



# Specification of Red Surface Course for Use on Off-Road Urban Cycleways - Interim Technical Advice

April 2023

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## Document Attributes

Document Type:	Interim Technical Advice
Document Title:	Specification of Red Surface Course for Use on Off-Road Urban Cycleways
Document No:	Issue 01
Publication Date:	18/04/2023

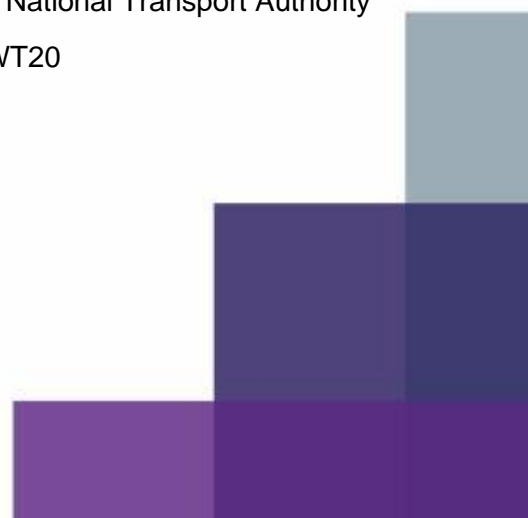
Pages:	17	Figures:	3	Tables:	5
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## NTA Authorisation and Contact Details

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## Summary

This Interim Technical Advice contains the Specification for Red Stone Mastic Asphalt (SMA) surface course for use on Off-Road urban cycleways.

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# 1. Introduction

## 1.1 General

This Interim Technical Advice (ITA) provides the Specification for Red Stone Mastic Asphalt (SMA) surface course for use on off-road urban cycleways. The **Off-Road cycleway** is a facility that is physically segregated from the road pavement by, for example, a verge or kerb.

SMA mixtures for off-road urban cycleways shall comply with this ITA which is derived from Standard Recommendation S.R. 28 (2018) "Recommendation for the use and implementation of the I.S. EN 13108 series bituminous mixtures – material specifications" and IS EN 13108-5 "Bituminous Mixtures – Material Specifications – Part 5: Stone Mastic Asphalt".

SMA for off-road urban cycleways shall also comply with the relevant requirements for SMA surface course mixtures under CC-SPW-00900 (July 2022) "Specification for Works – Road Pavements Bituminous Materials", including Clause 1 General Requirements and Definitions, Clause 2 Preparatory Work, Clause 5 Stone Mastic Asphalt Products, Clause 9 Reclaimed Asphalt, Clause 10 Works and Clause 11 Tables of CC-SPW-00900 unless otherwise specified in this ITA.

Detailed information on bituminous material types including SMA, and surfacing processes, together with advice on their use, is provided in Transport Infrastructure Ireland (TII) Publications DN-PAV-03024 and DN-PAV-03074. Reference should also be made to the TII Publications DN-PAV-03023, DN-GEO-03047, CC-SPW-00700, CC-SPW-00800 and CC-GSW-00900 where applicable.

## 2. Stone Mastic Asphalt for Off-Road Urban Cycleways

### 2.1 Mixture Designations & Pavement Type

#### 2.1.1 Mixture Designation

The mixture designation for the surface course on off-road urban cycleways is:

**SMA 6 surf PMB 65/105-60 des**

The mixture shall comply with the requirements regarding constituents, composition and installation into the Works as laid out in this ITA and the referenced requirements in CC-SPW-00900.

#### 2.1.2 Pavement Structure

Figure 1 in this ITA details the required pavement materials and layer thicknesses for off-road urban cycleways. The SMA surface course specified in this ITA shall be laid on an asphalt concrete (AC) binder course are detailed in Figure 1.

The material types and mixtures specified allow for the incorporation of reclaimed asphalt and aggregates within the pavement structure subject to this ITA and the relevant National Standards Authority of Ireland (NSAI) and TII publications including the latest editions of CC-SPW-00800 and CC-SPW-00900.

## 2.2 Constituent Materials

### 2.2.1 Binder

The binder grade shall be 65/105-60 polymer modified binder (PMB) in accordance with the requirements of Table 4 of this ITA and shall conform to Table 14 of CC-SPW-00900.

### 2.2.2 Aggregates

#### Aggregates - General

All aggregates shall be in accordance with the requirements of Table 1 of this ITA.

#### Coarse Aggregates for Surface Courses

Coarse aggregates shall be of a single rock type and source. In addition, they shall comply with the PSV and AAV requirements stated in Table 1 of this ITA. The PSV and AAV shall be determined in accordance with the 'suite of tests' methodology outlined in DN-PAV-03023 "Surfacing Materials for New and Maintenance Construction for Use in Ireland".

### 2.2.3 Filler

Filler shall comply with the requirements of Table 1 of this ITA. Reclaimed filler may be used for Off-road urban cycleways SMA surface course as set out in Table 1 of this ITA.

### 2.2.4 Reclaimed Asphalt

Reclaimed asphalt is permitted for use in SMA surface course for **off-road** urban cycleways. The source of the reclaimed asphalt shall only be from a SMA surface course and shall only contain mineral aggregate, filler and paving grade bitumen or polymer modified bitumen (PMB). The source of the reclaimed asphalt shall be declared, and documentary evidence provided that the source SMA

surface course had a minimum PSV52. The amount, size and grading of the reclaimed asphalt, the mix type and the course from which the reclaimed asphalt has been or will be derived, the percentage of reclaimed asphalt in the mixture and the active binder content utilised for the mixture shall be declared in the Type Test Report.

The maximum amount of reclaimed asphalt permitted shall be 15% by mass of the total mixture as set out in Table 1 of this ITA. The size fraction for the reclaimed asphalt shall be 0/6. The grading of the 0/6 reclaimed asphalt shall comply with the limits set out in Table 2 of this ITA. The grading of the reclaimed asphalt used in the mixture shall be declared.

Where reclaimed asphalt is a constituent of the SMA product, the requirements of Clause 9 of CC-SPW-00900 shall be adhered to. Reclaimed asphalt shall be assessed and classified according to IS EN 13108-8 "Bituminous mixtures - Material specifications - Part 8: Reclaimed Asphalt"; and Tables 13a, 13b, 13c and 13d of CC-SPW-00900.

Reclaimed asphalt shall be tested in accordance with the requirements of Table 13a of CC-SPW-00900 to ensure that the material is suitable for use. The binder coating the aggregate particles of the reclaimed asphalt shall be tested for binder content and recovered penetration and softening point. If the penetration of the recovered binder is less than 15, the recovered binder shall be considered inert for the purposes of consideration of the mixture binder content.

Where more than 10% reclaimed asphalt (by mass of the total mixture) is used, additional properties shall be established in accordance with Table 13b of CC-SPW-00900.

In line with SR 28 and Clause 9 of CC-SPW-00900, where more than 10% reclaimed asphalt is used (by mass of the total mixture)), then the final penetration of the binder and softening point of the mixture shall be calculated using Annex A on IS EN 13108-5. The calculation of the final mixture values in Annex A is based on the combination of the penetration of the binder and softening point values for the reclaimed asphalt binder and the virgin binder used. The penetration and softening point of the combined fresh and active binder shall fall within the permitted range in Table 14 of CC-SPW-00900.

In addition to routine testing requirements, the testing in Table 13c of CC-SPW-00900 shall be carried out. As stated in CC-SPW-00900, changes in the properties of the reclaimed asphalt may affect the composition of the final mixture; these effects will be greater with increasing amounts of reclaimed asphalt in the mixture. The content and grade of fresh binder required in the mixture design shall be recalculated if the change in binder content and/or the change in recovered penetration of the reclaimed asphalt exceed the amounts in Table 13d of CC-SPW-00900.

### **2.2.5 Additives**

The use of the additives shall comply with Clause 5.2.5 of CC-SPW-00900 and the requirements of this ITA clause. The nature and properties of all additives shall be declared.

Colour pigment additive of iron oxide is a required additive and shall be in pelleted form. The addition of the colour pigment shall be by red granules. The colour pigment additive shall comply with the properties set out in Table 3 of this ITA.

The quantity of colour pigment additive in the SMA mixtures shall be 3.5% to 4.0% by mass of the total mixture as set out in Table 4 of this ITA.

Other additives for SMA mixtures which may be permitted for inclusion are fibres, adhesion agents and workability additives. The suitability of such additives shall be demonstrated in accordance with IS EN 13108-5 and the Provisional Type Approval Installation Trial (prTAIT) process outlined in this ITA.

## **2.3 Product Composition**

### **2.3.1 General**

The requirements under this Clause relate to the composition of the product and shall be detailed in the Type Testing documentation accompanying the Declaration of Performance (DoP) and CE Mark. Separate and additional requirements for the placement of products in the Works are contained in Clause 10 of CC-SPW-00900.

The grading specification is given in Table 4 below within which the manufacturer's declared target grading must fall. The manufacturer's declared target grading in combination with the tolerances from IS EN 13108-21 "Bituminous mixtures - Material specifications - Part 21: Factory Production Control" result in the overall grading envelope of the product to be supplied.

### **2.3.2 Compositional Grading**

The grading of the target composition shall fall within the grading envelope given in Table 4 of this ITA.

### **2.3.3 Binder Content**

The minimum binder content is given in Table 4 of this ITA.

The binder content shall be expressed in percentage by mass of the total mixture. The binder content shall be expressed to the nearest 0,1 % for FPC purposes.

### **2.3.4 Void Content**

Void content shall be reported as  $V_{max}$  and  $V_{min}$  categories in accordance with Table 4 of this ITA.

### **2.3.5 Water Sensitivity**

Water sensitivity shall comply with the requirements of Table 4 of this ITA.

### **2.3.6 Resistance to Permanent Deformation**

The resistance to permanent deformation shall comply with the requirements of Table 4.

### **2.3.7 Binder Drainage**

Binder drainage shall comply with the requirements of Table 4 of this ITA. Where necessary stabilising additives (fibres) shall be added in order to comply with the binder drainage requirements.

### **2.3.8 Temperature**

The maximum temperature of the mixture is set out in Table 4 of this ITA. Maximum temperature applies at any place in the plant and shall be declared on the CE Mark for the product.

### **2.3.9 Colour**

The colour of the SMA mixture is required to be red and approximately RAL 3013 (tomato red). The colour shall be visually a clear and consistent tomato red colour, a typical example is indicated in Figure 2 of this ITA. The colour should be assessed when surface dry and under clear lighting conditions. The ability to achieve the required red colour shall be demonstrated as part of the prTAIT process in this ITA.

## **2.4 Product Approval**

### **2.4.1 General**

The proposed SMA shall have been subject to a Provisional Type Approval Installation Trial (prTAIT) for the intended use. A prTAIT is used to provide confidence in the product, and the capability of the Producer to design, manufacture and install the product, and to demonstrate that the characteristics of the product comply with the required characteristics according to this ITA. The Producer shall undertake the prTAIT process set out below for each variant of the SMA material for off-road urban cycleways. Any change to any of the virgin constituent materials, the production plant or surfacing contractor is considered to be a variant.

The proposed SMA shall have an approved prTAIT in the previous 18 months. The prTAIT shall have been installed in accordance with the Producer's certified Factory Production Control system.

If the proposed SMA product has received an approved prTAIT, it shall have been carried out on a site with the same characteristics to that to be treated in the Contract.

### **2.4.2 prTAIT Process**

The prTAIT comprises a three-stage process as set out in Figure 3:

1. Laboratory study,
2. Product mix trial and
3. Cycleway trial.

The properties of the mixture at each stage shall comply with the requirements of this ITA specification. Each stage of the prTAIT must be approved by the Employer's Representative before progression to the next Stage. The purpose of the prTAIT is to demonstrate that the product is of a high quality, is able to be consistently produced and laid correctly, and that the product demonstrates the required colour and material properties in accordance with the requirements of this specification.

The laboratory study (Stage 1) relates to designing a mixture that meets the requirements of this ITA specification. The product mix trial (Stage 2) provides the opportunity to assess the behaviour of the mix under compaction, to assess the colour achieved, and enables the collection of information that provides the necessary properties of the laid and compacted material. The product mix trial is not permitted to form part of any permanent pavement cycleway works and should comprise at least one 20 tonne batch of the design mixture proposed. The Employer's Representative must be given sufficient opportunity to witness the Stage 2 product mix trial.

Following the completion of a satisfactory product mix trial, a site Cycleway trial (Stage 3) can then be undertaken which may form part of a permanent Cycleway works pavement. The prTAIT shall have been carried out on a site with similar characteristics to that to be treated in the Contract. The site of the Stage 3 trial must be approved by Employer's Representative, and the Employer's Representative must be given the opportunity to witness the trial. Following satisfactory completion of this Stage 3 trial and subsequent mixture approval, confirmation of formal approval to use the product may be given by the Employer's Representative.

Where the Producer can demonstrate approval by the National Transport Authority (NTA) for a prTAIT and show evidence of satisfactory completion of an urban cycleway in accordance with this ITA in the previous 18 months, a new prTAIT will not be required. Notwithstanding this, as set out above the Producer shall undertake the prTAIT process for each variant of the SMA material for off-road urban cycleways including any change to any of the virgin constituent materials, the production plant or surfacing contractor.



### **2.4.3 Data to be Recorded and Reported**

As part of the prTAIT, the producer shall record all the data required by this ITA for each stage of the prTAIT, and any additional information required by the Employer's Representative. A report shall be submitted by the Producer with the information for each stage of the prTAIT. This should include but is not limited to the following:

- Works Proposal as set out in Clause 10.1 of CC-SPW-00900
- Coarse aggregate source and geological rock type
- Fine aggregate source and geological rock type
- Reclaimed asphalt source
- Filler source, type and supplier
- Colour additive type, properties and supplier
- Bitumen type, properties and supplier
- Expected manufacturing plant
- Laboratory design properties
- Declaration of Performance (DoP)
- CE mark certificates
- Type Test Reports
- Test certificates for coarse aggregate physicals, binder properties, mixture properties (binder drainage, wheel tracking, voids etc.)
- the amount, size and grading of reclaimed asphalt, the mix group and/or the course from which the reclaimed asphalt has been or will be derived shall be declared in the Type Test Report.
- Texture depth data
- Visual assessment and photos of the laid material for colour achieved

### **3. Works**

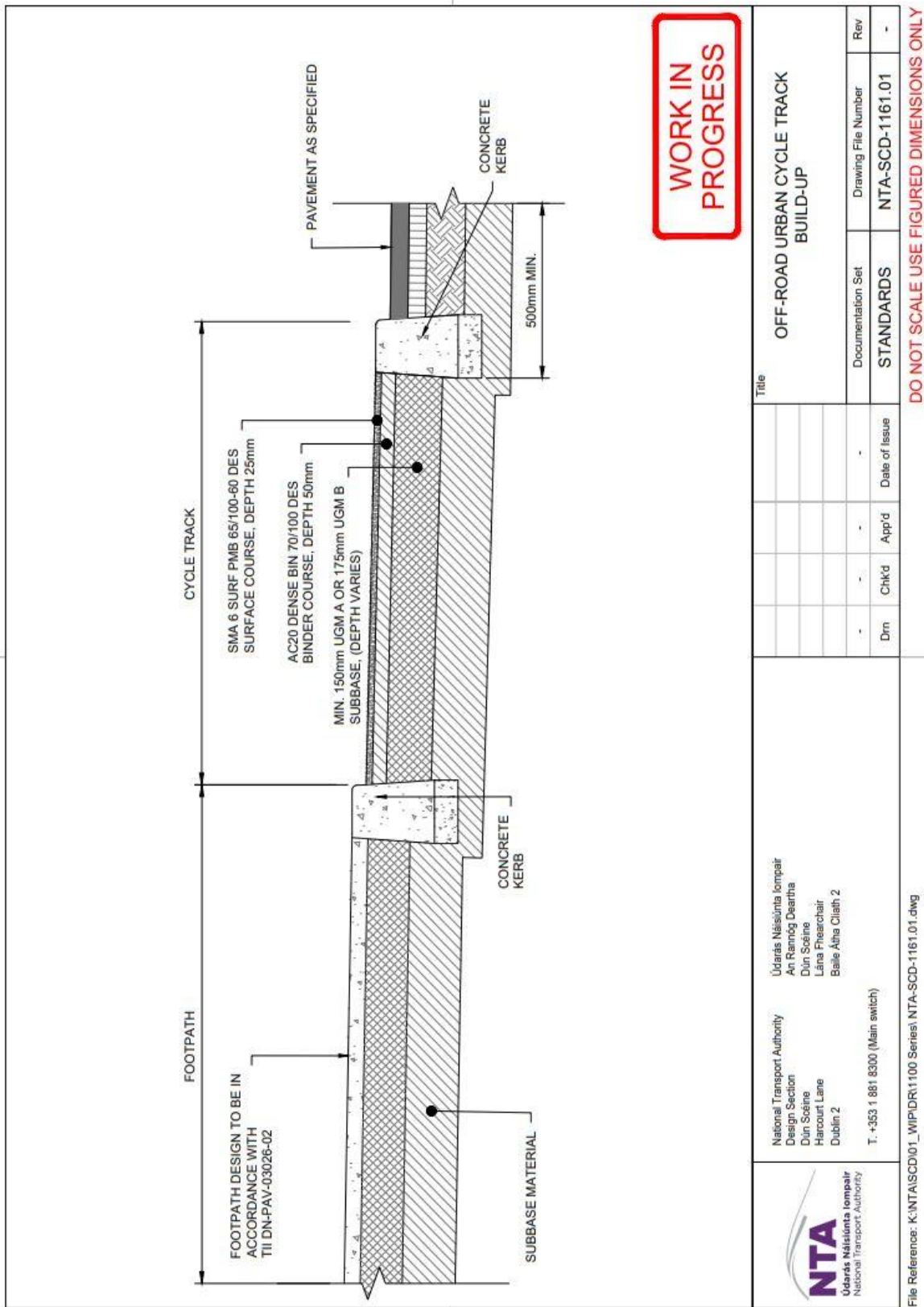
For the red SMA product to be incorporated into the Works the prTAIT report, DoP, CE Mark and Type Test Reports shall be supplied to the Employer's Representative for review prior to commencement of the Works.

The requirements for the placement and compaction of SMA on off-road urban cycleway products within the Works shall comply with all the requirements of Clause 10.1 of CC-SPW-00900 and shall be controlled and monitored in accordance with the requirements of Table 5 of this ITA.

Before work commences, the Contractor shall submit a Works Proposal to the Employer's Representative as set out in Clause 10.1 of CC-SPW-00900.

The surface course shall exhibit a uniform macrotexture. The macrotexture of the SMA surface course on off-road urban cycleways shall comply with the requirements of Table 5 of this ITA and the testing methodology outlined under Clause 10.1.11 of CC-SPW-00900.

# 4. Figures





**Figure 2: Stone Mastic Asphalt for Urban Cycleways**  
**– Example of Typical Red Colour (RAL 3013) to be Achieved**

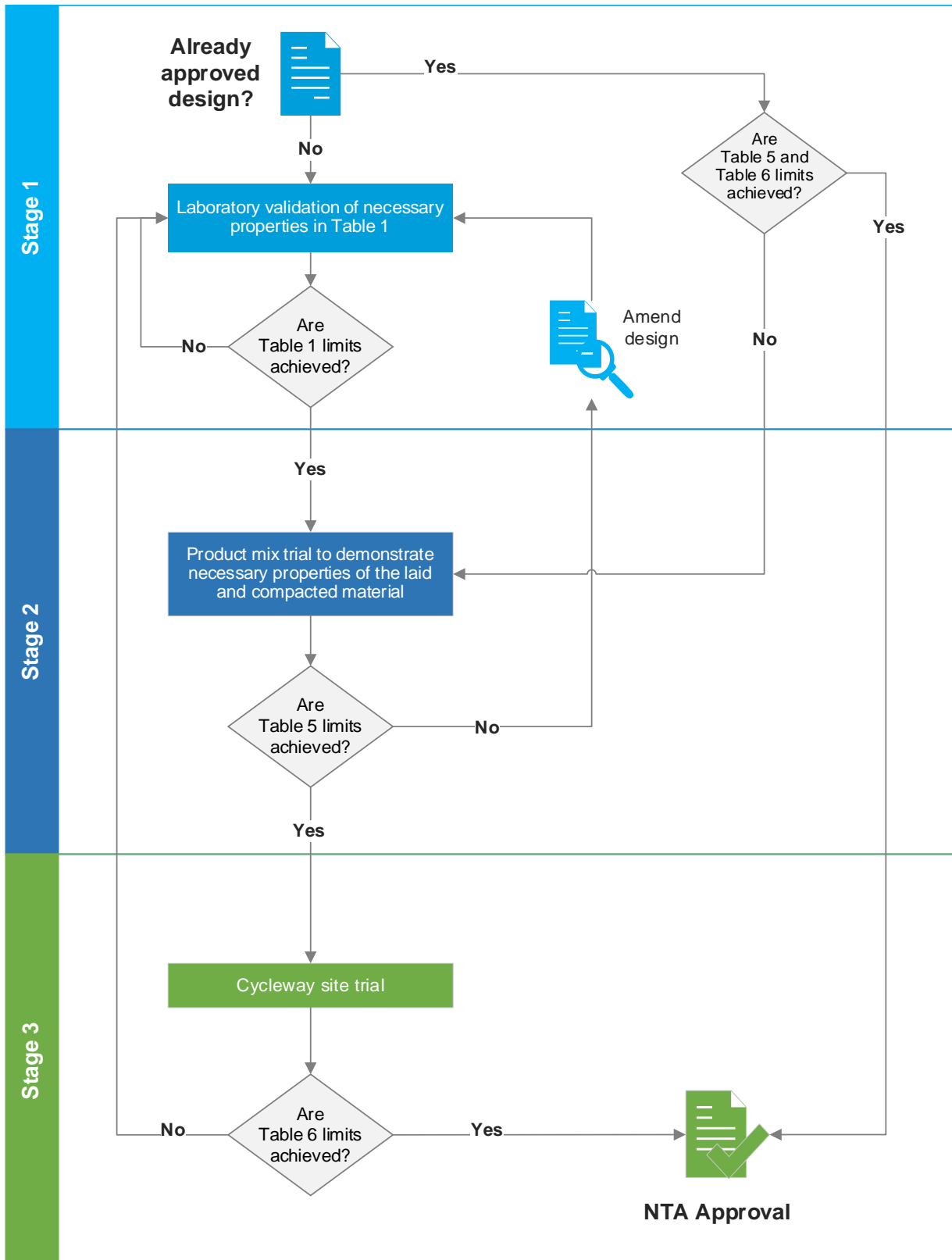


Figure 3: Provisional Type Approval Installation Trial (prTAIT) Process

## 5. Tables

**Table 1 Stone Mastic Asphalt for Off-Road Urban Cycleways**  
– Requirements for Constituent Materials

Test	SMA Surface Course for Off-Road Urban Cycleways	Test Method
<b>Coarse Aggregate<sup>2</sup></b>		
Aggregate of a single type and source	✓	EN 932-3
Type - Crushed Rock	✓	na
Type - Crushed Gravel	C <sub>100/0</sub>	EN 933-5
Fines Content	f <sub>4</sub>	EN 933-1
Shape - Flakiness and size	F <sub>15</sub>	EN 933-3
Resistance to Fragmentation - Los Angeles	LA <sub>25</sub>	EN 1097-2
Resistance to Freezing & Thawing - Soundness	MS <sub>25</sub>	EN 1367-2
Resistance to Freezing & Thawing - Water Absorption	WA <sub>24</sub> <sup>21</sup>	EN 1097-6
Resistance to Polishing - PSV	PSV <sub>52</sub>	EN 1097-8
Resistance to Surface Abrasion - AAV	AAV <sub>16</sub>	EN 1097-8
<b>Reclaimed Asphalt<sup>2, 3, 4</sup></b>		
Maximum allowed (% by mass of total mixture)	15%	na
Grading <sup>4</sup>	0/6	EN 933-1
<b>Fine Aggregate<sup>2</sup></b>		
Grading	0/2 or 0/4	EN 933-1
Fines Content	f <sub>22</sub>	EN 933-1
Type	crushed rock fines, sand or mixture with max 50% sand	na
<b>Added Filler</b>		
Reclaimed filler	Yes	
Grading	EN 13043 table 24	EN 933-10
Type	limestone, hydrated lime, cement CEM I or CEM II	na
Loose bulk density in kerosene (except hydrated lime)	Clause 5.5.5 of EN 13043	EN 1097-7
<b>Notes</b>		
<sup>1</sup> If the water absorption value is greater than WA <sub>24</sub> , the aggregate shall be deemed acceptable if the Soundness meets the MS <sub>25</sub> requirement		
<sup>2</sup> Source of coarse aggregate, fine aggregate and reclaimed asphalt to be declared		
<sup>3</sup> The source of the reclaimed asphalt shall only be from a SMA surface course with PSV <sub>55</sub> minimum		
<sup>4</sup> The grading of the reclaimed asphalt shall comply with the limits in Table 2 of this ITA		

**Table 2 Stone Mastic Asphalt for Off-Road Urban Cycleways  
– Grading Limits for 0/6 Reclaimed Asphalt**

<b>0/6 Reclaimed Asphalt</b>	
<b>Sieve Size (mm)</b>	<b>% by mass passing</b>
10	100
6,3	90 to 100
4	70 to 100

**Table 3 Stone Mastic Asphalt for Off-Road Urban Cycleways  
– Requirements for Colour Pigment Additive**

<b>Property</b>	<b>Requirement</b>
Form	Pelleted form
Appearance	Red Granules
Chemical Composition	Fe <sub>2</sub> O <sub>3</sub> Wax-coated
Pigment as Fe <sub>2</sub> O <sub>3</sub>	≥ 70%
Melting Point (°C)	86 – 120

**Table 4 Stone Mastic Asphalt for Off-Road Urban Cycleways**  
**– Product Composition and Properties**

hEN reference	EN 13108 – 5 Stone Mastic Asphalt
<b>Table column reference</b>	<b>1</b>
Urban Cycleway Type	Off-Road
Layer	Surface
Mixture designation	SMA 6 surf des
<b>Sieve Size (mm)</b>	<b>% by mass passing</b>
10	100
6,3	90 to 100
4	25 to 45
2	25 to 40
0,063	8 to 14
<b>Binder content <math>B_{min}</math><sup>1</sup></b>	
PMB 65/105-60	5,8
<b>Binder grade<sup>2</sup></b>	
PMB 65/105-60	✓
<b>Additives</b>	
Red Granules/Pellets (% by mass of total mixture)	3,5 – 4,0
<b>Properties</b>	
Binder drainage <sup>3</sup>	$D_{0,3}$
Air Void content minimum <sup>3</sup>	$V_{min\ 2,0}$
Air Void content maximum <sup>3</sup>	$V_{max\ 8,0}$
Water sensitivity <sup>3</sup>	$ITSR_{80}$
Resistance to permanent deformation <sup>3</sup>	$WTS_{AIR\ 1,0}$ $PRD_{AIR\ 9,0}$
<b>Temperature of the mixture – maximum<sup>4</sup></b>	
PMB 65/105-60	<i>Supplier Declared Value</i>
<b>Notes</b>	
<sup>1</sup> The minimum binder content, expressed as $B_{min}$ , is corrected for FPC purposes to $B$ , in accordance with CC-GSW-00900, Clause 5.3.3.	
<sup>2</sup> Binder properties specified in Table 14 of CC-SPW-00900	
<sup>3</sup> Test methods and test conditions contained in Table 19 of CC-SPW-00900	



**Table 5 Stone Mastic Asphalt for Off-Road Urban Cycleways**  
 – Requirements for the Works

hEN reference	EN 13108 – 5 Stone Mastic Asphalt	
<b>Table column reference</b>	<b>1</b>	
Urban Cycleway Type	Off-Road	
Layer	Surface	
Mixture designation	SMA 6 surf des	
<b>Alignment, levels, tolerances, thickness &amp; regularity (mm)</b>		
Horizontal alignment	See Clause 702	
Levels	See Clause 702	
Tolerances	± 6	
Adjacent to surface water or linear drainage channel	10	
Layer thickness – nominal (mm)	25 ± 5	
Surface regularity	See Clause 702	
<b>Temperature of the mixture – minimum (°C)</b>	<b>Delivery</b>	<b>Rolling</b>
PMB 65/105-60	145	115
<b>Properties</b>		
Water sensitivity <sup>1</sup>	<i>ITSR</i> <sub>80</sub>	
Resistance to permanent deformation <sup>1</sup>	<i>WTS</i> <sub>AIR 1,3</sub> <i>PRD</i> <sub>AIR 14,0</sub>	
<b>Surface Macrotexture (mm) <sup>1</sup></b>		
<b>All locations</b>		
Average per 1000m - minimum	0,8	
Average per 1000m - maximum	1,3	
Average for a set of 10 measurements - minimum	0,7	
<b>Notes</b>		
<sup>1</sup> Test methods and test conditions contained in Table 20 of CC-SPW-00900		

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