

NCC Clause 971AR - Stone Mastic Asphalt Surface Course for use within S38 and S278 works

Unless otherwise stated reference to clauses and appendices are clauses and appendices within the 'Specification for Highway Works' published by Her Majesty's Stationery Office as Volume 1 of the Manual of Contract Documents for Highway Works (MCHW). Where there is reference to a substitute or alternative clause or appendix ("NCC") including this clause, the substitute or alternative clause or appendix shall take precedence.

Unless specified otherwise within the approved design the following shall apply:

1. GENERAL

1.1 Stone Mastic Asphalt shall comply with the requirements of BS EN 13108 Bituminous mixtures - Material specifications Part 5, and PD 6691 Guidance on the use of BS EN 13108 Bituminous mixtures. Stone Mastic Asphalt shall be designed and manufactured to comply with the requirements of PD 6691 annex D unless otherwise varied by this clause and shall be transported handled and laid in accordance with the requirements of BS 594987.

2. MATERIALS

2.1 Aggregate

2.1.1 Polished Stone Value - Course aggregates shall have a minimum PSV of 60 unless otherwise specified in NCC Appendix 7/1 for carriageway surface course after reference to CD 236 table 3.3.

2.1.2 Minimum PSV for all footway surface course material shall be 45.

2.1.2 Resistance to Fragmentation - Category LA30, or as specified in NCC Appendix 7/1.

2.1.3 Aggregate abrasion Value - for carriageway material, not more than 12, or as specified in NCC Appendix 7/1 after reference to CD 236 table 3.13

2.1.4 Durability (Water Absorption) - Category WA24 2 or as specified in NCC Appendix 7/1.

2.1.5 When tested in accordance with the procedures in BS EN 13043, the fine aggregate shall comprise crushed rock or crushed slag fines, which may be blended with not more than 50 percent natural sand.

2.1.6 The use of limestone and any other material that does not comply with the minimum PSV requirements specified within the approved design (NCC Appendix 7/1) shall not be permitted as course and fine aggregates in SMA surface courses.

2.2 Filler

2.2.1 Added filler shall only be crushed limestone or other approved material in accordance with the requirements of BS EN 13043, 5.2.1.

2.3 Binder Grades

2.3.1 As alternatives to the standard material references SC1 and SC2 listed in NCC Appendix 7/1, consideration will be given to the use of these materials with substituted paving grades of 70/100 and 100/150 for areas of hand lay only. The Highway Authority's approval to use these alternative materials needs to be sought on a scheme by scheme basis and should not be assumed.

3. MIXTURE

3.1 The target grading for the mixture shall fall within the limits given in PD 6691 table D1, unless agreed otherwise by the Highway Authority.

3.2 The manufacturer shall carry out initial type testing in accordance with EN 13108 - 20 to demonstrate conformity with EN 13108 - 5 and PD 6691, as amended below.

3.3 Minimum binder contents shall be (but see paragraph 3.4):

20mm B_{min} 5.8

14mm B_{min} 6.0

10mm B_{min} 6.4

6mm B_{min} 7.0

3.4 Mixtures containing polymer modified bitumen conforming to BS EN 14023 may be permitted.

3.5 Void content shall be V_{min}1.5 and V_{max}4 when tested in accordance with PD 6691 table 4 but with the amendment that BS EN 12697-6 procedure C - sealed specimen shall be used to determine specimen bulk density.

4. COMPACTION

4.1 Stone mastic asphalt shall be compacted to practical refusal following the general requirements of BS 594987 clause 9.

4.2 The degree of compaction shall be assessed in accordance with Clause 901.20.

4.3 Testing shall be carried out by a laboratory approved by the Highway Authority.

4.4 Test cores shall be extracted by a laboratory approved by the Highway Authority.

5. SURFACE TEXTURE

5.1 Texture depth as specified in NCC Appendix 7/1 but shall generally be 1.3mm for high speed roads and 1.0mm for all other roads

5.2 Texture depth measurement shall be carried out in accordance with clause 921.

5.3 Grit shall be applied as specified within the approved design (NCC Appendix 7/1) and/or NCC Clause 972AR.

6. NOMINAL LAYER THICKNESS

Unless otherwise stated in NCC Appendix 7/1 nominal compacted thickness shall be:

20mm aggregate: 50 - 75mm

14mm aggregate: 40mm

10mm aggregate: 40mm.

6mm aggregate: 25mm when used as footway surface course and 15 - 35mm when used as a regulating layer.

7. RECLAIMED ASPHALT

7.1 Unless otherwise permitted within the approved design Reclaimed Asphalt shall not be permitted for use in Stone Mastic Asphalt surfacing course.

NCC Clause 972AR Surface Treatments - Application Of Grit To Enhance Early Life Skidding Resistance

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Unless specified otherwise within the approved design the following shall apply:

1. General

1.1 Where stated within the approved design (NCC Appendix 7/1) newly laid Stone Mastic Asphalt surface courses shall be treated using one of the following methods.

2. Method A (Material SG1)

2.1 Method A: Application of the sealing grit is required to any section of surfacing comprising material references SC1 and SC2 and any other scheme specific surfacing material identified within the approved design (NCC Appendix 7/1) requiring so to be treated. Material and method particulars are provided below.

2.2 The aggregate shall comprise of 0/4mm bitumen coated grit and shall be supplied from a source approved by the Highway Authority. The aggregate grading shall fall within the appropriate envelope given in NCC Table 972AR/1. The grit shall be mechanically applied at a rate between 0.5 and 0.7 kg/m² during compaction.

NCC Table 972AR/1 - Aggregate Grading for Sealing Grit (SG1)

| Test sieve aperture size (mm) | % by mass passing |
|-------------------------------|-------------------|
| 6.3 | 100 |
| 3.35 | 85 - 100 |
| 0.60 | 30 - 55 |
| 0.212 | 14 - 32 |
| 0.075 | 5 - 17 |

Note: Up to 25% by mass of the fine aggregate passing the 3.35mm sieve may be sand.

2.3 The soluble binder content of the sealing grit for all aggregates shall be 3 + 0.5%.

2.4 The bitumen coated grit shall be free flowing.

2.5 The Grade of binder shall be in accordance with NCC Table 972AR/2.

NCC Table 972AR/2 - Grade of Binder for Coated Grit (SG1) Grade of binder for bitumen

| Period | Category A Traffic | Category B Traffic |
|---------------------|--------------------|--------------------|
| Winter (Oct-Mar) | 100 s to 300 pen | 100 s to 300 pen |
| Summer (April-Sept) | 200 s to 200 pen | 200 s to 300 pen |

3. Application of Aggregate

3.1 The application of grit to areas of surface courses shall be by mechanical calibrated roller mounted spreader capable of distributing grit to an even rate of spread. Application of grit by hand operations shall only be permitted in the following circumstances:

- In confined spaces, where it is impractical for a mechanical spreader to operate;
- As a temporary expedient, when adjustments have to be made to the spreader distribution mechanism;
- When hand laying of the surface course is permitted; or
- To correct uneven distribution of grit.

3.2 The coated grit shall be uniformly applied and then rolled on to the surface after an initial roll by the primary roller. The surface shall then be rolled and compacted in accordance with the requirements of Clause 901.

3.3 Prior to the opening of the lane to traffic the excess coated grit shall be swept off the surface using a mechanical sweeper.

4. Method B (Material G1) – Equestrian traffic

4.1 Method B: Application of the grit is restricted to those sections of newly laid surfacing material identified within the approved design (NCC Appendix 7/1) that are to be used by equestrian traffic. Material and method particulars are provided below.

5.1 Aggregate

5.1 The aggregate (grit) shall comprise of 3mm crushed quartzite grit and shall be supplied from a source approved by the Highway Authority. The aggregate grading shall fall within the appropriate envelope given in NCC Table 972AR/3. Other similar types of aggregates and grading may be equally effective, but the Contractor shall undertake trials and provide a report confirming the effectiveness of any alternative. The quartzite grit shall be applied at a rate between 0.7 and 1.0 kg/m².

NCC Table 972AR/3 - Aggregate Grading for Quartzite Grit (G1)

| Test sieve aperture size (mm) | % by mass passing |
|-------------------------------|-------------------|
| 6.3 | 100 |
| 5.0 | 95 - 100 |
| 3.35 | 66 - 90 |
| 1.18 | 0 - 20 |
| 0.60 | 0 - 8 |
| 0.075 | 0 - 1.5 |

6. Application of Aggregate

6.1 The application of grit to areas of surface courses shall be by mechanical calibrated roller mounted spreader capable of distributing grit to an even rate of spread. Application of grit by hand operations shall only be permitted in the following circumstances:

- In confined spaces, where it is impractical for a mechanical spreader to operate;
- As a temporary expedient, when adjustments have to be made to the spreader distribution mechanism;

- When hand laying of the surface course is permitted; or
- To correct uneven distribution of grit.

6.2 The grit shall be uniformly applied and then rolled on to the surface after an initial roll by the primary roller. The surface shall then be rolled and compacted in accordance with the requirements of Clause 901.

6.3 Prior to the opening of the lane to traffic the excess grit shall be swept off the surface using a mechanical sweeper.

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