

# DRAFT UGANDA STANDARD

First Edition  
2016-mm-dd

---

---

## Concrete pipes and ancillary concrete products — Part 2: Specification for unreinforced and reinforced concrete manholes and soakaways

PUBLIC REVIEW DRAFT



Reference number  
DUS EAS 426-2: 2006

**Compliance with this standard does not, of itself confer immunity from legal obligations**

**A Uganda Standard does not purport to include all necessary provisions of a contract. Users are responsible for its correct application**

© UNBS 2016

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilised in any form or by any means, electronic or mechanical, including photocopying and microfilm, without prior written permission from UNBS.

Requests for permission to reproduce this document should be addressed to

The Executive Director  
Uganda National Bureau of Standards  
P.O. Box 6329  
Kampala  
Uganda  
Tel: 256 417 333 250/1/2/3  
Fax: 256 414 286 123  
E-mail: [info@unbs.go.ug](mailto:info@unbs.go.ug)  
Web: [www.unbs.go.ug](http://www.unbs.go.ug)

## National foreword

Uganda National Bureau of Standards (UNBS) is a parastatal under the Ministry of Trade, Industry and Cooperatives established under Cap 327, of the Laws of Uganda, as amended. UNBS is mandated to co-ordinate the elaboration of standards and is

- (a) a member of International Organisation for Standardisation (ISO) and
- (b) a contact point for the WHO/FAO Codex Alimentarius Commission on Food Standards, and
- (c) the National Enquiry Point on TBT Agreement of the World Trade Organisation (WTO).

The work of preparing Uganda Standards is carried out through Technical Committees. A Technical Committee is established to deliberate on standards in a given field or area and consists of representatives of consumers, traders, academicians, manufacturers, government and other stakeholders.

Draft Uganda Standards adopted by the Technical Committee are widely circulated to stakeholders and the general public for comments. The committee reviews the comments before recommending the draft standards for approval and declaration as Uganda Standards by the National Standards Council.

This Draft Uganda Standard, DUS EAS 426-2: 2006, *Concrete pipes and ancillary concrete products — Part 2: Specification for unreinforced and reinforced concrete manholes and soakaways*, is identical with and has been reproduced from an East African Standard, EAS 426-2: 2006, *Concrete pipes and ancillary concrete products — Part 2: Specification for unreinforced and reinforced concrete manholes and soakaways*, and is being proposed for adoption as a Uganda Standard.

This standard was developed by the Building and civil engineering Standards Technical Committee (UNBS/TC 3).

Wherever the words, "East African Standard" appear, they should be replaced by "Uganda Standard."



**EAS 426-2:2006**

**ICS 91.140.80**

**HS 6810.20.00**

**HS 6810.91.00**

## **EAST AFRICAN STANDARD**

---

**Concrete pipes and ancillary concrete products —**

**Part 2:**

**Specification for unreinforced and reinforced concrete manholes  
and soakaways**

PUBLIC REVIEW DRAFT

## **EAST AFRICAN COMMUNITY**

---

## Table of contents

1	Scope .....	1
2	Normative references.....	1
3	Terms and definitions.....	2
4	Symbols.....	3
5	General requirements .....	3
5.1	Application.....	3
5.2	Concrete (4.2) .....	3
5.3	Finish (4.3.2) .....	5
5.4	Geometrical characteristics (4.3.3).....	6
5.5	Crushing strength of chamber and shaft units (4.3.5).....	12
5.6	Watertightness of vertical units (4.3.8) .....	12
5.7	Steps (4.1).....	12
6	Special requirements .....	12
6.1	Reinforced concrete units and components (5.2) .....	12
6.2	Vertical strength of cover, reducing and landing slabs and corbel slabs (5.2.4).....	13
7	Conformity evaluation .....	17
7.1	Application.....	17
7.2	Finish .....	17
7.3	Geometrical characteristics .....	17
7.4	Vertical strength of landing slabs and corbel slabs.....	17
8	Marking.....	17
	Annex B (normative) Standards relevant to EAS 418 .....	19
	Annex C (normative) Surface void test.....	20
	Annex D (normative) Dimensional tests .....	21
	Bibliography .....	23

## Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in East Africa. It is envisaged that through harmonized standardization, trade barriers which are encountered when goods and services are exchanged within the Community will be removed.

In order to achieve this objective, the Partner States in the Community through their National Bureaux of Standards, have established an East African Standards Committee.

The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the private sectors and consumer organizations. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the procedures of the Community.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

© East African Community 2006 — All rights reserved\*

East African Community

P O Box 1096

**Arusha**

Tanzania

Tel: 255 27 2504253/8

Fax: 255-27-2504481/2504255

E-Mail: [eac@eachq.org](mailto:eac@eachq.org)

Web: [www.each.org](http://www.each.org)

***[Based on 5911-3:2002]***

\*

© 2005 EAC — All rights of exploitation in any form and by any means reserved worldwide for EAC Partner States' NSBs.

PUBLIC REVIEW DRAFT

# Concrete pipes and ancillary concrete products —

## Part 2:

### Specification for unreinforced and reinforced concrete manholes and soakaways

## 1 Scope

EAS 418 specifies requirements and describes test methods for precast concrete manholes of circular, rectangular (with or without chamfered or rounded corners) or elliptical cross-section, unreinforced, steel fibre and reinforced, with nominal sizes or nominal lengths not exceeding DN 1250 or LN 1250, respectively. The intended use of EAS 418 is to permit access to, and to allow aeration of, drain or sewer systems for the conveyance of sewage, rainwater and surface water under gravity or occasionally at low head of pressure, mainly installed in areas subjected to vehicular and/or pedestrian traffic.

This part of EAS 426 specifies complementary requirements to those in EAS 418 for unreinforced and reinforced concrete manholes of circular and rectangular cross-section (with or without chamfered or rounded corners), as provided for in that European Standard, i.e. units with nominal sizes or nominal lengths not exceeding DN 1250 or LN 1250, respectively. Full requirements for unreinforced and reinforced concrete manholes with nominal sizes greater than DN 1250, but not exceeding DN 3000, are also specified. The manholes are intended to be installed in carriageways of roads (including pedestrian streets), hard shoulders and parking areas for all types of road vehicles, though provision is also made for units subject to lighter traffic loading. Requirements for soakaways, landing slabs and corbel slabs are also specified.

Steel fibre concrete manholes are not manufactured in the United Kingdom and so have been excluded from this part of EAS 426.

EN 752-2, -3 and -4, EN 1295-1 and EN 1610 deal with the planning, design, installation and testing of drains and sewers.

## 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 146, *Specification for blastfurnace cements with strength properties outside the scope of EAS 18-1*

BS 3123, *Specification for spring calipers and spring dividers*

BS 3892-1, *Pulverized-fuel ash — Part 1: Specification for pulverized-fuel ash for use with Portland cement*

BS 4027, *Specification for sulfate-resisting Portland cement*

BS 4035, *Specification for linear measuring instruments for use on building and civil engineering constructional works — Steel measuring tapes, steel bands and retractable steel pocket rules*

BS 4449, *Specification for carbon steel bars for the reinforcement of concrete*

BS 4482, *Specification for cold reduced steel wire for the reinforcement of concrete*

BS 4483, *Steel fabric for the reinforcement of concrete*



BS 4484-1, *Specification for measuring instruments for constructional works — Part 1: Metric graduation and figuring of instruments for linear measurement*

BS 6699, *Specification for ground granulated blastfurnace slag for use with Portland cement*

EAS 18-1, *Cement — Part 1: Composition, specifications and conformity criteria for common cements*

BS EN 934-2, *Admixtures for concrete, mortar and grout — Part 2: Concrete admixtures — Definitions, requirements, conformity, marking and labelling*

BS EN 1008, *Mixing water for concrete — Specification for sampling, testing and assessing the suitability of water, including water recovered from processes in the concrete industry, as mixing water for concrete*

EAS 418, *Concrete manholes and inspection chambers, unreinforced, steel fibre and reinforced*

BS EN 12620, *Aggregates for concrete*

BS EN 13101, *Steps for underground man entry chambers — Requirements, marking, testing and evaluation of conformity*

### **3 Terms and definitions**

For the purpose of this part of EAS 426, the terms and definitions given in EAS 418 and the following apply.

#### **3.1**

##### **cementitious content**

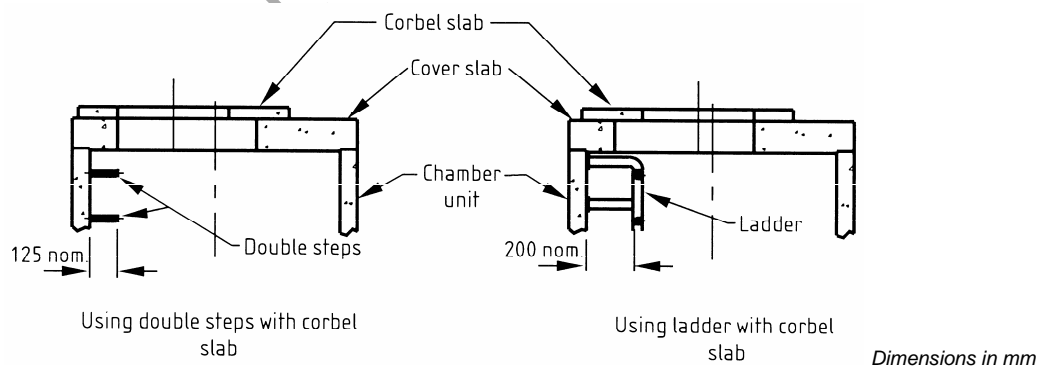
amount of cement plus any pozzolanic or latent hydraulic addition in the concrete mix

#### **3.2**

##### **corbel slab**

component without a joint or installed step incorporating a load-bearing overhang, used to adjust the total height of a structure and/or to accommodate an appropriate frame or cover

NOTE See Figure 1.



**Figure 1 — Use of corbel slabs in conjunction with double steps or ladder**

#### **3.3**

##### **landing slab**

component forming an intermediate horizontal platform within a manhole and having an access opening

#### **3.4**

##### **manufacturing diameter**

diameter of a circular unit that a manufacturer seeks to achieve

**3.5****manufacturing size**

dimensions of a rectangular unit that a manufacturer seeks to achieve

**3.6****soakaway**

vertical chamber of circular cross-section, perforated to allow the passage of water and with or without an access shaft

**3.7****square or rectangular opening**

square or rectangular shaped access hole whose corners may be relieved by nominal 75 mm × 75 mm chamfers, or by nominal 75 mm radii

**4 Symbols**

The meanings of symbols used in this part of EAS 426 shall be as given in Table 1, together with those in EAS 418, Table 2.

**Table 1 — Symbols**

Symbol	Meaning	Unit	Reference
$h_s$	Height of studs on straightness gauge	mm	D.3.2
$h'$	Effective height minus 0.03 m	m	D.3.2

**5 General requirements**

NOTE The numbers in brackets after subclause headings are the corresponding subclause numbers in EAS 418.

**5.1 Application**

For units with nominal size or nominal length not exceeding DN 1250 or LN 1250, respectively, the requirements of this part of EAS 426 shall be in addition to those specified in EAS 418 and for the purposes of the latter the reference specifications shall be those listed in Annex B of this Standard. For manholes with nominal sizes greater than DN 1250, landing slabs, corbel slabs and soakaways the requirements of EAS 418 shall also apply, except as otherwise required by, or stated in, this part of EAS 426.

**5.2 Concrete (4.2)****5.2.1 Composition****5.2.1.1 Types of cement**

The cement (see EAS 418:2002, 4.1) shall either:

- a) be factory-produced by the cement manufacturer and conform to one of the following Standards as appropriate:

Type of cement	Standard
CEM I	EAS 18-1
CEM II/B-V	EAS 18-1
BIII/B	BS 146
Sulfate-resisting Portland	BS 4027; or

- b) consist of a combination of cement conforming to CEM I as specified in EAS 18-1 and an addition in the form of ground granulated blastfurnace slag (ggbfs) or pulverized-fuel ash (pfa) in the proportions specified in 5.2.1.2", to be included as part of the concrete mix by simultaneously combining them with the other concrete materials at the concrete mixer.

## EAS 426-2:2006

In all cases where combinations of cement conforming to CEM I as specified in EAS 18-1 and ggbs or pfa are used, the relevant proportion of ggbs or pfa shall be fully documented in the production records.

### 5.2.1.2 Cementitious content

The fully compacted concrete shall have a minimum cementitious content of not less than the relevant amount shown in Table 2. The composition/specification of cement groups shall be as shown in Table 3.

**Table 2 — Cementitious content<sup>a</sup>**

Class <sup>b</sup>	Aggregate carbonate range <sup>c</sup>	Cement or combination group	Minimum cement or combination content kg/m <sup>3</sup>	Maximum w/c ratio
DC-2	A, B, C	1, 2, 3	340	0.45
DC-3	A	2a	400	0.40
	A	2b, 3	380	0.45
	B, C	2, 3	340	0.45
DC-3*	B	2, 3	380	0.45
DC-3**	C	2, 3	380	0.45
DC-4	A	2a	400	0.35
	A	2b, 3	400	0.40
	A	2, 3	380	0.33
	B, C	2, 3	380	0.45
	B, C	2, 3	360	0.40
DC-4*	B	2, 3	380	0.33
	B	2, 3	400	0.40
DC-4**	C	2, 3	380	0.33
	C	2, 3	400	0.40
DC-4m	A	2b, 3	380	0.33
	A	2b, 3	400	0.40
	B	3	400	0.40
	B, C	3	360	0.40
	B, C	3	380	0.45
DC-4m*	B	3	380	0.33
DC-4m**	C	3	380	0.33
	C	3	400	0.40

<sup>a</sup> The table is consistent with the provisions of BS 8500-1:2002 and BRE Special Digest 1 [1] insofar as they relate to precast concrete pipeline systems, except that the maximum water content (w/c) ratio is limited to 0.45 in accordance with EAS 418:2002, 4.2.4.2.

<sup>b</sup> The class designations are those for design chemical class (DC-class) in BS 8500-1:2002, Table A.15. Where there is more than one option in a class the choice is at the manufacturer's discretion.

<sup>c</sup> See BRE Special Digest 1 — Part 4, Table 4.

Table 3 — Cement groups<sup>a</sup>

Type (see 5.2.1.1)	Designation	Standard	Grouping with respect to sulfate resistance
Portland cement	CEM I	BS EN 197-1	1
Portland fly ash cements	CEM II/B-V <sup>b</sup>	BS EN 197-1	2a <sup>c</sup>
Sulfate-resisting Portland cement	SRPC	BS 4027	3
Blastfurnace slag cements <sup>e</sup>	BIII/B <sup>d</sup>	BS 146	2b <sup>e</sup>
<i>Combinations conforming to BS 8500-2:2002, Annex A manufactured in the concrete mixer from Portland cement and pfa or ggbs:</i>			
CEM I cement conforming to BS EN 197-1 with a mass fraction of 6 % to 20 % of combination of pfa conforming to BS 3892-1	CIIA-V	BS 8500-2	1
CEM I cement conforming to BS EN 197-1 with a mass fraction of 21 % to 35 % of combination of pfa conforming to BS 3892-1	CIIB-V <sup>b</sup>	BS 8500-2	2a <sup>c</sup>
CEM I cement conforming to BS EN 197-1 with a mass fraction of 36 % to 55 % of combination of pfa conforming to BS 3892-1	CIVB-V <sup>b</sup>	BS 8500-2	2a <sup>f</sup>
CEM I cement conforming to BS EN 197-1 with a mass fraction of 6 % to 35 % of combination of ggbs conforming to BS 6699	CII-S <sup>g</sup>	BS 8500-2	1
CEM I cement conforming to BS EN 197-1 with a mass fraction of 36 % to 65 % of combination of ggbs conforming to BS 6699	CIIIA	BS 8500-2	1
CEM I cement conforming to BS EN 197-1 with a mass fraction of 66 % to 80 % of combination of ggbs conforming to BS 6699	CIIB <sup>d</sup>	BS 8500-2	2b <sup>e</sup>
<sup>a</sup> The table is consistent with BS 8500-1:2002, Table A.17 and BS 8500-2:2002, Table 1. <sup>b</sup> Where the proportions for sulfate resistance are required, i.e. not less than 25 % and not more than 40 % pfa, add to the abbreviation "+SR". <sup>c</sup> Provided the pfa content is a mass fraction of not less than 25 % of cement or combination. Where it is less than 25 %, the cement of combination falls within group 1. <sup>d</sup> Where the proportions for sulfate resistance are required (see e), add to the abbreviation "+SR". <sup>e</sup> Where the alumina content of the slag exceeds 14 %, the tricalcium aluminate content of the Portland cement fraction should not exceed 10 %. Where this is not the case, the grouping with respect to sulfate resistance is "1". <sup>f</sup> Provided the pfa content is a mass fraction of not more than 40 % of cement or combination. Where it exceeds 40 %, no guidance is provided. <sup>g</sup> Where necessary, this class can be subdivided into CIIA-S (6 % to 20 % ggbs) and CIIB-S (20 % to 35 % ggbs).			

### 5.2.1.3 Mixing water (4.1)

Mixing water for concrete shall conform to BS EN 1008.

NOTE EN 1008:2002, 3.1 specifies that potable water does not need testing.

## 5.3 Finish (4.3.2)

### 5.3.1 Surface voids

With the exception of the external edges of slabs and of adjusting units and of corbel slabs, when tested in accordance with Annex C surfaces of units and components shall be free from voids that permit diametrically opposite points of the rim of the gauge to touch the surface of the unit or component simultaneously.

Units and components exhibiting any surface void greater than 12 mm deep shall be deemed not to conform to this part of EAS 426.

NOTE Voids up to and including 12 mm deep may be made good by the manufacturer — see EAS 418, 4.3.2.

## 5.4 Geometrical characteristics (4.3.3)

### 5.4.1 General

Subject to the requirements of this clause, the dimensions and thickness of units and components shall conform to those stated in the factory documents.

### 5.4.2 Nominal sizes

NOTE 1 Nominal size is defined in EAS 418:2002, 3.1.16 as a numerical designation of the size of a component within a structure, which is a convenient integer approximately equal to the manufacturing dimension in millimetres; for a circular unit it is the internal diameter (DN), and for a unit having a rectangular or elliptical internal shape it is the internal length/width (LN/WN).

The nominal sizes of circular and rectangular vertical units and tapers for use with them, shall be those given in Table 4 and Table 5, respectively. Steps shall not be permitted in DN 900 shafts or associated components.

NOTE 2 DN 900 units are intended only to be used as a winch shaft because, if fitted with steps or a ladder, the clear space to the back of the shaft would be less than the 900 mm as recommended in the HSE publication, "Safe work in confined spaces" [2] and in BS EN 752-3:1997, Annex NB. Equally, ladders should not be fitted to DN 1050 units.

**Table 4 — Nominal sizes, internal manufacturing diameters and tolerances of circular units**

Nominal size of chamber and shaft units DN	Limits of internal manufacturing diameter		Tolerance on actual diameter from manufacturer's stated diameter <sup>a</sup> mm
	Minimum mm	Maximum mm	
900	900	950	±8
1050	1 050	1 100	±8
1200	1 200	1 250	±9
1500	1 500	1 550	±11
1800	1 800	1 850	±12
2100	2 100	2 150	±14
2400	2 400	2 450	±15
2700	2 700	2 750	±15
3000	3 000	3 050	±15
NOTE 1 Base units have not been commonly used in the United Kingdom — see Note 2 to Figure 1 in EAS 418:2002. It is not envisaged that any will be available in nominal sizes greater than DN 1250.			
NOTE 2 Capping units are not manufactured in the United Kingdom.			
<sup>a</sup> See 3.4.			

### 5.4.3 Internal manufacturing diameter and manufacturing size of vertical units

The internal manufacturing diameters and manufacturing sizes of circular and rectangular vertical units shall not be outside the limits given in Table 4 and Table 5, respectively.

**Table 5 — Nominal sizes, internal manufacturing sizes and tolerances of rectangular units**

Nominal size LN/WN	Limits of internal manufacturing size		Tolerance on actual size from manufacturer's stated size <sup>a</sup> mm
	Minimum mm	Maximum mm	
900/675	925/700	900/675	±6
1200/675	1 250/700	1 200/675	±6
1200/750	1 250/800	1 200/750	±7
<sup>a</sup> See 3.4.			

### 5.4.4 Shape, size and position of openings in slabs, adjusting units and corbel slabs

The shape, size and position of openings in slabs, adjusting units and corbel slabs shall be in accordance with Table 6 and Table 7. The tolerance on the sizes of openings in cover slabs, adjusting units and corbel slabs shall be mm.

NOTE It is permissible for the vertical face(s) of an opening to be cast with a nominal release angle away from the opening.

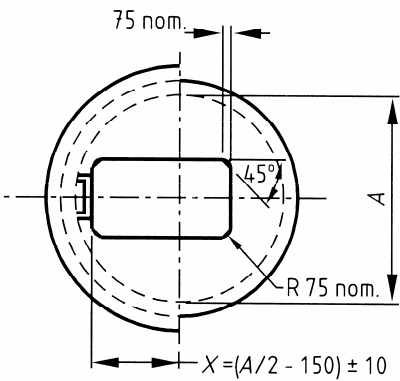
**Table 6 — Shape, size and position of openings in cover slabs, adjusting units and corbel slabs**

Type of unit	Shaft or chamber nominal size DN or LN/WN	Opening configuration		
		Size [mm]	Location	Reference
Cover slab — circular	900	600×600	Central	Figure 2
	900	675×675		
	1050	600×600	Eccentric	
	1050	675×675		
	1050	750×750	Central	
	1200 and 1500	675×675	Eccentric	
	1200 and 1500	750×600		
	1200 and 1500	1200×675	Central	
	1800, 2100, 2400, 2700 and 3000	675×675	Eccentric	
	1800, 2100, 2400, 2700 and 3000	750×600		
	1800, 2100, 2400, 2700 and 3000	1200×675		
Cover — rectangular	900/675	600×600	Eccentric	Figure 3
	1200/675			
	1200/750			
Adjusting unit	—	600×600	Central	Figure 4
	—	675×675		
	—	750×600		
	—	750×750		
	—	1200×675		
Corbel slab	—	600×600	Eccentric	Figure 5
NOTE 1 The sizes of the openings are generally consistent with the safety guidelines given in the HSE publication “Safe work in confined spaces” [2] and in BS EN 752-3:1997, Annex NB.				
NOTE 2 In EAS 426-200 “adjusting units” and “corbel slabs” were both described as “cover frame seating rings”.				

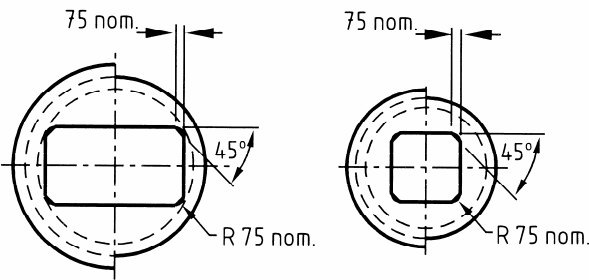
**Table 7 — Shape, size and position of openings in reducing and landing slabs**

Type of unit or component	Chamber nominal size DN	Shaft nominal size DN	Opening configuration		
			Size mm	Location	Reference
Reducing slab	1200 to 3000	900	900	Eccentric	Figure 6
	1500 to 3000	1050	1050	Eccentric	
	1800 to 3000	1200	1200	Eccentric	
Landing slab	1500 to 3000	—	900	Eccentric	Figure 7

Dimensions in mm



Details of eccentric opening



Details of central openings

Figure 2 — Openings in circular cover slabs

Dimensions in mm

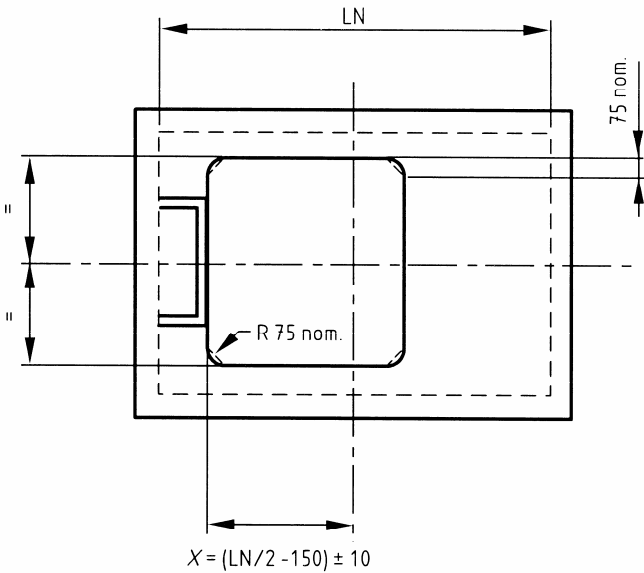
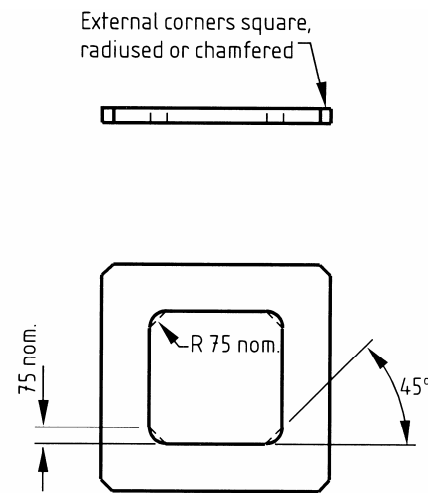


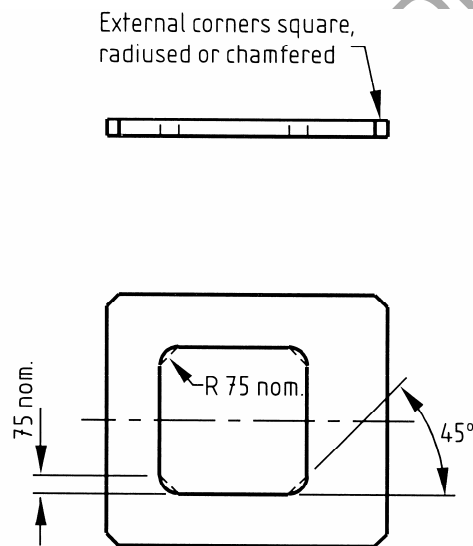
Figure 3 — Openings in rectangular cover slabs

*Dimensions in mm*



**Figure 4 — Typical adjusting unit**

*Dimensions in mm*



**Figure 5 — Typical corbel slabs**



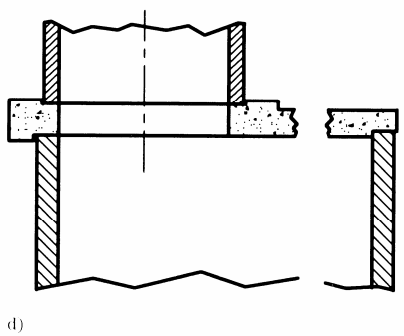
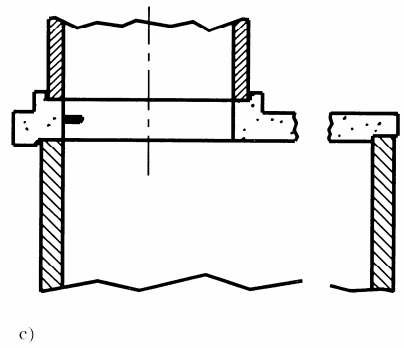
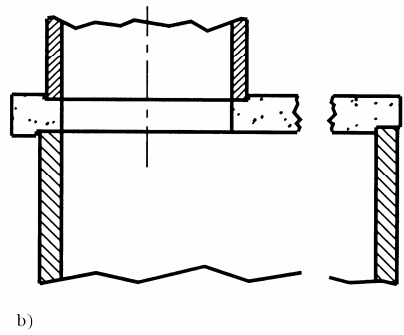
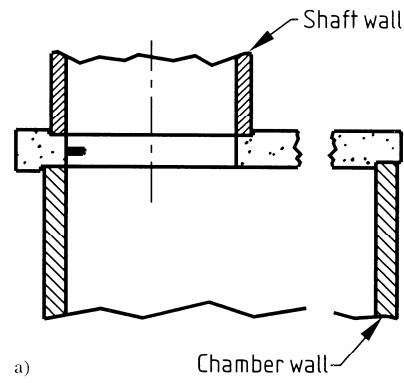


Figure 6 — Typical reducing slabs

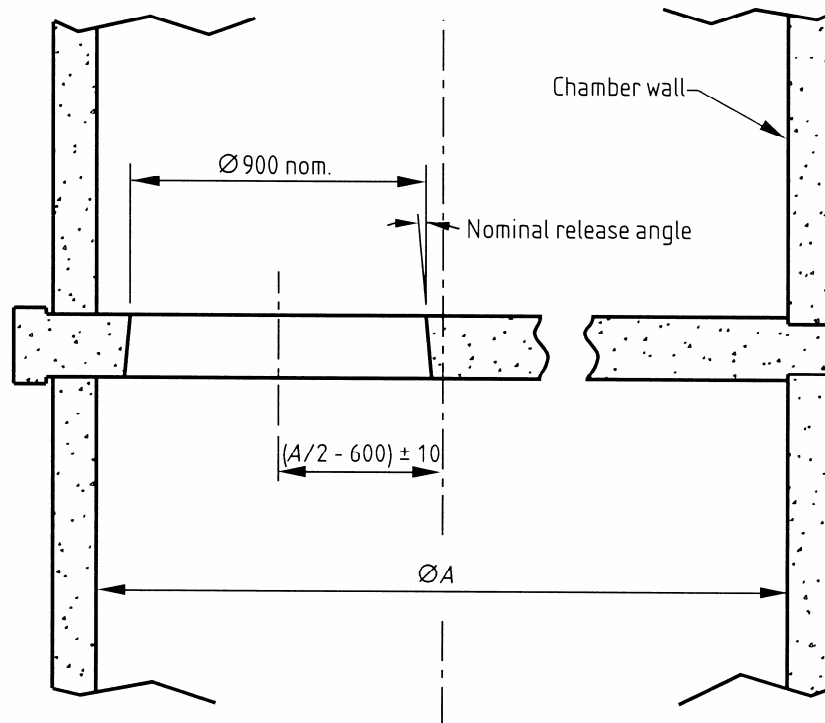


Figure 7 — Typical landing slabs

#### 5.4.5 Sizes and number of apertures in soakaways

Soakaway chamber units shall have holes not less than 45 mm and not greater than 80 mm in diameter, or slits not less than 15 mm or not greater than 25 mm wide, spaced around the circumference. The number and area of holes or slits shall be such that there is a minimum aperture area in each unit of 50 000 mm<sup>2</sup> per metre of effective height per metre of nominal size of chamber.

#### 5.4.6 Dimensional tolerances

##### 5.4.6.1 Tolerances on the internal diameter of circular vertical units

The tolerances on the internal manufactured diameter of circular vertical units and related tapers shall be  $\pm(3 + 0.005DN)$  mm (rounded to the nearest millimetre), limited to  $\pm 15$  mm (see Table 4). No individual measurement, measured in accordance with D.1, shall be outside the specified limits.

##### 5.4.6.2 Tolerances on the internal size of rectangular vertical units

The tolerances on the internal manufactured size of rectangular vertical units shall be  $\pm(3 + 0.005WN)$  mm (rounded to the nearest millimetre), limited to  $\pm 15$  mm (see Table 5). No individual measurement, measured in accordance with D.1, shall be outside the specified limits.

##### 5.4.6.3 Tolerance on the thickness

Any value of thickness measured in accordance with D.2 shall be not less than the value stated in the factory documents.

##### 5.4.6.4 Deviation from straightness

When measured in accordance with D.3, for the internal surface of a vertical unit having an effective height greater than 0.5 m, both ends of the gauge shall not make contact with the surface of the unit when using Edge X and the two studs shall be in contact simultaneously when using Edge Y.

NOTE See Figure D.1.

**5.4.6.5 Squareness of ends**

Vertical units shall be capable of being jointed with their relevant axes coincident. For circular chamber and shaft units this requirement shall apply in any orientation.

NOTE Squareness of ends is significant only to the extent that it relates to type of sealing material and to the performance of a joint assembly.

**5.5 Crushing strength of chamber and shaft units (4.3.5)**

NOTE Strength class is defined in EAS 418, 3.1.21 as the minimum crushing load in kilonewtons per metre, divided by one thousandth of either a unit's nominal size (DN) or nominal length (LN).

The strength classes and corresponding minimum crushing loads of circular and rectangular chamber and shaft units shall be in accordance with Table 8.

For the purposes of carrying out the test described in EAS 418, A.4.1 on chamber and shaft units greater than DN 1250, the maximum width of bearing strips shall be 150 mm for units not greater than DN 2500 and 200 mm for larger units.

**Table 8 — Strength classes and corresponding minimum crushing loads for circular and rectangular chamber and shaft units**

Nominal size DN	Nominal length LN	Single strength class	Minimum crushing load $F_n$ (rounded up to nearest kN/m)
—	900	30	27
—	1200	25	30
900	—	30	27
1050	—	30	32
1200	—	25	30
1500	—	20	30
1800	—	20	36
2100	—	18	38
2400	—	18	44
2700	—	18	49
3000	—	18	54

**5.6 Watertightness of vertical units (4.3.8)**

The requirements of EAS 418, 4.3.8 shall not apply to soakaways, nor to vertical units with nominal sizes greater than DN 1250.

NOTE EAS 426-200 did not require watertightness tests for chamber and shaft units and for nominal sizes greater than DN 1250, which often have a low ratio of effective height to nominal size, safety considerations call into question the tests required by EAS 418, 4.3.8. However, such sizes will have thicker walls and so this, together with the requirement for maximum water absorption of the concrete, is considered to provide adequate assurance of the durability — see EAS 418, 4.3.8.

**5.7 Steps (4.1)**

Steps shall be Type D Class I double steps conforming to BS EN 13101:2002 and be manufactured from one of the materials specified in 4.2.1b), excluding flake graphite (grey) cast iron, or 4.2.1c). The minimum length of tread as defined in BS EN 13101:2002, 4.3.2.2d) shall be 320 mm.

**6 Special requirements**

NOTE The numbers in brackets after subclause headings are the corresponding subclause numbers in EAS 418.

**6.1 Reinforced concrete units and components (5.2)****6.1.1 Concrete cover (5.2.2)**

The minimum concrete cover shall be 15 mm (20 mm for slabs, adjusting units and corbel slabs), or the relevant nominal maximum size of aggregate stated in the factory documents, whichever is the larger.

NOTE 1 Given the inspection procedures specified in this part of EAS 426 and the maximum permitted stabilized surface crack width specified in EAS 418, 5.2.3 and EAS 418, 5.2.4 the value of minimum concrete cover is consistent with the serviceability conditions specified in EAS 418, 4.3.9. Taken together, these factors are also consistent with the crack control provisions given in BS 8110-1 and BS 8110-2.

NOTE 2 Units conveying sea water, industrial waste, etc. and those to be installed in more aggressive serviceability conditions than those specified in EAS 418, 4.3.9 might need additional concrete cover. The advice of the manufacturer should be sought in such a situation.

## 6.2 Vertical strength of cover, reducing and landing slabs and corbel slabs (5.2.4)

### 6.2.1 Vertical strength of slabs to fit chambers greater than DN 1250 and corbel slabs

When subjected to the vertical proof load test for reinforced concrete slabs in accordance with EAS 418, Annex B with the exception that the loading arrangements shall be as given in Figure 8, Figure 9, Figure 10 and Figure 11 of this part of EAS 426 as appropriate, a cover, reducing or landing slab to fit a chamber greater than DN 1250 and corbel slabs shall withstand the relevant vertical proof test load(s) given in Table 9. The surface width of any residual crack after removal of the load(s) shall not exceed 0.15 mm over a continuous length of 300 mm or more, or the full width of a concrete surface, whichever is the lesser. Where separately required by the relevant sampling procedures, the loading shall be taken continuously up to the ultimate (collapse) load without shock and a record made of that load.

**Table 9 — Vertical proof loads for cover, reducing and landing slabs to fit chambers greater than DN 1250 and corbel slabs**

Type of slab	Nominal size of chamber unit DN	Vertical proof load(s), $F_p$	Loading positions
Cover slab	1500 (all)	Two 120 kN loads applied simultaneously	See Figure 8
	1800 (all)		
	2100 (1200 × 675 access)		
	2100 (675 × 675) and (750 × 600 accesses)	Three 120 kN loads applied simultaneously	
	2400 to 3 000 (all)		
Reducing slab	All	One 120 kN load and one uniformly distributed 120 kN load applied simultaneously	See Figure 9
Landing slab	All	One 35 kN load	See Figure 10
Corbel slab	All	One 120 kN uniformly distributed load	See Figure 11

Dimensions in mm

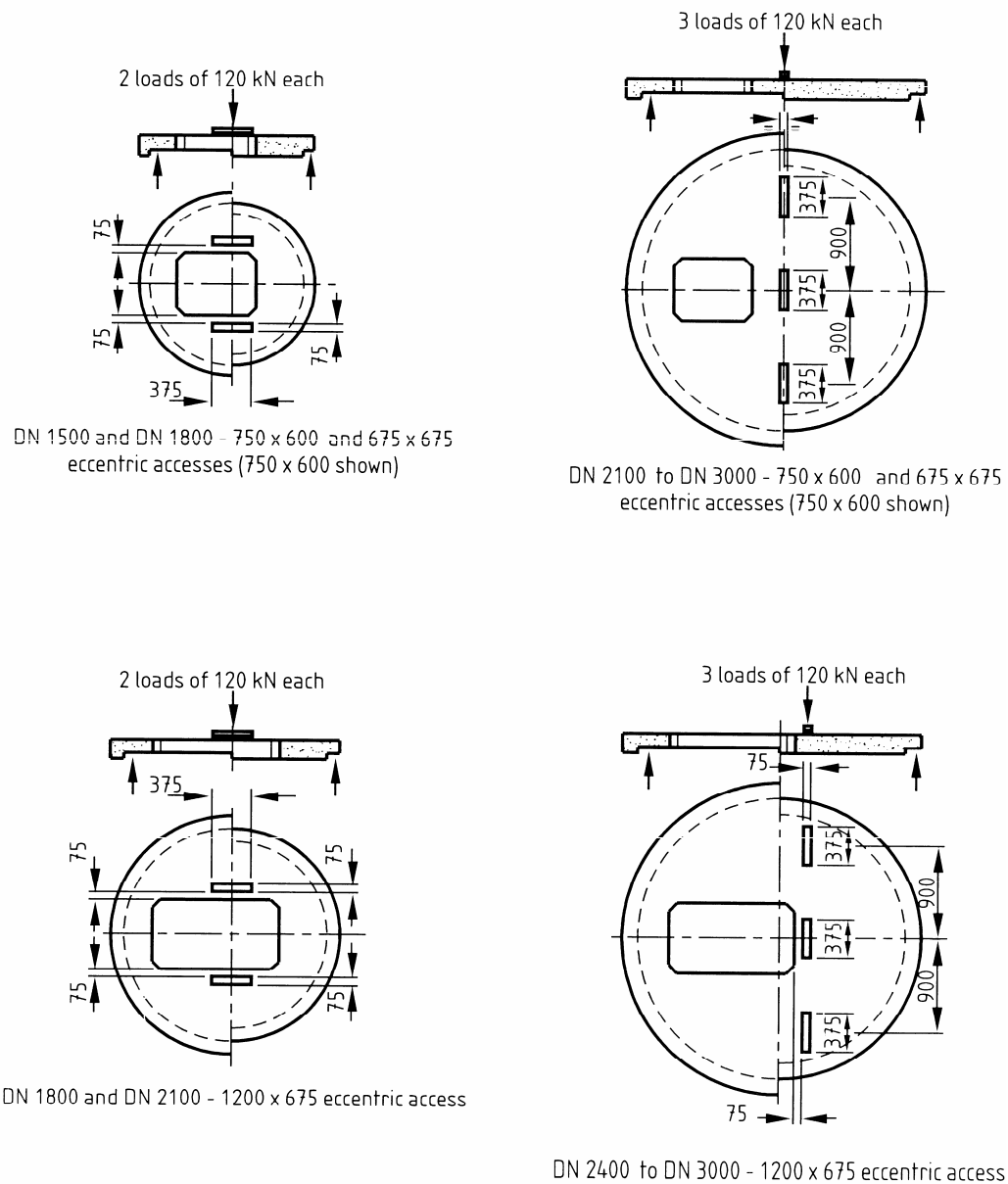


Figure 8 — Loading arrangements for cover slabs

Dimensions in mm

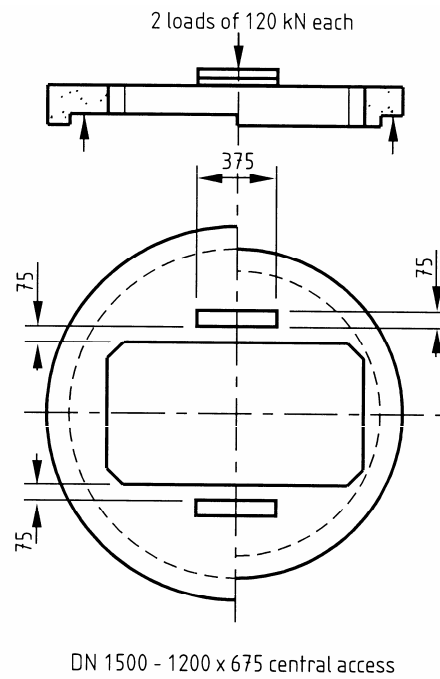


Figure 8 — Loading arrangements for cover slabs (continued)

Dimensions in mm

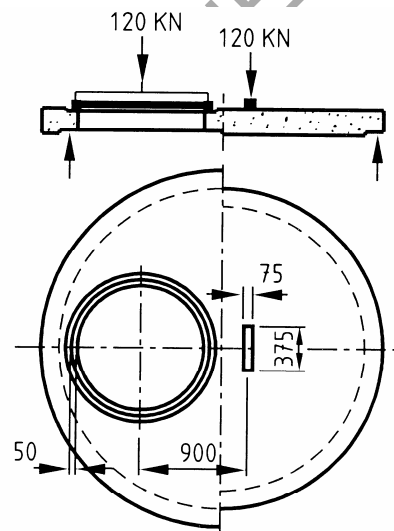


Figure 9 — Loading arrangements for reducing slabs

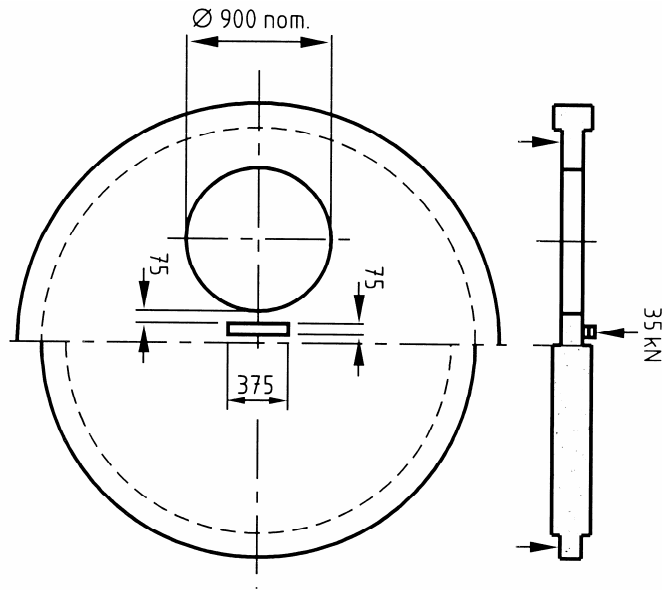


Figure 10 — Loading arrangements for landing slabs

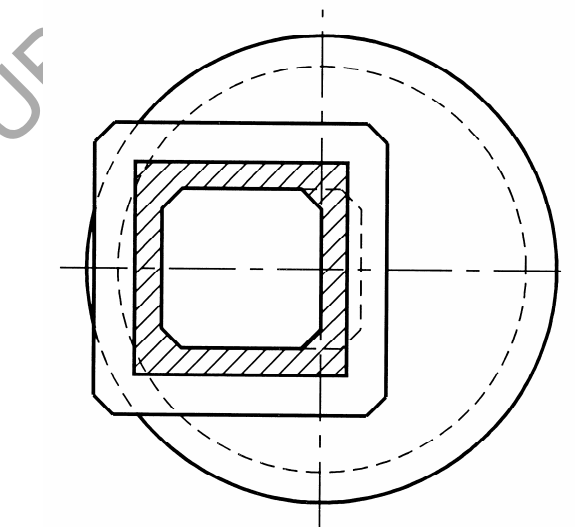
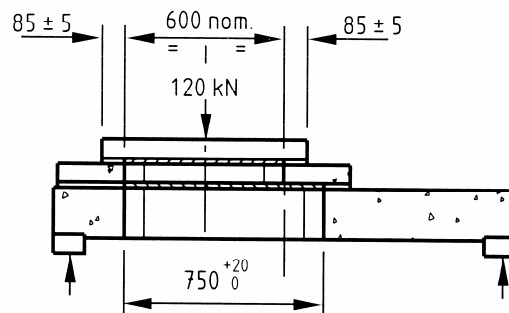


Figure 11 — Loading arrangements for corbel slabs

## **7 Conformity evaluation**

### **7.1 Application**

The conformity evaluation requirements of EAS 418 shall apply to this part of EAS 426 (including soakaways, but see **5.6**), supplemented by the following sampling procedures.

### **7.2 Finish**

When subjected to the test given in Annex C the finish of any unit or component (except for the external edges of slabs and of adjusting units and corbel slabs) shall conform to **5.3.1** for surface voids.

### **7.3 Geometrical characteristics**

Sampling procedures to evaluate the conformity of internal diameter, internal size, thickness and straightness to **5.4.6.1**, **5.4.6.2**, **5.4.6.3** and **5.4.6.4**, respectively shall be in accordance with those for “Geometrical characteristics — Units” in EAS 418, Table G.1.

### **7.4 Vertical strength of landing slabs and corbel slabs**

Sampling procedures to evaluate the conformity of the vertical strength of landing slabs and corbel units to **6.2.1** shall be in accordance with those for “Vertical strength” in EAS 418, Table G.1.

## **8 Marking**

In addition to the requirements in EAS 418, Clause 8 each unit component shall be marked EAS 426-3 immediately following EAS 418 and with the letter “R” if it is a reinforced concrete unit or component.



### 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 may be fully understood:

	Reference in EAS 418	Reference in this part of EAS 426
a) quantity, cross-sectional shape(s) and nominal size(s) of units or components	— 5.4.1	
b) design chemical class (DC-class) of concrete in units	4.3.9	5.2.1
c) if additional concrete cover is required	4.3.9 and 5.2.2	6.1.1
d) whether double or no steps are to be fixed	4.1, 4.3.3.4 and 4.3.7	—
e) if the products are to be fully covered by a third party certification scheme	7.1	Foreword

PUBLIC REVIEW DRAFT

**Annex B (normative) Standards relevant to EAS 418**

The reference specifications prescribed in **5.1** are listed in Table B.1.

PUBLIC REVIEW DRAFT

## Annex C (normative) Surface void test

### C.1 Principle

The purpose of this test is to evaluate whether any void in the surface of a unit or component (except for the external edges of slabs and of adjusting units and corbel slabs) conforms to the limiting requirement in 5.3.1.

### C.2 Apparatus

C.2.1 Gauge, as shown in Figure C.1.

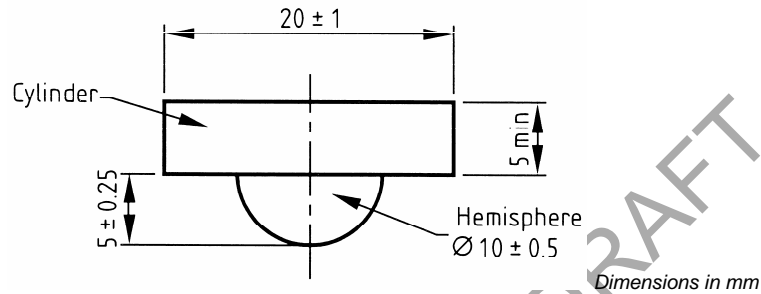


Figure C.1 — Gauge for assessing surface voids

### C.3 Procedure

Apply the ball of the gauge to the void.

### C.4 Expression of result

Record whether diametrically opposite points in the rim of the gauge simultaneously touched the surface of the unit or component.

## Annex D (normative) Dimensional tests

NOTE At the manufacturer's discretion it is permissible to use purpose-made "go/no-go" gauges for dimensional measurements in lieu of the apparatus specified for the tests in this Annex.

### D.1 Internal dimensions test

#### D.1.1 Principle

The purpose of this test is to evaluate whether the internal diameter of circular vertical units and tapers, and the width/length of rectangular vertical units, conforms to **5.4.6.1** or **5.4.6.2** as appropriate.

#### D.1.2 Apparatus

**D.1.2.1** Steel measuring tape or retractable pocket rule, conforming to BS 4035, with metric graduation and figuring conforming to BS 4484-1.

#### D.1.3 Procedure

For circular vertical units and related tapers, make three measurements of the internal diameter at each end at approximately 60° to each other. For rectangular vertical units, make two measurements of each internal dimension at each end. For base units, make measurements only at the upper end. For all units, take the measurements at approximately 50 mm from the end(s) of the unit.

#### D.1.4 Expression of results

Record whether each measured value of the internal diameter or length/width conforms to **5.4.6.1** or **5.4.6.2** as appropriate.

### D.2 Thickness tests

#### D.2.1 Principle

The purpose of these tests is to evaluate whether the thickness of a unit or component conforms to **5.4.6.3**.

#### D.2.2 Apparatus

**D.2.2.1** Outside spring caliper, conforming to BS 3123.

**D.2.2.2** Steel measuring tape or retractable pocket rule, conforming to BS 4035, with metric graduation and figuring conforming to BS 4484-1.

#### D.2.3 Procedure

For circular vertical units, use the outside spring caliper to measure the wall thickness at approximately 50 mm from the end of the external barrel at the upper end, at three positions equidistant around the circumference of the unit.

For rectangular vertical units, use the outside spring caliper to measure the wall thickness at approximately 50 mm from the end of the external barrel at the upper end, at each quarter point around the perimeter.

Measure the thickness of tapers using the outside spring caliper at three positions approximately equidistant around the upper circumference of the unit and repeat the procedure for the lower circumference.

Measure the thickness of slabs and adjusting units using the steel measuring tape or retractable pocket rule at each quarter point around the circumference or perimeter.

## D.2.4 Expression of results

Record whether each measured value of the thickness conforms to 5.4.6.3.

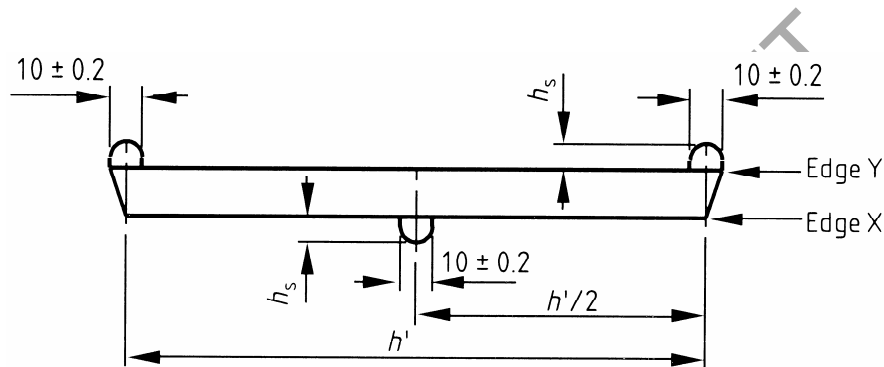
## D.3 Straightness test

### D.3.1 Principle

The purpose of this test is to evaluate whether the internal straightness of a vertical unit having an effective height greater than 0.5 m conforms to 5.4.6.4.

### D.3.2 Apparatus

**D.3.2.1** Rigid straightedge, made into a gauge of the form and dimensions shown in Figure D.1. Dimensions in mm



$$h_s = (3.5h' \pm 5\%) \text{ in mm}$$

NOTE The studs should be detachable from the basic straight edge to facilitate checking and replacement.

**Figure D.1 — Gauge for measuring deviation from straightness**

### D.3.3 Procedure

**D.3.3.1** Place the straightedge within the unit with Edge X (see Figure D.1) in contact with the unit and on a line parallel to its vertical axis. Hold the plane of the gauge in a radial plane and make a record of whether or not both ends of the gauge, wherever so placed, were in contact with the internal surface of the unit.

**D.3.3.2** If both ends of the gauge were not in contact with the internal surface of the unit at both ends, reverse the gauge so that Edge Y, placed as above (see Figure D.1), is adjacent to the internal surface of the unit.

### D.3.4 Expression of result

Record whether both ends of the gauge were in contact with the surface of the unit when using Edge X, and whether the two studs (see Figure D.1) touched the surface simultaneously when using Edge Y.

## **Bibliography**

EAS 426-200:1994, *Precast concrete pipes, fittings and ancillary products — Part 200: Specification for unreinforced and reinforced manholes and soakaways of circular cross-section.*

BS 8110-1:1997, *Structural use of concrete — Part 1: Code of practice for design and construction.*

BS 8110-2:1985, *Structural use of concrete — Part 2: Code of practice for special circumstances.*

BS 8500-1:2002, *Concrete — Complementary British Standard to BS EN 206-1 — Part 1: Method of specifying and guidance for the supplier.*

BS 8500-2:2002, *Concrete — Complementary British Standard to BS EN 206-1 — Part 2: Specification for constituent materials and concrete.*

BS EN 752-2:1997, *Drain and sewer systems outside buildings — Part 2: Performance requirements.*

BS EN 752-3:1997, *Drain and sewer systems outside buildings — Part 3: Planning.*

BS EN 752-4:1998, *Drain and sewer systems outside buildings — Part 4: Hydraulic design and environmental considerations.*

BS EN 1295-1:1998, *Structural design of buried pipelines under various conditions of loading — Part 1: General requirements.*

BS EN 1610:1998, *Construction and testing of drains and sewers.*

PUBLIC REVIEW DRAFT

PUBLIC REVIEW DRAFT