TWEED SHIRE COUNCIL

DEVELOPMENT CONSTRUCTION SPECIFICATION

C255

BITUMINOUS MICROSURFACING

VERSION 1.2

SPECIFICATION C255- BITUMINOUS MICROSURFACING

CITATION

This document is named “Tweed Shire Council, Development Construction Specification C255 - Bituminous Microsurfacing”.

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VERSIONS, C255 BITUMINOUS MICROSURFACING

VERSION	AMENDMENT DETAILS	CLAUSES AMENDED	DATE ISSUED (The new version takes effect from this date)	Authorised by the Director of Engineering Services
1.1	Original Version		1 July 2003	
1.2	Replace all references to SWAC with "Certifying Engineer"	Various	5 February 2016	

DEVELOPMENT CONSTRUCTION SPECIFICATION C255

BITUMINOUS MICROSURFACING

GENERAL

C255.01 SCOPE

1. This Specification is for the design, supply, mixing and placement of bituminous microsurfacing for surface correction and wearing surface applications on road pavements, carparks, cycleways and footpaths.

2. Bituminous microsurfacing shall consist of a mixture of emulsified polymer modified bitumen binder, mineral aggregate, mineral filler, additives and water proportioned and mixed to form a slurry which is placed and spread evenly on the road surface. It shall be capable of being spread in variably thick layers for surface correction and for wearing surface applications. ***Bituminous Slurry***

3. The size, nominal thickness, and extent of bituminous microsurfacing shall be as shown on the design plans or as directed by the Certifying Engineer. ***Size and Extent***

4. For all new works on road and carpark pavements, this Specification should be read in conjunction with the Specification for SPRAYED BITUMINOUS SURFACING. For new works on road and carpark pavements, bituminous microsurfacing shall be preceded by the application of a sprayed bituminous seal a minimum of two (2) weeks prior to the application of the bituminous microsurfacing wearing course. ***Preceded by Sprayed Bituminous Seal***

5. Requirements for quality control and testing, including maximum lot sizes and minimum test frequencies, are cited in the Specification Part for Quality Requirements. ***Quality***

C255.02 TERMINOLOGY

1. Bituminous microsurfacing is one (1) of two (2) types of bituminous slurry surfacing. It is distinguished from the other type, slurry seals, by the incorporation of polymer and other additives to the bituminous binder to improve the performance of the slurry surfacing. ***Polymer Modified Binder***

2. Bituminous microsurfacing is also commonly known under various proprietary names such as 'cold overlay', 'microsealing', 'paveseal', 'microasphalt', etc. ***Proprietary Names***

3. The size of the bituminous microsurfacing is based on the nominal largest stone size in the mix. For the purpose of this Specification, the size shall be either Size 5 or Size 7. ***Size***

C255.03 REFERENCE DOCUMENTS

1. Documents referenced in this Specification are listed in full below whilst being cited in the text in the abbreviated form or code indicated. ***Documents Standards Test Methods***

(a) Council Specification

C244 - Sprayed Bituminous Surfacing

(b) Australian Standards

AS 1141.11	-	Particle size distribution by dry sieving
AS 1141.12	-	Material finer than 75 µm in aggregates (by washing)
AS 1141.22	-	Wet/dry strength variation
AS 1141.23	-	Los Angeles value
AS 1141.25	-	Degradation factor - source rock
AS 1141.42	-	Pendulum friction test (PAFV)
AS 1160	-	Bitumen emulsions for construction and maintenance of pavements
AS 1289.3.7.1	-	Determination of the sand equivalent of a soil using a power-operated shaker
AS 2008	-	Residual bitumen for pavements
AS 2357	-	Mineral fillers for asphalt
AS 2891.3.1	-	Bitumen content and aggregate grading (reflux method)

(c) International Slurry Surfacing Association

ISSA TB 100	-	Test method for wet track abrasion of slurry surfaces
ISSA TB 114	-	Wet stripping test for cured slurry seal mix
ISSA TB 139	-	Test method to classify emulsified asphalt/aggregate mixture systems by modified cohesion tester measurement of set and cure characteristics
ISSA TB 144	-	Test method for classification of aggregate filler-bitumen compatibility by Schulze-Breuer and ruck procedure

MATERIALS

C255.04 BINDER

1. The binder supplied and used in the works shall be an emulsified polymer modified bitumen, formulated to meet the performance requirements of the mix specified in Clauses C255.10 and C255.18. ***Polymer Modified Bitumen Emulsion***

2. Prior to emulsification, incorporation of polymer and additives, the bitumen shall comply with AS 2008. ***Specification***

3. The Subdivider shall provide the Certifying Engineer with sufficient information to verify that the binder supplied is the same as that nominated in the mix design. ***Verification***

C255.05 MINERAL AGGREGATES

1. Mineral aggregates shall consist of crushed rock or crushed gravel, or a mixture of crushed rock or crushed gravel and natural sand. It shall consist of clean, hard, angular, durable particles, and free form clay, dirt, organic material or other deleterious matter. ***Quality***

2. The aggregate from each source shall comply with the requirements given in Table C255.1. ***Aggregate Properties***

Property	Test Method	Requirement
Degradation Factor	AS 1141.25	50 minimum
Los Angeles Value	AS 1141.23	30 maximum
Aggregate Wet Strength	AS 1141.22	150 kN minimum
Wet/Dry Strength Variation	AS 1141.22	30% maximum
Polished Aggregate Friction Value	AS 1141.42	45 minimum
Sand Equivalent	AS 1289.3.7.1	60 minimum

Table C255.1 - Aggregate Properties

3. When tested in accordance with AS 1141.11 and AS 1141.12, the aggregate (including mineral filler) shall conform with the grading limits given in Table C255.2. ***Grading Limits***

Sieve Size	Percent Passing by Mass	
	Size 5	Size 7
13.2 mm	100	100
9.50 mm	100	100
6.70 mm	100	85-100
4.75 mm	90-100	70-90
2.36 mm	50-70	45-70
1.18 mm	30-50	28-50
600 µm	20-35	19-34
300 µm	12-25	12-25
150 µm	7-18	7-18
75 µm	4-10	5-15

Table C255.2 - Grading Limits for Combined Aggregate/Filler

4. The Subdivider shall nominate the source/s of aggregates to the Certifying Engineer, and shall submit NATA certified test reports on the quality and grading of the combined aggregate proposed to be used. ***NATA Certification***

5. The Subdivider shall submit test results to the Certifying Engineer for each lot/stockpile of aggregate a minimum of seven (7) days prior to incorporation in the works. ***7 Days***

C255.06 MINERAL FILLER

1. Mineral filler shall consist of hydrated lime, flyash, Portland cement, or other material approved by the Certifying Engineer. ***Type***

2. The mineral filler shall be dry, free from lumps and any deleterious material, with a minimum of 85 per cent passing a 75 µm sieve. In all other respects, the mineral filler shall comply with the requirements of AS 2357. ***Quality***

3. The quantity of filler added to the bituminous microsurfacing during placement shall not vary by more than 1 per cent of the total aggregate (by mass) from the filler content nominated in the mix design. ***Proportion***

C255.07 WATER

1. Water added to the bituminous microsurfacing shall be potable and shall be compatible with the component materials. ***Potable***

C255.08 ADDITIVES

1. Details of the type, source and nominal proportions of additives shall be submitted to the Certifying Engineer with the mix design. ***Type and Proportion***

C255.09 SAMPLING AND TESTING OF MATERIALS

1. Sampling and testing of materials shall be arranged by the Subdivider and carried out by a NATA registered laboratory for the nominated test methods. ***Subdivider's Responsibility***

2. All costs associated with sampling and testing of materials shall be borne by the Subdivider. ***Subdivider's Costs***

MIX DESIGN

C255.10 MIX PROPERTIES

1. The nominated mix design shall satisfy the properties given in Table C255.3. ***Mix Properties***

Mix Property	Test Method	Requirement
Wear Loss	ISSA TB 100 6 day	800 g/m^2 maximum
Traffic Time	ISSA TB 139 30 minutes 60 minutes	 12 kg.cm minimum 20 kg.cm minimum
Adhesion	ISSA TB 114 or ISSA TB 144	= 90% or 11 grade points minimum (AAA, BAA)

Table C255.3 - Mix Properties

C255.11 NOMINATED MIX

1. At least seven (7) days before commencing bituminous microsurfacing work, the Subdivider shall submit to the Certifying Engineer for approval, details of the nominated bituminous microsurfacing mix design for the work including the target application rate (m^3 of mix/m^2 of road surface) and the corresponding nominal layer thickness, together with NATA certification and test results demonstrating that the nominated mix and its constituents meet the requirements of the Specification. ***Submit for Approval***

2. The details of the nominated mix design shall include the following: ***Mix Design Details***

   (a) Bitumen emulsion content of the mix, and the residual binder content of the emulsion;

   (b) Target combined aggregate/filler grading;

   (c) Proportions of constituent materials used; and

   (d) Type and sources of aggregates, filler and binder.

C255.12 APPROVED MIX

1. When a nominated mix has been approved by the Certifying Engineer, it shall be known as the 'approved mix'. Work shall not commence until a bituminous microsurfacing mix has been approved. ***Approved Mix***

2. The combined aggregate/filler grading and the binder content of the approved mix will be termed the 'approved grading' and the 'approved binder content' respectively. ***Grading and Binder Content***

PRODUCTION AND PAVING

C255.13 REQUIREMENTS OF PRODUCTION MIX

1. Bituminous microsurfacing produced in the paving unit at the site shall be known as the 'production mix'. ***Production Mix***

2. The production mix shall comply with the requirements given in Table C255.4. ***Permitted Variation***

Production Mix Properties	Maximum Permitted Variations from Approved Mix (by mass)	
	Size 5	Size 7
Grading*		
Passing 9.50mm AS sieve and larger	Nil	Nil
Passing 6.70mm	Nil	± 7%
Passing 4.75mm	± 6%	± 6%
Passing 2.36mm and 1.18mm	± 5%	± 5%
Passing 0.600mm	± 4%	± 4%
Passing 0.300mm	± 3%	± 3%
Passing 0.150mm	± 2%	± 2%
Passing 0.075mm	± 1.5%	± 1.5%
Residual Binder Content	- 0.5% + 1.0%	- 0.5% + 1.0%
* Notwithstanding, these allowable variations shall not fall outside the limits for design of nominated mix as given in Table C255.2.		

Table C255.4 - Maximum Permitted Variations from Approved Mix

C255.14 PAVING UNIT CALIBRATION

1. The paving unit to be used shall be calibrated for the component materials of the approved mix prior to the commencement of paving. Previous calibration documentation covering the same materials and approved mix shall be acceptable provided that calibration has been carried out within the previous twelve (12) months. ***Calibration***

2. The documentation shall include an individual calibration for each component material at various settings which can be related to the paving unit's metering devices. ***Documentation***

3. No paving unit shall be allowed on the work until the calibration has been verified and approved by the Certifying Engineer. ***Approval by Certifying Engineer***

C255.15 PREPARATION OF PAVEMENT

1. The existing surface shall be clean and free from any loose stones, dirt, dust and foreign matter. The surface shall be swept beyond the edge of the area to be surfaced by at least 300mm. Any foreign matter adhering to the pavement and not swept off shall be removed by other means. Any areas significantly affected by oil contamination shall be cleaned to the satisfaction of the Certifying Engineer. ***Clean Pavement***

2. The Subdivider shall take all necessary precautions to prevent the bituminous microsurfacing or other materials used on the work from entering or adhering to kerbs, gutters, driveways, gratings, hydrants, valve boxes, access chamber covers, bridge or culvert decks or other road fixtures. After the bituminous microsurfacing has been spread the Subdivider shall clean off any such material and leave such gratings, access chamber covers and other road fixtures, in a clean and satisfactory condition. ***Protection of Services***

C255.16 WEATHER LIMITATIONS

1. Bituminous microsurfacing shall not commence if either the pavement or air temperature is below 10^{o}C and falling. ***Temperature***

2. Bituminous slurry may be applied when both pavement and air temperatures are above 7^{o}C and rising, or above 10^{o}C. ***Temperature***

3. Spreading shall not proceed during rain or when rain appears imminent. ***Rain***

C255.17 SPREADING

1. The surface may be pre-dampened if necessary by fogging ahead of the spreader box. Water used for pre-wetting the surface shall be applied so that the entire surface is damp with no apparent flowing water ahead of the spreader box. The application rate of the fog spray shall be adjusted to suit temperature, surface texture, humidity and dryness of the surface being covered. ***Water Fog Spray***

2. Bituminous microsurfacing shall be mixed and applied using a purpose built paver. The mix shall be of the desired consistency when deposited in the spreader box, and nothing more shall be added other than minor amounts of water for the purpose of overcoming temporary build-up of microsurfacing in the corners of the spreader box. ***Paving Unit***

3. The mixing time shall be sufficient to produce a complete and uniform coating of the aggregate and the resulting mixture shall be conveyed into the moving spreader box at a sufficient rate to always maintain an ample supply across the full width of the strike-off. ***Mixing Time and Rate***

4. The strike-off shall be adjusted to provide an application rate which will completely fill the surface voids and provide the nominal application rate of bituminous microsurfacing as scheduled. ***Application Rate***

5. After the bituminous microsurfacing has been spread, the Subdivider shall ensure that all kerbs, gutters, driveways, gratings, hydrants, valve boxes, access chamber covers, etc are uncovered and left in a clean and satisfactory condition. ***Clean Services***

6. After the emulsion has broken and the mix is sufficiently stable, rolling shall be carried out using pneumatic tyred rollers to produce a dense, even, homogeneous compacted surface where there is insufficient local traffic to achieve satisfactory compaction across the mat. ***Rolling***

7. Bituminous microsurfacing shall be capable of carrying slow moving traffic (<40km/h) within one (1) hour of application without permanent damage occurring, such as rutting or ravelling. When the time before the microsurfacing is capable of carrying traffic exceeds one (1) hour, work shall cease unless specifically approved by the Certifying Engineer. ***Traffic***

C255.18 SURFACE TEXTURE

1. The resulting surface after spreading shall be uniform in appearance, and free of areas exhibiting segregation or excessive or insufficient binder. ***Uniform Texture***

2. The surface texture shall be demonstrated on a short test run for approval by the Certifying Engineer. If the surface texture is acceptable to the Certifying Engineer, then all subsequent work shall be finished to an equivalent surface texture. ***Test Run***

3. Where increased surface texture is required, a fabric skirt may be trailed behind the spreader box. ***Increased Texture***

C255.19 JOINTS

1. Longitudinal joints in the wearing course shall be straight and placed at either the edge or the centre of a traffic lane. If necessary, the edges and joints shall be lightly screeded with a hand squeegee to achieve a smooth uniform appearance and to remove excess build-up of material. ***Uniform Joints***

C255.20 SAMPLING AND TESTING OF PRODUCTION MIX

(a) Lot Definition

1. Compliance sampling and testing of bituminous microsurfacing shall be undertaken on a lot by lot basis. For this purpose, 50m^3 or one (1) day's production (whichever is the lesser), or such smaller quantity which is considered as representative of consistent production of the paving unit, shall be considered as representative of consistent production of the paving unit. ***Lots***

(b) Responsibility of Sampling

1. The Subdivider shall be responsible for taking samples and shall supply all facilities, equipment and labour for that purpose. ***Subdivider's Responsibility***

2. The costs associated with taking samples of production mix shall be borne by the Subdivider. ***Subdivider's Cost***

(c) Frequency of Sampling

1. For the testing of production mix, two (2x) 1.5kg representative samples of bituminous microsurfacing shall be taken from each lot at random intervals. The samples shall be taken from the discharge of the paving unit and the sample containers immediately sealed. ***Mix Samples***

2. For the testing of the binder, two (2x) 2L samples of bitumen emulsion shall be taken from each bulk delivery in accordance with AS 1160. ***Bitumen Emulsion***

(d) Testing

1. The samples of bituminous microsurfacing shall be treated and tested at a NATA registered laboratory to confirm compliance with Table C255.4. Prior to testing for Residual Binder Content and Aggregate Gradation, as determined by AS 2891.3.1, the samples shall be dried to constant weight in an oven at 60^{o}C for a minimum of 15 hours. ***Mix Tests***

2. Each delivery of emulsion shall be tested for residual binder content in accordance with AS 1160 Appendix D and accompanied by a certification of specification compliance traceable to the relevant batch at the supplier's storage tank. ***Emulsion Tests***

C255.21 SHAPE AND LEVELS

1. Where a correction and wearing course have been placed, the finished surface level shall not vary from the design level at any point by more than ±10mm. Additionally immediately adjacent to any kerb and/or gutter the finished surface level shall not be below nor more than 10mm above the level of the lip of the adjacent gutter. ***Level Tolerances***

2. Notwithstanding the above, the deviation from a 3m long straight edge placed anywhere on the top of the finished surface shall not exceed 10mm when assessed within 24 hours of work completion. ***3m Straight Edge***

C255.22 NON-CONFORMANCE OF MATERIALS AND FINISHED SURFACING

1. If any materials supplied fail to conform to the requirements in this Specification or if any section of bituminous microsurfacing fails to conform to the requirements of this Specification - whether failure of the work is due to bad workmanship, defective materials supplied by the Subdivider or materials made defective by the method of operation adopted - then such failure or failures shall constitute a 'Non-conformance'. Such nonconforming sections of bituminous microsurfacing work shall be either replaced or corrected. ***Non-conformance Conditions***

2. The cost of rectifying non-conformances, including any restoration work to any underlying or adjacent surface or structure, which becomes necessary as a result of such replacement or correction, shall be borne by the Subdivider. Materials removed from the site by the Subdivider shall be replaced with materials which conform to this Specification. ***Subdivider's Cost***

LIMITS AND TOLERANCES

C255.23 SUMMARY OF LIMITS AND TOLERANCES

1. The limits and tolerances applicable to the various clauses in this Specification are summarised in Table C255.5 below.

Item	Activity	Limits/Tolerances	Spec Clause
1.	Mineral Aggregate	As per Table C255.1	C255.05
2.	Combined Aggregate/filler	As per Table C255.2	C255.05
3.	Mineral Filler	> 85% passing a 75µm Sieve	C255.06
4.	Mix Properties		
	a) Design properties	As per Table C255.3	C255.10
	b) Permitted variations	As per Table C255.4	C255.13
5.	Surface Preparation	Sweeping shall extend at least 300mm beyond edge of area to be surfaced	C255.15
6.	Weather Limitations	Microsurfacing shall not commence if either air or pavement temperature is below 10^{o}C and falling, and shall only commence if both air and surface temperature is above 7^{o}C and rising or above 10^{o}C	C255.16
7.	Shape and Levels		
	a) Finished Levels	Shall not vary at any point by more than ± 10mm from design levels. Immediately adjacent to kerb and/or gutters, levels shall not be below nor more than 10mm above design level	C255.21
	b) Finished Shape	Deviation from the bottom of a 3m straight edge shall not vary by more than 10mm	C255.21

Table C255.5 - Summary of Limits and Tolerances

SPECIAL REQUIREMENTS

C255.24 CONTROL OF TRAFFIC

1. The Subdivider shall provide for traffic in accordance with the requirements of the Specification for CONTROL OF TRAFFIC while undertaking the work and shall take all necessary precautions to protect the work from damage until such time as the new work has developed sufficient strength to carry normal traffic without damage.

2. The Subdivider shall take all necessary steps to avoid or minimise delays and inconvenience to road users during the course of the work. Where adequate detours or side tracks are included or are otherwise available, traffic shall be temporarily diverted while the work is in progress.

C255.25 RESERVED

C255.26 RESERVED

C255.27 RESERVED