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 **भारतीय मानक**

 **Indian Standard**

**मिट्टी से संबंधित शब्दों की शब्दावली भवनों के लिए उत्पाद**

(*तीसरा* पुनरीक्षण)

**GLOSSARY OF TERMS RELATING TO CLAY PRODUCTS FOR BUILDINGS**

(*Third Revision*)

**ICS No. 91.100.25**

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**B U R E A U O F I N D I A N S T A N D A R D S**

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FOREWORD

This Indian Standard (Third Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Clay and Stabilized Soil Products Sectional Committee had been approved by the Civil Engineering Division Council.

Clay and Stabilized Soil products, such as bricks, hollow clay blocks, tiles, stabilized earth blocks, etc, are used abundantly in masonry construction. To understand the properties of such products, a clear understanding of the meaning of various terms is necessary. This glossary has been prepared to fulfil this objective. This standard was first published in 1969 and subsequently revised in 1981 and 1992. In this revision some common definitions, terminology, and terms pertaining to stabilized compressed earth blocks and hollow clay blocks and bricks have been modified.

The significant modifications in this revision are:

1. Some common definitions, terminology, and terms pertaining to stabilized compressed earth blocks and hollow clay blocks and bricks have been modified.
2. Some terms which are obsolete have been removed.
3. Some new general terms have been introduced.

In the formulation of this standard, due weightage has been given to international co-ordination among the standards and practices prevailing in different countries in addition to relating it to the construction practices in India.

This standard contributes to the United Nations Sustainable Development Goal 11 ‘Sustainable cities and communities’ towards strengthen efforts to protect and safeguard the world’s cultural and natural heritage and Goal 12 ‘Ensure sustainable consumption and production patterns’ towards substantially reduce waste generation through prevention, reduction, recycling and reuse.

The composition of the Committee responsible for formulation of this standard is given in Annex A.

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 analysis, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (second revision)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard*

**GLOSSARY OF TERMS RELATING TO CLAY**

**PRODUCTS FOR BUILDINGS**

(*Third Revision* of IS 2248)

**1 SCOPE**

**1.1** This standard covers the definition of common terms applicable to clay and Stabilized Soil products for building and other structures, commonly known as masonry units.

Note — Masonry units are Bricks or blocks of burnt clay, stabilized compressed earth, compressed fly ash, etc., used in masonry construction.

**2** **TERMINOLOGY**

**2.1 Raw Materials**

**2.1.1** *Clay* –– Clay minerals arehydrous aluminium phyllosilicates (like [kaolin](https://en.wikipedia.org/wiki/Kaolin), [Al](https://en.wikipedia.org/wiki/Aluminium)2[Si](https://en.wikipedia.org/wiki/Silicon)2[O](https://en.wikipedia.org/wiki/Oxygen)5([OH](https://en.wikipedia.org/wiki/Hydroxide))4 etc), sometimes with variable amounts of [iron](https://en.wikipedia.org/wiki/Iron), [magnesium](https://en.wikipedia.org/wiki/Magnesium), [alkali metals](https://en.wikipedia.org/wiki/Alkali_metal), [alkaline earths](https://en.wikipedia.org/wiki/Alkaline_earth_metal), and other [cations](https://en.wikipedia.org/wiki/Cation), which attain plastic state when wetted, hard when dry and vitreous when fired to a sufficiently high temperature.

**2.1.2** *Shale —*Soft finely stratified sedimentary rock formed from consolidated mud or clay and can be easily split into fragile plates.

**2.1.3** *Sand/silt* — Siliceous inert material found in the soil or earth.

**2.1.4** *Ground slag* — Blast furnace slag ground to a fineness more 350 m2/kg with average particle size of about 10 microns.

**2.2 Manufacture**

**2.2.1** *Flashing**––* The operation of heating the clay products with and without air alternately, where irregularly colored bricks or tiles are required.

**2.2.2** *Hand Moulding*

**2.2.2.1***Ground moulding ––*When the clay products are moulded by hand on ground.

**2.2.2.2** *Sand moulding ––*The process of moulding of bricks by hand in which fine sand is used to dust the mould before throwing in the processed plastic earthy clay lump.

**2.2.2.3** *Slop moulding ––*The process of moulding bricks by hand in which the mould is dipped in water, before processed clay or soil is thrown into it.

**2.2.2.4** *Table moulding ––*Where bricks are moulded by hand on tabIe and then transported using pallet boards to the drying area.

**2.2.3** *Machine Moulding ––*The process in which the clay products are shaped in hand-operated or power-driven machines, such as a hand-screw press, a soft-mud moulding machine, an extruder or a semi-dry/dry press.

**2.2.4** *Maturing Temperature ––*The temperature of firing at which the clay body used in the manufacture of the building material acquires the optimum mechanical strength and the necessary physical properties to satisfy the requirements set down in the standard specifications for the relevant building material.

**2.2.5** *Pugging ––*This is the process by which the plastic clay is tempered prior to moulding.

**2.2.6** *Sanding ––*The operation of imparting to the clay product rough surface by blowing sand on to it, that is, by sand blasting prior to drying.

**2.2.7** *Soaking ––*The process of imparting heat to the clay product by maintaining the temperature constant for a specified period near about the maturing temperature.

**2.2.8** *Tempering ––*This is the process of mixing cIay, water and other ingredients, if any, by which a homogeneous paste is produced.

**2.2.9** *Weathering ––*This is the process of exposing excavated earth or soil in the open air, so that it comes in contact with natural agencies, such as sun, rain and frost due to which there is change in some of the physical properties that are helpful in subsequent treatment and also impart better mixing and moulding properties.

**2.2.10** *Lime Blowing ––*If the soil contains lime noduIes or calcarious ‘*kankars*’ the bricks get cracked due to the formation of Calcium Oxide within the brick mass during firing. The oxides so formed swell after absorbing moisture from the air and cause blowing of the bricks.

**2.2.11** *Lamination ––* Lamination is a defect normally found in the extruded bricks caused by the differential movement of the clay mass when it is pushed by the auger or wing knife of the extrusion machine towards the die of the machine. If the spacer is too short, there may be hollow core in the centre when the clay mass enters the die. In the die this core is flattened and owing to the rotation of the clay mass it shows in the extruded brick as an ‘S’ crack.

**2.3 Surface Features**

**2.3.1** *Combed Finish ––* Masonry Unit surfaces are altered by creating scratches in green condition during the manufacture process.

**2.3.2** *Natural Finish ––*Retaining the natural raw material colour even after undergoing various stages of manufacture.

**2.3.3** *Salt Glaze**––*Masonryunit’s surfaces having lustrous glazed finish from the thermo - chemical reaction of the silicates of the clay body with vapours of common salt and/or other suitable chemicals.

**2.3.4** *Sand Finish ––*Units whose surfaces are covered with sand.

**2.4 Bricks ––** Amasonry unit not exceeding 300 mm in length, 150 mm in width nor 100 mm in height.

**2.4.1** *Acid Resistant Bricks ––* Bricks used for masonry construction, such as flooring, subject to acid attack, lining of chambers and towers in chemical units, lining of sewers carrying industrial effluents, etc to prevent deterioration of the surface by acids.

**2.4.2** *Burnt Clay Solid Bricks ––*Burnt solid clay bricks in solid state or having perforations or cores or cells of hollow spaces not exceeding 25 percent of its volume.

**2.4.3** *Facing Bricks ––*Thinner bricks specially used for a thin masonry skin exposed to give an appearance of brick or block masonry.

**2.4.4** *Heavy duty bricks ––* Bricks required for masonry in heavy engineering work, such as, bridge structure, industrial foundations and multi - storeyed building having high durability and compressive strength and low water absorption.

**2.4.5** *Paving Bricks ––* Bricks when are used as a paving material for roads, heavy duty industrial floors, particularly suited to resist heavy wear and tear from traffic.

**2.4.6** *Perforated Bricks ––* Bricks in which holes passing through the bricks exceed 25 percent of the volume and the holes are small. For the purpose of the definition, a small hole is a hole less than 20 mm wide and less than 500 mm2 in area. The hole may be circular, square, rectangular or any other regular shape.

**2.4.7** Sewer Bricks –– Bricks intended for use in the lining of walls, and floors of sewers used for the sanitary construction works.

**2.4.8** Soiling Bricks *––* Bricks used for soiling purpose. They are different from common building solid bricks.

**2.4.9** *Wire Cut Bricks ––* Bricks manufactured by cutting an extruding column through a die of weathered and processed clay with the help of wires fixed to a cutting frame.

**2.5** **Tiles ––** Burnt clay units which are applicably smaller in thickness than the bricks and are used for flooring, roofing, ceiling and wall covering.

**2.5.1** *Ceiling Tiles (Plain) ––*Clay roofing tiles which are capable of being used on sloping roofs below the interlocking plain Mangalore tiles.

**2.5.2** *Flooring Tiles ––*Clay tiles made by pressing or extrusion, which are capable of being laid level on a prepared base.

**2.5.3** *Hollow Clay Tiles ––* Burntclay units in which holes passing through the tiles exceed 25 percent of the volume and the holes are not small. The perforations are parallel to their length. These tiles can be used both as filler material and structural units.

**2.5.4** *Ridge Tile ––*A clay roofing tile which is capable of being used on the ridge of a sloping roof in conjunction with interlocking plain Mangalore pattern tiles.

**2.5.5** *Roofing Tile, Mangalore Pattern ––*A type of clay roofing tile, capable of being laid down on sloping roof by means of nibs which catch on the reepers or battens interlock with and overlap similar tiles at the lower end on the sides.

**2.5.6** *Terracing Tile ––* A flat tile, which iscapable of being laid level on a prepared basein one or more courses to provide satisfactoryfloor or roof finish.

**2.6 Blocks ––** Masonry unit exceeding size of a burnt clay brick (defined in section 2.4) in any dimension.

**2.6.1** *Hollow Block ––*A block in which cores or cells or perforations passing through the block exceed 25 percent of its volume.

**2.6.2** *Solid Block ––*A solid block in which cores or cells or perforations passing through the block do not exceed 25 percent of its volume.

**2.6.3** *Stabilised Compressed Earth Block or brick* **––** A brick or block manufactured by compressing the processed stabilized soil or earth with optimum clay fraction using a machine.

**2.6.4** *Compressed stabilized fly ash brick or block* **––** A brick or block manufactured by compressing the processed stabilized fly ash and sand mixture using a machine.

**2.7** **Tests**

**2.7.1** *Drying Shrinkage ––*The percentage reduction in the length or volume of bricks or tiles on drying, due to the removal of the film of water which surrounds the individual grains in the plastic form.

**2.7.2** *Efflorescence ––*A white, yellow or green powdery substance occurring on the surface of the masonry and other products and which is caused by the migration of soluble salts, followed by precipitation.

**2.7.3** *Fired Shrinkage ––*The percentage reduction in length or volume of dry clay tiles or bricks when subjected to heating to a maturing temperature of the clay body.

**2.7.4** *Flexural Strength ––*A property of solid material that indicates its ability to withstand a flexural or transverse load.

**2.7.5** *Warpage ––*Distortion or deformation of original shape of the clay body during the manufacturing process.

**2.7.6** *Water Absorption ––* The increase in weight of a test specimen after immersion in water, at a constant temperature and for a specified period, expressed as a percentage of the dry weight.

**2.8 General**

**2.8.1** *Cells ––*Hollow spaces or voids enclosed within the perimeter of the exterior shells of hollow blocks or masonry units.

**2.8.2** *Frog ––*The depression made in one or both bed faces of bricks or other masonry units for enhancing bonding between the mortar and the masonry units.

**2.8.3** *Perforations ––* A hollow space of uniform section, within a brick or block, extending from one face to the opposite parallel face with its axis perpendicular to the two faces.

**2.8.4** *Shells ––* Peripheral material between a perforation and surface of a masonry unit.

**2.8.5** *Webs ––*Solid material between the perforations in a masonry unit.

**2.8.6** *Nominal size* –– Size of the masonry unit including the thickness of perpend mortar bed joint.

**2.8.7** *Actual size* –– Size of masonry unit as measured.

**2.8.8**  *Horizontally perforated or hollow clay unit* –– Burnt clay masonry unit with one or more formed voids that pass completely through the unit parallel to the bed face.

**2.8.9** *Vertically perforated or hollow clay* *unit* –– Burnt clay masonry unit with one or more formed voids that pass completely through the unit perpendicular to the bed face.

**2.8.10** *Bulk dry density* –– Mass of the masonry unit (in oven dry condition) divided by the bulk volume.

**2.8.11** *Net dry density* –– Mass of the masonry unit (in oven dry condition) divided by the net volume after deducting the volume of voids/cells/perforations/frogs, etc.

**ANNEX A**

(*Foreword*)

**COMMITTEE COMPOSITION**

Clay and Stabilized Soil Products for Construction Sectional Committee, CED 30

|  |  |
| --- | --- |
| *Organization (s)* | *Representative(s)* |
| Indian Institute of Science, Bengaluru | Dr B. V. Venkatarama Reddy (***Chairperson***) |
| CSIR - Advanced Materials and Processes Research Institute, Bhopal | Dr Manish Mudgal |
| CSIR - Central Building Research Institute, Roorkee | Dr B. Srinivas NaikShrimati Humaira Athar (*Alternate*) |
| CSIR - Central Glass and Ceramic Research Institute, Kolkata | Dr Parvesh AgrawalShrimati Asha T. Anil (*Alternate*) |
| CSIR - Structural Engineering Research Centre, Chennai | Dr S.R. BalasubramanianDr K Senthil Kumar (*Alternate*)Dr P. S Ambily (*Young Professional*) |
| Central Pollution Control Board, New Delhi | Shri B. Vinod Babu |
| Central Public Works Department, New Delhi | Shri Prem MohanShri Dinesh K Ujjainia (*Alternate*) |
| Central Soil and Materials Research Station, New Delhi | Shri U. S. VidyarthiShri B. K. Munzni (*Alternate*) |
| Engineers India Limited, New Delhi | Shri Shri V. K. PanwarShri Bholanath Mandal (*Alternate I*)Shri Mriganabh Choudhary (*Alternate II*) |
| Gujarat Engineering Research Institute, Vadodara | Shri R. S. VasavaShri R.M.Patel (*Alternate* )  |
| Indian Institute of Science, Bengaluru | Dr K. S. Nanjunda Rao |
| Indian Institute of Technology Kanpur, Kanpur | Prof Syam NairProf Rajesh Sathiyamoorthy (*Alternate* ) |
| Indian Institute of Technology Madras, Chennai | Dr Piyush Chaunsali |
| Military Engineer Services, New Delhi | Shri Brig Ravi ReddyShri Hirikesh Kumar Gupta (*Alternate* ) |
| Ministry of Science and Technology, Department of Science & Technology, New Delhi | Dr R K Joshi |
| NBCC (India) Limited, New Delhi | Shri Apurva AgarwalShri Amit Kumar Chitragupt (*Alternate*) |
| National Institute of Technology Agartala, Agartala | Dr Deb Dulal Tripura |
| *Organization (s)* | *Representative*(s) |
| National Test House, Kolkata | Shri D. V. S. PrasadShri Sushant Kumar (*Alternate*) |
| Punjab State Council for Science and Technology, Chandigarh  | Shri Pritpal Singh Shri Maganbir Singh (*Alternate* I) |
| Shriram Institute for Industrial Research, Delhi | Dr Mukesh GargDr Amit kumar tyagi (*Alternate*) |
| The Energy and Resources Institute, New Delhi  | Shri Yatin ChoudharyShri Rana Veer Pratap Singh |
| The National Institute of Engineering Mysuru  | Dr Gourav K. |
| Unique Geocivil Services Private Limited, Surat | Shri Hitesh H. DesaiShri Nehal H. Desai (*Alternate*)Shri Dhruval D. Shah (*Young Professional*) |
| Wienerberger India Private Limited, Bangalore | Shri Kundan B. DigheShri D.J. Jagadeesha (*Alternate*) |
| In Personal Capacity (*Flat 119, Amulya Fortune Apartments, Road No 1, Opp. Union Bank, Madhavapuri Hills, Chandanagar, Hyderabad -500050*) | Shri K. Sitaramananjeyulu |
| BIS Directorate General | Dwaipayan Bhadra, Scientist ‘E’/Director And Head (Civil Engineering) |

*Member Secretary*

Shrimati Divya S.

Scientist ‘D’/Joint Director

(Civil Engineering), BIS