

BRICKWORK, BLOCKWORK AND STONWORK

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Brickwork, Blockwork and Stonework

2401 Cement

- 1 Cement shall be one of the following:
 - (i) Portland cement complying with IS 1 or with BS 12 for white or coloured cement;
 - (ii) Masonry cement complying with BS 5224;
 - (iii) Sulfate-resisting Portland cement complying with BS 4027 where described in Appendix 24/1.

2402 Aggregates

- 1 Sand shall comply with IS 5.

2403 Water

- 1 If water for the Works is not available from a public piped water supply, the Engineer's approval shall be obtained regarding the source of supply and the manner of its use. When required by the Engineer the Contractor shall arrange for tests of the water to be carried out in accordance with BS 3148. Water from the sea or tidal rivers shall not be used.

2404 Mortar

- 1 Cement mortar for brickwork, blockwork and stonework shall be mixed in the proportions given in Table 24/1 according to the mortar designation described in Appendix 24/1.
- 2 The chloride ion content of the mortar determined in accordance with BS 812 : Part 117 shall not exceed 0.3% of the mass of cement for mortar made with Portland cement and 0.2% for mortar made with sulfate-resisting Portland cement. Calcium chloride or admixtures containing calcium chloride shall not be used.
- 3 For work in which cement mortars of designation (ii) or (iii) as defined in BS 5628 : Part 3 are required, the Contractor shall select the appropriate mortar from one of the mixes for the designation given in Table 24/1. If the work is to be carried out in frosty weather and the bricks are wet when laid, then a cement sand mortar with an air entraining plasticiser shall be used. Admixtures shall comply with either BS 4887 or BS 5075 and shall not contain calcium chloride.

Table 24/1: Mortar Proportions by Volume

| Mortar designation | Cement: lime: sand | Masonry cement: sand | Cement: sand with plasticiser |
|--------------------|--------------------|----------------------|-------------------------------|
| (i) | 1:0 to ¼:3 | — | — |
| (ii) | 1: ½:4 to 4½ | 1:2½ to 3½ | 1:3 to 4 |
| (iii) | 1:1:5 to 6 | 1:4½ | 1:5 to 6 |

- 4 The inclusion of lime in mortar designation (i) is optional. The proportions of lime given in Table 24/1 are for lime putty complying with BS 890. If the lime is measured as the dry hydrate, the amount may be increased up to 1.5 volumes for each volume of lime putty. Where a range of sand contents is given in the Table, the higher shall be used for sand that is well graded and the lower for coarse or uniformly fine sand.
- 5 Mortar shall be mixed thoroughly either by hand or mechanically until its colour and consistency are uniform. The constituent materials shall be accurately gauged, allowance being made for bulking of sand. Mortar shall be made in small quantities only as and when required. Mortar which has begun to set or which has been mixed for a period of more than 1 hour in the case of a mortar designation (i) or more than 2 hours in the case of other designations shall be discarded.

2405 Lime Mortar

- 1 Lime mortar shall consist of one part by volume of hydrated lime complying with BS 890 to 2.5 parts by volume of sand.

2406 Bricks

- 1 Clay bricks shall comply with the particular requirements of IS 91 as described in Appendix 24/1.
- 2 Calcium silicate bricks (sand lime and flint lime) shall comply with BS 187.
- 3 Concrete bricks shall comply with IS 189.

- 4 Bricks beneath frames for chambers and gullies, and for the construction of brick chambers, shall, unless otherwise described in Appendix 24/1, be Class A clay engineering bricks complying with IS 91; or concrete bricks complying with IS 189 having an average compressive strength not less than 20 N/mm² when used for surface water drainage; or special purpose concrete bricks having a minimum cement content of 350 kg/m³ when used for foul drainage and for situations where improved durability is required.
- 5 Bricks to be used for facework should not develop efflorescence worse than slight when tested in accordance with IS 91.

2407 Blocks

- 1 Concrete blocks shall comply with the requirements of IS 20 and Appendix 24/1.

2408 Reconstructed Stone

- 1 Reconstructed stone shall be used only in blockwork and shall comply with BS 6457 and any particular requirements described in Appendix 24/1.

2409 Natural Stone

- 1 Building stone shall be of the type and quality described in Appendix 24/1.

2410 Reinforcement

- 1 Wire or fabric, laid between brickwork or blockwork shall be austenitic stainless steel to BS 970 : Part 1 Type 304 S 15, 316 S 31 or 316 S 33, softened condition, excluding free machining specifications.
- 2 Steel bars laid between brickwork or blockwork shall be austenitic stainless steel to BS 6744 Grade 250 or 460, Type 304 S 31 or 316 S 33, softened condition, excluding free machining specifications.

Table 24/2: Austenitic Stainless Steel

| Form | Standard to be complied with |
|-------|------------------------------|
| Strip | BS 1449 : Part 2 |
| Rod | BS 970 : Part 1 |
| Bar | BS 6744 |
| Tube | BS 6323 : Part 8 |
| Wire | BS 1554 |

2411 Anchorages, Dowels, Fixings and Ties

- 1 Anchorages, dowels, fixings and ties shall be austenitic stainless steel Type 304 S 15, 316 S 31 or 316 S 33, softened condition, excluding free machining specifications, complying with the requirements given in the British Standards listed in Table 24/2.

2412 Brickwork and Blockwork

- 1 Brickwork and blockwork shall be laid on a full bed of mortar and bonded as described in Appendix 24/1. Single frogged bricks shall be laid with the frog uppermost. Perpend between bricks and blocks shall be filled with mortar before the next mortar bed is laid. Whole bricks and blocks shall be used except where it is necessary to cut closers or where otherwise agreed by the Engineer.
- 2 Brickwork and blockwork shall be built uniformly. Corners and other advanced work shall be stepped back and not raised above the general level more than 900 mm. Courses shall be kept horizontal and matching perpend shall be in vertical alignment.
- 3 Unless otherwise agreed by the Engineer, overhand work shall not be permitted.
- 4 Reinforcement in brickwork and blockwork shall be completely embedded in the mortar joint.
- 5 Where pointing is required in Appendix 24/1 the joint shall be raked out to a depth of 12 mm and after the completion of the entire facework, pointed in mortar as described in Appendix 24/1.
- 6 Where jointing is required in Appendix 24/1 it shall be done as the work proceeds to the finish described in Appendix 24/1.

2413 Stonework

General

- 1 Except where otherwise described in Appendix 24/1 or on the drawings, the length of any stone shall not exceed three times its height. The breadth on the bed shall be not less than 150 mm, nor greater than three-quarters of the thickness of the wall.
- 2 All stratified stone possessing bedding planes shall be laid with its natural bed as nearly as possible at right angles to the direction of load. In the case of arch rings, the natural bed shall be radial.
- 3 Facework quoins shall be built to a height not exceeding 900 mm in advance of the main body of the work and adjacent walling stepped down on either side.
- 4 Stone facework between the quoins shall then be built to a height not exceeding 450 mm above the backing which shall then be brought up level with the completed facework. At no time shall the backing be built up higher than the facework.
- 5 Except for dry rubble walling, all joints shall be sufficiently thick to prevent stone-to-stone contact and shall be completely filled with mortar.

Ashlar

- 6 All stones shall be dressed to accurate planes on the beds and joints, and they shall be fair and neatly or fine tooled on the face as described in Appendix 24/1.

Block-in-course

- 7 Beds and joints shall be squared and dressed for a distance of at least 225 mm from the exposed face. Bond stones shall form not less than one sixth of the area of the exposed face and shall extend at least 900 mm into the wall or for the full thickness of the wall if the latter is less than 900 mm. Unless described in Appendix 24/1 as tooled or worked, the exposed face of all stone shall be blocked and left rough. Arrises shall be dressed square at all beds and joints.

Squared Random Rubble Coursed and Uncoursed

- 8 All stones shall be truly squared and dressed on the beds and joints for a distance of at least

125 mm from the exposed face. Bond stones shall be provided at the rate of not less than one to every square metre of exposed face, and shall measure not less than 150 mm x 150 mm on the face, and not less than 450 mm or the full thickness of the wall if the latter is less than 450 mm. Sneck stones shall be not less than 75 mm in any dimension. Vertical joints shall not include more than three consecutive stones, and the horizontal lapping of the stones shall be not less than 100 mm.

Random Rubble Coursed and Uncoursed

- 9 All stones shall be carefully set with a bond stone provided at the rate of not less than one to every square metre of exposed face. Bond stones shall measure not less than 150 mm x 150 mm on the exposed face, and not less than 450 mm in length or the full thickness of the wall if the latter is less than 450 mm unless otherwise described in Appendix 24/1. For coursed work the joints shall be levelled as described in Appendix 24/1 and the backing flushed up in mortar.

Dry Rubble

- 10 Dry rubble stonework shall be constructed generally to the requirements of uncoursed random rubble stonework, as specified in sub-Clause 9 of this Clause but without mortar. All stones shall be carefully shaped to obtain a close fit at all beds and joints, any interstices between the stones being filled with selected stone chippings or spalls. The exposed tops or copings of dry rubble walls shall be formed as shown on the Drawings.

Special Stonework Including Quoins, Copings, Plinths, Voussoirs etc.

- 11 Special stonework shall consist of selected and approved stones dressed to the shapes and dimensions, and where required their faces worked, all as shown on the Drawings.

2414 Cold Weather Working

- 1 No bricks, blocks or stones shall be laid when the air temperature in the shade is below 3°C unless special precautions are taken which have been approved by the Engineer. All materials when used shall be free from snow, ice and frost.

2415 Protection of New Work

- 1 Immediately after laying and for 3 days thereafter, brickwork, blockwork and stonework shall be protected against the harmful effects of weather. The upper surface of newly laid brickwork, blockwork and stonework shall be protected against rain as the work proceeds until such time as the work is completed and the upper damp-course, coping or other finishing feature is laid.
- 2 All visible brickwork, blockwork and stonework and any surface below such work which is visible at the completion of the Works shall be clean and free from damage and spillage. All purpose-made open joints shall be free from debris of any description.

2416 Brick, Block and Stone Facework Fixed to Concrete

- 1 Any loose material shall be removed from the concrete, and its surface washed with clean water before any bricks, blocks or masonry is laid.
- 2 The portion of the stainless steel fixing projecting from the concrete shall be completely embedded in the mortar of the facework and shall be kept back a minimum of 30 mm from the face of the brickwork and blockwork or 40 mm from the face of the masonry.
- 3 The cavity between brick and block facework and the concrete shall be completely filled as the work proceeds with mortar of the same mix as that specified for the facework.
- 4 The variation in depth, front to back of stones for natural stone facework shall not exceed that described in Appendix 24/1 and the space between the facework and the backing shall be completely filled as the work proceeds with concrete Class 15/10 complying with the 1700 Series.

