TECHNICAL GUIDE FOR BLOCKS USED IN CONSTRUCTION SITES IN THE EMIRATE OF DUBAI

REVISION HISTORY

Issue Date	Revision	Revision Description
28.06.2020	2.0	TG 1 Part 1 (Masonry)
28.06.2020	02	TG 1 Part 2 (Filler)
05.06.2020	05	TG 1 Part 3 (AAC)
28.06.2020	5.0	TG 1 Part 4 (Paving)
14.08.2011	01	TG 1 Part 5 (Sandwich)
14.02.2006	2	TG 17 (Clay)
17.07.2024	01	ISSUE FOR USE (Merging)

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FOREWORD

To ensure the health and safety of all the stakeholders as the primary aim of the government, the Dubai Municipality-Dubai Central Laboratory Department (DM-DCLD), in addition to other regulatory departments within DM, are working jointly for the creation, formulation, and development of comprehensive sets of unified Technical Guides (TG), and ensuring their suitability with the local environmental conditions, drawing guidance with some International and Regional Norms to consistently meet the local, regional, and international standards.

Based on the Local Order 44 issued in 1990 as amended by the Local Order (1) 2012 on " Technical Guide of Concrete Blocks Used in the Emirate of Dubai", this guide is developed to combine all previously issued relevant Technical Guides for blocks , taking into account the latest developments in terms of materials including the use of recycled materials, the types of blocks, the innovations in manufacturing technology, the availability of the testing facilities and test methods, and the requirements set forth by the local authorities.

The combined guide specification is composed of six (6) parts as follows:

Part 1: Masonry blocks

Part 2: Filler blocks

Part 3: Autoclaved aerated concrete (AAC) masonry blocks

Part 4: Paving blocks

Part 5: Concrete–thermal sandwich masonry blocks

Part 6: Clay Masonry Blocks

This guide specification publication does not cover all the necessary provisions of a contract and the users are responsible for its correct application.

Compliance with DM requirements cannot confer immunity from legal obligations, neither it does allow the use and/or delivering the blocks directly to the construction sites within the emirate of Dubai; unless all other set DM requirements are fully met and complied with.

SCOPE

TG Specification for Blocks used in Construction Sites specifies the requirements for the different types of blocks generally used in construction sites within the emirate of Dubai.

It covers the following types of blocks which specify the minimum requirements and performance levels for each type and applications:

- Normal-weight and lightweight precast concrete masonry blocks as specified in part 1 of the guide.
- Normal-weight and lightweight precast filler blocks used as non-structural fillers in the construction of reinforced concrete cast in-situ ribbed slabs, as specified in part 2 of the guide.
- Autoclaved aerated concrete masonry (AAC) units, as specified in part 3 of the guide.
- Precast concrete paving blocks, as specified in part 4 of the guide.
- Normal weight and lightweight precast concrete-thermal sandwich masonry blocks, as specified in part 5 of the guide.
- Fired-clay hollow masonry blocks for general use, as specified in part 6 of the guide.

The guide specification describes product characteristics and includes procedures for testing and evaluation of conformity. However, the performance of systems incorporating the above-mentioned products is not covered.

DEFINITIONS

Masonry Block

A precast concrete masonry block manufactured from cementitious binder, aggregates, and water, which may contain admixtures and additions, coloring pigments, and other materials incorporated or applied during or after block manufacture intended for use in the construction of walls.

Solid Block

A block that contains no formed holes.

Cellular Block

A block that has one or more formed holes that do not pass through the blocks.

Hollow Block

A precast concrete block that has one or more formed holes that pass through the block.

Filler Block

A filler block is a solid or hollow block manufactured from cementitious binder, aggregates, and water and which may contain admixtures, additions, coloring pigments and other materials incorporated or applied during or subsequent to manufacture and is used as fillers in the construction of ribbed slabs.

AAC Block

A block manufactured from hydraulic binders such as cement and/or lime, combined with siliceous-based fine materials (sand), cell-generating material and water. AAC blocks are intended for use in the construction of walls.

Paving Block

A precast concrete block intended for the construction of paved surfaces.

Sandwich Block

A precast concrete block consisting of two outer leaves of concrete sandwiching a polystyrene core, or any core thermal insulation materials.

Clay Block

A hollow block manufactured from clay intended to be used for non-load-bearing masonry.

Insulated Block

A block with a thermal insulation material inserted in one or more of its cavities.

Normal Weight Concrete

Concrete having an oven-dry density greater than 2000 kg/m^3 but not exceeding 2600 kg/m^3.

Lightweight Concrete

Concrete that has an oven-dry net density not more than 2000 kg/m^3. It is produced using lightweight aggregate with full or partial replacement of the lightweight fines with normal-weight sand.

Aggregates

Granular materials, such as sand, gravel, crushed stone, crushed hydraulic-cement concrete, or iron blast-furnace slag, used with a cementing medium to produce either concrete or mortar.

Admixture

Material added during the mixing process in small quantities related to the mass of cement to modify the properties of fresh or hardened concrete.

Binders

Any material or substance that holds or draws other materials together to form a cohesive whole mechanically, chemically, by adhesion or cohesion.

Pigments

Is a powder used to add color or change visual appearance.

Expanded Polystyrene

Rigid cellular plastic material, manufactured by molding beads of expandable polystyrene or one of its copolymers, with an air-filled closed cellular structure.

Extruded Polystyrene

Rigid cellular plastic insulation material extruded with or without a skin, from polystyrene or one of its copolymers and which has a closed cell structure.

Thermal Insulation Material

A rigid or semi-rigid material with a low thermal conductivity property not exceeding 0.05 W/(m.K) tested at 35 ºC and 60% relative humidity (RH).

Length

The largest dimension of the horizontal plane of installation.

Width

The smallest dimension of the horizontal plane of installation.

Height

The vertical dimension perpendicular to the installation plane.

Lot

Refers to any number of concrete blocks of any configuration or dimension manufactured by the producer using the same materials, concrete mix, manufacturing process, and curing method.

REFERENCES

This document incorporates provisions from other references, which are cited and updated at the appropriate points in the text, but the latest edition applies (including amendments). If any reference is shown as dated, then that specific edition shall be used. The titles of these references are listed on the last page of this guide.

1 PART 1 - MASONRY BLOCKS

1.1 SCOPE

This part of the guide specifies the minimum performance levels for normal-weight and lightweight precast concrete masonry blocks.

1.2 REQUIREMENTS FOR MATERIALS

Refer to Annex F.

1.3 REQUIREMENTS FOR MASONRY BLOCKS

1.3.1 Shape

Blocks shall have a regular and uniform shape, free of cracks and defects, and have rough surfaces to provide a key for plastering.

1.3.2 Sizes

1.3.2.1 Work Size

The size of a masonry block specified for its manufacture, to which its actual size should conform within specified permissible deviations. The work size of the blocks shall be as specified by the purchaser.

1.3.2.2 Dimensions

The dimensions of the blocks shall be declared by the manufacturer.

1.3.2.3 Shell and Web Thickness

For hollow and cellular blocks, the external shell thickness and web thickness shall conform to the requirements prescribed in Table 1.

Hollow and cellular blocks shall be provided with at least one internal web, but when the average length exceeds 400 mm there shall be two internal webs.

Table 1 - Minimum web and shell thickness of blocks

Nominal width (mm)	Shell thickness (mm)	Web thickness (mm)
100	20	20
150	25	25
≥ 200	30	25

1.3.2.4 Tolerances

When measured in accordance with BS EN 772: Part 16, the length, height, and width of each block from the sample shall not deviate by more than ±3 mm from the declared dimensions.

1.3.2.5 Net Density of Blocks

Block manufacturers shall declare the net density of each type and configuration of their masonry blocks. When tested in accordance with BS EN 772: Part 13, the net density of each type and configuration shall not deviate by more than ±10% from the declared value.

1.3.2.6 Chloride and Sulphate Content

When tested in accordance with BS 1881: Part 124, the acid-soluble chloride (Cl) and sulphate (SO_3) content of masonry blocks shall not exceed 0.05% and 0.5% by mass of concrete respectively.

1.3.2.7 Compressive Strength

When tested in accordance with BS EN 772: Part 1 or by using the rapid compressive strength method as per "Annex A" of this TG, the average compressive strength based on gross area of masonry blocks and that of an individual specimen shall not be less than the values given in Table 2.

Table 2 - Minimum compressive strength of masonry blocks based on gross area.

Type of masonry blocks		Strength N/mm^2	
		Average	Individual
For Non load bearing walls	Normal weight concrete	7.5	6
	Lightweight concrete	3.2	2.6
For load bearing walls	Normal & Light weight concrete	12	9
NOTE: Designers may specify blocks of higher strength than those given in this Table if required from design considerations.			

1.3.2.8 Drying Shrinkage

When tested in accordance with ASTM C 426, for a sample of four masonry blocks, the average drying shrinkage shall not exceed 0.06%.

1.3.2.9 Thermal Conductivity

For blocks intended to be used in elements subject to thermal requirements, the thermal conductivity of blocks shall be declared by the manufacturer according to BS EN ISO 10456 at 35 ºC and 60% relative humidity (RH).

When tested in accordance with any of the following standards:

- BS EN 12664,
- BS EN 12667,
- BS EN 1934,
- BS EN ISO 8990,
- ASTM C 1363,

at 35 ºC and 60% RH, block thermal conductivity shall not exceed the declared value.

As an alternative, the thermal conductivity of the blocks shall be calculated according to BS EN ISO 6946 taking into consideration the block configuration and concrete thermal conductivity declared by the manufacturer at 35 ºC & 60% RH.

The thermal conductivity of the wall shall conform to the requirements as per clause E.5.2.3.1 of the Dubai Building Code.

1.4 DURABILITY ASPECT

Under normal exposure conditions of use in the Arabian Gulf region environment, precast concrete masonry blocks will continue to provide satisfactory strength, provided they conform to clause (1.3) above.

1.5 VISUAL ASPECTS

1.5.1 Appearance

Masonry Blocks shall be sound and free of defects that would interfere with the proper placing on the units or impair the strength or performance of the construction and shall have a uniform texture. The faces of the blocks shall not exhibit defects such as cracking.

1.5.2 Special Texture

In the case of blocks produced with special surface textures, the texture shall be described by the manufacturer.

1.6 SAMPLE REQUIREMENTS

For the minimum number of test specimens, refer to Annex G.

2 PART 2- FILLER BLOCKS

2.1 SCOPE

This part of the guide specifies the minimum performance levels for precast concrete filler blocks used as non-structural fillers in the construction of reinforced concrete cast in-situ ribbed slabs.

2.2 REQUIREMENTS FOR MATERIALS

Refer to Annex F.

2.3 REQUIREMENTS FOR FILLER BLOCKS

2.3.1 Shape

The blocks shall be shaped so that they cannot slip out of the cast in situ concrete. Block surfaces shall be clean, plain, and free from cracks and flaws.

2.3.2 Sizes

2.3.2.1 Work Size

The size of filler blocks shall be as specified by the purchaser. If the blocks are trapezoidal, the difference in length-top and length-bottom shall not be less than 20 mm nor more than 40 mm.

2.3.2.2 Dimensions

The dimensions of blocks shall be declared by the manufacturer.

2.3.2.3 Internal Webs

Hollow filler blocks shall be provided with at least one internal web, but when the average length exceeds 400 mm there shall be two internal webs. The minimum thickness of the external shell and web of filler blocks shall not be less than 25 mm.

2.3.2.4 Tolerances

When measured in accordance with BS EN 772: Part 16, the length top, length bottom, height, or width of each block from the sample shall not deviate by more than ±3 mm from the declared dimensions.

2.3.3 Net Density of Blocks

Block manufacturers shall declare the net density of each type and configuration of their filler blocks. When tested in accordance with BS EN 772: Part 13, the net density of each type and configuration of shall not deviate by more than ±10% from the declared value.

2.3.4 Chloride and Sulphate Content

When tested in accordance with BS 1881: Part 124, the acid-soluble chloride (Cl) and sulphate content (SO_3) by mass of filler block concrete shall not exceed 0.05% and 0.5 % by mass of concrete respectively.

2.3.5 Compressive Strength

The compressive strength test shall be carried out on air-dry filler block specimens. The filler block specimen shall be tested with both faces under compression reflecting each other's exact shape and size. Filler blocks may be sawn appropriately to suit machine platen dimensions. The testing method shall be as specified in BS EN 772: Part 1 or by using the rapid compressive strength method as per "Annex A" of this TG.

The compressive strength of filler blocks based on gross area shall not be less than the values given in Table 3

Table 3 - Minimum compressive strength of filler blocks based on gross area.

Type of filler blocks	**Strength N/mm^2**	
	Average	Individual
Normal weight concrete / Lightweight concrete	3.2	2.6
NOTE: Designers may specify blocks of higher strengths than those given in this Table if required from design considerations.		

2.3.6 Drying Shrinkage

When tested in accordance with ASTM C 426, for a sample of four blocks, the average drying shrinkage shall not exceed 0.06%.

2.3.7 Thermal Conductivity

For blocks intended to be used in elements subject to thermal requirements, the thermal conductivity of filler blocks shall be declared by the manufacturer according to BS EN ISO 10456 at 35ºC and 60% relative humidity (RH)

When tested in accordance with:

- BS EN 12664
- BS EN 12667
- BS EN 1934
- BS EN ISO 8990
- ASTM C 1363,

at 35ºC and 60% RH, block thermal conductivity shall not exceed the declared value.

As an alternative, the thermal conductivity of the blocks shall be calculated according to BS EN ISO 6946 taking into consideration the block configuration and concrete thermal conductivity declared by the manufacturer at 35ºC & 60% RH.

2.4 DURABILITY ASPECT

Under normal exposure conditions of use in Arabian Gulf region environment, precast concrete filler blocks will continue to provide satisfactory strength, provided they conform to clause (2.3) above.

2.5 VISUAL ASPECTS

2.5.1 Appearance

Filler Blocks shall be sound and free of defects that would interfere with the proper placing on the units or impair the strength or performance of the construction and shall have a uniform texture. The faces of the blocks shall not exhibit defects such as cracking.

2.5.2 Special Texture

In the case of blocks produced with special surface textures, the texture shall be described by the manufacturer.

2.6 **SAMPLE REQUIREMENTS**

For the minimum number of test specimens, refer to Annex G.

3 PART 3 - AUTOCLAVED AERATED CONCRETE MASONRY UNITS

3.1 **SCOPE**

This part of the guide specifies the materials and minimum performance levels for autoclaved aerated concrete masonry units.

3.2 **MATERIALS OF MANUFACTURE**

3.2.1 The following materials of manufacture combined with additives and agents where appropriate may be used in the manufacturing process:

3.2.1.1 Cement conforming to the requirements of ASTM C 150, or BS EN 197.

3.2.1.2 Lime conforming to the requirements of BS 890.

3.2.1.3 Water conforming to the requirements of BS EN 1008.

3.2.1.4 Siliceous-based material.

3.2.1.5 Cell-generating material.

3.2.2 Any other material can be used by the manufacturer providing that the material will be subjected to the approval of DM-DCLD.

NOTE 1: The use of recycled material is permitted, provided however that the requirements of the final product will still be complied. The manufacturer shall keep all quality checks and records related to the control criteria of the added percentage of recycled material and the production control parameters.

NOTE 2: The raw materials are mixed and cast into molds where the mix is allowed to rise and set into cakes. After this process, the cake is cut into the required sizes of blocks and cured with high-pressure steam in autoclaves.

3.3 REQUIREMENTS FOR AAC BLOCKS

3.3.1 Gross Density

Block manufacturers shall declare the maximum gross density of each type and configuration of their masonry blocks. Declared gross density shall not be more than 850 kg/m^3.

When tested in accordance with BS EN 772: Part 13, the gross density of each type and configuration of the masonry blocks shall not exceed the declared value.

3.3.2 Chloride and Sulphate Content

When tested in accordance with BS 1881: Part 124, the acid-soluble chloride (Cl) and sulphate (SO_3) content of blocks shall not exceed 0.05% and 1.0% by mass of dry concrete respectively.

3.3.3 Drying Shrinkage

When tested in accordance with BS EN 680, the average drying shrinkage shall not exceed 0.9 mm/m.

3.3.4 Thermal Conductivity

For blocks intended to be used in elements subject to thermal requirements, the thermal conductivity of blocks shall be declared by the manufacturer according to BS EN ISO 10456 at 35ºC and 60% relative humidity (RH).

When tested in accordance with ASTM C 518 at 35ºC and 60% RH AAC thermal conductivity shall not exceed the declared value.

3.4 DURABILITY ASPECT

Under normal exposure conditions of use in Arabian Gulf region environment, AAC blocks will continue to provide satisfactory strength, provided they conform to clause (3.3).

3.5 VISUAL ASPECTS

3.5.1 Appearance

AAC blocks shall be sound and free of defects that would interfere with the proper placing on the units or impair the strength or performance of the construction and shall have a uniform texture. The faces of the blocks shall not exhibit defects such as cracking.

3.5.2 Special Texture

In the case of blocks produced with special surface textures, the texture shall be described by the manufacturer.

3.6 BASIC CERTIFICATION REQUIREMENTS

3.6.1 Sizes

3.6.1.1 Work Size

The size of an AAC block specified for its manufacture, to which its actual size should conform within specified permissible deviations. The purchaser shall specify the work size. Table 4 gives the most frequently used work sizes of blocks.

Table 4 - Works sizes and tolerances of blocks

	Length (mm)	**Width (mm)**	**Height (mm)**
Dimensions	390 - 590	300, 250, 200, 150, 100	200 - 250
Tolerances	± 3	± 2	± 2
NOTE: Other work sizes may also be used as per requirements.			

3.6.1.2 Dimensions

The dimensions of blocks shall be declared by the manufacturer.

3.6.1.3 Tolerances

When measured in accordance with BS EN 772-16, the tolerances in length, height, or width of each block from the sample shall not exceed the limits shown in Table 4.

3.6.2 Strength

When tested at the air-dry condition in accordance with BS EN 772: Part 1, the average normalized compressive strength and that of an individual specimen shall be not less than the values given in Table 5.

Table 5 - Minimum compressive strength of AAC blocks in N/mm^2.

Average	Individual
3.2	2.6
NOTE: Designers may specify blocks of higher strength than those given in this Table if required from design considerations.	

3.7 SAMPLE REQUIREMENTS

For the minimum number of test specimens, refer to Annex G.

4 PART 4- PAVING BLOCKS

4.1 SCOPE

This part of the guide specifies the minimum performance levels for precast concrete paving blocks.

4.2 GENERAL REQUIREMENTS

4.2.1 Requirements For Materials

Refer to Annex F.

4.2.2 Binders

Products shall be made using one or more of the binders conforming to any of the following standards:

ASTM C 150

BS EN 197-1

BS EN 15167-1

ASTM C989/C989M

BS 3892-Part 1

BS EN 450-1

ASTM C 618-17

4.2.3 Aggregates

Products shall be made using one or more of the aggregates conforming to ASTM C404 and equivalent standards.

4.2.4 Admixtures

Proprietary accelerating, retarding and water reducing agents shall conform to the BS EN 934 parts (1, 2 & 3) and any equivalent standards.

Where admixtures are formulated from a combination of materials, including those specified above, then the accelerating, retarding and water reducing ingredients, where they are included in such combinations, shall conform to the BS EN 934 parts (1, 2 & 3) and any equivalent Standards.

Any other admixtures employed shall be supported by evidence confirming that no adverse effect on the properties required by this technical guide will result.

4.2.5 Pigments

Pigments supplied in powder form shall conform to BS EN 12878 and any equivalent Standards.

4.3 REQUIREMENTS FOR PAVING BLOCKS

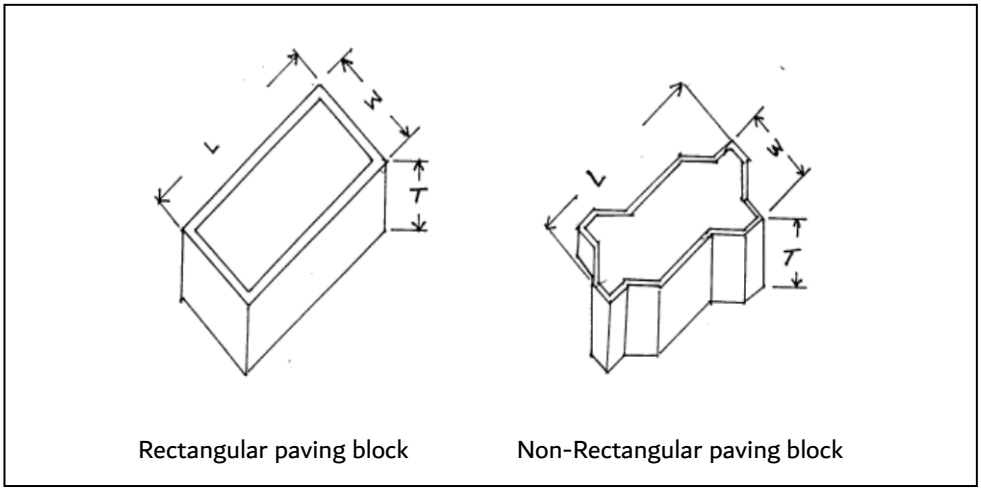
4.3.1 Size and Shape

4.3.1.1 Work Size

Paving block units shall be of any size and shape and shall have an exposed face area less than or equal to 90,000 mm², and the maximum overall dimension divided by thickness shall be less than or equal to 5, see Figure 1. The paving blocks shall not have a work size thickness less than 60 mm. All that arises shall be clean, plane, and uniform dimension.

4.3.1.2 Dimensions

The size and shape of blocks shall be as specified by the purchaser. All details, including dimensions of blocks with profiled sides, shall be declared by the manufacturer.



Rectangular paving block Non-Rectangular paving block

Figure 1 : Example shape of paving blocks

4.3.2 Dimensions and Maximum Tolerances

The maximum average dimensional deviations from the declared sizes when measured in accordance with "Annex B" shall be within the values ± 3 mm length, width, and thickness.

A sample consisting of ten (10) blocks shall be considered failed if four (4) or more measured average dimensions (length, width, or thickness) failed to comply with the maximum allowed deviation of ± 3 mm.

4.3.3 Compressive Strength

When a sample of ten (10) blocks is tested as per "Annex C" of this TG, the average compressive strength shall not be less than 49 N/mm^2 and the crushing strength of any individual block shall not be less than 40 N/mm^2.

NOTE: Only for blocks with a work plan area less than or equal to 5000 mm^2 and thickness ≥ 80mm. The average Compressive Strength shall not be less than 40 N/mm^2 and the crushing strength of any individual block shall not be less than 35 N/ mm^2.

4.3.4 Water Absorption

When a sample of three (3) blocks is tested as per "Annex D", the average absorption shall not be greater than 5 %, with no individual unit with a value greater than 7%.

4.3.5 Abrasion Resistance

When a sample of three (3) blocks is tested as per (BS EN 1338 - Annex G), no individual test result shall be greater than 20 mm.

4.3.6 Chloride and Sulphate Content

When a sample of one (1) block is tested in accordance with BS 1881-124:2015 – TC the acid soluble chloride content (Cl) and the acid-soluble sulphate content (SO_3) shall not exceed 0.05 % and 0.7% by mass of concrete respectively.

4.3.7 Solar Reflective Index

When used as hardscapes in building projects, 50 % of hardscapes materials shall demonstrate a Solar Reflective Index (SRI) of at least 29. *(Refer to clause K.5.12.1 of the Dubai Building Code)*

4.4 DURABILITY ASPECT

Under normal exposure conditions of use in Arabian Gulf region environment, precast concrete paving blocks will continue to provide satisfactory strength, provided they conform to clause (4.3) above and are subject to normal maintenance.

4.5 VISUAL ASPECTS

4.5.1 Appearance

Paving blocks shall be sound and free of defects that would interfere with the proper placing on the units or impair the strength or performance of the construction and shall have uniform color and texture. The upper faces of the concrete paving blocks shall not exhibit defects such as cracking or flaking.

4.5.2 Special Texture

In the case of blocks produced with special surface textures, the texture shall be described by the manufacturer.

4.5.3 Color

Colors may be provided in a facing layer or throughout the block at the manufacturer's discretion.

Colored interlocks shall comply with the requirements under clause 4.4.6

4.6 SAMPLE REQUIREMENTS

For the minimum number of test specimens, refer to Annex G.

5 PART 5- CONCRETE-THERMAL SANDWICH MASONRY BLOCKS

5.1 SCOPE

This part of the guide specifies the minimum performance levels for normal weight and lightweight precast concrete- thermal sandwich masonry blocks. Annex E of this guide addresses the connectivity and stability requirements of a wall constructed using this type of block.

5.2 REQUIREMENTS FOR MATERIALS

Refer to Annex F.

5.2.1 Polystyrene/Other Thermal Insulation Core Properties

5.2.1.1 Size and Shape

The polystyrene /other thermal insulation core of the sandwich block shall have the same length and height of the overall concrete dimensions. Polystyrene/other thermal insulation core thickness, when measured at any point, shall not be less than 60 mm.

Polystyrene core /other thermal insulation core shall have a dovetailing shape as shown in Fig. 2. Other shapes can also be used.

The polystyrene core shall be either molded or extruded to shape. Other thermal insulation core shall be produced according to applicable manufacturing process.

5.2.2 Apparent Density

For polystyrene / other thermal insulation core materials, when tested in accordance with BS EN 1602, the average apparent density shall not be less than 25 kg/m^3.

5.2.3 Thermal Conductivity

Figure 2: Shape of polystyrene / other thermal insulation core

Thermal conductivity of the polystyrene/other thermal insulation core shall be declared by the polystyrene/other thermal insulation manufacturer according to BS EN ISO 10456 at 35 ºC and 60% relative humidity (RH).

When tested in accordance with BS EN 12667 or ASTM C 518, at 35 ºC & 60% RH, polystyrene/other thermal insulation core average thermal conductivity of three specimens shall not exceed the declared value.

NOTE: The Polystyrene/other thermal insulation material used in the blocks shall be certified by Dubai Central Laboratory Department – Certification and Quality Control of Products and bear the DCL Conformity Mark.

It shall also comply -as applicable- with the related requirements of UAE Fire & Safety Code

5.3 REQUIREMENTS FOR SANDWICH BLOCKS

5.3.1 Shape

Sandwich-blocks shall have regular and uniform shape, free of cracks and defects and have rough surfaces to provide key for plaster.

5.3.2 Sizes

5.3.2.1 Dimensions

Sandwich-block overall dimensions shall conform to the requirements of Table 6. If air cavities exist in any of the two concrete leaves of the Sandwich-block, the shell thickness shall not be less than 20mm. A sample block is shown in Figure 3.

Table 6 - Dimensions of Sandwich-blocks

Sandwich-block sizes		
Length (mm)	**Height (mm)**	**Width (mm)**
400	200	200
400	200	250
400	200	300
400	200	350

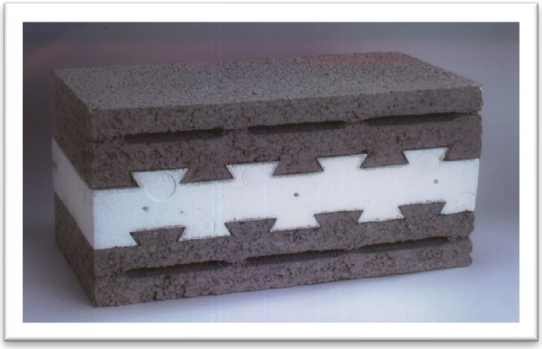


Figure 3: Sample Block

NOTE: Other dimensions can be declared by the manufacturers (Subject to approval by Dubai Municipality – Dubai Central Laboratory Department).

5.3.2.2 Tolerances

When measured in accordance with BS EN 772: Part 16, the length, height, or width of each block from the sample shall not deviate by more than ± 3 mm from the declared dimensions.

5.3.3 Manufacturing

Sandwich-blocks are manufactured using concrete cast integrally with the dovetailed polystyrene or other thermal insulation core placed in the mold and wet concrete poured around it. The concrete is then compacted and cured. These processes are to be carried out without damage to the polystyrene or other thermal insulation core.

5.3.4 Chloride And Sulfate Content

When tested in accordance with BS 1881: Part 124, the acid-soluble chloride (Cl) and sulfate (SO_3) content of Sandwich-blocks concrete shall not exceed 0.05% and 0.5% by dry mass of concrete respectively.

5.3.5 Compressive Strength

When tested in accordance with BS EN 772: Part 1 or by using the rapid compressive strength method as per "Annex A" of this TG, the average compressive strength and that of an individual specimen, based on the gross area, shall not be less than the values given in Table 7:

Table 7 - Minimum compressive strength of masonry blocks based on gross area.

Type of masonry blocks		Strength N/mm^2	
		Average	Individual
For Non load bearing walls	Normal weight concrete	7.5	6
	Lightweight concrete	3.2	2.6
For load bearing walls	Normal & Light weight concrete	12	9
NOTE: Designers may specify blocks of higher strength than those given in this Table if required from design considerations.			

Sandwich-blocks shall maintain their integrity during the compressive strength test i.e., failure pattern during compressive strength test shall not show evidence of separation between the polystyrene or other thermal insulation core and the outer concrete leaves. Any evidence of separation noticed before or during the test shall be considered as not complying with the requirement of this clause.

5.3.6 Thermal Properties

Thermal conductivity of the Sandwich-blocks shall be declared by the block manufacturer according to BS EN ISO 10456 at 35 ºC and 60% relative humidity (RH).

When tested in accordance with:
BS EN 12664
BS EN 12667
BS EN 1934
BS EN ISO 8990
ASTM C 1363,
at 35 ºC and 60% RH, Sandwich-block thermal conductivity shall not exceed the declared value. As an alternative, the thermal conductivity of the Sandwich-blocks shall be calculated according to BS EN ISO 6946 taking into consideration the block configuration, concrete and polystyrene / other thermal insulation thermal conductivities declared by their manufacturers at 35 ºC & 60% RH.

The thermal conductivity of the wall shall conform to the requirements as per clause E.5.2.3.1 of the Dubai Building Code.

5.4 DURABILITY ASPECT

Under normal exposure conditions of use in Arabian Gulf region environment, precast concrete sandwich masonry blocks will continue to provide satisfactory strength, provided they conform to clause (5.3) above.

5.5 VISUAL ASPECTS

5.5.1 Appearance

Concrete-thermal sandwich masonry blocks shall be sound and free of defects that would interfere with the proper placing on the units or impair the strength or performance of the construction and shall have uniform texture. The faces of the blocks shall not exhibit defects such as cracking. The polystyrene /other thermal insulation core shall be connected firmly with the concrete leaves without any signs of separation. The core shall not show any signs of damage or deterioration.

5.5.2 Special Texture

In the case of blocks produced with special surface textures, the texture shall be described by the manufacturer.

5.6 SAMPLE REQUIREMENTS

For the minimum number of test specimens, refer to Annex G.

5.7 INTENDED USE

Sandwich-blocks are intended to be used as thermal insulating blocks for the construction of infill, non-load bearing, masonry walls in buildings.

Sandwich-blocks shall be used in superstructures only and shall not be used in substructures.

6 PART 6 - CLAY MASONRY BLOCKS

6.1 SCOPE

This part of the guide specifies the minimum performance levels for fired-clay hollow masonry blocks for general use.

6.2 REQUIREMENTS FOR MATERIALS

6.2.1 Clay

Blocks covered by this guide shall be manufactured from clay and subjected to a heat treatment. The heat treatment must develop sufficient inter-particulate bonds to provide the strength and other property requirements of this specification.

6.2.2 Thermal Insulation Material Insert

Thermal insulation materials used as inserts shall comply with Dubai Municipality requirements for that material.

Thermal insulation inserts made of polystyrene or other types of thermal insulation shall comply with the requirements of clause (6.5) of this guide and shall be certified by Dubai Municipality - Dubai Central Laboratory.

6.3 REQUIREMENTS FOR CLAY BLOCKS

6.3.1 Sizes

6.3.1.1 Dimensions

Block dimensions shall be declared by the manufacturer.

6.3.1.2 Tolerances

When measured in the manner described in BS EN 772: Part 16, the length, height, or thickness of each block from the sample shall not exceed ± 3 mm from the declared dimensions.

6.3.2 Configurations

6.3.2.1 Blocks for general use

The shape of blocks, the directions and percentage of voids shall be declared by the manufacturer.

6.3.2.2 Insulated Clay Blocks

Insulated clay blocks shall have at least one continuous cavity, in its height as laid, in which a thermal insulation material can be inserted to enhance its thermal properties when used as thermal insulating blocks for the wall construction. Figure 4 shows an example of an insulated clay block.

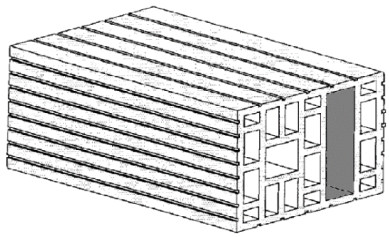


Figure 4: Insulated Clay Block

6.3.3 Density

The gross density of blocks shall be declared by the block manufacturer. When tested in accordance with BS EN 772: Part 13, for a sample of three blocks, the average gross density shall not deviate from the declared value by more than ±10%.

6.3.4 Compressive Strength

When tested at the air-dry condition in accordance with BS EN 772: Part 1, for a sample of six blocks, the average compressive strength and that of an individual specimen, based on the gross area, shall not be less than the values given in Table 8:

Table 8 - Minimum compressive strength of clay blocks based on gross area in N/mm^2.	
Average	**Individual**
3.2	2.6
NOTE: Designers may specify blocks of higher strength than those given in this Table if required from design considerations.	

NOTE: Soft board shall be used to replace the mortar capping. Blocks shall be tested in the same direction as laid in construction.

6.3.5 Water Absorption

When tested in accordance with Annex C of BS EN 771: Part 1, for a sample of five blocks, the maximum block water absorption shall not be more than the values given in Table 9:

Table 9 - Maximum water absorption of clay blocks in %	
Average	**Individual**
20%	25%

6.3.6 Efflorescence

When tested in accordance with ASTM C 67/ C 67M, for a sample of 10 blocks, the rate of efflorescence shall be “not effloresced”.

6.4 THERMAL INSULATION MATERIAL PROPERTIES

The Polystyrene/ other thermal insulation used in the blocks shall be certified by Dubai Central Laboratory Department – Certification and Quality Control of Products Section and shall bear the DCL Conformity Mark.

6.4.1 Size

Thermal insulation material insert shall have the same length and cross section of the cavity dimensions of the block where it will be inserted.

6.4.2 Thermal conductivity

Thermal conductivity of the thermal insulation material insert shall be declared by its manufacturer according to BS EN ISO 10456 at 35ºC and 60% relative humidity (RH).

When tested in accordance with:

BS EN 12667

ASTM C 518

at 35ºC & 60% RH the thermal conductivity of the thermal insulation material insert shall not exceed the declared value.

6.4.3 Apparent density

When tested in accordance with BS EN 1602, for a sample of five thermal insulation inserts, the average apparent density shall be not less than 22 kg/m3.

6.5 THERMAL PROPERTIES OF INSULATED BLOCKS

Thermal conductivity of the insulated blocks shall be declared by the block manufacturer according to BS EN ISO 10456 at 35ºC and 60% relative humidity (RH).

When tested in accordance with any of the following:

BS EN 12664

BS EN 12667

BS EN 1934

BS EN ISO 8990

ASTM C 1363,

at 35ºC and 60% RH, insulated block thermal conductivity shall not exceed the declared value.

As an alternative, thermal conductivity of the insulated block shall be calculated according to BS EN ISO 6946 taking into consideration the block configuration, clay and insert thermal conductivities declared by their manufacturers at 35ºC & 60% RH.

6.6 DURABILITY ASPECT

Under normal exposure conditions of use in Arabian Gulf region environment, precast clay blocks will continue to provide satisfactory strength, provided they conform to clause (6.3) above.

6.7 VISUAL ASPECTS

6.7.1 Appearance

Clay Blocks shall be sound and free of defects that would interfere with the proper placing on the units or impair the strength or performance of the construction and shall have uniform texture. The faces of the blocks shall not exhibit defects such as cracking.

6.8 SAMPLE REQUIREMENTS

For the minimum number of test specimens, refer to Annex G.

7 CONFORMITY ASSESSMENT AND CERTIFICATION

7.1 Conformity of the products with this technical guide shall be assessed in accordance with Dubai Municipality third party product certification schemes.

For Batch Certification, a representative sample of blocks required for test purposes shall be randomly selected from every designated lot as per Table 10:

Table 10 – Selection of test specimens or representative samples required per lot size:

LOT SIZE (BLOCKS)	Masonry (Normal)	Masonry (Light Weight)	Filler (Normal)	Filler (Light weight)	Paving	AAC	Thermal	Clay
10,000	✓		✓		✓			
20,000		✓		✓		✓	✓	✓

NOTE 1. For the minimum number of test specimens, refer to Annex G.

2. Each specimen shall be marked so that it may be identified at any time.

7.2 Products delivered to site shall demonstrate compliance with this technical guide through a Certificate of Conformity or Mark of Conformity issued by Dubai Municipality.

ANNEX A: COMPRESSIVE STRENGTH: RAPID TESTING

A.1 Method of testing

Compressive strength test shall be carried in accordance with BS EN 772 – 1 with the following deviations:

A.1.1 Surface preparation

Rub the bed faces of specimens with a carborundum stone to remove any fins or high spots. Wipe the bearing surfaces of all the platens clean and remove any loose grit or other material from the surfaces of the specimen which are to be in contact with the platens.

A.1.2 Conditioning

Specimens shall be stored in the normal laboratory temperature and humidity for at least 16 h before being used for tests.

A.1.3 Procedure

A.1.3.1 Grinding method

Grind the specimen as per the requirement of BS EN 772 – 1

A1.3.2 Use of fiber board

As an alternative to grinding method and capping method as mentioned in BS EN 772 – 1, fiber boards can be used. Use fiber board (12 ± 1) mm thickness as in parallel contact with the platens. Place the specimen in the machine between two new pieces of 12 mm thick fiber board. Ensure that the board overhangs the specimen by a minimum of 5 mm along each edge and the center of mass of the specimen coincides with the axis of the machine.

ANNEX B: MEASUREMENT OF DIMENSIONS AND PLAN AREA

B.1 Determination of Thickness, Length and Width

B.1.1 Apparatus

B.1.1.1 Linear measuring devices, with an accuracy of 0.5 mm.

B 1.2 Procedure

B 1.2.1 Rectangular Blocks

B 1.2.1.1 Thickness

Measure the thickness of the block at four representative positions to the nearest 1 mm.

Report the value of each measurement to the nearest 1 mm.

B 1.2.1.2 Length and Width

Measure the length and width across two opposite faces of the block to the nearest 1 mm.

Two representative positions shall be used for length measurement and three positions for width measurement.

Report the value of each measurement to the nearest 1 mm.

NOTE: Care should be taken to measure each block in a sample using the same representative positions.

B.1.2.2 Non-Rectangular Blocks

B.1.2.2.1 Thickness

Measure the thickness of the block at four representative positions to the nearest 1 mm.

Report the value of each measurement to the nearest 1 mm.

B.1.2.2.2 Length and Width

Measure the maximum length and maximum width declared by the manufacturer to define the shape of the block to the nearest 1 mm.

Report the value of each measurement to the nearest 1 mm.

B.2 Determination of Plan Area

B.2.1 Rectangular Paving Blocks

Calculate the plan area by multiplying the length by the width.

B.2.2 Non-Rectangular Blocks

B.2.2.1 Apparatus

B.2.2.1.1 Balance, capable of weighing 100 g to an accuracy of 0.01 g.

B.2.2.1.2 Sheets of Thin Cardboard, Of Uniform Thickness.

B.2.2.2 Measurement of Plan Area

Place the block, wearing surface uppermost, on the cardboard and trace around its perimeter with a pencil. Cut out the shape accurately and weigh it to the nearest 0.01 g, using the balance.

Weigh a rectangle measuring 200 mm × 100 mm, cut accurately from the same cardboard to the nearest 0.01 g.

Calculate the plan area of the paving block as (in mm^2) to the nearest 10 mm^2, either by using the equation:

$$As = \frac{20000\ ms}{mr}$$

Where

As: is the plan area of the paving block (in mm^2)

m*s*: is the mass of the cardboard shape matching the block (in g);

m*r*: is the mass of the 200 mm × 100 mm cardboard rectangle (in g);

OR by using other means capable of measuring up to 10 mm^2.

OR by using the manufacturer's declared value.

ANNEX C: DETERMINATION OF COMPRESSIVE STRENGTH (PAVING BLOCKS)

C.1 Apparatus

C.1.1 Compression testing machine, conforming to BS EN 12390 - 4 Specification for compression testing machines for concrete.

C.1.2 Plywood packing, approximately 4 mm thick and larger than the specimen by a margin of at least 5 mm at all points. The packing shall be knot free.

C.2 Procedure

Measure the dimensions of each block before storing it in water and calculate the plan area, as described in annex B.

Test a sample of blocks after storing them for (24 ± 4) h in water maintained at a temperature of (20 ± 5) °C.

Wipe clean the platens of the testing machine.

Remove any loose grit or other material from the contact faces of the block. Place plywood packing between the upper and lower faces of the block and the machine platens.
Use fresh packing for each block tested.

Place the block in the machine with the wearing surface in a horizontal plane and in such a way that the axes of the block are aligned with those of the machine platens.
Apply the load without shock and increase it continuously at a rate of (15 ± 3) N/ (mm²·min) until no greater load can be sustained by the paving block or delamination occurs. Record the maximum load applied to the block.

C.3 Calculation of Compressive Strength

Calculate the crushing strength of each block to the nearest 0.1 N/mm² by dividing the maximum load by the plan area and multiplying by the appropriate factor from Table C1 and Table C2 Calculate the compressive strength, expressing the value to the nearest 1 N/mm².

Table C1 — Thickness and chamfer correction factors for compressive strength of block having plan area more than 10000 $mm^{2.}$

Work Size Thickness mm	Correction factors	
	Plain block	Chamfered block*
60 or 65	1.00	1.06
80	1.12	1.18
100	1.18	1.24
*Blocks with chamfer of work size greater than 5 mm in width		

Table C2 — Thickness and chamfer correction factors for compressive strength of block having plan area equal or less than 10000 $mm^{2.}$

Work Size Thickness mm	Correction factors	
	Plain block	Chamfered block*
60 or 65	1.23	1.29
80	1.29	1.35
100	1.32	1.38
*Blocks with chamfer of work size greater than 5 mm in width		

Refer also to note under clause 5 for block with a work plan area less than or equal 5000 mm^2 and thickness ≥ 80mm.

ANNEX D: WATER ABSORPTION FOR PAVING BLOCKS

D.1 Apparatus

D.1.1 Balance used shall be readable and accurate to 0.1 g

D.1.2 Ventilated oven capable to maintain temperature more than 100°C

D.2 Test Specimens

Three specimens shall be used in water absorption.

The tests shall be performed on full-sized specimens.

D.3 Procedure

D.3.1 Immersing

Immerse the test specimens in water at a temperature of (20 ± 5) °C for (24 ± 4) h. Such that the top surfaces of the specimens are 150 mm below the surface of the water. Specimens shall be separated from each other and from the bottom of the immersion tank by at least 25 mm, using wire mesh, grating, or other spacers. After immersing remove specimens from the water and allow to drain for 60±5 s by placing on coarser wire mesh, removing visible surface water with a damp cloth; weigh and record as Ws (saturated Weight) to nearest 0.1g.

D.3.2 Drying

Subsequent to saturation, dry all specimens in a ventilated oven at (110 ±5°C) for not less than 24 h and until two successive weighing at intervals of 2 h show an increment of loss not greater than 0.2 % of the last previously determined weight of the specimen. Record weight of dried specimens as Wd (oven-dry weight) to nearest 0.1g.

D.4 Calculations

$$Water\ Absorption\ \% = \frac{Ws - Wd}{Wd \times 100}$$

where: Ws = saturated weight of specimen, (g)

Wd = oven-dry weight of specimen, (g)

D.5 Report

The report shall include the following.

- Water absorption result for each specimen to the nearest 0.1 %
- Water absorption result for average to the nearest 0.5%
- Identification of the report and the date of issue
- Description and identification of the test sample
- Date of receipt of the test sample
- Date of test performance
- Age of test specimens, if known

ANNEX E: SITE APPLICATION OF SANDWICH-BLOCKS

E.1 Site Storage

Ultra-Violet light adversely affects the polystyrene/ other thermal insulation materials properties. Therefore, polystyrene/ other thermal insulation cores should be stored or kept in closed places unexposed to solar radiation. Also, Sandwich-blocks need to be protected from exposure to solar radiation during their storage and handling until the time of erection where the polystyrene/ other thermal insulation is then fully protected.

E.2 Handling

Sandwich-blocks need to be handled with care to avoid damage such as chipping of edges and corners, splitting between the polystyrene/ other thermal insulation core and the outer concrete layers, ...etc.

E.3 Thermal Bridging

Mortar joints in masonry walls built with Sandwich-blocks will act as a thermal bridge due to the high thermal conductivity of the mortar compared to the polystyrene/ other thermal insulation core. To avoid this thermal bridge, 45 mm wide Polystyrene strips, having a thickness equal to the mortar joints thickness, shall be included in the horizontal and vertical mortar joints to provide continuity for the Polystyrene thermal insulation layer. For other thermal insulation specific thickness shall be provided to avoid thermal bridging.

As an alternative, lightweight aggregate concrete mortar with low thermal conductivity can be used as full bed mortar joints without any polystyrene/ other thermal insulation strips.

Other alternatives can also be used.

E.4 Installation

Care should be taken to align the blocks both horizontally and vertically in a way that the polystyrene/ other thermal insulation cores of adjacent blocks are not staggered. This is of great importance to avoid forming thermal bridges inside the walls.

E.5 Reinforcement

E.5.1 General

Polystyrene/ other thermal insulation material may lose its adhesion with the concrete with time, leaving the two concrete leaves of the Sandwich-block apart without connectivity. To ensure the connectivity of the two concrete leaves together, a suitable method of those mentioned in clause (E.5.2) shall be applied.

E.5.2 Methods of Connection:

- 150 mm wide Alkali resistant fiber mesh reinforcement, or galvanized metal mesh or ladder type wire mesh reinforcement, embedded in the mortar joints at every third course.
- 150 mm long ties complying with the requirements of BS EN 845: Part 1 shall be placed in mortar joints at a rate not less than 4.9 ties per one square meter of wall area.
- Other methods for ensuring connectivity may be used.

E.5.3 Column-masonry junctions shall be connected by galvanized wall ties, 2.5 mm x20 mm x 150 mm, complying with the requirements of BS EN 845: Part 1, at every third course.

E.5.4 If the wall height is more than 3.5 m, galvanized beam-masonry wall ties of 2.5 mm x 20 mm x 75 mm, complying with the requirements of BS EN 845: Part 1, shall be fixed at 1.2 m c/c approximately.

E.5.5 Concrete stiffeners should be provided around windows and doors openings to allow for stiffening the wall free ends.

E.6 Condensation

To avoid the condensation problem that is expected to happen in walls built with Sandwich-blocks, special coatings having very low water-vapor permeability characteristic (i.e., permeance ≤ 57.5 ng/(Pa.s.m^2) [1.0 perm]) shall be applied on the external surface of the walls.

ANNEX F: REQUIREMENTS FOR MATERIALS

General

Only materials with suitability established in terms of their properties and performance shall be used in the manufacture of concrete masonry blocks.

The suitability requirements and acceptance criteria of the material used shall be given in the manufacturer's production control documentation.

The materials used shall conform to the applicable guide or shall be shown by test or experience that it is not detrimental to the durability of the concrete masonry units, or any material customarily used in masonry manufacturing.

NOTE: The use of recycled material is permitted, provided however that the requirements of the final product will still be complied. The manufacturer shall keep all quality checks and records related to the control criteria of the added percentage of recycled material and the production control parameters.

Asbestos

Asbestos, or materials containing asbestos, shall not be used.

ANNEX G: SAMPLE REQUIREMENTS FOR BLOCKS						
TEST PARAMETERS	**MASONRY**	**FILLER**	**AAC**	**PAVING**	**THERMAL**	**CLAY**
Dimensions and compressive strength	10	10	6	10	10	6
Density	6 (See Note 1)	3 (See Note 1)	6 (See Note 1)	NA	(See Note 2)	6 (See Note 1)
Chloride and Sulphate	1	1	1	1	1	NA
Drying shrinkage	4	4	3	NA	NA	NA
Abrasion resistance	NA	NA	NA	3	NA	NA
Water absorption	NA	NA	NA	3	NA	5
Efflorescence	NA	NA	NA	NA	NA	10
Thermal conductivity or concrete/material thermal conductivity	1 (See Note 3)	1 (See Note 3)	1	NA	1	1
Solar Reflective Index (SRI)	NA	NA	NA	3	NA	NA

NA- Not Applicable

NOTE: 1. Net Density for Masonry & Filler blocks and Gross Density for AAC & Clay Blocks

2. Apparent density only for the thermal inserts

3. If declared by the manufacturer

8 PUBLICATIONS REFERRED TO

AL SA'FAT – DUBAI GREEN BUILDING SYSTEM	REGULATIONS & SPECIFICATIONS.
ASTM C 67	STANDARD TEST METHOD FOR SAMPLING AND TESTING BRICKS AND STRUCTURAL CLAY TILE
ASTM C 127	STANDARD TEST METHOD FOR DENSITY, RELATIVE DENSITY (SPECIFIC GRAVITY), AND ABSORPTION OF COARSE AGGREGATE
ASTM C 128	STANDARD TEST METHOD FOR DENSITY, RELATIVE DENSITY (SPECIFIC GRAVITY), AND ABSORPTION OF FINE AGGREGATE
ASTM C 140	STANDARD TEST METHODS OF SAMPLING AND TESTING CONCRETE MASONRY UNITS
ASTM C150 / C150M	STANDARD SPECIFICATION FOR PORTLAND CEMENT
ASTM C 404	STANDARD SPECIFICATION FOR AGGREGATES FOR MASONRY GROUT
ASTM C 426	STANDARD TEST METHOD FOR LINEAR DRYING SHRINKAGE OF CONCRETE MASONRY UNITS
ASTM C 518	STANDARD TEST METHOD FOR STEADY-STATE THERMAL TRANSMISSION PROPERTIES BY MEANS OF THE HEAT FLOW METER APPARATUS
ASTM C 618	STANDARD SPECIFICATION FOR COAL FLY ASH AND RAW OR CALCINED NATURAL POZZOLAN FOR USE IN CONCRETE

ASTM C 936	STANDARD SPECIFICATION FOR SOLID CONCRETE INTERLOCKING PAVING UNITS
ASTM C989/C989M	STANDARD SPECIFICATION FOR SLAG CEMENT FOR USE IN CONCRETE AND MORTARS
ASTM C 1363	STANDARD TEST METHOD FOR THERMAL PERFORMANCE OF BUILDING MATERIALS AND ENVELOPE ASSEMBLIES BY MEANS OF A HOT BOX APPARATUS
ASTM D 512	STANDARD TEST METHODS FOR CHLORIDE ION IN WATER
ASTM D 516	STANDARD TEST METHOD FOR SULFATE ION IN WATER
ASTM D 2863	STANDARD TEST METHOD FOR MEASURING THE MINIMUM OXYGEN CONCENTRATION TO SUPPORT CANDLE-LIKE COMBUSTION OF PLASTICS (OXYGEN INDEX)
BS 890	BUILDING LIMES.
BS 1881: PART 124	METHOD FOR ANALYSIS OF HARDENED CONCRETE
BS 3892-1	PULVERIZED-FUEL ASH – SPECIFICATION FOR PULVERIZED-FUEL ASH FOR USE WITH PORTLAND CEMENT.
BS 6073: PART 1	PRECAST CONCRETE MASONRY UNITS. SPECIFICATION FOR PRECAST CONCRETE MASONRY UNITS.
BS 6073: PART 2	PRECAST CONCRETE MASONRY UNITS. GUIDE FOR SPECIFYING PRECAST CONCRETE MASONRY UNITS.
BS 7263-1	PRECAST CONCRETE FLAGS, KERBS, CHANNELS, EDGINGS AND QUADRANTS – SPECIFICATION.
BS EN 197	CEMENT — PART 1: COMPOSITION, SPECIFICATIONS AND CONFORMITY CRITERIA FOR COMMON CEMENTS.

BS EN 450-1	FLY ASH FOR CONCRETE - DEFINITION, SPECIFICATIONS AND CONFORMITY CRITERIA.
BS EN 680	DETERMINATION OF DRYING SHRINKAGE OF AUTOCLAVED AERATED CONCRETE
BS EN 771: PART 1	SPECIFICATIONS FOR MASONRY UNITS – PART 1: CLAY MASONRY UNITS
BS EN 771: PART 3	SPECIFICATION FOR MASONRY UNITS. AGGREGATE CONCRETE MASONRY UNITS (DENSE AND LIGHTWEIGHT AGGREGATES).
BS EN 772: PART 1	METHODS OF TEST FOR MASONRY UNITS. DETERMINATION OF COMPRESSIVE STRENGTH
BS EN 772: PART 2	METHODS OF TEST FOR MASONRY UNITS. DETERMINATION OF PERCENTAGE AREA OF VOIDS IN MASONRY UNITS (BY PAPER INDENTATION)
BS EN 772: PART 13	METHODS OF TEST FOR MASONRY UNITS. DETERMINATION OF NET AND GROSS DRY DENSITY OF MASONRY UNITS (EXCEPT FOR NATURAL STONE).
BS EN 772: PART 16	METHODS OF TEST FOR MASONRY UNITS. DETERMINATION OF DIMENSIONS
BS EN 845: PART 1	SPECIFICATION FOR ANCILLARY COMPONENTS FOR MASONRY — PART 1: TIES, TENSION STRAPS, HANGERS, AND BRACKETS
BS EN 934-1	ADMIXTURES FOR CONCRETE, MORTAR AND GROUT - COMMON REQUIREMENTS
BS EN 934-2	ADMIXTURES FOR CONCRETE, MORTAR AND GROUT - CONCRETE ADMIXTURES. DEFINITIONS AND REQUIREMENTS

BS EN 934-3	ADMIXTURES FOR CONCRETE, MORTAR AND GROUT - ADMIXTURES FOR MASONRY MORTAR. DEFINITIONS, REQUIREMENTS, CONFORMITY, MARKING AND LABELLING
BS EN 1008	MIXING WATER FOR CONCRETE
BS EN 1338	CONCRETE PAVING BLOCKS. REQUIREMENTS AND TEST METHODS
BS EN 1340	CONCRETE KERB UNITS. REQUIREMENTS AND TEST METHODS
BS EN 1602	THERMAL INSULATION PRODUCTS FOR BUILDING APPLICATIONS – DETERMINATION OF APPARENT DENSITY
BS EN 1934	THERMAL PERFORMANCE OF BUILDINGS - DETERMINATION OF THERMAL RESISTANCE BY HOT BOX METHOD USING HEAT FLOW METER - MASONRY
BS EN 11925: PART 2	REACTION TO FIRE TESTS – IGNITABILITY OF BUILDING PRODUCTS SUBJECTED TO DIRECT IMPINGEMENT OF FLAME – PART 2: SINGLE FLAME SOURCE TEST
BS EN 12390-4	TESTING HARDENED CONCRETE. COMPRESSIVE STRENGTH. SPECIFICATION FOR TESTING MACHINES
BS EN 12664	THERMAL PERFORMANCE OF BUILDING MATERIALS AND PRODUCTS – DETERMINATION OF THERMAL RESISTANCE BY MEANS OF GUARDED HOT PLATE AND HEAT FLOW METER METHODS – DRY AND MOIST PRODUCTS OF MEDIUM AND LOW THERMAL RESISTANCE

BS EN 12667	THERMAL PERFORMANCE OF BUILDING MATERIALS AND PRODUCTS –DETERMINATION OF THERMAL RESISTANCE BY MEANS OF GUARDED HOT PLATE AND HEAT FLOW METER METHODS – PRODUCTS OF HIGH AND MEDIUM THERMAL RESISTANCE
BS EN 12878	PIGMENTS FOR THE COLORING OF BUILDING MATERIALS BASED ON CEMENT AND/OR LIME. SPECIFICATION S AND METHODS OF TEST
BS EN 13055	LIGHTWEIGHT AGGREGATES
BS EN 15167-1	GROUND GRANULATED BLAST FURNACE SLAG FOR USE IN CONCRETE, MORTAR AND GROUT - DEFINITIONS, SPECIFICATIONS AND CONFORMITY CRITERIA
BS EN ISO 6946	BUILDING COMPONENTS AND BUILDING ELEMENTS – THERMAL RESISTANCE AND THERMAL TRANSMITTANCE – CALCULATION METHOD
BS EN ISO 8990	THERMAL INSULATION — DETERMINATION OF STEADY-STATE THERMAL TRANSMISSION PROPERTIES — CALIBRATED AND GUARDED HOT BOX
BS EN ISO 10456	BUILDING MATERIALS AND PRODUCTS. HYDROTHERMAL PROPERTIES. TABULATED DESIGN VALUES AND PROCEDURES FOR DETERMINING DECLARED AND DESIGN THERMAL VALUES
CEN/TC 178/ WG4	TEST METHODS FOR SIMULATION OF AGEING OF PAVERS BY POLISHING
EN 10083-2	STEELS FOR QUENCHING AND TEMPERING - PART 2: TECHNICAL DELIVERY CONDITIONS FOR NON-ALLOY STEELS

ISO 6506-1	METALLIC MATERIALS BRINELL HARDNESS TEST PART 1: TEST METHOD
ISO 6506-2	METALLIC MATERIALS BRINELL HARDNESS TEST PART 2: VERIFICATION AND CALIBRATION OF TESTING MACHINES
ISO 6506-3	METALLIC MATERIALS BRINELL HARDNESS TEST PART 3: CALIBRATION OF REFERENCE BLOCKS
ISO 8486-1	BONDED ABRASIVES. DETERMINATION AND DESIGNATION OF GRAIN SIZE DISTRIBUTION. PART 1: MACRO GRITS F4 TO F220
ISO 21920-3	GEOMETRICAL PRODUCT SPECIFICATIONS (GPS) SURFACE TEXTURE: PROFILE. PART 3: SPECIFICATION OPERATORS