SERIES NG 2400
BRICKWORK, BLOCKWORK AND STONEWORK

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NG 2401 Cement

1 Sulfate-resisting Portland cement should be specified where there is a risk of sulfate attack; guidance is given in BS 5628: Part 3. The cement to be used in different locations should be shown in Appendix 24/1.

NG 2404 Mortar

1 Table 24/1 in the Specification is confined to the more durable mortars which can withstand exposure to severe weather. Further guidance is given in BS 5628 : Parts 1 and 3.

2 An important consideration besides durability when selecting a mortar for a particular use is that increasing strength is accompanied by decreasing ability to accommodate movements such as drying shrinkage, expansion or settlement.

3 Generally for brickwork, blockwork or stonework in bridgework, mortar designation (i) or (ii) will be appropriate except for reconstructed stone, concrete and calcium silicate bricks and blocks, when mortar designation (iii) should be specified to allow for their relatively high shrinkage. Details of the mortar required for use in the Works should be shown in Appendix 24/1.

4 Extensive use of loadbearing brickwork, blockwork and masonry is not envisaged in new bridge construction but when these are required, reference should be made to BS 5628 : Part 1, and the Specification should contain an Additional Clause which should include 28-day mean compressive strengths.

5 The approximate 28-day mean compressive strengths of the mixes in Table 24/1 based on six 75 mm cubes, 100 mm cubes or 100 mm x 25 mm x 25 mm prisms are shown in Table NG 24/1.

TABLE NG 24/1 : Mortar Compressive Strengths

Mortar designation	28-day mean compressive strength	
	Laboratory Tests N/mm²	Work Tests N/mm²
(i)	16.0	11.0
(ii)	6.5	4.5
(iii)	3.6	2.5

6 Where a plasticiser is to be used the recommendations of the admixture manufacturer should be followed. Where previous evidence of the suitability of the mixer and time of mixing is not available trials should be conducted.

NG 2405 Lime Mortar

1 Lime mortars have good working qualities but develop strength very slowly. For this reason such mortars are rarely suited to present day needs and should only be used for renovating existing lime mortar joints.

NG 2406 Bricks

1 Full details of the bricks required for use in the Works should be shown in Appendix 24/1. The terms of BS 3921 should be used for the description of the bricks.

2 (11/03) Unless otherwise described in Appendix 24/1, frost resistant bricks classified in BS 3921 as durability designation ‘FL’ should be specified for facework. Bricks manufactured to the requirements of BS 3921 (Note: BS 3921 is still current, however it is partially replaced by BS EN 772-3 and BS EN 772-7. These parts are related to testing. Forthcoming 'harmonised' EN 771-1 for "prEN 771-1. Specification for masonry units. Part 1. Clay masonry units" is not published yet.) should have a minimum strength of 5 N/mm², which will normally be sufficient for non-structural facework fixed to concrete as described in Clause 2416. If a higher strength is required, eg. where the facework is loadbearing, this should be shown in Appendix 24/1.

NG 2407 Blocks

1 Full details of the blocks required for use in the Works should be shown in Appendix 24/1. The terms of BS 6073 with regard to type and designation should be used for the description of the blocks.

NG 2408 Reconstructed Stone

1 Reconstructed stone is alternatively referred to as cast stone, or reconstituted stone.

2 Special requirements such as colour, special mixes, texture, and casting in stainless steel ties should be shown in Appendix 24/1.

NG 2409 Natural Stone

1 (11/03) In some quarries the durability of stone is well known while in others the variations are such that each individual block has to be considered separately. The performance of the stone used in the area should be studied to gauge the effects of exposure. Samples of selected stones should be taken and these should represent the range of variations that are acceptable. Further guidance on choice of stone is given in BS 5628 : Part 3.

NG 2412 Brickwork and Blockwork

1 Different bricks and blocks including reconstructed stone possess different suction properties and any requirements regarding wetting before laying should be given on the Drawings.

2 The bond and type of mortar required for jointing, and pointing where necessary, should be shown in Appendix 24/1 and for all visible work the coursing should be described, eg. brickwork 4 courses to 300 mm.

3 The Drawings should also include information regarding the use of purpose-made bricks or blocks, eg. in quoins, copings or string courses, and of any sample panels of brickwork or blockwork which will be required to be built.

4 Reinforcement laps and cover should be detailed on the Drawings. This is particularly important if the joints are raked out and left open.

5 The type of pointing required in exposed joints should be described in Appendix 24/1. Reference should be made to BS 5628 : Part 3 for the correct definitions.

NG 2413 Stonework

1 The selection of stone to be used for masonry will involve aesthetic as well as technical consideration.

2 Where required, directions should be shown in Appendix 24/1 regarding:

(i) the amount and type of dressing the stones require on the face and sides;

(ii) the minimum and maximum size of the stones;

(iii) the treatment of the pointing;

(iv) in the case of coursed work, the depth of the course;

(v) stonework fixings including dowels, cramps, joggles, etc;

(vi) stones which must be laid damp;

(vii) the limit of projection of any part of the exposed face of stones;

(viii) the minimum and maximum thickness of joints.

3 Except in the case of the finest ashlar, joints should not normally be less than 6 mm thick in any part of the bed.

4 (11/03) For guidance on walling type, finishes and other relevant details reference should be made to BS 5628 : Part 3.

5 When special stones are required for quoins, copings or other similar purposes, they should be detailed separately on the Drawings. Special care should be taken in the choice of stone for parapets, cornices, string courses and places where more than one face of the stone is exposed. Such stones should have good weathering characteristics and be able to withstand frost.

6 The use of block-in-course stonework is limited to heavy engineering works and requires the use of power-driven plant to lift the heavy stones.

NG 2414 Cold Weather Working

1 The precautions to be adopted if bricks, blocks or stonework are to be laid in cold weather should accord with BS 5628: Part 3. The precautions to be taken may also include:

(i) storing materials in a heated shed or covering them with waterproof sheets;

(ii) warming sand and water but not the cement or lime;

(iii) not wetting the bricks, blocks or stonework, but if necessary using a little more water for mixing the mortar;

(iv) protecting the working areas and the site where mortar is mixed from frost, snow and rain;

(v) ensuring compliance with Clause 2414 if special precautions are not taken.

NG 2415 Protection of New Work

1 For advice on the avoidance of efflorescence and lime-staining reference should be made to BS 5628 : Part 3.

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NG 2416 Brick, Block and Stone Facework Fixed to Concrete

1 Brick, block and stone facework should normally be built after the concrete has hardened. Brickwork built by this method is less liable to discoloration from efflorescence than that used as formwork.

2 Full details of the method of construction and spacing of ties should be shown on the Drawings. An adequate support should be provided so that the sole function of the ties is to hold the facework back to the concrete and not to carry its weight.

3 It is essential that there should be no voids between the facework and the backing so that damage will not be caused by water collecting behind the facework and subsequently freezing. The gap to be filled should be a minimum of 30 mm.

4 The acceptable variation in depth from front to back of stones for masonry facework should be shown in Appendix 24/1.

NG SAMPLE APPENDIX 24/1: BRICKWORK, BLOCKWORK AND STONEWORK

[Note to compiler: This should include:]

1. Locations where sulfate-resisting Portland cement is to be used *[2401.1]*.
2. (11/03) Mortar designations for brickwork, blockwork and stonework *[2404.1]*.
3. Particular requirements for clay bricks to BS 3921 *[2406.1]*.
4. Requirements for bricks for chambers if different from the requirements of sub-Clause 2406.4.
5. Particular requirements for concrete blocks to BS 6073 *[2407.1]*.
6. Details of the type and quality of natural building stone *[2409.1]*.
7. (11/03) Particular requirements such as colour, special mixes, texture and casting-in stainless steel ties for reconstructed stone *[2408.1]*.
8. Type of bonding for brickwork and blockwork *[2412.1]*.
9. Whether overhand work is permitted *[2412.3]*.
10. Locations where pointing is required and the type of pointing *[2412.5]*.
11. Locations where jointing is required and the type of finish to be used *[2412.6]*.
12. Requirements for dimensions of stones if different from the requirements of sub-Clause 2413.1.
13. Requirements for tooling stonework *[2413.6, 2413.7]*.
14. Requirements for dimensions of bond stones if different from the requirements of sub-Clause 2413.9.
15. Details of the requirements for levelling squared random rubble coursed and uncoursed stonework *[2413.9]*.
16. The variation in depth, front to back for masonry facework *[2416.4]*.

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