



# 8407 Bituminous Cold Mix

REVISION 16/02/2024

## 8407.1 Introduction

This supplementary requirement applies to the design, production, delivery, application and conformance of cold mix. Including supply of all materials, sampling, testing and any other operations necessary to provide the conforming product. This Specification unless amended, applies to dense graded cold mix of nominal sizes 7, 10 or 14 mm.

### 8407.1.1 Definition of Terms

The following terms apply specifically to this specification;

Term	Definition
Cold Mix	<i>Bituminous hot mixed – cold laid plant mix</i>

## 8407.2 Referenced Documents

This supplementary specification shall be read in conjunction with the following:

- MRS01 *“Introduction to Specifications”*;
- MRTS01 *“Introduction to Technical Specifications”*;
- MRS30 & MRTS30 *“Asphalt Pavements”*
- AS 1141 *“Methods for Sampling and Testing Aggregates”*;
- AS 1141.11 *“Particle Size distribution by Sieving”*;
- AS 1141.15 *“Flakiness Index”*;
- AS 1141.18 *“Crushed particles in coarse aggregate derived from gravel”*;
- AS 1141.22 *“Wet/Dry Strength Variation”*;
- AS 1160 *“Bituminous emulsion for the construction and maintenance of pavements”*;
- AS 2008 *“Residual bitumen for pavements”*;
- AS 2150 *“Asphalt – A guide to good practice”*
- AS 2157 *“Cutback Bitumen”*
- AS 2250 *“Hot Mix Asphalt – A Guide to Good Practice”*;
- AS 2758 *“Aggregates and Rock for Engineering purpose”*;
- AS 2758.2 *“Aggregate for sprayed bituminous surfacing”*;
- AS 2758.5 *“Asphalt aggregates”*;
- AS 2891 *“Methods of Sampling and testing asphalt”*;
- AS 2891.3.1 *“Bitumen Content and Aggregate Grading – Reflux Method”*;
- AS 3568 *“Oils for reducing the viscosity of bitumen for pavements”*;



- AS 4283 “Cold Mix Asphalt for Maintenance Patching”;
- DTMR Road Asset Management Contract (RAMC) Gen 2 Appendix M: Routine Maintenance Specification – Section 100 Sealed Surfaces;
- DTMR Road maintenance Guidelines; and
- the project Drawings.

### 8407.3 Description of Works

Work items incorporated by this supplementary specification are identified in Section 8407.6 and 8407.7 with individual activities/tasks for measurement and payment sourced from the Bill of Quantities and listed in MRC Supplementary Specification Annexure 8407\_1 Bituminous Cold Mix Section 1

### 8407.4 Quality Systems Requirements

#### 8407.4.1 Std Test Methods (Testing Regime)

Unless otherwise approved by the Superintendent the following minimum testing regime applies to this specification:

The testing references detailed within this specification shall also mean the minimum test frequencies and minimum numbers of tests, where they have not been referenced testing shall be as follows:

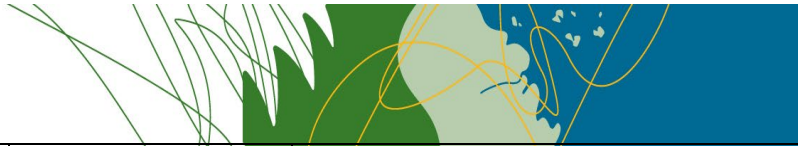
- Mix and compaction (as required) shall be tested in accordance with MRTS30 Asphalt Pavements and referenced specifications

Where there are additional testing requirements these are included in Clause 2 of MRC Supplementary Specification Annexure 8407\_1 Bituminous Cold Mix

#### 8407.4.2 Hold Points, Witness Points and Milestones

The following table represents the minimum inspection and milestone requirements for this specification;

Activity	Inspection Type	When
Preliminary Documentation as required by 8407.5	Milestone	4 weeks prior to works commencing or prestart meeting
Nominated Mix design	Milestone	21 days prior to first delivery
Approved mix - Superintendents approval of the nominated mix	Hold Point	Prior to works commencing
Storage of Cold Mix in stockpiles	Witness Point	Prior to use, less than 14 days maximum stockpiling
Testing of Production Mix	Witness Point	As required by specification based on works schedule and lot sizes
Surface Preparation of holes	Hold Point	Prior to placing and compacting cold mix
Placing and Compacting Cold Mix	Witness point	After surface preparation inspection approval
Site clean up and disposal of waste materials	Witness Point	At conclusion of works



Works as Executed documentation (As Required)	Hold Point	4 weeks prior to practical completion being requested.
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**8407.4.3 Construction Tolerances**

Unless otherwise approved by the Superintendent the following construction tolerances shall apply to this Supplementary Specification;

The construction activity outcome shall not depart from the widths, lengths, heights, and shapes specified by the relevant specifications as applies to this specification;

- Cold Mix laying and compacting tolerances shall be in accordance with the applicable activity 105 and 108 of DTMR Road Asset Management Contract (RAMC) Gen 2 Appendix M: Routine Maintenance Specification – Section 100 Sealed Surfaces
- Cold Mix laying and compacting tolerances shall be in accordance with the applicable activity 101, 102, 105, 107, 110, 111, 127, and 142 of DTMR Routine Maintenance Guidelines – Sealed Surfaces

Tolerances specific to the project are detailed on the design drawings and are included in Clause 2 of MRC Supplementary Specification Annexure 8407\_1 Bituminous Cold Mix

**8407.5 Preliminary**

The Contractor is to submit the following documentation 4 weeks prior to commencing work or a prestart is conducted. (MILESTONE):

- Works procedure – all activities and order of construction
- Environmental Management Plan
- Traffic Management Plan and TGS’s

Other preliminary requirements unique to the project will be listed in the MRC Supplementary Specification Annexure 8407.1 (MILESTONE)

The contractor is to ensure their construction activities are based on the design drawing requirements. Alternate construction materials and procedures are not acceptable unless site conditions dictate and at the Superintendents approval.

Cold Mix must be supplied from Council’s preferred supplier and comply with Council’s requirements unless otherwise approved by the Superintendent.

Supply of all materials to site is the responsibility of the Contractor at their cost, where items are Principal supplied the nominated storage site shall be obtained from MRC Supplementary Specification Annexure 8407\_1 Bituminous Cold Mix Section 3 and shall be the point of supply.

**8407.5.1 Materials**

Supply of all materials to site is the responsibility of the Contractor at their cost, where items are Principal supplied the nominated storage site shall be obtained from MRC Supplementary Specification Annexure 8407\_1 Bituminous Cold Mix Section 3 and shall be the point of supply.

All items and materials not detailed within this specification shall be supplied in accordance with Specifications MRTS30. Where the project materials specification varies this will be detailed in MRC Supplementary Specification Annexure 8407\_1 Bituminous Cold Mix Section 5.2.

**8407.5.1.1 Sampling and Testing of Materials**



Sampling and testing of materials shall be arranged by the Contractor and carried out by a laboratory with appropriate NATA (National Association of Testing Authorities) registration in accordance with the relevant material specifications cited in this Supplementary Specification

#### **8407.5.1.2     Aggregates**

##### **Uniformity**

Aggregates shall be of uniform quality and grading. Aggregates complying with the requirements, when combined with the mineral filler shall be capable of achieving the properties required by this work section.

##### **Coarse Aggregate**

Coarse aggregate comprises all mineral matter retained on the 4.75 mm AS sieve.

Coarse aggregate shall consist of clean, dry, hard, tough and sound crushed rock, metallurgical slag or gravel, be of uniform quality and be free from dust, clay, dirt or other matter deleterious to asphalt. Coarse aggregate shall comply with AS 2758.5.

The grading of the coarse aggregate used in the work shall be determined in accordance with AS 1141.11.

When submitting details of the nominated mix, the Contractor shall submit to the Superintendent NATA Certified Laboratory Test Reports on the quality and grading of the coarse aggregate proposed to be used. Such test results shall be less than 12 months old and representative of current aggregate supply. The grading shall be known as the 'Proposed Grading'.

If the Contractor proposes to blend two or more coarse aggregates to provide the Proposed Grading, then test reports of each constituent material shall be submitted separately and the Superintendent advised of the proportions in which the various sizes and constituents are to be combined.

The coarse aggregate from each source shall comply with the following requirements:

- a) Wet Strength (AS 1141.22) shall be not less than 100 kN for any source except the wet strength required for any fraction of open graded asphalt shall not be less than 150 kN;
- b) Wet / Dry strength variation (AS 1141.22) shall not exceed 35 per cent for any fraction of constituent;
- c) Flakiness index (AS 1141.15) of the aggregate shall not exceed 35;
- d) Fractured faces (AS 1141.18) – the fraction of aggregate retained on a 4.75 mm AS sieve shall comprise at least 75% by weight of particles with at least two fractured faces.

##### **Fine Aggregate**

Fine aggregate comprised all mineral matter (other than filler) passing the 4.75 mm AS sieve. It shall consist of clean, hard, tough and sound grains, free of coatings or loose particles of clay, silt or other matter deleterious to asphalt.

The fine aggregate shall consist of natural sand or a mixture of natural sand and material derived from the crushing of sound stone or gravel.

The grading of the fine aggregate used in the work shall be determined in accordance with AS 1141.11.

When submitting details of the nominated mix, the Contractor shall submit to the Superintendent a NATA Certified Laboratory Test Report on the quality and grading of the fine aggregate proposed to be used. Such test results shall be less than 12 months old and representative of current aggregate supply. The grading shall be known as the 'Proposed Grading'.



If the Contractor proposes to blend two or more fine aggregates to provide the Proposed Grading, then test reports for each constituent material shall be submitted separately and the Superintendent advised of the proportions in which the various sizes and constituents are to be combined.

#### **8407.5.1.3 Mineral Filler**

Mineral filler may consist of hydrated lime, fly ash, Portland cement, flue dust from the manufacture of Portland cement, asphalt plant baghouse fines, or other material approved by the Superintendent.

The mineral filler shall comply in all other respects with the requirements of AS 2150.

#### **8407.5.1.4 Binder**

The binder shall be Class 170 or Class 320 bitumen. The residual bitumen shall be homogeneous, contain no inorganic mineral matter other than that naturally occurring.

The bitumen used in the works shall comply with AS 2008.

Subsequent to the introduction of fluxing oil or cutting oil, all cutback bitumen shall comply with the requirements of AS 2157

#### **8407.5.1.5 Flux Oil and Cutter Oil**

The flux oil and cutter oil to be used for reducing the viscosity of the binder and retaining the sold mix in a workable condition shall conform to AS 3568 in addition to the following requirements:

- a) It shall be clean and free from water; and
- b) When one part by volume of oil is mixed with four parts by volume of bitumen at a temperature of 177°C the mixture shall be homogeneous and shall not foam.

#### **8407.5.1.6 Bitumen Adhesion Agent**

A bitumen adhesion agent shall be added, if required, to the binder at one per cent by mass when nominated by the Superintendent based on experience with asphalts incorporating aggregates from the same source.

Details of the proposed bitumen adhesion agent shall be submitted for the Superintendent's approval in accordance with Clause 8407.5.2.1

The bitumen adhesion agent shall be used in a manner compatible with the manufacturer's recommendations.

### **8407.5.2 Mix Design**

#### **8407.5.2.1 Nominated Mix**

##### **Design limits**

The Contractor shall design the mix, henceforth called the 'nominated mix', within the limits shown in Table 8407.1 unless otherwise approved by the Superintendent.

The Contractor shall provide a Certificate from a laboratory with appropriate NATA registration stating that each nominated mix and its constituents meet the requirements of this Specification.

All phases of any particular test must be performed at one laboratory unless otherwise approved by the Superintendent.

All relevant test results shall accompany the Certificate. The Certificate shall confirm that the required testing has been carried out within the twelve months period before the date of submission to the Superintendent.



### Mix Details

Details of the nominated mix shall be submitted to the Superintendent at least twenty-one (21) days before first delivery of the cold mix. (MILESTONE)

The nominated mix information shall include combined aggregate grading and binder content, proportions of constituent materials used (including adhesion agent), gradings of aggregate and filler, and type and sources of aggregates, filler, binder and adhesion agent.

### Revised Mix

If any revision is necessary, then the costs associated with revision of the nominated mix and testing of the revised nominated mix in accordance with Design limits shall be borne by the Contractor.

**Table 8407.1 – Limits for design of nominated mix**

Property	Requirement for nominal mix size			Test method
	Aggregate % by mass passing			
	7 mm	10 mm	14 mm	
AS Sieve grading:				AS 1141.11
19.0 mm	100	100	100	
13.2 mm	100	100	95 – 100	
9.50 mm	100	90 – 100	70 – 85	
6.70 mm	90 – 100	70 – 85	57 – 74	
4.75 mm	70 – 90	55 – 70	45 -65	
2.36 mm	45 – 60	35 – 50	28 – 45	
1.18 mm	26 – 45	22 – 38	15 – 30	
600 µm	15 – 30	12 – 27	10 – 23	
300 µm	10 – 20	6 – 16	5 – 17	
150 µm	4 – 14	4 – 11	3 – 11	
75 µm	3 – 8	2 – 6	2 – 5	
Filler	0.5 – 1.0	0.5 – 1.0	0.5 – 1.0	



Binder content (% by mass of total mix) *	4.5 – 6.0	4.0 – 5.5	4.0 – 5.0	AS 2891.3.1
Medium flux oil (%) in binder	10 – 20	10 – 20	10 – 20	
* Some increase beyond these ranges of binder may be permitted for aggregates having unusually high absorption characteristic. Such departures will require Superintendent’s approval.				

### 8407.5.2.2 Approved Mix

#### Approval

When a nominated mix has been approved by the Superintendent it shall be known as the ‘Approved Mix’. Work shall not commence until cold mix design has been approved. (HOLD POINT)

Superintendent’s approval of specific nominated mixes or previously approved mixes (Prior approval) constituted a HOLD POINT for use of those mixes.

The Superintendent will recognise AS 4283 as a reference in determining approval of the nominated mix.

#### Changes to Approved Mixes

The Contractor shall not make any changes to the Approved Mix, or constituent materials without the prior written approval of the Superintendent.

If any such change is proposed, then the Contractor shall provide details of the nominated mix and materials, in accordance with Nominated Mix.

#### Prior Approval

If the contractor’s nominated mix has received prior approval under a separate contract with the principal within twelve months before the proposed date of initial delivery under this contract, then provided that:

- a) the Contractor produced documentary evidence and full details of the previously approved mix supplied under a specification which required the same standard of materials and product as this Specification;
- b) the constituent materials and their quality remain unchanged from that previously approved; and
- c) the in-service performance of the asphalt incorporating the nominated mix has proved acceptable to the Principal.

The Superintendent may approve the nominated mix without requiring the prior-testing or samples by the contractor at a NATA registered laboratory but may require samples to be tested in accordance with Mix design at any time during the course of the contract.

Notwithstanding any approval given by the Superintendent to a proposed asphalt mix, the Contractor shall be responsible for producing the cold mix which satisfies all requirements of the Specification.

### 8407.5.2.3 Requirements of Production Mix

#### Name

The cold mix produced in the plant and delivered to the site shall be known as the ‘production mix’.



**Fluxing**

Fluxing shall be carried out prior to the addition of the binder to the mix by adding the required amount of cold flux oil and cutter oil to the hot bitumen.

**Grading Variations**

The grading of the total mineral aggregate in the mix produced shall not vary from the approved mix design figures by more than the amounts given in Table 8407.2.

**Binder Variation**

The binder content shall not vary from the approved mix by more than  $\pm 0.3\%$ .

**Table 8407.2 - Permissible grading variations table**

Sieve size	Allowable variation from nominated mix gradings (% passing)
4.75 mm and larger	$\pm 7\%$
1.18 mm and 2.36 mm	$\pm 5\%$
0.600 and 0.300 mm	$\pm 4\%$
Other sizes	$\pm 2.5\%$

**8407.5.3 Non-Complying Production Cold Mix**

Mixes not complying with this work section may be rejected. Consideration may be given by the Superintendent to the acceptance of the material at an agreed reduced payment.

**8407.5.4 Mixing Procedure**

**Plant**

Mixing shall be undertaken in a suitable plant nominated at tender and approved by the Superintendent, capable of uniformly mixing the coarse and fine aggregate and binder to meet the specified requirements.

**Mixing time and temperature**

Mixing time and temperature shall be such that all particles of the mineral aggregate are uniformly coated with binder.

**Storage of Mix**

If stored by the contractor prior too delivery, the mix shall be stored under cover from the weather and on a concrete or asphalt slab. (WITNESS POINT)

The stockpile site shall be in a free draining area not susceptible to ponding of water due to precipitation.

Stockpiles shall be constructed in such a manner that no compaction, other than by the weight of the material itself, will result. No equipment of any kind shall be run over the surface of the stockpile.



All stockpiles are to remain covered and protected from precipitation and excess evaporation of incorporated oils.

Storage of the mix by the Contractor prior to delivery is limited to a period of 2 weeks. (WITNESS POINT)

#### **8407.5.5 Sampling and Testing of Production Mix**

##### **Responsibility for sampling**

The Contractor shall be responsible for taking samples and shall supply all facilities, equipment and labour for that purpose. The costs associated with taking samples of production mix shall be borne by the contractor.

##### **Frequency of Sampling**

For the purpose of testing production mix, samples shall be taken at the rate of one sample for each production lot or days production whichever is the lesser. Sampling shall be in accordance with AS 2891.1.

##### **Testing of mix**

The Contractor shall maintain and operate a testing laboratory with appropriate NATA registration at, or near, the mixing plant so as to ensure complete control over the mixture produced.

Conformance reports shall be provided promptly to the Superintendent, if requested.

The cost of testing shall be borne by the Contractor.

#### **8407.5.6 Performance Properties of the Mix**

The manufactured material shall be cohesive and capable of being compacted readily into a semi-dense mass which is resistant to the destructive action of traffic.

When compacted visual examination of the compacted material shall indicate good mechanical interlock of particles which are fully coated with binder.

#### **8407.5.7 Transport**

##### **Haulage Trucks**

The bodies of haulage trucks shall be kept clean and coated with a thin film of approved release agent to prevent asphalt sticking to the body of the truck. Any surplus release agent shall be removed before loading.

##### **Load measurement**

Unless other means of measurement are approved by the Superintendent, the mass of all truckloads of cold mix shall be measured on a registered weighbridge.

#### **8407.5.8 Delivery**

##### **Times**

Unless otherwise specially requested, deliveries shall reach the site of the work between the hours of 7.30 am and 3.30 pm Mondays to Fridays inclusive.

As much preliminary notice as possible will be given before the first deliveries are required, and thereafter advice of delivery requirements for particular locations will be given not later than 10.00 am on the day preceding the delivery.

The Contractor shall comply with all reasonable delivery instructions meeting these guidelines.



### **Cancellation of deliveries by Principal**

The Principal reserves the right to cancel deliveries, other than loads premixed, that are in the process of being mixed or in transit.

## **8407.6 Construction**

Carrying out all works associated with the placing, compacting, and trimming of the cold mix as specified on project drawings and/or documents.

This section lays out the works operations with more detail based on specific requirements of this supplementary specification. Some activities may appear to include items which are stated within other specifications, the purpose is to reinforce that requirement specific to this supplementary specification.

### **8407.6.1 Work Operations**

Work Operations incorporated in this item will include:

- a) Work operations included in Clause 2.1.5 of MRS01 “Introduction to Specifications”;**
- b) Supply of all materials;**

All materials, plant, and labour required to carry out the works under this Specification is to be supplied by the Contractor, where materials are Principal supplied the designated storage site will be the point of supply for the purposes of this Specification.

All loads shall be inspected at delivery to site prior to use, certification of material from supplier and weighbridge dockets shall form the basis of the site inspection. Any loads which are not compliant to the cold mix ordered are not to be used and are to be returned to the supplier. (HOLD POINT)

- c) Surface preparation;**

Surface preparations as applies to this specification shall be carried out as required by activities 105 and 108 of DTMR Road Asset Management Contract (RAMC) Gen 2 Appendix M: Routine Maintenance Specification – Section 100 Sealed Surfaces and Activity 101, 107, 110, 111, 127, and 142 of DTMR Routine Maintenance Guidelines – Sealed Surfaces, and other applicable specifications. (HOLD POINT)

These include but not limited to;

- (1) Determining the works area
- (2) Establishment and disestablishment of traffic control
- (3) Cleaning sweeping existing surface
- (4) Removal of any cracked or loose material
- (5) Removal and reinstatement of any road markings or RPM’s, temporary and permanent
- (6) Formation of vertical faces on the hole edges and shaped in the form of a rectangle
- (7) Edges of hole are to be cleaned.

- d) Place and compact bituminous cold mix inclusive of conformance testing as per project specifications**



Work operations and activities as applies to this specification shall be carried out as required by activities 105 and 108 of DTMR Road Asset Management Contract (RAMC) Gen 2 Appendix M: Routine Maintenance Specification – Section 100 Sealed Surfaces and Activity 101, 107, 110, 111, 127, and 142 of DTMR Routine Maintenance Guidelines – Sealed Surfaces, and other applicable specifications (WITNESS POINT)

Conformance testing and geometric compliance shall be carried out as required for each Activity as per the design drawings or project specification.

The following link identifies the above activity references;

[https://www.tmr.qld.gov.au/\\_/media/busind/techstdpubs/contract/road-asset-management-contract/gen-2/appendix-m](https://www.tmr.qld.gov.au/_/media/busind/techstdpubs/contract/road-asset-management-contract/gen-2/appendix-m)

[www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Routine-maintenance-guidelines](http://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Routine-maintenance-guidelines)

**e) Clean up and disposal of unwanted materials.**

Clean up of the site including the disposal of any waste / excavated material in accordance with current Government Statutes that are applicable to these works. (WITNESS POINT)

**8408.7 Post construction**

**a) Collection and submission of all As Constructed data including QA data requirements. (As Required)**

Unless otherwise approved by the Superintendent the Contractor is to supply and submit Works as Executed documentation as required by *MRC D20 - Drawings and Documentation* for approval by the Superintendent 4 weeks prior to requesting a practical completion inspection. (HOLD POINT)

Format of submitted “As Constructed” documentation shall be compliant with MRC Supplementary Specification 8919.

**8408.8 Measurement and Payment**

Provision for these works shall be included in the scheduled unit rate for the items show in Clause 8408.3 of this Supplementary Specification and Annexure. No separate payment will be made for the works specified within this Supplementary specification or it’s annexure.

Version Control:

Version	Description	Reviewed / Endorsed	Date
1.0	Original issue	MRC	09.08.2012
2.0	Review of Specification	MRC	23.11.2021
3.0	Review of Specification	MRC	14.03.2022
4.0	Review of specification	C. Sultana	16.02.2024