SPECIFICATION 1142

BITUMINOUS COLD MIX
**SPECIFICATION 1142 – BITUMINOUS COLD MIX**

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1142 Bituminous cold mix

1142 BITUMINOUS COLD MIX

1 GENERAL

1.1 RESPONSIBILITIES

Objectives
General: Provide bituminous cold mix as documented.

Performance
Quality: Requirements for quality control and testing, including maximum lot sizes and minimum test frequencies to conform with 0161 Quality (Construction).

1.2 CROSS REFERENCES

General
Requirement: Conform to the following:
- 0136 General requirements (Construction).
- 0161 Quality (Construction).

1.3 REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

Standards
AS 1141 Methods for sampling and testing aggregates
AS 1141.11.1.1-2009 Particle size distribution by sieving
AS 1141.15-1999 Flakiness index
AS 1141.18-1996 Crushed particles in coarse aggregate derived from gravel
AS 1141.22-2008 Wet/dry strength variation
AS 2008-1997 Residual bitumen for pavements
AS 2150-2005 Hot mix asphalt – a guide to good practice
AS 2157-1997 Cutback bitumen
AS 2758 Aggregates and rock for engineering purposes
AS 2758.5-2009 Coarse asphalt aggregates
AS 2891 Methods of sampling and testing asphalt
AS 2891.1.1-2008 Sampling - loose asphalt
AS 2891.1.2-2008 Sampling - Coring method
AS/NZS 2891.3.1-1997 Bitumen content and aggregate grading—Reflux method
AS 3568-1999 Oils for reducing the viscosity of residual bitumen for pavements
AS 4283-1995 Cold mix asphalt for maintenance patching.
SAA HB 81.6 – 1998 Field guide for traffic control at works on roads – Bituminous surfacing works

Other publications
AUSTROADS
AP-C87-2010 Austroads Glossary of terms

1.4 INTERPRETATIONS

Definitions
General: For the purposes of this worksection the definition given below applies.
Bituminous cold mix: Hot mixed-cold laid plant mix.

1.5 SUBMISSIONS

Acceptance criteria
General: All submissions will be subject to the approval of the Superintendent.

Documents
Submit the following for approval:
- Design:
  - Design and control of bituminous mixes to achieve approval of the nominated mix.
  - Proposed changes to the nominated mix
- Test results: Submit for approval of Superintendent the test results and NATA Certification for the constituent materials as specified in materials details of the nominated mix.
- Technical data: Refer to Mix Design and Materials clauses.
- Materials: Technical data of materials as specified for the following:
  - Aggregates.
  - Mineral filler.
  - Binder.
  - Flux oil and cutter oil.
  - Bitumen adhesion agent.

1.6 INSPECTION

Notice
General: Give notice so that the inspection may be made of the following:

Summary of HOLD POINTS

<table>
<thead>
<tr>
<th>Clause title/Item</th>
<th>Requirement</th>
<th>Notice for inspection</th>
<th>Release by</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE-CONSTRUCTION PLANNING</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Design and control of bituminous mixes –</td>
<td>Nominated mix including</td>
<td>21 days before first</td>
<td>Superintendent</td>
</tr>
<tr>
<td>Nominated mixes</td>
<td>NATA Certification</td>
<td>delivery of cold mix</td>
<td></td>
</tr>
<tr>
<td>EXECUTION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Requirements of production mix – Non-</td>
<td>Approval for use or rejection</td>
<td>Progressive</td>
<td>Superintendent</td>
</tr>
<tr>
<td>complying production cold mix</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixing procedure -</td>
<td>Plant location and</td>
<td>At tender acceptance</td>
<td>Superintendent</td>
</tr>
<tr>
<td>Plant</td>
<td>specifics to be approved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport and delivery – Cancellation of</td>
<td>Notice for cancellation of</td>
<td>Progressive</td>
<td>Superintendent</td>
</tr>
<tr>
<td>deliveries by Principle</td>
<td>delivery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport and delivery – Delivery dockets</td>
<td>Submit all delivery dockets</td>
<td>Within 1 working day of delivery</td>
<td>Superintendent</td>
</tr>
<tr>
<td>Traffic Control - Provision</td>
<td>Traffic control for safety and</td>
<td>3 working days prior to</td>
<td>Superintendent</td>
</tr>
<tr>
<td></td>
<td>stockpile locations to be approved</td>
<td>starting on site</td>
<td></td>
</tr>
</tbody>
</table>

Summary of Witness Points – Off-site activities

<table>
<thead>
<tr>
<th>Clause title/Item</th>
<th>Requirement</th>
<th>Notice for inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATERIALS</td>
<td></td>
<td></td>
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<tr>
<td>Aggregate – Coarse aggregate</td>
<td>Submit NATA certificates</td>
<td>At time of nominated mix</td>
</tr>
<tr>
<td>Aggregate – Fine aggregate</td>
<td>Submit NATA certificates</td>
<td>At time of nominated mix</td>
</tr>
<tr>
<td>Mineral filler – General</td>
<td>Submit NATA certificates</td>
<td>At time of nominated mix</td>
</tr>
<tr>
<td>Binder - General</td>
<td>Submit NATA certificates</td>
<td>At time of nominated mix</td>
</tr>
<tr>
<td>Flux oil and cutter oil - General</td>
<td>Submit NATA certificates</td>
<td>At time of nominated mix</td>
</tr>
<tr>
<td>Bitumen adhesion agent - General</td>
<td>Submit NATA certificates</td>
<td>At time of nominated mix</td>
</tr>
<tr>
<td>EXECUTION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Requirements of production mix - General</td>
<td>Submit NATA certificates</td>
<td>With in 7 days of the delivery</td>
</tr>
</tbody>
</table>
Requirements of production mix – Adjusting for weather

Variation of added oil for seasonal conditions

Progressive

Mixing Procedure – Storage of mix

Rectify / reject stockpiles with visible segregation, contamination or weathering

Progressive

Sampling and testing -General

Conformance reports from NATA laboratory near mixing plant

Progressive

Transport and delivery – Storage of mix

Rectify / reject stockpiles with visible segregation, contamination or weathering

Progressive

Transport and delivery – Load measurement

Alternatives to registered weighbridge

Progressive

2 PRE-CONSTRUCTION PLANNING

2.1 DESIGN AND CONTROL OF BITUMINOUS MIXES

Design limits

Design mix: The contractor is to design a mix within the limits set out in the Limits for design of nominated mix table and submit for approval as a nominated mix.

Limits for design of nominated mix table

<table>
<thead>
<tr>
<th>Property</th>
<th>Requirement for nominal mix size</th>
<th>Test method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aggregate % by mass passing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 mm</td>
<td>10 mm</td>
</tr>
<tr>
<td>AS Sieve grading:</td>
<td>AS 1141.11.1</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>150 µm</td>
<td>4–14</td>
<td>4–11</td>
</tr>
<tr>
<td>75 µm</td>
<td>3–8</td>
<td>2–6</td>
</tr>
<tr>
<td>Filler</td>
<td>0.5–1.0</td>
<td>0.5–1.0</td>
</tr>
<tr>
<td>Binder content (% by mass of total mix)*</td>
<td>4.5–6.0</td>
<td>4.0–5.5</td>
</tr>
<tr>
<td>Medium flux oil (%) in binder</td>
<td>10–20</td>
<td>10–20</td>
</tr>
</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.

Nominated mixes

Approval: Submit details of the proposed cold mix design including details for the mix and the constituent materials. Approval of the nominated mix will be in consideration of AS 4283. The Contractor must produce the cold mix to conform with all specifications. This is a HOLD POINT.

Details for submission:
- Combined aggregate grading and binder content.
- Proportions of constituent materials used (including adhesion agent).
- Grading of aggregate and filler.
- Type and sources of aggregates, filler, binder and adhesion agent.
- All relevant compliance certificates.

Definition: When a nominated mix has been approved it is to be known as the ‘Approved Mix’.

Costs: Borne by the contractor including any revision of the mix and subsequent testing required.

Prior approval

Conditions: A mix may be approved due to ‘prior approval’ in the following conditions:
- If the mix was used in a separate contract within 12 months of proposed works date.
- If full approved details have been previously used.
- If the constituent materials and quality remain unchanged from that previously approved.
- If the in-service performance of the concrete incorporating the nominated mix is acceptable.

Variations to approved mixes

Written approval required: Any changes to the approved mix, its method of production or source of supply of constituents require written approval 21 days prior to proposed implementation.

Certificates of compliance

Submission: Submit NATA Certificates of compliance for each constituent and nominated mix.

Requirements: All phases of any particular test to be performed at one laboratory. All relevant test results to accompany the Certificate and be within twelve months of the submission date.

2.2 SCHEDULING

Program for the works

Planning: Conform to the following:
- Provide planning resources to allocate plant and personnel for the contract period.
- Program the work to meet the constraints of HOLD POINTS, WITNESS POINTS.

3 MATERIALS

3.1 AGGREGATES

General

Standard: To AS 2758.5 and AS 1141 and Austroads AGPT04J.

Quality: Uniform quality and grading.

Coarse aggregate

Standard: To AS 2758.5.

Size: All mineral matter retained on the 4.75 mm AS sieve.

Quality: 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.

Grading: Determine grading to AS 1141.11.1.

Proposed grading: The grading is to be known as the ‘Proposed Grading’.

Compliance certificates: When submitting details of the nominated mix submit test reports on the quality and grading of the coarse aggregate proposed to be used. Include source, geological type and particle size distribution. For blended aggregates submit results for each constituent coarse aggregate and the proportions of the various sizes proposed. Certificate to include Wet strength, Wet / dry strength variation, flakiness index, fractured faces. This is a WITNESS POINT.

Currency: Test results must be less than 12 months old and representative of current aggregate supply.

Property requirements for coarse aggregates

<table>
<thead>
<tr>
<th>Property</th>
<th>Limit</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet Strength</td>
<td>≥ 100 kN for any mix except for any fraction of open graded asphalt ≥ 150 kN</td>
<td>AS 1141.22</td>
</tr>
<tr>
<td>Wet/Dry strength variation</td>
<td>≤ 35% for any fraction or constituent</td>
<td>AS 1141.22</td>
</tr>
<tr>
<td>Flakiness index</td>
<td>≤ 35</td>
<td>AS 1141.15</td>
</tr>
<tr>
<td>Fractured faces</td>
<td>≥ 75% by weight of particles with at least two fractured faces.</td>
<td>AS 1141.18</td>
</tr>
</tbody>
</table>
Fine aggregate
Size: All mineral matter (other than filler) passing the 4.75 mm AS sieve.
Quality: Clean, hard, tough and sound grains, free of coatings or loose particles of clay, silt or other matter deleterious to asphalt.
Material: Natural sand or a mixture of natural sand and material derived from the crushing of sound stone or gravel.
Grading: Determine grading to AS 1141.11.1.
Compliance certificates: When submitting details of the nominated mix submit test report on the quality and grading of the fine aggregate proposed to be used. For blended aggregates submit results for each constituent coarse aggregate and the proportions of the various sizes proposed. This is a WITNESS POINT.
Currency: Such test results must be less than 12 months old and representative of current aggregate supply.

3.2 MINERAL FILLER
General
Standard: To AS 2150.
Size: Mineral matter passing a 0.075 mm sieve including rock dust derived from coarse and fine aggregates.
Composition: Consistent in mineral composition and dry compacted air voids.
Quality: Dry and free from lumps, clay, organic matter or other material deleterious to asphalt.
Materials: Added mineral filler to comply with table 3 of AS 2150. May consist of hydrated lime, fly ash, portland cement, flue dust from the manufacture of portland cement, asphalt plant baghouse fines or other approved material.
Submit: Submit compliance certificates for added mineral fillers at time of nominated mix submission. This is a WITNESS POINT.

3.3 BINDER
General
Standard: Conform to AGPT04F and the following:
- Binder: To AS 2008 and AS 2157.
- Bitumen: To AS 2008.
Classification: On the basis of consistency expressed in terms of viscosity at 60°C Class 170 or Class 320 bitumen.
Consistency: The residual bitumen must be homogeneous, contain no inorganic mineral matter other than that naturally occurring.
Oils: Add flux oil or cutter oil to AS 3568 to reduce the viscosity. All cutback bitumen to conform with AS 2157.
Submit: Compliance certificates for binders for approval at time of nominated mix submission. This is a WITNESS POINT.

3.4 FLUX OIL AND CUTTER OIL
General
Standard: To AS 3568.
Oils: Use for reducing the viscosity of the binder and retaining the cold mix in a workable condition to AS 3568.
Quality: Clean and free from water.
Mixing: When one part by volume of oil is mixed with four parts by volume of bitumen at a temperature of 177°C the mixture must be homogeneous and not foam.
Submit: Compliance certificates for Flux oil and cutter oil for approval at time of nominated mix submission. Test results must be less than 3 years old. This is a WITNESS POINT.
3.5 BITUMEN ADHESION AGENT

General
Standard: To AS 2150 and manufacturer recommendation.
Criteria: Add a bitumen adhesion agent, if required, to the binder at 1% by mass when directed by the Superintendent based on experience with asphalts incorporating aggregates from the same source.
Bitumen adhesion agent: A substance for promoting adhesion between binder and aggregates, normally in the presence of water.
Submit: Compliance certificates for bitumen adhesion agent for approval at time of nominated mix submission. This is a WITNESS POINT.

4 EXECUTION

4.1 REQUIREMENTS OF PRODUCTION MIX

General
Production mix: The cold mix produced in the plant and delivered to the site is to be known as the ‘production mix’.
Submit: NATA test results from the refinery batch from which the bitumen was taken, sampling within 7 days of the delivery of the bitumen. This is a WITNESS POINT.
Fluxing: 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.
Adjusting for weather
Quantities: The amount of flux oil and cutter oil added to be varied according to the season as agreed between the Contractor and the Superintendent based on local experience. This is a WITNESS POINT.
Grading variations
Tolerance: The grading of the total mineral aggregate in the mix produced must not vary from the approved mix design figures by more than the amounts given in AS 2758.5 clause 1.7.
Binder variation
Tolerance: The binder content not to vary from the approved mix by more than ± 0.3%.
Non-complying production cold mix
Criteria: Mixes not complying with this worksection will be rejected. This is a HOLD POINT.

4.2 MIXING PROCEDURE

Plant
Submit: Undertake mixing in a suitable plant nominated and approved at tender. This plant must be capable of uniformly mixing the coarse and fine aggregate and binder to meet the specified requirements. This is a HOLD POINT.
Requirements: Mixing time and temperature to be such that all particles of the mineral aggregate are uniformly coated with binder.
Storage of mix
Protect: From weather and store on a concrete or asphalt slab.
Locate the stockpile site: In a free draining area not susceptible to ponding of water due to precipitation.
Construct stockpiles: To ensure no compaction, other than by the weight of the material itself, will result. Do not run equipment of any kind over the surface of the stockpile.
Cover: All stockpiles are to remain covered and protected from precipitation and excess evaporation of incorporated oils.
Rectify or reject: Stockpiles that exhibit visible segregation, contamination or weathering must be rectified or replaced. This is a WITNESS POINT.
Prior to delivery: Storage of the mix by the Contractor prior to delivery is limited to a period of 2 weeks.

4.3 SAMPLING AND TESTING

General
Standard: To AS 2891.1.1 or AS 2891.1.2.
Supply: All facilities, equipment and labour for sampling.
Costs: Borne by the Contractor for sampling and testing of the production mix.
Frequency: Take one sample for each production lot or days production whichever is the lesser.
NATA laboratory: Maintain a NATA registered testing laboratory at, or near, the mixing plant so as to
ensure complete control over the mixture produced.
Submit: Provide certificates of compliance reports for the production mix verifying at the point of
manufacture that every batch of the bitumen complies for viscosity and temperature range. This is a
WITNESS POINT.

Performance properties of the mix
Cohesiveness: The manufactured material must be cohesive and capable of being compacted readily
into a semi-dense mass which is resistant to the destructive action of traffic.
Interlock: When compacted, visual examination of the compacted material is to indicate good
mechanical interlock of particles which are fully coated with binder.

4.4 TRANSPORT AND DELIVERY

Haulage trucks
Release agent: Keep the bodies of haulage trucks clean and coated with a thin film of an approved
release agent to prevent asphalt sticking to the body of the truck. Remove any surplus release agent
before loading. This is a WITNESS POINT.

Load measurement
Means of measurement: Measure the mass of all truck-loads of cold mix on a registered weighbridge
unless other means of measurement are approved. This is a WITNESS POINT.

Delivery times
Arrivals: Unless otherwise specially requested, deliveries are to reach the site of the work between the
hours of 7.30 am and 3.30 pm Mondays to Fridays inclusive.
Advice of delivery: 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 a.m. on the day preceding the delivery. Conform to all reasonable delivery instructions
meeting these guidelines.

Cancellation of deliveries by Principal
Criteria: The Principal reserves the right to cancel deliveries other than premixed loads actually being
mixed or in transit. This is a HOLD POINT.

Delivery docket
Submit: Each delivery docket must be submitted with in 24 hours of delivery. Docket details to include:
- Manufacturer's name, product name and class.
- Refinery batch number.
- Date of loading at refinery.
- Any intermediate delivery site.
- Loading temperature.
- Delivery temperature for bitumen delivered by road tanker or sprayer.
- Weighbridge tickets showing gross mass of the delivery, the mass of the empty vehicle or container
  and the net mass of bitumen. This is a HOLD POINT.

4.5 TRAFFIC CONTROL

Provision
Safety: Set up traffic control for safe delivery and stockpile sites to conform with 1101 Control of traffic
and SAA HB 81.6 1998.
Stockpile locations: Set up stockpile locations as directed by the Superintendent and ensure sufficient
sign posting. This is a HOLD POINT.
5 MEASUREMENT AND PAYMENT

5.1 GENERAL

Payment shall be made for all the activities associated with completing the work detailed in this worksection and shown on the drawings, in accordance with provisions made in Contract Document.