Design Manual for Roads and Bridges

Pavement
Design

CD 236
Surface course materials for construction

(formerly CD 236 (rev. 3 inc. HD 36/06 and IAN 156/16), HD 37/99, HD 38/16, IAN 157/11, TA 81/16)

Version 4.1.0

Summary
This document provides requirements for pavement surfacing for both flexible and rigid pavements

National Variation
This document has associated National Application Annexes providing alternative or supplementary content to that given in the core document, which is relevant to specific Overseeing Organisations. National Application Annexes are adjoined at the end of this document.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated National Highways team. The online feedback form for all enquiries and feedback can be accessed at: www.standardsforhighways.co.uk/feedback.

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Latest release notes

Document code	Version number	Date of publication of relevant change	Changes made to	Type of change
CD 236	4.**1**.0	December 2022	Core document, England NAA, Scotland NAA, Wales NAA	Incremental change to requirements

Revision 4.1.0 (Published Dec. 2022) removes a duplicate requirement relating to the use of visually contrasting surfaces on central reservations. This topic is covered by CD 127.

Previous versions

Document code	Version number	Date of publication of relevant change	Changes made to	Type of change
CD 236	4.0.**1**	July 2021	Core document, Wales NAA	Incremental change to notes and editorial updates
CD 236	4	March 2020		

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Foreword

Publishing information

This document is published by National Highways.

This document supersedes HD 36/06, HD 37/99, HD 38/16, IAN 156/16, IAN 157/11 and TA 81/16 which are withdrawn.

Contractual and legal considerations

This document forms part of the works specification. It does not purport to include all the necessary provisions of a contract. Users are responsible for applying all appropriate documents applicable to their contract.

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Introduction

Background

The appropriate choice of surface course material plays a key role in providing roads that are safe, meet the needs of the user and offer good value for money. Permitted surface course materials and guidance on their selection are presented in this document.

In dry conditions all clean, surfaced roads have a high skidding resistance. However in wet conditions the skidding resistance is reduced. Using aggregates with an appropriate resistance to polishing for a particular site and traffic loading should result in a surfacing giving wet skidding resistance above the appropriate investigatory level (IL) assigned in accordance with CS 228 [Ref 7.N].

Assumptions made in the preparation of this document

The assumptions made in GG 101 [Ref 3.N] apply to this document.

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Abbreviations

Abbreviations

Abbreviation	Definition
AADF	Annual average daily flow (1-direction)
AAV	Aggregate abrasion value
CAUTS	Cold applied ultra-thin surfacing
CSC	Characteristic skid coefficient
EAC	Exposed aggregate concrete
HFS	High friction surfacing
HRA	Hot rolled asphalt
IL	Investigatory level
PSV	Polished stone value
TSCS	Thin surface course system

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Terms and definitions

Terms

Term	Definition
Departure	Variation or waiving of a requirement carried out in accordance with the Overseeing Organisation's procedures.
High friction surfacing	Specialised high friction surfacing conforming to Clause 924 of the Specification for Highway Works MCHW Series 0900 [Ref 5.N].
Thin surface course systems	Thin surface course systems conforming to Clause 942 of the Specification for Highway Works MCHW Series 0900 [Ref 5.N].

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1. Scope

Aspects covered

1.1 This document shall be applied to surface course materials for new and maintenance construction on both flexible and rigid pavements.

NOTE 1 *This document gives requirements for aggregates in surface course materials, which aim to ensure that appropriate skidding resistance is provided on roads.*

NOTE 2 *Additional requirements for aggregates used in pavement construction can be found in the Specification (MCHW1) MCHW Series 0700 [Ref 6.N], MCHW Series 0900 [Ref 5.N] and MCHW Series 1000 [Ref 4.N] together with the Notes for Guidance MCHW Series NG 0700 [Ref 4.I], MCHW Series NG 0900 [Ref 5.I] and MCHW Series NG 1000 [Ref 3.I].*

NOTE 3 *Detailed information on maintenance of asphalt and concrete roads can be found in CM 231 [Ref 6.I] and CD 227 [Ref 1.I].*

NOTE 4 *This document does not cover the requirements for footways and cycleways, which can be found in CD 239 [Ref 2.I].*

1.2 This document shall be read in conjunction with 'Skidding resistance' CS 228 [Ref 7.N].

Implementation

1.3 This document shall be implemented forthwith on all schemes involving design of road pavement surface on the Overseeing Organisations' motorway and all-purpose trunk roads according to the implementation requirements of GG 101 [Ref 3.N].

Use of GG 101

1.4 The requirements contained in GG 101 [Ref 3.N] shall be followed in respect of activities covered by this document.

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2. Surface course material options

2.1 The specific requirements for surface course material options shall apply as provided in the National Application Annexes.

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3. Aggregate selection

Polished stone value (PSV) and aggregate abrasion value (AAV)

3.1 The aggregates used in pavement quality concrete complying with Clause 1026 of the Specification MCHW Series 1000 [Ref 4.N] shall be exempt from the requirements of Section 3 of this document.

3.2 Coarse aggregates or chippings shall undergo polished stone value (PSV) testing in accordance with BS EN 1097-8 [Ref 8.N] to determine the resistance to polishing under the action of traffic.

3.3 For all roads, PSV shall be selected from the rows of Table 3.3a or Table 3.3b for the relevant material type, and corresponding site category and traffic level.

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Table 3.3a PSV for chippings or coarse aggregate in surfacings excluding thin surface course systems complying with clause 942 and pavement quality concrete complying with clause 1026 of the Specification (MCHW1)

Site category	Site description	Default	IL	PSV required for given IL, traffic level and type of site									
				Traffic (cv/lane/day) at design life									
				1 - 250	251 - 500	501 - 750	751 - 1000	1001 - 2000	2001 - 3000	3001 - 4000	4001 - 5000	5001 - 6000	Over 6000
A	Motorway		0.30	50	50	50	50	50	55	55	60	65	65
		*	**0.35**	**50**	**50**	**50**	**50**	**50**	**60**	**60**	**60**	**65**	**65**
B	Non-event carriageway with one-way traffic		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+
C	Non-event carriageway with two-way traffic		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+
Q	Approaches to and across minor and major junctions; approaches to roundabouts and traffic signals	*	**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
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
R	Roundabout	*	**0.45**	**50**	**55**	**60**	**60**	**65**	**65**	**68+**	**68+**	**68+**	**68+**
			0.50	68+	68+	68+	68+	68+	68+	68+	68+	68+	68+
G1	Gradients 5-10% longer than 50 m	*	**0.45**	**55**	**60**	**60**	**65**	**65**	**68+**	**68+**	**68+**	**68+**	**68+**
			0.50	60	68+	68+	HFS	HFS	HFS	HFS	HFS	HFS	HFS
G2	Gradient >10% longer than 50 m		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

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Table 3.3a PSV for chippings or coarse aggregate in surfacings excluding thin surface course systems complying with clause 942 and pavement quality concrete complying with clause 1026 of the Specification (MCHW1) (continued)

Site category	Site description	Default	IL	PSV required for given IL, traffic level and type of site									
				Traffic (cv/lane/day) at design life									
				1 - 250	251 - 500	501 - 750	751 - 1000	1001 - 2000	2001 - 3000	3001 - 4000	4001 - 5000	5001 - 6000	Over 6000
S1	Bends radius <500 m – carriageway with one-way traffic	*	**0.45**	**50**	**55**	**60**	**60**	**65**	**65**	**68+**	**68+**	**HFS**	**HFS**
			0.50	68+	68+	68+	HFS	HFS	HFS	HFS	HFS	HFS	HFS
S2	Bends radius <500 m – carriageway with two-way traffic		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

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Table 3.3b PSV for coarse aggregate in thin surface course systems complying with clause 942 of the Specification (MCHW1)

Site category	Site description	Default	IL	PSV required for given IL, traffic level and type of site									
				Traffic (cv/lane/day) at design life									
				1-250	251- 500	501- 750	751- 1000	1001- 2000	2001- 3000	3001- 4000	4001- 5000	5001- 6000	Over 6000
A	Motorway		0.30	50	50	**50**	50	50	50	50	53	63	63
		*	**0.35**	**50**	**50**	**50**	**50**	**50**	**53**	**53**	**53**	**63**	**63**
B	Non-event carriageway with one-way traffic		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+
C	Non-event carriageway with two-way traffic		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+
Q	Approaches to and across minor and major junctions, approaches to roundabouts and traffic signals	*	**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
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
R	Roundabout	*	**0.45**	**50**	**55**	**60**	**60**	**65**	**65**	**68+**	**68+**	**68+**	**68+**
			0.50	68+	68+	68+	68+	68+	68+	68+	68+	68+	68+
G1	Gradients 5-10% longer than 50 m		0.45	55	60	60	65	65	68+	68+	68+	68+	68+
		*	**0.50**	**60**	**68+**	**68+**	**HFS**	**HFS**	**HFS**	**HFS**	**HFS**	**HFS**	**HFS**
G2	Gradient >10% longer than 50 m		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

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Table 3.3b PSV for coarse aggregate in thin surface course systems complying with clause 942 of the Specification (MCHW1) (continued)

Site category	Site description	Default	IL	PSV required for given IL, traffic level and type of site									
				Traffic (cv/lane/day) at design life									
				1-250	251- 500	501- 750	751- 1000	1001- 2000	2001- 3000	3001- 4000	4001- 5000	5001- 6000	Over 6000
S1	Bends radius <500 m – carriageway with one-way traffic	*	**0.45**	**50**	**55**	**60**	**60**	**65**	**65**	**68+**	**68+**	**HFS**	**HFS**
			0.50	68+	68+	68+	HFS	HFS	HFS	HFS	HFS	HFS	HFS
S2	Bends radius <500 m – carriageway with two-way traffic		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

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3.3.1 PSV should be selected from those rows marked with a * in the default column of Table 3.3a or Table 3.3b.

NOTE 1 *Table 3.3a applies to all types of surface course materials with the exception of Clause 942 thin surface course systems (TSCS), Clause 942TS (Stone Mastic Asphalt Surface Course (TS2010), Clause 942WG (Welsh Government Procedure W2F and Advice Guidance (PAG) 112/20 – Stone Mastic Asphalt Specification) and Clause 1026 (pavement quality concrete). Table 3.3b is applicable to Clause 942 TSCS only*

NOTE 2 *There is no PSV requirement for the aggregate used in clause 1026 materials (pavement quality concrete) , Clause 942TS (Stone Mastic Asphalt Surface Course (TS2010)) and), Clause 942WG (Welsh Government Procedure W2F and Advice Guidance (PAG) 112/20 – Stone Mastic Asphalt Specification) .*

NOTE 3 *Surfacing material containing a high proportion of calcined bauxite and 68+ psv natural aggregate blend in the mix can offer a similar skid resistance performance and durability to that provided by HFS in some of the site category and investigatory level combinations in table 3.3b.*

3.4 The appropriate PSVs taken from Table 3.3a or Table 3.3b and AAVs from Table 3.10 shall be inserted in Appendix 7/1 of the Specification MCHW Series 0700 [Ref 6.N].

3.5 For all roads the justification for selecting PSV from rows other than those marked with a * in the default column of Table 3.3a or Table 3.3b shall be recorded.

NOTE 1 *The default column * marked rows in Table 3.3a or Table 3.3b indicate the levels of PSV appropriate to the lowest CSC 'ST' marked cell in Table 4.1 (Site categories and investigatory levels) of CS 228 [Ref 7.N] .*

NOTE 2 *Aggregates with a lower PSV than indicated in Table 3.3a or Table 3.3b can be proposed if evidence is available that the aggregate has achieved the required life, skid resistance and skidding accident rate on a road of similar geometry, traffic volume and meteorological conditions.*

3.6 Where '68+' material is listed in Table 3.3a or Table 3.3b, none of the three most recent results from consecutive PSV tests relating to the aggregate to be supplied shall fall below 68.

3.7 Basic oxygen steel slag complying with the chemical composition in Table 3.7 shall be classified as equivalent to PSV60 aggregate up to and including 5,000 cv/lane/day traffic at design life in site categories A, B and C when used in a TCSC complying with Clause 942 of the Specification MCHW Series NG 0900 [Ref 5.I].

Table 3.7 Permitted chemical composition for basic oxygen steel slag

Chemical	Percentage by mass (%)
Fe_2O_3	20-30
CaO	40-50
SiO_2	10-51
MgO	4-10

Site category and investigatory level

3.8 The site category and investigatory level to be used in Table 3.3a or Table 3.3b shall be those which have been allocated to the specific site on which the material is to be laid.

3.9 Site category and investigatory level shall be determined by following the procedures in CS 228 [Ref 7.N].

Aggregate abrasion value

3.10 The AAV for the coarse aggregate shall be selected from Table 3.10, based on the relevant site categories and traffic levels.

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Table 3.10 Maximum AAV of chippings, or coarse aggregates in unchipped surfaces, for new surface courses excluding Clause 1026 (pavement quality concrete)

Traffic (cv/lane/day) at design life	≤ 250	251 - 1000	1001 - 1750	1751 - 2500	2501 - 3250	>3250
Max. AAV for chippings for hot rolled asphalt, surface dressing and for aggregate in slurry and microsurfacing systems	14	12	12	10	10	10
Max. AAV for aggregate in thin surface course systems, CAUTS, exposed aggregate concrete surfacing and asphalt concrete surface course	16	16	14	14	12	12
Note: The maximum AAV requirement for porous asphalt is specified in Clause 938 of the Specification (MCHW Series 0900 [Ref 5.N]).						

NOTE *The aggregate abrasion value (AAV) of the coarse aggregate or chippings is determined in accordance with Annex A BS EN 1097-8 [Ref 8.N] having regard to the durability or resistance of the aggregate to abrasion under the action of traffic.*

3.11 Limestone aggregates shall not be specified as the coarse aggregate or chippings in surface courses as noted in PD 6691 [Ref 2.N].

Traffic flow

3.12 The traffic flow used to determine the PSV and AAV for a particular surfacing shall be the design traffic as commercial vehicles per lane per day (cv/lane/day) based on the annual average daily flow (AADF) predicted to be using the lane at the end of the anticipated life of the surfacing.

NOTE *Information on traffic flow can be found in CD 224 [Ref 7.I].*

3.13 For maintenance schemes where classified traffic counts are not generally available and automatic counters are used for vehicle counts, the number of commercial vehicles per lane shall be regarded as equivalent to the number of vehicles >6.6 m in length.

3.14 For new construction and complete carriageway resurfacing, the level of PSV chosen shall reflect the design traffic flows for each individual lane.

3.15 Where a single lane is being resurfaced for maintenance purposes the appropriate PSV and AAV shall be used for that lane.

NOTE *The PSVs and AAVs chosen need not match the values of existing adjacent surfacing.*

3.16 For lanes with a design traffic of zero commercial vehicles the minimum PSV for surface coarse aggregates shall be 50.

3.17 Where the traffic flow on motorways within site category A exceeds 6,000 commercial vehicles per day, the specified PSV for surface coarse aggregates shall not exceed those specified in Table 3.3a or Table 3.3b.

Gyratory junctions

3.18 A maximum nominal aggregate size of 10 mm shall be specified in a thin surface course system on the circulatory part of a roundabout or other gyratory junctions or other highly stressed sites.

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High friction surfacing (HFS)

3.19 High friction surfacing (HFS) shall not be specified on the circulatory parts of roundabouts, even if traffic signal controlled.

3.20 HFS shall not be specified solely because a coloured road surface is required.

Coloured surfacing

3.21 Any requirements for the use of coloured surfacing as determined in CD 127 [Ref 1.N] shall use materials provided in the National Application Annexes.

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4. Normative references

The following documents, in whole or in part, are normative references for this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Ref.	Document
Ref 1.N	National Highways. CD 127, 'Cross-sections and headrooms'
Ref 2.N	BSI. PD 6691, 'Guidance on the use of BS EN 13108, Bituminous mixtures. Material specifications'
Ref 3.N	National Highways. GG 101, 'Introduction to the Design Manual for Roads and Bridges'
Ref 4.N	Highways England. MCHW Series 1000, 'Manual of Contract Documents for Highway Works. Volume 1 - Specification for Highway Works. Series 1000 Road Pavements – Concrete Materials'
Ref 5.N	Highways England. MCHW Series 0900, 'Manual of Contract Documents for Highway Works. Volume 1 Specification for Highway Works. Series 900 Road Pavements – Bituminous Bound Materials.'
Ref 6.N	Highways England. MCHW Series 0700, 'Manual of Contract Documents for Highways Works, Volume 1 Specification for Highways Works, Series 700 Road Pavements - General'
Ref 7.N	Highways England. CS 228, 'Skidding resistance'
Ref 8.N	BSI. BS EN 1097-8, 'Tests for mechanical and physical properties of aggregates - Determination of the Polished Stone Value (PSV)'

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5. Informative references

The following documents are informative references for this document and provide supporting information.

Ref.	Document
Ref 1.I	National Highways. CD 227, 'Design for pavement maintenance'
Ref 2.I	National Highways. CD 239, 'Footway and cycleway pavement design'
Ref 3.I	Highways England. MCHW Series NG 1000, 'Manual of Contract Documents for Highway Works. Volume 2 - Notes for Guidance on the Specification for Highway Works. Series NG 1000 Road Pavements – Concrete Materials.'
Ref 4.I	Highways England. MCHW Series NG 0700, 'Manual of Contract Documents for Highway Works. Volume 2 - Notes for Guidance on the Specification for Highway Works. Series NG 700 Road Pavements - General'
Ref 5.I	Highways England. MCHW Series NG 0900, 'Manual of Contract Documents for Highway Works. Volume 2 - Notes for Guidance on the Specification for Highway Works. Series NG 900 Road Pavements – Bituminous Bound Materials.'
Ref 6.I	Highways England. CM 231, 'Pavement surface repairs'
Ref 7.I	National Highways. CD 224, 'Traffic assessment'

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Pavement
Design

CD 236 - ENAA
England National Application Annex for Surface course materials for construction

(formerly CD 236 (revision 4 including HD 36/16),)

Version 4.0.1

Summary
This National Application Annex gives the National Highways specific requirements on pavement surfacing for both flexible and rigid pavements.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated National Highways team. The online feedback form for all enquiries and feedback can be accessed at: www.standardsforhighways.co.uk/feedback.

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Latest release notes

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CD 236 - ENAA	4.0.**1**	December 2022	England NAA	Incremental change to advice

(Pub. Dec. 2022: Version 4.0.1) National Highways National Application Annex to CD 236. This document contains National Highways requirements and advice for section 2 of CD 236 related to pavement surfacing for both flexible and rigid pavements. Revision 4.01 Amends the choice of surfacing for existing lay-bys to include the 'same surfacing type as the adjacent carriageway' - see E/1.4.

Previous versions

Document code	Version number	Date of publication of relevant change	Changes made to	Type of change
CD 236	4	March 2020		
CD 236	1	December 2018		

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Foreword

Publishing information

This document is published by National Highways.

This document is a National Application Annex to CD 236 [Ref 10.N].

Contractual and legal considerations

This document forms part of the works specification. It does not purport to include all the necessary provisions of a contract. Users are responsible for applying all appropriate documents applicable to their contract.

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Introduction

Background

This National Application Annex gives the National Highways-specific requirements related to pavement surfacing for both flexible and rigid pavements.

Assumptions made in the preparation of this document

The assumptions made in GG 101 [Ref 4.N] apply to this document.

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Abbreviations

Abbreviations

Abbreviation	Definition
CAUTS	Cold applied ultra-thin surfacing
DEFRA	Department for Environment, Food and Rural Affairs
EA	Emergency area
EAC	Exposed aggregate concrete
ELPV	Enhanced longitudinal profile variance
HRA	Hot rolled asphalt
MCHW	Manual of contract documents for highways works
NSC	Network structural condition
TRACS	Traffic speed condition survey
TRASS	Traffic speed structural survey
TSCS	Thin surface course systems

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Terms and definitions

Terms

Term	Definition
Departure	Variation or waiving of a requirement carried out in accordance with the Overseeing Organisation's procedures.
Emergency area(s)	The full legal term is 'emergency refuge area(s)'; see UKSI 2015/392 [Ref 11.N]
Smart motorway(s)	Smart motorways are defined in GD 301 [Ref 9.N]

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E/1. Surface course material options (CD 236, 2.1)

Choice of surfacing

E/1.1 Surface course materials shall be selected from the permitted options provided in Table E/1.1 from MCHW Series 0900 [Ref 7.N] & MCHW Series 1000 [Ref 5.N].

Table E/1.1 Pavement surface course materials for new and maintenance construction

	Material
New Construction	MCHW1 Clause 924 high friction surfacing MCHW1 Clause 942 thin surface course system MCHW1 Clause 943 hot rolled asphalt MCHW1 Clause 1026 performance concrete surface (see Note 2)
Maintenance	MCHW1 Clause 923 cold applied ultra-thin surfacing MCHW1 Clause 924 high friction surfacing MCHW1 Clause 942 thin surface course system MCHW1 Clause 943 hot rolled asphalt MCHW1 Clause 1026 performance concrete surface (see Note 2) MCHW1 Clause 1026 brushed concrete surface (see Note 2)
Note 1: The choice of materials has been determined by National Highways based on: the nature of the existing network; population density; traffic intensity; climatic conditions; historic performance; availability of materials; and noise requirements. Note 2: Rigid construction only.	

NOTE 1 *Some of the particular factors that can influence the selection of a surface course material are provided in Appendix E/A.*

NOTE 2 *Traffic noise in lower speed zones (up to 50 km/h) is mainly attributable to engine, transmission and exhaust noise, especially from lorries.*

NOTE 3 *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 (HRA). These include, for example, hot, paver-laid thin surface course systems, performance concrete and exposed aggregate concrete.*

E/1.1.1 HRA, cold applied ultra-thin surfacing (CAUTS) , performance concrete finished surface and exposed aggregate concrete (EAC) may be options for the surface course unless the site is 'noise sensitive'.

E/1.2 Details of which surface course materials are selected (including the aggregate properties) shall be recorded as required by CD 226 [Ref 1.N] Section 6.

Lay-bys, emergency areas and hardstanding locations

E/1.3 New lay-bys and hardstanding locations including emergency areas (EAs) shall use a surfacing from one of the following options:

1) concrete (see MCHW Series 1000 [Ref 5.N]);
2) block paving (see MCHW Series 1100 [Ref 6.N]); or,
3) bituminous mixtures with deformation and fuel resisting properties.

NOTE 1 *'Fuel resisting' is defined as a bituminous mixture that conforms to Cimax6 when tested to BS EN 12697-43 [Ref 1.I].*

NOTE 2 *'Deformation resisting' is defined as a bituminous mixture developing a rut depth (RD) of less than 2.5 mm when tested with a small device at 60C using procedure A for 1000 cycles to BS EN 12697-22 [Ref 2.I].*

E/1.4 Existing lay-bys shall be resurfaced with either:

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1) the same surfacing type as the adjacent carriageway;
2) bituminous mixtures with deformation and fuel resisting properties;
3) block paving (see MCHW Series 1100 [Ref 6.N]); or,
4) concrete (see MCHW Series 1000 [Ref 5.N]).

E/1.4.1 Existing bus lay-bys should be resurfaced with either:

1) bituminous mixtures with deformation and fuel resisting properties (MCHW Series 0900 [Ref 7.N]);
2) block paving (MCHW Series 1100 [Ref 6.N]); or,
3) concrete (MCHW Series 1000 [Ref 5.N]).

E/1.5 Emergency areas (EAs) shall be surfaced in accordance with MCHW Series 0900 [Ref 7.N].

Noise sensitive sites

E/1.6 Where any of the following applies, a site shall be classed as 'noise sensitive':

1) the location has been identified as a noise important area in any of England's noise action plans published by DEFRA NAP(E) [Ref 3.N];
2) noise 'sensitive receptors' are located within 600 m from the roadside (and 600 m from the ends of the sections);
3) noise barriers or earth bunds have been installed as a noise mitigation measure; or,
4) there are designated areas of landscape or biodiversity value within 600 m of the roadside (and 600 m from the ends of the sections).

NOTE 1 *Examples of 'sensitive receptors' are given in LA 111 [Ref 8.N].*

NOTE 2 *Areas of landscape or biodiversity value include areas of bird nesting or areas with multiple footpaths used regularly for recreation.*

E/1.7 Where the site is 'noise sensitive', a low noise surfacing (as defined in E/1.10) shall be used where traffic speeds are greater than 50 km/h.

E/1.7.1 All departure applications to use non-low-noise surfacing should be supported with a value for money calculation.

E/1.7.2 Where traffic speeds are 50 km/h or lower, a low noise surfacing may not be required even if the site is 'noise sensitive'.

NOTE *Guidance on calculating the value for money of a 'noise sensitive' departure approval is provided in Appendix E/B.*

E/1.8 HRA shall be used during resurfacing on bridge decks that have not been designed for a TSCS, even if the site is 'noise sensitive' and the approaches are surfaced in TSCS.

NOTE 1 *Ponding of water in the surface layers, particularly TSCS, can occur if the bridge deck has not been fitted with an asphalt drainage system. Ponded water can contribute to reduced durability of the surface under trafficking and freeze/thaw conditions.*

NOTE 2 *Further information on bridge deck surfacing is available in CD 358 [Ref 12.N] .*

Noise levels

E/1.9 Surfacing with noise levels 0 and 1 contained in Clauses 923, 942 and 1026 of the Specification MCHW Series 0900 [Ref 7.N] & MCHW Series 1000 [Ref 5.N] shall not be specified at sites with existing noise barriers or earth bunds that have been specifically installed as a noise mitigation measure or at locations that have been identified as an important area in any of England's noise action plans published by DEFRA NAP(E) [Ref 3.N].

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Texturing

E/1.10 Selected surface course materials shall meet the required texture depth requirements specified in Clauses 921, 942 or 1026 of the specification MCHW Series 0900 [Ref 7.N] & MCHW Series 1000 [Ref 5.N].

E/1.11 Retexturing of existing surfaces shall be permitted for pavements with a particular skidding concern pending replacement of the surface.

NOTE *Further guidance on retexturing is provided in CD 227 [Ref 2.N].*

Coloured surfacing

E/1.12 The surface course material or system to be used for coloured surfacing shall be selected from Table E/1.12.2N.

E/1.12.1 Coloured surfacing materials or systems may be used to provide a contrasting colour to the adjacent pavement surfaces, and/or to supplement prescribed signs/markings such as for bus and cycle lanes.

E/1.12.2 Coloured surfacing may be provided by using individually (or a combination of) the following:

1) natural coloured aggregates;
2) artificially pigmented aggregates;
3) pigmented binder; and,
4) addition of pigments to a mixture.

NOTE *The surface course materials or systems presented in Table E/1.12.2N can be produced as a coloured surfacing.*

Table E/1.12.2N Material options for coloured surfacing

Material	Specification clause MCHW Series 0900 [Ref 7.N]
Thin surface course systems	Clause 942
Cold applied ultra thin surfacing	Clause 923
Slurry surfacing and microsurfacing	Clause 918
Surface dressing	Clause 922
High friction surfacing	Clause 924
Grouted macadam surfacing	N/A
Hot rolled asphalt	Clause 943

E/1.12.3 Where the coloured surfacing selected forms a layer <10 mm thick the underlying material should be in a sound condition such that it:

1) is free of visual defects;
2) has TRACS rut depth and ELPV all in condition category 1;
3) has TRACS lane fretting intensities all <2; and,
4) has TRASS NSCs all in category 1 or 2.

NOTE *Information on network level surveys is provided in CS 229 [Ref 3.I].*

E/1.13 Bright orange coloured surface course shall be used on EAs on smart motorway schemes as defined in GD 301 [Ref 9.N].

E/1.14 Bright orange coloured surface course shall not be used for any application other than EAs on smart motorway schemes as defined in GD 301 [Ref 9.N].

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E/2. Normative references

The following documents, in whole or in part, are normative references for this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Ref.	Document
Ref 1.N	National Highways. CD 226, 'Design for new pavement construction'
Ref 2.N	National Highways. CD 227, 'Design for pavement maintenance'
Ref 3.N	DEFRA. NAP(E), 'England's Noise Action Plans'
Ref 4.N	National Highways. GG 101, 'Introduction to the Design Manual for Roads and Bridges'
Ref 5.N	Highways England. MCHW Series 1000, 'Manual of Contract Documents for Highway Works. Volume 1 - Specification for Highway Works. Series 1000 Road Pavements – Concrete Materials'
Ref 6.N	Highways England. MCHW Series 1100, 'Manual of Contract Documents for Highway Works. Volume 1 Specification for Highway Works. Series 1100 Kerbs, Footways and Paved Areas.'
Ref 7.N	Highways England. MCHW Series 0900, 'Manual of Contract Documents for Highway Works. Volume 1 Specification for Highway Works. Series 900 Road Pavements – Bituminous Bound Materials.'
Ref 8.N	Highways England. LA 111, 'Noise and vibration'
Ref 9.N	National Highways. GD 301, 'Smart motorways'
Ref 10.N	National Highways. CD 236, 'Surface course materials for construction'
Ref 11.N	The National Archives. legislation.gov.uk. UKSI 2015/392, 'The Motorways Traffic (England And Wales) (Amendment) (England) Regulations 2015'
Ref 12.N	National Highways. CD 358, 'Waterproofing and surfacing of concrete bridge decks'

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E/3. Informative references

The following documents are informative references for this document and provide supporting information.

Ref.	Document
Ref 1.I	BSI. BS EN 12697-43, 'Bituminous mixtures. Test methods for hot mix asphalt. Resistance to fuel'
Ref 2.I	BSI. BS EN 12697-22, 'Bituminous mixtures. Test methods for hot mix asphalt. Wheel tracking'
Ref 3.I	Highways England. CS 229, 'Data for pavement assessment'
Ref 4.I	Department for Transport. TAG Unit A1-3, 'Transport Appraisal Guidance Unit A1-3 user and provider impacts'
Ref 5.I	Department for Transport. TAG Unit A3, 'Transport Appraisal Guidance Unit A3 environmental impact appraisal'

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Appendix E/A. Surfacing selection guidance

E/A1 Examples of scheme specific factors

A scheme may include particular issues that can influence the selection of a surface course material or surface course material system. Typical examples of scheme-specific requirements can include:

1) water permeability or impermeability;
2) existing road geometry and traffic management constraints;
3) speed of installation required;
4) weather conditions;
5) coloration;
6) high resistance to scuffing;
7) high deformation resistance;
8) adhesion to particular substrates; and,
9) fuel resisting properties.

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Appendix E/B. Value for money calculation for noise

E/B1 Calculation

Value for money with respect to noise abatement measures may be calculated as follows:

1) benefit: cost saving of the proposed surface over 60 years, when compared to standard surface (taking into account the number of renewals anticipated over 60 years);
2) cost: additional cost of noise at properties within 600 m of the proposed surfaces over 60 years as defined by TAG Unit A1-3 [Ref 4.I] TAG Unit A3 [Ref 5.I] or any update thereof.

E/B2 Noise cost

Further information on how to calculate noise cost is provided as follows:

1) all properties within 600 m should experience the same noise change if the surface noise characteristics change;
2) the noise cost of a surface should increase by a maximum of £25,000 per property over 60 years for every increase of 3 dB(A). This figure can be used to quickly calculate the maximum cost of additional noise in sparsely populated areas;
3) if a noise model is available for the scheme it can be used to accurately calculate noise exposure for each individual property, which can thereafter be used to calculate cost. If no noise model is available, existing noise exposure for properties can be estimated using DEFRA noise mapping data.

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Department for Infrastructure
An Roinn Bonneagair
Depairtment fur Infrastructure
www.infrastructure-ni.gov.uk

Pavement
Design

CD 236 - NINAA
Northern Ireland National Application Annex for Surface course materials for construction

(formerly CD 236 revision 3 including HD 36/06)

Version 4.1.0

Summary
This National Application Annex sets out the Department for Infrastructure, Northern Ireland specific requirements on surface course material options.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated team in the Department for Infrastructure, Northern Ireland. The email address for all enquiries and feedback is: dcu@infrastructure-ni.gov.uk

This is a controlled document.

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Latest release notes

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CD 236 - NINAA	4.**1**.0	December 2022	Northern Ireland NAA	Incremental change to requirements

Version 4.1.0 (Dec. 2022) Department for Infrastructure, Northern Ireland National Application Annex to CD 236. Revision 4 has additional requirements for lay-bys and hardstanding locations.

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Document code	Version number	Date of publication of relevant change	Changes made to	Type of change
CD 236	4	March 2020		
CD 236	3	April 2019		
CD 236	0	October 2018		

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Foreword

Publishing information

This document is published by National Highways on behalf of the Department for Infrastructure, Northern Ireland.

This document is a National Application Annex to CD 236 [Ref 7.N].

Contractual and legal considerations

This document forms part of the works specification. It does not purport to include all the necessary provisions of a contract. Users are responsible for applying all appropriate documents applicable to their contract.

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Introduction

Background

This National Application Annex gives the Department for Infrastructure, Northern Ireland-specific requirements related to surface course materials options.

Assumptions made in the preparation of this document

The assumptions made in GG 101 [Ref 1.N] apply to this document.

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Abbreviations

Abbreviation	Definition
DAERA	Department of Agriculture, Environment and Rural Affairs (NI)
HRA	Hot rolled asphalt
NMA	Noise management area
SMA	Stone mastic asphalt

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Terms and definitions

Term	Definition
Departure	Variation or waiving of a requirement carried out in accordance with the Overseeing Organisation's procedures.

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NI/1. Surface course material options (CD 236, 2.1)

Choice of surfacing

NI/1.1 Surface course materials shall be selected from the permitted options provided in tables NI/1.1a, NI/1.1b, and NI/1.1c (MCHW Series 0900 [Ref 4.N] & MCHW Series 1000 [Ref 2.N]).

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Table NI/1.1a : Permitted pavement surface course materials for new and maintenance construction (flexible and flexible composite construction)

				Use without restriction	Departure required
New construction or major maintenance?	Yes	High speed? (85%ile above 65 km/h)	Yes	MCHW clause 924 high friction surfacing MCHW clause 942 thin surface course system MCHW clause 910 hot rolled asphalt	MCHW clause 938 porous asphalt 1
			No	MCHW clause 924 high friction surfacing MCHW clause 942 thin surface course system MCHW clause 910 hot rolled asphalt	MCHW clause 938 porous asphalt 1
	No (minor)	High speed? (85%ile above 65 km/hr)	Yes	MCHW clauses 919 and 922 surface dressing MCHW clause 924 high friction surfacing MCHW clause 942 thin surface course system MCHW clause 910 hot rolled asphalt MCHW clause 912 Asphalt concrete surface course	MCHW clause 938 porous asphalt 1
			No	MCHW clause 924 High friction surfacing MCHW clause 942 thin surface course system MCHW clause 910 hot rolled asphalt MCHW clause 912 Asphalt concrete surface course MCHW clauses 919 and 922 surface dressing MCHW clause 918 slurry surfacing	MCHW clause 938 porous asphalt 1
NOTE 1 Not permitted on flexible composite construction					

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Table NI/1.1b Permitted pavement surface course materials for new and maintenance construction (rigid)

				Use without restriction	Departure required
New construction or major maintenance	Yes	High speed? (85%ile above 65km /h)	Yes	MCHW clause 1044 exposed aggregate concrete	MCHW clause 1026 textured concrete
			No	MCHW clause 1044 exposed aggregate concrete	MCHW clause 1026 textured concrete
	No	High speed? (85%ile above 65km /h)	Yes	MCHW clause 1044 exposed aggregate concrete MCHW clause 910 hot rolled asphalt MCHW clauses 919 and 922 surface dressing	MCHW clause 1026 textured concrete MCHW clause 938 porous asphalt MCHW clause 942 thin surface course system
			No	MCHW clause 1044 exposed aggregate Concrete MCHW clause 910 hot rolled asphalt MCHW clauses 919 and 922 surface dressing MCHW clause 918 slurry surfacing	MCHW clause 1026 textured concrete MCHW clause 938 porous asphalt MCHW clause 942 thin surface course system

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Table NI/1.1c Permitted pavement surface course materials for new and maintenance construction (rigid composite)

				Use without restriction	Departure required
New construction or major maintenance?	Yes	High speed? (85%ile above 65 km/h)	Yes	MCHW clause 910 Hot rolled asphalt MCHW clause 942 thin surface course system	MCHW clause 938 porous asphalt
			No	MCHW clause 910 hot rolled asphalt MCHW clause 942 thin surface course system MCHW clauses 919 and 922 surface dressing	MCHW clause 938 porous asphalt
	No (minor)	High speed? (85%ile above 65 km/h)	Yes	MCHW clause 910 Hot rolled asphalt MCHW clause 942 thin surface course system	MCHW clause 938 porous asphalt
			No	MCHW clause 910 hot rolled asphalt MCHW clause 942 thin surface course system MCHW clauses 919 and 922 surface dressing MCHW clause 918 slurry surfacing	MCHW clause 938 porous asphalt

NI/1.2 Retexturing of existing surfaces shall not be carried out without departure approval.

NI/1.3 Where small lengths of pavement with a particular skidding or other safety concern are the object of proposed retexturing then departure approval shall not be unreasonably withheld.

NI/1.4 Where a materials option in tables NI/1.1a, NI/1.1b or NI/1.1c is shown in the 'departure required' column then a departure from standard shall be obtained from the Overseeing Organisation before use.

Lay-bys and hardstanding locations

NI/1.5 New lay-bys and hardstanding locations on trunk roads shall use a surfacing from one of the following options:

1) concrete (see Series 1000 of MCHW Series 1000 [Ref 2.N]);
2) block paving (see Series 1100 of MCHW Series 1100 [Ref 3.N]);
3) bituminous mixtures with deformation and fuel resistant properties.

NOTE 1 'Fuel resistant' is defined as a bituminous mixture that suffers a loss of less than 6% mean value of the combined loss of mass (Cimax) when tested to BS EN 12697-43 [Ref 1.I].

NOTE 2 'Deformation resistant' is defined as developing a rut of less than 2.5 mm when tested to BS EN 12697-22 [Ref 2.I].

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NOTE 3 *Grouted macadam can provide a suitable surfacing for lay-bys and hardstanding locations.*

NI/1.6 Existing lay-bys shall be resurfaced with either:

1) the same surfacing type as the adjacent carriageway in agreement with the project sponsor.
2) bituminous mixtures with deformation and fuel resisting properties
3) block paving (MCHW Series 1100 [Ref 3.N]); or,
4) concrete (MCHW Series 1000 [Ref 2.N]).

Noise sensitive sites

NI/1.7 Where any of the following applies, a site shall be classed as 'noise sensitive':

1) the location has been identified as a noise important area in any of Northern Ireland's noise action plans published by DAERA NAP(NI) [Ref 6.N];
2) noise 'sensitive receptors' are located within 600 m from the roadside (and 600 m from the ends of the sections);
3) noise barriers or earth bunds have been installed as a noise mitigation measure; or,
4) there are designated areas of landscape or biodiversity value within 600 m of the roadside (and 600 m from the ends of the sections).

NOTE 1 *Examples of 'sensitive receptors' are given in LA 111 [Ref 5.N].*

NOTE 2 *Areas of landscape or biodiversity value include areas of bird nesting or areas with multiple footpaths used regularly for recreation.*

NI/1.8 Noise sensitive areas shall be assessed and appropriate mitigation provided, taking account of site specific factors, in agreement with the project sponsor.

NI/1.8.1 Where noise levels are high due to the intensity of high-speed traffic, surfacing materials may be used that can significantly reduce tyre/road-generated noise emission compared to hot-rolled asphalt (HRA).

NOTE 1 *Surfacing materials that can significantly reduce tyre/road-generated noise emission can include, for example, hot, paver-laid thin-surface course systems (TSCS) complying with clause 942 of the specification MCHW Series 0900 [Ref 4.N].*

NOTE 2 *Traffic noise at lower speed zones (85%ile traffic speed below 50 km/h) is mainly attributable to engine, transmission and exhaust noise, especially from lorries.*

NOTE 3 *Further information on NMAs can be obtained from the Overseeing Organisation.*

Coloured surfacing

NI/1.9 The surface course material or system to be used for coloured surfacing shall be selected from Table NI/1.9.2N.

NI/1.9.1 Coloured surfacing materials or systems may be used to provide a contrasting colour to the adjacent pavement surfaces, and/or to supplement prescribed signs/markings such as for bus and cycle lanes.

NI/1.9.2 Coloured surfacing may be provided by using individually (or a combination of) the following:

1) natural coloured aggregates;
2) artificially pigmented aggregates;
3) pigmented binder; or,
4) addition of pigments to a mixture.

NOTE *The surface course materials or systems presented in Table NI/1.9.2N can be produced as a coloured surfacing.*

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Table NI/1.9.2N Material options for coloured surfacing

Material	Specification clause MCHW Series 0900 [Ref 4.N]
Thin surface course systems	Clause 942
Cold applied ultra thin surfacing	Clause 923
Slurry surfacing and microsurfacing	Clause 918
Surface dressing	Clause 922
High friction surfacing	Clause 924
Grouted macadam surfacing	N/A
Hot rolled asphalt	Clauses 910 and 943

NI/1.9.3 Where the coloured surfacing selected forms a layer <10 mm thick the underlying material should be in a sound condition and free of visual defects.

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NI/2. Normative references

The following documents, in whole or in part, are normative references for this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Ref.	Document
Ref 1.N	National Highways. GG 101, 'Introduction to the Design Manual for Roads and Bridges'
Ref 2.N	Highways England. MCHW Series 1000, 'Manual of Contract Documents for Highway Works. Volume 1 - Specification for Highway Works. Series 1000 Road Pavements – Concrete Materials'
Ref 3.N	Highways England. MCHW Series 1100, 'Manual of Contract Documents for Highway Works. Volume 1 Specification for Highway Works. Series 1100 Kerbs, Footways and Paved Areas.'
Ref 4.N	Highways England. MCHW Series 0900, 'Manual of Contract Documents for Highway Works. Volume 1 Specification for Highway Works. Series 900 Road Pavements – Bituminous Bound Materials.'
Ref 5.N	Highways England. LA 111, 'Noise and vibration'
Ref 6.N	DAERA. NAP(NI), 'Northern Ireland's Noise Action Plans'
Ref 7.N	National Highways. CD 236, 'Surface course materials for construction'

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NI/3. Informative references

The following documents are informative references for this document and provide supporting information.

Ref.	Document
Ref 1.I	BSI. BS EN 12697-43, 'Bituminous mixtures. Test methods for hot mix asphalt. Resistance to fuel'
Ref 2.I	BSI. BS EN 12697-22, 'Bituminous mixtures. Test methods for hot mix asphalt. Wheel tracking'

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Pavement
Design

CD 236 - SNAA
Scotland National Application Annex for Surface course materials for construction

(formerly CD 236 revision 3 including HD 36/06)

Version 4.1.0

Summary
This National Application Annex sets out the Transport Scotland specific requirements on surface course materials options.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Transport Scotland team. The email address for all enquiries and feedback is: TSStandardsBranch@transport.gov.scot

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Latest release notes

Document code	Version number	Date of publication of relevant change	Changes made to	Type of change
CD 236 - SNAA	4.**1**.0	December 2022	Scotland NAA	Incremental change to requirements

[Version 4.1.0; Published Dec. 2022] New requirements on lay-bys and hardstanding for HGVs (Sec. S/) and other PSV values allowed if performance demonstrated (Sec. 2) and updated reference. Transport Scotland National Application Annex to CD 236.

Previous versions

Document code	Version number	Date of publication of relevant change	Changes made to	Type of change
CD 236	4	March 2020		
CD 236	3	April 2019		

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Foreword

Publishing information

This document is published by National Highways on behalf of Transport Scotland.

This document is a National Application Annex to DMRB document CD 236 [Ref 5.N].

Contractual and legal considerations

This document forms part of the works specification. It does not purport to include all the necessary provisions of a contract. Users are responsible for applying all appropriate documents applicable to their contract.

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Introduction

Background

This National Application Annex gives the Transport Scotland-specific requirements related to pavement surfacing for both flexible and rigid pavements.

Assumptions made in the preparation of this document

The assumptions made in GG 101 [Ref 1.N] apply to this document.

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S/1. Surface course material options (CD 236, 2.)

Choice of surfacing

S/1.1 Surface course materials shall be selected from those listed in Table S1.1 as permitted options.

Table S/1.1 Permitted pavement surface course materials

	New construction	Maintenance
Clause 911TS Hot rolled asphalt[1]	✓	✓
Clause 918 Slurry surfacing and microsurfacing	X	ATP
Clause 922 Surface dressing[1]	X	ATP
Clause 924 High-friction surfacing	✓	✓
Clause 938 Porous asphalt	ATP	ATP
Clause 942 Thin surface course system	ATP	ATP
Clause 942TS Stone mastic asphalt surface course (T S2010)	✓	✓
Clause 943 Hot rolled asphalt[1]	✓	✓
Clause 1044 Exposed aggregate concrete[1]	ATP	X
NOTE: Key:		
✓	Use permitted without further approval	
ATP	ATP - 'Approval to Proceed' to be obtained from Overseeing Organisation	
X	Not permitted for use	
Note 1: Not generally permitted within noise management areas – see Cl. S/1.10		

NOTE *More information on the permitted materials can be seen in the 0900 and 1000 Series of the Manual of Contract Documents for Highway Works, Volume 1 MCHW Series 0900 [Ref 4.N] & MCHW Series 1000 [Ref 2.N].*

S/1.2 Where required by Table S1.1, an Approval to Proceed shall be obtained from the Overseeing Organisation for use of the material.

S/1.3 The decision on which permitted surface course materials are selected or excluded shall be made on a site- specific basis.

S/1.4 A record of the decision on which permitted surface course have been selected shall be made.

S/1.5 A departure shall not be required for retexturing.

S/1.6 High friction surfacing shall be grey in colour unless colour contrast is specifically required for demarcation purposes.

S/1.7 High friction surfacing shall not be used for the sole purpose of achieving colour contrast.

Lay-bys and hardstanding locations frequented by heavy goods vehicles

S/1.8 Lay-bys and hardstanding locations that are frequented by heavy goods vehicles shall use a deformation-resisting and fuel-resisting surfacing from one of the following options:

1) concrete (see MCHW Series 1000 [Ref 2.N]);
2) block paving (see MCHW Series 1100 [Ref 3.N]); or,

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3) bituminous mixtures with deformation and fuel resistant properties.

NOTE 1 *'Fuel resisting' is defined as a bituminous mixture that suffers a loss of less than 6% mean value of the combined loss of mass (Ci_{max}) when tested to BS EN 12697-43 [Ref 3.I].*

NOTE 2 *'Deformation resisting' is defined as a bituminous mixture developing a rut of less than 2.5 mm when tested to BS EN 12697-22 [Ref 4.I].*

NOTE 3 *Grouted macadam can provide a suitable surfacing for lay-bys and hardstanding locations.*

NOTE 4 *All dual-carriageway lay-bys and hardstandings are considered to be subject to frequent use by heavy goods vehicles.*

Noise management areas

S/1.9 The design of maintenance and construction schemes within Scotland Noise Management Areas (see Noise Map (S) [Ref 5.I]) shall incorporate the requirements of the Transportation Noise Action Plan TNAP 2014 [Ref 7.N] in the selection of surface course materials.

S/1.9.1 Where traffic speeds are lower than 30 mph the full range of surface course materials may be selected.

S/1.10 A submission for justification for selecting materials not generally permitted within noise management areas as shown in Table S1.1 shall not be based solely on value for money.

NOTE 1 *More information on Scotland Noise Management Areas can be found in the Scottish Government 'Transportation Noise Action Plan' 2014 TNAP 2014 [Ref 7.N].*

NOTE 2 *Further advice with respect to road noise can be found in TRL report TRL PPR 443 [Ref 2.I].*

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S/2. Aggregate selection (CD 236, 3)

S/2.1 For clause 942 thin surface course systems (TSCS) aggregate with a PSV other than those contained within CD 236 [Ref 5.N] Table 3.2b shall be permitted providing it has been demonstrated that the aggregate is able to provide the required skid resistance based on previous uses of the aggregate.

NOTE *PSV tables in the main document do not apply to TS2010 material other than for consideration prior to approval of initial stage 3 trials.*

S/2.2 When aggregate with a PSV other than those contained with Table 3.2b is adopted, technical and historical data along with the reasoning and justification shall be documented, as well as the methodology adopted to support the case.

NOTE *One methodology usable for supporting a case for the use of lower PSV aggregates with adequate skid resistance is presented in TRL PPR 820 [Ref 1.I].*

S/2.3 Site category definitions used for PSV selection shall be as given in the Transport Scotland Interim Amendment - Skidding Resistance TS IA 51/22 2022 [Ref 6.N].

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S/3. Normative references

The following documents, in whole or in part, are normative references for this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Ref.	Document
Ref 1.N	National Highways. GG 101, 'Introduction to the Design Manual for Roads and Bridges'
Ref 2.N	Highways England. MCHW Series 1000, 'Manual of Contract Documents for Highway Works. Volume 1 - Specification for Highway Works. Series 1000 Road Pavements – Concrete Materials'
Ref 3.N	Highways England. MCHW Series 1100, 'Manual of Contract Documents for Highway Works. Volume 1 Specification for Highway Works. Series 1100 Kerbs, Footways and Paved Areas.'
Ref 4.N	Highways England. MCHW Series 0900, 'Manual of Contract Documents for Highway Works. Volume 1 Specification for Highway Works. Series 900 Road Pavements – Bituminous Bound Materials.'
Ref 5.N	National Highways. CD 236, 'Surface course materials for construction'
Ref 6.N	Transport Scotland. TS IA 51/22, 'Transport Scotland Interim Amendment 51/22 – Skidding Resistance ' , 2022
Ref 7.N	Scottish Government. TNAP 2014, 'Transportation Noise Action Plan 2014'

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S/4. Informative references

The following documents are informative references for this document and provide supporting information.

Ref.	Document
Ref 1.I	Transport Research Laboratory. TRL PPR 820, 'A procedure for justifying aggregate use based on skid resistance'
Ref 2.I	Transport Research Laboratory. P G Abbot, P A Morgan and B McKell (AECOM). TRL PPR 443, 'A review of current research on road surface noise reduction techniques'
Ref 3.I	BSI. BS EN 12697-43, 'Bituminous mixtures. Test methods for hot mix asphalt. Resistance to fuel'
Ref 4.I	BSI. BS EN 12697-22, 'Bituminous mixtures. Test methods for hot mix asphalt. Wheel tracking'
Ref 5.I	Scottish Government. Noise Map (S), 'Scotland's Noise Maps'

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Llywodraeth Cymru
Welsh Government

Pavement
Design

CD 236 - WNAA
Wales National Application Annex for Surface course materials for construction

(formerly CD 236 revision 3 including HD 36/06)

Version 4.2.0

Summary
This National Application Annex sets out the Welsh Government specific requirements on surface course materials options.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Welsh Government team. The email address for all enquiries and feedback is: Standards$_{F}eedback_{a}nd_{E}nquiries@gov.wales$

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Latest release notes

Document code	Version number	Date of publication of relevant change	Changes made to	Type of change
CD 236 - WNAA	4.**2**.0	December 2022	Wales NAA	Incremental change to requirements
[PUB. DATE Dec. 2022] Approvals changes to Table W/1.1. Other changes for MDD compliance.				

Previous versions

Document code	Version number	Date of publication of relevant change	Changes made to	Type of change
CD 236	4.**1**.0	July 2021	Wales NAA	Incremental change to requirements
CD 236	4	March 2020		
CD 236	3	April 2019		
CD 236	0	October 2018		

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Foreword

Publishing information

This document is published by National Highways on behalf of the Welsh Government.

This document is a National Application Annex to CD 236 [Ref 6.N].

Contractual and legal considerations

This document forms part of the works specification. It does not purport to include all the necessary provisions of a contract. Users are responsible for applying all appropriate documents applicable to their contract.

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Introduction

Background

This National Application Annex gives the Welsh Government-specific requirements related to surface course materials options.

Assumptions made in the preparation of this document

The assumptions made in GG 101 [Ref 1.N] apply to this document.

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Abbreviations

Abbreviations

Abbreviation	Definition
BSI	British Standards Institution
DMRB	Design Manual for Roads and Bridges
HSCA	High stone content asphalt
MCHW	Manual of Contract Documents for Highway Works
SMA	Stone mastic asphalt
PAG	Procedure advice and guidance

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Terms and definitions

Terms

Term	Definition
Approval to proceed	Formal agreement to be obtained from the Overseeing Organisation before use, as listed in Table W/1.1.
Departure	Variation or waiving of a requirement carried out in accordance with the Overseeing Organisation's procedures.
Overseeing Organisation	The highways or roads authority of the Welsh Government and its successors.

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W/1. Surface course material options (CD 236, 2.1)

Choice of surfacing

W/1.1 Surface course materials shall be selected from MCHW Series 1000 [Ref 2.I] & MCHW Series 0900 [Ref 3.N] using the permitted options provided in Table W/1.1.

Table W/1.1 Permitted pavement surface course materials for new and maintenance construction

Is the scheme within a noise priority area?	Use can be without approval	'Approval to proceed' is required
No	Clause 911W and 943 Hot rolled asphalt; Clause 923 Cold-applied ultra-thin surfacing. WG Stone mastic asphalt[1].	Clause 918 Slurry and microsurfacing; Clause 922 Surface dressings; Clause 942 Thin surface course system; Clause 1026 Textured concrete [2] ; Clause 1044 Exposed aggregate concrete [2] ;
Yes	Clause 911W Hot rolled asphalt[3]; WG Stone mastic asphalt[1].	Clause 911W and Clause 943 Hot rolled asphalt; Clause 918 Slurry and microsurfacing; Clause 923 Cold-applied ultra-thin surfacing; Clause 942 Thin surface course system;
Note 1: To comply the latest issue of Welsh Government's PAG 112/20 [Ref 5.N]		
Note 2: Rigid construction only.		
Note 3: 55/14C and 55/10C mixtures only.		

W/1.2 Where a material option in Table W/1.1 requires an 'approval to proceed', an approval shall need to be obtained from the Overseeing Organisation.

W/1.3 Materials complying with MCHW clauses 918, 922 & 923 shall only be used for maintenance purposes.

W/1.3.1 All other materials in Table W/1.1 should be proposed for new constructions.

W/1.4 The choice to use a material outside or not in accordance with Table W/1.1, must require a departure from standard.

Noise priority areas

W/1.5 Materials complying with MCHW clauses 911WG, 922, 923 and 943 shall only be used for sites where:

1) the location has not been identified as a priority area in the Welsh Government's 'Noise and Soundscape action plan 2018-2023' N&SAP [Ref 4.N]published in December 2018 or any update thereof ;
2) no noise action priority areas are located within an envelope of 600 metres from the roadside and 600 metres from the ends of section;
3) the scheme is not considered noise-sensitive and has not received any noise mitigation measures; and,

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4) no residential areas, schools, hospitals or similar are within 600 metres of the proposed scheme.

W/1.5.1 Traffic noise at speeds <50 km/h is mainly attributed to engine, transmission and exhaust noise, especially from larger vehicles and therefore, all materials should be assessed for use.

NOTE *In this instance HRA complying with Clause 911WG refers to chipped surfaces.*

Aggregate selection

W/1.6 Section 3 CD 236 [Ref 6.N] shall not apply to materials complying with Clause 1026 and PAG 112/20.

W/1.7 When an aggregate with a lower PSV than indicated in CD 236 Table 3.3a or 3.3b is proposed, previous usage and supporting evidence shall demonstrate the aggregates durability with a satisfactory skid resistance performance and skidding accident rate, before approval can be obtained from the Overseeing Organisation.

W/1.8 The minimum PSV values indicated in CD 236 Table 3.3a and 3.3b shall only be used if no alternative information is available.

Texture

W/1.9 Any retexturing of existing surfaces shall require an approval to proceed from the Overseeing Organisation.

W/1.10 Texture depth for MCHW Clauses 911WG, 918, 922 and 943 shall comply with Clause 921.

W/1.11 Any use of asphalt preservation treatments, including sealants and rejuvenators, shall require an approval to proceed from the Overseeing Organisation.

Coloured surfacing

W/1.12 When applied as a veneer (<10 mm thick) the existing surface course shall be in a sound condition with no:

1) visual sign of, or recorded, defects;
2) rutting in condition category 1; nor,
3) deflectograph in condition categories 1.

NOTE *Network level condition survey information is provided in CS 229 [Ref 1.I].*

Lay-bys and hardstanding locations

W/1.13 Laybys and hardstanding locations including emergency areas shall use a deformation- and fuel- resisting surfacing from the following options:

1) concrete (see MCHW Series 1000 [Ref 2.I]);
2) block paving (MCHW Series 1100 [Ref 2.N]); or,
3) bituminous mixtures with deformation- and fuel-resistant properties.

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W/2. Normative references

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Ref.	Document
Ref 1.N	National Highways. GG 101, 'Introduction to the Design Manual for Roads and Bridges'
Ref 2.N	Highways England. MCHW Series 1100, 'Manual of Contract Documents for Highway Works. Volume 1 Specification for Highway Works. Series 1100 Kerbs, Footways and Paved Areas.'
Ref 3.N	Highways England. MCHW Series 0900, 'Manual of Contract Documents for Highway Works. Volume 1 Specification for Highway Works. Series 900 Road Pavements – Bituminous Bound Materials.'
Ref 4.N	Welsh Government. N&SAP, 'Noise and soundscape action plan 2018 to 2023'
Ref 5.N	Welsh Government. PAG 112/20, 'Stone Mastic Asphalt Specification'
Ref 6.N	National Highways. CD 236, 'Surface course materials for construction'

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W/3. Informative references

The following documents are informative references for this document and provide supporting information.

Ref.	Document
Ref 1.I	Highways England. CS 229, 'Data for pavement assessment'
Ref 2.I	Highways England. MCHW Series 1000, 'Manual of Contract Documents for Highway Works. Volume 1 - Specification for Highway Works. Series 1000 Road Pavements – Concrete Materials'

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