8407 Bituminous Cold Mix

REVISION 09/08/12

8407.1 Introduction
This supplementary requirement applies to the design, production and delivery of ‘hot mixed – cold laid plant mix’ (hereinafter referred to as ‘cold mix’) and includes supply of 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.

8407.2 Referenced Documents
This supplementary specification shall be read in conjunction with the following:

- MRS01 “Introduction to Specifications”;
- MRTS01 “Introduction to Technical Specifications”;
- 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 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”; and
- the project Drawings.

8407.3 Description of Works
The following work items are covered by this supplementary specification:

<table>
<thead>
<tr>
<th>Task Item No.</th>
<th>Description</th>
<th>Unit of Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>8407</td>
<td>Bituminous Cold Mix</td>
<td>m3</td>
</tr>
</tbody>
</table>

8407.4 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;
c) Preparation of surfaces;
d) Application of the bituminous cold mix; and
e) Clean up and disposal of unwanted materials.

**8407.5 Materials**

**8407.5.1 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 registration in accordance with the relevant material specifications cited in this Supplementary Specification.

**8407.5.2 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.

8407.5.3 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.

8407.5.4 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.

8407.5.5 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 177OC the mixture shall be homogeneous and shall not foam.

8407.5.6 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 8407.6.1.

The bitumen adhesion agent shall be used in a manner compatible with the manufacturer’s recommendations.
8407.6  Mix Design

8407.6.1  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.

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

<table>
<thead>
<tr>
<th>Property</th>
<th>Requirement for nominal mix size Aggregate % by mass passing</th>
<th>Test method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7 mm</td>
<td>10 mm</td>
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<tr>
<td>AS Sieve grading:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.0 mm</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>13.2 mm</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>9.50 mm</td>
<td>100</td>
<td>90 – 100</td>
</tr>
<tr>
<td>6.70 mm</td>
<td>90 – 100</td>
<td>70 – 85</td>
</tr>
<tr>
<td>4.75 mm</td>
<td>70 – 90</td>
<td>55 – 70</td>
</tr>
<tr>
<td>2.36 mm</td>
<td>45 – 60</td>
<td>35 – 50</td>
</tr>
<tr>
<td>1.18 mm</td>
<td>26 – 45</td>
<td>22 – 38</td>
</tr>
<tr>
<td>600 µm</td>
<td>15 – 30</td>
<td>12 – 27</td>
</tr>
<tr>
<td>300 µm</td>
<td>10 – 20</td>
<td>6 – 16</td>
</tr>
<tr>
<td></td>
<td>150 µm</td>
<td>75 µm</td>
</tr>
<tr>
<td>----------------</td>
<td>--------</td>
<td>-------</td>
</tr>
<tr>
<td></td>
<td>4 – 14</td>
<td>4 – 11</td>
</tr>
<tr>
<td></td>
<td>3 – 8</td>
<td>2 – 6</td>
</tr>
<tr>
<td></td>
<td>0.5 – 1.0</td>
<td>0.5 – 1.0</td>
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<td></td>
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</tbody>
</table>

* Some increase beyond these ranges of binder may be permitted for aggregates having unusually high absorption characteristic. Such departures will require Superintendent’s approval.

### 8407.6.2 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.

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.
8407.6.3 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 ±0.3%.

Table 8407.2 - Permissible grading variations table

<table>
<thead>
<tr>
<th>Sieve size</th>
<th>Allowable variation from nominated mix gradings (% passing)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.75 mm and larger</td>
<td>± 7%</td>
</tr>
<tr>
<td>1.18 mm and 2.36 mm</td>
<td>± 5%</td>
</tr>
<tr>
<td>0.600 and 0.300 mm</td>
<td>± 4%</td>
</tr>
<tr>
<td>Other sizes</td>
<td>± 2.5%</td>
</tr>
</tbody>
</table>

8407.6.4 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.

8407.6.5 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 to delivery, the mix shall be stored under cover from the weather and on a concrete or asphalt slab.

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 weigh 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.

8407.6.6 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.

8407.6.7 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.

8407.6.8 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 truck-loads of cold mix shall be measured on a registered weighbridge.

8407.6.9 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 actually being mixed or in transit.

**8407.7 Measurement and Payment**
Work Operations under this specification shall be claimed under the items listed in Clause 8407.3.