

DIVISION 6 PAVEMENT

(Note: Subbase, Base and Levelling Courses are specified in Specification Section 05100)

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SPECIFICATION SECTION 06100 - PRIME COAT AND TACK COAT

1. DESCRIPTION

This Specification Section prescribes the requirements for the provision of the Prime and Tack Coats:

- a) The Prime Coat shall consist of an emulsified or cut back asphalt coat applied to absorbent surfaces such as subgrade, granular subbase or aggregate base courses prior to placing subsequent bituminous layers. The Prime Coat shall be applied to the full width and in the locations indicated on the Drawings. Where indicated in this Specification Section the use of cover aggregate may be required.
- b) The Tack Coat shall consist of an emulsified or cut back asphalt coat applied to; asphaltic base or binder courses, concrete bridge decks, approach slabs and other concrete surfaces to receive asphaltic concrete wearing course.

2. MATERIAL REQUIREMENTS

2.1 Reference Standards

The most recent editions of the following Standards shall be applied to the Works covered by this Specification Section:

Vietnamese Standards:

TCVN8818-11	Specification of Cur Back Asphalt
22TCN345-06	Specification for Construction and Acceptance Asphalt Pavement with High Roughness Cover Layer
22TCN354-06	Standard of Acid Emulsified Asphalt – Technical Requirement and Testing Method.
22TCN319-04	Polymer Asphalt - Technical Requirement and Testing Method.
22TCN250-98	Technical Specifications for Construction and Approval of Acid Emulsified Asphalt Macadam Pavement.
22TCN231-96	Procedures for Asphalt Samples for Highway, Airport and Station.
22TCN279-01	Technical Requirement and Testing Method of Solid Asphalt.

International Standards:

AASHTO M82	Cut-back Asphalt Medium Curing Type
AASHTO M226	Viscosity Graded Asphalt Cement
AASHTO T179	Effect of Heat and Air on Asphalt Materials (Thin-film Oven

Test)

ASTM D2028-97 Standard Specification for Cutback Asphalt (Rapid Curing Type)

2.2 Materials

- a) Material for the Prime Coat shall be liquid bitumen with medium congestion MC30, or MC70 (TCVN 8819:2011)
- b) In particular materials for the Tack Coat to be used on the A/C course shall satisfy the requirements of liquid bitumen RC-70 (ASTM D2028-97). Application rates will depend on the condition of the surface of the A/C course and will be subject to the requirements of Section 5.5 of Vietnamese Standard 22TCN345-06.
- c) Where AC-20 is to be diluted with kerosene, the proportion of kerosene shall be subject to the prior approval of the Engineer.

2.3 Submittals

The Contractor shall submit to the Engineer for his approval the following items. These items shall be submitted well in advance of the Contractor's programmed start for this work.

- a) A 5 litre sample of any bitumen that the Contractor proposes to use in the Works together with a certificate from the Manufacturer. The certificate must state that the materials comply with all the requirements for the Prime Coat and the Tack Coat given in this Specification Section.
- b) A satisfactory record of the calibration certificates of all instruments and gauges, including the dipstick for the bitumen distributor, shall be submitted not less than 30 days before construction begins.
- c) A spray chart meeting the requirement of sub-section 3.2.3 of this Specification Section. The spray chart will also be required to enable equipment checks to be carried out.
- d) Samples of materials used in each day's work shall be submitted in accordance with subsection 3.5 of this Specification Section. Daily records of sealing works done and material application rates shall be submitted in accordance with this Specification Section, the Drawings or as required by the Engineer.

3. CONSTRUCTION REQUIREMENT

The Contractor shall prepare and submit his method statement for Prime and Tack Coats to the Engineer for approval.

3.1 Weather Limitation

The Prime Coat and the Tack Coat shall be applied only on dry surfaces and shall not be applied during high winds, rain, mist or fog or if rain is imminent and likely to interrupt the work.

3.2 Equipment

3.2.1 General

The equipment to be used by the Contractor shall include; a power broom and/or a power blower, a pressurized bitumen distributor and equipment for heating bitumen. The Engineer will not permit the use of gravity distributors.

3.2.2 Distributor

- a) The distributor shall have a minimum capacity of 1,000 liters.
- b) The distributor shall be so designed, equipped, maintained and operated that bitumen at an even heat can be applied uniformly on variable widths of surface, at a controlled rate of transverse and longitudinal spread within ± 10 percent of the required rate of application.
- c) The distributor equipment shall include a tachometer, pressure gauges, a calibrated tank dipstick, a thermometer for measuring the temperature of the tank contents and an instrument for measuring the speed of travel at low speed. All measuring equipment on the distributor shall have been recently calibrated and an accurate and satisfactory record of such calibration shall be supplied to the Engineer.

3.2.3 Instrumentation/Calibration

- a) The distributor shall be equipped with a spray chart and operation manual, which shall be in good condition and carried with the sprayer at all times.
- b) The operation manual shall include pipe flow diagrams and full instructions for all operations of the distributor.
- c) The spray chart shall show the relationship between speed and application rate for the bitumen distributor being used as well as the relationship between pump speed and the number of nozzles in use, based on a constant bitumen output per nozzle. The constant nozzle output (liters/min) and the spraying pressure shall be noted on the spray chart.
- d) The spray chart shall also show the height of the spray bar from the surface and the correct horizontal angle of the spray nozzles to ensure triple overlap of the nozzle fans (i.e. the width of road coated by each

nozzle is exactly three times the spacing between nozzles).

3.2.4 Unacceptable Equipment

- a) Equipment used for the spraying of the Prime Coat and the Tack Coat shall be fit for purpose and in sound condition. All equipment shall be operated by trained and experienced operators and work shall be carried out by skilled and experienced labour.
- b) Unsatisfactory work produced as a consequence of inadequate equipment and labour shall be rejected. Work will not be allowed to proceed until such time as the Contractor provides suitable equipment and experienced labour and operators able to produce satisfactory work in accordance with this specification. In such case the Engineer may at his discretion instruct the Contractor to carry out further trial sections to demonstrate the capabilities of the replacement equipment and labour.

3.3 Application Methods

Prior to the start of work on Site the layer to which the prime or tack coat is to be applied and the Contractor's proposed; materials, method statement and equipment shall have been approved by the Engineer and a satisfactory trial shall have been completed.

3.3.1 Site Preparation

- a) Prior to the application of the bitumen, loose dirt and other objectionable materials shall be removed from the surface by means of power broom or blower or both. If this does not provide a uniformly clean surface, additional sweeping shall be done by hand using stiff brooms. Sweeping shall extend at least 20 centimeters beyond each edge of the area to be sprayed.
- b) Adherent patches of objectionable materials shall be removed from the surface by steel scraper or other approved method and where the Engineer so directs, the scraped area shall be washed down with water and hand brooms.
- c) Application of bitumen shall not be made until the pavement has been prepared to the satisfaction of the Engineer. The Engineer will not permit the application when there is free water present on the surface
- d) The work shall be carried out to offer the least inconvenience to traffic and without damage to the work.
- e) The Contractor shall be responsible for all the consequences of traffic being admitted too early to newly laid Prime Coat and he shall prohibit such traffic when necessary by providing a detour or by half width

construction.

- f) The Contractor shall all necessary precautions to ensure that surfaces of structures or trees or property adjacent to the areas shall be protected against marring and spattering and that bituminous material shall not be discharged into any side ditch, drain or watercourse.

3.3.2 Spraying Temperatures

Spraying temperatures shall comply with Table 1.

Table 1: Spraying Temperatures (Prime Coat)

Type of Material	Spraying Temperature Range
Cutback, 50 pph kerosene (MC-70 grade cutback)	70 ± 10 °C
Cutback, 75 pph kerosene (MC-30 grade cutback)	45 ± 10 °C
Cutback, 100 pph kerosene	30 ± 10 °C
Cutback, more than 100 pph kerosene	Not heated

Table 2: Spraying Temperatures (Tack Coat)

Type of Material	Spraying Temperature Range
Cutback, 25 pph kerosene	110 ± 10 °C

Note: The abbreviation pph shown in Table 1 means parts of kerosene per 100 parts of asphalt cement by volume.

3.3.3 Excessive Heating

Heating in excess of the requirements or prolonged heating at high temperatures shall be avoided. Any material which, in the opinion of the Engineer, has been damaged by overheating shall be rejected.

3.3.4 Safety

At the heating site the Contractor shall provide and maintain adequate fire prevention and control measures and first aid supplies and facilities.

Extreme care should be taken when heating any cutback asphalt cement. Open flames or sparks shall not be permitted close to these materials. Controlled heat should be applied in heating kettles, mixers, distributors or other equipment designed and approved for the purpose. Open flames shall not be used to inspect or examine drums, tank cars or other containers in which these materials are stored. All vehicles transporting these materials shall be properly vented. Only experienced personnel shall be permitted to supervise the handling of these materials.

3.3.5 Rate of Application

- a) The Contractor shall carry out field trials under the supervision of the Engineer to establish the appropriate application rate for each type of bitumen and for each type of surface to which bitumen is to be applied.
- b) The rate of application of the Prime Coat shall be 1kg/m^2 or as otherwise approved by the Engineer.
- c) The rate of application of the Tack Coat shall be 0.5 kg/m^2 for each layer or as otherwise approved by the Engineer.
- d) The transverse distribution of bitumen application rates produced by the distributor shall be tested by passing the spray bar over a test area laid with $25\text{cm} \times 25\text{cm}$ sheets of absorbent material with a binder proof backing, which are weighed before and after the spray application. The difference in weight shall be used in determining the spraying rate actually applied to each sheet and the variation from the mean rate for any sheet across the full width sprayed shall not exceed 15 percent.
- e) The Contractor shall check the amount of emulsion sprayed on the road pavement by; placing a box with a $25 \times 40\text{cm}$ on the pavement to collect emulsion from the spreader. Then the Contractor shall weigh the box to determine the amount of emulsion actually applied over the given area. The difference between the actual amount of emulsion applied and the required emulsion amount shall be less than 100g/m^2 .

3.3.6 Maintenance of Prime Coat

- a) The Contractor shall maintain the coated surface to the specified standard until it is overlaid by the subsequent course.
- b) Traffic shall not be permitted on the coated surface until the bitumen has penetrated and dried and, in the opinion of the Engineer, will not pick up under traffic.
- c) In exceptional circumstances where it becomes necessary to permit traffic on the Prime Coat prior to the drying of the bitumen but in no case sooner than 4 hours after the application of the Prime Coat, clean cover aggregate shall be applied as directed by the Engineer and traffic may be permitted to use the lanes so treated.
- d) Cover aggregate shall be spread from trucks in such a manner that no wheel will travel on uncovered wet bitumen. When applying cover aggregate to a treated lane that adjoins an untreated lane a strip, at least 20 cm wide along the adjoining edge, shall be left uncovered or if covered shall be uncovered when the second lane is being prepared for treatment, in order to permit an overlap of bitumen as required above. The cover aggregate shall be used to the minimum extent possible.

3.4 Quality of Work and Rectification of Unsatisfactory Work

- a) The finished coat shall completely cover the area treated and have a uniform appearance without missed areas or streaks or “rich” areas of accumulated bitumen.
- b) After curing for 4 to 6 hours the binder shall have soaked into the course where it was applied leaving behind only sufficient binder to ensure that the surface is uniformly black or dark grey in color and non porous.
- c) Rectification of unsatisfactory Prime Coat or Tack Coat shall be conducted as directed by the Engineer. Minor potholing shall be promptly patched.

3.5 Field Quality Control and Testing

- a) A bitumen sample and certificate shall be provided for each delivery of bitumen to the site of the works.
- b) Samples of the Prime Coat shall be taken from the distributor as directed by the Engineer.
- c) The bitumen distributor shall be inspected and tested as follows:
 - (i) Prior to the commencement of spraying works under the Contract;
 - (ii) Every 6 months or every 150,000 liters of binder sprayed by the distributor, whichever is the more frequent;
 - (iii) Following any accident or modification to the distributor that, in the opinion of the Engineer, warrants rechecking the distributor.
- d) The result of the wet sieve testing of any proposed cover aggregate shall be submitted to the Engineer for approval prior to any use of the material.
- e) A detailed daily written record of; surfacing operations, the location of the operations, the binder used on each sprayer run, the application rates and the area covered shall be prepared and submitted to the Engineer.

4. MEASUREMENT AND PAYMENT

4.1 Method of Measurement

- a) The quantity of asphaltic material shall be measured for payment from the Drawings according to the square meters of coverage accepted by the Engineer. The measurement of the width of Prime Coat and Tack Coat shall extend no further than the edge of the course to which the coat is applied. Any coverage beyond this line shall be deemed to be included in the unit rates.
- b) The Prime Coat and Tack Coat provisions, material requirements and

construction requirements identified in this Specification Section shall be measured for payment in pay items 06100-01 and 06100-02.

- c) Any Prime Coat and Tack Coat Works not specifically identified in this Specification Section but which are necessary for the performance of the Works shall be deemed to be included in pay items 06100-01 and 06100-02.
- d) Any cover aggregate used shall be considered incidental to the work for achieving a satisfactory Prime Coat and shall neither be measured nor paid for.
- e) The work of preparing and maintaining the formation on which the Prime or Tack Coat is to be placed is not measured or paid for separately.
- d) Final cleaning and preparation of the surface and maintenance of the completed prime or tack coated surface shall be considered incidental to the work for achieving a satisfactory Prime or Tack Coat and shall not be measured or paid for separately.
- e) No payment shall be made for the rectification and retesting of Prime Coat or Tack Coat rendered unsatisfactory due to unacceptable materials or workmanship provided by the Contractor.

4.2 Basis of Payment

The work under this Specification Section shall be paid for in accordance with the applicable unit prices as indicated in the Bill of Quantities and given below. Payment shall constitute full compensation for performing the requirements of the Contract for the item of work as specified including furnishing all necessary labor, materials, tools, equipment, cover aggregate, testing and incidentals.

No adjustment shall be made to the unit prices in the Bills of Quantities in the event the rates of application in subsection 3.3.5b) & c) of this Specification Section vary from those foreseen.

<u>Pay Item</u>	<u>Description</u>	<u>Unit</u>
06100	Prime Coat and Tack Coat	
06100-01	Prime Coat, 1.0kg/m ²	m ²
06100-02	Tack Coat, 0.5kg/m ²	m ²