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Material Extraction Report

Sl. No	Material Name	Test Name/Reference Code/Standard as per the given document (with reference page number)	Specific Material Type/Material Definition	Any other relevant information
1	Waterproofing Materials	1. (f) Permeability Reducing (water proofing) Admixtures. (Page 4) 2. 4.4.4 Water Proofing Materials (Page 20) 3. TEST FOR SURFACE MOISTURE (Page 21) 4. 5.1 MATERIALS (Page 41) 5. which 12 mm thick water proofing ply of approved quality may be used. (Page 46)	No specific definition could be determined from the context.	Waterproofing materials are essential for protecting concrete structures from water damage and deterioration. They include permeability-reducing admixtures, coatings, and membranes. Selection depends on the specific application and exposure conditions. Table 4.11 suggests the use of polyethylene or polychloroprene sheets, or surface coatings based on asphalt, chlorinated rubber, epoxy, or polyurethane materials to prevent sulphate solution ingress. Supersulphated cement with protective coatings may also be considered.
2	Galvanised Sleeves	1. sleeves shall also be provided for accommodating 6 mm dia fully threaded bolts for fixing holdfasts (Page 72) 2. 5.7B EXPANSION JOINT COVERING WITH STAINLESS STEEL GRADE 304 (Page 73)	No specific definition could be determined from the context.	Galvanized sleeves are used in concrete construction to provide protection against corrosion for embedded bolts and fixings. They are often used in expansion joints or where fixings are required in concrete structures. The use of stainless steel grade 304 for expansion joint coverings is also mentioned in the document.

3	organic impurities	1. (b) Estimation of organic impurities (as per IS 2386 - Part II) – IS 2386 (Page 3) 2. 4.1.1.2 Deleterious Material: Coarse aggregate shall not contain any deleterious material, such as (Page 1) 3. and organic impurities in such quantity as to affect the strength or durability of the concrete. Coarse (Page 1) 4. Limits of deleterious substances in the aggregate (Page 100)	Deleterious organic substances present in concrete aggregates that can negatively impact the strength and durability of the concrete.	Organic impurities in aggregates can significantly reduce the strength and durability of concrete. IS 2386 - Part II provides a method for estimating the amount of organic impurities present. Limits for deleterious substances in aggregates are specified to ensure concrete quality. Aggregates should be tested for organic impurities to ensure they meet the required specifications. Extreme surface exposure should be considered to avoid contact with liquid/ solid aggressive chemicals.
4	Damp Proof Course	1. 4.4 DAMP PROOF COURSE (Page 20) 2. stone masonry work shall be levelled and prepared before laying the cement concrete. Edge of damp (Page 20) 3. be terminated only at the predetermined location where damp proof course is to be discontinued. (Page 20) 4. There shall be no construction joints in the Damp Proof Course. (Page 20) 5. 4.4.2 Curing (Page 20) 6. 4.4.4 Water Proofing Materials (Page 20)	A barrier layer designed to prevent moisture transmission through a structure.	Damp proof courses (DPC) are crucial for preventing rising damp in buildings. The document specifies requirements for its proper installation, including ensuring it's straight, even, and vertical, avoiding construction joints within the DPC, and proper curing. Termination points should be predetermined to maintain the integrity of the damp-proof barrier. Waterproofing materials used in the DPC should be selected based on site conditions and expected moisture levels. Ensure compatibility with adjacent building materials. Curing the DPC for at least seven days and allowing it to dry is essential for achieving its intended function of preventing moisture ingress.

5	pentachlorophenol	1. IS 716 Specification for pentachlorophenol – IS 716 (Page 40) 2. pentachlorophenol conforming to IS 716 well mixed to a viscosity of 70-80 centipoises. – IS 716 (Page 47) 3. 5.2.4 Surface Treatment 134 (Page 28)	A wood preservative chemical.	Pentachlorophenol (PCP) is specified as conforming to IS 716, indicating its use as a wood preservative. It's applied with a specific viscosity (70-80 centipoises) for effective penetration and protection. Consider surface treatments (5.2.4) in conjunction with PCP for enhanced durability, particularly in aggressive environments. Ensure compliance with safety regulations during handling and application due to its toxicity. Properly dispose of any excess or contaminated materials following environmental guidelines. PCP use might be restricted in some regions, so verifying its acceptability is crucial before application.
6	Particle Board	1. particle board (Page 31) 2. 5.7A EXPANSION JOINT COVERING WITH CEMENT BONDED PARTICLE BOARD (Page 72) 3. 5.7A.2.2 Sampling and Inspection: In any consignment, all the boards of the same dimensions 4. wood particle board over expansion joints. (Page 73) 5. IS 14276 (Page 73)	An engineered wood product manufactured from wood particles bonded together with a resin.	Particle board is used as an expansion joint covering (5.7A), often cement-bonded. When using particle board for expansion joints, ensure proper sampling and inspection (5.7A.2.2) to maintain quality and consistency. Compliance with IS 14276 is crucial. Consider using un-sanded boards and always pre-bore holes for nailing to prevent damage. All boards must be of the same dimensions. Verify the physical and mechanical properties as per Table 1 of IS 14276:1995.

7	Reinforcement	1. 5.1.3 Steel for Reinforcement 129 (Page 28) 2. 5.8A.3 Steel for reinforcement 163 (Page 32) 3. 5.8B.3 Steel for reinforcement 170 (Page 32) 4. IS 1786 Specification for high strength deformed steel and wires for concrete (Page 40) 5. IS 2502 Code of practice for bending and fixing of bars for concrete reinforcement. – IS 2502 (Page 40) 6. 5.1.3.6 Chemical composition of reinforcement bars shall be as per Table 5.3 as follows:- (Page 44) 7. 5.3A.5 Chemical composition of reinforcement bars shall be as per Table 5.4C as follows:- (Page 55)	Steel bars or mesh used in reinforced concrete to provide tensile strength.	Reinforcement steel should adhere to IS 1786 standards, especially if using high-strength deformed steel. Proper storage is essential to prevent distortion and corrosion. Welding should comply with IS 2751 guidelines. In seismic zones III and above, Fe 415 D grade steel is preferred. Bending and fixing should follow IS 2502. Chemical composition must align with Table 5.3 or 5.4C as applicable. For main reinforcement up to 12 mm diameter bar for mild exposure the nominal cover may be reduced by 5 mm.
8	Polymer Block	1. 5.6A.4 Other Hardware fixing- RCC frames shall be provided with high strength polymer (Page 72) 2. 5.7B EXPANSION JOINT COVERING WITH STAINLESS STEEL GRADE 304 (Page 73)	High-strength polymer blocks used for securing hardware fixings in RCC frames.	Polymer blocks are used in RCC frames for hardware fixing, specifically for hinges, tower bolts, and sliding bolts, conforming to IS 3395. For expansion joints, stainless steel grade 304 is a suitable covering material. For sulphate attack use polyethylene or polychloroprene sheet, or surface coating based on asphalt, chlorinated rubber, epoxy, or polyurethane materials.
9	Bitumen felt	1. 4.4.3 Application of Hot Bitumen (Page 20)	A waterproofing material composed of bitumen-saturated felt.	Bitumen felt is primarily used for waterproofing. When dealing with very high sulphate concentrations, alternatives like polyethylene or polychloroprene sheets, or surface coatings of asphalt, chlorinated rubber, epoxy, or polyurethane may be used to prevent sulphate ingress. Hot bitumen applications are referenced on Page 20, section 4.4.3.

10	Copper plate	1. embedded metal 0.6 (Page 15) 2. IS 226 Structural Steel – IS 226 (Page 40) 3. IS 1343 Code of Practice for Prestressed Concrete – IS 1387 (Page 40) 4. IS 4925 Batch plants specification for concrete batching and mixing plant (Page 40) 5. IS 2062 (Page 42) 6. IS 2751 (Page 42)	A sheet of copper metal, typically used for its conductivity, corrosion resistance, or aesthetic properties.	Copper plates are often used in civil engineering for grounding systems, waterstops in concrete structures (due to their corrosion resistance), and architectural features. The specific grade and thickness should be selected based on the application's requirements, considering factors like conductivity, mechanical strength, and environmental exposure.
11	Foundations	1. Foundation, footings, bassees for columns (Page 18) 2. Slabs (Page 18) 3. Columns, piers abutmenttss, pillars, post and struts (Page 18) 4. CONCRETE WORK (Page 26) 5. IS 13311 Indian standard for non-destructive testing of concrete. Method of testing (Page 40)	The engineered structure that transfers loads from a building or other structure to the ground.	Foundations are a critical element of any civil structure, responsible for safely transferring loads to the underlying soil or rock. Design considerations include soil bearing capacity, settlement characteristics, and environmental factors. Various types exist, including shallow foundations (spread footings, mats) and deep foundations (piles, caissons), selected based on site-specific conditions and structural requirements. Concrete grades lower than those specified may be used for lean concrete or temporary construction.

12	Shuttering	1. Form Work (Centring & Shuttering) (Page 41) 2. FORM WORK (CENTRING & SHUTTERING) (Page 45) 3. Typical details of Multi-Stage Shuttering 218 (Page 35) 4. Erection of Form Work (Centering and shuttering) (Page 28) 5. Oiling the Surface (Page 47) 6. Extra for shuttering in circular work in plan (Page 66)	Temporary molds, typically made of wood or steel, used to contain and shape concrete during its placement and hardening.	Shuttering, also known as formwork, is crucial for achieving the desired shape and dimensions of concrete structures. It must be sufficiently stiff to prevent excessive deflection and tightly sealed to prevent slurry leakage. Steel shuttering is generally preferred, but plywood may be used for smaller works. Proper surface preparation, including oiling, is essential for easy removal and to extend the shuttering's lifespan. Multistage shuttering may be required for taller structures, with appropriate support provided from lower floors. Formwork exceeding 3.5 meters in height should be specifically measured for payment purposes. Compaction by vibration using shutter vibrators can improve the surface finish.
13	Slump Test	1. IS 1199 (Page 6) 2. SLUMP TEST (Page 24) 3. 5.4.9.3 Slump Test : This test shall be carried out as prescribed in sub-head 4 of concrete. (Page 62) 4. Flow ability Slump-flow test (Page 77) 5. 5.8A.5.1.1 Slump - flow (Page 77) 6. (a) Slump (Page 103) 7. 5.11.4.1 Slump (Page 103)	The slump test is a method used to assess the consistency and workability of fresh concrete. It's not suitable for very dry mixes.	The slump test, as per IS 1199, is crucial for quality control, especially in pavement applications and SCC (Self-Compacting Concrete). Slump measurements should be taken within 20 minutes of mixing, and slump-flow tests are used to confirm uniformity between batches. Field checks should ensure that the final slump measurement aligns with the ordered slump, and samples should be collected from every 20 cubic meters of concrete placed.

14	sea shells	1. 4.0 CONCRETE WORK (Page 1) 2. 4.1.1.2 Deleterious Material (Page 1) 3. Concrete completely immersed in sea water (Page 14)	Sea shells are considered a deleterious material in concrete.	Sea shells, along with other organic impurities, are considered deleterious materials in concrete as per section 4.1.1.2. Their presence can negatively impact the strength and durability of the concrete. Special considerations apply to concrete in coastal areas, defined as within 10 km of the sea, due to saturated salt air. Concrete immersed in seawater or exposed to coastal environments requires careful mix design and material selection to ensure longevity and resistance to corrosion.
15	Aggregate	1. 4.1.1 Coarse Aggregate (Page 1) 2. IS 383 (Page 1) 3. 4.1.1.2 Deleterious Material: Coarse aggregate shall not contain any deleterious material (Page 1) 4. IS 2386 (Page 3) 5. TABLE 4.3 (Page 2)	Aggregate is granular material, such as sand, gravel, crushed stone, or recycled concrete, used as a filler in concrete mixes. Coarse aggregate is typically retained on a 4.75 mm IS sieve.	Aggregates must adhere to IS 383 and be tested per IS 2386. Deleterious materials like vegetable matter must be avoided. Proper grading and proportioning of fine to coarse aggregates are crucial, with adjustments based on the fine aggregate's grading zone and the coarse aggregate's maximum size. Storage should prevent segregation, and surface moisture content must be accounted for in water adjustments. The supplier should furnish information on crushing strength, impact value, and potential reactivity.
16	Admixture	1. 4.1.2 Chemical Admixtures (Page 3) 2. IS 9103 (Page 41, 76, 103) 3. 5.8.1.6 Admixture performance evaluation (Page 74) 4. 4.2.4 Batching (Page 7) 5. 5.9.1.3 Mineral Admixtures (Page 88) 6. 5.11.3.4 Admixtures (Page 102)	Admixtures are chemical or mineral substances added to concrete during mixing to modify its properties, such as workability, setting time, or durability.	Admixtures must conform to IS 9103 and their performance should be evaluated before use by comparing concrete properties with and without the admixture. Compatibility of different admixtures must be confirmed before use. Dosage should be carefully controlled according to manufacturer's recommendations, and chloride content should be declared and within stipulated limits.

17	Abutments	1. 5.8A.7.1 Abutments (Page 80) 2. 5.8A.7.2 Pier and abutment cap (Page 81) 3. (g) Columns, pillars, piers, abutments, posts and struts (Page 18, 66)	Abutments are structural supports located at the ends of a bridge or other structure, designed to retain earth and support the superstructure.	Abutments carry the superstructure load and retain earth from the approach embankment. They should be designed and dimensioned accordingly. When spill-through abutments are used, the surcharge effect needs to be considered. Design considerations also depend on whether counterforts are present and their dimensions.
18	Cube Test	1. Appendix A Cube Test for Compressive Strength of Concrete - 196 (Page 34) 2. 5.4.9.1 Cube Test for Compressive Strength of Concrete - Mandatory Lab Test (Page 62) 3. IS 456; IS 516 (Page 105)	The cube test is a compressive strength test performed on concrete cubes to assess the quality and strength of the concrete mix.	Cube tests are mandatory for assessing concrete compressive strength. Three cubes are typically tested at 7 days and three at 28 days. Standard test cubes should be prepared and cured properly. Results should be analyzed to compare actual strength with target values and to ensure compliance with IS 456 and IS 516.
19	Pozzolana	1. Portland Pozzolana 350 0.45 (Page 16) 2. Soluble Chloride Content (Page 15) 3. TEST FOR SURFACE MOISTURE (Page 21)	A siliceous or aluminous material which, in itself, possesses little or no cementitious value but which will, in finely divided form and in the presence of moisture, chemically react with calcium hydroxide at ordinary temperatures to form compounds possessing cementitious properties.	Pozzolana is a siliceous or aluminous material that reacts with calcium hydroxide in the presence of moisture to form cementitious compounds. Its use in cement can be advantageous under certain conditions. When Portland Pozzolana cement or low heat cement, or Ordinary Portland Cement (OPC) with direct addition of fly ash is used, the stripping time for formwork may require adjustment.
20	HYSD bars	1. IS 1786 (Page 42) 2. IS 432 (Part I) (Page 42) 3. IS 2502 (Page 51) 4. 5.3A.8 Wlding of Bars 143 (Page 29)	No specific definition could be determined from the context.	HYSD (High Yield Strength Deformed) bars are steel reinforcing bars conforming to IS 1786. They are used in reinforced concrete construction. Special care should be taken to identify these bars at the site, and staff should be trained to recognize manufacturer identification marks. When working in seismic zones, the size of hooks at the end of the rod shall be eight times the diameter of the bar.

21	Concrete	1. IS 456 (Page 40) 2. IS 516 (Page 40) 3. IS 1199 (Page 40) 4. IS 1791 (Page 40) 5. IS 10262 (Page 40) 6. IS 4926 (Page 33) 7. Appendix A Cube Test for Compressive Strength of Concrete - 196 (Page 34)	A composite material composed of cement, aggregates (fine and coarse), water, and sometimes admixtures, which hardens over time through a chemical process known as hydration.	Concrete is a composite material used extensively in construction. Mix design can be either a 'Design Mix Concrete' or a 'Nominal Mix Concrete,' with the former preferred. Ready-mixed concrete should comply with IS 4926. Key properties include workability (measured by slump test according to IS 1199), compressive strength (tested as per IS 516, with acceptance criteria as per IS 456), and durability. Minimum cement content, water-cement ratio, and concrete grade are related to the exposure conditions. Fly ash or other blended cements are commonly used as an admixture.
22	Formwork	1. 4.2.12 Form Work (Page 13) 2. 4.3.5 Form work shall be as specified in 4.2.12. (Page 20) 3. 5.2.1 Form Work 132 (Page 28) 4. 5.2.5 Inspection of Form Work 135 (Page 28) 5. 5.2.3.1 Material for Form Work (Page 45) 6. 5.2.3.7 Removal of Form work (Stripping Time) (Page 46) 7. 5.2.4.2 The design of form work shall conform to sound Engineering practices and relevant IS codes. (Page 48)	Formwork refers to temporary or permanent molds used to contain concrete during pouring and hardening. It encompasses all temporary structures required for forming concrete, including supports.	Work damaged through premature or careless removal of forms must be reconstructed within 24 hours. Proper stripping time is crucial and varies based on circumstances and cement type, with cold weather potentially increasing the required time. Design should conform to sound engineering practices and relevant IS codes.

23	Couplers	1. 5.3B Reinforcement couples 145 (Page 29) 2. 5.3B REINFORCEMENT COUPLERS (Page 58) 3. IS 16172 Indian standard for couplers for mechanical splices of bars in concrete. 4. 5.10.2.5 Couplers : Couplers to be used for connecting pipe line sections (either hard or flexible) (Page 97)	Couplers are devices used for mechanically splicing reinforcing bars or connecting pipe sections. Couplers for rebar should meet IS 16172 standards. For pipelines, couplers must withstand handling stresses and misalignments.	When used for connecting pipeline sections, couplers (whether hard or flexible) shall have adequate strength to withstand stresses due to handling, misalignments, and poor support. For horizontal pipe runs and vertical runs up to 30 meters, couplers should be rated for a minimum pressure of 35 kg/cm². Different types of couplers may be used, including grooved end, one-piece extended lever swing type, and full flow oil line type.
24	TMT Bars	1. 5.3A.8 Wlding of Bars 143 (Page 29) 2. IS 432 (Part I) – IS 432 (Part I) 3. 5.1.3.7 Thermo Mechanically treated reinforcement bars: (Page 44) 4. IS 1786 5. 5.3.3.2 The bars shall be kept in correct position by the following methods: (Page 52)	Thermo-Mechanically Treated (TMT) bars are high-strength deformed steel bars manufactured through a process involving rapid quenching after the final rolling pass.	While there isn't a specific BIS code solely for TMT bars, they generally conform to IS 1786, which pertains to High Strength Deformed (HSD) bars. TMT bars are produced under license from firms such as Tempcore. Care should be taken to properly identify these bars at the site, looking for identification marks provided by the manufacturers.

25	Fly Ash	1. 5.1.2.0 Fly ash Blended Cements conforming to IS 1489 (Part I) may be used in RCC structures as per – IS 1489 (Part I) (Page 41) 2. (v) In environment subjected to aggressive chloride or sulphate attach in particular, use of fly ash (Page 41) 3. (i) Fly ash shall have its chemiiccal characteristics and physical requirements etc.. conforming to IS (Page 42) 4. (i) Fly ash shall have its chemiiccal characteristics and physical requirements etc.. conforming to IS – IS 45566 (Page 42) 5. 5.8B.2 MATERIALS – IS 1489 (Part I) (Page 82) 6. inclusive of mineral admixtures mentioned in 5.9.1.3. The additions such as fly ash or (Page 6)	A pozzolanic material, often a byproduct of coal combustion, used as a cement replacement in concrete.	Fly ash can be used as a mineral admixture in concrete to improve its properties, such as workability, durability, and resistance to chemical attack. It's often used in blended cements conforming to IS 1489 (Part I) and should meet the chemical and physical requirements as per IS 45566. Fly ash can be particularly beneficial in environments with aggressive chloride or sulfate exposure. When using fly ash, consider its compatibility with chemical admixtures and ensure proper storage and handling to maintain its quality. Note that fly ash should not be added to Portland Pozzolana cement, as it already contains fly ash.
26	Columns	1. TABLE 4.1 (Page 2) 2. TABLE 4.2 (Page 2) 3. (a) Foundation, footings, bassees for columns (Page 18) 4. (g) Columns, piers abutmenttss, pillars, post and struts (Page 18) 5. section of columns and beams -5 mm (Page 45) 6. (a) Vertical form work to columns, 16-24 h 16-24 h 24-36 h (Page 46) 7. (a) Foundations, footings, bases of columns etc. and for mass concrete (Page 50)	Vertical structural members designed to carry compressive loads from beams, slabs, or other structural elements to the foundations.	Columns are critical vertical structural elements that transfer loads to the foundation. Construction considerations include proper formwork (allowing 16-36 hours for vertical formwork), accurate placement of vertical reinforcement, and appropriate concrete cover (at least 50mm) to protect the steel from corrosion. Beams should be measured face-to-face of columns, and column measurements should be taken through the beam. Ensure proper analysis for live load surcharge on columns, particularly in retaining structures.

27	MS bars	1. (a) Mild steel and medium tenssiille bars conforming to IS 432 (Part I) – IS 432 (Part I) (Page 42) 2. sizes of steel bars are mentioned below in Table 5.2. (Page 43) 3. 5.3.1.2 Bonds and Hooks Forming End Anchorages: Reinforcement shall be bent and fixed in – IS 2502 (Page 51) 4. 5.3.1.3 Anchoring Bars in Tension : Deformed bars may be used without end anchorages provided, (Page 52) 5. Cross Sections Area and Mass of Steel Bar (Page 53) 6. all sizes of steel bars are mentioned below in Table 5.4B. (Page 54) 7. 5.6A.1.4 Reinforcement - Steel reinforcement shall be minimum of 3 nos. 6 mm dia M.S. bars tied (Page 70)	Mild steel reinforcing bars used to provide tensile strength to concrete structures.	Mild steel (MS) bars conforming to IS 432 (Part I) are used as reinforcement in concrete. High strength deformed bars & wires shall conform to IS 1786. The nominal mass/weight tolerance for round and square bars should adhere to Table 5.1/5.4A requirements. In seismic zones, hook sizes at rod ends should be eight times the bar diameter. Cut and bend rebars shall be performed as directed by the Engineer-in-charge. Minimum reinforcement in some applications (e.g., parapets) is 3 nos. 6mm dia MS bars.
28	lignite	1. substances. It shall be roughly cubical in shape. Flaky and elongated pieces shall be avoided. (Page 1) 2. Gravel: It shall consist of naturally occurring river bed shingle (Page 1) 3. Deleterious Material: Coarse aggregate shall not contain any deleterious material (Page 1)	No specific definition for lignite could be determined from the context.	Lignite, while not explicitly defined in the provided snippets, would be considered a deleterious material if present in coarse aggregates for concrete production. Its presence could affect the strength and durability of the concrete. Specifications for aggregates emphasize the avoidance of flaky and elongated pieces, and the exclusion of deleterious materials.

29	pyrites	1. CONCRETE WORK (Page 1) 2. substances. It shall be roughly cubical in shape. Flaky and elongated pieces shall be avoided. (Page 1) 3. Gravel: It shall consist of naturally occurring river bed shingle (Page 1) 4. Deleterious Material: Coarse aggregate shall not contain any deleterious material (Page 1)	No specific definition for pyrites could be determined from the context.	Pyrites, if present in aggregates, are considered a deleterious material that can negatively impact concrete durability. Specifications emphasize using aggregates free from such materials. The document highlights concrete work requirements, aggregate properties, and testing procedures to ensure quality.
30	Cement	1. IS 456 (Page 40, 41, 57, 88, 105) 2. IS 6909 (Page 15, 47) 3. IS 455 (Page 17, 68, 70, 107) 4. IS 13311 (Page 40, 99, 100) 5. IS 14276 (Page 40, 73, 142, 143) 6. Table 4.7 (Page 7) 7. IS 1791 (Page 9)	A binder material that, when mixed with water, sets and hardens, adhering to other materials to bind them together. Different types of cement exist, each with specific properties suitable for various applications (e.g., Portland cement, pozzolana cement, slag cement, supersulphated cement).	Cement quality and proportioning are critical for concrete performance. The document emphasizes adherence to IS 456 and other relevant Indian Standards. Key considerations include the type of cement, water-cement ratio, minimum cement content for different exposure conditions, and the use of mineral admixtures like fly ash or ground granulated blast furnace slag. Proper storage, batching accuracy, and mixing procedures are essential for achieving the desired concrete properties. The cement content should be checked against approved design mixes and adjustments to cement content will be paid or deducted based on rates provided.

31	Mortar	1. 4.0 CONCRETE WORK (Page 1) 2. 4.2.8.1 When the work has to be resumed on a surface which has hardened, such surface shall be (Page 11) 3. This layer of cement slurry of mortar shall be freshly mixed and applied immediately before placing of (Page 11) 4. (a) In case of beam and slab construction pre-cast cover blocks in cement mortar 1:2 (1 cement : 2 (Page 52) 5. (a) In case of beam and slab construction pre-cast cover blocks in cement mortar 1:2 (Page 56) 6. 5.4.3.2 Concrete shall be judged to be properly compacted, when the mortar fills the spaces between (Page 59)	No specific definition could be determined from the context.	Mortar is a crucial component in concrete work, serving various purposes such as filling gaps, providing a bonding agent, and ensuring proper compaction. Its application and composition are referenced throughout the document, particularly in the context of concrete placement, joint preparation, and repair work. The mix proportions and application methods are critical to achieving the desired performance characteristics of the final structure.
32	Gravel	1. 4.0 CONCRETE WORK (Page 1) 2. 4.1.1.1 General: Aggregate most of which is retained on 4.75 mm IS Sieve and contains only as much (Page 1) 3. (b) Gravel: It shall consist of naturally occurring (uncrushed, crushed or broken) river bed shingle or (Page 1) 4. (i) Stone aggregate and gravel: It shall be either graded or single sized as specified. Nominal size (Page 1) 5. (a) Nominal sizes of graded stone aggregate or gravel shall be 40, 20, 16, or 12.5 mm as (Page 1) 6. (b) Nominal sizes of single sized stone aggregate or gravel shall be 63, 40, 20, 16, 12.5 or 10 mm (Page 2)	Gravel consists of naturally occurring, uncrushed, crushed, or broken river bed shingle, most of which is retained on a 4.75 mm IS Sieve.	Gravel is a key component of concrete, functioning as a coarse aggregate. The document specifies various requirements for gravel, including its source (river bed shingle), size grading (40, 20, 16, 12.5 mm for graded; 63, 40, 20, 16, 12.5, 10 mm for single-sized), and the need for washing to remove deleterious materials. Proper selection and preparation of gravel are vital for ensuring the strength, durability, and workability of the concrete mix.

33	Steel	1. 5.1.3 Steel for Reinforcement 129 (Page 28) 2. 1. IS 226 Structural Steel – IS 226 (Page 40) 3. 1. IS 432 (Part I) steel wire for concrete reinforcement part-I mild steel and medium tensile (Page 40) 4. 11. IS 1566 Specification for hard drawn steel wire fabric for concrete requirement. – IS 1566 (Page 40) 5. 17. IS 1786 Specification for high strength deformed steel and wires for concrete – IS 1786 (Page 40) 6. 5.1.3 Steel for Reinforcement (Page 42) 7. (c) Hard drawn steel wire fabriicc conforming to IS 1566 – IS 1566 (Page 42)	Steel used for reinforcement includes mild steel, medium tensile steel bars, hard drawn steel wire fabric, and structural steel conforming to relevant IS codes.	Steel reinforcement is crucial for enhancing the tensile strength of concrete structures. The document references various types of steel, including mild steel, high strength deformed bars, and steel wire fabric, each conforming to specific Indian Standards (IS codes). Proper storage and handling of steel reinforcement are emphasized to prevent distortion and corrosion. The choice of steel grade and its correct placement within the concrete are essential for achieving the desired structural performance, especially in seismic zones.
34	Brick	1. 4.1.1.1 General: Aggregate most of which is retained on 4.75 mm IS Sieve and contains only as much (Page 1) 2. (c) Brick Aggregate: Brick aggregate shall be obtained by breaking well burnt or overburnt dense (Page 1) 3. Brick Aggregate (Page 3) 4. the concrete is uniform in colour and consistency. Before mixing the brick aggregate shall be well (Page 9)	Brick aggregate obtained from well-burnt or overburnt dense brick/brick bats. Nominal size is 40 mm with specified grading as per Table 4.	Brick aggregate should be well soaked with water for a minimum of two hours before mixing. Nominal size of brick aggregate is 40 mm, and its grading must conform to Table 4.4 when tested for sieve analysis. Concrete of lower grades may be used for lean concrete or foundations for masonry walls.

35	Piers	1. (g) Columns, piers abutmenttss, pillars, post and struts (Page 18) 2. (e) Columns, pillars, piers, abutments posts and struts. (Page 50) 3. (g) Columns, pillars, piers, abutments, posts and struts. (Page 66) 4. (i) Thickness of the wall of hollow concrete pier should not be 300mm. (Page 80) 5. 5.8A.7.2 Pier and abutment cap. (Page 81)	Vertical support members, often part of a larger structure like a bridge or building.	Piers are structural elements, with a note regarding concrete dimensions tolerance, not positioning of vertical steel or dowels. The minimum wall thickness for hollow concrete piers is 300mm. Reinforcement should extend end to end of the pier cap, with right angle reinforcement extending for the caps.
36	Slabs	1. (d) Slabs (Page 18) 2. (b) Soffit form work to slabs (Props 3 days 3 days 4 days (Page 47) 3. (d) Props to slabs: (Page 47) 4. (m) Waffle or ribbed slabs. (Page 50) 5. (n) Edges of slabs and breaks in floors and walls (to be measured in running metres where (Page 50) 6. (a) Slabs shall be taken as running continuously through except when slab is monolithic with (Page 67)	A flat, typically horizontal, structural element used in floors, roofs, and decks.	For cantilever slabs and beams, the centering shall remain until counteracting structures have sufficient strength. The top surface of roof slabs should be finished smooth with a wooden trowel before the concrete sets. Slabs are considered to run continuously unless monolithic with the beam. For thin slabs with gaps greater than 80 mm, no specified passing ability is required.

37	Beams	1. Suggested ranges of workability of concrete measured in accordance with IS 1199 (Page 6) 2. Typical details of Beam Head and Stiffener (Fig. 5.8, Page 35) 3. Cube Lab Appendix (5 cum in case (i) Every 5, Page 36) 4. section of columns and beams -5 mm (Page 45) 5. Soffit form work to beams (Props, Page 47) 6. Beams shall be measured from face to face of columns (Page 67)	No specific definition could be determined from the context.	Beams are structural elements designed to resist bending moments. Construction considerations include formwork striking times dependent on span and cement type. Special attention is given to cantilever slabs and beams, where centering remains until counteracting structures attain sufficient strength to prevent deflection.
38	Walls	1. Suggested ranges of workability of concrete measured in accordance with IS 1199 (Page 6) 2. IS 13311 Indian standard for non-destructive testing of concrete (Page 40) 3. Typical arrangement of form work for ‘beams, columns and walls’ (Page 46) 4. Walls : The form faces have to be kept at fixed distance apart (Page 46) 5. Wall (any thickness) including attached pilasters, buttresses plinth and string course, fillets (Page 66)	No specific definition could be determined from the context.	Concrete grades lower than those in Table 4.6 can be used for lean concrete, masonry wall foundations, or temporary reinforced concrete structures. Wall formwork requires maintaining a fixed distance, often achieved using wall ties with spacer tubes or bolts. Proper surface preparation is crucial for plastering or joining with brick masonry, ensuring adequate bonding.

39	Piles	1. Heavily reinforced sections in (Page 6) 2. Sampling and Testing for Quality Control of Fresh (Page 33) 3. IS 4925 Batch plants specification for concrete batching and mixing plant (Page 40) 4. IS 13311 Indian standard for non-destructive testing of concrete (Page 40)	No specific definition could be determined from the context.	Pile construction tolerances apply to concrete dimensions only, not vertical steel or dowel positioning. Formwork support involves using struts, braces, wedges, mud sills, or pile arrangements. Consistent material control and testing are important for pile construction.
40	shale	1. 4.1.1.2 Deleterious Material: Coarse aggregate shall not contain any deleterious material, such as (Page 1) 2. TABLE 4.2 (Page 2) 3. Soluble Chloride Content (Page 15)	No specific definition could be determined from the context.	Shale, when present in aggregates, can be a deleterious material due to its potential for breakdown and expansion when exposed to moisture. This can lead to durability issues in concrete structures. The acceptable limits for shale and other deleterious substances are usually specified in aggregate testing standards. The presence of shale should be carefully monitored during aggregate selection and testing to ensure the long-term performance of the concrete.
41	Sand	1. 4.0 CONCRETE WORK (Page 1) 2. (b) Gravel: It shall consist of naturally occurring (uncrushed, crushed or broken) river bed shingle or (Page 1) 3. 4.2.5.4 Hand Mixing: When hand mixing has been specifically permitted in exceptional circumstances (Page 10) 4. Sand 4.0 (Page 19) 5. Sand 3.5 (Page 19) 6. 5.11.4 Sampling and Testing for Quality Control of Fresh (Page 33) 7. IS 13311 Indian standard for non-destructive testing of concrete. Method of testing (Page 40)	No specific definition could be determined from the context.	Sand is a fine aggregate used in concrete and mortar mixes. Its properties, such as grading, particle shape, and mineral composition, significantly affect the workability, strength, and durability of the final product. Proper selection and testing of sand are crucial to ensure that it meets the required specifications for the intended application. Factors like silt content and organic impurities should be checked to prevent adverse effects on cement hydration and concrete performance. The moisture content of sand must also be considered for accurate mix proportioning.

42	Jali	1. 5.7 Precast Cement Concrete Jali (Page 31) 2. 5.7 PRECAST CEMENT CONCRETE JALI (Page 72) 3. 5.7.0 The jali shall be of cement concrete 1:2:4 (1 cement 2 coarse sand:4 stone aggregate 6 mm (Page 72)	No specific definition could be determined from the context.	Jali is a precast cement concrete element, often with an ornamental or perforated design, used for ventilation and aesthetic purposes in construction. The typical mix proportion for jali is 1:2:4 (cement:sand:aggregate). Proper placement and alignment of the jali are essential for structural stability and visual appeal. The surrounding joints should be carefully sealed to prevent water penetration and maintain the integrity of the structure.
43	Slag	1. IS 1489 (Part 1) (Page 6) 2. IS 455 (Page 6, 17) 3. 1.2 cement or Portland slag (Page 16) 4. 6. Portland slag cement conforming to IS 455 with slag content more than 50 per cent exhibits better – IS 455 (Page 17) 5. cent slag or a blend of ordinary Portland cement and slag may be used provided sufficient information (Page 17)	Granulated blast furnace slag used as a cementitious material in concrete. Can be used as a partial replacement for Portland cement.	Slag can be incorporated into concrete mixtures to improve durability and reduce the heat of hydration. When using slag, it's crucial to refer to IS 455 and IS 1489 (Part 1) for specific requirements and performance characteristics. Slag cement with more than 50% slag content provides enhanced sulfate resistance. Proper testing is required when using blended cements to ensure desired performance characteristics are achieved in the concrete mix. The suitability of the slag should be established based on its characteristics and the intended application.
44	mica	1. 4.1.1.2 Deleterious Material: Coarse aggregate shall not contain any deleterious material, such as (Page 1)	No specific definition could be determined from the context.	The document only mentions mica as a deleterious material to be avoided in coarse aggregates. Further information from other sources would be needed to understand its specific properties and effects in concrete or other civil engineering applications. Its presence in aggregates is generally undesirable.

45	clay	1. 4.1.1.2 Deleterious Material: Coarse aggregate shall not contain any deleterious material, such as (Page 1)	Fine-grained soil consisting of hydrous aluminum phyllosilicates. Often present as a contaminant in aggregates or soil.	Clay content in aggregates is generally undesirable as it can negatively impact the workability and durability of concrete. It can also interfere with the bond between cement paste and aggregate particles, reducing the overall strength of the concrete. The document mentions clay only as a deleterious material to be avoided in coarse aggregates. Bentonite clay is referenced within slurry contexts.
46	coal	1. 4.0 CONCRETE WORK (Page 1) 2. Content Cement Concrete Content Water- Concrete (Page 5) 3. Heavily reinforced sections in (Page 6) 4. IS 13311 Indian standard for non-destructive testing of concrete. Method of testing (Page 40) 5. pouring concrete. (Page 50) 6. concrete in the (Page 100)	No specific definition could be determined from the context.	While coal itself isn't directly used in concrete, its derivatives (like fly ash, a byproduct of coal combustion) can be used as a supplementary cementitious material (SCM) in concrete production. This improves concrete workability, durability, and reduces cement consumption. However, the provided document excerpts primarily focus on concrete work, aggregates, and testing standards without explicitly mentioning coal or its derivatives as SCMs. The references to concrete work and related standards suggest a context of construction and material specifications. Therefore, further context or a different document focusing on concrete additives is needed to understand the relevance of coal-derived materials.