

ROAD PAVEMENTS – UNBOUND MATERIALS

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Road Pavements - Unbound Materials

NG 800 General

- 1 Advice on the design and construction of sub-bases is published in the U.K. Highways Agency Design Manual for Roads and Bridges (DMRB) Vol. 7 as amended by the NRA DMRB.
- 2 IS EN 13285 specifies the requirements for unbound mixtures used for construction and maintenance of roads, airfields and other trafficked areas. Under the construction products directive this standard must be fully implemented. All 800 series unbound mixtures must comply with IS EN 13285. The requirements for aggregates used in mixtures complying with IS EN 13285 are defined with appropriate cross reference to IS EN 13242.
- 3 Because IS EN 13285 mixtures are not directly equivalent to the established types of granular subbase material specified in previous editions of the Specification for Road Works the gradings and material properties chosen reflect a material of similar quality and product conformity. The grading requirements for the materials specified in accordance with the standards IS EN 13285 and IS EN 13242 refer to gradings carried out with the ISO 565 series of sieves.
- 4 Presently insufficient data exists on the correlation details of the methylene blue and liquid limit tests and therefore it is not considered satisfactory for the purpose of determining harmful fines content in the fine aggregate.
- 5 Sonnenbrand of basalt is a type of rock decay that is tested in order to determine the susceptibility of certain types of young basalt aggregates, found in some European countries, to degradation through mineralogical instability. This phenomenon is not experienced and it is not anticipated that this test will be applied in Ireland. It is recommended that

category SB_{NR} (No Requirement) is adopted, although further information should be obtained on the susceptibility of imported basalt aggregates.

NG 802 Compaction

- 1 Sub-Clause 802.5 (viii) permits combinations of different types of compacting equipment provided each type contributes its correct proportion of the total compactive effort. Thus if a machine when operated singly is required in Table 8/1 to apply a minimum of X passes and that same machine actually applies K passes, then the sum of the values of K/X for each of the types of plant used in combination should equal or exceed unity.

NG 803, 804 and 805 Granular Material Types A, B and C

- 1 Clause 803 material allows the use of recycled crushed mixed concrete aggregates as defined in Annex A of IS EN 13285. In accordance with the requirements of IS EN 13285 the composition of mixtures containing recycled crushed mixed concrete aggregates shall comply with Table A.1 of Annex A. The compositions in this table reflect established practice in some countries. Recycled Crushed Mixed Concrete Aggregates in accordance with IS EN 13285 allows for the inclusion of masonry as a component of the mix. Crushed masonry may include crushed concrete brick or block, or cut natural stone or rubble.
- 2 Clause 804 excludes all gravels from Granular Material Type B. In practice clean boulders and cobbles retained on a 100 mm sieve can be crushed to produce a satisfactory Granular Material Type B.
- 3 The magnesium sulphate soundness test should initially be used for source approval of aggregates and thereafter only in cases where the Employer's Representative suspects their durability. Where local experience indicates that an aggregate with a higher soundness category than that specified may be acceptable, this value should be inserted

in Appendix 7/1. The water absorption test can be used as a routine check test of such aggregates. Where required, details of the tests should be scheduled in Appendix 1/5.

- 4 In the past gravel meeting the specification requirements for Granular Material Type C has performed successfully in Irish road pavements. In areas where suitable crushed rock is not available locally, consideration should be given to using gravel complying with Clause 805 on less heavily trafficked roads. Because of the variability in naturally occurring gravels, control of the quality of such materials is important.
- 5 IS EN 13285 details additional requirements to control individual batches of unbound mixtures with overall grading Categories G_A , G_B and G_O within a system of factory production control. The supplier must nominate a supplier declared value for the intermediate sieves in the grading envelope as part of the system of factory production control for the mixture. The nominated value must lie within the supplier declared value grading range applicable to the overall grading category in Table 6 of IS EN 13285. Individual batches are then assessed using the tolerances in Table 7 of IS EN 13285, applied to the supplier declared values. As explained in Annex B (informative) of IS EN 13285, the use of tolerances does not change the overall grading range.
- 6 IS EN 13285 Table 8 also includes requirements for the calculated difference between the values of percentage by mass passing selected adjacent sieves. These requirements are to ensure a 'well graded' mixture by controlling the continuity of the grading curve.
- 7 Whilst there is no specified moisture content for laying and compacting unbound mixtures to Clause 802, in order to satisfy the requirements of this clause it will be necessary to carry out these operations at the optimum moisture content or within the range identified in the applicable clauses.
- 8 It is important to maintain the material within the optimum moisture content range stated in the applicable clause for each mixture. The method of maintaining the mixture within this range may depend

on environmental conditions and the time to overlay.

NG 806 Wet-Mix Macadam

- 1 Experience has shown that limestone aggregate produces the most satisfactory wet-mix macadam where satisfactory production systems are in place. Satisfactory wet-mix macadam can be produced with aggregates other than limestone, but requires a greater control during production and a higher rate of quality control testing than is necessary with limestone.
- 2 Past experience indicates that most well graded wet-mix macadams have an optimum moisture content of about 3%-4%, and that high in situ strengths can be mobilised in wet-mix macadam if it is compacted at about 0.5%-1.0% below the optimum moisture content in accordance with the requirements of Table 8/1. However the optimum moisture content for some unbound materials with low fines content may be difficult to determine accurately and, where uncertainty about the optimum moisture content occurs, guidance on the most suitable moisture content range for laying and compaction can be obtained by carrying out CBR tests at a range of moisture content so that the appropriate moisture content range for mobilising maximum strength can be determined. The compaction technique to be used for this purpose should be the vibrating hammer method described in IS EN 13286 - 4. Further information on this topic is given in An Foras Forbartha report RC188 and Environmental Research Unit report RC 358.

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