SLS 847 : Part 1 : 1989

Sri Lanka Standard

SPECIFICATION FOR CEMENT BRICKS
PART 1 : REQUIREMENTS

SRI LANKA STANDARDS INSTITUTION

DRAFTING COMMITTEE ON PRECAST MASONRY UNITS

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PART 1 : REQUIREMENTS

FOREWORD

This Sri Lanka Standard was authorized for adoption and publication by the Council of the Sri Lanka Standards Institution on 1989-05-12, after the draft, finalized by the Drafting Committee on Precast masonry units, had been approved by the Civil Engineering Divisional Committee.

Cement bricks are preferred over burnt clay bricks for (a) underground applications such as manholes which require good durability and ease of construction and (b) normal masonry applications in regions of the country where burnt clay bricks are not freely available. Poor quality, arbitrary reduction of size and escalating cost of burnt clay bricks have opened new avenues for greater use of these bricks. Availability of information on hand casting, availability of locally made production equipment for manual and even automatic operation, and ease with which dimensional tolerances and strength requirements can be attained are factors that will lead to further popularization of cement bricks in the future.

A Sri Lanka Standard on cement bricks was considered opportune in order to (a) encourage better quality control ; (b) instill greater confidence in designers, manufacturers and users ; (c) benefit from knowledge incorporated in similar standards of other countries; and (d) provide procedures for testing.

This part of the standard deals with requirements for compliance and specifies materials, dimensions, tolerances, strength requirements, physical requirements, sampling and criteria for conformity, and a method of marking. Part 2 of this standard specifies test methods related to cement bricks.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or an analysis, shall be rounded off in accordance with CS 102. The number of significant figures to be retained in the rounded off value shall be the same as that of the specified value in this standard.

In the preparation of this standard the assistance derived from the publications of the British Standards Institution, the Standards Association of Australia, and the American Society for Testing and Materials is gratefully acknowledged.

1 SCOPE

This part of the standard deals with requirements for compliance and specifies materials, sizes and dimensional tolerances and minimum performance levels for cement bricks for construction work.

2 REFERENCES

BS CP 3 Chapter V : Part 2 : Wind loads.
BS 882 Aggregate from natural sources for concrete.
BS 1014 Pigments for Portland cement and Portland cement products.
SLS 107 Ordinary Portland cement.
CS 124 Test sieves.
SLS 428 Random sampling methods.
SLS 522 Water for making concrete.
SLS 847 Cement bricks : Part 2 : Test methods.

3 DEFINITIONS

For the purpose of this specification the following definitions shall apply :

3.1 brick : A masonry unit not exceeding 337.5 mm in length, 225.0 mm in width or 112.5 mm in height.

3.2 fixing brick : A masonry unit of same dimensions as a brick, which permits the easy driving of, and provides a good purchase for, nails or screws.

3.3 types of brick : A solid brick, a perforated brick, a hollow brick and cellular brick.

3.3.1 solid brick : A brick satisfying any of the following conditions :

a) a brick without holes or frogs;
b) a brick having holes (less than 20 mm wide or less than 500 mm^2 in area passing through or nearly through the brick) not exceeding 25 per cent of its volume; and
c) a brick having frog(s) {(depression(s) in the bed face(s) of a brick)} not exceeding 20 per cent of its volume.

NOTE

Other types of bricks such as perforated bricks, hollow bricks or cellular bricks are not covered in this specification.

3.4 size : The co-ordinating size or the work size.

3.4.1 co-ordinating size : The size of a co-ordinating space allocated to a brick including allowances for joints and tolerances.

3.4.2 work size : The size of a brick specified for its manufacture (to which its actual size should conform within specified permissible deviations).

3.5 height : The vertical dimension of a brick measured perpendicular to the base when the brick is used in its normal aspect.

3.6 length : The larger dimension measured along an edge of a brick in the plane which is used as the base of the brick.

3.7 width : The shorter dimension measured along an edge of a brick in the plane which is used as the base of the brick.

3.8 compressive strength : The average value of the crushing strength of ten or more bricks tested in accordance with 4 of **SLS 857 : Part 2 : 1989**, provided that the lowest crushing strength of any individual brick is not less than 75 per cent of the average value of the crushing strength of the bricks tested.

NOTE
When the lowest crushing strength of any individual brick does not satisfy the above condition, the compressive strength is taken as 1.33 times the lowest crushing strength of any individual brick.

3.9 drying shrinkage : The difference between the length of a specimen (cut from a brick), which has been immersed in water and its length when subsequently dried, all under specified conditions. It is usually expressed as a percentage of the dry length.

3.10 wetting expansion : The difference in length of a specimen when dried to constant length and that when subsequently immersed in water, all under specified conditions. It is usually expressed as a percentage of the dry length.

3.11 brick density : The density calculated by dividing the mass of a brick by the overall volume including holes and cavities, if any.

4 MATERIALS

4.1 Cement

The cement used in the manufacture of bricks shall be ordinary Portland cement conforming to the requirements of SLS 107.

NOTE

Other types of cement complying to any other national standard acceptable to the Sri Lanka Standards Institution may also be used.

4.2 Aggregates

Aggregate or aggregates used in the manufacture of bricks shall be clean and free from deleterious matter and shall conform to the requirements of BS 882.

NOTE

Aggregate complying to any other national standard acceptable to the Sri Lanka Standards Institution may also be used.

4.3 Water

The water to be used in the manufacture of bricks shall conform to the requirements of SLS 522.

5 ADDITIVES OR ADMIXTURES

Additives or admixtures may be used either as additives to the cement during manufacture, or as admixtures to the concrete mix.

Additives or admixtures used in the manufacture may be one or more of the following :

(a) Pigments, which shall comply with BS 1014, or any other standard acceptable to the Sri Lanka Standards Institution; where appropriate, they shall also be suitable for use in a product which is steam cured at atmospheric pressure or high pressure ;

(b) Substances to control or adjust the setting and hardening times of the mix ;

(c) Substances to improve the workability of the mix and reduce the permeability of the product ;

(d) Substances to cause air entrainment, foaming or gas generation ; and

(e) Waterproofing or hydrophobic compounds.

6 DIMENSIONS AND TOLERANCES

6.1 Sizes

The purchaser shall specify the work size, that is the face dimensions and width of the brick in Table 1.

TABLE 1 - Work sizes of Bricks

Length mm	Height mm	Width mm	
		90	103
190	65	X	–
190	90	X	–
215	65	–	(X)
290	90	X	–

NOTES

1. To obtain the co-ordinating size of a brick, add the nominal joint width, which is normally 10 mm, to the length and height of the brick given in Table 1 (The width remains unchanged).

2. The preferred size is shown encircled.

6.2 Tolerances

The maximum dimensional deviations for bricks measured in accordance with 5 of SLS.847 : Part 2 : 1989 shall be as in Table 2.

TABLE 2 - Tolerances of dimensions

Dimension	Maximum dimensional deviation for bricks	
Length	+ 4 mm	– 2 mm
Height	+ 2 mm	– 2 mm
Average width	+ 2 mm	– 2 mm
Width at any point	Not a requirement	

7 SURFACE TEXTURE AND FINISH

7.1 Surface characteristics

When intended for use with rendering or plastering, the surface characteristics of the brick shall be such as to provide a satisfactory bond.

7.2 Form

Subject to the provisions of 7.4 and the tolerance specified in 6.2, the faces of the bricks shall be flat and rectangular. Opposite faces shall be parallel and all arrises shall be square.

7.3 Joints

The bedding surfaces shall be at right angles to the faces of the bricks. The ends of the bricks which form the vertical joints shall generally be plain butt.

7.4 Bricks with special faces

Bricks in the following categories may be supplied by mutual agreement between purchaser and the supplier :

a) bricks having profiled faces ;
b) bricks having special facing backed with concrete as an integral part of manufacturer ; and
c) bricks having a special face applied to the brick subsequent to moulding.

The profile and/or facing including thickness of any integral or applied facing and its suitability for its intended purpose shall be as previously agreed between the purchaser and the supplier. Bricks with special faces shall be deemed to comply with this specification provided that the bricks conform to the test requirements appropriate to them.

8 VISUAL APPEARANCE

All bricks shall be sound, free from cracks, broken edges, honeycombing and other defects that would interfere with the proper placing of bricks or impair the strength or permanence of construction.

9 STRENGTH

By the time the bricks are despatched from the place of manufacture the bricks shall conform to the following strength requirements :

(a) The compressive strength (average crushing strength of 10 bricks or more) shall be not less than 2.8 N/mm²; and

(b) The corresponding lowest crushing strength of any individual brick shall be not less than 75 per cent of the minimum permisible compressive strength given in (a) as tested in accordance with **4 of SLS 847 : Part 2 : 1989.**

10 PHYSICAL PROPERTIES

At the time of dispatch of bricks from the place of manufacture a sample as specified in 12 shall be tested in accordance with the relevant method given in Table 3. The average value of the particular physical property shall not exceed the specified value in Table 3.

TABLE 3 – Methods of tests and specified values for physical properties

Physical property	specified value	Method of test in following clauses of SLS ...* Part 2 : 1989
a) Drying shrinkage	0.06 per cent	7
b) Wetting expansion	0.03 per cent	8
c) Water absorption	240 kg/m³	9
d) Moisture content	40 per cent	9

11 CERTIFICATE OF COMPLIANCE

11.1 The manufacturer shall satisfy himself that the bricks conform to the requirements of this specification and, if requested, shall supply a certificate to this effect to the purchaser or his representative.

11.2 If the purchaser or his representative requires independent tests the samples shall be taken before or immediately after delivery at the option of the purchaser or his representative and the tests shall be carried out in accordance with SLS 847 : Part 2 : 1989.

11.3 Unless otherwise specified in the indent or order, the cost of the tests shall be borne as follows :

a) By the manufacturer in the event of the results showing that the bricks do not conform to this specification ; or

b) By the purchaser in the event of the results showing that the bricks conform to this specification.

12 SAMPLING AND CRITERIA FOR CONFORMITY

12.1 Lot

All cement bricks of same size, type and batch of manufacture or supply shall constitute a lot.

12.2 Scale of sampling

12.2.1 Samples from each lot shall be tested for ascertaining its conformity to the requirements of this specification.

12.2.2 Twenty bricks shall be taken from every 3000 units or part thereof.

12.2.3 The sample of bricks shall be taken in accordance with one of the procedures given in **12.2.3.1** or **12.2.3.2.** It is preferable to do sampling of bricks in motion.

12.2.3.1 Sampling of bricks in motion

Whenever practicable, samples shall be taken when the bricks are moved as in the case of loading or unloading. The batch from where samples are to be drawn, shall be divided into a number of convenient portions and equal number of bricks shall be drawn from each portion to constitute the sample.

12.2.3.2 Sampling of bricks from a stack
The number of bricks required for the test shall be taken at random from across the stack, the sides accessible and from the interior of the stack by opening trenches from the top.

12.2.4 The bricks shall be drawn at random. In order to ensure randomness of selection a method given in **SLS 428** shall be used.

12.3 Number of tests

12.3.1 All bricks selected as in **12.2** shall be inspected for requirements given in **6,7** and **8.**

12.3.2 The bricks of the sample selected as in **12.2** shall be divided into four parts and the bricks of each part shall be individually tested as given in Table 4.

Table 4 - Sample sizes for the specified tests

Requirement(s)	Number of bricks required per consignment of 3 ØØØ or part thereof
Strength	1Ø
Water absorption and moisture content	3
Drying shrinkage and wetting expansion	3
Density	4

12.4 Criteria for conformity
A lot shall be declared as conforming to the requirements of this specification if the conditions specified in **12.4.1, 12.4.2, 12.4.3** and **12.4.4** are satisfied .

12.4.1 The number of bricks not conforming to one or more requirements given **in 6,7** or **8** is less than or equal to two bricks for every twenty bricks in the sample.

12.4.2 The compressive strength of the sample shall conform to the requirements of **9.**

12.4.3 For water absorption and moisture content, the average value of each is less than or equal to the corresponding maximum value specified in **10.**

12.4.4 For drying shrinkage and wetting expansion the average value of each is less than or equal to the corresponding maximum value specified in **10.**

13 MARKING

The following particulars relating to bricks shall be clearly indicated on the delivery note, invoice, or supplier's certificate supplied with each consignment of bricks:

a) the name, address, and where available, trade mark of the manufacturer ;

b) the compressive strength in N/mm^2;

c) the length, height and width of the brick ; and

d) the type of bricks i.e solid, fixing, or special faced bricks.

NOTE

Attention is drawn to certification facilities offered by SLSI (See the inside back cover of this standard).