

INTERIM ADVICE NOTE 154/12

Revision of SHW Clause 903, Clause 921 and Clause 942

Summary

This IAN revises the specification for location of longitudinal surface joints and the initial texture depth for thin surface course systems and gives a specification for cold applied ultra thin surfacings (CAUTS).

Instructions for Use

This IAN gives new and substitute clauses for the Specification for Highway Works and Notes for Guidance. It should be read in conjunction with the relevant parts of the Design Manual for Roads and Bridges and the Manual of Contract Documents for Highway Works.

1. Introduction

This IAN gives revised requirements for the locations of longitudinal joints in highway resurfacing and the initial and retained texture depth of thin surface course systems. It also gives requirements for cold applied ultra thin surfacing.

1.1 Purpose

The introduction of this IAN addresses 3 main issues:

- Permitting the use of partial lane resurfacing (Clause 903.21SR)
- Improving the durability of thin surface course systems (Clause 921SR, Clause 942SR).
- Introduction of cold applied ultra thin surfacings (Clause 942SR).

1.2 Relationship

This IAN provides and requires the use of Substitute Clauses 903.21SR, 942 SR, 921 Substitute Table 9/3 and attendant Substitute Notes for Guidance. It should be read in conjunction with the relevant parts of both the Design Manual for Roads and Bridges and the Manual of Contract Documents for Highway Works.

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

The requirements in the revised specification clauses at Annexes A, B and C shall be applied in conjunction with the Series 900 of the Specification for Highway Works

The guidance given in Annexes A and C should be applied by compliers of contract specific specifications.

3. Withdrawal Conditions

This IAN shall be applied until either revised interim requirements are issued or the Manual of Contract Documents Volume 1 The Specification for Highway Works Series 900 and Volume 2 The Notes for Guidance for the Specification for Highway Works Series NG 900 are updated and this IAN notified as withdrawn as a result of those amendments.

4. Contacts

For questions or feedback regarding this IAN please contact:

standards_enquiries@highways.gsi.gov.uk

5. Normative References

The Manual of Contract Documents for Highway Works, Volume 1 – Specification for Highway Works, Series 900

The Manual of Contract Documents for Highway Works, Volume 2 – Notes for Guidance on the Specification for Highway Works, Series NG 900

Nicholls, J. C. et al. TRL Report TRL674 - Durability of thin surfacing systems, Part 4 Final report after nine years monitoring. Transport Research Laboratory, Nine Mile Ride, Wokingham, Berkshire.

BS EN 13108 Bituminous mixtures - Material specifications

BS EN 12271 Surface Dressing - Requirements

BS EN 13043 Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas

BS 594987 Asphalt for roads and other paved areas - Specification for transport, laying and compaction and type testing protocols

BS EN 13036 Road and airfield surface characteristics - Test methods. Measurement of pavement surface macrotexture depth using a volumetric patch technique

Construction Products Directive (89/106/EEC)

Construction Products Regulation (Regulation (EU) No 305/2011)

6. Informative References

National Highway Sector Scheme 13
National Highway Sector Scheme 14

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.

Interim Advice

Annex A Amendments to Clause 903 and Clause NG 903

Clause 903 Placing and Compaction of Bituminous Mixtures

The following shall be included in contract specific Appendix 0/2 Part A

903.21SR For new pavement construction, all longitudinal joints in all layers shall be situated outside wheel-track zones. Where an existing road pavement is resurfaced, joints in the surface course shall coincide with either the lane edge, the lane marking, or the middle of a traffic lane, whichever is appropriate. Joints shall not coincide with the wheel path. For the purposes of this Clause, the wheel-track zones shall be taken to be between 0.5 m and 1.1 m and between 2.55 m and 3.15 m from the centre of the nearside lane markings for each traffic lane (or, in the absence of lane markings, lane edges). All joints shall be offset at least 300 mm from parallel joints in the layer beneath.

Clause NG 903 Placing and Compaction of Bituminous Mixtures

The following alteration to Clause NG 903 is to be used for all appropriate schemes and included in contract specific Appendix 0/2 Part B when necessary.

NG 903.12SR Joints should always be located in low stress areas of the pavement wherever practicable, as indicated in sub-Clause 903.21. However, where an existing road surface is being replaced, it is permitted to locate the longitudinal joints within the surfacing material in the middle of a traffic lane. This position should only be selected if positioning the joint under the lane edge or lane marking would result in significant areas of sound surface course material being unnecessarily replaced. Joints should never be placed in the wheel-track zones.'

Annex B: Clause 921 Table 9/3

Clause 921

Table 9/3SR Requirements for Initial Texture Depth for Trunk Roads including Motorways

Road Type	Surfacing Type	Average per 1,000m section, mm		Average for a set of 10 measurements, mm (minimum)
		Minimum	Maximum	
High speed roads Posted speed limit \geq 50 miles/hr (80 km/hr)	Hot applied thin surface course systems to Clause 942 with an upper (D) aggregate size of 14mm	1.3	1.8	1.0
	Hot applied thin surface course systems to Clause 942 with an upper (D) aggregate size of 10mm	1.1	1.6	0.9
	Hot applied thin surface course systems to Clause 942 with an upper (D) aggregate size of 6mm	1.0	1.5	0.9
	Cold applied ultra thin surface course systems to Clause 942	1.5	2.0	1.2
	Chipped hot rolled asphalt, surface dressing and all other surfacings	1.5	2.0	1.2
Lower speed roads Posted speed limit \leq 40 miles/hr (65 km/hr)	Thin surface course systems to Clause 942 with an upper (D) aggregate size of 14mm or less	1.0	1.5	0.9
	Chipped hot rolled asphalt, surface dressing and all other surfacings	1.2	1.7	1.0
Roundabouts on high speed roads Posted speed limit \geq 50 miles/hr (80 km/hr)	Hot applied thin surface course systems to Clause 942 with an upper (D) aggregate size of 10mm	1.1	1.6	0.9
	Chipped hot rolled asphalt, surface dressing and all other surfacings	1.2	1.7	1.0
Roundabouts on lower speed roads Posted speed limit \leq 40 miles/hr (65 km/hr)	Hot applied thin surface course systems to Clause 942 with an upper (D) aggregate size of 10mm	1.1	1.6	0.9
	Hot applied thin surface course systems to Clause 942 with an upper (D) aggregate size of 6mm	1.0	1.5	0.9
	Chipped hot rolled asphalt, surface dressing and all other surfacings materials	1.0	1.5	0.9

Annex C: Amendments to Clause 942 and Clause NG 942

The following substitute Clause 942SR shall be included in contract specific Appendix 0/1 Part A

942SR Thin Surface Course Systems

General

1 Thin surface course systems shall either:

- (i) have a HAPAS Certificate, or equivalent certification, applicable to the required product performance under the combination(s) of traffic level and site classification specified in contract specific Appendix 7/1, or
- (ii) have the required product performance declared under the CE mark for the product in accordance with the relevant British adopted European standard and either the Construction Products Directive (89/106/EEC) (CPD) or the Construction Products Regulation (Regulation (EU) No 305/2011) (CPR) and for installation have a HAPAS Certificate or equivalent certification applicable to the required product performance under the combination(s) of traffic level and site classification specified in Appendix 7/1 or
- (iii) have the required product performance declared under the CE mark for the product in accordance with a European Technical Approval and the CPD and for installation have a HAPAS Certificate or equivalent certification applicable to the required product performance under the combination(s) of traffic level and site classification specified in Appendix 7/1, or
- (iv) have the required product performance declared under the CE mark for the product in accordance with a European Technical Assessment and the CPR and for installation have a HAPAS Certificate or equivalent certification applicable to the required product performance under the combination(s) of traffic level and site classification specified in Appendix 7/1.

2 (i) Thin surface course systems that are mixed hot as asphalt shall comply with the relevant part of BSEN13108 and either be CE marked in accordance with the relevant parts of BSEN 13108 and the CPD or CPR, or shall be produced in plants that operate Attestation of Conformity to BSEN 13108-21 and the Contractor shall provide certification to demonstrate this.

(ii) Cold applied ultra thin surface course systems (not to be used on Motorways) that are produced using surface dressing techniques shall comply with either Sub clause 1(i), (iii) or (iv) and for materials complying with Sub-clause 1 (i) be produced by companies that are either:

- a. registered to the National Highways Sector Scheme 13 for The Supply and Application of Surface Dressings to Road Surfaces as described in Appendix A, or
- b. operating Attestation of Conformity to BSEN 12271 and the Contractor shall provide certification to demonstrate this.

3 The generic type of thin surface course system required shall be specified in contract specific Appendix 7/1 as either:

- (i) Hot applied thin surfacings.
- (ii) Cold applied ultra thin surfacings.
- (iii) Other thin surfacings.

Test Certificates and Material Samples

4 A copy of the HAPAS Certificate or equivalent certification for the system shall be provided to the Overseeing Organisation, together with the associated Quality Plan and Installation Method Statement which shall comply with the requirements of this specification and any minimum laying requirements given in the HAPAS certificate. Copies of these documents shall be provided in the asset records. If the product is CE marked then the CE mark and associated declaration of performance must also be provided. The thin surface course system shall be manufactured, transported and laid in accordance with these documents. The material shall be manufactured in plants as defined in sub-Clause 2 and shall be laid by an installer approved by the Certificate Holder.

5 When required for audit purposes the component materials (including, where relevant, their nominal sizes) and their relative proportions and/or spread rates for use in the Permanent Works shall be notified to the Overseeing Organisation. The component materials listed shall include, as appropriate, coarse aggregates, fine aggregates, filler, additives (including fibres), binder, modifier and bond coat, and shall be subdivided into layers if applied using surface dressing or slurry surfacing techniques. Where a thin surface course system is not produced under a sector scheme as defined in sub-Clause 2, the Quality Plan and Quality System shall be acceptable to the Overseeing Organisation.

6 If detailed in contract specific Appendix 1/6, samples of aggregate, bond coat or binder, modified or unmodified bitumen from either the spray bar or storage tank or mixed bituminous materials from the pavement surface or other suitable sampling point shall be supplied to the Overseeing Organisation.

Aggregates

7 Only hot applied thin surface course systems with an upper (*D*) aggregate size of 10mm or less shall be permitted on Site Categories H1, H2, L and J. Areas where only hot applied thin surface course systems with an upper (*D*) aggregate size of 10mm or less are permitted shall be as specified in contract specific Appendix 7/1.

8 Coarse aggregate shall be crushed rock or steel slag complying with Clause 901 when tested in accordance with the procedures of BS EN 13043. The coarse aggregate shall additionally have the following properties.

- (i) Polished Stone Value (PSV) - as specified in contract specific Appendix 7/1 - BS EN 13043;
- (ii) Aggregate Abrasion Value (AAV) - as specified in contract specific Appendix 7/1 - BS EN 13043;
- (iii) Los Angeles Coefficient (LA) - not greater than LA_{30} . - BS EN 13043;
- (iv) Flakiness Index (FI) - not more than FI_{20} . - BS EN 13043.

Test certificates stating the properties of the aggregate to be used shall be supplied to the Overseeing Organisation unless the values are declared in the declaration of performance under the CE mark.

Performance Levels

9 The wheel-tracking levels of the thin surface course system, as recorded on the HAPAS Certificate or equivalent certification, shall be Level 3 unless otherwise specified in contract specific requirements Appendix 7/1. For thin surface course systems whose maximum thickness is less than 20 mm and no deformation resistance information is given, Level 3 is assumed.

10 The road/tyre noise level of the thin surface course system shall be specified as NR, 0, 1, 2 or 3 in contract specific requirements Appendix 7/1.

Layer Thickness

11 The minimum and/or maximum compacted thickness of the thin surface course system shall be as specified in contract specific requirements Appendix 7/1. The installed layer thickness must not be less than the permitted minimum thickness stated in the HAPAS certificate or equivalent certification for a particular system

12 Where necessary, the existing substrate surface shall be regulated in accordance with Clause 907, prior to laying surfacing material to this Clause. Evidence that the deformation resistance of material used for regulation is capable of complying with the requirements of sub-Clause 7 shall be provided to the Overseeing Organisation except that, if the combined maximum thickness of the regulating material and/or of the thin surface course system is more than 20 mm, evidence of the deformation resistance of the combined layers shall be provided.

Surface Preparation

13 When required, in contract specific requirements Appendix 7/1, a site inspection shall be undertaken prior to the main works jointly by representatives of the Overseeing Organisation and the Contractor to agree suitable preparation works (e.g. patching).

14 Surface preparation shall be in accordance with BS 594987 and the Installation Method Statement provided in accordance with sub-Clause 4.

Transportation

15 Transportation of the thin surface course system and/or its components shall be in accordance with the Installation Method Statement provided in accordance with sub-Clause 4. Notwithstanding, hot bituminous materials shall be transported in accordance with sub-Clause 903.6.

Sweeping and early life monitoring of Cold Applied Ultra Thin Surfacing

16 Sweeping of newly laid cold applied ultra thin surfacing shall be in accordance with the HAPAS certificate or equivalent certification and the Installation Method Statement.

17 Notwithstanding the above, suction sweeping shall be undertaken immediately before the newly laid cold applied ultra thin surfacing is opened to traffic.

18 The installation shall be monitored closely for a minimum period of 2 hours after the road is opened to traffic. Traffic safety and management procedures shall be reinstated or other such remedial actions instigated, if there are signs of distress in the surfacing, such as turning of the chippings, in order to prevent further damage to the installation.

19 Where detailed in contract specific requirements Appendix 7/1 a mandatory speed limit shall be implemented during installation and for a period of 5 days after installation. This speed limit would not normally be in excess of 40mph. The actual speed limit applied shall be agreed with the Overseeing Organisation.

20 Further operations to remove subsequently loosened chippings shall be carried out over the next 48 hours. The road, and adjacent side roads, footways and paved areas shall be kept substantially free of loose chippings for a period of 30 days after completion of the surfacing work.

Surface Macrotexture – Untrafficked

21 The macrotexture depth of the thin surface course system after compaction has been completed and before opening to traffic shall be in accordance with Clause 921.

Surface Macrotexture - Performance Guarantee

22 A guarantee shall be provided that for a period of two years from the date of opening to traffic the average macrotexture, measured using the volumetric patch technique described in BS EN 13036-1, will be maintained above the levels given in contract specific requirements Appendix 7/1.

23 Where measurement is necessary to demonstrate compliance during the guarantee period, the macrotexture shall be measured in accordance with BS EN 13036-1 in the most heavily trafficked lane at 10 m intervals. The average value of a set of 10 individual measurements taken along the centre of the most heavily worn wheel-track shall not be less than the appropriate value stated in contract specific requirements Appendix 7/1.

Surfacing Integrity – Performance Guarantee

24 For surfacing installed on the strategic road network a guarantee shall be provided for the integrity of the surfacing and the workmanship for a period of five years from the date of opening to traffic.

25 The five-year guarantee shall include for defects such as fretting, ravelling, stripping and loss of chippings. The guarantee shall exclude defects arising from accidental damage or damage caused by settlement, subsidence or failure of the underlying carriageway on which the surfacing material has been laid. Replacement of the surfacing or other remedial measures agreed with the Overseeing Organisation shall be executed if the surfacing is in a “Suspect” or “Poor” condition as defined in Appendix A of TRL Report TRL674 – “Durability of thin surfacing systems, Part 4, Final report after nine years monitoring, TRL report 674”.

The following substitute Clause NG 942 is to be used for all appropriate schemes and included in contract specific Appendix 0/1 Part B when necessary.

NG 942SR Thin Surface Course Systems

General

1 Thin surface course systems are proprietary bituminous products with suitable properties to provide a surface course that is laid at a nominal depth of less than 50 mm. As such, this classification can include hot-mixed asphalts, slurry surfacings incorporating microsurfacing and (multiple) surface dressings without any explicit exclusion. Acceptance requirements have been extended to include acceptance of CE marked products with the required declared performance and a valid CE mark. These generally cover only the manufacture of the product and not its installation. A valid HAPAS certificate or equivalent is still required to cover installation. Generally the HAPAS certificates will cover both the production and installation of materials but, where appropriate, recognise performance declared for CE marked products.

2 This Specification gives the minimum performance categories to which proprietary materials will need to be designed. The assessment as to the acceptable traffic flows that a system has been proved to be capable of carrying without excessive wear is based on the site stress level and commercial traffic on specific trial sites. The acceptable commercial traffic flows are separated by site stress levels, as given in Table NG 9/27.

TABLE NG 9/27: Site Stress Level Classification

Site Category	Site Definition	Stress Level
A	Motorway (main line)	1
B	Dual carriageway (all purpose) non-event sections	1
C	Single carriageway non-event sections	1
D	Dual carriageway (all purpose) minor junctions	1
E	Single carriageway minor junctions	1
F	Approaches to and across major junctions (all limbs)	2
G	Gradient >5%, longer than 50 m (Dual downhill; single uphill and downhill)	2
H1	Bend (not subject to 40 mph or lower speed limit) radius 100 – 250 m	2
H2	Bend (not subject to 40 mph or lower speed limit) radius <100 m	3
L	Roundabout	3
J	Approach to roundabout	4
K	Approach to traffic signals, pedestrian crossing, railway level crossing and similar	4

Where a product with a valid CE mark is offered and its declared performance under the CE mark meets the requirements of the specification then the product should not be rejected on the basis of any HAPAS certification not covering the product manufacture or the product being manufactured in a plant that is not assessed as meeting the requirements of a sector scheme. However, as all surfacing materials rely heavily on their quality of installation for their satisfactory performance, the HAPAS certification or equivalent and appropriate and relevant sector scheme membership must be present if required by the specification for installation.

3 The compiler of contract specific Appendix 7/1 should state the site stress levels for each section of road and the anticipated commercial traffic flows expected at the site over the guarantee period and should also require the Contractor to inspect the Site where the material will be laid.

4 The compiler of contract specific Appendix 7/1 should state the type of thin surface course system required for each section of road. The classifications are given in Table NG9/28.

TABLE NG 9/28: Thin Surface Course System Types

Type	Definition
Hot Applied Thin Surfacing	Mixed as hot asphalt above 120°C and produced in plants for the Production of Asphalt Mixes'
Cold Applied Ultra Thin Surfacing	Produced and mixed at the location where they are used at temperatures below 100°C

Other thin surfacings such as those produced using slurry or micro surfacing techniques will require a departure from standards.

Test Certificates and Material Samples

5 The initial assessment as to the suitability of thin surface course systems relies on the systems having gained a HAPAS Certificate or equivalent certification, in the course of which its in-situ properties will have been monitored for at least two years. Where a product is CE marked in accordance with the Construction Products Directive (CPD) or Construction Products Regulation (CPR) that will normally be taken into account in the certification and the HAPAS certification will deal principally with the installation of the product. Those supervising the works should ensure that they receive for CE marked products both the HAPAS certification or equivalent and the Declaration/Certificate of Performance under the CE mark.

6 However, possession of a Certificate and CE marking does not automatically mean that the particular system is suitable for every situation where a thin surface course system is required. The appropriate properties need to be checked against the properties of the system as recorded on the Certificate and under the CE mark.

7 Although a HAPAS Certificate or equivalent certification is a requirement under this Clause, there must be an opportunity for new materials to gain approval. Therefore, systems that do not have a HAPAS certificate or equivalent may be permitted (subject to departures from standards approval), provided the works are monitored as a trial, for not less than two years, with the intention of gaining appropriate approval. Full details of the monitoring arrangements and details of intervention contingency plans must be included in the departures from standards submission. The Surface Macrotexture Performance Guarantee period shall be extended to three years in these circumstances.

8 A clear distinction should be drawn between limitations set for the properties of thin surface course systems recorded on the HAPAS Certificate or equivalent certification and requirements placed on the work being carried out. The former are based on results from past works and identify what the system has achieved, whilst the latter identify what the system is required to achieve in this case.

Aggregates

9 The compiler of contract specific Appendix 7/1 should state whether each section of road is only suitable for hot mixed thin surface course systems with an upper (*D*) aggregate size of 10mm or less.

10 The minimum polished stone value of the coarse aggregate should be selected from Table 3.1 in HD 36 (DMRB 7.5.1). Separate maximum aggregate abrasion values should be given for thin surface course systems based on surface dressing or slurry surfacing techniques and other thin surface course systems using the appropriate information from Table 3.2 in HD 36 (DMRB 7.5.1).

Performance Levels

11 The deformation resistance of thin surface course systems can be set in terms of wheel tracking level stated on the HAPAS Certificate or equivalent certification. For trunk roads including motorways, Level 3 is usually required (see also Table 9/27). Deformation resistance should not be specified if the thin surface course system is being laid at thicknesses less than 20 mm.

12 If other levels of deformation resistance are required, this shall be specified in contract specific Appendix 7/1, with due consideration of the limits given in Table NG 9/29.

13 Permitted Road/Tyre Noise Levels are given in Table NG9/30. Levels 2 and 3 are necessary in noise-sensitive areas. In the interest of sustainability, Level 3 should only be specified in very noise sensitive areas.

14 Level 0 must not be specified at sites with existing noise barriers or earth bunds, where the latter have been specifically installed as a noise mitigation measure, and must not be used at locations that have been identified as an Important Area, either with or without First Priority Locations, in any of England's Noise Action Plans published by DEFRA in March 2010.

15 Road/Tyre Noise Levels are demonstrated by the optional value stated on HAPAS Certificates, or equivalent certification.

TABLE NG 9/30: Road/Tyre Noise Levels

Level	Equivalence to Traditional Surfacing Materials	Road Surface Influence RSI
3	Very quiet surfacing material	-3.5 dB(A)
2	Quieter than HRA surfacing materials	-2.5 dB(A)
1	Equivalent to HRA surfacing materials	-0.5 dB(A)
0	Equivalent to Cold Applied Ultra Thin Surfacing	+1.2 dB(A)
NR	No requirement	No requirement

Layer Thickness

16 The minimum and/or maximum thicknesses at which the thin surface course system shall be laid should only be specified where there are specific reasons for doing so. Possible reasons for specifying a minimum thickness may be:

- to maintain continuity with the material to be planed out or,
- to avoid premature cooling in adverse cold weather conditions or
- to provide a contribution to the structural strength of the pavement.

Possible reasons for specifying a maximum thickness may be:

- to maintain continuity with the material to be planed out or
- to retain sufficient headroom under over-bridges or
- to avoid overloading under-bridges or
- to minimise the need to raise kerbs, safety barriers and/or ironwork.

Premature cooling in adverse cold weather could be overcome either by use of thicker surfacing or by pre-heating of the substrate. The nominal thickness at which to lay the material has to be selected by the Contractor with due allowance for the constructional tolerance. If both a minimum and a maximum thickness are specified, the difference between the maximum and minimum thicknesses should be at least 20% of their average.

TABLE NG 9/29: Classification of Sites by Traffic and Stress Condition for Resistance to Permanent Deformation of Thin Surface Course Systems

	Site Category	Site Definition	Traffic at Design life (Commercial vehicles per lane per day)							
			Up to 250	251 - 500	501 - 1000	1001 - 1500	1501 - 2000	2001 - 2500	2501 - 4000	over 4001
I & II	A	Motorway (main line)	0			1		2		3
	B	Dual carriageway (all purpose) non-event sections								
	D	Dual carriageway (all purpose) minor junctions								
	C	Single carriageway non-event sections								
	E	Single carriageway minor junctions								
IA & IIA	As I and II, above, but with contraflow anticipated during summer months		0		1		2		3	
III	F	Approaches to and across major junctions (all limbs)	0		1		2		3	
	G1	Gradient 3% to 10%, longer than 50 m								
	L	Roundabout								
IIIA	As III, above, but with contraflow anticipated during summer months or in a south-facing cutting uphill		0	1		2	3			
IV	G2	G2 Gradient steeper than 10%, longer than 50 m	0	1		2	3			
IVA	As IV, above, but with contraflow anticipated during summer months or in a south-facing cutting uphill		0	2		3				
	J/K	Approach to roundabout, traffic signals, pedestrian crossings, railway level crossings and similar	0	2		3				

17 The range of nominal installation depth at which a thin surface course system can be laid are given on the HAPAS Certificate or equivalent certification. If systems are specified to be laid at nominal depths other than those quoted, then the performance categories identified in the Certificate will not be valid.

Surface Preparation, Transportation, Placement and Compaction

18 The design, manufacture, transportation, placement and compaction of the materials is the Contractor's responsibility, within the constraints of the HAPAS Certificate or equivalent accreditation for the system, as is a decision as to whether the weather conditions are suitable for placement and compaction. This transfer of responsibility provides scope for the Contractor to design and place the materials to suit the Contractor's system.

19 Contraflow and maintenance operations often require the application of temporary retroreflecting road studs. There are many proprietary types of stud available. Trials have indicated that many types of stud leave a sticky deposit of bituminous adhesive which clogs the surface voids and some studs also cause pluck-out of surface aggregate potentially leading to accelerated local deterioration of the pavement surfacing. Therefore, trials may need to be performed, at the outer edge of the hard shoulder, to ensure that the studs proposed for use can be removed from the surface without plucking-out surface aggregate or leaving an excessive deposit.

20 Problems have also been reported with pre-formed road marking tapes on negatively macrotextured surfaces coming unstuck in wet weather. Trials should be performed to select the best material.

Surface Macrotexture – Untrafficked

21 The minimum macrotexture depth required from hot rolled asphalt surfacing on high-speed trunk roads is generally 1.5 mm. With thin surface course systems, the choice of aggregate grading is the Contractor's provided that the specified minimum surface macrotexture is achieved. To ensure that suitable macrotexture is provided and maintained on all roads, an initial macrotexture depth is specified in Clause 921 and a minimum requirement after two years has been included as part of the Contractor's guarantee.

22 Whilst measurement of macrotexture depth for compliance purposes is to be by the volumetric patch technique specified in BS EN 13036-1 only, Sensor Measured Texture Depth may be used as a screening procedure.

23 Calibration trials and checks should be undertaken at the start and during the course of work to derive and confirm a relationship between the sand patch method and the Measured Texture Depth (SMTD).

24 In the event of a dispute, or discrepancy between the two methods, only results obtained using the volumetric patch method will be considered for compliance purposes.

25 Calibrations carried out on site are only applicable to that site and that surfacing.

26 SMTD is numerically different from macrotexture measured by the volumetric patch technique. Glass spheres patch macrotexture depth is a measurement of the average depth of hollows in the surface below general level of peaks. SMTD is the standard deviation of the sample height measurements.

Surface Macrotexture – Performance Guarantee

27 The performance levels of macrotexture depth for use on the strategic road network are given in Table NG 9/32. Research has shown that hot applied thin surfacings with an upper (*D*) aggregate size of 10mm or 14mm maintain adequate high speed skid resistance with these levels of texture. For hot applied thin surfacings with an upper (*D*) aggregate size of 6mm, current techniques for assessing texture depth do not satisfactorily explain the skid resistance characteristics. These materials will require a supplementary assessment from a Type Approval Installation Trial (TAIT) to provide evidence verifying adequate high-speed friction performance. Evidence must be provided that a TAIT has been carried out or a TAIT must be included in the proposal for departure from standard.

TABLE NG 9/32: Retained Surface Macrotexture Requirements

Surfacing Type	Average texture depth per 1,000m section, mm ¹
Hot applied thin surface course systems with an upper (<i>D</i>) aggregate size of 14mm	0.9
Hot applied thin surface course systems with an upper (<i>D</i>) aggregate size of 10mm	0.8
Hot applied thin surface course systems with an upper (<i>D</i>) aggregate size of 6mm	0.7 ²
Cold applied ultra thin surface course systems produced using surface dressing techniques	1.0

¹ or the complete carriageway lane where this is less than 1,000 m.

² verification of high speed friction performance required.

28 A lower level of retained surface macrotexture may be suitable where there is limited traffic and/or restricted speeds.

29 Sensor Measured Texture Depth (SMTD) is routinely measured on the Highways Agency’s trunk road network. To comply with sub-Clause 942.16 macrotexture need only be measured in accordance with BS EN 13036-1 in cases of dispute, when the measured SMTD or another routine assessment method indicates compliance may not have been achieved.

Performance Guarantee

24 The guarantee periods only relate to the surface course. An appropriate Special Requirement should be included in the Conditions of Contract, which draws particular attention to sub-Clauses 942.17, 942.18 and 942.16. At the end of the five-year guarantee period, the surfacing should be in at least a “Moderate/Acceptable” condition or a better condition after discounting any faults caused by the substrate. Surface conditions are as defined in Appendix A of TRL Report TRL674.