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Transport Infrastructure Ireland

TII Publications



Method of Measurement for Road Works Series MM 700 - Pavements

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About TII

Transport Infrastructure Ireland (TII) is responsible for managing and improving the country's national road and light rail networks.

About TII Publications

TII maintains an online suite of technical publications, which is managed through the TII Publications website. The contents of TII Publications is clearly split into 'Standards' and 'Technical' documentation. All documentation for implementation on TII schemes is collectively referred to as TII Publications (Standards), and all other documentation within the system is collectively referred to as TII Publications (Technical). This system replaces the NRA Design Manual for Roads and Bridges (NRA DMRB) and the NRA Manual of Contract Documents for Road Works (NRA MCDRW).

Document Attributes

Each document within TII Publications has a range of attributes associated with it, which allows for efficient access and retrieval of the document from the website. These attributes are also contained on the inside cover of each current document, for reference. For migration of documents from the NRA and RPA to the new system, each current document was assigned with new outer front and rear covers. Apart from the covers, and inside cover pages, the documents contain the same information as previously within the NRA or RPA systems, including historical references such as those contained within NRA DMRB and NRA MCDRW.

Document Attributes

TII Publication Title	<i>Method of Measurement for Road Works Series MM 700 - Pavements</i>
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NRA DMRB and MCDRW References

For all documents that existed within the NRA DMRB or the NRA MCDRW prior to the launch of TII Publications, the NRA document reference used previously is listed above under 'historical reference'. The TII Publication Number also shown above now supersedes this historical reference. All historical references within this document are deemed to be replaced by the TII Publication Number. For the equivalent TII Publication Number for all other historical references contained within this document, please refer to the TII Publications website.

- (n) provision of soundness test certificate.

Pavement

Units	6	<p>The unit of measurement shall be:</p> <p>(i) base, lower base, upper base, binder course, surface course, concrete slab square metre.</p>																							
Measurement	7	<p>The measurement of base, lower base, upper base, binder course, surface course and concrete slab shall be calculated using the width of the top surface of the course or slab.</p> <p>Note: The width of the “top surface” of the course or slab shall be the width required by the Contract and shall exclude sloping sides or edges.</p> <p>No deductions shall be made for openings of 1 square metre or less.</p>																							
Itemisation	8	<p>Separate items shall be provided for base, lower base, upper base, binder course, surface course and concrete slab in accordance with Chapter II paragraphs 3 and 4 and the following:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Group</th> <th style="text-align: left;">Feature</th> </tr> </thead> <tbody> <tr> <td>I</td> <td>1 Pavement</td> </tr> <tr> <td rowspan="6">II</td> <td>1 Base</td> </tr> <tr> <td>2 Lower base</td> </tr> <tr> <td>3 Upper base</td> </tr> <tr> <td>4 Binder course</td> </tr> <tr> <td>5 Surface course</td> </tr> <tr> <td>6 Concrete slab</td> </tr> <tr> <td>III</td> <td>1 Each group or type</td> </tr> <tr> <td>IV</td> <td>1 Different thicknesses</td> </tr> <tr> <td>V</td> <td>1 Reinforced</td> </tr> <tr> <td rowspan="3">VI</td> <td>1 In carriageway, hardshoulder and hardstrip</td> </tr> <tr> <td>2 In emergency crossing</td> </tr> <tr> <td>3 In lay-by and bus bay</td> </tr> <tr> <td>VII</td> <td>1 In overlay</td> </tr> </tbody> </table>	Group	Feature	I	1 Pavement	II	1 Base	2 Lower base	3 Upper base	4 Binder course	5 Surface course	6 Concrete slab	III	1 Each group or type	IV	1 Different thicknesses	V	1 Reinforced	VI	1 In carriageway, hardshoulder and hardstrip	2 In emergency crossing	3 In lay-by and bus bay	VII	1 In overlay
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Base, Lower Base, Upper Base, Binder course, Surface course and Concrete Slab	9	<p>The items for base, lower base, upper base, binder course, surface course and concrete slab shall in accordance with the Preambles to Bill of Quantities General Directions include for:</p>																							

Item Coverage	<ul style="list-style-type: none">(a) trial areas and trials;(b) making good after sampling and testing;(c) protection of material in transit and while awaiting tipping;(d) designing and verifying mixes;(e) grading, measuring, reclaiming, mixing and depositing materials;(f) air entrainment;(g) spreading and compaction;(h) cutting back, saw cutting, cleaning, preparing and working on or up to existing surfaces and features;(i) edge support;(j) reinforcement (as Series 1700 paragraph 25);(k) waterproof and separation membranes;(l) chippings;(m) formwork (as Series 1700 paragraph 14);(n) making joints;(o) forming or sawing grooves, cleaning, grit blasting, priming, caulking, temporary and permanent sealing of joints;(p) longitudinal, expansion, contraction, warping and construction joint assemblies, including joint filler and crack inducers, tie and dowel bars, dowel bar cradles, caps and sheaths and inspection of dowel bars and corrosion protection to tie bars and coating to transverse reinforcement;(q) shaping to cambers, falls and crowns;(r) forming sockets, recesses, openings, and bays;(s) curing and protection;(t) protection and masking and unmasking of kerbs, drainage channels, chamber covers, gully gratings, expansion joints, and the like;(u) maintenance of surface;(v) taking measures to protect and maintain the pavement from deterioration by the use of constructional plant and the ingress of water and other materials;(w) anchorages including excavation and disposal, steel beams, ground beams and thickening of slab;(x) measures required for aftercare and opening the road to traffic;(y) protective system to steel beams (as Series 1900 paragraph 4);(z) microsurfacing, surface dressing, high friction surfacing and bond coat forming integral parts of the pavement;
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- (aa) filler;
- (bb) reclaimed asphalt;
- (cc) admixtures and additives;
- (dd) providing for areas to be kept free of pre-coated chippings;
- (ee) saw cutting and sealing bituminous overlays;
- (ff) bond-breaker tape;
- (gg) treatment to faces of cold upstanding edges prior to laying hot bituminous mixtures;
- (hh) applying sealant to the whole of any freestanding edge on the outside of the finished pavement;
- (ii) sealant to the top surface of base and binder course joints;
- (jj) cold milling, pulverisation and production of in situ Low Energy Bound Mixtures.

Regulating

- | | |
|-------------|--|
| Units | 10 The units of measurement shall be: <ul style="list-style-type: none">(i) bituminous regulating material tonne or cubic metre.(ii) cement bound regulating material cubic metre. |
| Measurement | 11 The measurement of bituminous regulating material by tonne shall be calculated from the tonnage of material certified by the Employer's Representative multiplied by the factor stated for the particular aggregate used. <p>The tonnage certified by the Employer's Representative shall be only that material included on delivery tickets which is incorporated in the Works in the locations and to the extent and thickness required by the Contract. Material in excess of the requirements of the Contract and material used for any other purpose shall not be included within the certified tonnage.</p> <p>The measurement of bituminous regulating material by cubic metres shall be the volume of material measured to the outlines required by the Contract.</p> 12 The measurement of cement bound regulating material shall be the volume of material measured to the outlines required by the Contract. |
| Itemisation | 13 Separate items shall be provided for bituminous regulating materials and cement bound regulating materials in accordance with Chapter II paragraphs 3 and 4 and the following: |

Group	Feature
I	1 Each group or type of bituminous regulating material
	2 Each group or type of cement bound regulating material
II	1 Lower base
	2 Upper base
	3 Base
	4 Binder course
	5 Surface course
Note:	Each item description which includes Group I Feature shall relate to the tabulated list of different constituent aggregate types and their factors included in the Bill of Quantities

Bituminous and Cement Bound Regulating

14 The items for bituminous and cement bound regulating material shall in accordance with the Preambles to Bill of Quantities General Directions include for:

Item coverage

- (a) base, lower base, upper base, binder course, surface course and concrete slab (as this Series paragraph 9);
- (b) weighing, tickets and copies;
- (c) material not laid as regulating material.

Surface Treatment

Units

15 The unit of measurement shall be:

- (i) surface treatment square metre.

Measurement

16 The measurement of surface treatment shall be calculated using the width of the top surface to be treated as described in paragraph 7.

17 Surface treatment shall only be measured separately when the Contract requires a separate or additional surface treatment to be applied to the pavement. Surface treatment forming an integral part of any specified group or type of pavement shall not be separately measured.

less.

No deductions shall be made for openings of 1 square metre or

Itemisation

18 Separate items shall be provided for surface treatment, in accordance with Chapter II paragraphs 3 and 4 and the following:

Group	Feature
I	1 Microsurfacing
	2 Surface dressing
	3 High friction surfacing
	4 Retexturing
II	1 Different types
III	1 Different colours
IV	1 Different rates of spread

Surface Treatment

19 The items for surface treatment shall in accordance with the Preambles to Bill of Quantities General Directions include for:

Item Coverage

- (a) trial areas and trials;
- (b) making good after sampling and testing;
- (c) protection of product in transit and while awaiting installation;
- (d) grading, measuring, reclaiming, mixing and depositing materials;
- (e) spraying binder and spreading materials and products;
- (f) rolling deposited materials;
- (g) pre-treatment, cleaning, preparing and working on or up to existing surfaces and features;
- (h) bond coat (as this Series paragraph 24);
- (i) chippings and broadcast aggregate;
- (j) making joints;
- (k) curing and protection;
- (l) protection and masking and unmasking of kerbs, drainage channels, chamber covers, gully gratings, expansion joints, and the like;
- (m) taking measures to protect and maintain the pavement from deterioration by the use of constructional plant and the ingress of water and other materials;
- (n) calibration and certification of equipment and supplying copy of certificate at to the Employer;
- (o) measures required for aftercare and opening road to traffic;
- (p) additives;
- (q) waste management and disposal of material resulting from retexturing.

Bond Coat

- Units **20** The unit of measurement shall be:
- (i) bond coat square metre.
- Measurement **21** The measurement of bond coat shall be the surface area to be coated.
- 22** Bond coat shall only be measured separately when the Contract requires a separate or additional bond coat to be applied to an existing surface prior to the construction of the following course or treatment. Bond coat forming an integral part of any specified group or type of pavement or surface treatment shall not be separately measured.
- Itemisation **23** Separate items shall be provided for bond coat in accordance with Chapter II paragraphs 3 and 4 and the following:

Group	Feature
I	1 Bond coat
II	1 Different materials
III	1 Different rates of spread

Bond Coat

- 24** The items for bond coat shall in accordance with the Preambles to Bill of Quantities General Directions include for:
- Item Coverage
- (a) trial areas and trials;
- (b) making good after sampling and testing;
- (c) designing and verifying mixes;
- (d) grading, measuring, mixing and depositing materials;
- (e) making joints;
- (f) cleaning surfaces;
- (g) protection and masking and unmasking of kerbs, drainage channels, chamber covers, gully gratings, expansion joints, road studs, road markings and the like and obtaining clean markings;
- (h) cutting back, preparing and working on or up to adjacent faces, surfaces and features;
- (i) admixtures and additives.

Cold Milling

- Units **25** The unit of measurement shall be:
- (i) milling square metre.
- Measurement **26** The measurement of milling shall be calculated using the width stated in the Contract. No deductions shall be made for openings of 1 square metre or less.

Milling carried out as part of the production of ex situ Low Energy Bound Mixtures shall be separately measured.

- Itemisation **27** Separate items shall be provided for milling in accordance with Chapter II paragraphs 3 and 4 and the following:

Group	Feature
I	1 Milling
II	1 Different thicknesses or depths

- Milling** **28** The items for milling shall in accordance with the Preambles to Bill of Quantities General Directions include for:

- Item Coverage
- (a) re-shaping and rolling;
 - (b) shaping to cambers, falls and crowns;
 - (c) multiple handling of material;
 - (d) loading into transport;
 - (e) disposal of material (as Series 600 paragraph 39);
 - (f) working around drainage channels, chamber covers, gully gratings, expansion joints and the like;
 - (g) ramps;
 - (h) removing road studs not required for re-use;
 - (i) surface preparation and cleaning;
 - (j) pulverisation, and regrading of material to be re-used in the production of ex situ Low Energy Bound Mixtures.

Repave Recycle Process

- 29** Not Used
- 30** Not Used
- 31** Not Used
- 32** Not Used

Reinstatement of Paved Areas

- Units **33** The unit of measurement shall be:
- (i) reinstatement of paved area square metre.
- Measurement **34** The measurement of reinstatement of paved area shall be calculated using the width of the top surface to be reinstated excluding sides and edges.
- No deduction shall be made for openings of 1 square metre or less.

The top surface for the following features shall be the widths or areas described below:

- (a) for drains, sewers, piped culverts, service ducts and filter drains – the width shall be the internal diameter of the pipe plus 600 mm;
- (b) for kerbs, channels, edgings, combined drainage and kerb blocks and the like – the width of the foundations;
- (c) for chambers, gullies, traffic signs, traffic signals, road lighting columns and the like – the horizontal area of the base slab or where no base slab is required the area of the bottom of the excavation.

Itemisation

35 Separate items shall be provided for reinstatement of paved area in accordance with Chapter II paragraphs 3 and 4 and the following:

Group	Feature
I	1 Each type of paved area reinstatement
II	1 Different thicknesses or depths

Reinstatement of Paved Area

36 The items for reinstatement of paved area shall in accordance with the Preambles to Bill of Quantities General Directions include for:

Item Coverage

- (a) determination of the extent of the reinstatement and agreement with the Employer's Representative;
- (b) subbase (as this Series paragraph 5);
- (c) base, lower base, upper base, binder course, surface course and concrete slab (as this Series paragraph 9);
- (d) bituminous and cement bound regulating material (as this Series paragraph 14);
- (e) surface treatment (as this Series paragraph 19);
- (f) kerbs, channels, edgings and combined drainage and kerb blocks (as Series 1100 paragraph 4);
- (g) footways and paved areas (as Series 1100 paragraph 21);
- (h) scarifying;
- (i) milling (as this Series paragraph 28);
- (j) drilling holes;
- (k) bond coat (as this Series paragraph 24);
- (l) bringing to correct levels and surface regularly following settlement.

Repairs to Existing Concrete Carriageway

Units

37 The units of measurement shall be:

- (i) thin bonded repairs square metre.

(ii) joint repairs linear metre.

- Measurement**
- 38** The measurement of thin bonded repairs shall be calculated using the plan area of the top surface of each repair patch excluding areas of joint sealant.
- 39** Thin bonded repairs and joint repairs shall only be measured separately when areas and lengths to be repaired are stated in the Contract.

- Itemisation**
- 40** Separate items shall be provided for thin bonded repairs and joint repairs in accordance with Chapter II paragraphs 3 and 4 and the following:

Group	Feature
I	1 Thin bonded repairs
	2 Joint repairs
II	1 Each type
III	1 Individual areas not exceeding 1 square metre on plan
	2 Individual areas exceeding 1 square metre but not exceeding 2 square metres on plan and so on in steps of 1 square metre
	3 In individual lengths not exceeding 1 linear metre
	4 In individual lengths exceeding 1 linear metre but not exceeding 2 linear metres and so on in steps of 1 linear metre
IV	1 Different thicknesses or depths

Thin Bonded Repairs and Joint Repairs

- 41** The items for thin bonded repairs and joint repairs shall in accordance with the Preambles to Bill of Quantities General Directions include for:

- Item Coverage**
- (a) determination of the area or length of the repair and agreement with the Employer's Representative;
 - (b) base, lower base, upper base, binder course, surface course and concrete slab (as this Series paragraph 9);
 - (c) removal of any existing joint sealant and caulking material;
 - (d) removal of unsound concrete and cutting back reinforcement within the repair area;
 - (e) treatment of repair area and surrounds;
 - (f) wetting and removal of excess water;
 - (g) finishing repair material flush with the level of the surrounding concrete slab and brushing and applying surface texture to match existing;
 - (h) reinstatement of sub-base;

- (i) disposal of material (as Series 600 paragraph 39).

Geotextiles and Geotextile-related products

Units	42	The unit of measurement shall be: <ul style="list-style-type: none"> (i) Geotextile and geotextile-related product square metre. 								
Measurement	43	The measurement of geotextile and geotextile-related products shall be the developed area covered by the product measured to the limits stated in the Contract.								
	44	<p>Geotextile and geotextile-related products shall be measured separately when the Contract requires a geotextile and geotextile-related product to be installed within the pavement structure either between binder course and base or base and subbase.</p> <p>No deductions shall be made for openings of 1 square metre or less.</p>								
Itemisation	45	<p>Separate items shall be provided for geotextile and geotextile-related products in accordance with Chapter II paragraphs 3 and 4 and the following:</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-left: 40px;"> <thead> <tr> <th style="text-align: left;">Group</th> <th style="text-align: left;">Feature</th> </tr> </thead> <tbody> <tr> <td>I</td> <td>1 Geotextile and geotextile-related products</td> </tr> <tr> <td>II</td> <td>1 Different types</td> </tr> <tr> <td>III</td> <td>1 Different grades</td> </tr> </tbody> </table>	Group	Feature	I	1 Geotextile and geotextile-related products	II	1 Different types	III	1 Different grades
Group	Feature									
I	1 Geotextile and geotextile-related products									
II	1 Different types									
III	1 Different grades									
Geotextiles and Geotextile-related Products	46	The items for surface treatment shall in accordance with the Preambles to Bill of Quantities General Directions include for:								
Item Coverage		<ul style="list-style-type: none"> (a) trial areas and trials; (b) protection of product in transit and while awaiting installation; (c) pre-treatment, cleaning, preparing and working on or up to existing surfaces and features; (d) cutting and jointing, sealing and fixing; (e) laying products and securing in place; (f) bond coat (as this Series paragraph 24); (g) overlapping product; (h) protection and masking and unmasking of kerbs, drainage channels, chamber covers, gully gratings, expansion joints, and the like. 								

Repair Systems

Units	47	The unit of measurement shall be: (i) repair systems square metre.												
Measurement	48	The measurement of repair material shall be calculated using the width of the top surface to be treated as described in paragraph 7. No deductions shall be made for openings of 1 square metre or less.												
Itemisation	49	Separate items shall be provided for base, binder course and surface course in accordance with Chapter II paragraphs 3 and 4 and the following:												
		<table border="0" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; padding: 5px;">Group</th> <th style="text-align: left; padding: 5px;">Feature</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">I</td> <td style="padding: 5px;">1 Repair System</td> </tr> <tr> <td style="padding: 5px;">II</td> <td style="padding: 5px;">1 Each type of system</td> </tr> <tr> <td style="padding: 5px;">III</td> <td style="padding: 5px;">1 Base 2 Binder course 3 Surface course</td> </tr> <tr> <td style="padding: 5px;">IV</td> <td style="padding: 5px;">1 Different thicknesses</td> </tr> <tr> <td style="padding: 5px;">VI</td> <td style="padding: 5px;">1 In carriageway, hardshoulder and 2 hardstrip 3 In emergency crossing In lay-by and bus bay</td> </tr> </tbody> </table>	Group	Feature	I	1 Repair System	II	1 Each type of system	III	1 Base 2 Binder course 3 Surface course	IV	1 Different thicknesses	VI	1 In carriageway, hardshoulder and 2 hardstrip 3 In emergency crossing In lay-by and bus bay
Group	Feature													
I	1 Repair System													
II	1 Each type of system													
III	1 Base 2 Binder course 3 Surface course													
IV	1 Different thicknesses													
VI	1 In carriageway, hardshoulder and 2 hardstrip 3 In emergency crossing In lay-by and bus bay													
Repair System	50	The items for repair systems shall in accordance with the Preambles to Bill of Quantities General Directions include for:												
Item Coverage		(a) protection of material in transit and while awaiting tipping; (b) grading, measuring, reclaiming, mixing and depositing materials; (c) cutting back, saw cutting, cleaning, preparing and working on or up to existing surfaces and features; (d) disposal of material (as Series 600 paragraph 39). (e) edge support; (f) infra-red treatment to existing surface; (g) bond coat (as this Series paragraph 24); (h) spreading and compaction; (i) additional materials required for localised surface repair system;												

- (j) making joints;
- (k) taking measures to protect and maintain the pavement from deterioration by the use of constructional plant and the ingress of water and other materials;
- (l) measures required for aftercare and opening the road to traffic;
- (m) filler;
- (n) treatment to faces of cold upstanding edges prior to laying hot bituminous mixtures.



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