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Hot Rolled Asphalt and Coated Chippings – Checks and Key Points

CC-PAV-04011
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CC Construction & Commissioning

Technical

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1. Introduction

The aim of this Technical Document is to provide Employer's Representatives and other interested parties with background information on key attributes for the installation of Hot Rolled Asphalt and Coated Chippings. This document is provided to enhance the understanding of the written requirements of the specifications with photographs and notes used to emphasise the points being made. The photographs aim to show examples of good practice and poor practice.

The Document is not a specification but should be read in conjunction with contract specific documentation and other TII Publications including the Specification for Road Works. It is not the intention for this Technical Document to replace the requirements of the Specification for Road Works but to help in the interpretation of the requirements. In many instances the specification reference is provided in order for the user to easily locate the actual specification requirement.

It is important to note that this Technical Document does not purport to cover every aspect of Hot Rolled Asphalt and Coated Chippings nor any legal interpretation of the Specification for Road Works. It is the Contractors responsibility to ensure the end product installed is fit for the intended purpose and durable for its expected life.

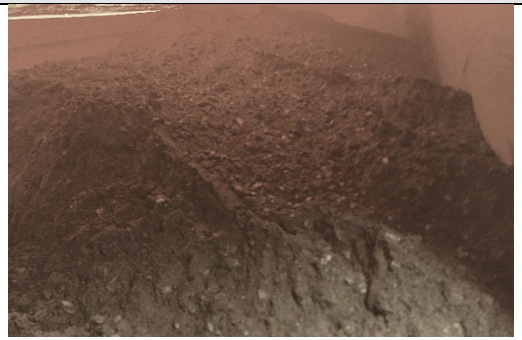
2. Checklist of items required prior to commencing works:

Item	Specification Reference	Task	Done □
CE Marking	CC-SPW-00900 Clause 4 CC-SPW-00900 Table 4 CC-SPW-00900 Table 5	Review documentation for compliance with specified HRA mixture and coated chipping requirements:	
		Constituents - Type testing, Declaration of Performance, CE Marking - CC-GSW-00900 Table NG1.2a	
		Product Composition - Type testing, Declaration of Performance, CE Marking - CC-GSW-00900 Table NG1.2a	
Works Proposals	CC-SPW-00900 Clause 10.1.2	Contractor to submit works proposals to include:	
		Laying and compaction plant – CC-SPW-00900 Clause 10.1.7, 10.1.7.1, 10.1.9, 10.1.9.2 & CC-GSW-00900 Clause NG 10.1.7.1, NG 10.1.9.2	
		Working in different climatic conditions - CC-SPW-00900 Clause 10.1.5 & CC-GSW-00900 NG 10.1.5	
		Formation of joints - CC-SPW-00900 Clause 10.1.8	
		Further reading CC-GSW-00900 Clause NGA 10	
Trial strip details	CC-SPW-00900 Clause 10.1.7.1	Trial strip minimum 30m long to be constructed for every HRA mixture and coated chipping combination to be used in the works; ideally with the same crew and machinery proposed for the works. The trial strip does not have to be undertaken on the site. However, evidence shall be provided to confirm that the trial has taken place. The trial location shall be provided to enable a visual inspection to be carried out. CC-GSW-00900 Clause NG 10.1.7.1	

3. Checklist of items required during and after completion of the works:

Item	Specification Reference	Task	Done □
Works Requirements	CC-SPW-00900 Table 6 CC-GSW-00900 Table NG10.1 CC-GSW-00900 Table NG10.2	Undertake checks and review for compliance with specified requirements including:	
		Traceability of material in the works – laying records – CC-SPW-00900 Clause 10.1.2	
		Operating Compliance Level of the manufacturing plant – obtain reports - CC-GSW-00900 Clause NG1.5	
		Temperatures - CC-SPW-00900 Clause 10.1.6 & CC-GSW-00900 Clause NG 10.1.6	
		Mixture Properties - CC-SPW-00900 Clause 10.1.10.2	
		Macrotexture - CC-SPW-00900 Clause 10.1.11, 10.1.11.1 & CC-GSW-00900 Clause NG 10.1.11.1	
		Visual assessment – CC-SPW-00900 Clause 10.1.11.1 CC-GSW-00900 Clause NGA 10.1.11.1	
Monitoring	AM-PAV-06049 Clause 7.2	The Implementation Authority is required to confirm that the data is compliant with the Specification and that the test records are available for review. Macrotexture testing should be carried out by an independent entity. This would ensure that there is an independent record of works performance by both parties in the event of any legal or contractual issues arising.	

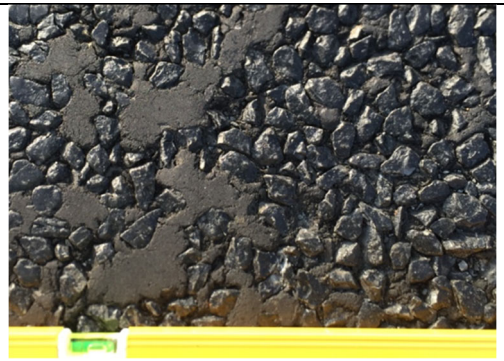
4. Key points during and after completion of the works:

Key point	Level	Example Photographs		Specification References and notes
HRA Mixture	Good Mixture sits up in peaks in paver hopper indicating good bearing capacity Screed able to maintain level and float on the HRA without displacement			The composition of the HRA mixture should be sufficiently robust to support the coated chippings and sufficiently malleable to hold the coated chippings in place. The manufacturing process can also play a significant role in the ability of the HRA mixture to support the coated chippings. The temperature of the HRA mixture should be within the limits contained in Tables 5 and 6 of CC-SPW-00900. Insulated transport is essential to minimise heat loss prior to use. CC-SPW-00900 Clause 10.1.3 stipulates the requirements for transport. Particularly wet or cold ambient conditions can affect the ability of the HRA mixture to support the coated chippings. Paver tamper settings can be altered to assist the process of supporting the coated chippings. Truck inspections on site should only take place if hopper material or screed indicates poor bearing capacity.
	Poor Mixture is level in paver hopper indicating poor bearing capacity Screed struggles to maintain level and will require screed assist to stop displacement			

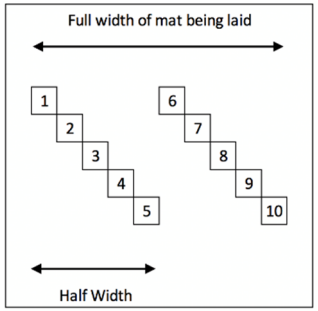
Key point	Level	Example Photographs		Specification References and notes
Chip condition	Good Fresh Shiny			The coated chippings are 'turned' and sprinkled with water in storage and in site stockpiles to maintain a free-flowing condition. Coated chippings should have a 'fresh' shiny look. The binder on the surface helps to ensure coated chippings remain embedded in the HRA mat. The bond between the coated chippings and the HRA mat is essential. Chippings covered in dust or lacking binder reduce the bond, leading to unacceptable levels of chip loss from the mat. CC-SPW-00900 Clause 4.2.4 contains the requirements for the Hot Sand test for the adhesivity of binder on coated chippings. CC-GSW-00900 NG 10.1.7.1 requires stockpiles of coated chippings to be sheeted to protect them from wind-blown dust and in the winter to prevent them becoming too cold as these issues can lead to difficulties with adhesion and embedment. In adverse weather conditions it is good practice to keep the coated chippings indoors overnight to ensure they do not become frozen.
	Poor Old Dull Uncoated		 An alternative to stockpiling coated chippings on site, is to deliver them direct from the supplier in a truck and draw from the truck to the chipper as required, often using a wheeled excavator.	
	Covered in dust			

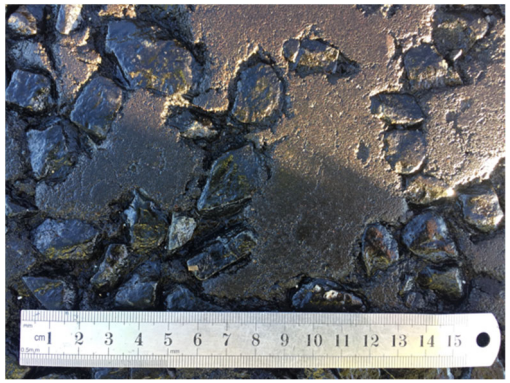
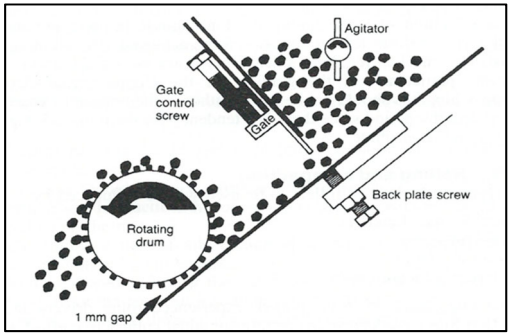
Key point	Level	Example Photographs		Specification References and notes
Chip size	Uniform			The size and shape of the coated chippings influences the resultant macrotexture that can be achieved. CC-SPW-00900 Table 5, Column 6 contains the requirement for the grading and binder content of coated chippings.
	Non uniform			Non uniform coated chippings lead to a non uniform macrotexture. CC-SPW-00900 Table 4 contains the requirement for the shape of coated chippings.

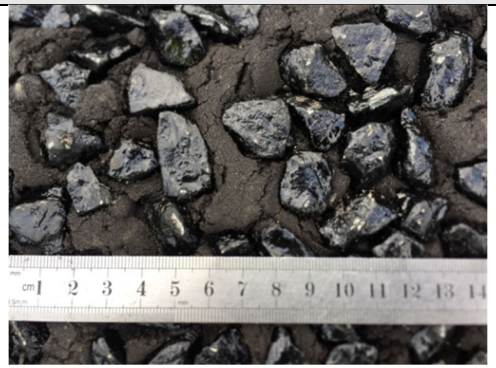
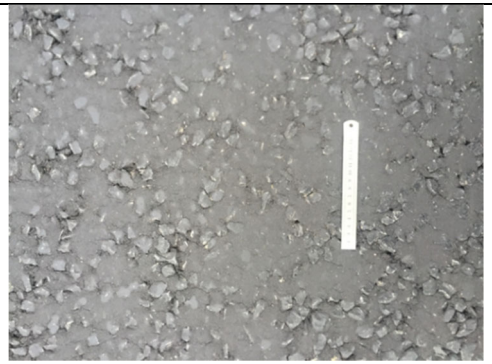
Key point	Level	Example Photographs		Specification References and notes
Macrotexture	Appropriate			CC-SPW-00900 Clause 10.1.7.1 A trial strip of not less than 30 metres shall be constructed for every HRA mixture and coated chipping combination to be used. It is used to demonstrate that the requisite properties of the finished surface course are compliant with the requirements for macrotexture and in particular that this is evidently positive.
	High			

Key point	Level	Example Photographs		Specification References and notes
Macrotexture continued	Low			CC-GSW-00900 Clause NG10.1.11.1 In addition to the assessment of macrotexture, a visual assessment is carried out by a competent person to assess that a positive and consistent macrotexture has been achieved. See Form NGA 10.1.11 for a suitable visual assessment format.
	Variable			CC-SPW-00900 Clause 10.1.11.1 If the visual assessment does not result in agreement between the Contractor and Employer's Representative that positive macrotexture has been achieved, a 3D photogrammetry survey shall be undertaken. Further information relating to the visual assessment and 3D Photogrammetry methods is contained in section NG 10.1.11.1 of CC-GSW-00900

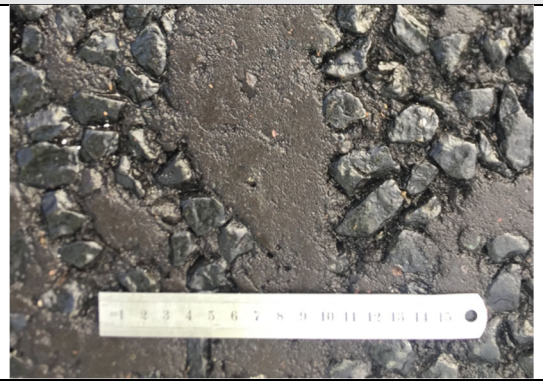
Key point	Level	Example Photographs		Specification References and notes
Rate of spread	Appropriate			CC-SPW-00900 Clause 10.1.7.1 The rate of spread is monitored against the effective shoulder to shoulder cover of the coated chippings in use. The shoulder to shoulder cover is the mass of a single layer of coated chippings expressed in kilograms per square metre. The mass can differ significantly between different sources. The mass of coated chippings required to achieve a given rate of spread is determined by the contractor. The shoulder to shoulder mass and the target rate of spread mass should be provided to the client. The rate of spread is checked using chipping trays and a calibrated spring balance. The rate of spread of coated chippings should ideally be monitored by the contractor for every 50 linear metres laid.

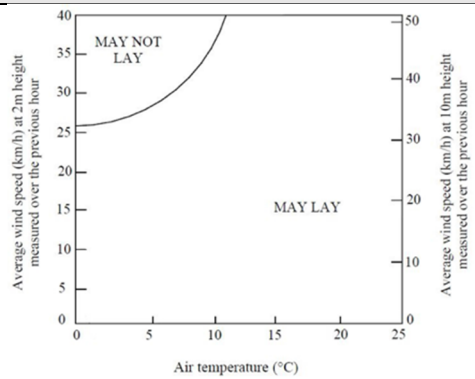
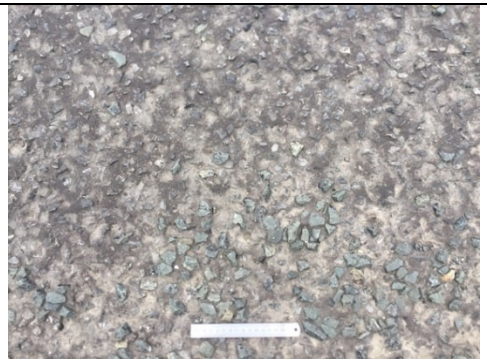
Key point	Level	Example Photographs		Specification References and notes
Rate of spread continued	High			The application of coated chippings shall be by a mechanical spreader capable of distributing chippings to an even rate of spread. BS 598-1 Clause 4.3 10 chipping trays, 300mm x 300mm square, are laid on the HRA mat, 5 trays for each half width of the mat being laid. After the mechanical spreader has passed over, each tray is picked up with the spring balance to assess the quantity of coated chippings present. The reported rate of spread is the average of the 10 trays. A rate of spread that is too high can lead to a loss of chippings. Excessive amounts of coated chippings on the surface leads to poor embedment as there is insufficient room for each chipping to penetrate the HRA mat.

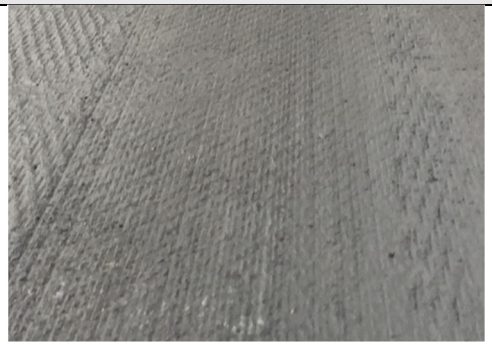
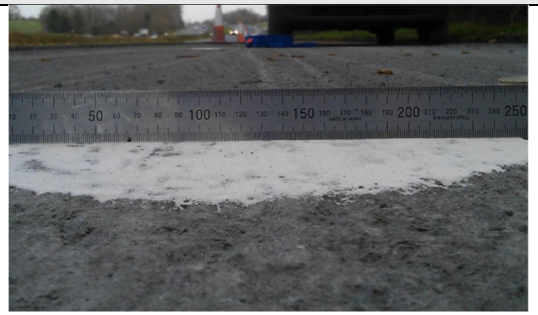
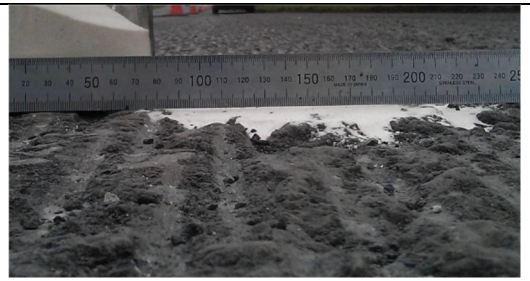
Key point	Level	Example Photographs		Specification References and notes
Rate of spread continued	Low			A skilled foreman will visually see when changes are necessary to ensure the rate of spread is uniform over the entire HRA mat laid, both transversely and longitudinally. Monitoring when a change in gradient occurs is particularly important as the quantity of coated chippings applied to the mat fluctuates when the chipping machine is on an incline or decline. Changes in rate of spread are necessary particularly for changes in gradient. This can easily be rectified by individual adjustment of the gate control screws.
				

Key point	Level	Example Photographs		Specification References and notes
Embedment	Appropriate Coated chippings held by HRA mat			The initial trapping of the coated chippings by the first roller pass is key to ensuring retention of the coated chippings in the HRA mat. The proven equipment used for this 'lead roller' task is a three point static deadweight roller weighing 10 to 12 tonnes. Rolling coated chippings into a HRA mat requires a specific skillset that is entirely different to other forms of compaction. The basic principle is to impart equal compaction to all areas of the mat to ensure uniform embedment of the coated chippings. Insufficient and/or untimely rolling leads to insufficient embedment (also see key point on weather) Excessive rolling leads to too much embedment and loss of macrotexture
	Insufficient Coated chippings sit on HRA mat			
	Excessive Coated chippings consumed by HRA mat			

Key point	Level	Example Photographs		Specification References and notes
Joints	Well cut joint			CC-SPW-00900 Clause 10.1.8 Where the compacted thickness of the layer is 50mm or less, the unsupported edge of longitudinal and transverse joints shall be cut back to a vertical face, by a width equal to or greater than the layer thickness. The cut should extend to the full depth of the layer. Joints in the surface course shall coincide with either lane edge or the lane marking and should not fall within wheeltrack zones.
	Poorly cut joint			

Key point	Level	Example Photographs		Specification References and notes
Joints Continued	Well painted and sealed joint			The faces of all cold upstanding edges of material, including previously laid asphalt, against which hot bituminous mixtures are to be laid to form joints shall be treated with binder. This operation shall be carried out so that the binder adheres evenly to the full area of both the cold and the warm upstanding edges when the asphalt is placed.
	Poorly painted and sealed joint			
	Consequence of Poor joints			Joints are the weakest part of a pavement. The Surface Course should protect the lower layers. Water ingress from the surface leads to deterioration in the pavement layers below. Joint sealing is required to arrest further deterioration from water ingress.

Key point	Level	Example Photographs		Specification References and notes
Weather		The degree of embedment of the coated chippings is heavily influenced by the ambient weather conditions. Particular attention should be paid to wind speed as wind chill at the surface has a significant effect on the resultant compaction.		CC-SPW-00900 Clause 10.1.5 As can be seen in this Figure, when the air temperature is 10°C or below there are conditions when laying HRA should cease. A wind speed of 25km/h is equivalent to small tree branches moving. The ambient conditions at the time of installation should be recorded.
Chip loss	Major			CC-GSW-00900 Clause NG10.1.11.1 Chipping loss should be kept to a minimum. However, surfaces should not be rejected for minor chip loss. A loss of less than 5% is considered to be within acceptable limits.
	Minor			

Key point	Level	Example Photographs		Specification References and notes
Ride quality	Good Milling			When cold milling of the existing pavement is required, the profile and regularity of the milled substrate is important. The profile is particularly important when only replacing the Surface Course. The profile can be affected by the milling machine speed and drum speed. The milling machine cutting tool spacing and condition of the cutting tools also affects the profile. CC-SPW-00900 Clause 2.1 The transverse profile of the milled surface shall be uniform. For any variation greater than 10mm, adjustments shall be made before work continues.
	Poor Milling			
	Regularity			CC-SPW-00700 Clause 702 The longitudinal regularity of the surface is measured with a rolling straightedge. Limits are given in Table 7/2 of CC-SPW-00700. Transversely, a 3 metre straightedge can be used to check for irregularities.

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