

PSMH ASPHALT BASE AND SURFACING**PSMH 3 MATERIALS****PSMH 3.4 Bituminous binder****PSMH 3.4.1 Surfacing**

Replace this sub-clause with the following:

"Where reference is made in this specification or the standard specifications to the SABS / SANS bitumen specifications, the latest version of SANS 4001 shall apply. All products shall conform to the specification and shall bear the inspection seal or brand mark of the SABS (South African Bureau of Standards).

(i) Conventional bituminous binders

The conventional binder used for this project, will be 50/70 penetration grade bitumen, complying with SANS 4001.

(ii) Homogenous cold applied modified binders

Any tests referred to in the publication "Technical Guideline: TG1 The Use of Modified Bituminous Binders in Road Construction (TG 1-2019): Asphalt Academy", shall supersede those specified in the SANS 1200 specifications. This document is available from the Asphalt Academy.

The homogenous cold applied modified binder used for this project, will be the cationic emulsion SC-E2, which shall comply with the requirements in table PHMS 3.4/1.

Table PHMS 3.4/1: Properties of polymer modified emulsions

Property	Unit	Test Method	Class	
			SC-E2	
Binder content (m/m)	%	MB-22	65 - 68	70 - 73
Saybolt Furol viscosity @ 50°C	sec	MB-21	51 - 200	51 - 400
Residue on sieving ¹ (/100 ml)	710µm sieve	g	MB-23	≤ 0.1
	150µm sieve			≤ 0.5
Particle charge		MB-24	positive	
Sedimentation after 60 rotations		SANS 4001 BT3	nil	
Properties of recovered binder residue Test Method (MB-20)²				
Softening point ³	°C	MB-17	≥ 55	
Elastic recovery @ 15°C	%	MB-4	≥ 55	

¹ Pour the emulsion through the larger sieve to remove the skin and larger particles before passing the emulsion through the finer sieve.

² Either the rotary vacuum or the simple evaporation method can be used. For on-site testing the simple method is more practical and is thus recommended. The simple method retains most of the fluxing oils whereas these are removed in the rotary vacuum method. The latter method renders a better indication of the binder properties after in-service curing.

³ The prescribed test method is based on not using stirrers although it has been reported that the use of stirrers has shown no difference in test results. For refereeing purposes no stirrers should be used."

PSMH 3.5 Aggregate**PSMH 3.5.1 General**

Add the following:

"The fine aggregate for the asphalt surfacing shall consist of crushed aggregate only. Natural sand shall not be permitted."

PSMH 3.5.4 Bituminous binder absorption

Replace the phrase "shall be 1.0%" with "shall not exceed 0.5% by mass."

PSMH 3.5.6 Grading

Add the following:

"The use of crushed stone base material, and the use of natural sand shall not be permitted. Asphalt mixes shall be manufactured using single size coarse aggregate fractions. The Engineer may request a reconsideration of a blend to achieve any grading within the specified envelope to improve specific mix properties."

PSMH 3.6 Mineral filler

PSMH 3.6.1 Base and continuously graded and gap graded surfacing

Add the following:

"For tender purposes the active filler shall be hydrated lime."

PSMH 4 PLANT AND EQUIPMENT

Add the following new sub-clause:

PSMH 4.8 Transfer of mix to paver

"Asphalt shall be transferred from the haul trucks to the paver by means of a materials storage and transfer vehicle and no material shall be transferred directly from the haul truck into the paver.

The material storage and transfer vehicle must be able to store and transfer the hot-mixed asphalt material from a truck to a paver to ensure continuous paving. It must contain an anti-segregation auger which remixes materials just before they are delivered to the asphalt paver,"

PSMH 5 CONSTRUCTION

PSMH 5.1 General requirements

PSMH 5.1.1 Preparation of surface

Add the following:

"Before applying the sealing layer, the surface shall be clean, dry, sound, and free of oil and all bond inhibiting substances. The surface shall be thoroughly broomed to remove all dust and loose material."

PSMH 5.1.5 Weather limitations

PSMH 5.1.5.2 Asphalt

Replace this sub-sub-clause with the following:

"Asphalt may only be placed under favourable weather conditions and shall not be placed when rain is imminent or during misty, foggy, or wet conditions.

The following conditions are regarded as being suitable for paving work:

- (a) While the air temperature is rising, work may be performed at temperatures of 6°C with an allowable wind velocity of less than 25 km/h;

- (b) With falling air temperature, work must be stopped when the temperature reaches 10°C regardless of the wind velocity and may not be restarted before the temperature is rising;
- (c) Where an abe adhesive/primer product is applied, a minimum drying time of 48 hours under favourable weather conditions, or as otherwise specified by the product supplier, shall be allowed before placing the asphalt layer.”

PSMH 5.5 Design of asphalt

PSMH 5.5.1 General

Add the following:

“The design of the asphalt mixes shall be in accordance with “Interim Guidelines for the Design of Hot-Mix Asphalt in South Africa (June 2001)”. The mix properties and requirements shall be as specified in the project specifications.

The following asphalt mixes are required for this project:

- Continuously graded fine asphalt **waterproofing layer** (10 mm NMPS), using a 50/70 pen grade binder;
- Continuously graded fine asphalt **surfacing layer** (10 mm NMPS), using a 50/70 pen grade binder;

The relevant asphalt mixes for the asphalt layers shall comply with the requirements in table PHMS 5.5/1. No asphalt layers shall be constructed unless the mix design process has been carried out by the Contractor and submitted to the Engineer in an appropriate format for assessment and approval.

Table PHMS 5.5/1: Composition and performance criteria for asphalt mixes

Continuously graded fine asphalt mixes (10 mm NMPS):		
Property	Waterproofing Layer	Surfacing Layer
Binder Film Thickness (µm)	> 10	8 - 10
VMA (%)	> 14	> 14
VFB (%)	> 80	70 – 80
Air Voids / VIM (%)	0 – 2	2 – 4
Modified Lottman at 7% voids (TSR)	> 0.8	> 0.8
Indirect Tensile Strength at 25°C (kPa)	> 900	> 900
Dynamic Creep Modulus at 40°C (MPa)	> 10	> 10

PSMH 5.6 Proportioning, mixing and transportation of the asphalt

PSMH 5.6.5 Transportation of the mixture

Add the following:

“To minimize temperature loss, all vehicles used for transporting asphalt to the site shall be fitted with thermal asphalt covers (canvas covers are not acceptable) irrespective of the prevailing climatic conditions or distance of transport.”

PSMH 5.7 Placing of asphalt

Add the following:

“Special precautions shall be taken by the Contractor to ensure that the temperature of the total mass of asphalt does not decrease by more than 15°C from point of dispatch to the point where it is to be paved. The use of thermal blankets is obligatory at all times.”

PSMH 5.8 Compaction

Add the following:

The compaction shall be measured using the maximum void-less density (MVD or Rice's density) determined in accordance with SANS 3001-AS11:2011. The sequence of rollers used in compaction is at the discretion of the Contractor provided the completed layers shall have density as specified in table PHMS 5.8/1.

Table PHMS 5.8/1: Compaction density specification

Layer	Density
Waterproofing layer (10 mm NMPS, continuously grade fine asphalt)	> 97% of MVD
Surfacing layer (10 mm NMPS, continuously grade fine asphalt)	> 94% of MVD

PSMH 5.9 Joints

Add the following:

"All longitudinal asphalt joints shall be cut by a roller (minimum 100 mm in 2 x roller wheel cuts) in a straight line to the satisfaction of the Engineer. The paving width is to be a full half width where practically possible. The paved width shall be such that allowance is made for up to 100 mm cut-back for the longitudinal joint.

Whenever the paver stops for more than 10 minutes and/or the un-compacted material already paved cools down to below compaction temperature (100°C), a joint shall be constructed as specified and all cooled un-compacted materials removed. All un-laid asphalt that has cooled to below the specified spreading temperature (120°C for asphalt surfacing mixes) shall be removed from the paver and from the site.

The cost of all such joint construction activities (transverse and longitudinal joints) is to be included into the relevant asphalt layer rates."

PSMH 6 TOLERANCES

PSMH 6.3 Dimensions, levels, etc

PSMH 6.3.4 Thickness

Add the following:

"For asphalt layers of less than 35 mm nominal thickness, the actual measured thickness shall not be less than the specified thickness."

PSMH 8 MEASUREMENT AND PAYMENT

PSMH 8.1 Rates of application and bituminous binder content

PSMH 8.1.4 Tack coat

Add the following:

"Where a stable grade emulsion tack is specified, the minimum application rate shall be 0.5 litre/m² of emulsion."

PSMH 8.1.5 Bituminous binder content

Add the following to "b) surfacing":

"5) continuously grade fine: 6.5%"

PSMH 8.1.6 Mineral filler

Add the following:

"For this project, the nominal rate of lime (active filler) shall be 1.0%."

PSMH 8.4 Computation of quantities

Replace the 1st and 2nd sentences of sub-clause 8.4.2 with the following:

"The unit of measurement for asphalt surfacing shall be the square metre of area paved."

PSMH 8.5 Scheduled items

Amend item 8.5.4 as follows:

"PSMH 8.5.4 Asphalt.....Unit: m²"

Add the following new items:

"PSMH 8.5.9 Adhesive/primer product (abe bitu.@prime or similar approved)
applied as a sealing/bonding layer.....Unit: litre"

"The unit of measurement shall be the litre of adhesive/primer product (as approved by the Engineer), applied according to the suppliers specifications. The application rate shall be provided by the Engineer upon approval of adhesive/primer product.

The rate shall cover the cost of preparing the surface, as specified in 5.1.1, furnishing the material and applying the adhesive/primer product, and all other incidental costs including labour, plant, and equipment, necessary for constructing the sealing/bonding layer complete as specified."

PSMH 8.5.10 Homogeneous polymer modified binder (type indicated) applied
by binder distributor as a sealing/bonding layerUnit: litre"

The unit of measurement shall be the litre of bituminous binder sprayed using a binder distributor, measured at spray temperature. The application rate shall be provided by the Engineer upon approval of the homogenous polymer modified binder product.

The rate shall cover the cost of preparing the surface, as specified in 5.1.1, furnishing the material and applying the binder, and all other incidental costs including labour, plant, and equipment, necessary for constructing the sealing/bonding layer complete as specified."