DUS EAS 426-6

DRAFT UGANDA STANDARD

First Edition
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Concrete pipes and ancillary concrete products — Part 6: Specification for porous pipes

Reference number
DUS EAS 426-6: 2006

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

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National foreword

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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 426-6: 2006, *Concrete pipes and ancillary concrete products — Part 6: Specification for porous pipes,* is identical with and has been reproduced from an East African Standard, EAS 426-6: 2006*, Concrete pipes and ancillary concrete products — Part 6: Specification for porous pipes,* 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."

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ICS 91.140.80
HS 6810.20.00
HS 6810.91.00

EAST AFRICAN STANDARD

Precast concrete pipes, fittings and ancillary products — Part 6: Specification for porous pipes

EAST AFRICAN COMMUNITY

First Edition 2006

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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.

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Precast concrete pipes, fittings and ancillary products — Part 114: Specification for porous pipes

Section 1: General

1 Scope

This Part of BS 5911 specifies requirements for unreinforced porous concrete pipes which are intended to admit water through the pipe wall throughout their full length and full circumference or, in the case of pipes with non-porous inverts, throughout part of their circumference. Porosity of the joint is not a requirement.

The specification covers constituent materials, dimensional requirements, performance requirements, appropriate test methods and inspection procedures.

Combinations of special cements have not been included in this standard in the absence of experience with them in this context.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this Part of BS 5911 the following definitions apply.

2.1
porous pipe
a hollow cylinder manufactured from unreinforced porous concrete, of uniform internal diameter and cross section throughout its length, except at the joint profile

NOTE When “pipe” is used alone in this standard this indicates a porous pipe.

2.2
barrel
that portion of a pipe throughout which the internal diameter and cross section remain substantially uniform

2.3
rebated joint
a joint made within the wall thickness of a pipe, including ogee joints

NOTE See Figure 1.

2.4
nominal size (DN)
a numerical designation of the bore of a pipe, which is a convenient round number approximately equal to the internal diameter in millimetres

2.5
manufacturing diameter
a diameter of a pipe that a manufacturer seeks to achieve

2.6
actual internal diameter
an internal diameter found by measurement

2.7
effective length
the length of a pipe measured as shown in Figure 2

2.8
batch
the number of pipes of a particular specification produced under uniform conditions during a given production period by one particular process

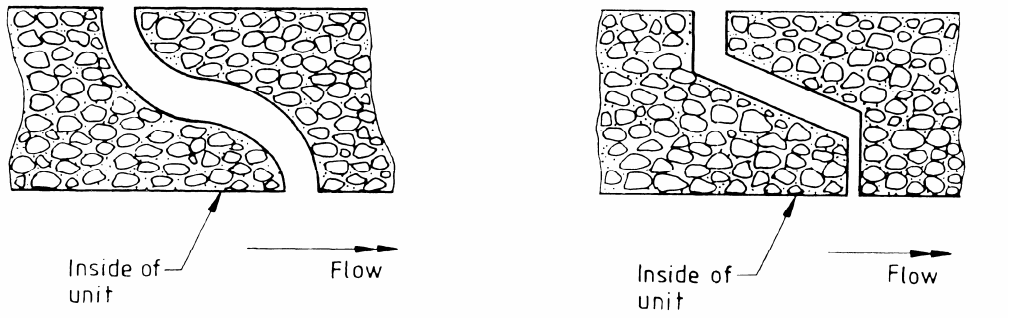


Figure 1 — Typical joints

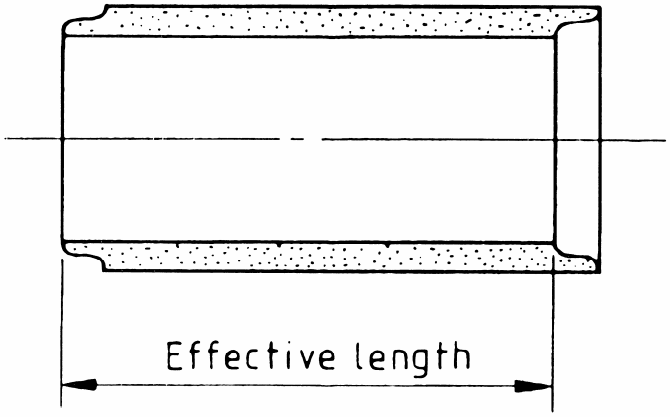


Figure 2 — Effective length of units

Section 2: Materials

3 Cement

The cement shall be factory-produced by the cement manufacturer and comply with one of the following standards as appropriate:

Type of cement	Standard to be complied with
ordinary and rapid-hardening Portland	BS 12
Portland-blastfurnace	BS 146
sulfate-resisting Portland	BS 4027

4 Aggregates

4.1 General

Aggregates shall consist of either:

a) materials complying with BS 882:1983 except that the manufacturer may modify the grading requirements of clause **5** of that standard (see clause **0** of BS 882:1983); or

b) lightweight aggregate complying with BS 3797.

4.2 Testing

4.2.1 Mechanical properties

The limiting values on the mechanical properties of coarse aggregates shall be either a minimum 10 % fines value of 100 kN or a maximum aggregate impact value of 30 %. Aggregates complying with BS 3797-2 shall have values of 10 % fines, aggregate impact and chloride ion content which are consistent with the relevant provisions of BS 882.

4.2.2 Nominal maximum size

The nominal maximum size of aggregate shall not exceed the least of the following:
a) 20 mm;

b) one quarter of the wall thickness.

5 Other concrete materials
5.1 Water

Water shall be clean and free from harmful matter in such quantities as would affect the properties of the concrete in either the plastic or the hardened state (see Appendix A of BS 3148:1980).

NOTE As a general rule, potable water, whether treated for distribution through the public supply or untreated, is suitable for marking concrete.

5.2 Admixtures

Admixtures shall comply with BS 5075.

NOTE Admixtures, when used (see Appendix A), should not impair the durability of the concrete, nor combine with the ingredients to form harmful compounds.

The chloride ion content of admixtures shall not exceed 2 % by mass of the admixture or 0.03 % by mass of the cement, when used in any concrete made with cement complying with BS 4027.

The manufacturer shall make available details of:

a) the relevant production records;

b) the admixture(s) used;

c) the dosage rate of each admixture;

d) the effect of under-dosing and over-dosing.

6 Concrete

6.1 Work in cold weather

Concrete, when placed, shall have a temperature of at least 5 °C, which shall be maintained until the concrete is hardened.

It is permissible to heat aggregates and water before mixing to a temperature not exceeding 60 °C.

Other materials and moulds, if at a temperature below 0 °C, shall not be used.

Section 3: Dimensions and tolerances

7 Nominal size (DN)

The nominal sizes (see **2.4**) of pipes shall be those given in Table 1.

8 Effective length of pipes

The effective length of pipes, see (**2.7**), shall be in the range 0.45 m to 1.25 m inclusive.

Information shall be available on the effective lengths of pipes in a given nominal size named in an enquiry or order (see Appendix A).

9 Diameters

9.1 Internal manufacturing diameter and actual diameter

Information shall be available at the enquiry stage on the internal manufacturing diameters (see **2.5**) that can be supplied (see Appendix A).

The internal manufacturing diameter shall not be outside the limits given in column 2 of Table 1.

The actual internal diameter (see **2.6**) shall not deviate from the manufacturing diameter by an amount greater than that given in column 3 of Table 1.

9.2 External manufacturing diameter

The external manufacturing diameter of the barrel of the pipe (see **2.2**) shall be declared if required. (See Appendix A.)

10 Variation in the thickness of wall

The radial thickness of the wall of a pipe shall not vary by more than the amount stated in column 4 of Table 1.

11 Deviation from straightness

When assessed as described in Appendix B, the pipe shall satisfy the criteria for straightness.

12 Joints

The axial length of each joint of a pipe shall be not less than 15 mm or (0.03 DN + 7) mm, where DN is the nominal size of the pipe, whichever is the greater. For example, for a section of DN 600, the axial length shall be not less than (0.03 × 600 + 7) mm = 25 mm. Other joint dimensions shall conform to the manufacturer's stated dimensions and tolerances.

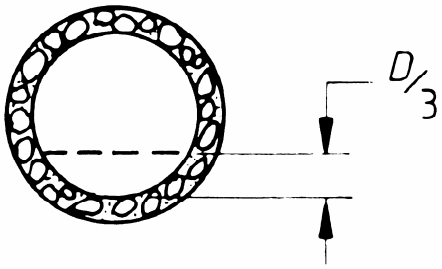
NOTE For typical joints see Figure 1.

13 Non-porous inverts

When specified (see Appendix A) a non-porous invert shall extend for the full length of the pipe and to a height up the pipe equal to not less than one-third of the internal diameter (*D*) measured from the invert of the pipe as intended to be laid (see Figure 3).

Table 1 — Nominal sizes and tolerances

1	2		3	4
Nominal size of pipes	Permissible limits of internal manufacturing diameter (see clause 9)		Permissible deviation of actual internal diameter from manufacturing diameter (see clause 9)	Variation of wall thickness (see clause 10)
	Maximum diameter	Minimum diameter		
DN	mm	mm	mm	mm
100	105	100	5	6
150	155	150	5	6
225	230	225	5	6
300	305	300	5	6
375	385	365	6	6
450	460	440	6	6
525	535	515	6	6
600	610	590	6	6
750	770	730	6	6
900	920	880	6	6



NOTE The treatment of the invert is not intended totally to seal the wall of the pipe. The pipe may be made non-porous by treating either the inside or outside of the pipe.

Figure 3 — Non-porous invert

Section 4: Tests

14 General

14.1 Routine and type testing

14.1.1 Pipes shall comply with the appropriate routine and type test requirements given in this section and summarized in Table 3 and shall be inspected using the procedures specified in section 5.

NOTE Inspection procedures are not given in this Part for isolated batches of units subject to the hydrostatic or works proof load crushing test.

14.1.2 Type tests shall be carried out to prove the design of a pipe. They shall be undertaken wherever there is a change in design, type of material or method of manufacture.

14.1.3 Records of all tests and inspection procedures shall be kept by the manufacturer.

14.2 Acceptance of pipes

Pipes shall be considered ready for acceptance only after the design has been proven by type tests and the batch of which the pipes form part has been routinely tested and shown to comply with clause **16**.

All pipes within any batch shall be cured and matured under similar conditions. They shall not be despatched until they are at least 10 days old.

15 Test requirements

15.1 Crushing load test

When tested in accordance with Appendix D, a pipe shall support, for 1 min, the load specified in Table 2 without any sign of failure.

NOTE Cube tests for the concrete used in pipes and built-up bends and junctions are not required because the concrete used in the manufacture of these units is generally compacted in quite a different way from the method specified in BS 1881-5.

Table 2 — Infiltration rates and crushing loads

Nominal size	Infiltration rate	Crushing load (minimum)	
		Class 1	Class 2
DN	l/min/m	kN/m	kN/m
100	65	20	—
150	100	20	—
225	150	20	—
300	200	20	—
375	250	20	—
450	250	20	23
525	250	20	25
600	250	20	27
750	250	20	30
900	250	20	30

15.2 Infiltration test

When tested in accordance with Appendix C, porous pipes shall have an average rate of infiltration of not less than the values shown in Table 2, column 2.

Any individual result shall be not less than half the stated infiltration rate.

The rate of infiltration for porous pipes with non-porous inverts shall be ascertained before the invert is treated.

Table 3 — Summary of test requirements and inspection procedures

Unit	Nominal size and category	Test	Compliance requirements given in clause	Test method given in	Required as type test (see 14.1.1)	Required as routine test	Inspection procedures given in clause
Pipe	All	Infiltration	15.2	Appendix C	√	√	17.2
	All	Crushing load	15.1	Appendix D	√	√	17.1
	All	Straightness	11	Appendix B	—	—	See note 1
	All	Joints	12	—	√	—	See note 1
	All	Dimensions	7, 8, 9, 10	—	√	—	See note I
NOTE 1 These tests are to be carried out as and when required. NOTE 2 Inspection procedures are not given in this Part for isolated batches of units.							

Section 5. Inspection procedures and marking

16 Type of inspection and batch size

16.1 Type of inspection

16.1.1 Normal inspection

Normal inspection shall be used when a process has been in operation long enough to be in a state of control.

16.1.2 Tightened inspection

Tightened inspection shall be used:

a) when inspecting a new product, a redesigned product or a new production line; or

b) when so directed by the switching rules in 16.2

16.1.3 Reduced inspection

Reduced inspection shall be substituted for normal inspection only when permitted by the switching rules given in 16.2.4.

16.2 Switching rules

16.2.1 General

Changes from one inspection type to another shall be in accordance with the following switching rules. The rules given in 16.2.2, 16.2.5 and 16.2.6 shall apply in all cases whereas the rules given in 16.2.3 and 16.2.4 shall apply at the discretion of the manufacturer.

1

6.2.2 Normal to tightened inspection

When using normal inspection, switch to tightened inspection if two in five or less consecutive batches have been rejected.

16.2.3 Tightened to normal inspection

When using tightened inspection, switch to normal inspection only when five consecutive batches have been accepted.

16.2.4 Normal to reduced inspection (infiltration or crushing load test)

16.2.4.1 When using normal inspection, switch to reduced inspection only if:

a) the last 10 batches given (see Table 4) have been subject to normal inspection and have all been accepted; and

b) the total number of defectives in samples taken from the last 10 batches is less than or equal to the number given in Table 4. When double sampling is used all samples inspected shall be included, i.e. not the first samples only.

16.2.4.2 Where the sample consists of less than 30 pipes, more batches shall be used provided that the batches used are the most recent ones in sequence, that they have all been on normal inspection, and that none has been rejected.

NOTE A total of less than 30 pipes sampled is not sufficient for switching to reduced inspection.

Table 4 — Maximum number of individual defectives in last 10 batches permitted for switching to reduced inspection (crushing load test)

Number of pipes sampled from last 10 batches	Total number of defectives in last 10 batches on normal inspection
30 to 79	0
80 to 129	2
130 to 199	4
200 to 319	8
320 to 499	14
500 to 799	25
800 to 1 249	42
NOTE The values in the table are consistent with those in Table VIII of BS 6001-1:1991 for a target acceptable quality level (AQL) of 6.5 %.	

16.2.5 Reduced to normal inspection (infiltration and crushing load tests)

When using reduced inspection, switch to normal inspection if:

a) a batch is rejected; or

b) a batch is accepted where the acceptance number given in column 4 (single sampling) or 6 (double sampling) of Table 5 has been exceeded but the rejection number in column 5 (single sampling) or 7 (double sampling) has not been reached; or

c) production becomes irregular or delayed.

16.2.6 Tightened inspection to stopping production

When using tightened inspection, stop production if it is not possible to switch to normal inspection (see 16.2.3) after 10 consecutive batches. Investigate the cause of failure and take any necessary remedial action. Resume production using tightened inspection.

16.3 Size of batch

16.3.1 Crushing

When inspecting pipes, it is permissible to choose any size of batch (see 2.8), provided that the requirements given in 14.2 are complied with.

16.3.2 Infiltration

A batch shall comprise one day's production provided that the requirements given in 14.2 are complied with.

Table 5 — Inspection plans for crushing load tests

1	2	3	4	5	6	7
Inspection type	Batch size	Sample size	Accept	Reject	Accept	Reject
			Numbers of failures			
Normal	2 to 50	2 (single)	0	1	-	-
	51 to 500	5 (double)	0	2	1	2
	501 to 3200	8 (double)	0	3	3	4
	3 201 to 10000	13 (double)	1	4	4	5
Tightened	2 to 50	3 (single)	0	1	-	-
	51 to 3200	8 (double)	0	2	1	2
	3 201 to 10000	13 (double)	0	3	3	4
Reduced	2 to 50	2 (single)	0	1	-	-
	51 to 500	2 (double)	0	2	0	2
	501 to 3200	3 (double)	0	3	0	4
	3 201 to 10000	5 (double)	0	4	1	5
NOTE This table is based on tables in BS 6001-1:1991 and is consistent with a target acceptable quality level (AQL) of 6.5 % at Special Inspection Level S3.						

17 Inspection procedures

17.1 Inspection procedures for crushing load test

When carrying out the crushing load test, the inspection procedure for each batch shall be as follows.

a) Determine the appropriate inspection type (see 16.1).

b) Select the batch size (see 16.3).

c) Take a random sample of the size given in column 3 of Table 5 for the appropriate inspection type and size of batch.

d) Subject the sample to the appropriate crushing load test specified in 15.1.

e) Assess the acceptability of the batch, as follows:

1) For batches of 25 or less (single sampling), if the number of defectives is nil (see "Accept" number in column 4 of Table 5), accept the batch. If the number of defectives is one or more (see "Reject" number in column 5 of Table 5), reject the batch.

2) For batches of 26 or more (double sampling), if the number of defectives is equal to or less than the "Accept" number in column 4 of Table 5, accept the batch, with the exception of any defectives. If the number of defectives is equal to or greater than the "Reject" number in column 5 of Table 5, reject the batch.

However, if the number of failures is greater than the "Accept" number in column 4 but less than the "Reject" number in column 5, take a second random sample of the same size as the first one. Then if the cumulative number of defectives for both samples is less than the second "Reject" number (column 7), accept the batch, with the exception of any defectives [see also 16.2.4.1 b)]. If the cumulative number of defectives is equal to or greater than the second "Reject" number in column 7, reject the batch.

f) Record the results.

17.2 Inspection procedure for infiltration test

The production from each machine shall be sampled on a daily basis at the following rates:

up to 200 pipes:

2 201 and above: 3

If the batch fails a second sample shall be taken of double the size of the first sample and tested in accordance with 15.2.

If the second sample passes the whole of the batch shall be accepted except those pipes which failed to achieve 50 % of the infiltration rate shown in column 2, Table 2.

Should the second sample fail, the batch shall be rejected.

18 Marking

18.1 Pipe

Each pipe which is made with sulfate-resisting Portland cement shall be clearly marked with blue indelible paint.

Each class 2 pipe (see 15.1) shall be clearly marked with yellow indelible paint.

18.2 Documentation

The delivery note issued by the manufacturer in respect of all pipes manufactured in accordance with this standard shall clearly state the following information:

a) the number of this British Standard, i.e. BS 5911-114[1)];

b) the type of cement used in the manufacture of this pipe;

c) the strength classification, i.e. class 1 or 2;

d) whether admixtures have been used;

e) the date of manufacture.

[1)] Marking BS 59l 1-114 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 therefore solely the responsibility of the person making' the claim. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.

Appendix A Information to be supplied in an enquiry and order

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

a) quantity, category and nominal sizes of pipes (see clause **7**);

b) if any restriction on effective length is to apply (see clause **8**);

c) crushing test loads of pipes, class 1 or 2 where applicable (see **15.1**);

d) the classification of exposure conditions for sulfate attack, if higher than exposure class 2 (see BS 8110);

e) if samples of aggregates and/or evidence of satisfactory performance of concrete made with such aggregates are required (see **4.1** and Appendix E);

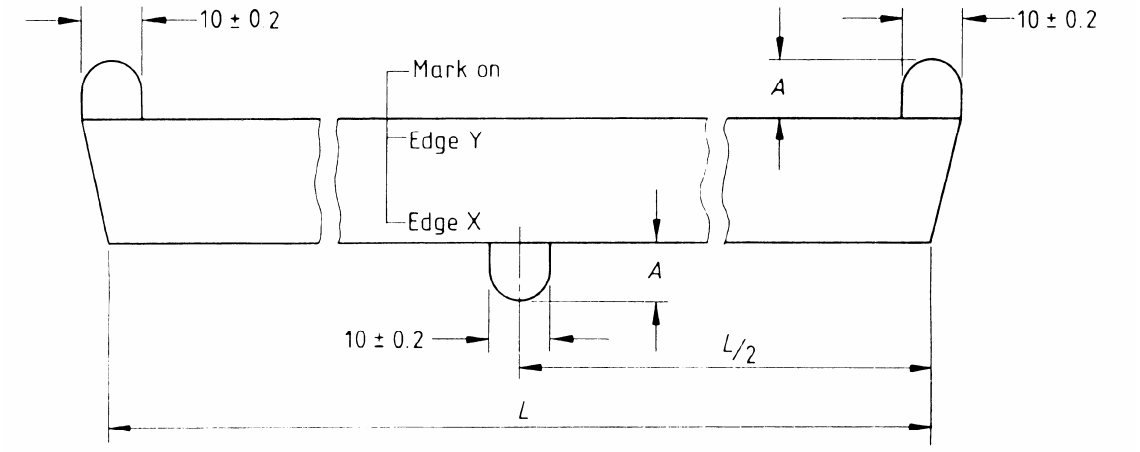
f) if any restriction on admixtures is required (see **5.2**);

g) whether details of internal and external diameter are required (see clause **9**);

h) the number and type of tests to be witnessed and if any additional tests are required (see Appendix E);

i) if the products are to be covered by a third party certification scheme (see Appendix E);

j) whether non-porous inverts are needed (see clause **13**).



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

Figure 4 — Gauge for assessing deviation from straightness

Appendix B Method of assessment of deviation from straightness

The deviation from straightness of pipes shall be assessed in the following manner.

a) Place a rigid straightedge, made into a gauge of the form and dimensions shown in Figure 4, in the bore of the pipe with edge X in contact with the pipe and on a line parallel to the pipe axis. Hold the plane of the gauge in a radial plane.

   If both ends of the gauge, when so placed, are in contact with the internal surface of the pipe, the deviation from straightness is excessive.

   If this condition occurs at any one of four or more different positions of the gauge, the pipe does not comply with this particular requirement.

b) If both ends of the gauge, when used as described in a), are not in contact with the internal surface of the pipe, reverse the gauge so that edge Y, placed as in a) is adjacent to the internal surface of the pipe.

   If the two studs in edge Y cannot be made to touch the surface of the pipe simultaneously, the deviation from straightness is excessive.

   If this condition occurs at any one of four or more positions of the gauge approximately equally spaced around the pipe circumference, the pipe does not comply with this particular requirement.

Appendix C Method of carrying out infiltration test

Fix the pipe horizontally in a tank with each end protruding as shown in Figure 5. Make a watertight seal between the sides of the tank and the pipe.

Fill the tank with water, completely immersing the pipe. Maintain the head of water in this tank at 50 mm above the crown of the pipe throughout the test.

Collect and measure the water passing through the pipe wall and calculate the infiltration rate R from the equation:

$$R = \frac{V}{L \times t}$$

where

V is the volume of water in litres
L is the length of pipe in water in metres
t is the time during which water is collected in minutes

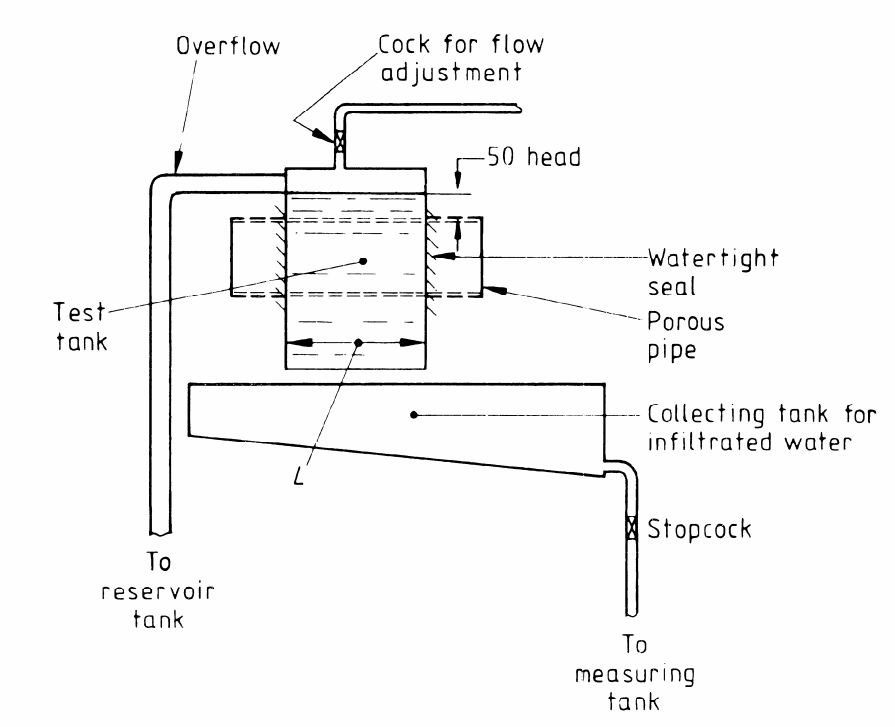


Figure 5 — An arrangement for a porous pipe testing apparatus

Appendix D Crushing load tests for pipes

D.1 Testing machine

D.1.1 A testing machine having a device that will apply the load at a uniform rate of about 30 kN per minute, or in increments of not more than 1.5 kN/m at the same rate, shall be used for making the test. The testing machine load shall be verified by the means detailed in BS 1610.

D.1.2 Ensure that the testing machine is substantial and rigid throughout so that the distribution of the load will not be affected appreciably by the deformation or yielding of any part and that, under the maximum load, the deflection of the unit is uniform throughout its length.

The bearing shall be as specified in **D.1.3** and shall be attached to the machine so as to receive and transmit uniformly the maximum loads required in the tests without lost motion, vibrations or sudden shock. The machine and bearings shall be designed to transmit the load in a vertical plane through the longitudinal centre lines of the bearings and unit. Where the testing machine is so constructed that instead of a single load a number of equal individual loads, equally spread, are applied along the bearer, ensure that the resultant of all such individual loads acts at the centre of the overall length of the unit. The loaded length of the unit used in this test may extend over the joint, at the discretion of the manufacturer.

D.1.3 The bearings shall consist of a lower number, being a rigid beam, on which two bearing strips are symmetrically disposed parallel to a vertical plane passing through the longitudinal axis of the pipe, and an upper member, also being a rigid beam, on which one bearing strip is centred and disposed so that it lies in the vertical plane passing through the longitudinal axis of the pipe.

It is permissible to interpose a timber packing strip between the beam and the rubber bearing strip as shown in Figure 6.

NOTE The machine may apply the test load either upwards or downwards on the pipe under test. For convenience, the description given here is for top loading.

D.2 Procedure

D.2.1 The pipe to be tested shall be supported in a horizontal position on two bearings parallel to its longitudinal axis. Apply the load to it along the length of the pipe through a third bearing on top of the pipe.

D.2.2 Use a low carbon steel plate to face the upper flange of the bottom beam. Ensure that the facing is straight and free from warping or twisting and is centrally and permanently located on the flange of the beam. The cross section of the facing shall be rectangular, 330 mm× 25 mm minimum, without a joint and with the addition of steel wedge strips attached to it as shown in Figure 6.

D.2.3 The bearing strips shall consist of rubber cut or formed from material having a hardness between 50 IRHD and 60 IRHD measured in accordance with BS 903-A26. The top bearing strip shall be of rectangular cross section having a width of 150 mm and a thickness of not less than 25 mm and not more than 40 mm. The two bottom bearing strips shall be of equal thickness: 150 mm wide and 25 mm thick.

Use the single top bearing strip with the 150 mm face in contact with the unit. It may be positioned on the bearing by the use of wood or metal strips along its outside edges, provided the thickness of each positioning strip does not exceed one-half the thickness of the rubber bearing strip.

Lay the lower bearing strips on the 150 mm surface. They may be positioned on the bearing with wood or metal strips between them and adjacent to their outside edges, provided the thickness of each positioning strip does not exceed one-half the thickness of the rubber bearing strips. Ensure that the two strips are parallel and 25 mm apart for all nominal sizes of pipe.

The rubber bearing strips may be attached to the facings or, in the case of the single upper strip, directly to the upper beam by adhesive if desired, provided such method of attachment results in the strip(s) remaining firmly fixed in position when carrying the maximum load.

D.3 Loading

D.3.1 Apply the load to the top bearing at a point distant from the male end of the pipe equal to one-half of the overall length of the unit. Apply this load to the top bearing in such a way that the bearing is free to rotate in a vertical plane through the longitudinal centre lines of the top and bottom bearings.

D.3.2 Ensure that the loading of the pipe is a continuous operation and that the pipe is not under load longer than is required to apply the load.

Appendix E Facilities for purchasers

The purchaser or his representative, by arrangement with the manufacturer, should at all reasonable times have free access to the places where the pipes are manufactured and tested, for the purpose of examining quality control procedures and records and of witnessing the testing and marking of units.

Representative samples of the aggregates should be supplied to the purchaser on request.

When required by the purchaser, evidence of satisfactory performance of the concrete manufactured with such aggregates should be made available at the time of placing the order.

Where the manufacturer is not covered by a scheme of third party certification, the purchaser should be permitted to select samples for test using the appropriate inspection criteria specified in this Part of BS 5911.

NOTE The allocation of the cost of carrying out any additional tests over and above the tests specified in this Part of BS 5911 is generally agreed between the manufacturer and the purchaser prior to testing.

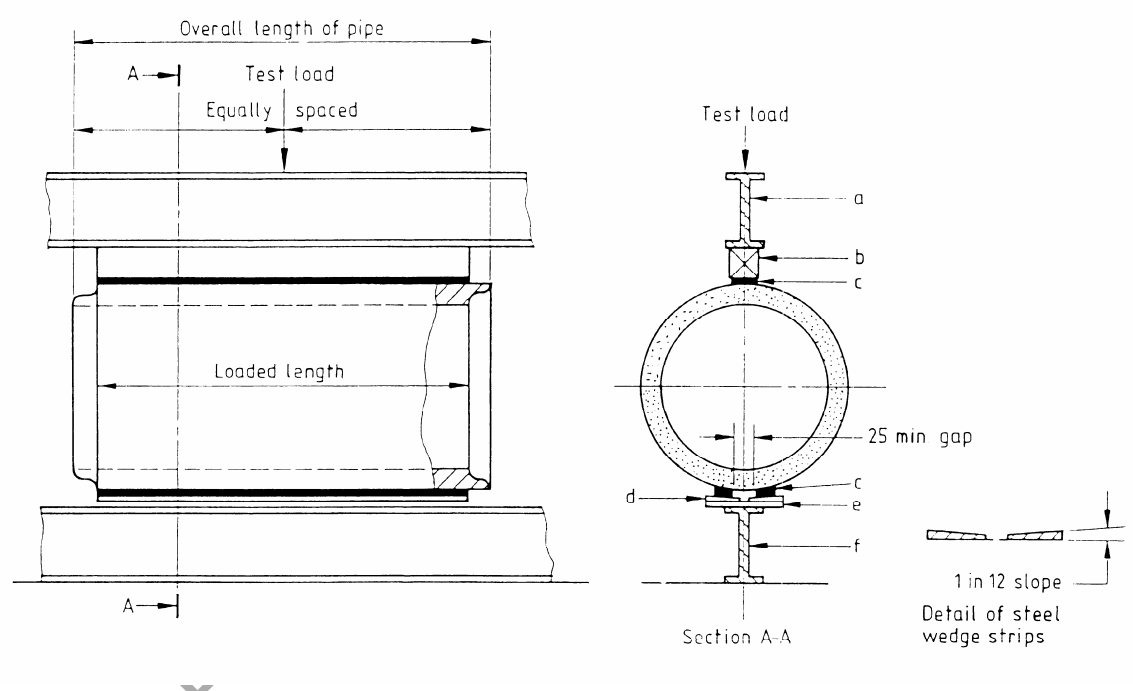


Figure 6 — Testing arrangement for the crushing test

Publication(s) referred to

BS 12, *Specification for Portland cement*

BS 146, *Specification for Portland blastfurnace cements*

BS 882, *Specification for aggregates from natural sources for concrete*

BS 903, *Physical testing of rubber*

BS 903-A26, *Determination of hardness*

BS 1610, *Materials testing machines and force verification equipment*

BS 1881, *Testing concrete*

BS 1881-5, *Methods of testing hardened concrete for other than strength*

BS 3148, *Methods of test for water for making concrete (including notes on the suitability of the water)*

BS 3797, *Specification for lightweight aggregates for masonry units and structural concrete*

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

BS 5075, *Concrete admixtures*

BS 5750, *Quality systems*

BS 5911, *Precast concrete pipes, fittings and ancillary products.*

BS 5911-100, *Specification for unreinforced and reinforced pipes and fittings with flexible joints*

BS 6001, *Sampling procedures for inspection by attributes*

BS 6001-1, *Specification for sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection*

BS 8110, *Structural use of concrete*

