INTERIM ADVICE NOTE 156/12

Revision of Aggregate Specification for Pavement Surfacing

Summary
This IAN revises the requirements in HD36/06 for aggregate polished stone values incorporating the results of recent research.

Instructions for Use
This IAN shall be implemented in accordance with the implementation instructions given at Cl 1.3 of this document

1. Introduction

This IAN provides updated advice on the selection of polished stone value (PSV) of aggregates used in pavement surfacing. Research has shown that the frictional properties of thin surface course systems (TSCS) incorporating aggregates with a nominal size of 10mm or less, are better than those for larger sized aggregates.

1.1 Purpose

It is anticipated that the introduction of this IAN should deliver cost savings by reducing haulage distances for premium aggregates, without increasing risk for the road user. By matching specifications more closely to the geology of sources available in the UK the sustainability of road construction should also be enhanced by reducing the consumption of scarce premium aggregate. This IAN also limits the use of larger nominal aggregate size surfacings in high stress locations. Use of smaller nominal size aggregates has been shown to improve durability of TSCS at high stress sites.

1.2 Relationship

This IAN revises specific requirements and guidance within HD 36/06. It must be read in conjunction with HD 36/06 .

1.3 Implementation

This IAN shall be implemented immediately except where the procurement of works, at any stage from conception through design to completion of construction, has reached a stage at which, in the opinion of the HA, use of this document would result in significant additional expense or delay progress (in which case the decision must be recorded in accordance with the HA's procedures)

1.4 Mutual Recognition

Any reference in this specification to a "British Standard", or to a "British Standard which is an adopted European Standard", is to be taken to include reference also to the following standards:

(a) a standard or code of practice of a national standards body or equivalent body of any EEA state;

(b) any international standard recognised for use as a standard or code of practice by any EEA state;

(c) a technical specification recognised for use as a standard by a public authority of any EEA state; and

(d) a European Technical Approval (ETA) issued in accordance with the procedure set out in directive 89/106/EEC.

Where there is a requirement in this specification for compliance with any part of a British Standard or a British Standard which is an adopted European Standard, that requirement may be met by compliance with any of the standards given above, provided that the relevant standard imposes an equivalent level of performance and safety provided for by a British Standard or a British Standard which is an adopted European Standard.

“EEA State” means a state which is a contracting party to the EEA Agreement.

“EEA Agreement” means the agreement on a European Economic Area signed at Oporto on the 2nd of May 1992 as adjusted or amended.

2. Requirements

This IAN shall be read in conjunction with Design Manual for Roads and Bridges document HD 36/06. The new and revised requirements and guidance given in Annex A of this IAN shall be applied in place HD36/06 Paragraphs 3.11, 3.12 and 3.16 and Table 3.1

3. Withdrawal Conditions

This IAN will remain current until these requirements are either included in, or revised by, a subsequent document issued by the HA. .

4. Contacts

For queries regarding this IAN please contact:

Email: standards_enquiries@highways.gsi.gov.uk

5. Normative References

The Design Manual for Roads and Bridges, Volume 7 – HD 36/06

The Design Manual for Roads and Bridges, Volume 7 – HD 28/04

Manual of Contract Documents for Highway Works, Volume 1 - Clause 924

6. Informative References

Roe, P G. and Dunford AI, “The skid resistance behaviour of thin surface course systems”,TRL report PPR564

7. Notification

This document was notified in draft to the European Commission in accordance with Directive 98/34/EC, as amended by Directive 98/48/EC.

Appendix A

Revised Paragraph 3.11

The minimum PSVs to be applied to different categories of site and related to traffic flow are given in Table 3.1a or Table 3.1b. The appropriate AAVs are given in Table 3.2. Tables 3.1a, 3.1b and 3.2 refer to both new works and maintenance and values of PSV and AAV must be inserted into the appropriate part of Appendix 7/1 of the Specification (MCHW1). The minimum values of PSV given in Table 3.1a or Table 3.1b are the values to be used if no other information is available. On an existing site, if the life that has been achieved by the aggregates, the skid resistance and the skidding accident rate have all been satisfactory, then the continued use of the same aggregate source, albeit with a lower PSV than that given in Table 3.1a or 3.1b may be considered. If, however, the measured skid resistance of the site when related to the life achieved and the skidding accident rate are below expectations for an aggregate from a particular source, then a higher PSV than that given in Table 3.1a or 3.1b may be specified. Table 3.1a applies to all types of surfacing material with the exception of paver laid thin surfacing course systems.

New Paragraph 3.11a

Where a thin surfacing system is used on the circulatory part of a roundabout or other gyratory junction, a maximum nominal aggregate size of 10mm should be used in the surfacing as research has demonstrated that it will provide greater durability. High friction surfacing should not normally be used on roundabouts even if traffic light controlled.

Revised Paragraph 3.12

Although some motorways carry in excess of 6000 commercial vehicles per lane per day, PSVs in excess of those shown in Table 3.1a or 3.1b must not be specified. Although minimum PSV values have been included for all types of site and traffic level, some combinations are unlikely to occur in practice.

Revised Paragraph 3.16

For new construction, the same levels of PSV and AAV must be used on different traffic lanes across the carriageway and in the hardshoulder except that, where aggregates are used for demarcation, a maximum difference of 5 PSV points may be allowed. Where a single lane is being resurfaced for maintenance purposes the appropriate PSV and AAV shall be selected from Tables 3.1a, 3.1b and 3.2.

Site category	Site description	IL	Minimum PSV required for given IL, traffic level and type of site									
			Traffic (cv/lane/day) at design life									
			0-250	251- 500	501- 750	751- 1000	1001- 2000	2001- 3000	3001- 4000	4001- 5000	5001- 6000	Over 6000
A1	Motorways where traffic is generally free-flowing on a relatively straight line	0.30	50	50	50	50	50	55	55	60	65	65
		0.35	50	50	50	50	50	60	60	60	65	65
A2	Motorways where some braking regularly occurs	0.35	50	50	50	55	55	60	60	65	65	65
B1	Dual carriageways where traffic is generally free-flowing on a relatively straight line	0.30	50	50	50	50	50	55	55	60	65	65
		0.35	50	50	50	50	50	60	60	60	65	65
		0.40	50	50	50	55	60	65	65	65	65	68+
B2	Dual carriageways where some braking regularly occurs	0.35	50	50	50	55	55	60	60	65	65	65
		0.40	55	60	60	65	65	68+	68+	68+	68+	68+
C	Single carriageways where traffic is generally free-flowing on a relatively straight line	0.35	50	50	50	55	55	60	60	65	65	65
		0.40	55	60	60	65	65	68+	68+	68+	68+	68+
		0.45	60	60	65	65	68+	68+	68+	68+	68+	68+
G1/G2	Gradients >5% longer than 50m as per HD 28	0.45	55	60	60	65	65	68+	68+	68+	68+	68+
		0.50	60	68+	68+	HFS	HFS	HFS	HFS	HFS	HFS	HFS
		0.55	68+	HFS	HFS	HFS	HFS	HFS	HFS	HFS	HFS	HFS
K	Approaches to pedestrian crossings and other high risk situations	0.50	65	65	65	68+	68+	68+	HFS	HFS	HFS	HFS
		0.55	68+	68+	HFS	HFS	HFS	HFS	HFS	HFS	HFS	HFS
Q	Approaches to major and minor junctions on dual carriageways and single carriageways where frequent or sudden braking occurs but in a generally straight line	0.45	60	65	65	68+	68+	68+	68+	68+	68+	HFS
		0.50	65	65	65	68+	68+	68+	HFS	HFS	HFS	HFS
		0.55	68+	68+	HFS	HFS	HFS	HFS	HFS	HFS	HFS	HFS
R	Roundabout circulation areas	0.45	50	55	60	60	65	65	68+	68+	68+	68+
		0.50	68+	68+	68+	68+	68+	68+	68+	68+	68+	68+
S1/S2	Bends (radius <500m) on all types of road, including motorway link roads; other hazards that require combined braking and cornering	0.45	50	55	60	60	65	65	68+	68+	HFS	HFS
		0.50	68+	68+	68+	HFS	HFS	HFS	HFS	HFS	HFS	HFS
		0.55	HFS	HFS	HFS	HFS	HFS	HFS	HFS	HFS	HFS	HFS

Table 3.1a: Minimum PSV for chippings or coarse aggregate in bituminous surfacings (excluding hot applied thin surface course systems).

Notes:

1. Site categories are grouped according to their general character and traffic behaviour. The Investigatory Levels (IL) for specific categories of site are defined in HD 28 (DMRB 7.3.1). The IL to be used here must be that which has been allocated to the specific site on which the material is to be laid, as determined by following the procedures in HD 28.

2. Motorway or dual carriageway slip roads may fit in a number of groups depending on their layout. For example, a free flowing section close to the main line would be in Group 1 whereas the end of an off-slip approaching a give way line or the point at which a queue develops would be in Group 3. Some slip roads with gradients may be in Group 4. Use the most appropriate Group depending upon the Site Category from HD 28 that was used to determine the IL.

3. Where '68+' material is listed in this Table, none of the three most recent results from consecutive PSV tests relating to the aggregate to be supplied must fall below 68. See paragraph 3.21.

4. Throughout this Table, HFS means specialised high friction surfacing, incorporating calcined bauxite aggregate and conforming to Clause 924 of the Specification (MCHW 1) will be required. Where HFS is required on the approaches to a hazard, the minimum treatment length must be 50m. This may be extended where queuing traffic or sightlines indicate that 50m may not be sufficiently long.

5. For site categories G1/G2, S1/S2 and R any PSV in the range given for each traffic level may be used for any IL and should be chosen on the basis of local experience of material performance. In the absence of this information, the values given for the appropriate IL and traffic level must be used.

6. Where designers are knowledgeable or have other experience of particular site conditions, an alternative PSV value can be specified.

7. Site categories K and Q should not be applied to the circulatory parts of a roundabout.

Site category	Site description	IL	Minimum PSV required for given IL, traffic level and type of site									
			Traffic (cv/lane/day) at design life									
			0-250	251- 500	501- 750	751-1000	1001-2000	2001-3000	3001-4000	4001-5000	5001-6000	Over 6000
A1	Motorways where traffic is generally free-flowing on a relatively straight line	0.30	50	50	50	50	50	50	50	53	63	63
		0.35	50	50	50	50	50	53	53	53	63	63
A2	Motorways where some braking regularly occurs	0.35	50	50	50	55	55	60	60	65	65	65
B1	Dual carriageways where traffic is generally free-flowing on a relatively straight line	0.30	50	50	50	50	50	50	50	53	63	63
		0.35	50	50	50	50	50	53	53	53	63	63
		0.40	50	50	50	50	53	58	58	58	63	68+
B2	Dual carriageways where some braking regularly occurs	0.35	50	50	50	55	55	60	60	65	65	65
		0.40	55	60	60	65	65	68+	68+	68+	68+	68+
C	Single carriageways where traffic is generally free-flowing on a relatively straight line	0.35	50	50	50	50	50	53	53	58	63	63
		0.40	50	53	53	58	58	63	63	63	68+	68+
		0.45	53	53	58	58	63	63	63	63	68+	68+
G1/G2	Gradients >5% longer than 50m as per HD 28	0.45	55	60	60	65	65	68+	68+	68+	68+	68+
		0.50	60	68+	68+	HFS	HFS	HFS	HFS	HFS	HFS	HFS
		0.55	68+	HFS	HFS	HFS	HFS	HFS	HFS	HFS	HFS	HFS
K	Approaches to pedestrian crossings and other high risk situations	0.50	65	65	65	68+	68+	68+	HFS	HFS	HFS	HFS
		0.55	68+	68+	HFS	HFS	HFS	HFS	HFS	HFS	HFS	HFS
Q	Approaches to major and minor junctions on dual carriageways and single carriageways where frequent or sudden braking occurs but in a generally straight line	0.45	60	65	65	68+	68+	68+	68+	68+	68+	HFS
		0.50	65	65	65	68+	68+	68+	HFS	HFS	HFS	HFS
		0.55	68+	68+	HFS	HFS	HFS	HFS	HFS	HFS	HFS	HFS
R	Roundabout circulation areas	0.45	50	55	60	60	65	65	68+	68+	68+	68+
		0.50	68+	68+	68+	68+	68+	68+	68+	68+	68+	68+
S1/S2	Bends (radius <500m) on all types of road, including motorway link roads; other hazards that require combined braking and cornering	0.45	50	55	60	60	65	65	68+	68+	HFS	HFS
		0.50	68+	68+	68+	HFS	HFS	HFS	HFS	HFS	HFS	HFS
		0.55	HFS	HFS	HFS	HFS	HFS	HFS	HFS	HFS	HFS	HFS

Table 3.1b: Minimum PSV for coarse aggregate in hot applied thin surface course systems.

Notes:

1. Site categories are grouped according to their general character and traffic behaviour. The Investigatory Levels (IL) for specific categories of site are defined in HD 28 (DMRB 7.3.1). The IL to be used here must be that which has been allocated to the specific site on which the material is to be laid, as determined by following the procedures in HD 28.

2. Motorway or dual carriageway slip roads may fit in a number of groups depending on their layout. For example, a free flowing section close to the main line would be in Group 1 whereas the end of an off-slip approaching a give way line or the point at which a queue develops would be in Group 3. Some slip roads with gradients may be in Group 4. Use the most appropriate Group depending upon the Site Category from HD 28 that was used to determine the IL.

3. Where '68+' material is listed in this Table, none of the three most recent results from consecutive PSV tests relating to the aggregate to be supplied must fall below 68. See paragraph 3.21.

4. Throughout this Table, HFS means specialised high friction surfacing, incorporating calcined bauxite aggregate and conforming to Clause 924 of the Specification (MCHW 1) will be required. Where HFS is required on the approaches to a hazard, the minimum treatment length must be 50m. This may be extended where queuing traffic or sightlines indicate that 50m may not be sufficiently long.

5. For site categories G1/G2, S1/S2 and R any PSV in the range given for each traffic level may be used for any IL and should be chosen on the basis of local experience of material performance. In the absence of this information, the values given for the appropriate IL and traffic level must be used.

6. Where designers are knowledgeable or have other experience of particular site conditions, an alternative PSV value can be specified.

7. Site categories K and Q should not be applied to the circulatory parts of a roundabout.