An tÚdarás um Bóithre Náisiúnt
National Roads Authority

NRA Interim Advice Note 05/13

Update to HD 36 Surfacing Materials for New and Maintenance Construction, for Use in Ireland

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St. Martin's House, Waterloo Road, Dublin 4 Tel: +353 1 660 2511 Fax +353 1 668 0009
Email: infoDMRB@nra.ie Web: www.nra.ie

Summary:

This NRA Interim Advice Note 05/13 (NRA IAN 05/13) provides an update of HD 36 Surfacing Materials for New and Maintenance Construction, for use in Ireland as directed by the National Roads Authority. The update includes mandatory and advisory parts in relation to the following aspects;

- Surfacing Options;
- Texture, Skidding Resistence and Noise; and
- Selection of Aggregate

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NRA Interim Advice Note 05/13
Update to HD 36 Surfacing Materials for New and Maintenance Construction, for Use in Ireland

Contents

1. INTRODUCTION

Scope

1.1 This NRA Interim Advice Note 05/13 (NRA IAN 05/13) provides a summary of surfacing options available for use on both flexible and rigid pavements and advises on current requirements for surfacings. NRA IAN 05/13 also details the requirements for aggregates to ensure that satisfactory skidding resistance is provided on roads and should be read in conjunction with NRA HD 28 (NRA DMRB 7.3.1). NRA IAN 05/13 also includes details of surface texture and how this affects skidding resistance and surface noise at the tyre/road interface.

1.2 Detailed information on bituminous material types, and surfacing processes, together with advice on their use, is presented in HD 37 (NRA DMRB 7.5.2). Reference should also be made to the NRA Specification for Road Works Series 700, 900 and 1000, together with the NRA Notes for Guidance on the Specification for Road Works.

Implementation

1.3 NRA IAN 05/13 should be used forthwith as directed by the NRA for schemes involving the construction, improvement or maintenance of national roads. NRA IAN 05/13 should be applied to the design of schemes already being prepared unless, in the opinion of the National Roads Authority, application would result in significant additional expense or delay progress. In such cases, Design Organisations should confirm the application of appropriate standards to those particular schemes with the National Roads Authority.

Mutual Recognition

1.4 The construction of road pavements will normally be carried out under contracts incorporating the NRA Specification for Road Works. In such cases works, goods or materials conforming to harmonised European Standards (hEN) will be acceptable in accordance with the terms of the 104 and 105 Series of Clauses of that Specification. Any contract not containing these clauses must contain suitable clauses of mutual recognition having the same effect regarding which advice should be sought.

1.5 Construction products must be supplied with appropriate CE marking in accordance with the Construction Products Regulation (CPR).

Mandatory Sections

1.6 Sections of this document which form part of the minimum standards the National Roads Authority expects in design are highlighted by being contained in boxes. These are the sections with which the Design Organisation must comply or must have agreed a suitable Departure from Standards with the National Roads Authority. The remainder of the document contains advice and enlargement which is commended to Design Organisations for their consideration.

Departures from Standards

1.7 In exceptional situations, the National Roads Authority may be prepared to agree to a Departure from Standards. Design Organisations wishing to consider pursuing this course shall discuss any such option at an early stage in design with the National Roads Authority. Proposals to adopt Departures form Standard must be submitted by the Design Organisation to the National Roads Authority and formal approval received BEFORE incorporation into a design layout.

2. SURFACING OPTIONS

Background

2.1 The choice of surfacing materials/systems plays a vital role in providing roads that meet the needs of the user, are safe and give value for money. For many years hot rolled asphalt with chippings rolled into the surface was the most widely used surfacing on national roads, including motorways, for both new construction and major maintenance. Surface dressing was also widely used on national secondary roads. However, recent years have seen the development of new materials and techniques, many of which are proprietary, which offer significant advantages not just to the road user but also to the environment. For example, noise generation may be reduced, delays at road works curtailed, ride quality improved and deformation resistance enhanced, all while maintaining existing safety levels. Furthermore, new products such as energy efficient 'cold-lay' materials are in their development phase. This Chapter gives guidance on the range of surfacing options that are now available for both new construction and maintenance.

Performance Specifications

2.2 To remove barriers to trade and to encourage innovation, the Construction Products Regulation (CPR) of the European Union requires the introduction of performance related specifications wherever possible. Specification clauses of this type have been included in the NRA Specification for Road Works covering surfacings such as microsurfacing (Clause 918), surface dressings (Clause 919), High Friction Surfacing (Clause 924), Porous Asphalt (Clause 938), Polymer Modified Stone Mastic Asphalt (PMSMA) systems (Clause 942) and hot rolled asphalt (Clause 943). Performance is assessed by testing samples from the laid material and testing the laid material in-situ. It is noted that NRA IAN 04/13 includes updates to Clauses 918 and 919, and should be used in conjunction with this NRA IAN 05/13.

Choice of Surfacings

2.3 Apart from the suitability of surfacing materials in terms of safety and robustness, the permitted pavement surfacing options for use on national roads, have been determined by the National Roads Authority, as indicated in Table 2.1.

2.4 The decision on which of the permitted options are used within a scheme should be made on a site-specific basis, taking into account the existing surfacing type and the scale of the works, to maintain local consistency in surface type.

2.5 Where noise levels are high due to the intensity of high-speed traffic, surfacing materials are available that can significantly reduce tyre/road generated noise emission compared to hot rolled asphalt. These include PMSMA (NRA Specification for Road Works Clause 942) and Porous Asphalt (NRA Clause 938). Conversely, in locations where speeds are limited and tyre/road generated noise low, or where traffic intensity (and therefore the overall noise level) is not very great, then the noise reducing benefits of these surfacings will be limited and, therefore, the full range of suitable surfacings should be considered.

2.6 Where Porous Asphalt is proposed for use on high speed roads (see Table 2.1) the approval of the National Roads Authority shall be sought and a Departure from Standards agreed prior to incorporation in the permanent works.

2.7 Advice on the different types of surfacings is given in HD 37 (NRA DMRB 7.5.2). However, although information on various surfacings and treatments is provided, it should not be assumed that their use is permitted on the national road network. Advice is provided for certain treatments for information only. Reference should be made to Table 2.1 to check permitted options.

2.8 The surfacing options permitted shall be those shown in Table 2.1. Where an option is permitted with "Departure Required", a Departure from Standard will be required from the National Roads Authority.

2.9 For the purpose of this document, high-speed roads are defined as those with a posted speed limit above 60 km/h. The various pavement construction types are defined in NRA HD 25-26 (NRA DMRB 7.2.2A).

2.10 The National Roads Authority should be contacted for advice on suitable materials for use on concrete pavements.

2.11 Mechanical retexturing of existing surfaces can provide a short term improvement in microtexture and therefore skid resistance. However its use is not permissible without National Roads Authority approval. This approval will not be unreasonably withheld for small lengths of pavement with a particular skidding or other safety concern. Water jetting is not permitted for this purpose, although it can be used for removal of bitumen from the surface.

Fully Flexible and Flexible Composite Pavements

Traffic volume	Posted speed limit	Use without restriction	Departure required
5,000 AADF [1] and above	Above 60 km/h	PMSMA Hot Rolled Asphalt [2] High Friction Surfacing [3]	Porous Asphalt
	60 km/h or below	PMSMA Hot Rolled Asphalt Asphalt Concrete [4] High Friction Surfacing [3]	Microsurfacing / Slurry sealing
Below 5,000 AADF	Above 60 km/h	PMSMA Hot Rolled Asphalt [2] Surface Dressing [2, 5] High Friction Surfacing [3]	Porous Asphalt
	60 km/h or below	PMSMA Hot Rolled Asphalt Asphalt Concrete [4] Surface dressing [5] High Friction Surfacing [3]	Microsurfacing / Slurry sealing

Notes:

1. Average Annual Daily Flow (one way)
2. See paragraph 2.5 in relation to noise
3. Use of High Friction Surfacing Materials is subject to prior approval by the Head of Standards of the National Roads Authority, see clause 4.12
4. For use only where the posted speed limit is 50km/h or less
5. At high stress locations, such as approaches to junctions, bends and roundabouts, use of surface dressing is restricted to super premium poly-modified binder systems and double surface dressing

Table 2.1: Permitted Pavement Surfacing Materials for the Construction, Improvement or Maintenance of National Roads

3. TEXTURE, SKIDDING RESISTANCE AND NOISE

Background

3.1 The interface between the tyre and the road surface contributes to both the generation of friction and traffic noise.

3.2 There are a number of factors related to the road surface texture that play significantly different roles in improving skidding resistance and generating noise. These are related to the different scales of the texture (see Figure 3.1).

Microtexture describes the roughness of the surface aggregate which is associated with its crystalline structure.

Macrotexture represents the "gaps" between the individual aggregate particles in the surface material and is a factor of the size and shape of the aggregate.

Surface macrotexture takes two forms:

a) 'positive' texture: a cluster of angular peaks or series of ridges above a datum level, typical of surface dressings, hot rolled asphalt with chips and slurry and microsurfacings;

b) 'negative' texture: a network of depressions or series of grooves below the general level, typical of PMSMAs and porous asphalt.

Megatexture represents the degree of smoothness of the surface.

Unevenness describes amplitudes of features with longer wavelengths.

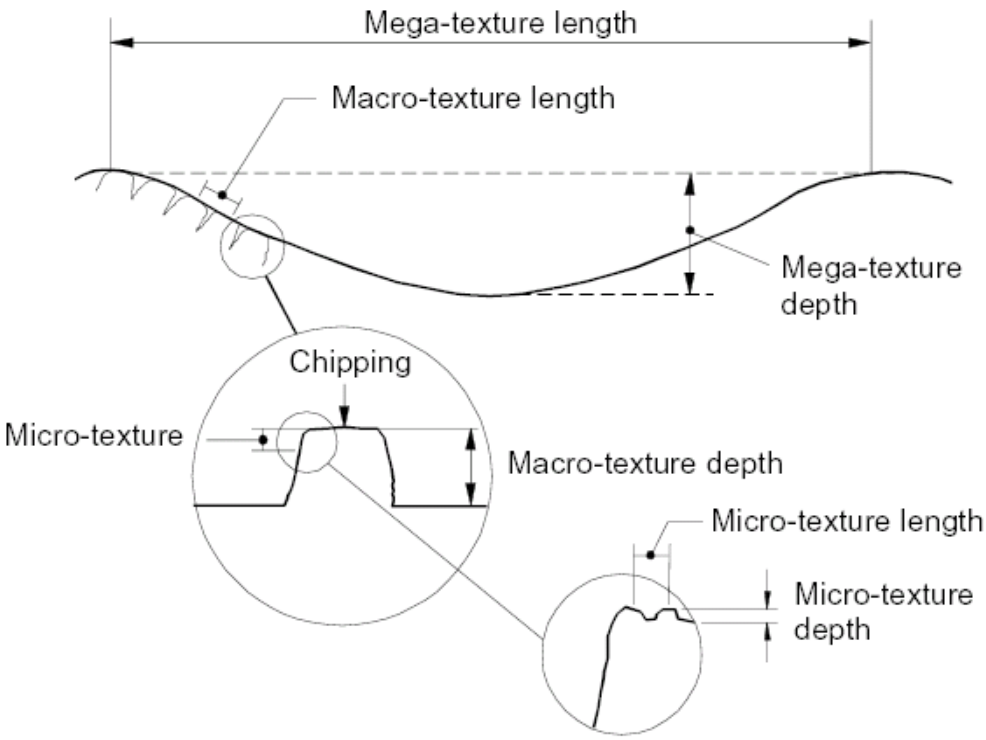

Figure 3.1: Details of texture length and depths

Skidding resistance

3.3 The friction available to a driver attempting a particular manoeuvre depends on many different factors including the road surface characteristics. Other factors include the vehicle's tyres and braking system, the dynamic interaction of the vehicle suspension system with the road geometry, vehicle speed and environmental factors such as the temperature and the presence of water or other contaminants.

3.4 In dry conditions clean, surfaced roads generally have a high skidding resistance.

3.5 The skidding resistance of wet roads is reduced by the lubricating action of the film of water on the wet road surface. Drainage channels, provided by the macrotexture and/or the pattern on the tyre, assist in getting rid of the bulk of the water and are of increasing importance the higher the speed. Penetration of the remaining water film can be achieved only if there are sufficient fine scale sharp edges (microtexture) on the road surface on which the tyre can build up high contact pressures to establish areas of 'dry' contact between the road and the tyre.

3.6 Aquaplaning is the condition where the vehicle tyres are completely supported by a layer of water and there is no contact with the road surface. High speed and a thick film of water on the road surface encourage a vehicle to aquaplane, but a relatively thin layer of water could cause a problem if combined with low texture depth and 'smooth' tyres.

3.7 Megatexture and unevenness do not have a direct effect on skid resistance, but poor road profile may have an adverse influence on vehicle handling.

3.8 It should be noted that road collisions are complex multi-factored incidents and there is seldom one single cause. Various elements come together and without them all, the incident would not happen or the consequence would be different. Within normal ranges, low skid resistance does not cause collisions on its own although, depending on the particular circumstances, it may be a contributory factor. Other contributory factors such as driver error/distraction, the road environment and vehicle defects often play a part.

Noise

3.9 Where traffic speeds are less than 50 km/h, traffic noise is mainly attributable to engine, transmission and exhaust noise, especially from lorries. Where speeds are higher, the major component of traffic noise comes from the tyre/road interface. This noise comes from, amongst other things, vibration of the tyre wall, compression of air within the contact area of the tyre, and the snapping out of the tread blocks as they leave the road surface.

3.10 Microtexture has a minimal effect on tyre/road noise.

3.11 Macrotexture allows air trapped between the tyre and the road to escape but the release of pressure causes noise. At larger lengths of macrotexture vibrations in a tyre wall are excited, which are a significant cause of tyre noise.

3.12 The nature of the texture also has an influence on noise and, for the same texture depth, surfaces with negative texture generate much less noise than those with positive texture.

3.13 High megatexture depths cause a tyre wall to deflect and vibrate under load and this is a major cause of tyre/road noise.

4. SELECTION OF AGGREGATE

To deliver the levels of skid resistance required by NRA HD 28, the aggregate used in the surfacing will need to provide adequate microtexture and macrotexture during the life of the surfacing.

MICROTEXTURE

4.1 The microtexture characteristics of a particular stone depend on its polishing susceptibility under the action of tyre forces. This is assessed based on the Polished Stone Value (PSV) and Aggregate Abrasion Value (AAV) of the stone as specified in IS EN 1097-8.

4.2 The PSVs required for different categories of site are related to traffic flow and are given in Table 4.1. The appropriate AAVs are given in Table 4.2. Tables 4.1 and 4.2 apply to new works, improvement and maintenance works. In specifying surfacing materials, the minimum values of PSV and maximum values of AAV given in Tables 4.1 and 4.2 must be used and, where applicable, inserted into the appropriate part of Appendix 7/1 of the NRA Specification for Road Works.

4.3 The traffic flow used to determine the appropriate PSV and AAV for a particular surfacing must be the maximum volume of traffic measured as commercial vehicles per lane per day (cv/lane/day) based on the Average Annual Daily Flow (AADF) predicted to be using the lane at the end of the anticipated life of the surfacing – see HD 24 (NRA DMRB 7.2.1). Estimates of traffic growth rates and life of the surfacing may be based on local experience.

4.4 On an existing site, if evidence is available to demonstrate that an aggregate with a lower PSV than specified in Table 4.1 has delivered satisfactory skid resistance performance in relation to NRA HD 28 (NRA DMRB 7.3.1) over the lifetime of the surface, then the continued use of the same aggregate source may be considered. Similarly, if the performance has been below expectations for an aggregate from a particular source, then an alternative source or a higher PSV than that given in Table 4.1 should be considered. However, at present, it is considered that there is unlikely to be sufficient evidence to support the specification of aggregates with PSVs differing to those indicated in Table 4.1.

4.5 The specification of PSVs differing to those given in Table 4.1 would only be accepted under an Approved Departure in accordance with NRA GD 100 (NRA DMRB 0.3.2).

4.6 To gain further information on the performance of aggregates in road surfacings two additional tests on the aggregate shall be specified and, where applicable, inserted into the appropriate part of Appendix 7/1 of the NRA Specification for Road Works. These tests are a Flakiness Index test as specified in IS EN 933-3 and a friction after polishing test. The test method for the latter should be based on the draft IS EN 12697-49, but the test specimens should be aggregate mosaics rather than asphalt specimens (see Annex A for further details). No thresholds for the results of these tests are included in this standard but records of the test results must be retained by the supplier for possible inspection for a minimum of 5 years after the date of construction. The results must also be forwarded to the NRA at the time of construction.

4.7 The NRA will also undertake more detailed monitoring of skid resistance at selected sites, in addition to the annual SCRIM survey, to gain further understanding of the performance of aggregates and surfacing materials in service. Further details of this strategy are also given in Annex A.

4.8 The PSVs given in Table 4.1 will normally provide satisfactory skid resistance on sites of average difficulty within the site category for the life of the surfacing.

4.9 To determine the correct PSV and AAV for a particular site the designer should have regard to the extent and scale of the work. When specifying a PSV it is undesirable to have too frequent changes of aggregate and the aim should be to specify and provide the most economical aggregate available over the longest possible lengths. The highest PSV aggregates should be restricted to those locations where they are required such as on bends and gradients, and at intersections and junctions.

4.10 For a multiple lane carriageway, the same PSV and AAV must be used on all lanes with traffic travelling in the same direction (including the hard shoulder). Where aggregates are used for demarcation, a maximum difference of 5 PSV points may be allowed. Selection of the appropriate PSV and AAV must be based on the lane carrying the most commercial vehicles at design life.

4.11 Where a PMSMA surfacing is used on the circulatory part of a roundabout, a maximum nominal aggregate size of 10mm should be used in the surfacing as research has demonstrated that this will provide greater durability.

4.12 Some sections of Table 4.1 require either the use of High Friction Surfacing (H) or the use of aggregates in the surface course with a PSV in excess of 70 (70+) because of the combination of high risk, high stress and high traffic at a site. Given its relatively high cost and short lifetime in comparison with surfacings using natural aggregate, the use of High Friction Surfacing shall only be permitted at the locations specified in Table 4.1 and requires the prior approval of the Head of Standards of the National Roads Authority. Evidence must be provided that a site investigation has been carried out to determine the underlying risk factors and to consider the most appropriate solution. Options should include: the use of engineering measures to reduce the risk and/or stresses (e.g. minor realignment or signage); the use of a natural aggregate with a PSV of 70+; High Friction Surfacing in accordance with Clause 924 of the SRW. The options considered must be compared on a whole life cost basis.

4.13 Although highly skid resistant, material complying with Clause 924 is unable to meet the texture depth requirement given in Series 900 of the NRA Specification for Road Works. Therefore, on high speed roads, attention must be given to the need to drain water off the surface by profiling or by other means.

4.14 Where HFS is used 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. When used on bends, transitions between surfacing types should be avoided within the extent of the bend. HFS should not normally be used on the circulatory area of roundabouts even if traffic signal controlled. Further guidance on the use of HFS is provided in HD37 (NRA DMRB 7.5.2).

4.15 Tables 4.1 and 4.2 specify the minimum and maximum values of PSV and AAV respectively to be included in the contract specification. The contract specification shall also state that the actual PSVs, AAVs and texture depths as built must be recorded and maintained in a readily available form, (e.g. the safety file for new construction, or close out report for maintenance works). Standards to be adopted in subsequent renewal work may then be determined in the light of the skidding resistance performance set against those initial recorded values.

Site category and definition (see NRA HD 28/11)		IL	Minimum PSV required for given IL, traffic level and type of site						
			Traffic (Commercial Vehicles per Lane per Day) at design life						
			<250	251-500	501-750	751-1000	1001-2000	2001-3000	Over 3000
A/B	Motorway or Dual carriageway	0.30	50						
		0.35	50*	50*	50*	55	55	55*	60*
C	Single carriageway	0.35	55						
		0.40	55*	55*	60	60	65	65	68+
G1/ G2	Gradients >5% longer than 50m	0.40	55						
		0.45	55	60	60	65	65	68+	68+
		0.50	60	65	68+	68+	H / 70+	H / 70+	H / 70+
K	Approaches to traffic signals, pedestrian crossings	0.50	65						
		0.55	68+	68+	H / 70+	H / 70+	H / 70+	H / 70+	H / 70+
Q	Approaches to and across major and minor junctions on dual carriageways and single carriageways where frequent or sudden braking occurs but in a generally straight line	0.40	60						
		0.45	60	60	65	65	68+	68+	68+
R	Roundabout circulation areas	0.45	60						
		0.50	65	65	65	68+	68+	68+	68+
S1/ S2	Bends (radius <250m) on all types of road, including motorway link roads; other hazards that require combined braking and cornering	0.45	60						
		0.50	65	65	68+	H / 70+	H / 70+	H / 70+	H / 70+

Notes:

1. Site categories are grouped according to their general character and traffic behaviour. Site categories and the Investigatory Levels (IL) for specific categories are defined in NRA HD 28. 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 NRA HD 28. The shaded sections of the table represent combinations of traffic and IL that do not form part of NRA HD 28.
2. The lowest IL level for each site category normally applies for traffic ≤250 CVD and the upper level applies for traffic >250 CVD. For low-traffic situations where an analysis of other hazards has led to the IL has being set at the higher level, use the PSV value for the assigned IL and traffic level.
3. For roads in site categories A and B where some braking regularly occurs (e.g. on 300m approach to an off-slip) there may be increased polishing stresses compared with most locations in these categories. In such situations add 5 to the PSV value where it is marked with an asterisk.
4. Throughout this Table, H means specialised high friction surfacing (HFS) conforming to Clause 924 of the NRA Specification for Road Works.
5. Although minimum PSV values have been included for all types of site and traffic level, some combinations are unlikely to occur in practice.

Table 4.1: Minimum PSV of Chippings, or Coarse Aggregate in Unchipped Surfaces, for new Surface Courses

Traffic (cv/lane/day) at design life (see 4.11)	**<250**	**251-1000**	**1001-1750**	**1751-2500**	**2501-3250**	**>3250**
Max AAV for chippings for hot rolled asphalt and surface dressing, and for aggregate in slurry and microsurfacing systems	14	12	12	10	10	10
Max AAV for aggregate in PMSMA systems and coated macadam surface course	16	16	14	14	12	12

Notes:
1. The maximum AAV requirement for porous asphalt is specified in Clause 938 of the Specification (NRA Specification for Road Works).

Table 4.2: Maximum AAV of Chippings, or Coarse Aggregates in Unchipped Surfaces, for New Surface Courses

4.16 The requirements of Tables 4.1 and 4.2 cover:

a) chippings for surface dressing;

b) the coarse aggregate in PMSMA systems, porous asphalt, asphalt concrete surface courses and surface courses of hot rolled asphalt without coated chippings applied to the surface;

c) coated chippings applied to the surface of hot rolled asphalt,

d) coarse aggregate in microsurfacing / slurry sealings

4.17 Where asphalt binder courses and bases are used as temporary surfaces by general traffic, reference should be made to Clause 903.32 of the SRW and to Annex B of this standard.

Measurement

4.18 Samples of the aggregate representative of those to be incorporated into the Works must be tested in accordance with IS EN 1097-8 for compliance with the specified PSV and AAV properties. The aggregate will be deemed to comply if the mean of the two most recent results from consecutive "suite of tests", relating to the material to be supplied, is greater than or equal to the specified PSV and less than the specified AAV. A "suite of tests" shall comprise three separate individual PSV tests, where each must be undertaken by a different laboratory and any result more than 5 units above or below the median value of the three tests must be discarded and an additional test undertaken. This process must be repeated, if necessary, until three results within 5 units of the median value of those results are obtained. Where a PSV of 68+ or 70+ is specified, none of the three valid results obtained from the testing regime outlined above shall be less than 68 or 70 respectively.

4.19 Tests must have been carried out in the previous six months by a laboratory accredited by INAB or equivalent for these tests. Alternatively the laboratory must be accredited in a Member State of the European Economic Area, or a State which is party to a relevant agreement with the European Union, in accordance with the relevant parts of EN45000 series of standards for the tests carried out.

4.20 Records of these test results must be retained by the supplier for possible inspection for a minimum of 5 years after the date of construction. The results must also be forwarded to the NRA at the time of construction.

4.21 It is essential that the aggregate supplied to site must be the same in all respects to the sample submitted for acceptance. Suppliers must maintain appropriate quality procedures and records to demonstrate how representative sampling and testing is achieved.

4.22 These testing requirements must be included in the contract specification / method of measurement, for example Appendix 7/1 of 1 of the NRA Specification for Road Works.

MACROTEXTURE

4.23 Adequate macrotexture is required for the rapid drainage of surface water from the interface between the tyre and the road pavement, thereby reducing the chance of aquaplaning. The texture depth is a measure of the macrotexture and is an increasingly important factor influencing skidding in wet conditions as speed increases. Minimum levels of texture depth for new roads therefore apply at construction or major maintenance. These are given in Series 900 of the NRA Specification for Road Works.

Measurement

4.24 Compliance measurements against the Series 900 requirement (Clause 921) must be made using the volumetric patch method in which a known volume of solid glass spheres or sand is spread into a circular patch. The diameter of the patch is measured and the average depth under the peaks in the surface calculated. The technique is described in IS EN 13036-1:2002.

4.25 Laser-based techniques are also available which can measure texture depths at speeds up to 100 km/h and are consequently more appropriate for monitoring the texture depth of high-speed roads in service.

5. REFERENCES AND BIBLIOGRAPHY

REFERENCES

NRA Design Manual for Road and Bridges (NRA DMRB)

(http://nrastandards.nra.ie/nra-dmrb-documents gives access to the NRA's DMRB documents)

HD 24 Traffic Assessment (NRA DMRB 7.2.1)

NRA HD 25-26 Pavement Design (NRA DMRB 7.2.2A)

NRA HD 28 Skidding Resistance (NRA DMRB 7.5.1)

HD 37 Bituminous Surfacing Materials and Techniques (NRA DMRB 7.5.2)

NRA Manual of Contract Documents for Road Works (NRA MCDRW)

(http://nrastandards.nra.ie/nra-mcdrw-documents gives access to the NRA's MCDRW)

Volume 1: Specification for Road Works

Volume 2: Notes for Guidance on the Specification for Road Works

NRA Interim Advice Notes (NRA IANs)

(http://nrastandards.nra.ie/interim-advice-notes gives access to the NRA IANs)

NRA IAN 04/13 Specification for Microsurfacing, Surface Dressing and Bond Coat

Irish Standards

IS EN 1097-8: Tests for mechanical and physical properties of aggregates - Determination of the Polished Stone Value (PSV), National Standards Authority of Ireland.

IS EN 13036-1: Road and airfield surface characteristics - Test methods - Measurement of pavement surface macrotexture using a volumetric patch technique, National Standards Authority of Ireland.

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European Union

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Szatkowski W S and Hosking J R (1972). The Effect of Traffic and Aggregate on the Skidding Resistance of Bituminous Surfacings. LR504. TRL, Crowthorne.

6. ENQUIRIES

6.1 All technical enquiries or comments on this document, or any of the documents listed as forming part of the NRA DMRB, should be sent by e-mail to infoDMRB@nra.ie, addressed to the following:

Head of Network Management, Engineering Standards & Research
National Roads Authority
St Martin's House
Waterloo Road
Dublin 4

……..
Pat Maher
Head of Network Management,
Engineering Standards & Research

ANNEX A: ADDITIONAL TESTING AND MONITORING OF AGGREGATE AND SURFACING PERFORMANCE

As the skid resistance standard (NRA HD 28; NRA DMRB 7.5.1) was only introduced in 2011, there is currently very limited experience of the in service performance of aggregates used in surfacings in delivering the skid resistance requirements for the different site categories within the standard. As such there is little evidence to support the use of aggregates with PSVs differing to those required by Table 4.1 (see clause 4.4). It is also recognised that the PSV test (IS EN 1097-8) has limitations and, whilst a good indicator, may not always accurately predict the in service skid resistance of aggregates for all stress and traffic combinations.

The NRA has therefore recognised a need to better understand the in service performance of aggregates to enable standards and product specifications to be refined in the future. The introduction of the CPR also increases the emphasis on the performance of construction products against standard property tests. To this end, the NRA are instigating an evidence gathering regime to supplement the data already obtained from construction works and routine skid resistance measurements.

Part of this regime will involve the testing of friction after polishing (based on the draft IS EN 12697-49). Initial testing undertaken on a small sample of aggregates suggests that the test may provide a useful additional guide to the performance of surfacings after polishing and enables comparisons to be made between the coarse aggregate when tested on its own and in an asphalt mix.

To gather data on aggregates, the need to undertake a friction after polishing test in addition to the standard PSV and AAV tests has been specified (clause 4.6). The test methodology should follow the draft European standard IS EN 12697-49, but with the test undertaken on an aggregate mosaic rather than an asphalt specimen. The aggregate used should meet the same grading requirements as for the PSV test (i.e. passing a 10mm sieve and retained on a 7.2mm flake sorting sieve) and individual chippings should be assembled and embedded in a mosaic with resin, using a flat circular former of about 225mm diameter, in a method analogous to that employed in the PSV test. It is sufficient for this process that the test is essentially source related so its required frequency is envisaged as per annum. The Flakiness Index test as specified in IS EN 933-3 is generally influenced by the production process rather than the source rock. It is considered that this may have an influence on the frictional characteristics of the finished road surface. It would consequently be beneficial to include this test to reflect the aggregate condition on a per contract basis.

The data collected from these tests will help to form a benchmark for the more detailed monitoring of individual sites that the NRA will be undertaking (clause 4.7). These sites will be selected to provide a range of surfacing materials, site conditions and traffic levels. They will be subject to SCRIM surveys in addition to the annual network survey and friction after polishing tests may be undertaken on material samples extracted from the sites. This additional monitoring will enable the in service performance to be compared to declared PSV and AAV values at the time of the works. This will allow future amendments to HD 36 (NRA DMRB 7.5.1) to better target the use of aggregates in delivering the levels of skid resistance on the network required by NRA HD 28 (NRA DMRB 7.5.1).

ANNEX B: MANAGEMENT OF SITES WHERE DBM BINDER COURSE IS USED AS A TEMPORARY SURFACING

During road maintenance and improvement works, dense bitumen macadam (DBM) binder course may be operated as a temporary surfacing for an extended period. The period of trafficking could last from a few weeks to several months. Where this does occur, the following guidance on the management of such sites must be adopted in addition to the requirements of Clause 903.32 of the SRW.

Sites with < 250 HCV per day (one-way)
Such sites can be trafficked for periods of ten weeks without restrictions.
After this period a speed limit of 60 km/h should be imposed along with "Temporary Surfacing" warning signs.
The DBM material should be covered with a surface course material within six months of trafficking.

All other sites
A speed limit of 60 km/h should be imposed along with "Temporary Surfacing" warning signs from the time the DBM material is exposed to traffic.
The DBM material should be covered with a surface course material within three months of trafficking.

For large roadwork sites where the construction sequence may result in the possibility of the DBM material being trafficked for more than three months, then consideration should be given to reducing the speed limit further until a permanent surfacing is in place.