

NRA Workshop for Area Engineers February / March 2014

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Construction Products Regulations

Construction **works** as a whole and in their separate parts must be

- fit for their intended use throughout the life cycle of the works
- subject to normal maintenance; satisfy the basic requirements for an economically reasonable working life

Durability is of Prime Importance

- The retention of the desired characteristics and the rate of deterioration over time are of prime importance in terms of cost and maintenance.
- There has been a noticeable increase in the incidence of early surface course failures such as chipping loss; stripping; fatting up and ravelling
- is there a way to improve their “Workmanship”

What Effects Workmanship

Product:-

- Constituent materials
- Manufacturing process
- Handling, Storage and Transportation

Works Planning

- Machinery
- Personnel
- Methodology

Works Execution

- Ride quality
- Density
- Waterproofing

Product Specification (1)

Empirical based specifications

- Generally workmanship defined by specifying materials and methods that have been acceptable in the past.
- Materials specified by requiring the use of constituents used previously,
- combined in the same proportions and using the same methods to mix them and apply them. Commonly known as '**recipe**' specifications

Product Specification (2)

Fundamental based specifications

- Generally workmanship specified by the requirements for a characteristic that has been found to correlate with a fundamental engineering property that predicts performance.
- Performance Based tests, with limited requirements for composition (performance based tests directly measure mix performance Stiffness, deformation resistance & fatigue etc.) Commonly known as **design** mixes

NRA Specification for Road Works

Series 900: Constituent Materials

Aggregates shall comply with selected requirements of IS EN 13043
Resistance to fragmentation – LA_{50} or less OR $>LA_{30}$ but $< LA_{35}$ if
successful material history

Freeze thaw (IS EN 13043 4.2.9.2) MS_{25} (or as Appendix 7/1)

Water absorption (IS EN 13043 4.2.9.1) WA_{24}

PSV category (IS EN 13043 4.2.3 & SR17) – **NOTE CURRENT
REQUIREMENTS IN IAN 05/13 FOR SURFACE COURSE**

Resistance to abrasion (IS EN 13043 4.2.4 & SR 17) AAV_{10}

Constituent Materials (2)

- **Bitumen** shall comply with IS EN 12591 and / or IS EN 13924 ; PmB to IS EN 14023, and from locations which have ISO 9001 or similar accredited management system since July 2013 they must be CE Marked
- **Precoated Chippings** For HRA chippings and manner of coating as per IS EN 13108.4
PSV min value as per Appendix 7/1 (as per IAN 05/13)
resistance to abraision $< AAV_{10}$;
shape to comply with FI_{15} (IS EN 13043 cl 4.1.6);
binder 40/60 pen; binder content 1.2 → 1.8%;
retained sand test as per IS EN 12697-37 (hot sand test method for determining the condition of the binder on coated chippings)

Bituminous Mixes

925 Testing of Bituminous Mixtures

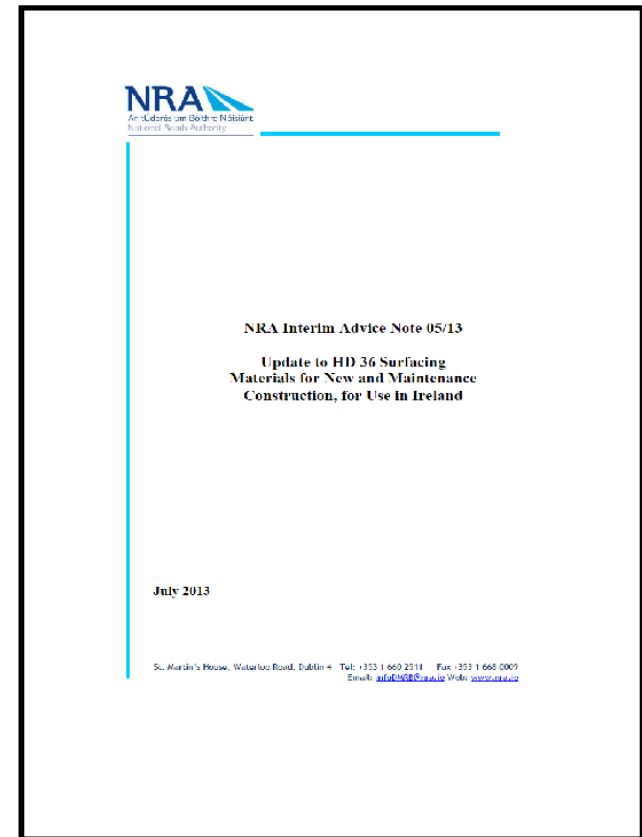
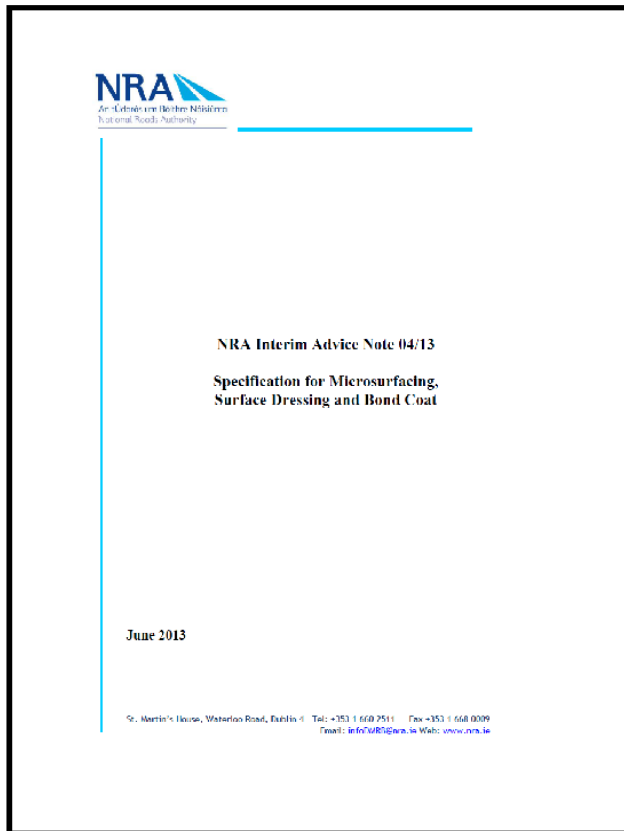
- Declaration of Performance covered by the following
 - IS EN 13108-20 Type testing; and
 - IS EN 13108-21 Factory production control.
- Type test reports shall be supplied to the E R and f pc records shall be submitted at weekly intervals during production of material for incorporation into the works
- Any tests additional to those required by IS EN 13108–20, IS EN 13108–21 or the relevant MCDRW Clause are specified in Appendices 1/5 and/or 7/1.

Bituminous Mixes (2)

925 Testing of Bituminous Mixtures

- FPC applies up to the point of delivery,
- Samples for quality assurance tests defined in Appendix 1/5 shall be taken from the delivery vehicle at the point of delivery.
- Half of these samples will be handed to the Employer for retention and possible future testing.
- The remainder of samples received shall be tested by the contractor with such testing being incorporated into the contractor's factory production control testing process.

IAN 04/13 & 05/13



WORKS Specification

Surfacing has end-performance criteria to satisfy including;

- level, evenness, compaction, texture depth and uniformity of appearance

Hence in addition to **products**, it's necessary to consider how the **works** will be performed including:

- plant employed and its maintenance
- trained personnel.
- Influence of weather conditions

Works: What's in the Contract ?

Works Proposals state how the Contractor proposes to carry out the works in response to the Employer's Invitation to Tender.

Usually this will include method statements, details of the Contractor's design and any other information required by the Employer in relation to the carrying out of the Works.

Works Proposals from the Contractor will vary depending on the Contract type – usually Employer Designed

Works Proposals (1)

Sufficient to ensure : the proper resources in the right place at the right time, with safety of the operatives and public as a priority.

- consider machine runs,
- the specified staggering of joints
- avoidance of trafficking freshly laid material
- traffic management
- competent and skilled crew

Works Proposals (2)

Should be site specific not generic

e.g. when laying hot rolled asphalt :-

- adjustment of chip spreader to achieve texture,
- adjustment and functioning of the paver,
- frequency and amplitude of vibration of the compaction equipment,
- joint preparation and sealing
- delivery trucks appropriately insulated and covered

Works Proposals (3)

Relevant in time and to prevailing conditions

The entire spectrum of weather events affect quality directly causing:

- poor compaction, level control and non-uniformity of texture in cold, wet and windy conditions;
- over compaction, level control problems, loss of texture and, if trafficked too early, rutting in very hot condition

Whereas the weather cannot be controlled.

The response to it can

Weather Conditions

- Wind speed ; air and surface temperature requirements
- Surface to be dry; free from ice, snow, salt and grit
- No standing water or heavy and / or persistent rain
- PMSMA – Quality Plan and Installation Method Statement
- HRA : no anemometer = lay 50mm thick and min delivery; air ; surface temperatures

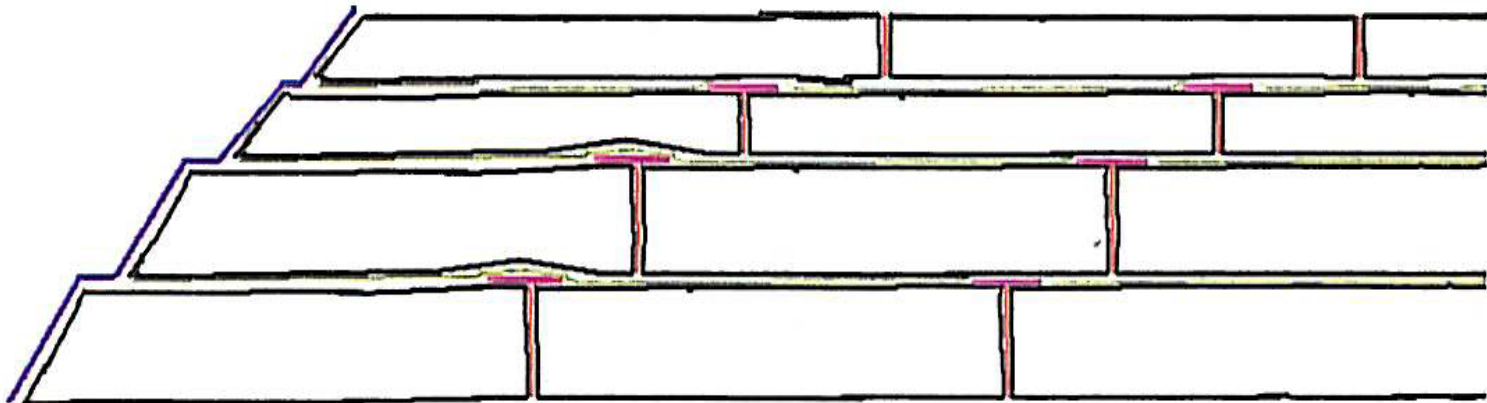
Placing and Compaction – WORKS

Specification for Road Works

Series 700 and BS 594987 (SRW to take precedence)

- Keep surfaces clean, uncontaminated and traffic free
- Provide bond or tack coat : IAN 04/13
- Max mixing temperature (IS EN 12697-13 & table 9/2)
- Minimum temperature at delivery declared within type test report
- Mat to be free from dragging, tearing and segregation
- Chippings applied uniformly and effectively held (see also BS 594987)
- Pavement to be adequately cooled and hardened prior to trafficking
- Initial macrotexture as per table 9/14 (note CI 942 warranty)

Waterproofing and Bonding



- Bitumen blinding to joints
- Surface sealing of joints
- - - Tack or bond coat
- Bitumen blinding of edge

Examples from BS 594987

6.2.3 chipped HRA surface courses - *The embedment and adhesion of coated chippings is affected by surface chilling of asphalt, which occurs quickly in windy conditions, particularly if it is also cold. The risk of loss of chippings increases if the surface course is first trafficked in cold weather. Insulating the paver hoppers could also provide some benefit.*

7.1 The rate of spread of chippings shall be either: a) at least 70% of that needed to give shoulder-to-shoulder cover; or b) at least 60% of shoulder-to-shoulder cover where there is evidence that the required texture depth can be consistently achieved.

Compaction Control Procedures –

AC Base & Binder Course (& CI 929 materials)

Indirect Density gauge @ 20 metre intervals– Wheel Tracks – Mean of six readings shall not exceed 7% Air Voids

- Pair Cores every 1000Metres – BS 594987 CI 9.5 - Wheel Tracks -Category V_{\max}^7
- Pair Cores every 250 Metres – BS 594987 CI 9.5 - centred 100mm from joint position (unsupported edge) – Category V_{\max}^9

Surface Dressing

- Designed in accordance with IAN 04/13
- Construction to IAT Guidelines for Surface Dressing in Ireland
- Aggregates as SRW 901.4 PSV as per 7/3 and IAN 05/13
- Aftercare as per IAT Guidelines; defects / deficiencies in materials ; workmanship ; aftercare during or at Defects Period to be rectified by the Contractor
- Progress Record IAT Guidelines within 30 days of completion

NOTE :

1. **Designed by Employer is non harmonised but constituents are.**
2. **Designed by Contractor is harmonised and requires CE Marking**

QA / QC At Construction Stage

Check for Declaration of Performance of mix materials – Certificate of FPC (and notified body)

Check for CE marked docket

Witness split sample at point of delivery for FPC

Test for workmanship including

- Max / Mix Temperature

- Compaction

- Waterproofing / Layer bonding

- Offset of joints

- Level / regularity tolerances

- Laying conditions (e.g. prevailing temperature; wind speed)

- Mix specific requirements

- Texture Depths

