IMPLEMENTATION SPECIFICATION FOR ROAD WORKS

SERIES IM/750 (IMPLEMENTATION)

ROAD PAVEMENTS – ASPHALT LAYING

This Specification Series implements the requirements in Subsidiary Legislation 499.57, Part II (New Roads and Road Works Regulations) in accordance with the Agency for Infrastructure Malta ACT XXVIII, CAP. 588, Part I

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750 ROAD PAVEMENTS – ASPHALT LAYING

751 Asphalt Laying

1 Bituminous Road pavements shall be constructed as described in this series.

752 Marshall Asphalt and Asphalt Concretes

Materials

1 The materials covered by this clause include:

a) AC 32 Base
b) AC 20 Bin
c) AC 20 Base Wearing
d) AC14 Surf

Thickness

2 The nominal layer thickness and minimum laying thickness for the materials covered is shown in Table 750-1: Nominal layer thickness and minimum laying thickness for Asphalt Concrete materialsTable 750-1 below.

Table 750-1: Nominal layer thickness and minimum laying thickness for Asphalt Concrete materials

Asphalt	Nominal Thickness	Minimum Thickness at any point
AC 32 Base	70mm – 130mm	60mm
AC 20 Bin	55mm – 100mm	45mm
AC 20 Base Wearing	55mm – 100mm	45mm
AC 14 Surf	35mm – 50mm	25mm

Temperature

3 The delivery temperature of the materials shall be in line with the bitumen used. For 40/60 and 50/70 paving grade bitumen complying with MSA EN 12591 the asphalt delivery temperature shall be between 140°C and 170°C.

4 The minimum temperature of the material in the paving machine shall be no less than 130°C.

5 The temperature at which rolling must be stopped and the material removed is 90°C.

6 The maximum temperature at which the bituminous material shall be opened to traffic shall be 60°C although this may be less for heavily trafficked roads.

753 Marshall Asphalt and Asphalt Concretes

Materials

7 The materials covered by this clause include:

a) SMA 20 SingleCourse
b) SMA 20 Bin
c) SMA 14 Surf

Thickness

8 The nominal layer thickness and minimum laying thickness for the materials covered is shown in Table 750-2 below.

Table 750-2: Nominal layer thickness and minimum laying thickness for Stone Mastic Asphalt materials

Asphalt	Nominal Thickness	Minimum Thickness at any point
SMA 20 Bin	60mm – 100mm	45mm
SMA 20 SingleCourse	55mm – 100mm	45mm
SMA 14 Surf	35mm – 50mm	25mm

Temperature

9 The delivery temperature of the materials shall be in line with the bitumen used. The bitumen shall comply with Clause 916. The asphalt delivery temperature shall be between 155°C and 180°C.

10 The minimum temperature of the material in the paving machine shall be no less than 150°C.

11 The temperature at which rolling must be stopped and the material removed is 120°C.

12 The maximum temperature at which the bituminous material shall be opened to traffic shall be 60°C although this may be less for heavily trafficked roads.

754 Operational Planning

1 At least one week prior to commencing works, a site- specific Quality Plan (Method Statement) shall be prepared and provided to the Overseeing Organisation. The plan shall detail how the installer proposes to meet the requirements of this Specification. It shall also describe how the health and safety of all interested parties including, where relevant, members of the public will be ensured on site.

2 Paving operations shall not commence until the Overseeing Organisation has confirmed

receipt of the Quality Plan and approved its contents. It shall be noted that such confirmation of receipt does not reduce the obligation of the contractor to meet the requirements of this and any other relevant specifications.

3 The operational plan shall include within the method statement the following:

a) Plans of site extents, treatments and designs for specified materials
b) Health and Safety management
c) Equipment employed and methods of work
d) Named personnel on site
e) Laying and Rolling Patterns
f) Inspection and Test Plan

755 Site Personnel

1 Personnel on site must be competent to deliver the work. Sites shall have, as a minimum, the following personnel during the operations:

a) **Site Supervisor**: taking overall responsibility for the paving operation and ensuring that the requirements of this schedule and any other relevant specifications, including health and safety requirements, are being met.
b) **Foreman**: constantly monitoring the laying and rolling processes to ensure compliance with all requirements of this schedule and any other relevant specifications, including health and safety requirements, are being met.
c) **Banksman**: to manage asphalt delivery vehicles and supervise the safe discharge of asphalt into the paver hopper and if other duties allow the monitoring of material quality upon delivery.
d) **Technician**(s): to monitor all quality aspects of the laying operation. (On less busy sites and at the discretion of the Site Supervisor and with the approval of the IM Perit these duties can be covered by other suitably trained members of the paving crew if their normal duties allow.)
e) **Other personnel required by the site**: The Contractor must be able to demonstrate that all personnel have sufficient training and/or experience to be able to achieve their designated tasks safely and competently.

756 Site Equipment

1 Equipment on site must be functional, maintained, and calibrated to ensure the correct delivery of material and end performance.

2 The equipment expected to be on site comprises of as a minimum:

a) Bond Coat Sprayer/Tanker
b) Disc Cutter
c) Sweeper
d) Paver

e) Rollers
f) Loading Shovel / Skid Steer
g) And any other equipment required by the Quality Plan and approved for use by the Overseeing Organisation.

3 All equipment shall be organisation owned and maintenance records must be readily available. In the instance of hiring equipment such equipment will be certified to BS EN ISO 9000 and detailed in the Quality Plan.

4 Bond Coat sprayers must be well maintained and calibrated, with vehicle speed/setting charts available to the driver. Carpet tiles can be used to verify application rates.

Marshall and Asphalt Concrete Pavers

5 Pavers must be well maintained and in good working order and a means of imparting an initial compaction via the screed should be fitted, together with the necessary apparatus for supplying heat to the finishing screed. Pavers shall be capable of laying the asphalt continuously to produce an even and compact surface to the required widths, thicknesses, profiles, cambers and crossfalls. This shall be done without causing segregation, dragging, burning, surface defects or irregularities. It shall also be capable of operating at such a speed as to permit continuous laying as far as the asphalt supply and site conditions allow. Rollers must be well maintained and in good working order. Suitable rollers are

a) ≥ 8 tonne tandem or
b) ≥ 8 tonne 3-point deadweight rollers and
c) ≥ 18 tonne pneumatic tyred rollers (PTR).
d) Lighter rollers (≥ 2.5tonnes) may be used for limited access areas.

6 The number of rollers shall be sufficient to achieve acceptable compaction at the speed of operation of the paving train. Rollers to have drum wetting devices fitted and operational. As a minimum, regardless of paving speed, the contractor shall have:

a) one ≥ 8 tonne tandem or ≥ 8 tonne 3-point deadweight roller and
b) one ≥18 tonne pneumatic tyred roller (PTR) must be used for each paver in operation.
c) back up rollers must be readily available.

Stone Mastic Asphalt Pavers

7 Pavers must be well maintained and in good working order and a means of imparting an initial compaction via the screed should be fitted, together with the necessary apparatus for supplying heat to the finishing screed. Pavers shall be capable of laying the asphalt continuously to produce an even and compact surface to the required widths, thicknesses, profiles, cambers and crossfalls. This shall be done without causing segregation, dragging, burning, surface defects or irregularities. It shall also be capable of operating at such a speed as to permit continuous laying as far as the asphalt supply and site conditions allow. Rollers must be well maintained and in good working order. Suitable rollers are

a) ≥ 8 tonne tandem or

b) ≥ 8 tonne 3-point deadweight rollers and

c) Lighter rollers (≥ 2.5tonnes) may be used for limited access areas.

8 The number of rollers shall be sufficient to achieve acceptable compaction at the speed of operation of the paving train. Rollers to have drum wetting devices fitted and operational. As a minimum, regardless of paving speed, when daily tonnages to be laid exceed 100t:

a) one ≥ 8 tonne tandem or ≥ 8 tonne 3-point deadweight roller and

b) back up rollers must be readily available.

757 Pre-Contract Inspection and Substrate Preparation

1 The site shall be inspected the day before laying operations are scheduled to take place.

2 Areas that have been cold milled (planed) must meet the requirements of clause 912 of the SHW.

3 Areas of stress, deformation and delamination in lower layers must be identified and appropriate action taken prior to surfacing. Attention should be given to thin laminates left after planning.

4 Excessive depths of road markings such as vibration lines and hatching should be removed.

5 Cleanliness of the prepared surface is paramount to ensure satisfactory bond. The surface shall be well swept and free of all loose dust, dirt, and other debris. Depending on the nature of any contamination, e.g. from earth moving traffic, cleaning by high pressure water jetting should be considered.

6 Ironwork must be raised to the appropriate levels; increased depths of material can be beneficial around these areas.

7 Assessment of existing profile must be undertaken to ensure minimum and maximum depth requirements can be complied with.

758 Bond Coats

1 Bond coats must be applied, on a dry surface, by a calibrated automated spray tanker.

2 Bond coats shall meet the requirements of clause 913 of the SHW & shall be approved by the Overseeing Organisation.

3 Rate of spread for spraying the bond coats shall be such as to achieve residual binder coverage of:

a) 0.35 to 0.60 litres/m^2 on fresh new and clean surface.

b) 0.55 to 0.85 litres/m^2 on planed or overlay surfaces.

4 K1-40 & K1-60 is only permissible for very areas of small hand lay approved by the Overseeing Organisation.

5 Very small areas only, with the approval of the Overseeing Organisation, can be hand sprayed.

6 A minimum of 30 minutes must be allowed for the complete Break of all Bond coats before laying. If longer is required, then time must be given for the complete Break to occur.

7 The trafficking of bond-coat by delivery or site vehicles moving around the site and on to the fresh mat or adjoining roads, must be minimised to prevent “pick up” as much as possible.

8 Dry / permeable substrates should be assessed and sprayed with additional bond coat to ensure effective sealing of the lower layers and a good bond of the surface course.

759 Limitations in Respect of Weather

1 Laying should not proceed where standing water is present or during heavy rain. Laying in drizzle is permissible, providing temperature/wind restrictions have been complied with.

2 Laying shall be carried out with due regard to ambient weather conditions and wind chill factor so that materials can be properly compacted.

3 Wind speed shall be measured by anemometer positioned near the laying site to accurately reflect conditions at the laying site. The anemometer shall be fitted with a digital accumulative device.

4 Wind chill factors must be considered when deciding whether the conditions are acceptable to lay.

Table 750-3: Asphalt laying - weather restrictions

Ambient Air Temperature	13°C	7°C
Wind Speed (mph)	Wind Chill Factor (Feels Like)	
5	12°C	7°C
15	8°C	0°C
25	3°C	**-5°C**
35	1°C	**-7°C**

5 The frequency of all temperature monitoring exercises shall be increased when weather conditions are deemed to be marginal.

760 Treatment of Joints

1 All joints must be cut vertical and then thoroughly cleaned. Joints must be cut back by a minimum of 75mm.

2 All cut joints must be painted with a thick uniform coating of either hot applied 50/70 penetration binder, hot elastomeric PMB complying with BS EN 14023 or cold thixotropic binder.

3 All ironworks shall be treated in the same way as joints.

4 Longitudinal joints must be, as far as is practical, protected from run down by rollers and site traffic. If damage occurs the surface must be cut back to a clean vertical face.

5 Joint patterns must be considered relative to traffic/stress lines. Whenever possible longitudinal joints of surface course materials should be under or close to the lane line

markings. Joints of multiple layers must be staggered so that the joint of one layer is not directly over the joint of another.

761 Method of Application / Installation

1 If two pavers are being used in echelon each paver must have its own crew. Material supplies must be suitable to ensure both pavers are traveling continuously throughout the paving operations. The distance between pavers in echelon must not exceed 5m. Sufficient rollers must be used to ensure that compaction requirements are met.

2 Paving operations shall not commence until sufficient material is available to ensure continuous paving operations throughout the length of the intended works. Transverse joints shall only be permitted at minimum intervals of one per 100 linear meters laid. If planned works are less than this minimum distance no transverse joints shall be permitted between the beginning and end of such works. Any deviations to these requirements shall be discussed and agreed with the Overseeing Organisation prior to commencing such works.

3 When charging cold pavers, consideration must be given to using the freshest / hottest load first.

4 All delivery vehicles must be sheeted. If safety constraints permit, vehicle sheets must remain on during discharge. If sheets cannot remain in place they shall only be removed immediately prior to tipping.

5 Discharge of material should be supervised to ensure hopper is not overfed and that material quality is acceptable.

6 After the discharge of each vehicle into the machine, the hopper wings must be pulled in and all left over material shovelled into the centre of the machine. Lumpy material must always be disposed of correctly.

7 The paver travelling speed shall be aligned with the arrival of delivery vehicles and set to allow constant travel throughout the paving operation. Time between manufacture and installation must be kept to a minimum and should be programmed for a maximum of 3 hours, if this time is exceeded, the materials continuing suitability must be reviewed and records made and the Overseeing Organisation shall be informed. Regular liaison with the manufacturing plant must be maintained.

8 The paver should be choke fed to help minimise segregation and heat loss.

9 Where laying ceases for more than 10 minutes, the hopper should preferably be run empty, if this is not possible, the material should be protected by a sheet. Before laying recommences the temperature of the material in the hopper shall be assessed, if it falls below the requirements of clause 752 and 753 of this schedule the material shall be rejected and all material, including that in front of the augurs, shall be rejected.

10 Regular checking of the materials temperature on delivery, in paver hopper and on laying immediately after the screed, shall take place and be recorded.

11 Regular checking of laid depths must be made.

12 All defects and irregularities in alignment, grade or texture shall be corrected by the addition or removal of material.

13 Throwing back and raking of material must be kept to a minimum and should be avoided if possible.

14 It is imperative that encroachment/walking on to the live/hot mat is kept to an absolute minimum and should be avoided altogether if possible.

762 Method of Compaction

1 Prior to commencing works and as part of the Quality Plan submitted to the Overseeing Organisation a site-specific rolling plan shall be determined. The rolling plan shall define the number of rollers required on site and their mode of operation (or rolling pattern) that will ensure that compaction requirements will be met.

2 Rolling and compaction to optimum should be undertaken immediately after the material has emerged from the paving machine and reached a suitable rolling temperature. Over rolling must be avoided to prevent possible bruising of aggregate or fatting.

3 In colder weather the rollers should be controlled to ensure compaction is achieved as soon as possible.

Compaction of Marshall Asphalt and Asphalt Concrete

4 One tandem roller shall be kept close to the paver to impart initial compaction to the mat, this shall then be followed by the PTR to apply main compactive effort to achieve void requirements, the second tandem roller shall be used to provide the final smoothing process, removing any roller marks

5 During compaction, it is recommended that the first pass straddles the cold longitudinal joint to help knit in and improve quality.

6 Continuous inspection of materials and assessment of rolling temperatures must take place. For highway works an electronic density meter shall be employed immediately after the PTR roller to ensure adequate compaction has been achieved. If full compaction is difficult to achieve, an immediate assessment of the cause shall take place and corrective action must be taken.

7 The surface shall be left with no distinct roller marks.

Compaction of SMA

8 One roller shall be kept close to the paver to impart initial compaction to the mat, this shall then be followed by the second roller to apply the main compactive effort to achieve void requirements. The second roller shall be used to provide the final smoothing process, removing any roller marks.

9 During compaction, it is recommended that the first pass straddles the cold longitudinal joint to help knit in and improve quality.

10 Continuous inspection of materials and assessment of rolling temperatures must take place. SMA is particularly sensitive to fatting if compaction is applied excessively and/or when the material is at elevated temperatures. If full compaction is difficult to achieve, an immediate assessment of the cause shall take place and corrective action must be taken.

11 Tandem rollers must not be operated in vibratory mode at any point!

12 The surface shall be left with no distinct roller marks.

763 Documentation Requirements

1 At the conclusion of each site visit as a minimum, copies of the following records must be retained in a tidy and easily retrievable manner by the contract supervisor, or his delegate.

a) Quality Plan in accordance with this schedule.

b) Initial Inspection – Detailing surface condition, including photo's when possible.

c) Daily Weather Conditions, a.m. / p.m. – Detailing air temperature, wind speed, precipitation.

d) Temperatures of all loads measured in the paver hopper and immediately upon discharge.

e) Site traceability of each load laid.

f) Surface regularity / Texture Depth (if required)

g) Final Inspection – surfaces and joints

h) Nonconformities / defects / corrective actions (If any)

2 It must be ensured that all measurements and records are traceable to site locations.

3 Records are to be maintained for a minimum of 5 years.