

BUILDING MATERIALS

2.1 GENERAL

Materials used for the construction of buildings shall conform to standard specifications listed in this part of the Code. Any deviation from the type design or architectural detail from those specified in these standards may be accepted by the Building Official as long as the materials standards specified therein are conformed with.

2.1.1 New or Alternative Materials

The provisions of this part are not intended to prevent the use of any new and alternative materials. Any such material may be approved provided it is shown to be satisfactory for the purpose intended and at least the equivalent of that required in this part in quality, strength, effectiveness, fire resistivity, durability, safety, maintenance and compatibility.

Approval in writing shall be obtained by the owner or his agent before any new, alternative or equivalent materials are used. The Building Official shall base such approval on the principle set forth in the previous paragraph and shall require that specified tests be made (Sec 2.1.4) or sufficient evidence or proof be submitted, at the expense of the owner or his agent, to substantiate any claim for the proposed material.

2.1.2 Used Materials

The provisions of this part do not preclude the use of used or reclaimed materials provided such materials meet the applicable requirements as for new materials for their intended use.

2.1.3 Storage of Materials

All building materials shall be stored at the building site(s) in such a way as to prevent deterioration or the loss or impairment of their structural and other essential properties (See Part 7, Construction Practices and Safety).

2.1.4 Methods of Test

Every test of material required in this part, or by the Building Official, for the control of quality and for the fulfillment of design and specification requirements, shall be carried out in accordance with a standard method of test issued by the Bangladesh Standards and Testing Institution. In the absence of Bangladesh Standards, the Building Official shall determine the test procedures. Laboratory tests shall be conducted by recognized laboratories acceptable to the Building Official.

If, in the opinion of the Building Official, there is insufficient evidence of compliance with any of the provisions of the Code or there is evidence that any material or construction does not conform to the requirements of this Code, the Building Official may require tests to be performed as proof of compliance. The cost of any such test shall be borne by the owner.

The manufacturer or supplier shall satisfy himself that the materials conform to the relevant standards and if requested shall furnish a certificate or guarantee to this effect.

2.2 MASONRY

2.2.1 Aggregates

Aggregates for masonry shall conform to the standards listed as follows: ASTM C144 - 04, Aggregates for Masonry Mortar; ASTM C404 -07, Aggregates for Masonry Grout; ASTM C331 - 05, Lightweight Aggregates for Concrete Masonry Units (the applicable standards for masonry are listed at the end of this section).

2.2.2 Cement

Cement for masonry shall conform to the standards listed as follows: BDS EN 197-1: 2003Cement Part-1 Composition, specifications and conformity criteria for common cements; or ASTM C150 / C150M - 09, Portland Cement; ASTM C91 - 05, Masonry Cement; ASTM C595 / C595M - 10, Blended Hydraulic Cements.

2.2.3 Lime

Limes for masonry shall conform to the standards listed as follows: ASTM C5 - 03, Quicklime for Structural Purposes; ASTM C207 - 06, Hydrated Lime for Masonry Purposes.

2.2.4 Masonry Units

- a) Clay : Masonry units of clay (or shale) shall conform to the standards listed as follows: BDS 208: 1980, Common Building Clay Bricks (First Revision); BDS 1249:1989, Acid Resistant Bricks; BDS 1250: 1989, Burnt Clay Facing Bricks; BDS 1263: 1990, Burnt Clay Hollow Bricks for Walls and Partitions; BDS 1264 : 1990, Glossary of terms relating to structural clay products; BDS 1432 : 1993, Burnt clay perforated building bricks; BDS 1803 : 2008, Specification for Hollow Clay Bricks and Blocks; ASTM C34 – 09, Structural Clay Load-Bearing Wall Tile; ASTM C212 – 00(2006), Structural Clay Facing Tile; ASTM C56 – 09 Structural Clay Non-Load-Bearing Tile; and IS 7556-1975 Burnt Clay Jallies.
- b) Concrete: Concrete masonry units shall conform to the standards listed as follows:

BDS EN 771-3: 2009	Specification for masonry units — Part: 3 Aggregate concrete masonry units (dense and lightweight aggregates)
BDS EN 772-1: 2009	Methods of test for masonry units — Part 1: Determination of compressive strength
BDS EN 772-2: 2009	Methods of test for masonry units — Part 2: Determination of percentage area of voids in masonry units (by paper indentation)
BDS EN 772-6: 2009	Methods of test for masonry units — Part 6: Determination of bending tensile strength of aggregate concrete masonry units
BDS EN 772-11: 2009	Methods of test for masonry units — Part 11: Determination of water absorption of aggregate concrete, autoclaved aerated concrete, manufactured stone and natural stone masonry units due to capillary action and the initial rate of water absorption of clay masonry units
BDS EN 772-13: 2009	Methods of test for masonry units — Part 13: Determination of net and gross dry density of masonry units (except for natural stone)
BDS EN 772-14: 2009	Methods of test for masonry units — Part 14: Determination of moisture movement of aggregate concrete and manufactured stone masonry units
BDS EN 772-16: 2009	Methods of test for masonry units — Part 16: Determination of dimensions
BDS EN 772-20: 2009	Methods of test for masonry units — Part 20: Determination of flatness of faces of masonry units

BDS EN 1052-3: 2009	Methods of test for masonry — Part 3: Determination of initial shear strength
	BDS EN 1745: 2009 Masonry and masonry products — Methods for determining design thermal values
ASTM C90 – 09	Hollow Load-Bearing Concrete Masonry Units;
ASTM C129 – 06	Non-Load Bearing Units;
ASTM C90 – 09	Solid Load-Bearing Units;
ASTM C55 – 09	Concrete Building Bricks.
c) Others	
	I. Calcium Silicate: Calcium Silicate Face Brick (Sand-Lime Brick) shall conform to ASTM C73 –05 standard specification.
	II. Glazed Masonry Units: Glazed Masonry building units shall conform to the standards listed as follows: ASTM C126 – 09, Ceramic-Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units; or ASTM C744 – 09, Prefaced Concrete and Calcium Silicate Masonry Units.
	III. Glass Block: Glass block may be solid or hollow and contain inserts; all mortar contact surfaces shall be treated to ensure adhesion between mortar and glass.
	IV. Unburnt Clay Masonry Units: Masonry of unburnt clay units including cement stabilized and lime stabilized blocks shall not be used, in any building more than one storey in height.
	V. Architectural Terra Cotta: All architectural terra cotta units shall be formed with a strong homogeneous body of hard-burnt weather-resistant clay which gives off a sharp metallic ring when struck. All units shall be formed to engage securely with and anchor to the structural frame or masonry wall.
	VI. Natural Stone: Natural stone for masonry shall be sound and free from loose friable inclusions. Natural stone shall have the strength and fire resistance required for the intended use.
	VII. Cast Stone: All cast stone shall be fabricated of concrete or other approved materials of required strength, durability and fire resistance for the intended use and shall be reinforced where necessary.
	VIII. AAC Masonry: AAC (autoclaved Aerated Concrete) masonry units shall conform to ASTM C1386 –07 for the strength class specified.
	IX. Ceramic tile: Ceramic tile shall be as defined in, and shall conform to the requirements of ANSI A137.1:2008
	X. Second Hand Units: Second hand masonry units shall not be used unless the units conform to the requirements for new units. The units shall be of whole, sound material and be free from cracks and other defects that would interfere with proper laying or use. All old mortar shall be cleaned from the units before reuse.

2.2.5 Mortar

Mortar shall consist of a mixture of cementitious material and aggregates to which sufficient water and approved additives, if any, have been added to achieve a workable, plastic consistency. Cementitious materials for mortar

shall be one or more of the following: lime, masonry cement, Portland cement and mortar cement. Mortar for masonry construction other than the installation of ceramic tile shall conform to the requirements of BDS 1303 : 1990 Chemical resistant mortars; BDS 1304:1990 Methods of test for chemical resistant mortars; ASTM C270 – 08a, Mortar for Unit Masonry.

2.2.6 Grout

Grout shall consist of a mixture of cementitious materials and aggregates to which water has been added such that the mixture will flow without segregation of the constituents. Cementitious materials for grout shall be one or both of the following: Lime and Portland cement. Grout shall have a minimum compressive strength of 13 Mpa. Grout used in reinforced and nonreinforced masonry construction shall conform to the requirements of ASTM C476 – 09, Grout for Masonry.

2.2.7 Mortar for Ceramic Wall and Floor Tile

Portland cement mortars for installing ceramic wall and floor tile shall comply with ANSI A 108.1-2005 listed in Sec 2.2.11 and be of the composition specified in Table 5.2.1.

2.2.7.1 Dry-set **leveling cement mortars.**

Premixed prepared **leveling** cement mortars, which require only the addition of water and are used in the installation of ceramic tile, shall comply with ANSI A118.1-2009. The shear bond strength for tile set in such mortar shall be as required in accordance with ANSI A118.1-2009. Tile set in dry-set Portland cement mortar shall be installed in accordance with ANSI A108.5 -1999 (R2005).

2.2.7.2 Latex-modified **leveling cement mortar.**

Latex-modified **leveling** cement thin-set mortars in which latex is added to dry-set mortar as a replacement for all or part of the gauging water that are used for the installation of ceramic tile shall comply with ANSI A118.4-2009. Tile set in latex-modified **leveling** cement shall be installed in accordance with ANSI A108.5-2009.

2.2.7.3 Epoxy mortar.

Ceramic tile set and grouted with chemical-resistant epoxy shall comply with ANSI A118.3-2009. Tile set and grouted with epoxy shall be installed in accordance with ANSI A108.6-2009.

2.2.7.4 Furan mortar and grout.

Chemical-resistant furan mortar and grout that are used to install ceramic tile shall comply with ANSI A118.5-2009. Tile set and grouted with furan shall be installed in accordance with ANSI A108.8-2009.

2.2.7.5 Modified epoxy-emulsion mortar and grout.

Modified epoxy-emulsion mortar and grout that are used to install ceramic tile shall comply with ANSI A118.8-2009. Tile set and grouted with modified epoxy-emulsion mortar and grout shall be installed in accordance with ANSI A108.9-2009.

2.2.7.6 Organic adhesives.

Water-resistant organic adhesives used for the installation of ceramic tile shall comply with ANSI A136.1-2009. The shear bond strength after water immersion shall not be less than 40 psi (275 kPa) for Type I adhesive and not less than 20 psi (138 kPa) for Type II adhesive when tested in accordance with ANSI A136.1-2009. Tile set in organic adhesives shall be installed in accordance with ANSI A108.4-2009.

2.2.7.7 Portland cement grouts.

Portland cement grouts used for the installation of ceramic tile shall comply with ANSI A118.6-2009. Portland cement grouts for tile work shall be installed in accordance with ANSI A108.10-2009.

2.2.7.8 Mortar for AAC masonry.

Thin-bed mortar for AAC masonry shall comply with Article 2.1 C.1 of TMS 602/ACI 530.1/ASCE 6. Mortar used for the leveling courses of AAC masonry shall comply with Article 2.1 C.2 of TMS 602/ACI 530.1/ASCE 6.

Table 5.2.1: Ceramic Tile Mortar Compositions

Walls	Scratch coat	1 cement; $\frac{1}{5}$ hydrated lime; * 4 dry or 5 damp sand
	Setting bed and leveling coat	1 cement; $\frac{1}{2}$ hydrated lime; 5 damp sand to 1 cement; 1 hydrated lime; 7 damp sand
Floors	Setting bed	1 cement; $\frac{1}{10}$ hydrated lime; 5 dry or 6 damp sand; or 1 cement; 5 dry or 6 damp sand
Ceilings	Scratch coat and sand bed	1 cement; $\frac{1}{2}$ hydrated lime; $2\frac{1}{2}$ dry sand or 3 damp sand
Note : *		Lime may be excluded from the mortar if trial mixes indicate that the desired workability and performance are achieved without lime.

2.2.8 Metal Ties and Anchors

Metal ties and anchors shall conform to the standards listed as follows: ASTM A82 / A82M – 07, Wire Anchor and Ties; and ASTM A1008 / A1008M – 10, Sheet Metal Anchors and Ties.

2.2.9 Reinforcement

Reinforcement in masonry shall conform to the standards listed as follows: ASTM A82 / A82M – 07, Cold Drawn Steel Wire for Concrete Reinforcement; ASTM A615 / A615M – 09b, Deformed and Plain Billet Steel Bars; ASTM A996 / A996M – 09b, Rail-Steel Deformed and Plain Bars; ASTM A996 / A996M – 09b, Axle-Steel Deformed and Plain Bars; ASTM A706 / A706M – 09b, Low-Alloy Steel Deformed Bars; ASTM A767 / A767M – 09, Zinc-Coated (Galvanized) Steel Bars; and ASTM A775 / A775M – 07b, Epoxy – Coated Reinforcing Steel Bars.

2.2.10 Water

Water used in mortar or grout shall be clean and free of deleterious amounts of acid, alkalis or organic material or other harmful substances.

2.2.11 Applicable Standards for Masonry

The applicable standards for Masonry are listed below:

BDS EN 197-1:2003 (Reaffirmed 2010)	Cement Part-1 Composition, specifications and conformity criteria for common cements.
BDS 208 : 2009	Specification for Common Building clay bricks (Third revision) Specifies the dimensions, quality & strength of common burnt clay bricks, methods of sampling, testing etc.
BDS 238	Fireclay refractory bricks and shapes for general purposes. This Standard specifies the requirements for fireclay refractory bricks

and shapes meant for general purpose; the products are classified in four grades according to the duty for which they are suitable.

BDS 1249 : 1989	Acid resistant bricks. It specifies the requirements for acid-resistant bricks, dimensions, tolerances, test etc.
BDS 1250 : 1990	Burnt clay facing bricks. It specifies the dimensions, quality & strength of burnt clay facing bricks used in building & other structure, physical requirements etc.
BDS 1263 : 1990	Burnt Clay hollow bricks for walls & partitions it covers the dimensions, quality & strength for hollow bricks made from burnt clay & having perforations through & at right angle to the bearing surface tests.
BDS 1264 : 1990	Glossary of terms relating to structural clay products. It covers the definition of common terms applicable to structural clay products, used in building & civil engineering works.
BDS 1432 : 1993	Burnt clay perforated building bricks. Specifies the requirements in regard to dimensions, perforations, quality, strength and also for quality of surface in case of special grade for facing bricks of perforated burnt clay building bricks for use in walls and partitions.
BDS 1433 : 1993	Dimensions quantities in general construction work. Specifies the various dimensional values in S. I units used in general construction work.
BDS 1803 : 2008	Specification for Hollow Clay Bricks and Blocks
BDS EN 1338: 2009	Concrete paving blocks — Requirements and test methods
BDS EN 1339:2009	Concrete paving flags — Requirements and test methods
BDS EN 1340:2009	Concrete kerb units — Requirements and test methods
BDS EN 13369: 2009	Common rules for precast concrete products
BDS EN 771-3: 2009	Specification for masonry units—Part: 3 Aggregate concrete masonry units (dense and lightweight aggregates)
BDS EN 772-1: 2009	Methods of test for masonry units — Part 1: Determination of compressive strength
BDS EN 772-2: 2009	Methods of test for masonry units — Part 2: Determination of percentage area of voids in masonry units (by paper indentation)
BDS EN 772-6: 2009	Methods of test for masonry units — Part 6: Determination of bending tensile strength of aggregate concrete masonry units

BDS EN 772-11: 2009	Methods of test for masonry units — Part 11: Determination of water absorption of aggregate concrete, autoclaved aerated concrete, manufactured stone and natural stone masonry units due to capillary action and the initial rate of water absorption of clay masonry units
BDS EN 772-13: 2009	Methods of test for masonry units — Part 13: Determination of net and gross dry density of masonry units (except for natural stone)
BDS EN 772-14: 2009	Methods of test for masonry units — Part 14: Determination of moisture movement of aggregate concrete and manufactured stone masonry units
BDS EN 772-16: 2009	Methods of test for masonry units — Part 16: Determination of dimensions
BDS EN 772-20: 2009	Methods of test for masonry units — Part 20: Determination of flatness of faces of masonry units
BDS EN 1052-3: 2009	Methods of test for masonry — Part 3: Determination of initial shear strength
BDS EN 1745: 2009	Masonry and masonry products — Methods for determining design thermal values
ANSI A108.1A—2009	Installation of Ceramic Tile in the Wet-set Method, with Portland Cement Mortar
ANSI A108.1B—2009	Installation of Ceramic Tile, quarry Tile on a Cured Portland Cement Mortar Setting Bed with Dry-set or Latex-portland Mortar
ANSI A108.1-2009	Specifications for the Installation of Ceramic Tile with Portland Cement Mortar;
ASTM A82 / A82M - 07	Specification for Steel Wire, Plain, for Concrete Reinforcement
ASTM A1008 / A1008M - 10	Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
ASTM A615 / A615M - 09b	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A996 / A996M - 09b	Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement
ASTM A996 / A996M - 09b	Standard Specification for Rail-Steel and Axle-Steel Deformed

Bars for Concrete Reinforcement

ASTM A706 / A706M - 09b	Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A183 - 03(2009)	Standard Specification for Carbon Steel Track Bolts and Nuts
ASTM A775 / A775M - 07b	Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM C5-03	Standard Specification for Quicklime for Structural Purposes
ASTM C34 - 09	Standard Specification for Structural Clay Load-Bearing Wall Tile
ASTM C55 - 09	Standard Specification for Concrete Building Brick
ASTM C56 - 09	Standard Specification for Structural Clay Non load bearing Tile
ASTM C73 - 05	Standard Specification for Calcium Silicate Brick (Sand-Lime Brick)
ASTM C90 - 09	Standard Specification for Load bearing Concrete Masonry Units
ASTM C91 - 05	Standard Specification for Masonry Cement
ASTM C126 - 09	Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units
ASTM C129 - 06	Standard Specification for Non-load bearing Concrete Masonry Units
ASTM C144 - 04	Standard Specification for Aggregate for Masonry Mortar
ASTM C90 - 09	Standard Specification for Load bearing Concrete Masonry Units
ASTM C150 / C150M - 09	Standard Specification for Portland Cement
ASTM C207 - 06	Standard Specification for Hydrated Lime for Masonry Purposes
ASTM C212 - 00(2006)	Standard Specification for Structural Clay Facing Tile
ASTM C270 - 08a	Standard Specification for Mortar for Unit Masonry
ASTM C331 - 05	Standard Specification for Lightweight Aggregates for Concrete Masonry Units
ASTM C404 - 07	Standard Specification for Aggregates for Masonry Grout
ASTM C476 - 09	Standard Specification for Grout for Masonry
ASTM C595 / C595M - 10	Standard Specification for Blended Hydraulic Cements
ASTM C744 - 09	Standard Specification for Prefaced Concrete and Calcium

Silicate Masonry Units

2.3 CEMENT AND CONCRETE

2.3.1 General

Materials used to produce concrete and admixtures for concrete shall comply with the requirements of this section and those of Chapter 5, Part 6 of this Code.

2.3.2 Aggregates

Concrete aggregates shall conform to the following standards:

BDS 243 : 1963, Coarse and Fine Aggregates from Natural Sources for Concrete; ASTM C33 / C33M - 08, Concrete Aggregates; ASTM C330 / C330M - 09, Lightweight Aggregates for Structural Concrete; ASTM C637 - 09, Aggregates for Radiation-Shielding Concrete; ASTM C332 - 09 , Lightweight Aggregate for Insulating Concrete; IS: 9142 Artificial Lightweight Aggregates for Concrete Masonry Units.

2.3.2.1 Special Tests

Aggregates failing to meet the specifications listed in Sec 2.4.2 shall not be used unless it is shown by special test or actual service experience to produce concrete of adequate strength and durability and approved by the Building Official.

2.3.2.2 Nominal Size

Nominal maximum size of coarse aggregate shall not be larger than:

- a) One-fifth of the narrowest dimension between sides of forms; or
- b) One-third the depth of slabs; or
- c) Three fourths the minimum clear spacing between individual reinforcing bars or wires, bundles of bars, or prestressing tendons or ducts.

Exception:

The above limitations regarding size of coarse aggregate may be waived if, in the judgment of the Engineer, workability and methods of consolidation are such that concrete can be placed without honeycomb or voids.

2.3.3 Cement

Cement shall conform to the following standards: BDS EN 197-1:2003 (Reaffirmed 2010), Cement Part-1 Composition, specifications and conformity criteria for common cements; BDS 612, Sulphate Resisting Portland Cement-Type A; ASTM C150 / C150M - 09, BDS 232 Portland Cement; ASTM C595 / C595M - 10, Blended Hydraulic Cements; and to other such cements listed in ACI 318.

2.3.4 Water

Water used in mixing concrete shall be clean and free from injurious amounts of oils, alkalies salts, organic materials or other substances that may be deleterious to concrete or reinforcement. Water shall conform to the following standards: BDS ISO 12439:2011 Mixing water for concrete.

2.3.4.1 Chloride Ions

Mixing water for prestressed concrete, or for concrete that will contain aluminium embeddedments, including the portion of mixing water contributed in the form of free moisture on aggregates shall not contain deleterious amounts of chloride ion. The maximum water-soluble chloride ion concentration in concrete shall not exceed the limitations specified in Sec 5.5.3 of Part 6.

2.3.4.2 Potability

Nonpotable water shall not be used in concrete unless the following are satisfied:

- a) Selection of concrete proportions shall be based on concrete mixes using water from such source.
- b) Mortar test cubes made with nonpotable mixing water shall have 7-day and 28-day strengths equal to at least 90 per cent of strengths of similar specimens made with potable water.

2.3.5 Admixtures

Admixtures to be used in concrete shall be subject to prior approval by the Building Official and shall comply with Sec. 2.4.5.1 through 2.4.5.5. Admixtures shall conform to the following standards:

BDS EN 934-1:2008	Admixtures for concrete, mortar and grout — Part 1: Common requirements
BDS EN 934-2:2008	Admixtures for concrete, mortar and grout — Part 2: Concrete admixtures — Definitions, requirements, conformity, marking and

2.3.5.1 Chloride

Calcium chloride or admixtures containing chloride from admixture ingredients shall not be used in prestressed concrete, concrete containing embedded aluminium in concrete cast against permanent galvanized metal forms, or in concrete exposed to severe or very severe sulphate-containing solutions (see Sec 5.5.2.1 of Part 6).

2.3.5.2 Standards

Air-entraining admixtures shall conform to ASTM C260 - 06. Water-reducing admixtures, retarding admixtures, accelerating admixtures, water-reducing and retarding admixtures, and water-reducing and accelerating admixtures shall conform to ASTM C494 / C494M - 10, Chemical Admixtures for Concrete, or ASTM C1017 / C1017M - 07, Chemical Admixtures for Use in Producing Flowing Concrete.

2.3.5.3 Pozzolanas

Fly ash (Pulverized Fuel Ash) or other pozzolanas used as admixtures shall conform to ASTM C618 - 08a.

2.3.5.4 Blast Furnace Slag

Ground granulated blast-furnace slag used as an admixture shall conform to ASTM C989 - 09a.

2.3.5.5 Pigment for Coloured Concrete

Pigment for integrally coloured concrete shall conform to ASTM C979 - 05.

2.3.6 Metal Reinforcement

Reinforcement and welding of reinforcement to be placed in concrete shall conform to the requirements of this section.

- a) Deformed Reinforcement : Deformed reinforcing bars shall conform to the following standards; BDS ISO 6935-2:2010 (1st revision), Steel for the reinforcement of concrete - Part-2: Ribbed bars;

Reinforcement conforming to the ASTM, Standards: A615 / A615M, Deformed and Plain Billet-Steel Bars; A616M, Rail-Steel Deformed and Plain Bars; A617M, Axle-Steel Deformed and Plain Bars; A706M, Low-Alloy Steel Deformed Bars; A767M, Zinc Coated (Galvanized) Steel Bars; and A775M, Epoxy-Coated Reinforcing Steel.

Deformed reinforcing bars with a specified yield strength exceeding 410 MPa may be used, provided shall be the stress corresponding to a strain of 0.35 per cent and the bars otherwise conform to ASTM standards noted above. Fabricated deformed steel bar mats conforming to ASTM A184 / A184M - 06 and deformed steel wire complying with ASTM A496 / A496M - 07 may be used. Deformed wire for concrete reinforcement shall not be smaller than size D4 (Nominal diameter : 5.72 mm), and for wire with a specified yield strength , exceeding 410 MPa shall be the stress corresponding to a strain of 0.35 per cent.

Welded deformed steel wire fabric conforming to ASTM A497 / A497M - 07 may be used; for a wire with a specified yield strength exceeding 410 MPa, shall be the stress corresponding to a strain of 0.35 per cent. Welded intersections shall not be spaced farther apart than 400 mm in direction of calculated stress, except for wire fabric used as stirrups.

b) Plain Reinforcement : Plain reinforcement shall conform to the following BDS and ASTM standards. BDS ISO 6935-1:2010 (1st revision); ASTM A615 / A615M - 09b; ASTM A996 / A996M - 09b and ASTM A996 / A996M - 09b. Steel welded wire, fabric plain reinforcement conforming to ASTM A185 / A185M - 07 may be used, except that for wire with a specified yield strength exceeding 410 MPa, shall be the stress corresponding to a strain of 0.35 per cent. Welded intersections shall not be spaced farther apart than 300 mm in direction of calculated stress, except for wire fabric used as stirrups.

Smooth steel wire conforming to ASTM A182 / A182M - 09a may be used in concrete; except that for a wire with a specified yield strength exceeding 410 MPa, shall be the stress corresponding to a strain of 0.35 per cent.

c) Cold-worked Steel Reinforcement : Cold-worked steel high strength bars shall conform to IS 1786 : 1985 or BS 4461 : 1978.

d) Prestressing Tendons : Wire, strands and bars for tendons in prestressed concrete shall conform to BDS : 240, Plain Cold Drawn Steel Wire; ASTM A416 / A416M - 06, Steel Strand Uncoated Seven-Wire Stress Relieved; ASTM A421 / A421M - 05, Uncoated Stress Relieved Steel Wire; and ASTM A722 / A722M - 07, Uncoated High-Strength Steel Bar.

Wires, strands and bars not specifically listed in the above standards may be used, provided they conform to minimum requirements of these specifications and do not have properties that make them less satisfactory than those listed.

e) Structural Steel, Steel Pipe or Tubing : Structural steel used with reinforcing bars in composite compression members meeting the requirements of the Code shall conform to ASTM A36 / A36M - 08, Structural Steel; ASTM A242 / A242M - 04(2009), High Strength Low-Alloy Structural Steel; ASTM A572 / A572M - 07, High-Strength Low-Alloy Columbium-Vanadium Steel; and ASTM A588 / A588M - 05, High-Strength Low-Alloy Structural Steel.

Steel pipe or tubing for composite compression members composed of a steel-encased concrete core meeting the requirements of this Code shall conform to ASTM A53 / A53M - 07, Pipe, Steel, Black and Hot Dipped Zinc Coated Welded and Seamless; ASTM A500 / A500M - 10 Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; and ASTM A501 - 07, Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

2.3.7 Applicable Standards

Materials used in concrete shall comply with the applicable standards listed below.

BDS 279:1963	Specification for Abrasion of Coarse Aggregates by Use of Los Angeles Machine (under revision);
BDS 281:1963	Specification for Organic Impurities in Sands for Concrete (under revision);
BDS 921:1980	Specification for Standard Sand for Testing of Cement;
BDS 240:1963	Specification for Plain Cold Drawn Steel Wire for Prestressed Concrete;
BDS 243:1963	Specification for Coarse and Fine Aggregates from Natural Sources for Concrete;
BDS ISO 1920-8: 2010	Testing of Concrete — Part 8: Determination of drying shrinkage of concrete for samples prepared in the field or in the laboratory
BDS ISO 1920-9: 2010	Testing of Concrete — Part 9: Determination of creep of concrete cylinders in compression
BDS ISO 1920-10: 2011	Testing of Concrete — Part 10: Determination of static modulus of elasticity in compression
BDS ISO 22965-1: 2008	Concrete — Part 1: Methods of specifying and guidance for the specifier
BDS ISO 22965-2: 2008	Concrete — Part 2: Specification of constituent materials, production of concrete and compliance of concrete
ASTM C31 / C31M - 09	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C39 / C39M - 09a	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C42 / C42M - 04	Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C78 - 09	Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
ASTM C94 / C94M - 09a	Standard Specification for Ready-Mixed Concrete
ASTM C172 - 08	Standard Practice for Sampling Freshly Mixed Concrete
ASTM C192 / C192M - 07	Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
ASTM C317 / C317M - 00(2005)	Standard Specification for Gypsum Concrete

ASTM C496 / C496M - 04e1	Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens
ASTM C617 - 09a	Standard Practice for Capping Cylindrical Concrete Specimens
ASTM C685 / C685M - 10	Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing
ASTM C989 - 09a	Standard Specification for Slag Cement for Use in Concrete and Mortars

2.3.8 Concrete Pipe and Precast Sections

Concrete pipes and precast sections shall conform to the standards listed below :

BDS 1626:1999	Concrete pipes (with and without) reinforcement
ASTM C14M - 07	Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe (Metric)
ASTM C76M - 10a	Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric)
ASTM C361M - 08	Standard Specification for Reinforced Concrete Low-Head Pressure Pipe (Metric)
ASTM C444M - 03(2009)	Standard Specification for Perforated Concrete Pipe (Metric)
ASTM C478M - 09	Standard Specification for Precast Reinforced Concrete Manhole Sections (Metric)
ASTM C507M - 10a	Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe (Metric)
ASTM C654M - 05a	Standard Specification for Porous Concrete Pipe (Metric)
ASTM C655M - 09	Standard Specification for Reinforced Concrete D-Load Culvert, Storm Drain, and Sewer Pipe (Metric)
ASTM C1433M - 10	Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers (Metric)
ASTM C858 - 10	Standard Specification for Underground Precast Concrete Utility Structures
ASTM C891 - 09	Standard Practice for Installation of Underground Precast Concrete Utility Structures
ASTM C913 - 08	Standard Specification for Precast Concrete Water and Wastewater Structures

ASTM C924M - 02(2009)	Standard Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method (Metric)
IS 458:2003	Specification for precast concrete pipes (with and without reinforcement) (fourth revision)
IS 784:2001	Specification for prestressed concrete pipes (including specials) (second revision)
IS 1916:1989	Specification for steel cylinder pipe with concrete lining and coating (first revision)
IS 3597:1998	Methods of test for concrete pipes (second revision)
IS 4350:1967	Specification for concrete porous pipes for under drainage
IS 7319:1974	Specification for perforated concrete pipes
IS 7322:1985	Specification for specials for steel cylinder reinforced concrete pipes (first revision)

2.3.9 Asbestos Cement Products

Asbestos cement products shall conform to the following standards:

BDS 428:1964	Specification for Asbestos Cement Pressure Pipes (under revision);
BDS 429:1964	Specification for Asbestos Cement Building and Sanitary Pipes (under revision);
BDS 430:1964	Specification for Asbestos Cement Corrugated Sheets for Roofing and Cladding (under revision);
BDS 431:1964	Specification for Asymmetrical Section Corrugated Sheets in Asbestos Cement for Roofing and Cladding (under revision);
BDS 579:1966	Specification for Asbestos Cement Flat Sheets (under revision);
BDS 1046:1983	Specification for Asbestos Cement Products-Corrugated Sheets and Fittings for Roofing and Cladding;
ASTM C222 - 97(2008)	Standard Specification for Asbestos-Cement Roofing Shingles
ASTM C223 - 98(2008)	Standard Specification for Asbestos-Cement Siding
ASTM C500 - 07	Standard Test Methods for Asbestos-Cement Pipe
ASTM C508 / C508M - 00(2009)e1	Standard Specification for Asbestos-Cement Underdrain Pipe

ASTM C663 - 98(2008)	Standard Specification for Asbestos-Cement Storm Drain Pipe
ASTM C875 - 98(2008)	Standard Specification for Asbestos-Cement Conduit
ASTM C966 - 98(2008)	Standard Guide for Installing Asbestos-Cement Nonpressure Pipe

2.4 PRE-STRESSED CONCRETE

2.4.1 Concrete for Pre-stressed Concrete

Cement and concrete required for pre-stressed concrete are elaborately described in section 2.3 of this part. BDS and other standards for concrete as a material are also contained in the same section.

2.4.2 Steel for Pre-stressed Concrete

Steel and tendons for pre-stressed concrete along with the BDS and other standard requirements are included in section 2.8 of this part.

Steel material for pre-stressed concrete shall also conform the following standards.

BDS ISO 6934 - 1 : 2008	Steel for the prestressing of concrete - Part 1: General requirements
BDS ISO 6934 - 2 : 2008	Steel for the prestressing of concrete - Part 2 Cold-drawn wire
BDS ISO 6934 - 3 : 2008	Steel for the prestressing of concrete - Part 3 Quenched and tempered wire
BDS ISO 6934 - 4 : 2008	Steel for the prestressing of concrete - Part 4 Strand
BDS ISO 6934- 5: 2008	Steel for the prestressing of concrete - Part 5 Hot-rolled steel bars with or without subsequent processing
BDS ISO 6935 (Part-1): 2010 (1st revision)	Steel for the re-enforcement of concrete - Part-1: Plain bars
BDS ISO 6935 (Part-2): 2010 (1st revision)	Steel for the reinforcement of concrete - Part-2: Ribbed bars
BDS ISO 6935 (Part-3): 2006	Steel for the reinforcement of concrete - Part-3: Welded Fabric. Specifies technical requirements for factory made sheets or rolls welded fabric manufacture from steel wires or bars with diameters from 4 mm to 16 mm and designed for reinforcement in ordinary concrete structured and for non-prestressed reinforcement in prestressed concrete structures.
BDS ISO 10065: 2006	Steel bars reinforcement of concrete— Bend and Rebend tests
BDS ISO 15835-1:2010	Steel for the reinforcement of concrete — Reinforcement couplers for mechanical splices of bars —Part 1: Requirements

BDS ISO 15835-2:2010	Steel for the reinforcement of concrete — Reinforcement couplers for mechanical splices of bars —Part 2: Test methods
BDS ISO 10144:2006	Certification scheme for steel bars and wires for the reinforcement of concrete structures.
BDS ISO 15630-1 : 2008	Steel for the reinforcement and prestressing of concrete — Test methods — Part 1: Reinforcing bars, wire rod and wire
BDS ISO 15630-2 : 2008	Steel for the reinforcement and prestressing of concrete — Test methods — Part 2: Welded fabric
BDS ISO 15630-3 : 2008	Steel for the reinforcement and prestressing of concrete — Test methods — Part 3: Prestressing steel
BDS ISO 16020 : 2008	Steel for the reinforcement and prestressing of concrete — Vocabulary

2.5 BUILDING LIMES

2.5.1 Types of Lime

According to the degree of calcinations, slaking and setting actions and depending upon the nature and amount of foreign matters associated with, the limes are classified as:

- i. High calcium, fat, rich, common or pure lime
- ii. Lean, meager or poor lime
- iii. Hydraulic or water lime

2.5.2 Properties of Lime

A good lime should: slake readily in water, dissolve in soft water, free from fuel ashes and unburnt particles and have good setting power under water.

Building limes shall comply with the following ASTM standard specifications: ASTM C206 - 03, Finishing Hydrated Lime; ASTM C207 - 06, Hydrated Lime for Masonry Purposes; ASTM C141 / C141M - 09, Hydraulic Hydrated Lime for Structural Purposes; ASTM C977 - 03, Quicklime and Hydrated Lime for Soil Stabilization; and ASTM C5 - 03, Quicklime for Structural Purposes.

The following Indian Standards may also be accepted for lime concrete and testing of building limes:

IS	712:1984	Specification for building limes (third revision)
IS	1624:1986	Method of field testing of building lime (first revision)
IS	712- 1984	Specification for building limes (third revision)
IS	1624 – 1986	Method of field testing of building lime (first revision)
IS	2686-1977	Specification for Cinder Aggregates for Use in Lime Concrete (First Revision);

IS	3068-1986	Specification for Broken Brick (burnt clay) Coarse Aggregates for Use in Lime Concrete (Second Revision);
IS	3115-1992	Specification for Lime-based Blocks (Second Revision);
IS	3182-1986	Specification for Broken Brick (burnt clay) Fine Aggregates for Use in Lime Mortar (second revision)
IS	4098-1983	Specification for Lime-Pozzolana Mixture (First Revision);
IS	4139-1989	Specification for Sand-lime Bricks (Second Revision);
IS	6932 (Parts I to X - 1973; Part XI-1983)	Method of Tests for Building Limes.
IS	10360-1982	Specification for Lime-Pozzolana Concrete Blocks for Paving;
IS	10772-1983	Specification for quick setting lime pozzolana mixture
IS	12894-2002	Specification for pulverized fuel ash lime bricks (First Revision)

2.6 GYPSUM BASED MATERIALS AND PLASTER

2.6.1 Gypsum Board

Gypsum wallboard, gypsum sheathing, gypsum base for gypsum veneer plaster, exterior gypsum soffitboard, predecorated gypsum board or water-resistant gypsum backing board complying with the standards listed below

2.6.2 Gypsum Plaster

A mixture of calcined gypsum or calcined gypsum and lime and aggregate and other approved materials as specified in this code.

2.6.3 Gypsum Veneer Plaster

Gypsum plaster applied to an approved base in one or more coats normally not exceeding 1/4 inch (6.4 mm) in total thickness.

2.6.4 Cement Plaster

A mixture of portland or blended cement, portland cement or blended cement and hydrated lime, masonry cement or plastic cement and aggregate and other approved materials as specified in this code.

Gypsum building materials shall conform to the standards listed below.

ASTM C22 / C22M - 00(2005)e1	Standard Specification for Gypsum
ASTM C28 / C28M - 00(2005)	Standard Specification for Gypsum Plasters

ASTM C35 - 01(2009)	Standard Specification for Inorganic Aggregates for Use in Gypsum Plaster
ASTM C1396 / C1396M - 09a	Standard Specification for Gypsum Board
ASTM C59 / C59M - 00(2006)	Standard Specification for Gypsum Casting Plaster and Gypsum Molding Plaster
ASTM C1396 / C1396M - 09a	Standard Specification for Gypsum Board
ASTM C317 / C317M - 00(2005)	Standard Specification for Gypsum Concrete
ASTM C1396 / C1396M - 09a	Standard Specification for Gypsum Board
ASTM C471M - 01(2006)e1	Standard Test Methods for Chemical Analysis of Gypsum and Gypsum Products [Metric]
ASTM C472 - 99(2009)	Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete
ASTM C473 - 09	Standard Test Methods for Physical Testing of Gypsum Panel Products
ASTM C474 - 05	Standard Test Methods for Joint Treatment Materials for Gypsum Board Construction
ASTM C587 - 04	Standard Specification for Gypsum Veneer Plaster
ASTM C1396 / C1396M - 09a	Standard Specification for Gypsum Board
ASTM C1396 / C1396M - 09a	Standard Specification for Gypsum Board
IS 2849-1983	Specification for Non-Load Bearing Gypsum Partition Blocks (Solid and Hollow Types)

2.7 FLOORING MATERIALS

2.7.1 General

Flooring materials are generally of two types; precast systems like tiles, bricks and cast insitu.

2.7.2 Concrete/Terrazzo Tiles

Concrete/Terrazzo tiles shall have good abrasion and impact resistance properties. Factors such as the type of cement and the type and grading of aggregate used influence the resistance of such tiles to chemicals including cleaning agents. Terrazzo tiles shall have a wear layer after grinding at least 6 mm composed of graded marble chipping in white, tinted or grey Portland cement on a layer of fine concrete. They may be ground after manufacture to expose the marble aggregate and subsequently grouted. Slip resisting grits may be incorporated. These tiles shall conform to BDS EN 13748-1:2008 Terrazzo tiles — Part 1: Terrazzo tiles for internal use; BDS EN 13748-2:2008 Terrazzo tiles — Part 2: Terrazzo tiles for external use; BDS 1262 : 1990 Clay flooring tiles; BDS 1248

: 1989 Ceramic Unglazed Vitreous acid resistant tiles or IS : 1237-1980, Specification for Cement Concrete Flooring Tile.

2.7.3 Asphalt Tiles/Flooring

Asphalt tiles/floorings are suitable for industrial flooring in areas where they will not be exposed to solvents, grease, oil, corrosive chemicals and excessive heat. Bitumen mastic for flooring shall conform to IS: 1195-1978; IS : 8374-1977, Bitumen Mastic, Anti-static and Electrically Conducting Grade and IS : 9510-1980, Bitumen Mastic Acid Resisting Grade.

2.7.4 Mosaic Tiles

Mosaic tiles of a variety of shapes and sizes may be used. Thickness of the wear layer is dependent on the sizes of marble chips but shall not be less than 6 mm thick. The tiles shall be wet cured for sufficient time before laying so that their surfaces are not damaged during grinding and polishing.

2.7.5 Clay Tile

Clay floor tiles shall have sufficient strength and abrasion resistant characteristics to withstand the impact and abrasion they are likely to be subject to. When glazed earthenware tiles are used in flooring they shall conform to IS : 777:1970, Glazed Earthenware Tiles.

2.7.6 Vinyl Tiles

The vinyl tiles shall consist of a thoroughly blended composition of thermoplastic binder, asbestos fibre, fillers and pigments. The thermoplastic binder shall consist substantially of either or both of the following:

- a) vinyl chloride polymer
- b) vinyl chloride copolymers.

The polymeric material shall be compounded with suitable plasticizers and stabilizers. The tiles may be plain, patterned or mottled. The thickness shall not be less than 1.5 mm.

2.7.7 Rubber Tiles

These tiles are composed of natural, synthetic or reclaimed rubber, or a combination of these, with reinforcing fibres, pigments, and fillers, vulcanized and moulded under pressure. The tiles shall have excellent resilience and resistance to indentation, and good resistance to grease, alkali and abrasion. The thickness shall not be less than 2 mm.

2.7.8 Cast Insitu Floor Coverings

- a) Terrazzo : Terrazzo is a marble mosaic with Portland cement matrix and is generally composed of two parts marble chips to one part Portland cement. Colour pigments may be added. The thickness of terrazzo topping may vary from 13 mm to 19 mm and may be applied to green concrete of the floor or bonded with neat Portland cement, or over a sand cushion placed on the concrete floor.
- b) Concrete : A concrete topping may be applied to a concrete structural slab before or after the base slab has hardened. Integral toppings may generally be 25 mm to 40 mm thick; independent toppings about 25 mm to 50 mm thick. Aggregate sizes shall not exceed 6 mm.

2.7.9 Other Flooring Materials

Other flooring materials i.e. bricks, natural stone, etc. showing satisfactory performance in similar situations may be allowed. Plastic flooring tile and ceramic unglazed vitreous acid resistant tiles, if used, shall conform to IS : 3464 and IS : 4357 respectively.

Flooring compositions complying with IS : 657, Materials for Use in the Manufacture of Magnesium Oxychloride Flooring Composition; and IS: 9197, Epoxy Resin Composition for Floor Topping may be allowed. Linoleum sheets and tiles shall conform to IS : 653.

Flooring materials shall also conform to the standards listed below.

BDS 1248 : 1989	Ceramic Unglazed Vitreous acid resistant tilesIt covers the requirements for ceramic unglazed vitreous acid resistant tiles used in laying of floors & lining of tanks subjected to corrosive conditions. Manufacture, Finish, Tests etc.
BDS 1262 : 1990	Clay flooring tilesIt specifies the requirements for dimensions, quality & strength for clay flooring tiles & different types of tests.
BDS ISO 10545 -1 : 2006	Ceramic tiles, Sampling and basis for acceptance. Specifies rules for batching, sampling, inspection and acceptance/rejection of ceramic tiles.
BDS ISO 10545 -2 : 2006	Ceramic tiles, Determination of dimensions and surface quality Specifies methods for determining the dimensional characteristics (length, width, thickness, straightness of sides, rectangularity, and surface flatness) and the surface of ceramic tiles.
BDS ISO 10545 -3 : 2006	Ceramic tiles, Determination of water absorption, apparent porosity, apparent relative density and bulk density. Specifies methods for determining water absorption, apparent porosity, apparent relative density and bulk density of ceramic tiles.
BDS ISO 10545 -4 : 2006	Ceramic tiles, Determination of modulus of rupture and breaking strength Defines a test method for determining the modulus of rupture and breaking strength of all ceramic tiles.
BDS ISO 10545 -5 : 2005	Ceramic tiles, Determination of impact resistance by measurement of coefficient of restitution Specifies methods for determining the impact resistance of ceramic tiles by measuring the coefficient of restitution.
BDS ISO 10545 -6 : 2006	Ceramic tiles, Determination of resistance to deep abrasion for unglazed tiles.
BDS ISO 10545 -7 : 2006	Ceramic tiles, Determination of resistance to surface abrasion for glazed tiles. Specifies a method for determining the resistance to surface

	abrasion of all glazed ceramic tiles used for floor covering.
BDS ISO 10545 -8 : 2006	Ceramic tiles, Determination of linear thermal expansion
	Defines a test method for determining the coefficient of linear thermal expansion of ceramic tiles.
BDS ISO 10545 -9 : 2006	Ceramic tiles, Determination of resistance to thermal shock.
	Defines a test method for determining the resistance to thermal shock of all ceramic tiles under normal conditions of use.
BDS ISO 10545 -10 : 2006	Ceramic tiles, Determination of moisture expansion.
	Specifies a method for determining the moisture expansion of all ceramic tiles.
BDS ISO 10545 -11 : 2006	Ceramic tiles, Determination of crazing resistance for glazed tiles.
	Defines a test method for determining the crazing resistance of all glazed ceramic tiles except when the crazing is an inherent decorative feature of the product.
BDS ISO 10545 -12 : 2006	Ceramic tiles, Determination of frost resistance.
	Specifies a method for determining the frost resistance of all ceramic tiles intended for use in freezing conditions in the presence of water.
BDS ISO 10545 -13 : 2006	Ceramic tiles, Determination of chemical resistance.
	Specifies a test method for determining the chemical resistance of all ceramic tiles at room temperature. The method is applicable to all types of ceramic tiles.
BDS ISO 10545 -14 : 2006	Ceramic tiles, Determination of resistance to stains.
	Specifies a method for determining the resistance to stains of the proper surface of ceramic tiles.
BDS ISO 10545 -15 : 2006	Ceramic tiles, Determination of lead and cadmium given off by glazed tiles.
	Specifies a method for the determination of lead and cadmium given off by the glaze of ceramic tiles.

BDS ISO 10545 -16 : 2006	Ceramic tiles, Determination of small color differences. Describes a method for utilizing color measuring instruments for quantifying the small color differences between plain colored glazed ceramic tiles, which are designed to be uniform and consistent color It permits the specification of a maximum acceptable value which depends only on the closeness of match and not on the nature of the color difference.
BDS EN 490: 2008	Concrete roofing tiles and fittings for roof covering and all cladding — Product specifications.
BDS ISO 13006 : 2006	Ceramic tiles- Definitions, Classification, Characteristics and Marking. This Bangladesh Standard defines terms and establishes classifications characteristics and marking requirements for ceramic tiles of the best commercial quality (first quality).
BDS EN 491: 2008	Concrete roofing tiles and fittings for roof covering and wall cladding — Test methods
BDS EN 538: 2008	Clay roofing tiles for discontinuous laying — Flexural strength test
BDS EN 539-1: 2008	Clay roofing tiles for discontinuous laying Determination of physical characteristics — Part 1: Impermeability test
BDS EN 1024: 2008	Clay roofing tiles for discontinuous laying — Determination of geometric characteristics
BDS EN 1304: 2008	Clay roofing tiles and fittings — Product definitions and specifications
BDS EN 13748-1: 2008	Terrazzo tiles — Part 1: Terrazzo tiles for internal use
BDS EN 13748-2: 2008	Terrazzo tiles — Part 2: Terrazzo tiles for external use

2.8 STEEL

2.8.1 Reinforcing Steel

Reinforcing steel shall comply with the requirements specified in Sec 2.4.6 in this Part.

2.8.2 Structural Steel

Structural steel shall conform to Bangladesh Standards BDS 878 : 1978, Specification for Weldable Structural Steels; BDS 1355 : 1992, Dimensions and Properties of Hot Rolled Steel Beam, Column, Channel and Angle Sections. Where Bangladesh standards are not available, the relevant standards listed below shall be applicable.

BDS 1429:1993	Light gauge steel sections
BDS ISO 2566-1:2008	Steel — Conversion of elongation values — Part 1: Carbon and low alloy steels
BDS ISO 2566-2:2008	Steel - Conversion of elongation values - Part 2: Austenitic steels
BDS ISO 657-1:2008	Hot-rolled steel sections - Part 1: Equal-leg angles – Dimensions
BDS ISO 657-2:2008	Hot-rolled steel sections - Part 2: Unequal-leg angles – Dimensions
BDS ISO 657-5:2008	Hot-rolled steel sections -Part V Equal-leg angles and unequal leg angles – Tolerances for metric and inch series
BDS ISO 657-11:2008	Hot-rolled steel sections — Part 11: Sloping flange channel sections (Metric series) — Dimensions and sectional properties
BDS ISO 657-15:2008	Hot-rolled steel sections - Part 15 Sloping flange beam sections (Metric series) - Dimensions and sectional properties
BDS ISO 657-16:2008	Hot-rolled steel sections — Part 16: Sloping flange column sections (metric series) — Dimensions and sectional properties
BDS ISO 657-18:2008	Hot-rolled steel sections — Part 18: L sections for shipbuilding (metric series) 104— Dimensions, sectional properties and tolerances
BDS ISO 657-19:2008	Hot-rolled steel sections — Part 19: Bulb flats (metric series) — Dimensions, sectional properties and tolerances
BDS ISO 657-21:2008	Hot-rolled steel sections - Part 21 T-sections with equal depth and flange width - Dimensions
BDS ISO 10474:2008	Steel and steel products — Inspection documents
BDS ISO 14284:2008	Steel and iron — Sampling and preparation of samples for the determination of chemical composition
BDS ISO 9769:2008	Steel and iron — Review of available methods of analysis
BDS ISO 6929:2008	Steel products — Definition and classification
BDS ISO 20723:2008	Structural steels — Surface condition of hot-rolled sections — Delivery requirements

BDS ISO 24314:2008	Structural steels — Structural steels for building with improved seismic resistance — Technical delivery conditions
BDS ISO 404:2008	Steel and steel products—General technical delivery requirements
BDS ISO 1127: 2006	Stainless steel tubes - Dimensions, tolerances and conventional masses per unit length.
BDS ISO 4200: 2006	Plain end steel tubes, welded and seamless - General tables of dimensions and masses per unit length.
BDS ISO 6761:2008	Steel tubes – Preparation of ends of tubes and fittings for welding
ASTM A27 / A27M - 08	Standard Specification for Steel Castings, Carbon, for General Application
ASTM A36 / A36M - 08	Standard Specification for Carbon Structural Steel
ASTM A48 / A48M - 03(2008)	Standard Specification for Gray Iron Castings
ASTM A53 / A53M - 07	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A148 / A148M - 08	Standard Specification for Steel Castings, High Strength, for Structural Purposes
ASTM A242 / A242M - 04(2009)	Standard Specification for High-Strength Low-Alloy Structural Steel
ASTM A252 - 98(2007)	Standard Specification for Welded and Seamless Steel Pipe Piles
ASTM A283 / A283M - 03(2007)	Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A307 - 07b	Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A325 - 09ae1	Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A325M - 09	Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength [Metric]
ASTM A336 / A336M - 09	Standard Specification for Alloy Steel Forgings for Pressure and High-Temperature Parts
ASTM A653 / A653M - 09a	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the

	Hot-Dip Process
ASTM A449 - 07b	Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use
ASTM A490 - 09	Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
ASTM A500 / A500M - 10	Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A501 - 07	Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
ASTM A514 / A514M - 05(2009)	Standard Specification for High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding
ASTM A529 / A529M - 05(2009)	Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality
ASTM A563 - 07a	Standard Specification for Carbons and Alloy Steel Nuts
ASTM A563M - 07	Standard Specification for Carbon and Alloy Steel Nuts [Metric]
ASTM A1011 / A1011M - 10	Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
ASTM A572 / A572M - 07	Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A588 / A588M - 05	Standard Specification for High-Strength Low-Alloy Structural Steel, up to 50 ksi [345 MPa] Minimum Yield Point, with Atmospheric Corrosion Resistance
ASTM A606 / A606M - 09a	Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance
ASTM A1008 / A1008M - 10	Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
ASTM A618 / A618M - 04	Standard Specification for Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing

ASTM A666 - 03	Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
ASTM A668 / A668M - 04(2009)	Standard Specification for Steel Forgings, Carbon and Alloy, for General Industrial Use
ASTM A690 / A690M - 07	Standard Specification for High-Strength Low-Alloy Nickel, Copper, Phosphorus Steel H-Piles and Sheet Piling with Atmospheric Corrosion Resistance for Use in Marine Environments
ASTM A852 / A852M - 03(2007)	Standard Specification for Quenched and Tempered Low-Alloy Structural Steel Plate with 70 ksi [485 MPa] Minimum Yield Strength to 4 in. [100 mm] Thick

2.8.3 Steel Plate, Sheet and Strips

These shall conform to the following standards.

BDS 868 : 1978	Code of Practice for Galvanized Corrugated Sheet Roof and Wall Coverings;
BDS 1122 : 1985	Specification for Hot-dip Galvanized Steel Sheet and Coil;
BDS ISO 9328-1:2009	Steel flat products for pressure purposes — Technical delivery conditions — Part 1: General requirements
BDS ISO 9328-2:2009	Steel flat products for pressure purposes — Technical delivery conditions — Part 2: Non-alloy and alloy steels with specified elevated temperature properties
BDS ISO 9328-3:2009	Steel flat products for pressure purposes — Technical delivery conditions — Part 3: Weldable fine grain steels, normalized
BDS ISO 9328-4:2009	Steel flat products for pressure purposes — Technical delivery conditions — Part 4: Nickel-alloy steels with specified low temperature properties
BDS ISO 9328-5:2009	Steel flat products for pressure purposes — Technical delivery conditions — Part 5: Weldable fine grain steels, thermo mechanically rolled
BDS ISO 9328-6:2009	Steel flat products for pressure purposes — Technical delivery conditions — Part 6: Weldable fine grain steels, quenched and tempered
BDS ISO 9328-7:2009	Steel flat products for pressure purposes — Technical delivery conditions — Part 7: Stainless steels
BDS ISO 4995:2006	Hot-rolled steel sheet of structural quality

BDS ISO 7452:2008	Hot-rolled structural steel plates — Tolerances on dimensions and shape
BDS ISO 7778:2008	Steel plate with specified through-thickness characteristics
BDS ISO 7788:2008	Steel – Surface finish of hot-rolled plates and wide flats – Delivery requirements
BDS ISO 9034:2008	Hot-rolled structural steel wide flats – Tolerances on dimensions and shape
BDS ISO 9364:2011	Continuous hot-dip aluminium/zinc coated steel sheet of commercial, drawing and structural qualities
BDS ISO 16160:2011	Continuously hot-rolled steel sheet products — Dimensional and shape tolerances
BDS ISO16162:2011	Continuously cold-rolled steel sheet products — Dimensional and shape tolerances
BDS ISO 16163:2011	Continuously hot-dipped coated steel sheet products — Dimensional and shape tolerances
IS 412 : 1975	Specification for Expanded Metal Steel Sheets for General Purposes (Second Revision);
IS 1079 : 1994	Specification for hot rolled carbon steel sheet and strip (fifth revision)
IS 4030 : 1973	Specification for Cold-Rolled Carbon Steel Strip for General Engineering Purposes (First Revision);
IS 7226 : 1974	Specification for Cold-Rolled Medium, High Carbon and Low-Alloy Steel Strip for General Engineering Purposes;
IS 3502 : 1994	Specification for steel chequered plates (second revision)
ASTM A109 / A109M - 08	Standard Specification for Steel, Strip, Carbon (0.25 Maximum Percent), Cold-Rolled
ASTM A123 / A123M - 09	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A167 - 99(2009)	Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM A176 - 99(2009)	Standard Specification for Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip
ASTM A240 / A240M - 10	Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for

General Applications

ASTM A263 - 09	Standard Specification for Stainless Chromium Steel-Clad Plate
ASTM A264 - 09	Specification for Stainless Chromium-Nickel Steel-Clad Plate
ASTM A285 / A285M - 03(2007)	Standard Specification for Pressure Vessel Plates, Carbon Steel, Low- and Intermediate-Tensile Strength
ASTM A328 / A328M - 07	Standard Specification for Steel Sheet Piling
ASTM A1008 / A1008M - 10	Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
ASTM A414 / A414M - 10	Standard Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy for Pressure Vessels
ASTM A424 / A424M - 09a	Standard Specification for Steel, Sheet, for Porcelain Enameling
ASTM A929 / A929M - 01(2007)	Standard Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe
ASTM A463 / A463M - 09a	Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process
ASTM A480 / A480M - 10	Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
ASTM A505 - 00(2005)	Standard Specification for Steel, Sheet and Strip, Alloy, Hot-Rolled and Cold-Rolled, General Requirements for
ASTM A506 - 05	Standard Specification for Alloy and Structural Alloy Steel, Sheet and Strip, Hot-Rolled and Cold-Rolled
ASTM A507 - 10	Standard Specification for Drawing Alloy Steel, Sheet and Strip, Hot-Rolled and Cold-Rolled
ASTM A653 / A653M - 09a	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A568 / A568M - 09a	Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for
ASTM A577 / A577M - 90(2007)	Standard Specification for Ultrasonic Angle-Beam Examination of Steel Plates
ASTM A578 / A578M - 07	Standard Specification for Straight-Beam Ultrasonic Examination of Rolled Steel Plates for Special Applications

ASTM A879 / A879M - 06	Standard Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface
ASTM A599 / A599M - 07	Standard Specification for Tin Mill Products, Electrolytic Tin-Coated, Cold-Rolled Sheet
ASTM A606 / A606M - 09a	Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance
ASTM A635 / A635M - 09b	Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Alloy, Carbon, Structural, High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability, General Requirements for
ASTM A653 / A653M - 09a	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A653 / A653M - 09a	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A666 - 03	Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
ASTM A690 / A690M - 07	Standard Specification for High-Strength Low-Alloy Nickel, Copper, Phosphorus Steel H-Piles and Sheet Piling with Atmospheric Corrosion Resistance for Use in Marine Environments
ASTM A775 / A775M - 07b	Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM A792 / A792M - 09a	Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
ASTM A857 / A857M - 07	Standard Specification for Steel Sheet Piling, Cold Formed, Light Gage
ASTM A875 / A875M - 09a	Standard Specification for Steel Sheet, Zinc-5 % Aluminum Alloy-Coated by the Hot-Dip Process

2.8.4 Steel Pipe, Tube and Fittings

These items shall conform to the following standards :

BDS ISO 49:2008	Malleable cast iron fittings threaded to ISO 7-1
BDS ISO 3545-3:2008	Steel tubes and fittings – Symbols for use in specifications – Part 3: Tubular fittings with circular cross-section

BDS ISO 4144:2008	Pipe work – Stainless steel fittings threaded in accordance with ISO 7-1
BDS ISO 4145:2008	Non-alloy steel fittings threaded to ISO 7-1
BDS ISO 3419:2008	Non – alloy and alloy steel butt–welding fittings
BDS ISO 5251:2008	Stainless steel butt–welding fittings
ASTM A53 / A53M - 07	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A105 / A105M - 09	Standard Specification for Carbon Steel Forgings for Piping Applications
ASTM A106 / A106M - 08	Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service
ASTM A134 - 96(2005)	Standard Specification for Pipe, Steel, Electric-Fusion (Arc)-Welded (Sizes NPS 16 and Over)
ASTM A139 / A139M - 04	Standard Specification for Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and Over)
ASTM A181 / A181M - 06	Standard Specification for Carbon Steel Forgings, for General-Purpose Piping
ASTM A182 / A182M - 09a	Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service
ASTM A234 / A234M - 07	Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service
ASTM A252 - 98(2007)	Standard Specification for Welded and Seamless Steel Pipe Piles
ASTM A254 - 97(2007)	Standard Specification for Copper-Brazed Steel Tubing
ASTM A268 / A268M - 10	Standard Specification for Seamless and Welded Ferritic and Martensitic Stainless Steel Tubing for General Service
ASTM A269 - 10	Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service
ASTM A270 - 03a(2008)e1	Standard Specification for Seamless and Welded Austenitic Stainless Steel Sanitary Tubing
ASTM A312 / A312M - 09	Standard Specification for Seamless, Welded, and Heavily Cold

	Worked Austenitic Stainless Steel Pipes
ASTM A333 / A333M - 10	Standard Specification for Seamless and Welded Steel Pipe for Low-Temperature Service
ASTM A334 / A334M - 04a	Standard Specification for Seamless and Welded Carbon and Alloy-Steel Tubes for Low-Temperature Service
ASTM A403 / A403M - 09	Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings
ASTM A420 / A420M - 07	Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low-Temperature Service
ASTM A423 / A423M - 09	Standard Specification for Seamless and Electric-Welded Low-Alloy Steel Tubes
ASTM A450 / A450M - 09	Standard Specification for General Requirements for Carbon and Low Alloy Steel Tubes
ASTM A500 / A500M - 10	Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A501 - 07	Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
ASTM A522 / A522M - 07	Standard Specification for Forged or Rolled 8 and 9% Nickel Alloy Steel Flanges, Fittings, Valves, and Parts for Low-Temperature Service
ASTM A524 - 96(2005)	Standard Specification for Seamless Carbon Steel Pipe for Atmospheric and Lower Temperatures
ASTM A530 / A530M - 04a	Standard Specification for General Requirements for Specialized Carbon and Alloy Steel Pipe
ASTM A589 / A589M - 06	Standard Specification for Seamless and Welded Carbon Steel Water-Well Pipe
ASTM A618 / A618M - 04	Standard Specification for Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing
ASTM A632 - 04(2009)	Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing (Small-Diameter) for General Service
ASTM A707 / A707M - 02(2007)	Standard Specification for Forged Carbon and Alloy Steel Flanges for Low-Temperature Service
ASTM A733 - 03(2009)e1	Standard Specification for Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples

ASTM A778 - 01(2009)e1	Standard Specification for Welded, Unannealed Austenitic Stainless Steel Tubular Products
ASTM A807 / A807M - 02(2008)	Standard Practice for Installing Corrugated Steel Structural Plate Pipe for Sewers and Other Applications
ASTM A865 / A865M - 06	Standard Specification for Threaded Couplings, Steel, Black or Zinc-Coated (Galvanized) Welded or Seamless, for Use in Steel Pipe Joints

2.8.5 Steel Bars, Wire and Wire Rods

These shall conform to the following standards.

BDS ISO 1035-1:2006	Hot-rolled steel bars-Part 1: Dimensions of round bars.
BDS ISO 1035-2:2006	Hot-rolled steel bars-Part 2: Dimensions of square bars.
BDS ISO 1035-3:2006	Hot-rolled steel bars-Part 3: Dimensions of flat bars.
BDS ISO 1035-4:2006	Hot-rolled steel bars-Part 4: Tolerances.
BDS ISO 4951-1:2008	High yield strength steel bars and sections — Part 1: General delivery requirements
BDS ISO 4951-2:2008	High yield strength steel bars and sections — Part 2: Delivery conditions for normalized, normalized rolled and as-rolled steels
BDS ISO 4951-3:2008	High yield strength steel bars and sections — Part 3: Delivery conditions for thermo mechanically-rolled steels
ASTM A29 / A29M - 05	Standard Specification for Steel Bars, Carbon and Alloy, Hot-Wrought, General Requirements for
ASTM A49 - 01(2006)	Standard Specification for Heat-Treated Carbon Steel Joint Bars, Microalloyed Joint Bars, and Forged Carbon Steel Compromise Joint Bars
ASTM A108 - 07	Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
ASTM A116 - 05	Standard Specification for Metallic-Coated, Steel Woven Wire Fence Fabric
ASTM A185 / A185M - 07	Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
ASTM A227 / A227M - 06	Standard Specification for Steel Wire, Cold-Drawn for

	Mechanical Springs
ASTM A228 / A228M - 07	Standard Specification for Steel Wire, Music Spring Quality
ASTM A229 / A229M - 99(2005)	Standard Specification for Steel Wire, Oil-Tempered for Mechanical Springs
ASTM A276 - 08a	Standard Specification for Stainless Steel Bars and Shapes
ASTM A311 / A311M - 04	Standard Specification for Cold-Drawn, Stress-Relieved Carbon Steel Bars Subject to Mechanical Property Requirements
ASTM A322 - 07	Standard Specification for Steel Bars, Alloy, Standard Grades
ASTM A108 - 07	Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
ASTM A368 - 95a(2009)	Standard Specification for Stainless Steel Wire Strand
ASTM A434 - 06	Standard Specification for Steel Bars, Alloy, Hot-Wrought or Cold-Finished, Quenched and Tempered
ASTM A475 - 03(2009)e1	Standard Specification for Zinc-Coated Steel Wire Strand
ASTM A478 - 97(2008)	Standard Specification for Chromium-Nickel Stainless Steel Weaving and Knitting Wire
ASTM A479 / A479M - 10	Standard Specification for Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels
ASTM A492 - 95(2009)	Standard Specification for Stainless Steel Rope Wire
ASTM A499 - 89(2008)	Standard Specification for Steel Bars and Shapes, Carbon Rolled from "T" Rails
ASTM A510 - 08	Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel
ASTM A575 - 96(2007)	Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades
ASTM A576 - 90b(2006)	Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality
ASTM A580 / A580M - 08	Standard Specification for Stainless Steel Wire
ASTM A586 - 04a(2009)e1	Standard Specification for Zinc-Coated Parallel and Helical Steel Wire Structural Strand
ASTM A603 - 98(2009)e1	Standard Specification for Zinc-Coated Steel Structural Wire Rope

ASTM A627 - 03	Standard Test Methods for Tool-Resisting Steel Bars, Flats, and Shapes for Detention and Correctional Facilities
ASTM A627 - 03	Standard Test Methods for Tool-Resisting Steel Bars, Flats, and Shapes for Detention and Correctional Facilities
ASTM A663 / A663M - 89(2006)	standard Specification for Steel Bars, Carbon, Merchant Quality, Mechanical Properties
ASTM A666 - 03	Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
ASTM A706 / A706M - 09b	Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A764 - 07	Standard Specification for Metallic Coated Carbon Steel Wire, Coated at Size and Drawn to Size for Mechanical Springs
ASTM C933 - 09	Standard Specification for Welded Wire Lath

2.8.6 Steel Fasteners

Steel fasteners shall conform to the following standards:

BDS 1373 : 1992	Slotted countersunk flat head tapping screws
BDS 1374 : 1992	Slotted raised counter
BDS 1375 : 1992	Fasteners hexagon products widths across flats
BDS 1405:1993	Bolts, Screws, Nuts and Accessories Terminology and Nomenclature
BDS 1406:1993	Hexagon nuts style 2 products grades A and B.
BDS 1407:1993	Hexagon nuts style 3 products grades A and B.
BDS 1408:1993	General purpose screw threads general plan
BDS 1409:1993	General purpose screw threads selected sizes for screws, bolts and nuts
BDS 1410:1993	Thread run-outs for fasteners thread of BDS 1408: 1995 and
BDS 1411:1993	Tapping screws thread
BDS 1412:1993	Thread undercuts of external metric thread fasteners
BDS 1413:1993	Head configuration and gauging of countersunk head screws

BDS 1428 : 1993	Fasteners-bolts, screws, studs and nuts-symbols and designations of dimensions
ASTM A31 - 04(2009)	Standard Specification for Steel Rivets and Bars for Rivets, Pressure Vessels
ASTM A183 - 03(2009)	Standard Specification for Carbon Steel Track Bolts and Nuts
ASTM A193 / A193M - 09	Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications
ASTM A194 / A194M - 10	Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both
ASTM A307 - 07b	Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A320 / A320M - 08	Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for Low-Temperature Service
ASTM A325 - 09ae1	Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A354 - 07a	Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners
ASTM A437 / A437M - 10	Standard Specification for Stainless and Alloy-Steel Turbine-Type Bolting Specially Heat Treated for High-Temperature Service
ASTM A449 - 07b	Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use
ASTM A489 - 04e1	Standard Specification for Carbon Steel Lifting Eyes
ASTM A490 - 09	Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
ASTM A502 - 03(2009)	Standard Specification for Rivets, Steel, Structural
ASTM A540 / A540M - 10	Standard Specification for Alloy-Steel Bolting for Special Applications
ASTM A563 - 07a	Standard Specification for Carbons and Alloy Steel Nuts
ASTM C954 - 07	Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs

	from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
ASTM C955 - 09a	Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases
ASTM F959 - 09	Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners
ASTM C1002 - 07	Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
ASTM F436 - 09	Standard Specification for Hardened Steel Washers
ASTM F593 - 02(2008)	Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
ASTM F594 - 09	Standard Specification for Stainless Steel Nuts
ASTM F844 - 07a	Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use
ASTM A574 - 08	Standard Specification for Alloy Steel Socket-Head Cap Screws
ASTM C514 - 04(2009)e1	Standard Specification for Nails for the Application of Gypsum Board

2.8.7 Welding Electrodes and Wires

Welding electrodes and wires shall conform to the following standards :

BDS 1442-1:1994	Filler rods and wire for gas shielded arc-welding-Ferric steel
BDS 1442-2:1994	Filler rods and wire for gas shielded arc-welding-Austenitic stainless steel
BDS 1442-3:1994	Filler rods and wires for gas shielded arc welding-copper and copper alloy
BDS 1442-4:1994	Filler rods and wires for gas shielded arc welding-Aluminium and Aluminium alloy and magnesium alloys
BDS 1442-5:1994	Filler rods and wires for gas shielded arc welding-Nickel and nickel alloys
IS 814 - 1991	Specification for covered electrodes for manual metal arc welding of carbon and carbon manganese steel (fifth revision)
IS 815-1974	Classification and Coding of Covered Electrodes for Metal Arc Welding of Structural Steels (Second Revision);

IS	1278-1972	Specification for Filler Rods and Wires for Gas Welding (Second Revision);
IS	1395-1982	Specification for Low and Medium Alloy Steel Covered Electrodes for Manual Metal Arc Welding (Third Revision);
IS	3613-1974	Acceptance Tests for Wire Flux Combinations for Submerged-Arc Welding of Structural Steel (First Revision);
IS	4972-1968	Specification for Resistance Spot-Welding Electrodes;
IS	6419-1996	Specification for welding rods and bare electrodes for gas shielded arc welding of structural steel (first revision);
IS	6560-1996	Specification for molybdenum and chromium-molybdenum low alloy steel welding rods and bare electrodes for gas shielded arc welding (first revision);
IS	7280-1974	Specification for Base Wire Electrodes for Submerged-Arc Welding of Structural Steels;
IS	8363-1976	Specification for Bare Wire Electrodes for Electroslag Welding of Steels;
BDS	239: 1963	Specification for Soft Solder (under revision);
ISO	9453:1990	Soft Solder Alloys-Chemical Compositions and Forms;
ISO	9454:1990	Soft Soldering Fluxes-Classification and Requirements
		Part 1 : Classification, Labelling and Packaging;
ISO	9455-1: 1990	Soft Soldering Fluxes- Test Methods
		Part 1 : Determination of Non-volatile Matter, Gravimetric Method;
ISO	9455-8:1991	Soft Soldering Fluxes-Test Methods
		Part 8 : Determination of Zinc Content;
ISO	9455-11:1991	Soft Soldering Fluxes-Test Methods
		Part 11 : Solubility of Flux Residues;
ISO	9455-14:1991	Soft Soldering Fluxes-Test Methods
		Part 14 : Assessment of Tacriness of Flux Residues.

2.9 TIMBER & WOOD PRODUCTS

2.9.1 Timber Types and Properties

Timber types for the structural purpose with their engineering characteristics are contained in Table 6.11.1 of Part-6 of this code. Details of the uses of timber in structures or elements of structures including terminology, material requirements, moisture content preferred cut sizes of sawn timbers, grading, permissible defects, suitability in respect of durability and treatability, design criteria, and details of joints are also given in Chapter 11 of Part 6. Timber and timber constructions shall satisfy the requirements of that chapter and conform to the following standards :

BDS	142: 1961	Specification for Wood Doors (under revision);
BDS	173: 1962	Specification for Wood Windows (under revision);
BDS	230: 1962	Glossary of Terms Applicable to Timber, Plywood and Joinery (under revision);
BDS	803:1973	Trade Names and Abbreviated Symbols for Timber Species;
BDS	819:1975	Code of Practice for Preservation of Timber;
BDS	820:1978	Recommendation for Maximum Permissible Moisture Content of Timber used for Different Purposes in Bangladesh;
BDS	857:1977	Specification for Grading Rules for Logs and Sawn Timbers;
BDS	1090:1984	Methods of Test for Plywood;
BDS	1256:1990	Classification of Commercial Timber;
BDS	1311:1990	Key for Identification of Commercial Timber.

2.9.2 Plywood

A wood structural panel comprised of plies of wood veneer arranged in cross-aligned layers. The plies are bonded with waterproof adhesive that cures on application of heat and pressure.

Plywood shall conform to the following standards:

BDS	799:1983	Specification for Plywood for General Purposes (First Revision);
BDS	1158:1986	Specification for Veneered Decorative Plywood;

For sampling and testing of Plywood, the following Bangladesh Standards are applicable :

BDS	1087:1984	Specification for Method of Sampling of Plywood :
BDS	1090 : 1984	Methods of Test of Plywood.
IS	4990-1993	Specification for plywood for concrete shattering work (second revision);

IS	5509-2000	Specification for fire retardant plywood (second revision);
IS	5539-1969	Specification for Preservative Treated Plywood.

2.9.3 Particle Boards and Fibre Boards

A panel primarily composed of cellulosic materials (usually wood), generally in the form of discrete pieces or particles, as distinguished from fibers. The cellulosic material is combined with synthetic resin or other suitable bonding system by a process in which the interparticle bond is created by the bonding system under heat and pressure.

Fiber boards are fibrous, homogeneous panel made from lignocellulosic fibers (usually wood or cane) and having a density of less than 497 kg per cubic meter but more than 160 kg per cubic meter.

These materials shall conform to the following standards:

BDS	619:1967	Specification for Particle Board (medium density) (under revision);
BDS	620:1967	Specification for Hardboard (under revision);
BDS EN	316:2008	Wood Fiberboards — Definition, Classification and Symbols
ISO	820:1975	Particle Boards—Definition and Classification
ISO	821:1975	Particle Boards—Determination of Dimensions of Test Pieces;
ISO	822:1975	Particle Boards—Determination of Density;
ISO	823:1975	Particle Boards—Determination of Moisture Content;
ISO	766: 1972	Fibre Building Boards—Determination of Dimensions of Test Pieces;
ISO	767:1975	Fibre Building Boards—Determination of Moisture Content;
ISO	768:1972	Fibre Building Boards—Determination of Bending Strength;
ISO	769:1972	Fibre Building Boards—Hard and Medium Boards—Determination of

Water Absorption and of Swelling in Thickness after Immersion in Water;

ISO	818:1975	Fibre Building Boards—Definition-Classification;
ISO	819:1975	Fibre Building Boards Determination of Density;
ISO	2695:1976	Fibre Building Boards—Hard and Medium Boards for General

Purposes-Quality Specifications-Appearance, Shape and Dimensional Tolerances;

ISO	2696:1976	Fibre Building Boards-Hard and Medium Boards-Quality
-----	-----------	--

Specifications- Water Absorption and Swelling in Thickness;

ISO	3340:1976	Fibre Building Boards-Determination of Sand Content;
ISO	3346:1976	Fibre Building Boards-Determination of Surface Finish (roughness);
ISO	3729:1976	Fibre Building Boards-Determination of Surface Stability;
ISO/TR	7469:1981	Dimensional Stability of Hardboards.

Wood based Laminates

Laminated boards having a core of strips, each not exceeding 7 mm in thickness, glued together face to face to form a slab which in turn is glued between two or more veneers, with the direction of the grain of the core strips running at right angles to that of the adjacent outer veneers.

Wood based laminates shall conform to the following standards :

IS	3513:1989	Specification for resin treated compressed wood laminates (compregs): Part 3 For general purposes (first revision)
IS	3513:1966	Specification for resin treated compressed wood laminates (compregs): Part 4 Sampling and Tests
IS	9307-1979 (Parts I to VIII)	Methods of Tests for Wood-based Structural Sandwich Construction. Part I Flexure Test Part II Edgewise Compression Test Part III Flatwise Compression Test Part IV Shear Test Part V Flatwise Tension Test Part VI Flexure Creep Test Part VII Cantilever Vibration Test Part VIII Weathering Test

2.9.4 Adhesives and Glues

Adhesives and glues are used to join two or more parts so as to form a single unit.

Adhesives shall conform to the following standards :

IS	848-1974	Specification for Synthetic Resin Adhesives for Plywood (Phenolic and aminoplastic) (First Revision);
IS	849-1994	Specification for cold setting case in glue for wood (first revision)
IS	851-1978	Specification for Synthetic Resin Adhesives for Construction Work (non structural) in Wood (First Revision);
IS	852-1994	Specification for animal glue for general wood-working purposes (second revision);
IS	4835-1979	Specification for Polyvinyl Acetate Dispersion-based Adhesives for Wood (First Revision);
IS	9188-1979	Specification for Adhesive for Structural Laminated Wood Products for Use Under Exterior Exposure Condition.

2.10 DOORS, WINDOWS AND VENTILATORS

2.10.1 Wooden Doors, Windows and Ventilators

These shall conform to the following standards:

BDS	142:1961	Specification for Wood Door (under revision);
BDS	173:1962	Specification for Wood Windows (under revision);
BDS	820:1978	Recommendation for Maximum Permissible Moisture Content of Timber Used for Different Purposes in Bangladesh;
BDS	1504:1996	Timber door window and ventilator frames
IS	1003-2003/1994	Specification for Timber Panelled and Glazed Shutters; Part 1-2003 Door Shutters (Fourth Revision); Part 2-1994 Window and Ventilator Shutters (Second Revision);
IS	1826-1961	Specification for Venetian Blinds for Windows;
IS	2191-1983	Specification for Wooden Flush Door Shutters (cellular and hollow core type); Part 1 Plywood Face Panels (Fourth Revision); Part 2 Particle Board Face Panels and Hardboard Face Panels (Third Revision);

IS	2202-1991/83	Specification for Wooden Flush Door Shutters (solid core type); Part 1 Plywood Face Panels (Fifth Revision); Part 2 Particle Board Face Panels and Hardboard Face Panels (Third Revision);
IS	4020-1998	Method of tests for door shutters: (Part 1): 1998 General (third revision) (Part 2): 1998 Measurement of dimensions and squareness (Third revision) (Part 3): 1998 Measurement of general flatness (third revision) (Part 4): 1998 Local planeness test (third revision) (Part 5): 1998 Impact indentation test (third revision) (Part 6): 1998 Flexure test (third revision) (Part 7): 1998 Edge loading test (third revision) (Part 8): 1998 Shock resistance test (third revision) (Part 9): 1998 Buckling resistance test (third revision) (Part 10) :1998 Slamming test (third revision) (Part 11) :1998 Misuse test (third revision) (Part 12) :1998 Varying humidity test (third revision) (Part 13) :1998 End immersion test (third revision) (Part 14) :1998 Knife test (third revision) (Part 15) :1998 Glue adhesion test (third revision) (Part 16) :1998 Screw withdrawal resistance test (third revision)
IS	4021:1995	Specification for timber door, window and ventilator frames
IS	4962:1968	Specification for wooden side sliding doors
IS	6198:1992	Specification for ledged, braced and battened timber shutters (second revision)Revision);

2.10.2 Metal Doors, Windows Frames and Ventilators

These shall conform to the following standards :

BDS	1270: 1990	Specification for Strong Room Door;
BDS	1273: 1990	Specification for Vault Doors;
IS	1038-1983	Specification for Steel Doors, Windows and Ventilators (Third Revision);
IS	1361-1978	Specification for Steel Windows for Industrial Buildings (First Revision);
IS	1948-1961	Specification for Aluminium Doors, Windows and Ventilators;
IS	1949-1961	Specification for Aluminium Windows for Industrial Buildings;
IS	4351-2003	Specification for Steel Door Frames (Second Revision);
IS	6248-1979	Specification for Metal Rolling Shutters and Rolling Grills (First Revision);
IS	7452-1990	Specification for Hot Rolled Steel Sections for Doors, Windows and Ventilators (Second Revision);
IS	10451-1983	Specification for Steel Sliding Shutters (top hung type);
IS	10521-1983	Specification for Collapsible Gates;

2.10.3 Plastic Doors and Windows

These shall conform to the following standards :

BDS EN 477: 2008	Unplasticized polyvinylchloride (PVC - U) profiles for the fabrication of windows and doors — Determination of the resistance to impact of main profiles by falling mass
BDS EN 478: 2008	Unplasticized polyvinylchloride (PVC - U) profiles for the fabrication of windows and doors — Determination of appearance after exposure at 150 °C
BDS EN 479: 2008	Unplasticized polyvinylchloride (PVC - U) profiles for the fabrication of windows and doors — Determination of heat reversion
BDS EN 513: 2008	Unplasticized polyvinylchloride (PVC - U) profiles for the fabrication of windows and doors — Determination of the resistance to artificial weathering
BDS EN 514: 2008	Unplasticized polyvinylchloride (PVC - U) profiles for the fabrication of windows and doors — Determination of the

	strength of welded corners and T-joints
BDS EN 12608: 2008	Unplasticized polyvinylchloride (PVC - U) profiles for the fabrication of windows and doors — Classification, requirements and test methods
BDS ISO 1163-1:2008	Plastics — Unplasticized poly (vinyl chloride) (PVC - U) moulding and extrusion materials — Part 1: Designation system and basis for specifications
BDS ISO 1163-2:2008	Plastics — Unplasticized poly (vinyl chloride) (PVC - U) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties
IS 14856:2000	Specification for glass fibre reinforced (GRP) panel type door shutters for internal use
IS 15380:2003	Specification for moulded raised high density fibre (HDF) panel doors

2.11 ALUMINIUM AND ALUMINIUM ALLOYS

Aluminum used for structural purposes in buildings and structures shall comply with AA ASM 35 and AA ADM 1.

Aluminium and Aluminium Alloys shall also conform to the following standards:

BDS EN 755-9:2010	Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 9: Profiles, tolerances on dimensions and form
BDS EN 755-2:2010	Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 2: Mechanical properties
BDS EN 755-1:2010	Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 1: Technical conditions for inspection and delivery
BDS EN 755-3:2010	Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 3: Round bars, tolerances on dimensions and form
BDS EN 755-4:2010	Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 4: Square bars, tolerances on dimensions and form
BDS EN 755-5:2010	Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 5: Rectangular bars, tolerances on dimensions and form
BDS EN 755-6:2010	Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 6: Hexagonal bars, tolerances on dimensions and

	form
BDS EN 755-7:2010	Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 7: Seamless tubes, tolerances on dimensions and form
BDS EN 755-8:2010	Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 8: Porthole tubes, tolerances on dimensions and form
BDS EN 12020-1:2010	Aluminium and aluminium alloys— Extruded precision profiles in alloys EN AW-6060 and EN AW-6063— Part 1: Technical conditions for inspection and delivery
BDS EN 12020-2:2010	Aluminium and aluminium alloys — Extruded precision profiles in alloys EN AW-6060 and EN AW-6063 — Part 2: Tolerances on dimensions and form
BDS EN 515:2010	Aluminium and aluminium alloys — Wrought products — Temper designations
ASTM B26 / B26M - 09	Standard Specification for Aluminum-Alloy Sand Castings
ASTM B85 / B85M - 09	Standard Specification for Aluminum-Alloy Die Castings
ASTM B108 / B108M - 08	Standard Specification for Aluminum-Alloy Permanent Mold Castings
ASTM B209 - 07	Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B210 - 04	Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes
ASTM B211 - 03	Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire
ASTM B221 - 08	Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B241 / B241M - 02	Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube
ASTM B308 / B308M - 02	Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles
ASTM B313 / B313M - 09	Standard Specification for Aluminum and Aluminum-Alloy Round Welded Tubes
ASTM B316 / B316M - 02	Standard Specification for Aluminum and Aluminum-Alloy Rivet and Cold-Heading Wire and Rods

ASTM B429 / B429M - 06	Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube
ASTM B483 / B483M - 03	Standard Specification for Aluminum and Aluminum-Alloy Drawn Tube and Pipe for General Purpose Applications
ASTM B547 / B547M - 02	Standard Specification for Aluminum and Aluminum-Alloy Formed and Arc-Welded Round Tube
ASTM B632 / B632M - 08	Standard Specification for Aluminum-Alloy Rolled Tread Plate
ASTM B745 / B745M - 97(2005)	Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains
ASTM E34 - 94(2002)	Standard Test Methods for Chemical Analysis of Aluminum and Aluminum-Base Alloys

2.12 BUILDERS HARDWARE

The applicable standards are listed below :

BDS	113:1986	Specification for Latches and Locks for Doors in Buildings;
IS	204-1991/1992	Specification for Tower Bolts; Part 1 Ferrous Metals (Fifth Revision); Part 2 Nonferrous metals (Fifth Revision);
IS	205-1992	Specification for Nonferrous Metal Butt Hinges (fourth Revision);
IS	206-1992	Specification for Tee and Strap Hinges (Fourth Revision);
IS	208-1996	Specification for Door Handles (Fifth Revision);
IS	281-1991	Specification for Mild Steel Sliding Door Bolts for Use with Padlock (Third Revision);
IS	362-1991	Specification for Parliament Hinges (Fifth Revision);
IS	363-1993	Specification for Hasps and Staples (Fourth Revision);
IS	364-1993	Specification for Fanlight Catch (Third Revision);
IS	452-1973	Specification for Door Springs, Rat-tail Type (Second Revision);
IS	453-1993	Specification for Double Acting Spring Hinges (Third Revision);
IS	729-1979	Specification for Drawer Locks, Cupboard Locks and Box Locks (Third Revision);

IS	1019-1974	Specification for Rim Latches (Second Revision);
IS	1341-1992	Specification for Steel Butt Hinges (Sixth Revision);
IS	1823-1980	Specification for Floor Door Stoppers (Third Revision);
IS	1837-1966	Specification for Fanlight Pivots (First Revision);
IS	2209-1976	Specification for Mortice Locks (vertical type) (Third Revision);
IS	2681-1993	Specification for Nonferrous Metal Sliding Door Bolts for Use with Padlocks (Third Revision);
IS	3564-1995	Specification for Door Closers (hydraulically regulated) (Second Revision);
IS	3818-1992	Specification for Continuous (piano) Hinges (Third Revision);
IS	3828-1966	Specification for Ventilator Chains;
IS	3843-1995	Specification for Steel Backflap Hinges; (First Revision)
IS	3847-1992	Specification for Mortice Night Latches; (First Revision)
IS	4621-1975	Specification for Indicating Bolts for use in Public Baths and Lavatories (First Revision);
IS	4948-2002	Specification for Welded Steel Wire Fabric for General Use (Second Revision);
IS	4992-1975	Specification for Door Handles for Mortice Locks (vertical type) (First Revision);
IS	5187-1972	Specification for Flush Bolts (First Revision);
IS	5899-1970	Specification for Bathroom Latches;
IS	5930-1970	Specification for Mortice Latch (vertical type);
IS	6315-1971	Specification for Floor Springs (hydraulically regulated) for Heavy Doors;
IS	6318-1971	Specification for Plastic Window Stays and Fasteners;
IS	6343-1982	Specification for Door Closers (pneumatically regulated) for Light Doors Weighing up to 40 kg (First Revision);
IS	6602-1972	Specification for Ventilator Poles;
IS	6607-1972	Specification for Rebated Mortice Locks (vertical type);
IS	7196-1974	Specification for Hold Fast;

IS	7197-1974	Specification for Double Action Floor Springs (without oil check) for Heavy Doors;
IS	7534-1985	Specification for sliding locking bolts for use with padlocks (first revision);
IS	7540-1974	Specification for Mortice Dead Locks;
IS	8756-1978	Specification for Ball Catches for use in Wooden Almirah;
IS	8760-1978	Specification for Mortice Sliding Door Locks, with Lever Mechanism;
IS	9106-1979	Specification for Rising Butt Hinges;
IS	9131-1979	Specification for Rim Locks;
IS	9460-1980	Specification Flush Drop Handle for Drawer;
IS	9899-1981	Specification for Hat, Coat and Wardrobe Hooks;
IS	10019-1981	Specification for Steel Window Stays and Fasteners;
IS	10090-1982	Specification for Numericals;
IS	10342-1982	Specification for Curtain Rail System
IS	12817:1997	Specification for stainless steel butt hinges (first revision)
IS	12867:1989	Specification for PVC hand rails covers
IS	14912:2001	Specification for door closers concealed type (hydraulically regulated)

2.13 ROOF COVERINGS

2.13.1 Scope

The provisions of this section shall govern the materials used for roof coverings.

2.13.2 Compatibility of Materials

All roofs and roof coverings shall be of materials that are compatible with each other and with the building or structure to which the materials are applied.

2.13.3 Material Specifications and Physical Characteristics

All materials to be used in the construction of roofs and roof coverings shall conform to the applicable standards listed in this section. In the absence of applicable standards or when materials are of questionable suitability, testing by an approved testing agency may be required by the building official to determine the character, quality and limitations of use of the materials.

2.13.4 Weather Protection

All roofs shall be covered with approved roof coverings properly secured to the building or structure to resist wind and rain. Roof coverings shall be designed, installed and maintained in accordance with approved manufacturer's recommendations such that the roof covering shall serve to protect the building or structure.

2.13.5 Wind Resistance

All roofs and roof coverings shall be secured in place to the building or structure to withstand the wind loads.

2.13.6 Structural and Construction Loads

The structural roof components shall be capable of supporting the roof covering system and the material and equipment loads that will be encountered during installation of the roof covering system.

2.13.7 Impact Resistance

Roof coverings shall resist impact damage based on the results of tests conducted in accordance with ASTM D4272 - 09 or D3746 - 85(2008).

2.13.8 Metal-Sheet Roof Coverings

Metal-sheet roof coverings installed over structural framing and decking shall comply with BDS 868, Galvanized Corrugated Sheet Roof and Wall Coverings; BDS 1122, Hot-dip Galvanized Steel Sheet and Coil; ASTM A755 / A755M - 03(2008) or B101 - 07. Metal-sheet roof coverings shall be installed in accordance with approved manufacturer's installation instructions.

2.13.9 Asbestos Sheet Roof Covering

Asbestos sheets used for roof coverings shall comply with BDS 430, Asbestos Cement Corrugated Sheets for Roofing and Cladding; BDS 431, Asymmetrical Section Corrugated Sheets in Asbestos Cement Roofing and Cladding; BDS 579, Asbestos Cement Flat Sheets; BDS 1046, Asbestos Cement Products-Corrugated Sheets and Fittings for Roofing and Cladding.

2.13.10 Interlocking Clay or Cement Tile

Interlocking clay or cement tile shall be installed only over solid sheathing or spaced structural sheathing boards. Interlocking clay or cement tile shall not be installed on roof slopes below one unit vertical in 3 units horizontal (1:3). Horizontal battens shall be required on roof slopes over one unit vertical in 2 units horizontal (1:2). Single layer underlayment is required over solid sheathing on all roof slopes. Reinforced underlayment shall be required when spaced sheathing is used. Regardless of roof slope, the first three tile courses and all tiles within 900 mm of roof edges, tiles at changes in roof slope or changes in slope direction, shall be fastened to the roof. For the field of the roof, fastening is not required on roof slopes below one unit vertical in 2 units horizontal (1:2). Every other tile course shall be fastened on roof slopes 1:2 to less than 1:1; and every tile shall be fastened on roof slopes 1:1 and over. Tile overlap shall be in accordance with approved manufacturer's installation instructions.

2.13.11 Non-interlocking Clay or Cement Tile

Non-interlocking clay or cement tile shall not be installed on roof slopes below one unit vertical in 5 units horizontal (1:5). Double layer underlayment is required on roof slopes below one unit vertical in 4 units horizontal (1:4). Single layer underlayment is required on all other roof slopes. Non-interlocking clay or cement tile shall be secured to the roof with two fasteners per tile. The minimum tile overlap shall be 75 mm.

2.13.12 Roof Insulation

Rigid combustible roof insulation shall be permitted, provided the insulation is covered with approved roof coverings directly applied thereto. Insitu lime concrete may be used on flat roofs of buildings. Minimum compacted thickness of such a layer shall be 75 mm and have adequate slope for drainage. The materials used in lime concrete shall conform to the standards specified in Sec 2.5 of this Part.

2.13.13 Recovering and Replacement of Roof Coverings

New roof coverings shall not be installed without first removing existing roof coverings when the existing roof or roof covering is water soaked or has deteriorated to the point that the existing roof or roof covering is not acceptable as a base for additional roofing.

2.13.14 Reuse of Materials

Existing slate, clay or cement tile shall be permitted for reuse, except that damaged, cracked or broken slate or tile shall not be reused. Existing vent flashings, metal edgings, drain outlets, collars and metal counter flashings shall not be reused where rusted, damaged or deteriorated. Aggregate surfacing materials shall not be reused.

2.13.15 Applicable Standards

The applicable standards for materials used in roofs and roof coverings are listed below:

BDS 430:1964	Specification for Asbestos Cement Corrugated Sheets for Roofing and Cladding
BDS 431:1964	Specification for Asymmetrical Section Corrugated Sheets in Asbestos Cement for Roofing and Cladding
BDS 579:1966	Specification for Asbestos Cement Flat Sheets (under revision);
BDS 868:1978	Code of Practice for Galvanized Corrugated Sheet Roof and Wall Coverings;
BDS 1046:1983	Specification for Asbestos Cement Products - Corrugated Sheets and Fittings for Roofing and Cladding;
BDS 1122:1985	Specification for Hot-dip Galvanized Steel and Coil.
BDS EN 490: 2008	Concrete roofing tiles and fittings for roof covering and all cladding — Product specifications
BDS EN 491: 2008	Concrete roofing tiles and fittings for roof covering and wall cladding — Test methods
BDS EN 538: 2008	Clay roofing tiles for discontinuous laying — Flexural strength test
BDS EN 539-1: 2008	Clay roofing tiles for discontinuous laying Determination of physical characteristics — Part 1: Impermeability test
BDS EN 1024: 2008	Clay roofing tiles for discontinuous laying — Determination of geometric characteristics

BDS EN 1304: 2008	Clay roofing tiles and fittings — Product definitions and specifications
ASTM A755 / A755M - 03(2008)	Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Pre-painted by the Coil-Coating Process for Exterior Exposed Building Products
ASTM B101 - 07	Standard Specification for Lead-Coated Copper Sheet and Strip for Building Construction
ASTM C222 - 97(2008)	Standard Specification for Asbestos-Cement Roofing Shingles
ASTM C406 - 06e1	Standard Specification for Roofing Slate
ASTM C836 / C836M - 10	Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
ASTM C1029 - 09	Standard Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation
ASTM D6380 - 03(2009)	Standard Specification for Asphalt Roll Roofing (Organic Felt)
ASTM D225 - 07	Standard Specification for Asphalt Shingles (Organic Felt) Surfaced With Mineral Granules
ASTM D226 / D226M - 09	Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D227 - 03	Standard Specification for Coal-Tar-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D6380 - 03(2009)	Standard Specification for Asphalt Roll Roofing (Organic Felt)
ASTM D312 - 00(2006)	Standard Specification for Asphalt Used in Roofing
ASTM D450 - 07	Standard Specification for Coal-Tar Pitch Used in Roofing, Dampproofing, and Waterproofing
ASTM D1227 - 95(2007)	Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing
ASTM D1863 - 05	Standard Specification for Mineral Aggregate Used on Built-Up Roofs
ASTM D2178 - 04	Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing
ASTM D2626 - 04	Standard Specification for Asphalt-Saturated and Coated Organic Felt Base Sheet Used in Roofing

ASTM D2898 - 10	Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing
ASTM D3161 - 09	Standard Test Method for Wind-Resistance of Asphalt Shingles (Fan-Induced Method)
ASTM D4897 / D4897M - 01(2009)	Standard Specification for Asphalt-Coated Glass-Fiber Venting Base Sheet Used in Roofing
ASTM D3747 - 79(2007)	Standard Specification for Emulsified Asphalt Adhesive for Adhering Roof Insulation
ASTM D3909 - 97b(2004)e1	Standard Specification for Asphalt Roll Roofing (Glass Felt) Surfaced With Mineral Granules
ASTM D4272 - 09	Standard Test Method for Total Energy Impact of Plastic Films By Dart Drop
ASTM D4434 / D4434M - 09	Standard Specification for Poly(Vinyl Chloride) Sheet Roofing
ASTM D4601 - 04	Standard Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing
ASTM D4637 - 08	Standard Specification for EPDM Sheet Used In Single-Ply Roof Membrane
ASTM E108 - 10a	Standard Test Methods for Fire Tests of Roof Coverings
ASTM G90 - 05	Standard Practice for Performing Accelerated Outdoor Weathering of Nonmetallic Materials Using Concentrated Natural Sunlight
ASTM G155 - 05a	Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials
ASTM G154 - 06	Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials
RMA (Rubber Manufacturer Association, USA) RP - 4 - 88	Wind Design Guide for Ballasted Single-Ply Roofing Systems;
SPRI (Single Ply Roofing Institute, USA) - 86	Wind Design Guide for Ballasted Single-Ply Roofing Systems;
FM (Factory Manual) 4450 - 89	Standard Laboratories Department Approved Standard for Class I Insulated Steel Deck Roofs;

FM	447 -86	Approval Standard for Class I Roof Coverings;
CGSB (Canadian General Standards Board) 37 - GP - 56M - 80		Membrane, Modified Bituminous, Prefabricated, and Reinforced for Roofing;

2.14 PAINTS AND VARNISHES

2.14.1 Water Based Paints and Pigments

Water based paints shall conform to the following standards:

BDS	500:1965	Specification for Distemper Dry (under revision);
BDS	1097:1984	Specification for Plastic Emulsion Paint. Part I for Interior Use; Part 2 for Exterior Use;
IS	427:1965	Specification for distemper, dry, colour as required (revised)
IS	428:2000	Specification for distemper, washable (second revision)
IS	5410:1992	Specification for cement paint, colour as required (first revision)
IS	5411	Specification for plastic emulsion paint: (Part 1):1974 For interior use(first revision) (Part 2): 1972 For exterior use

2.14.2 Ready Mixed Paints, Enamels and Powder Coatings

Ready mixed paints and enamels shall conform to the following standards:

BDS	13:1960	Specification for Ready Mixed Paints, Varnish, Lacquers and Related Products (under revision);
BDS	14:1960	Specification for Black Bituminous Paint, Brushing for General Purposes (under revision);
BDS	397:1964	Specification for Ready Mixed Paint, Brushing, Red Oxide Zinc Chrome, Priming (under revision);
BDS	398:1964	Specification for Ready Mixed Paint, Spraying, Red Oxide Zinc Chrome, Priming (under revision);
BDS	399:1964	Specification for Aluminum Paint, Spraying for General Purposes, in Dual Container (under revision);

BDS	400:1964	Specification for Aluminium Paint, Brushing, for General Purposes in Dual Container (under revision);
BDS	401:1964	Specification for Varnish, Finishing, Exterior, Type-I, (Synthetic) (Tentative) (under revision);
BDS	402:1989	Specification for Ready Mixed Paint, Brushing, Finishing, Semigloss, for General Purposes (First Revision);
BDS	499:1965	Specification for Ready Mixed Paints, Brushing, for Road Marking (white, yellow and black) (under revision);
BDS	616:1966	Specification for Enamel, Brushing, Exterior (i) Undercoating, (ii) Finishing, Colour as Required (under revision);
BDS	617:1966	Specification for Enamel, Brushing, Interior (i) Undercoating, (ii) Finishing, Colour as Required (under revision);
BDS	926:1980	Specification for Ready Mixed Paint, Brushing, Petrol Resisting, Air Drying, for Exterior Painting of Containers, Colour as Required;
BDS	927:1980	Specification for Ready Mixed Paint, Brushing, Petrol Resisting, Air Drying, for Interior Painting of Tanks and Containers, Red Oxide (colour unspecified);
BDS	928:1980	Specification for Ready Mixed Paint, Brushing, Acid Resisting, for Protection Against Acid Fumes, Colour as Required;
BDS	973:1981	Specification for Specification and Methods of Test for Linseed Stand Oil for Paints and Varnishes;
BDS	974:1981	Specification and Methods of Test for Raw Tung Oils for Paints and Varnishes;
BDS	1005:1981	Specification for Ready Mixed Paint, Brushing, Finishing, Stoving, Enamel, Colour as Required;
BDS	1141:1986	Specification for Ready Mixed Aluminium Priming Paints for Woodwork;
BDS	1151:1986	Specification for Pavement Marking Paints.
IS	101	Methods of sampling and test for paints, varnishes and related products: (Part I/See 1):1986 Test on liquid paints (general and physical), Section 1 Sampling (third revision) (Part I/See 2):1987 Test on liquid paints (general and

physical), Section 2 Preliminary examination and preparation of samples for testing (third revision)

(Part I/See 3):1986 Test on liquid paints (general and physical), Section 3 Preparation of panels (third revision)

(Part I/See 4):1987 Test on liquid paints (general and physical), Section 4 Brushing test (third revision)

(Part I/See 5):1989 Test on liquid paints (general and physical), Section 5 Consistency (third revision)

(Part I/See 6):1987 Test on liquid paints (general and physical), Section 6 Flash point (third revision)

(Part I/See 7):1987 Test on liquid paints (general and physical), Section 7 Mass per 10 litres (third revision)

(Part 2/See 1):1988 Test on liquid paints (chemical examination), Section 1 Water content (third revision)

(Part 2/See 2):1986 Test on liquid paints (chemical examination), Section 2 Volatile matter (third revision)

(Part 3/See 1):1986 Tests on paint film formation, Section 1 Drying time (third revision)

(Part 3/See 2):1989 Tests on paint film formation, Section 2 Film thickness (third revision)

(Part 3/See 4):1987 Tests on paint film formation, Section 4 Finish (third revision)

(Part 3/See 5):1987 Tests on paint film formation, Section 5 Fineness of grind (third revision)

(Part 4/See 1):1988 Optical test, Section 1 Opacity (third revision)

(Part 4/See 2):1989 Optical test, Section 2 Colour (third revision)

(Part 4/See 3):1988 Optical test, Section 3 Light fastness test (third revision)

(Part 4/See 4):1986 Optical test, Section 4 Gloss (third revision)

(Part 5/See 1):1988 Mechanical test on paint films, Section 1 Hardness tests (third revision)

- Part 5/See 2):1988 Mechanical test on paint films, Section 2 Flexibility and adhesion (third revision)
- (Part 5/See 3):1986 Mechanical test on paint films, Section 3 Impact resistance (fourth revision)
- (Part 5/See 4):1986 Mechanical test on paint films, Section 4 Print free test (third revision)
- (Part 6/See 1):1988 Durability tests, Section 1 Resistance to humidity under conditions of condensation (third revision)
- (Part 6/See 2):1989 Durability tests, Section 2 Keeping properties (third revision)
- (Part 6/See 3):1990 Durability tests, Section 3 Moisture vapour permeability (third revision)
- (Part 6/See 4):1991 Durability tests, Section 4 Degradation of coatings (pictorial aids for evaluation)
- (Part 6/See 5):1997 Durability tests, Section 5 Accelerated weathering test (third revision)
- (Part 7/See 1) :1989 Environmental tests on paint films, Section 1 Resistance to water (third revision)
- (Part 7/See 2):1990 Environmental tests on paint films, Section 2 Resistance to liquids (third revision)
- (Part 7/See 3) :1990 Environmental tests on paint films, Section 3 Resistance to heat (third revision)
- (Part 7/See 4) :1990 Environmental tests on paint films, Section 4 Resistance to bleeding of pigments (third revision)
- (Part 8/See 1):1989 Tests for pigments and other solids, Section 1 Residue on sieve (third revision)
- (Part 8/See 2):1990 Tests for pigments and other solids, Section 2 Pigments and nonvolatile matter (third revision)
- (Part 8/See 3):1993 Tests for pigments and other solids, Section 3 Ash content
- (Part 8/See 4):1993 Tests for pigments and other solids, Section 4 Phthalic anhydride
- (Part 8/See 5):1993 Tests for pigments and other solids, Section 5 Lead restriction test (third revision)

		(Part 8/See 6):1993	Tests for pigments and other solids, Section 6 Volume solids
		(Part 9/See 1):1993	Tests for lacquers and varnish, Section 1 Acid value
		(Part 9/See 2):1993	Tests for lacquers and varnish, Section 2 Rosin test
IS	104:1979		Specification for ready mixed paint, brushing, zinc chrome, priming (second revision)
IS	109:1968		Specification for ready mixed paint, brushing, priming, plaster to Indian Standard colours No. 361 and 631 (first revision)
IS	123:1962		Specification for ready mixed paint, brushing, finishing, semi-gloss, for general purposes, to Indian Standard colours No. 445, 446, 448, 449, 451 and 473; and red oxide (colour unspecified) (revised)
IS	133:1993		Specification for enamel, interior (a) undercoating, (b) finishing (third revision)
IS	137:1965		Specification for ready mixed paint, brushing, matt or egg-shell flat, finishing, interior, to Indian Standard colour, as required (revised)
IS	158:1981		Specification for ready mixed paint, brushing, bituminous, black, lead-free, acid, alkali, and heat resisting (third revision)
IS	168:1993		Specification for ready mixed paint, air-drying semi-glossy/matt, for general purposes (third revision)
IS	341:1973		Specification for black Japan, Types A, B and C first revision)
IS	2074:1992		Specification for ready mixed paint, air drying red oxide-zinc chrome, priming (second revision)
IS	2075:2000		Specification for ready mixed paint, stoving, red oxide-zinc chrome, priming (second revision)
IS	2339:1963		Specification for aluminium paint for general purposes, in dual container
IS	2932:2003		Specification for enamel, synthetic, exterior, (a) undercoating, (b) finishing (third revision)
IS	2933:1975		Specification for enamel, exterior, (a) undercoating, (b) finishing (first revision)
IS	3536:1999		Specification for ready mixed 'paint, brushing, wood primer

(first revision)

IS	3537:1966	Specification for ready mixed paint, finishing, interior for general purposes, to Indian Standard colours No. 101, 216, 217, 219, 275:”281, 352, 353, 358 to 361, 363,364,388,410,442, 444,628, 631,632,634,693,697, white andblack
IS	3539:1966	Specification for ready mixed paint, undercoating, for use under oil finishes, to Indian Standard colours, as required
IS	3585:1966	Specification for ready mixed paint, aluminium, brushing, priming, water resistant, for wood work
IS	3678:1966	Specification for ready mixed paint, thick white, for lettering
IS	8662:1993	Specification for enamel, synthetic, exterior, (a) undercoating, (b) finishing, for railway coaches (first revision)
IS	9862:1981	Specification for ready mixed paint, brushing, bituminous black lead free, acid, alkali, water and chlorine resisting
IS	11883:1986	Specification for ready mixed paint, brushing, red oxide, priming for metals
IS	13183:1991	Specification for aluminium paints, heat resistant
IS	13213:1991	Specification for polyurethane full gloss enamel (two pack)
IS	13607:1992	Specification for ready mixed paint, finishing, general purposes, synthetic
IS	13871:1993	Specification for powder coatings

2.14.3 Thinners and Solvents

These shall conform to the following standards:

IS	324-1959	Specification for Ordinary Denatured Spirit (revised);
IS	82:1992	Methods of sampling and test for thinners and solvents for paints (first revision)
IS	324:1959	Specification for ordinary denatured spirit (revised)
IS	533:1998	Specification for gum spirit of turpentine (oil of turpentine) (second revision)
IS	14314:1995	Specification for thinner general purposes for synthetic paints and varnishes

2.14.4 Varnishes and Lacquers

These materials shall conform to the following standards:

BDS	401:1964	Specification for Varnish, Finishing, Exterior, Type-I, (synthetic) (under revision);
BDS	1064:1983	Specification for Varnish, Stoving;
BDS	1065:1983	Specification for Varnish, Acid Resisting;
BDS	1066:1983	Specification for Varnish, Finishing, Interior;
IS	337:1975	Specification for varnish, finishing, interior (first revision)
IS	347-1975	Specification for Varnish, Shellac for general purposes (First Revision);
IS	348-1968	Specification for French Polish (First Revision);
IS	524:1983	Specification for varnish, finishing, exterior, synthetic (second revision)
IS	525:196	Specification for varnish, finishing, exterior and general purposes (first revision)
IS	642:1963	Specification for varnish medium for aluminium paint (revised)

2.15 SANITARY APPLIANCES AND WATER FITTINGS

2.15.1 Sanitary Appliances

Sanitary appliances shall conform to the following standards:

BDS	1162 : 2006 (1st revision)	Ceramic wash basin and pedestal, ceramic wash basin and pedestals dimension, design & construction, type, permissible deviation
BDS	1163 : 1987	Specification for Vitreous Sanitary Appliances, Part-1, General Requirements; Part-2, Specific Requirements for Water Closets; Part-3, Specification Requirements for Urinal (Bowl type); Part-4, Specific Requirements for Foot Rest; Part-5, Specific Requirements for Integrated Squatting Pans.
BDS	1361:1992	Faucets

BDS	1593:1998	Plastic sanitary squatting pan
ASHRA	E90A-80	Energy Conservation in New Building Design;
ASHRA	E 90B-75	Energy Conservation in New Building Design;
	C700-09:	Cold-Water Meters--Displacement Type, Bronze Main Case;
	C701-07:	Cold-Water Meters -- Turbine Type, for Customer Service;
	C702-01:	Cold-Water Meters -- Compound Type;
BS	1125: 1987	Specification for WC Flushing Cisterns (Including Dual Flush Cisterns and Flush Pipes);
BS	1244	Metal Sink for Domestic Purposes;
BS	1254:1981	Specification for C Seats (Plastics);
BS	1329:1974	Specification for Metal Hand Rinse Basins;
BS	1876: 1992(1977)	Specification for Automatic Flushing Cistern for Urinals

2.15.2 Pipes and Pipe Fittings for Water Supply and Sanitation

Pipes and pipe fittings for water supply and sanitation shall comply with the following standards.

BDS	428:1964	Specification for Asbestos Cement Pressure Pipe;
BDS	429:1964	Specification for Asbestos Cement Building and Sanitary Pipes (under revision);
BDS	1111:1984	Centrifugally Cast (spun) Iron Pressure Pipes for Water, Gas and Sewage;
BDS	1356:1992	Specification for Ferrules for Water Services;
BDS	1357: 1992	Specification for Washers with Fittings for Water Service;
BDS	1361 : 1992	Faucets This standard specifies the technical requirements of various types of Faucets.
BDS	1562:1997	Solvent cements for polyvinyl chloride (PVC) plastic pipe and fitting.
BDS	1593 : 1998	Plastic sanitary squatting pan Pan lays down the requirement for material, dimension physical

	requirements and testing for power flush type injection moulded high density polyethylene (HDPE) or polypropylene (PP) squatting pan.
BDS EN 1254-2: 2009	Copper and copper alloys - Plumbing fittings – Part 2: Fittings with compression ends for use with copper tubes
BDS EN 1717: 2009	Protection against pollution of potable water in water installations and general requirements of devices to prevent pollution by backflow
BDS EN 14506: 2009	Devices to prevent pollution by backflow of potable water – Automatic diverter – Family H, type C
BDS ISO 3419: 2008	Non – alloy and alloy steel butt–welding fittings
BDS ISO 5251: 2008	Stainless steel butt–welding fittings
BDS ISO 6761: 2008	Steel tubes – Preparation of ends of tubes and fittings for welding
BDS ISO 3822--1: 2009	Acoustics: Laboratory tests on noise emission from appliances and equipment used in water supply installations – Part 1: Method of measurement
BDS ISO 3822--2: 2009	Acoustics: Laboratory tests on noise emission from appliances and equipment used in water supply installations – Part 2: Mounting and operating conditions for drawoff taps and mixing valves
BDS ISO 3822--4: 2009	Acoustics: Laboratory tests on noise emission from appliances and equipment used in water supply installations – Part 4: Mounting and operating conditions for special appliances
BDS ISO 161-1 : 2008	Thermoplastics pipes for the conveyance of fluids Nominal outside diameters and Nominal Pressures- Part 1: Metric series
BDS ISO 161-2 : 2008	Thermoplastics pipes for the conveyance of fluids- Nominal outside diameters and Nominal Pressures- Part 2: Inch – based series
BDS ISO 265-1 : 2008	Pipes and fittings of plastics materials- fittings for domestic and industrial waste pipes- Basic dimensions: Metric series- Part 1: Unplasticized Poly (Vinyl chloride) (PVC-U)
BDS ISO 1167-1 : 2008	Thermoplastics pipes fittings and assemblies for the conveyance of fluids - Determination of the resistance to internal pressure- Part 1: General method
BDS ISO 1167-2 : 2008	Thermoplastics pipes fittings and assemblies for the conveyance of fluids- Determination of the resistance to internal pressure-

Part 2: Preparation of pipe test pieces

BDS ISO 1746 : 2008	Rubber or Plastics hoses and tubing-Bending tests
BDS ISO 2505 : 2008	Thermoplastics pipes- Longitudinal reversion – Test method and parameters
BDS ISO 2507-2 : 2008	Thermoplastics pipes and fittings – Vicat softening temperature-Part 2: Test conditions for Unplasticized poly (Vinyl chloride) (PVC-U) or chlorinated poly (Vinyl chloride) (PVC-C) pipes and fittings and for high impact resistance poly (Vinyl chloride) (PVC-HI) pipes
BDS ISO 3114: 2008	Unplasticized polyvinyl chloride (PVC) pipes for potable water supply-Extractability of lead and tin- Test method
BDS ISO 3126 : 2008	Plastics piping systems-Plastics components- Determination of dimensions
BDS ISO 3127: 2008	Thermoplastics pipes- Determination of resistance to external blows-Round – the - clock method
BDS ISO 3501:2010	Assembled joints between fittings and polyethylene (PE) pressure pipes — Test of resistance to pull-out
BDS ISO 3503:2010	Assembled joints between fittings and polyethylene (PE) pressure pipes — Test of leakproofness under internal pressure when subjected to bending
BDS ISO 3633: 2008	Plastics piping systems for soil and waste discharge (Low and high temperature) inside buildings- Specifications
BDS ISO 6964:2010	Polyolefin pipes and fittings — Determination of carbon black content by calcination and pyrolysis — Test method and basic specification
BDS ISO 4065: 2008	Thermoplastics pipes- Universal wall thickness table
BDS ISO /TR 4191: 2008	Unplasticized polyvinyl chloride (PVC-U) pipes for water supply- Recommended practice for laying
BDS ISO 4422-1: 2008	Pipes and fittings made of unplasticized poly (vinyl chloride) (PVC-U) for water supply - Specifications - Part 1: General
BDS ISO 4422-2: 2008	Pipes and fittings made of unplasticized poly (vinyl chloride) (PVC-U) for water supply - Specifications - Part 2: Pipes (with or without integral sockets)
BDS ISO 4422-3: 2008	Pipes and fittings made of unplasticized poly (vinyl chloride)(PVC-U) for water supply- Specifications - Part 3: Fittings and joints

BDS ISO 4422-4: 2008	Pipes and fittings made of unplasticized poly (vinyl chloride) (PVC-U) for water supply- Specifications- Part 4: Valves and ancillary equipment
BDS ISO 4422-5: 2008	Pipes and fittings made of unplasticized poly (vinyl chloride) (PVC- U) for water supply- Specifications- Part 5: Fitness for purpose of the system
BDS ISO 4433-3: 2008	Thermoplastics pipes- Resistance to liquid chemicals- Classification-Part 3: Unplasticized poly (vinyl chloride) (PVC-U), high- impact poly (vinyl chloride) (PVC-HI) and chlorinated poly (vinyl chloride) (PVC –C) pipes
BDS ISO 4435: 2008	Plastic piping systems for non- pressure underground drainage and sewerage- Unplasticized poly (vinyl chloride) (PVC-U)
BDS ISO 4439: 2008	Unplasticized polyvinyl chloride (PVC) pipes and fittings – Determination and specification of density
BDS ISO 6259-1: 2008	Thermoplastics pipes- Determination of tensile properties- Part 1: General test method
BDS ISO 6259-2: 2008	Thermoplastics pipes- Determination of tensile properties- Part 2: Pipes made of unplasticized poly (vinyl chloride) (PVC-U), Chlorinated poly (vinyl chloride) (PVC-C), and high – impact poly (vinyl chloride) (PVC-HI)
BDS ISO 6992: 2008	Unplasticized polyvinyl chloride (PVC-U) pipes for drinking water supply - Extractability of cadmium and mercury occurring as impurities
BDS ISO 9624:2010	Thermoplastics pipes for fluids under pressure — Mating dimensions of flange adapters and loose backing flanges
BDS ISO 11413:2010	Plastics pipes and fittings — Preparation of test piece assemblies between a polyethylene (PE) pipe and an electrofusion fitting BDS ISO 11414, Plastics pipes and fittings — Preparation of polyethylene (PE) pipe/pipe or pipe/fitting test piece assemblies by butt fusion
BDS ISO 12176-2:2010	Plastics pipes and fittings — Equipment for fusion jointing polyethylene systems — Part 2: Electrofusion
BDS ISO 12176-3:2010	Plastics pipes and fittings — Equipment for fusion jointing polyethylene systems — Part 3: Operator’s badge
BDS ISO 12176-4:2010	Plastics pipes and fittings — Equipment for fusion jointing polyethylene systems — Part 4: Traceability coding
BDS ISO 13479:2010	Polyolefin pipes for the conveyance of fluids — Determination of

	resistance to crack propagation — Test method for slow crack growth on notched pipes (notch test)
BDS ISO 13761:2010	Plastics pipes and fittings — Pressure reduction factors for polyethylene pipeline systems for use at temperatures above 20 °C
BDS ISO 13951:2010	Plastics piping systems — Test method for the resistance of polyolefin pipe/pipe or pipe/fitting assemblies to tensile loading
BDS ISO 13953:2010	Polyethylene (PE) pipes and fittings — Determination of the tensile strength and failure mode of test pieces from a butt-fused joint
BDS ISO 13954:2010	Plastics pipes and fittings — Peel decohesion test for polyethylene (PE) electrofusion assemblies of nominal outside diameter greater than or equal to 90 mm
BDS ISO 13955:2010	Plastics pipes and fittings — Crushing decohesion test for polyethylene (PE) electrofusion assemblies
BDS ISO 13957:2010	Plastics pipes and fittings — Polyethylene (PE) tapping tees — Test method for impact resistance
BDS ISO 14236:2010	Plastics pipes and fittings — Mechanical-joint compression fittings for use with polyethylene pressure pipes in water supply systems
BDS ISO 18553:2010	Method for the assessment of the degree of pigment or carbon black dispersion in polyolefin pipes, fittings and compounds
BDS ISO 18553:2010	Method for the assessment of the degree of pigment or carbon black dispersion in polyolefin pipes, fittings and compounds Amendment 1:2010
BDS ISO 4427-1:2010	Plastics piping systems — Polyethylene (PE) pipes and fittings for water supply — Part 1: General
BDS ISO 4427-2:2010	Plastics piping systems — Polyethylene (PE) pipes and fittings for water supply — Part 2: Pipes
BDS ISO 4427-3:2010	Plastics piping systems — Polyethylene (PE) pipes and fittings for water supply — Part 3: Fittings
BDS ISO 4427-5:2010	Plastics piping systems — Polyethylene (PE) pipes and fittings for water supply — Part 5: Fitness for purpose of the system
BDS ISO 4427-1:2010	Plastics piping systems — Polyethylene (PE) pipes and fittings for water supply — Part 1: General Technical corrigendum 1: 2010
BDS ISO 3458:2010	Assembled joints between fittings and polyethylene (PE)

	pressure pipes — Test of leakproofness under internal pressure
BDS ISO 3459:2010	Polyethylene (PE) pressure pipes — Joints assembled with mechanical fittings — Internal under pressure test method and requirement
ASTM A53 / A53M - 07	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A74 - 09	Standard Specification for Cast Iron Soil Pipe and Fittings
ASTM A377 - 03(2008)e1	Standard Index of Specifications for Ductile-Iron Pressure Pipe
ASTM B42 - 02e1	Standard Specification for Seamless Copper Pipe, Standard Sizes
ASTM B43 - 09	Standard Specification for Seamless Red Brass Pipe, Standard Sizes
ASTM B75 - 02	Standard Specification for Seamless Copper Tube
ASTM B88 - 09	Standard Specification for Seamless Copper Water Tube
ASTM B251 - 02e1	Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube
ASTM B302 - 07	Standard Specification for Threadless Copper Pipe, Standard Sizes
ASTM B306 - 09	Standard Specification for Copper Drainage Tube (DWV)
ASTM B429 / B429M - 06	Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube
ASTM B447 - 07	Standard Specification for Welded Copper Tube
ASTM B745 / B745M - 97(2005)	Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains
ASTM C14 - 07	Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe
ASTM C76 - 10a	Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C508 / C508M - 00(2009)e1	Standard Specification for Asbestos-Cement Underdrain Pipe
ASTM C654 - 05a	Standard Specification for Porous Concrete Pipe
ASTM C700 - 09	Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated

ASTM D1527 - 99(2005)	Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80
ASTM D1785 - 06	Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
ASTM D2239 - 03	Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter
ASTM D2241 - 09	Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D2321 - 09	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications ASTM D2464 - 06 Standard Specification for Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D2466 - 06	Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40 ASTM D2467 - 06 Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D2609 - 02(2008)	Standard Specification for Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe
ASTM D2661 - 08	Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings
ASTM D2665 - 09	Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
ASTM D2672 - 96a(2009)	Standard Specification for Joints for IPS PVC Pipe Using Solvent Cement
ASTM D2729 - 03	Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D2737 - 03	Standard Specification for Polyethylene (PE) Plastic Tubing
ASTM D2751 - 05	Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings
ASTM D2846 / D2846M - 09b	Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems
ASTM D2949 - 01a(2008)e1	Standard Specification for 3.25-in. Outside Diameter Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
ASTM D3034 - 08	Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings

ASTM F405 - 05	Standard Specification for Corrugated Polyethylene (PE) Pipe and Fittings
ASTM F409 - 02(2008)	Standard Specification for Thermoplastic Accessible and Replaceable Plastic Tube and Tubular Fittings
ASTM F437 - 09	Standard Specification for Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
ASTM F438 - 09	Standard Specification for Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40
ASTM B209 - 07	Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM F441 / F441M - 09	Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80
ASTM F442 / F442M - 09	Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR)
ASTM F628 - 08	Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe With a Cellular Core
ASTM F891 - 09	Standard Specification for Coextruded Poly(Vinyl Chloride) (PVC) Plastic Pipe With a Cellular Core
IS 404 (Part-I)-1993	Specification for Lead Pipes Part I for other than Chemical Purpose (third Revision);
ISO 160: 1980	Asbestos-Cement Pressure Pipes and Joints;
ISO 392:1986	Asbestos-Cement Pipe Fittings for Building and Sanitary Purposes;
ISO 881:1980	Asbestos-Cement Pipes, Joints and Fittings for Sewerage and Drainage;
ISO 2531-1991	Ductile Iron Pipes, Fittings and Accessories for Pressure Pipelines;
ASME/ANSI B16.3-2006	Malleable Iron Threaded Fittings: Classes 150 and 300;
ASME/ANSI B16.485	Cast Iron Threaded Fittings;
ASME/ANSI B16.9-2007	Factory Made Wrought Steel Buttwelding Fittings;
ASME/ANSI B16.11-2009	Forged Steel Fittings, Socket-Welding and Threaded;

ASME/ABSI 2009	B16.12-	Cast-Iron Threaded Drainage Fittings;
ASME/ANSI 2006	B16.15-	Cast Copper Alloy Threaded Fittings: Classes 125 and 250;
ASME/ANSI 2001	B16.18-	Cast Copper Alloy Solder Joint Pressure Fittings;
ASME/ANSI 2001	B16.22-	Wrought Copper and Copper Alloy Solder Joint Pressure Fittings;
ASME/ANSI 2002	B16.23-	Cast Copper Alloy Solder Joint Drainage Fittings (DWV);
ASME/ANSI 1994	B16.28-	Wrought Steel Butt welding Short radius Elbows and Returns;
ASME/ANSI 2007	B16.29-	Wrought Copper and Wrought Copper Alloy Solder Joint Fittings for solvent Drainage Systems;
ASME/ANSI 84	B16.32-	Cast Copper Alloy Solder Joint Fittings for Solvent Drainage Systems;
AWWAC110-08		Standard for Grey Iron and Ductile Iron Fittings, 76 mm to 1220 mm (3 in. through 48 inches), for Water and Other Liquids.

2.15.3 Joints and Connections Between Pipes and Fittings

Applicable standards for joints and connections between pipes and fittings are listed below:

BDS EN 681-1: 2008	Elastomeric seals — Materials requirements for pipe joint seals used in water and drainage applications — Part 1: Vulcanized rubber
BDS EN 681-2 : 2008	Elastomeric seals — Materials requirements for pipe joint seals used in water and drainage applications — Part 2: Thermoplastic elastomers
ASTM B42 - 02e1	Standard Specification for Seamless Copper Pipe, Standard Sizes
ASTM C425 - 04(2009)	Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings
ASTM C443 - 05ae1	Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C564 - 09a	Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings

ASTM D1869 - 95(2005)e1	- Standard Specification for Rubber Rings for Asbestos-Cement Pipe
ASTM D2235 - 04	Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings
ASTM D2564 - 04(2009)e1	- Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
ASTM D2657 - 07	Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings
ASTM D2661 - 08	Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings
ASTM D2846 / D2846M - 09b	Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems
ASTM D2855 - 96(2010)	Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings
ASTM D3139 - 98(2005)	Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
ASTM D3212 - 07	Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM F402 - 05	Standard Practice for Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings
ASTM F493 - 04	Standard Specification for Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings
ASTM F628 - 08	Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe With a Cellular Core
ASTM F656 - 08	Standard Specification for Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings
ASME/ANSI B1.20.1-1983 (R2006)	Pillar taps used in water supply

2.15.4 Taps and Valves

Taps and valves shall conform to the following standards :

BDS 1507 : 1995	Bib taps used in water supply
-----------------	-------------------------------

BDS 1508:1995	Stop taps used in water supply.
BDS 1509:1995	Pillar taps used in water supply
BDS 987 : 1981	Sand cast brass screwdown bib taps and stop taps for water services. It covers the requirements regarding materials, dimensions, constructions, workmanship, finish and testing of tapes for water services.
BDS 1508 : 1995	Stop taps used in water supply.Specifies the requirements, dimensions construction, materials and test methods of stop taps used in water supply.
BDS EN 200: 2009	Sanitary tapware — Single taps and combination taps for water supply systems of type 1 and type 2 — General technical specification
BDS EN 246: 2009	Sanitary tapware – General specifications for flow rate regulators
BDS EN 248: 2009	Sanitary tapware – General specification for electrodeposited coatings of Ni-Cr
BDS EN 1112: 2009	Sanitary tapware - Shower outlets for sanitary tapware for water supply systems of type 1 and type 2 – General technical specification
BDS EN 1113: 2009	Sanitary tapware – Shower hoses for sanitary tapware for water supply systems of type 1 and type 2 – General technical specification
BS 1212 3 (Parts)	Specification for Float Operated Valves (excluding floats);
BS 1010	Specification for Draw-Off Taps and Stopvalves for Water Services;
BS 1968	Specification for Floats for Ball Valves (copper);
BS 5433: 1976	Specification for Underground Stop valves for Water Services (copper);
BS 2456: 1973	Specification for Floats for Ball Valves (plastic) for Cold and Hot Water
BS 1415 (2 parts)	Mixing Valves (Manullay Operated);
BS 5163: 1986	Specification for Predominantly Key-Operated Cast Iron Wedge Gate Valve for Water Works;

BS	3377:1985	Specification for Boilers for Use with Domestic Solid Mineral Fuel Appliances;
BS	843: 1976	Specification for Thermal Storage Electric Water Heaters;
BS	855:1976	Specification for Welded Steel Boilers for Central Heating and Indirect Hot Water Supply.

2.16 MISCELLANEOUS MATERIALS

2.16.1 Ferrocement

Details including material requirements are given in Chapter 12 of Part 6.

2.16.2 Plastics

Plastics may be used in buildings or structures as light transmitting materials such as glazing, skylights, lighting lenses, luminous ceilings, roof panels, signs and similar purposes. Foam plastics are also used in buildings.

Applicants for approval of a plastic material shall furnish all necessary technical data required by the Building Official. The data shall include chemical composition; applicable physical, mechanical and thermal properties such as fire resistance, flammability and flame spread; weather resistance; electrical properties; products of combustion; and coefficient of expansion.

The requirements for light transmitting plastics, including roof panels and foam plastics are given below.

2.16.2.1 Light Transmitting Plastics

An approved light transmitting plastic shall be any thermoplastic, thermosetting or reinforced thermosetting plastic material which has a self-ignition temperature of 343°C or greater when tested in accordance with , Test Method for Ignition Properties of Plastics; a smoke density rating not greater than 450 when tested in the manner intended for use in accordance with ASTM E84 - 10, Test Method for Surface Burning Characteristics of Building Materials; or not greater than 75 when tested in the thickness intended for use in accordance with ASTM D2843 - 10, Test Method for Density of Smoke from the Burning or Decomposition of Plastics; and which conforms to one of the following combustibility classifications:

Class C1 : Plastic materials which have a burning extent of 25 mm or less when tested at a nominal thickness of 1.5 mm, or in the thickness intended for use, in accordance with ASTM D635 - 06, Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in Horizontal Position; or

Class C2: Plastic materials which have a burning rate of 63 mm/min or less when tested at a nominal thickness of 1.5 mm, or in the thickness intended for use, in accordance with ASTM D635 - 06.

2.16.2.2 Foam Plastics

All foam plastics and foam plastic cores of manufactured assemblies shall have a flame spread rating of not more than 75 and shall have a smoke developed rating of not more than 450 when tested in the maximum thickness intended for use in accordance with ASTM E84 - 10.

All foam plastics, unless otherwise indicated in this section, shall be separated from the interior of a building by an approved thermal barrier of 13 mm gypsum wall board or equivalent thermal barrier material which will limit the average temperature rise of the unexposed surface to not more than 121°C after 15 minutes of fire exposure complying with the standard time-temperature curve of ASTM E119 - 09c, Test Methods for Fire Tests of Building Construction and Materials. The thermal barrier shall be installed in such a manner that it will stay in place for a

minimum of 15 minutes under the same testing conditions. The thermal barrier is not required when the foam plastic is protected by a 25 mm minimum thickness of masonry or concrete.

2.16.2.3 Applicable Standards

A list of applicable standards for plastics is given below:

BDS	885:1979	Method for Measuring Viscosity Number and K-Value of PVC Resins;
BDS	886:1978	Method for Direct Measuring the Specific Gravity of Plastics;
BDS	887:1978	Method for Measuring Deformation under Heat of Flexible Rigid PVC Compounds;
BDS	888:1978	Method for Measuring Temperature of Deflection under Load;
BDS	889:1978	Method for Measuring the Vicat Softening Temperature (VST) of Thermoplastics;
BDS	890:1978	Method for Measuring the Water Absorption at Room Temperature and Bolling Water Absorption of Plastics;
BDS	891:1978	Method for Measuring the Flexural Modulus of Plastics;
BDS	892:1978	Method for Measuring the Resistance to Tear Propagation of Flexible Plastics, Film or Sheeting;
ASTM D543 - 06		Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents
ASTM D635 - 06		Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
ASTM D638 - 08		Standard Test Method for Tensile Properties of Plastics
ASTM D695 - 08		Standard Test Method for Compressive Properties of Rigid Plastics
ASTM D882 - 09		Standard Test Method for Tensile Properties of Thin Plastic Sheeting
ASTM D1003 - 07e1		Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics
ASTM D1044 - 08		Standard Test Method for Resistance of Transparent Plastics to Surface Abrasion
ASTM D1204 - 08		Standard Test Method for Linear Dimensional Changes of Nonrigid

	Thermoplastic Sheeting or Film at Elevated Temperature
ASTM D1593 - 09	Standard Specification for Nonrigid Vinyl Chloride Plastic Film and Sheeting
ASTM D2103 - 08	Standard Specification for Polyethylene Film and Sheeting
ASTM D2126 - 09	Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging
ASTM D2842 - 06	Standard Test Method for Water Absorption of Rigid Cellular Plastics
ASTM D2843 - 10	Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics
ASTM D3294 - 09	Standard Specification for PTFE Resin Molded Sheet and Molded Basic Shapes
ASTM D3678 - 97(2008)e1	Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Interior-Profile Extrusions
ASTM D3679 - 09a	Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Siding
ASTM D3841 - 97(2008)e1	Standard Specification for Glass-Fiber-Reinforced Polyester Plastic Panels
ASTM D4802 - 02	Standard Specification for Poly(Methyl Methacrylate) Acrylic Plastic Sheet
ASTM E84 - 10	Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E119 - 09c	Standard Test Methods for Fire Tests of Building Construction and Materials

2.16.3 Ballies and Wood Poles

Ballies of Sal/Gazari, Sundari and Garjan are used in building construction. These shall be free from rots, knots and sap, and straight and uniform in size. These should conform to the following standards:

BDS	809:1973	Specification for Wood Poles for Overhead Power and Telecommunication Lines;
ASTM	D25 - 99(2005)	Standard Specification for Round Timber Piles
IS	3337:1978	Specification for Ballies for General Purposes (First Revision);
IS	1900:1974	Method of Testing Wood Poles;
IS	6711:1972	Code of Practice for Maintenance of Wood Poles for Overhead Power and Telecommunications Lines.

2.16.4 Bamboos

The following standards shall be applicable for bamboos used for structural and nonstructural purposes:

IS	1902:1961	Code of Practice for Preservation of Bamboo and Cane for Non-structural Purposes;
IS	6874:1973	Method of Tests for Round Bamboos;
IS	8242:1976	Methods of Tests for Split Bamboo;
IS	8295:1976	Specification for Bamboo Chicks, Part I Fine;
IS	9096:1979	Code of Practice for Preservation of Bamboos for Structural Purposes.

2.16.5 Fillers, Stoppers and Putties

These shall conform to the following standards:

IS	110:1968	Specification for Ready Mixed Paint, Brushing, Grey Filler, for Enamels, for Use Over Primers (First Revision);
IS	345:1952	Specification for Wood Filler, Transparent, Liquid;
IS	419:1967	Specification for Putty for Use on Window Frames (First Revision);
IS	421:1953	Specification for Jointing Paste, for Bedding Moldings on Coaching Stock;
IS	423:1961	Specification for Plastic Wood, for Joiners' Filler (revised);
IS	424:1965	Specification for Plastic Asphalt (revised);
IS	3709:1966	Specification for Mastic Cement for Bedding of Metal Windows;
IS	7164:1973	Specification for Stopper.

2.16.6 Wire Ropes and Wire Products

These materials shall conform to the following standards:

ASTM A116 - 05 ASTM A121 - 07	Standard Specification for Metallic-Coated Carbon Steel Barbed Wire
ASTM A368 - 95a(2009)	Standard Specification for Stainless Steel Wire Strand
ASTM A392 - 07	Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric

ASTM A475 - 03(2009)e1	Standard Specification for Zinc-Coated Steel Wire Strand
ASTM A492 - 95(2009)	Standard Specification for Stainless Steel Rope Wire
ASTM A510 - 08	Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel
ASTM A121 - 07	Standard Specification for Metallic-Coated Carbon Steel Barbed Wire
ASTM A586 - 04a(2009)e1	Standard Specification for Zinc-Coated Parallel and Helical Steel Wire Structural Strand
ASTM A603 - 98(2009)e1	Standard Specification for Zinc-Coated Steel Structural Wire Rope
ASTM A817 - 07	Standard Specification for Metallic-Coated Steel Wire for Chain-Link Fence Fabric and Marcellled Tension Wire
ASTM A824 - 01(2007)	Standard Specification for Metallic-Coated Steel Marcellled Tension Wire for Use With Chain Link Fence
ASTM F1183 - 96(2006)	Standard Specification for Aluminum Alloy Chain Link Fence Fabric
IS 2365:1977	Specification for Steel Wire Suspension Ropes for Lifts, Elevators and Hoists (First Revision).

2.16.7 Waterproofing and Damp-proofing Materials

Waterproofing and damp-proofing materials shall conform to the following standards:

ASTM D41 - 05	Standard Specification for Asphalt Primer Used in Roofing, Damp proofing, and Waterproofing
ASTM D43 - 00(2006)	Standard Specification for Coal Tar Primer Used in Roofing, Damp proofing, and Waterproofing
ASTM D146 - 04	Standard Test Methods for Sampling and Testing Bitumen-Saturated Felts and Woven Fabrics for Roofing and Waterproofing
ASTM D173 - 03	Standard Specification for Bitumen-Saturated Cotton Fabrics Used in Roofing and Waterproofing
ASTM D6380 - 03(2009)	Standard Specification for Asphalt Roll Roofing (Organic Felt)
ASTM D226 / D226M - 09	Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing

ASTM D227 - 03	Standard Specification for Coal-Tar-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D449 - 03(2008)	Standard Specification for Asphalt Used in Damp proofing and Waterproofing
ASTM D450 - 07	Standard Specification for Coal-Tar Pitch Used in Roofing, Damp proofing, and Waterproofing
ASTM D1327 - 04	Standard Specification for Bitumen-Saturated Woven Burlap Fabrics Used in Roofing and Waterproofing
ASTM D1668 - 97a(2006)	Standard Specification for Glass Fabrics (Woven and Treated) for Roofing and Waterproofing
ASTM D2178 - 04	Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing
ASTM D2626 - 04	Standard Specification for Asphalt-Saturated and Coated Organic Felt Base Sheet Used in Roofing
ASTM D3468 - 99(2006)e1	Standard Specification for Liquid-Applied Neoprene and Chlorosulfonated Polyethylene Used in Roofing and Waterproofing

2.16.8 Glazed Tiles and Tile-setting Mortars

Glazed tiles shall conform to the following standards:

BDS 1301:1990	Specification for Glazed Earthenware Wall Tiles;
ASTM C126 - 09	Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units
ANSI A137.1-2008	Specification for Ceramic Tile;
BS 6431 Part 1 to Part 23	Ceramic Floor and Wall Tiles.

2.16.8.1 Mortars for Ceramic Wall and Floor Tile

- a) Portland Cement Mortars: Portland cement mortars for installing ceramic wall and floor tile shall comply with ANSI A108.1-2009 and be of the compositions indicated in Table 5.2.1.
- b) Dry-set Portland Cement Mortars: Premixed prepared Portland cement mortars, which require only the addition of water and which are used in the installation of ceramic tile, shall comply with ANSI A 118.1-2009. The shear bond strength for tile set in such mortar shall be as required in accordance with that standard. Tile set in dry-set Portland cement mortar shall be installed in accordance with ANSI A 108.5-2009.
- c) Electrically Conductive Dry-Set Mortars: Premixed prepared Portland cement mortars, which require only the addition of water and which comply with ANSI A118.2-2009, shall be used in the installation of

electrically conductive ceramic tile. Tile set in electrically conductive dry-set mortar shall be installed in accordance with ANSI A 108.7-2009.

- d) Latex-modified Portland Cement Mortars: Latex-modified Portland cement thin set mortars in which Latex is added to dry-set mortar as a replacement for all or part of the gauging water which are used for the installation of ceramic tile shall comply with ANSI A 118.4-2009. Tile set in latex-modified Portland cement mortar shall be installed in accordance with ANSI A 108.5-2009.
- e) Epoxy Mortar: Chemical-resistant epoxy for setting and grouting ceramic tile shall comply with ANSI A 118.3-2009. Tile set and grouted with epoxy shall be installed in accordance with ANSI A 108.6-2009.
- f) Furan Mortar and Grout: Chemical resistant furan mortar and grout which are used to install ceramic tile shall comply with ANSI A 118.5-2009. Tile set and grouted with furan shall be installed in accordance with ANSI A 108.8-2009.
- g) Modified Epoxy-Emulsion Mortar and Grout: Modified epoxy-emulsion mortar and grout which are used to install ceramic tile shall comply with ANSI A 118.8-2009. Tile set and grouted with modified epoxy-emulsion mortar and grout shall be installed in accordance with ANSI A 108.9-2009.
- h) Organic Adhesives: Water-resistant organic adhesives used for the installation of ceramic tile shall comply with ANSI A 136.1-2009. The shear bond strength after water immersion shall not be less than 0.25 kN/mm² for Type I adhesive, and not less than 0.13 kN/mm² for Type II adhesive when tested in accordance with ANSI A 136.1-2009. Tile set in organic adhesive shall be installed in accordance with ANSI A 108.4-2009.
- i) Portland Cement Grouts: Portland cement grouts used for the installation of ceramic tile shall comply with ANSI A 118.6-2009. Portland cement grouts for tilework shall be installed in accordance with ANSI A 108.10-2009.

2.16.8.2 Applicable Standards

A list of applicable standards for tiles, mortars and adhesives is given below.

BDS	1301 : 1990	Specification for Glazed Earthenware Wall Tiles;
ASTM	C126 - 09	Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units
ANSI	A108.1-2009	Specification for the Installation of Ceramic Tile with Portland Cement Mortar;
ANSI	A108.4-2009	Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile Setting Epoxy Adhesive;
ANSI	A108.5-2009	Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar;
ANSI	A108.6-2009	Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile Setting and Grouting Epoxy;
ANSI	A108.7-2009	Specification for Electrically Conductive Ceramic Tile Installed with Conductive Dry-Set Portland Cement Mortar;

ANSI	A108.8-2009	Installation of Ceramic Tile with Chemical Resistant Furan Mortar and Grout;
ANSI	A108.9-2009	Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout;
ANSI	A108.10-2009	Installation of Grout in Tilework;
ANSI	A118.1-2009	Specification for Dry-Set Portland Cement Mortar;
ANSI	A118.2-2009	Specifications for Conductive Dry-set Portland Cement Mortar;
ANSI	A118.3-2009	Specifications for Chemical Resistant Water Cleanable Tile Setting and Grouting Epoxy and Water Cleanable Tile Setting Epoxy Adhesive;
ANSI	A118.4-2009	Specifications Furan Latex - Portland Cement Mortar;
ANSI	A118.5-2009	Specifications for Chemical Resistant Furan;
ANSI	A118.6-2009	Specifications for Ceramic Tile Grouts;
ANSI	A118.8-2009	Specifications for Modified Epoxy Emulsion Mortar/Grout;
ANSI	A136.1-2009	Organic Adhesives for Installation of Ceramic Tile;
ANSI	A137.1-2008	Specifications for Ceramic Tile;
BS	6431	Floor and Wall Tiles;
BS	6431 Part 1 1983	Specification for Classification and Making, Including Definitions and Characteristics;
BS	6431 Part 2 1984	Specification for Struded Ceramic Tiles with Low Water Absorption (E< 3%) Group A1;
BS	6431 Part 3	Extruded Ceramic Tiles with a Water Absorption of 3% < 6%. Group A 11a;
BS	6431 Part 3 Section 3.1 1986	Specification for General Products;
BS	6431 Part 3 Section 3.2 1986	Specification for Products Terre Cuite, Cotto, Baldosion Catalan;
BS	6431 Part 4	Extruded Ceramic Tiles with a Water Absorption of 6% <E< 10%. Group A11b;
BS	6431 Part 4	Specification for General Products;

1986		
BS	6431 Part 4 Section 4.2	Specification for Specific Products (Terre Cuite, Cotto, Baldosion Catalan);
1986		
BS	6431 Part 5	Specification for Extruded Ceramic Tiles with a Water Absorption of E>10%, Group A111;
1986		
BS	6431 Part 6	Specification for Dust-prestressed Ceramic Tiles with a Low-Water Absorption (E<3%)Group B1;
1984		
BS	6431 Part 7	Specification for Dust-prestressed Ceramic Tiles with a Water Absorption of 3% < E ≤ 6%. Group B11a;
1986		
BS	6431 Part 8	Specification for Dust-prestressed Ceramic Tiles with Water Absorption of 6% < E ≤ 10%. Group B11b;
1986		
BS	6431 Part 9	Specification for Dust-Prestressed Ceramic Tiles with a Water Absorption of E >10%. Group B111;
1984		
BS	6431 Part 10	Method for Determination of Dimensions and Surface Quality;
1984		
BS	6431 Part 11	Method for Determination of Water Absorption;
1983		
BS	6431 Part 12	Method for Determination of Modulus of;
1983		
BS	6431 Part 13	Method for Determination of Scratch Hardness of Surface According to Mhos;
1986		
BS	6431 Part 14	Method for Determination of Resistance to Abrasion of Unglazed Tiles;
1983		
BS	6431 Part 15	Method for Determination of Linear Thermal Expansion;
1983		
BS	6431 Part 16	Method for Determination of Resistance to Thermal Shock;
1983		
BS	6431 Part 17	Method for Determination of Crazing Resistance-Glazed Tiles;
1983		
BS	6431 Part 18	Method for Determination of Chemical Resistance-Unglazed Tiles;
1983		
BS	6431 Part 19	Method for Determination of Chemical Resistance-Unglazed Tiles;
1984		

BS 1984	6431 Part 20	Method for Determination of Resistance to Surface Abrasion-Glazed Tiles;
BS 1986	6431 Part 23	Specification for Sampling and Basis for Acceptance;

2.16.9 Refractories

Refractories shall conform to the following standards:

BDS 1493:1994		Glossary of terms used in refractory
BDS 1494:1994		Dimension of refractory bricks
BDS 1495:1994		High aluminium refractory bricks
ISO 528:1983		Refractory Products-Determination of Pyrometric Cone Equivalent (refractoriness);
ISO 1109:1975		Refractory Products-Classification of Dense Shaped Refractory Products;
ISO 1146:1988		Pyrometric Reference Cones for Laboratory Use-Specification;
ISO 1893:1989		Refractory Products-Determination of Refractoriness-Under-Load (differential with rising temperature);
ISO 1927:1984		Prepared Unshaped Refractory Materials (Dense and Insulating) Classification;
ISO 2245:1990		Shaped Insulating Refractory Products-Classification;
ISO 2477:1987		Shaped Insulating Refractory Products-Determination of Permanent Change in Dimensions on Heating;
ISO 2478:1987		Dense Shaped Refractory Products-Determination of Permanent Change in Dimensions on Heating;
ISO 3187:1989		Refractory Products-Determination of Creep in Compression;
ISO 5013:1985		Refractory Products-Determination of Modulus of Rupture at Elevated Temperatures;
ISO 5014:1986		Refractory Products-Determination of Modulus of Rupture at Ambient Temperature;
ISO 5016:1986		Shaped Insulating Refractory Products-Determination of Bulk Density and True Porosity;
ISO 5017:1988		Dense Shaped Refractory Products-Determination of Bulk Density,

		Apparent Porosity and True Porosity;
ISO	5018:1983	Refractory Materials-Determination of True Density;
ISO	5019-1:1984	Refractory Bricks-Dimensions-Part 1: Rectangular Bricks;
ISO	5019-2:1984	Refractory Bricks-Dimensions-Part 2: Arch Bricks;
ISO	5019-3:1984	Refractory Bricks-Dimensions-Part 3: Rectangular Checker Bricks for Regenerative Furnace;
ISO	5419-4:1988	Refractory Bricks-Dimensions-Part 4: Dome Bricks for Electric arc Furnace Roofs;
ISO	5015-6:1984	Refractory Bricks-Dimensions-Part 6: Basic Bricks for Oxygen Steel Making Converters;
ISO	5022:1979	Shaped Refractory Products-Sampling and Acceptance Testing;
ISO	5417-1986	Refractory Bricks for Use in Rotary Kilns-Dimensions;
ISO	8656:1988	Refractory Products-Sampling of Raw Materials and Unshaped Products;
		Part 1; Sampling Scheme;
ISO	8840:1987	Refractory Materials-Determination of Bulk Density of Granular Materials (Grain Density);
ISO	8890:1988	Dense Shaped Refractory Products-Determination of Resistance to Sulfuric Acid;
ISO	8894-1:1987	Refractory Materials-Determination of Thermal Conductivity-
		Part 1: Hot-Wire Method (Cross-Array);
ISO	8894-2:1990	Refractory Materials-Determination of Thermal Conductivity-
		Part 2: Hot-Wire Method (Parallel);
ISO	8895:1986	Shaped Insulating Refractory Products-Determination of Cold Crushing Strength;
ISO	9205:1988	Refractory Bricks for Use in Rotary Kilns-Hot-face Identification Marking;
ISO	10080:1990	Refractory Products-Classification of Dense, Shaped Acid-Resisting Products;
ISO	10081:1991	Basic Refractory Products-Classification-Part I: Products Containing Less Than 7% Residual Carbon.

2.16.10 Thermal Insulating Materials

Thermal insulation may be in the following physical forms:

- Loose fill dry granules or nodules poured or below in place;
- Flexible or semi rigid blankets and bolts of wool like material;
- Rigid boards and blocks;
- Membrane reflective insulation;
- Spray applied mineral fibre or insulating concrete;
- Poured in plain-insulating concrete;
- Foamed in place-polyurethane;
- Gypsum plaster.

Thermal insulating materials shall conform to the standards listed below.

ASTM C167 - 09	Standard Test Methods for Thickness and Density of Blanket or Batt Thermal Insulations
ASTM C177 - 04	Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus
ASTM C195 - 07	Standard Specification for Mineral Fiber Thermal Insulating Cement
ASTM C196 - 00(2005)	Standard Specification for Expanded or Exfoliated Vermiculite Thermal Insulating Cement
ASTM C208 - 08a	Standard Specification for Cellulosic Fiber Insulating Board
ASTM C209 - 07ae1	Standard Test Methods for Cellulosic Fiber Insulating Board
ASTM C1363 - 05	Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus
ASTM C240 - 08e1	Standard Test Methods of Testing Cellular Glass Insulation Block
ASTM C335 - 05ae1	Standard Test Method for Steady-State Heat Transfer Properties of Pipe Insulation
ASTM C411 - 05	Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation
ASTM C449 - 07	Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement
ASTM C516 - 08	Standard Specification for Vermiculite Loose Fill Thermal Insulation

ASTM C518 - 04	Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
ASTM C520 - 04	Standard Test Methods for Density of Granular Loose Fill Insulations
ASTM C533 - 09	Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation
ASTM C534 / C534M - 08	Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
ASTM C547 - 07e1	Standard Specification for Mineral Fiber Pipe Insulation
ASTM C549 - 06	Standard Specification for Perlite Loose Fill Insulation
ASTM C552 - 07	Standard Specification for Cellular Glass Thermal Insulation
ASTM C553 - 08	Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
ASTM C578 - 09e1	Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
ASTM C591 - 09	Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
ASTM C592 - 08a	Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type)
ASTM C610 - 09e1	Standard Specification for Molded Expanded Perlite Block and Pipe Thermal Insulation
ASTM C612 - 09	Standard Specification for Mineral Fiber Block and Board Thermal Insulation
ASTM C665 - 06	Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
ASTM C726 - 05e1	Standard Specification for Mineral Fiber Roof Insulation Board
ASTM C728 - 05(2010)	Standard Specification for Perlite Thermal Insulation Board
ASTM C739 - 08	Standard Specification for Cellulosic Fiber Loose-Fill Thermal Insulation
ASTM C764 - 07	Standard Specification for Mineral Fiber Loose-Fill Thermal Insulation
ASTM C916 - 85(2007)	Standard Specification for Adhesives for Duct Thermal Insulation

ASTM C991 - 08e1	Standard Specification for Flexible Fibrous Glass Insulation for Metal Buildings
ASTM C1014 - 08	Standard Specification for Spray-Applied Mineral Fiber Thermal and Sound Absorbing Insulation
ASTM C1029 - 09	Standard Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation
ASTM C1071 - 05e1	Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material)

2.16.11 Screw Threads and Rivets

These shall conform to the following standards:

IS	554:1975	Dimensions for Pipe Threads where Pressure Tight Joints are Required on the Threads (Second Revision);
IS	1929:1982	Specification for Hot Forged Steel Rivets for Hot Closing (12 to 36 mm diameter) (First Revision);
IS	2155:1982	Specification for Cold-Forged Solid Steel Rivets for Hot Closing (6 to 16 mm diameter) (First Revision);
IS	2643:1975	Dimensions for Pipe Threads for Fastening Purposes; Part I - Basic Profile and Dimensions (First Revision); Part II - Tolerances (First Revision); Part III - Limits of Sizes;
IS	2907:1964	Specification for Non-ferrous Rivets (1.6 mm to 10 mm)
IS	2998:1981	Specification for Cold Forged Steel Rivets for Cold Closing (1 to 16 mm diameter) (First Revision);
IS	10102:1982	Technical supply conditions for Rivets.

2.16.12 Sealants

Sealants shall conform to the following standards:

ASTM C509 - 06	Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM C542 - 05	Standard Specification for Lock-Strip Gaskets

ASTM C564 - 09a	Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings
ASTM C716 - 06	Standard Specification for Installing Lock-Strip Gaskets and Infill Glazing Materials
ASTM C719 - 93(2005)	Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)
ASTM C1193 - 09	Standard Guide for Use of Joint Sealants
ASTM C794 - 06	Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
ASTM C834 - 10	Standard Specification for Latex Sealants
ASTM C864 - 05	Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers
ASTM C919 - 08	Standard Practice for Use of Sealants in Acoustical Applications
ASTM C920 - 08	Standard Specification for Elastomeric Joint Sealants
ASTM C1193 - 09	Standard Guide for Use of Joint Sealants
ASTM D2628 - 91(2005)	Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements
ASTM D6690 - 07	Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
ASTM D3406 - 95(2006)	Standard Specification for Joint Sealant, Hot-Applied, Elastomeric-Type, for Portland Cement Concrete Pavements
ASTM D3667 - 05	Standard Specification for Rubber Seals Used in Flat-Plate Solar Collectors
ASTM D3771 - 03(2007)	Standard Specification for Rubber Seals Used in Concentrating Solar Collectors
ASTM D3832 - 79(2006)	Standard Specification for Rubber Seals Contacting Liquids in Solar Energy Systems
ISO 3934:1978	Rubber Building Gaskets-Materials in Preformed Solid Vulcanizates Used for Sealing Glazing and Panels-Specification;
ISO 4633:1983	Rubber Seals-Joint Rings for Water Supply, Drainage and Sewerage Pipelines-Specifications for Materials;
ISO 4635:1982	Rubber, Vulcanized-Preformed Compression Seals for Use

		Between Concrete Motorway Paving Sections-Specifications for Material;
ISO	5892:1981	Rubber Building Gaskets-Materials for Preformed Solid Vulcanized Structural Gaskets-Specification;
ISO	6447:1991	Rubber Seals-Joint Rings Used for Gas Supply Pipes and Fittings-Specification for Material;
ISO	9331:1991	Rubber Seals Joint Rings for Hot Water Supply Pipelines up to 110oC Specifications for the Material.

2.16.13 Joints and Jointing Products

Joints and jointing products shall conform to the following standards:

ISO	2444 : 1988	Joints in Buildings-Vocabulary;
ISO	3867:1982	Agglomerated Cork-Material of Expansion Joints for Construction and Building Test-Methods;
ISO	3869:1981	Agglomerated Cork-Filler Material of Expansion Joints for Construction and Buildings -Characteristics, Sampling and Packing;
ISO	3934:1978	Rubber Building Gaskets-Materials in Preformed Solid Vulcanizates Used for Sealing Glazing and Panels-Specification;
ISO	4633:1983	Rubber Seals-Joint Rings for Water Supply, Drainage and Sewerage Pipelines-Specification for Materials;
ISO	4635:1982	Rubber, Vulcanized-Preformed Compression Seals for Use Between Concrete Motorway Paving Sections-Specification for Material;
ISO	5892:1981	Rubber Building Gaskets-Materials for Preformed Solid Vulcanized Structural Gaskets-Specification;
ISO	6447:1983	Rubber Seals-Joint Rings Used for Gas Supply Pipes and Fittings-Specification for Material;
ISO	6589:1983	Joints in Building-Laboratory Method of Test for Air Permeability of Joints;
ISO	7389:1987	Building Construction-Jointing Products-Determination of Elastic Recovery;
ISO	7390:1987	Building Construction-Jointing Products-Determination of Resistance to Flow;
ISO	7727:1984	Joints in Building-Principles for Jointing of Building Components-Accommodation of Dimensional Deviations During Construction;

ISO	8339:1984	Building Construction-Jointing Products-Sealants-Determination of Tensile Properties;
ISO	8340:1984	Building Construction-Jointing Products-Sealants-Determination of Tensile Properties at Maintained Extension;
ISO	8394:1988	Building Construction-Jointing Products-Determination of Extrudability of One-Component Sealants;
ISO	9046:1987	Building Construction-Sealants-Determination of Adhesion/ Cohesion Properties at Constant Temperature;
ISO	9047:1989	Building Construction-Sealants-Determination of Adhesion/ Cohesion Properties at Variable Temperatures;
ISO	9631:1991	Rubber Seals-Joint Rings for Hot Water Supply Pipelines up to 110oC Specifications for the Material;
ISO	10563:1991	Building Construction-Sealants for Joints-Determination of Change in Mass and Volume;
ISO	10590:1991	Building Construction-Sealants-Determination of Adhesion/Cohesion Properties at Maintained Extension after Immersion in Water;
ISO	10591 : 1991	Building Construction-Sealants-Determination of Adhesion/Cohesion Properties after Immersion in Water.

2.16.14 Glass and Glazing

The applicable standards for glass and glazing are listed below :

ASTM C1036 - 06	Standard Specification for Flat Glass
ASTM C1048 - 04	Standard Specification for Heat-Treated Flat Glass—Kind HS, Kind FT Coated and Uncoated Glass
ANSI Z 97.1-2009	Safety Performance Specifications and Methods of Tests for Transport Safety Glazing Materials Used in Building;
CPSC 16 CFR	Safety Standard for Architectural Glazing Materials. Part 1201A

2.17 CGI SHEET ROOFING AND WALLING

Galvanized corrugated steel sheets conforming to BDS 868, Galvanized Corrugated Sheet Roof and Wall Coverings, may be used over structural framing for construction of roofs and walls. Requirements for various roofing materials including CGI sheet have been specified in Sec 2.13 above.

