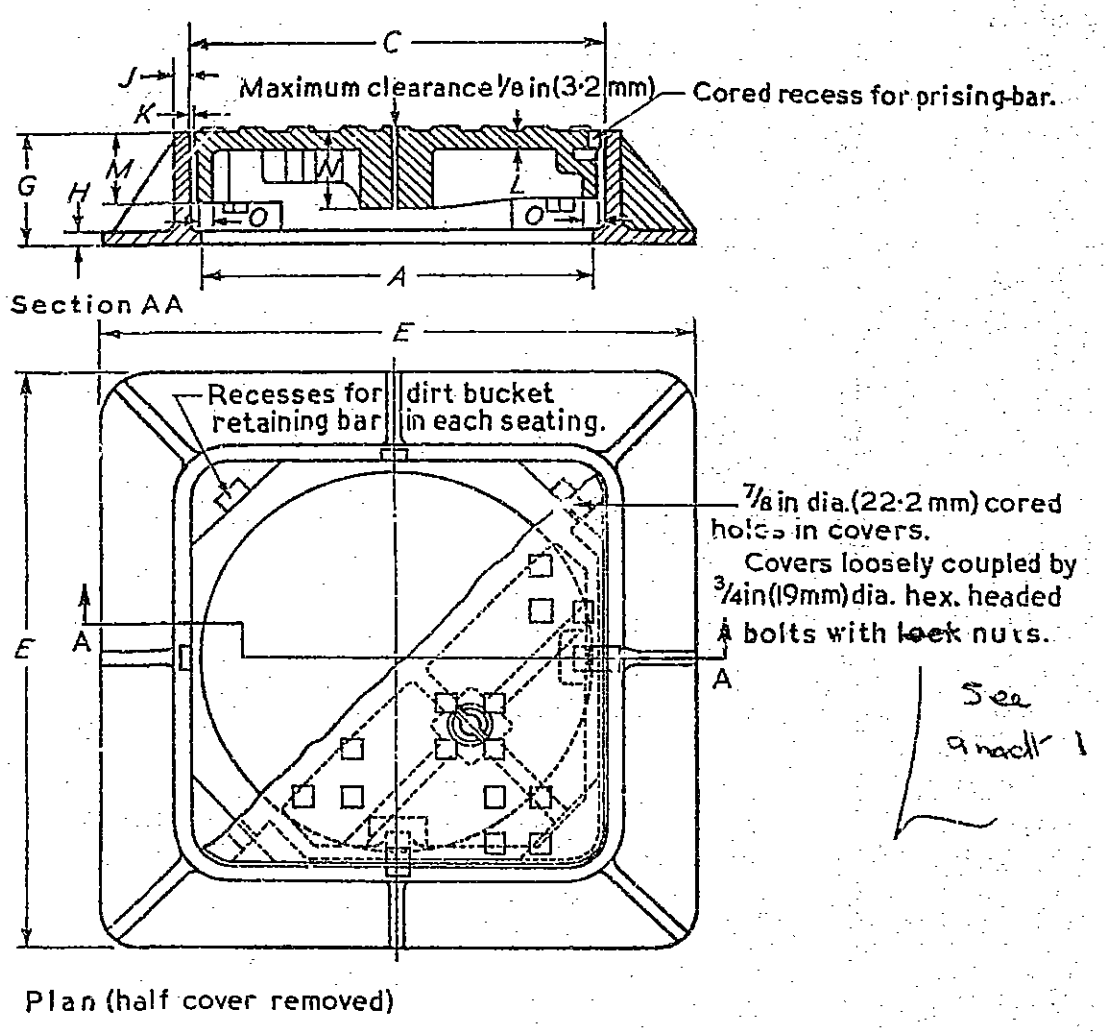
4. FIGURES AND TABLES OF DIMENSIONS

NOTE. Similar dimensions on all drawings are given similar reference letters so far as they apply.



See Amdt. 1

(For detail of keyhole see Fig. 15)

Fig. 1. Grade A (heavy duty) double triangular cover and frame*

* This figure applies to 20 in and 22 in covers only.

TABLE 1. GRADE A (HEAVY DUTY) DOUBLE TRIANGULAR COVER AND FRAME

Dimensions in inches

BS reference	Key letter											Total weight		
	A	*C*	*E*	*G*	*H* min.	*J* min.	*K* max.	*L* min.	*M*	*N* min.	*O* min.	cwt	qr	lb
A1-20	20	21	30	6	5/8	7/8	1/8	1 1/8	4	4 3/8	3/4	4	2	0
A1-22	22	23	32	6	5/8	7/8	1/8	1 1/4	4	4 3/8	3/4	5	0	0

Approximate dimensions in millimetres

BS reference	Key letter											Total weight
	A	*C*	*E*	*G*	*H* min.	*J* min.	*K* max.	*L* min.	*M*	*N* min.	*O* min.	kg
A1-20	508·0	533·4	762.0 ~~762·8~~	152·4	15·87	22·2	3·17	28·57	101·6	111 ~~112~~	19	228·6
A1-22	558·8	584·2	812·8	152·4	15·87	22·2	3·17	31·75	101·6	111 ~~112~~	19	254·0

See Amdt. No. 2.

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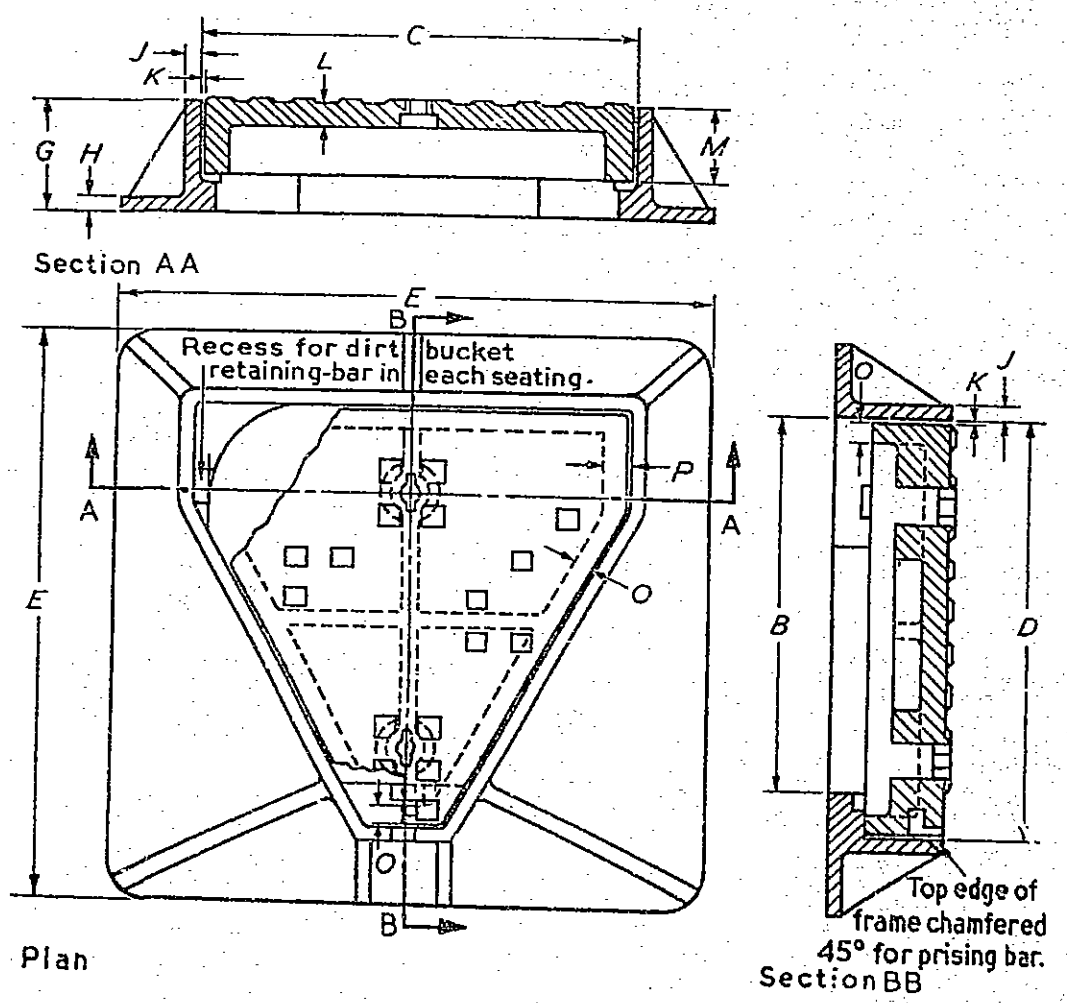

(For detail of keyhole see Fig. 15)

Fig. 2. Grade A (heavy duty) single triangular cover and frame

TABLE 2. GRADE A (HEAVY DUTY) SINGLE TRIANGULAR COVER AND FRAME

Dimensions in inches

BS reference	Key letter												Total weight
	B	*C*	*D*	*E*	*G*	*H* min.	*J* min.	*K* max.	*L* min.	*M*	*O* min.	*P* min.	
													cwt qr lb
A2-19½	19½	22	22	30	6	¾	¾	⅛	1⅜	4	1	1⅜	4 0 0

Approximate dimensions in millimetres

BS reference	Key letter												Total weight
	B	*C*	*D*	*E*	*G*	*H* min.	*J* min.	*K* max.	*L* min.	*M*	*O* min.	*P* min.	
													kg
A2-19½	495·3	558.8 ~~558·6~~	558.8 ~~558·6~~	762·0	152·4	19	19	~~3·7~~ 3.17	34·9	101·6	25·4	34·9	203·2

See Amdt. No. 2.

NOTE. It is permissible to modify the back edge of cover for hinging purposes and the central rib may be made the full depth of the cover between the keyholes.

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