HaTelit C 40/17

HIGH PERFORMANCE ASPHALT REINFORCEMENT

TECHNICAL SPECIFICATION

Applications on Bituminous Pavement Layers

Highway and Airfield Applications

Using Bitumen (Hot)/Bitumen Emulsion Tack Coat

HUESKER Australia
V2.5
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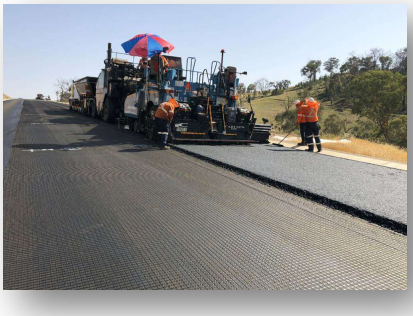

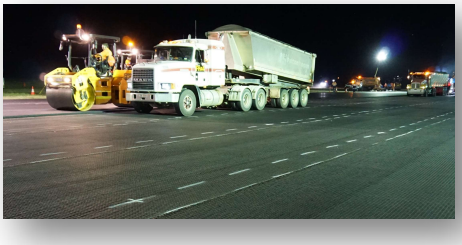

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Contents

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1. HaTelit C – Asphalt Reinforcement

1.1 Scope

This section of the Specification details the material, performance and installation requirements for HaTelit C, including requirements for applying the bitumen tack coat used to bond the HaTelit C to the underlying asphalt layer and bond the overlying asphalt layer to the HaTelit C and the underlying asphalt layer.

1.2 Applicable Publications

The following standards and publications referenced in this Section shall form part of the Technical Specification only to the extent that they are referenced to herein. Reference to each document hereinafter will be by basic designation only.

(a) Standards Australia:

– AS 2008 Bitumen for pavements

– AS 1160 Bitumen Emulsion for Construction & Maintenance of Pavements

(b) AUSTROADS

– AG:PT/T530–536 Calibration of Bitumen Sprayers (Parts 0 to 6)

– AP-T181/11 Performance requirements of Bitumen Sprayers

– NAS-70 Bitumen Sprayers

(c) American Society for Testing and Materials (ASTM International)

– ASTM D-5261 Standard Test Method for Measuring Mass per Unit Area of Geotextiles

– ASTM D-4595 Standard Test Method for Determining Tensile Properties of Geogrids. For the purposes of this document, tensile strength tests shall be performed on the finished product.

– ASTM D-276 Standard Test Methods for Identification of Fibres in Textiles

(d) International Organization for Standardization:

– DIN EN ISO 10319 Geosynthetics - Wide Width Tensile Test. For the purposes of this document, tensile strength tests shall be performed on the finished product.

– DIN EN ISO 10722:2007 and DIN EN ISO 10722:2019 Geosynthetics – Index test procedure for evaluation of mechanical damage under repeated loading.

(e) United States Army Corps of Engineers

– CWO 22125 Percentage Open Area

1.3 Materials

1.3.1 Bitumen Tack Coat

Bitumen (Hot) as Tack Coat
Bitumen for use as tack coat shall be complying with the requirements of AS 2008.

Bitumen Emulsion as Tack Coat
Bitumen emulsion for use as tack coat shall be rapid setting cationic bitumen emulsion with a minimum of 65% bitumen content complying with the requirements of AS 1160.

The bitumen emulsion shall be applied undiluted.

The bitumen emulsion must not be “track-less” type.

Bitumen Product Suitability
Contractor shall choose an appropriate bitumen (hot) and/or bitumen emulsion as tack coat product/s for HaTelit C.

Factors that should be considered in the selection of the bitumen tack coat product/s include but are not limited to the following:

- Bitumen softening point, particularly in warmer climates and time of year
- Air and Ground Temperatures
- Dew Point
- Time of day
- Time of year
- Available time to install HaTelit C including overlaps
- Available time to place asphalt over HaTelit C

Where the time available on site is limited, it is strongly recommended that straight run Bitumen (hot) is used instead of bitumen emulsion, in line with local technical guidelines. Alternatively, a bitumen emulsion with higher bitumen content of 70% or greater may be considered.

The binder shall retain its cohesiveness and remain adhesive throughout the works. The softening point of the chosen binder shall be greater than the expected pavement temperatures during the installation of HaTelit C and the subsequent overlaying asphalt works on the installed HaTelit C.

The class of bitumen to be used will be dependent upon weather conditions and other prevailing site conditions and may need to be altered to suit site-specific conditions during the progress of the works.

For warmer conditions (such as day works), it is recommended that a suitable and stiffer binder such as C320 or an appropriate PMB with a higher softening point is used.

1.3.4 HaTelit C – Asphalt Reinforcement

(a) General

The asphalt reinforcement must be Huesker HaTelit C installed in accordance with the manufacturer's installation instructions.

The reinforcing grid shall be made of high modulus **polyester yarns** with low creep properties and minimal stress-relaxation.

The grid must be firmly connected to an ultra-light polypropylene non-woven fabric.

The ultra-light non-woven polypropylene fabric attached to the grid must provide for ease of installation without tensioning. It must not act as a separator, and must allow a proper aggregate interlock between the asphalt layers.

The product shall be pre-coated with a polymer modified bituminous coating prior to supply to ensure a good bond between the reinforcement and the adjacent asphalt layers. The bitumen content used in the coating of the reinforcement shall not be less than 65% (solid content in the finished coating) and shall be certified independently.

The reinforcement shall be supplied in 150m long rolls. Each roll shall be labelled with an identification mark indicating roll ID number, product type and manufacturing details.

Quantities must be based on overlaps of not less than 250 mm in the length and 150 mm in the transverse direction. These overlaps must be the minimum used during installation of the grid with a maximum upward tolerance of 100mm.

(b) Properties

Properties of the HaTelit C asphalt reinforcement shall comply with the details outlined below and the requirements shown in Table 1-1.

In addition, the grid must be resistant to solvents and de-icing materials.

Table 1-1. HaTelit C Asphalt Reinforcement Properties

Property	Test Method	Value
Raw material of the reinforcement grid	-	High Modulus Polyester (PET)
Raw material of the nonwoven backing (installation aid for the geogrid)	-	Ultralight Polypropylene (PP)
Mass per Unit Area	ASTM D-5261 or DIN EN 965	270 g/m²
Weight of nonwoven backing (installation aid for the geogrid)	AS 3706.1	< 20 g/m²
Max. penetration resistance of nonwoven backing for aggregate interlock between the adjacent AC layers through the geogrid	NF G 38-019	< 0.14 kN (+0.00 tolerance)
Pre-Coating of entire product	-	Polymer Modified Bituminous Coating (PMB)
Bitumen content of the coating applied on the entire product as certified independently	-	≥ 65 % (-0 tolerance)
Ultimate tensile strength	EN ISO 10319 or ASTM D4595	≥ 50 kN/m (MD/CMD) * (-0.00 tolerance)
Strain at nominal tensile strength (50 kN/m)	EN ISO 10319 or ASTM D4595	≥ 4 % and ≤ 12 % (MD/CMD) * (-/+0.00 tolerance)
Tensile strength at 3 % strain	EN ISO 10319 or ASTM D4595	≥ 12 kN/m (MD/CMD) * (-0.00 tolerance)
Creep strain (after 20,000hrs) at 50% of tensile strength	ASTM D6992	< 1% (+0.00 tolerance)
Resistance to construction damage: Residual tensile strength after installation damage	EN ISO 10722:2007	≥ 90 % (-0.00 tolerance)
Ratio of the exposed specimen strength to nominal tensile strength	EN ISO 10722:2019	≥ 80 % (-0.00 tolerance)
Melting point of the reinforcement grid	ISO 11357-1 or ASTM D 276	> 235 °C (-0.00 tolerance)
Grid aperture size	-	~ 40 x 40 mm
Resistant to and suitable for standard coarse drum milled surfaces?	-	Yes
Resistant to moisture as well as de-icing agents?	-	Yes
Durability	EN 13249: 2015 ff.	Minimum of 100 years in natural contents with 4 ≤pH ≤9
Roll dimensions	-	2m, 3m, 4m, 5m x 150m

1.4 Plant, Equipment and Tools

1.4.1 General

The plant and equipment used in the Work under the Contract shall be appropriate for the execution of the specified tasks.

The Contractor must supply all plant, equipment, machines and tools to be used in the construction of the Works and must verify, by completion of a daily plant inspection verification check list, the compliance of all items with the requirements of this Specification. Work must not commence in any work period until the plant inspection verification checklist has been completed and submitted. A **Hold Point** must apply.

Hold Point 1-1	
Submission Details:	Prior to movement of any plant on to site of works, submission of daily plant inspection verification checklist.
Release of Hold Point:	By Contract Administrator

1.4.2 Maintenance of Plant and Equipment

The Contractor shall maintain all plant, equipment, machines and tools in a satisfactory working condition at all times and particular attention shall be given to avoiding and preventing oil, water, hydraulic fluid and fuel leaks on the installed HaTelit C or existing pavement surfaces.

Plant and equipment that has or develops leaks in the oil, fuel or hydraulic systems shall be removed from the Works immediately until repaired. Temporary repairs shall not be permitted.

The Contractor must clean the tyres of sprayers, rollers, trucks or other equipment daily where the build-up of bitumen or any other contamination occurs, daily before the commencement of a work period.

During the works, the Contractor shall ensure that the tyres of all vehicles are clean and free from bitumen or any other contamination prior to driving onto installed HaTelit C.

1.4.3 Tandem Smooth Drum Rollers

Tandem Steel Drum rollers used for the HaTelit C must be self-propelled and type used for asphalt compaction. The construction, maintenance, adjustment and operation of the rollers must be such that the HaTelit C does not adhere to or pick-up on the roller drums when operating on the HaTelit C.

The application of water to the drums must be the minimum necessary to prevent adhesion/pick-up of the HaTelit C. Any residual moisture on HaTelit C shall be allowed to evaporate prior to asphalt paving.

Tandem Steel Drum roller must have an all up weight of no more than 8 tonnes, and operated in a manner that ensures a full coverage on the installed HaTelit C, pressing the HaTelit C into the adequately tack-coated pavement surface.

1.4.4 Pneumatic Tyred Tandem Rollers

Pneumatic tyred rollers shall be self-propelled and shall be designed and constructed to provide 1 full coverage with each pass of the roller and shall be capable of operating with the wheel loads and tyre pressures specified. The rollers shall have smooth tyres and the wheel load and tyre pressure shall be the same for all wheels.

Single drum, spray seal type rollers or rollers unable to spray water onto its tyres shall not be used.

When operating on the HaTelit C bonded onto the adequately tack-coated underlying surface, the construction, maintenance, adjustment and operation of the rollers shall be such that the HaTelit C does not adhere to or pick-up on the roller tyres.

The application of water to the tyres shall be the minimum necessary to prevent adhesion/pick-up of the HaTelit C. Any moisture shall be allowed to evaporate prior to paving.

Pneumatic Tyred Rollers shall be rollers having an all up mass of not greater than 10 tonnes with all wheels uniformly loaded.

1.4.5 Bituminous Sprayer

The sprayer shall be capable of applying the bitumen (hot) / bitumen emulsion evenly and uniformly at the specified application rates in a single pass at 1m to 5m widths.

Crew trucks and/or tack coater type trucks shall not be used for HaTelit C, except when using a hand lance.

Mechanical sprayers of bituminous materials herein referred to as bitumen sprayers shall comply with the requirements of NAS-70, AustRoads APT181/11 and AustRoads AGPT/T530 – 536. The Contractor shall maintain a current certificate for each bitumen sprayer showing compliance with those requirements prior to and during the use of the sprayer for work. A copy of the certificate shall also be mounted or retained on the sprayer, protected from damage, and shall be available for inspection at all times.

1.4.6 Mechanical Brooms and Suction Sweepers

(a) General

All sweeping and cleaning equipment must be capable of rapidly cleaning asphalt pavement surfaces and cold planed asphalt pavement surfaces on or against which the HaTelit C is to be placed, and for cleaning up following construction and/or generally. All brooms and sweepers must be fitted with broom stocks having non-metallic bristles. The use of steel bristles on any broom or sweeper is not permitted. Side cast brooms must not be used.

All sweeping and cleaning equipment must be available on site for the full duration of each work period.

(b) Mechanical Brooms

Mechanical brooms shall be power operated and shall be suitable for rapidly cleaning the finished asphalt surface. Mechanical brooms may be skid steer loaders capable of being fitted with both a bucket and a broom/bucket combination. All brooms/broom stocks shall have non-metallic bristles.

(c) Vacuum Sweepers

Vacuum sweepers shall be suitable for rapidly cleaning all sealed surfaces.

At least one vacuum sweeper (including for final clean up before application of tack coat) shall be a machine purpose built to vacuum clean a width of pavement of at least two metres per pass with no reliance on brooming for lateral collection of material.

Conventional road suction sweepers are considered to be not effective in cleaning up after cold planing of asphalt and are not acceptable without supplementary equipment.

1.4.7 Huesker Unrolling Frame and Telehandler

(a) General

The unrolling of HaTelit C shall be undertaken using the manufacturer's unrolling frame specifically built for HaTelit C, or an unrolling frame already approved by the manufacturer of HaTelit C.

The unrolling frame shall be operated in a manner that HaTelit C is installed into the adequately tack-coated asphalt pavement surface, with the grid side facing up, without any wrinkles, creases, folds or the like.

(b) Towing Plant

The unrolling frame approved, or supplied, by the HaTelit C manufacturer shall be mounted to suitable plant with competent operator. Suitable plant are 3-7tonnes in weight and can include a telehandler, forklift, tractor or loader and assessed for suitability during construction trial.

Skid steer type plant are not acceptable for unrolling HaTelit C.

1.5 Surface Preparation

Before applying the bitumen (hot)/bitumen emulsion, all loose and foreign materials must be removed from the surfaces to a distance not less than 150 mm beyond the edge of the area to be tack-coated using suitable power operated brooms/sweepers.

Hand sweeping may be used if and where appropriate.

Full contact of HaTelit C with the underlying pavement surface is required at all times, any potholes, steps or irregularities >10mm in depth must be filled, removed or chamfered to 1:10 transition.

Uniform milling groove channels of up to 10mm depth, on the finished surface, is acceptable for the HaTelit C. Remnants of milled asphalt (where applicable) shall be scraped/mechanically removed.

Joints and cracks wider than 3mm shall be cleaned out and filled with a bituminous sealant in line with project specifications.

Areas of oil or fuel spillage must be cleaned with detergent and flushed with clean water and allowed to dry prior to the application of tack coat.

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1.6 Tack Coat

1.6.1 General

A tack coat of bitumen/bitumen emulsion shall be applied to all surfaces on which the HaTelit C is to be placed as shown on the Drawings.

Hold Point 1-2	
Submission Details:	Prior notice (30 minutes) that all of the treatments within the area to be tack coated are completed and ready for inspection. Treatment area dew point, pavement temperature and air temperature should be noted
Release of Hold Point:	By the Contract Administrator

1.6.2 Application of Tack Coat

Tack coat must not be applied to a wet or damp surface. Prior to applying tack coat, the cleaned surface must be dry. If the cleaned surface to receive tack coat is not dry, it must be either, allowed to dry through natural evaporation or be assisted to dry by brooming, vacuum sweeping and the use of air blowers together with natural evaporation.

Tack coat application must not commence until the pavement temperature is in excess of the minimum temperature for spraying recommended by the bitumen manufacturer and is likely to remain in excess of that minimum temperature during the entire tack coat operation.

Tack coat must be applied to the prepared surfaces in accordance with the requirements detailed in Section 5 of AS 2734 and as specified below such that a uniform cover at the specified application rate over the full surface is achieved. A satisfactory junction between the ends of previous and subsequent applications must be achieved.

Where applicable the vertical faces and edges of pavement must receive 2 applications of tack coat.

The tack coat for the HaTelit C must be applied at a starting spray rate of:

- 0.45 to 0.55 L/m2 of residual bitumen on brand new (warm) asphalt surfaces; and
- 0.45 to 0.55 L/m2 of residual bitumen on asphalt surfaces that have not been cold planed; and
- 0.55 to 0.65 L/m2 of residual bitumen on asphalt surfaces that have been cold planed.

Note: Above rates may be adjusted as required based on the site-specific conditions, ensuring that HaTelit C is bonded onto the underlying surface and remains bonded during subsequent construction works without excess bitumen.

For excessively coarse cold planed surfaces the spray rate may need to be increased to a maximum limit of 0.8 L/m2 residual bitumen.

HaTelit C must only be placed directly on an adequately prepared and tack-coated asphalt surface.

1.6.3 Application of Bitumen (Hot) as Tack Coat

Immediately after each spray run of the bitumen, HaTelit C shall be installed, before the next spray run commences. Immediately following the installation of HaTelit C, rolling with tandem rollers shall commence.

Tack coat must only be sprayed to match the length of HaTelit C remaining on the roll or the remaining length to be covered (whichever is shorter), and up to a maximum spraying distance equal to the length of a full roll.

Spraying of tack coat shall be closely coordinated with crews installing HaTelit C

1.6.4 Application of Bitumen Emulsion as Tack coat

Where Bitumen Emulsion is used, HaTelit C shall not be installed into Bitumen Emulsion tack coat until the tack coat has broken.

HaTelit C shall then be installed as soon as the tack coat has broken.

Contractor shall nominate whether tack coat is progressively applied as each sheet of HaTelit C is unrolled or applied over the entire area prior to HaTelit C unrolling taking into consideration HaTelit C overlaps.

All areas deficient in application of tack coat and all missed spots must be treated by hand spraying to achieve the specified application rate. Tack coat composition and method of application must be adjusted to ensure that over any unit area the tack coat has “broken” over the whole of surface prior to placing the HaTelit C.

Any bitumen emulsion that has separated into its separable component parts, to any degree, or has been contaminated with foreign matter, in any manner, must be rejected and must not be used in the Works.

Tack coating must be undertaken at such times determined by the Contractor that will ensure that the tack coat fully breaks prior to asphalt placement over the HaTelit C.

1.6.5 Tack Coat of HaTelit C Overlaps

Contractor to ensure all HaTelit C overlaps are tack coated and bonded prior to asphalt paving. Overspray of tack coat and exposed tack coat on the installed HaTelit C shall be avoided.

1.6.6 Treatment of Excess Tack Coat

Any pools of tack coat, which may form in small depressions or surface irregularities especially on planed surfaces, shall be brushed out over the adjacent areas with brooms or rubber squeegees before the emulsion breaks.

1.6.7 Protection

Every precaution shall be taken to avoid freshly tack-coated surfaces from being contaminated by dust, grass or other foreign material.

The Contractor shall protect the tack coat against all damage. The tack coated surface must not be trafficked by vehicles prior to installation of the HaTelit C.

1.6.8 Repair

The Contractor shall immediately repair any damage and shall clean up all contamination on areas where tack coat has been removed by pick-up on tyres. Where tack coat has picked up or damaged due to cleaning, the Contractor shall apply fresh tack coat prior to installing the HaTelit C.

1.6.9 Correction of Defective Areas

All areas deficient in rate of application of tack coat shall be treated by re-spraying by hand-held lance to achieve the specified application rate.

1.6.10 Curing of Tack Coat

If bitumen emulsion is used as tack coat, asphalt placement over the HaTelit C must not take place until the bitumen emulsion tack coat has fully broken into bitumen and water and the water has evaporated.

1.7 Placing HaTelit C

1.7.1 General

The HaTelit C must only be installed by adequately-resourced installers approved by the supplier or by persons who have demonstrated competence and experience installing the HaTelit C as detailed in the following section.

Prior to works commencing, the Contractor shall

- Submit HaTelit C Quality Plan to the Contract Administrator no later than four weeks prior to commencement of works.
- Undertake project-specific HaTelit C pre-installation session with the Supplier and the Contract Administrator no later than three weeks prior to commencement of works.

1.7.2 Installation by Competent and Experienced Installers

Installation of HaTelit C must only be undertaken by competent and experienced installers who have worked with HaTelit C, XP, eco or SamiGrid on relevant road or airfield projects with demonstrated large scale installations (greater than 10,000sqm in the last 12 months) completed in line with manufacturer's guidelines.

Supporting evidence of specified crew competency and experience in installing HaTelit C shall be supplied to the satisfaction of Contract Administrator and the manufacturer/supplier of HaTelit C.

Where competent and experienced crews are not available within the Contractor's team, specialist third-party HaTelit C installers, who are certified by the manufacturer, shall be engaged by the Contractor to install HaTelit C.

Where this is required, Contractor shall contact the manufacturer of the HaTelit C for certified third-party HaTelit C installer/s.

HaTelit C shall be installed using the manufacturer's purpose-built Installation Frame for HaTelit C or an applicator already approved by the manufacturer of HaTelit C.

Manual frame or hand placement may be used if and where appropriate, for small areas (<300sqm), provided that a fully flat and crease-free installation is achieved.

1.7.3 Installation of HaTelit C

A **Witness Point** shall be designated in the Project Quality Plan at the commencement of the application of HaTelit C.

Witness Point 1-1
Submission Details: Prior (48 hours minimum) notice to Contract Administrator of commencement of application of HaTelit C.

The HaTelit C must overlap the junction between abutting pavements by not less than 500 mm if applicable. The HaTelit C must be applied to the tack coated pavement surface so that it lays flat without any wrinkles, creases, folds or the like, and with the grid side facing up.

Following installation of the HaTelit C, and prior to placing the asphalt covering layer, the grid must be rolled with 2 passes of a tandem steel drum roller which must have an all up weight of no more than 8 tonnes and provide full coverage uniformly.

Laps in the HaTelit C as specified above (250 mm end and 150 mm side) must be tack coated to bond the upper lap to the lower lap of HaTelit C. This must be carried out after the grid is laid and rolled to avoid damaging or disturbing the HaTelit C with construction traffic.

(a) HaTelit C overlaps between adjoining sheets

Adjoining sheets of HaTelit C shall be tack coated, overlapped and rolled to bond the upper lap to the lower lap of HaTelit C. Overlaps in HaTelit C shall be lapped by 250 mm transversely and 150 mm longitudinally, determined by the direction of traffic travel. The upper laps shall fall in the direction of paving, where this is not practical adequate steps shall be taken to ensure the overlap remains bonded under paving.

This shall be carried out in a manner that avoids damaging or disturbing the HaTelit C during construction traffic.

1.7.3 Surface Finish Inspection

(a) Flatness of installed HaTelit C

The finished surface of the HaTelit C shall be inspected by the Contractor to identify areas installed that are wrinkled, creased, folded or the like or otherwise damaged that are not equal to the standard of surface finish of the applicable Reference Areas established in the Construction Trial.

The full extent of the installed HaTelit C be inspected prior to paving.

(b) Saturation of installed HaTelit C

The finished surface of the HaTelit C shall be inspected by the Contractor to identify areas installed including overlaps that have dry spots or exposed tack on finished surface that are not equal to the standard of surface finish of the applicable Reference Areas established in the Construction Trial.

The full extent of the installed HaTelit C be inspected prior to paving.

A **Witness Point** shall apply.

Witness Point 1-2

Submission Details:

Notice (24 hours prior) of time of Contractor's inspection of quality of finished surface for

a) Flatness and b) Saturation:

Areas installed that are wrinkled, creased, folded or the like or otherwise damaged;

and/or;

Areas installed including overlaps that have dry spots or exposed tack on finished surface;

that are not equal to the standard of surface finish of the applicable Reference Areas Shall be immediately marked clearly on the installed HaTelit C and recorded on a plan of the lot by the Contractor.

A Non-Conformance Report shall be raised and a record on the lot plan shall include the chainage, offset and extent of each area not equal to the standard of the applicable Reference Area.

1.7.3.1 Repair of Non-conforming Areas

In cases where the Contract Administrator has not directed removal and replacement of a lot of HaTelit C containing an area or areas of non-conforming surface flatness (or replacement of only the non-conforming area or areas), the non-conforming areas shall be repaired as specified in this clause prior to asphalt paving.

Areas of the completed surface of the installed HaTelit C that are non-conforming with respect to surface flatness (are wrinkled, creased, folded or otherwise damaged) shall be repaired to the satisfaction of the Contract Administrator by way of:

An angle grinder or equivalent tool to give a clean-cut face without fraying of HaTelit C material

Either;

a) Slit wrinkle, crease or fold at the base and lay flat in the direction of paving, forming an overlap. A bitumen tack coat of up to 0.15L/sqm must be placed at the location of the overlap to ensure an adequate bond.

   Or

b) Cut and remove wrinkle, crease or fold from the base leaving no overlap, with the edges of the HaTelit C butted properly and remaining bonded to the underlying surface.

All areas treated shall be protected from further damage or disturbance throughout the works.

All areas treated shall be recorded on the lot plan and shall include the treatment, chainage, offset and extent of each area.

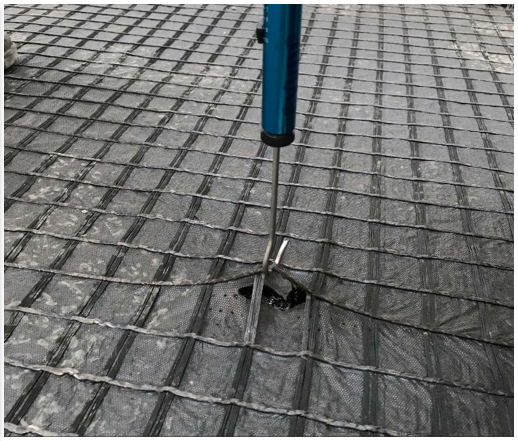
1.7.4 Assessment of bond

Following installation, the asphalt reinforcement shall not be trafficked by vehicles until the bond between HaTelit C and the underlying surface has been verified. A Spring Balance Adhesion Test shall be used to verify the bond prior to asphalt paving.

A **Witness Point** shall be designated in the Project Quality Plan at the completion of the installation of HaTelit C.

Witness Point 1-3

Submission Details: Spring Balance Adhesion Test Readings to be recorded for every 50 to 150 square meters.



Reference images showing adequate bond following installation onto the tack-coated surface

1.7.5 Placing asphalt over HaTelit C

Following installation and verification of bond in areas covered, asphalt paving may commence. HaTelit C shall be paved over without delay, or within 24 hours from installation, and covered by no less than 40mm thick (compacted) asphalt at any time.

The surface of the installed HaTelit C and the underlying asphalt layer shall be dry, clean, undamaged and free from loose material until the completion of paving over the installed HaTelit C.

Surface temperature of installed HaTelit C should be noted throughout the asphalt paving shift.

During asphalt placement, the Contractor must manage and control the operation of all plant in the paving train on the HaTelit C so that the HaTelit C is kept clean, dry, free of damage and surface contaminants.

The Contractor must keep all vehicles tyres free from exposed bitumen, applying abrupt braking or sharp direction changes whilst on HaTelit C. Only enough braking pressure should be applied by asphalt delivery trucks to keep it engaged at the asphalt paver/material transfer vehicle.

The Contractor must prevent the parking of asphalt delivery trucks and plant such as material transfer vehicles on HaTelit C.

1.8 Quality Assurance – General

1.8.1 Registration of Laboratory for Sampling, Testing and Certification

All sampling, testing and certification shall be carried out by a laboratory registered by the National Association of Testing Authorities (NATA) for the sampling, testing and certification required.

1.8.2 Quality Assurance Records

Not later than 2 weeks after completion of the HaTelit C constructed under the Contract, the Contractor shall submit a consolidated copy of the complete Quality Records for all HaTelit C work constructed under the Contract.

1.9 Quality Assurance – Test Methods

1.9.1 Bitumen Emulsion Test Procedures

Test procedures for bitumen emulsion shall be as specified in AS 1160 – Bituminous emulsion for the construction and maintenance of pavements.

1.9.2 HaTelit C Asphalt Reinforcement

Determination of the Mass per Unit Area of the HaTelit C shall be carried out in accordance with

ASTM D-5261 or DIN EN 965.

Determination of the Open Area of Grid shall be carried out in accordance with CWO 22125.

Determination of the Ultimate Tensile Strength, Tensile Strength at 3% Strain and Elongation at break shall be carried out in accordance with ASTM D-4595 or DIN EN ISO 10319. For the purposes of this document, tensile strength tests shall be performed on the finished product.

Determination of all other relevant properties, listed under Section 1.3.4 and Table 1-1 HaTelit C Asphalt Reinforcement Properties, shall be carried out in accordance with the corresponding test methods outlined in the Section 1.3.4 and Table 1-1.

1.10 Quality Assurance – Requirements Prior to Commencement of Works

1.10.1 Bitumen Emulsion - Conformance Test Certificates/Reports

For each type of bitumen emulsion proposed to be used in the works, the Contractor shall submit to the Contract Administrator the following information not less than 10 days prior to the commencement of delivery of bitumen emulsion to the site:

- Source of the bitumen emulsion;
- Name and address of the manufacturer,
- Location of manufacture,
- Process(es) used in manufacture, and
- Test certificates for every test property in the set of test properties that are required to demonstrate the compliance of the bitumen emulsion with the relevant Specification (AS 2157). The certificate shall indicate full compliance of the bitumen emulsion with the above-specified requirements and shall be issued by a laboratory registered by NATA for the performance of such tests.
  The test certificates shall be for the manufacturer's current production and samples to which the test certificates pertain shall have been taken not more than 1 month prior to submission.

Provision of this information shall constitute a **Hold Point**.

Hold Point 1-3

Submission Details: Source, name and address of manufacturer(s), manufacture information and test certificates for bitumen emulsion not less than 10 days prior to the commencement construction trial

Release of Hold Point: By Contract Administrator

1.10.2 HaTelit C Asphalt Reinforcement - Conformance Test Certificates/Reports

For the HaTelit C asphalt reinforcement proposed to be used in the works, the Contractor shall submit to the Managing Contractor and/or Contract Administrator the following information not less than twenty (20) working days prior to the scheduled commencement of application:

- Source of the HaTelit C;
- Name and address of the manufacturer;
- Location of manufacture; and
- Test certificates listing the results for every test property that are required to demonstrate the compliance of the HaTelit C with the relevant Specification, including **Section 1.3.4 and Table 1-1 HaTelit C Asphalt Reinforcement Properties specified in the document**. The certificate shall indicate full compliance of the HaTelit C with the above-specified requirements and **shall be issued by a laboratory registered by NATA (or an equivalent registration authority that is recognized by NATA)** for the performance of such tests. The test certificates shall be for the manufacturer's current production and samples to which the test certificates pertain shall have been taken not more than 12 months prior to submission. The test certificates shall cover each individual roll proposed to be used in the works, which shall be identified by the individual Roll ID number;
- Independent verification that the reinforcement can be milled at the end of the design life;
- Internal and external quality control in accordance with DIN 18200;
- CE declaration of performance in accordance with DIN EN 15381;
- Quality management certificate in accordance with EN ISO 9001:2008;
- Energy management certificate in accordance with EN ISO 50001:2011;
- Product liability insurance covering the risks of performance of the product related to product defaults;
- Environmental Product Declaration directly relating to the product.

If an alternative type reinforcement is proposed to be used in the works, in addition to the material test certificates complying with the specified requirements above outlined in the Section 1.3.4 and Table 1-1, the **Contractor shall also submit to the Managing Contractor and/or** Contract Administrator **the following information** not less than twenty (20) working days prior to the scheduled commencement of application:

- Independent certifications confirming that the product has been tested and successfully **verified for both effective crack retardation performance and successful shear resistance performance under AC overlays**, over a period of at least 10 years in the field on any/each project given as a reference. The certifications shall cover a minimum tested area of 500,000sqm combined, in the last 10 years, with the required demonstration.
- Independent certifications relating to product performance levels, demonstrating effectiveness against reflective cracking by a factor of "**4.6 to 6.1 times improved crack resistance and extended fatigue life**", compared to the control/unreinforced asphalt samples, where crack propagation is tested from up to 9mm wide crack openings and both reinforced and unreinforced samples are exposed to load position of bending as well as shear modes in Dynamic Fatigue Testing;
- Independently verified long-term field performance reports demonstrating **effectiveness against reflective cracking to the same standard as the specified product in the field**, compared to unreinforced/control sections. Such reports shall be verified by the relevant asset owner and include all relevant details relating to the reinforcement performance for a period of at least 10 years in the field;
- Manufacturer's **demonstrated expertise, ability and track record in locally training and supporting the crews on site with the installation of the product and an expert understanding of the paving operations**. Such support systems shall include specialised installation devices to enable the correct application of the product with optimum efficiency and made available directly by the manufacturer, as well as thorough training by the manufacturer's field experts in reinforced asphalt construction;
- List of locally completed installations in similar applications;
- List of referees.

Provision of the information listed above shall constitute a **Hold Point**.

Hold Point 1-4

Submission Details: Source, name and address of manufacturer(s), manufacture information, test certificates, performance certificates, quality and insurance certificates.

Release of Hold Point: By Contract Administrator

1.11 Quality Assurance – Production

1.11.1 Bitumen Emulsion – Production Sampling and Testing

(a) Bitumen Emulsion – Test Certificates

A test certificate for bitumen emulsion which demonstrates that it complies with the Specification shall be supplied with every delivery to the works.

The test certificate shall be for the production lot of bitumen emulsion from which the delivered quantity was supplied.

A copy of the certificate for every bitumen emulsion delivery and a copy of the delivery docket identifying the quantity and time and date of the delivery shall be submitted to the Contract Administrator not later than 24 hours after each delivery.

(b) Bitumen Emulsion – Sampling

If directed by the Contract Administrator, the Contractor shall take samples of bitumen emulsion in accordance with Appendix A of AS 1160.

1.12 Quality Assurance – Installation

1.12.1 Installed HaTelit C– Assessment of HaTelit C Surface Conformance

Contractor Assessment of Conformance / Non-conformance

The Contractor shall assess conformance of the surface flatness or saturation of the installed HaTelit C surface in the Lot as follows:

a) In the case that the finished HaTelit C surface in the Lot complies fully with the specified surface flatness and saturation tolerances, the Contractor shall issue a conformance report with the surface flatness and saturation records including the lot plan,

   Or

b) If the finished HaTelit C surface in the Lot does not comply fully with the specified surface flatness or saturation tolerances, the Contractor issue a non-conformance report with the surface flatness and saturation records including the lot plan.

A **Hold Point** shall apply prior to the commencement of the next HaTelit C shift.

Hold Point 1-5

Submission Details:

a) Conformance report and surface flatness testing records including the plan of the lot specified, or (as applicable)
   or
b) Non-conformance report, surface flatness testing records including the plan of the lot, summaries as specified and proposed disposition within one (1) working day of completion of the Surface Flatness Testing.

Release of Hold Point: By Contract Administrator

Contract Administrator's Adjudication on Surface Flatness Non-Conformance

The Contract Administrator will examine the constructed finished surface flatness and saturation records and the Contractor's Non-conformance Report and may accept a lot that contains an area (or areas) that is/are non-conforming for surface flatness or may direct that the non-conforming area(s) or the lot as a whole be replaced at the Contractor's expense.

1.13 Rectification of Non-conforming Work

1.13.1 General

A lot of HaTelit C assessed as non-conforming with respect to the requirements specified herein for tack coat quality, tack coat application rate, surface flatness, surface saturation or surface bond shall be rectified by the Contractor at the Contractor's expense in accordance with Clause 1.13.2 Removal and Replacement of Non-conforming Areas. At his discretion, the Contract Administrator may direct that only a particular area or areas assessed as nonconforming in any respect within a lot of asphalt be rectified by the Contractor by removal and replacement at the Contractor's expense.

Any installed HaTelit C that has become damaged or contaminated with foreign material shall be removed and replaced as specified herein at the Contractor's expense.

1.13.2 Removal and Replacement of Non-conforming Areas

Non-conforming HaTelit C shall be removed and disposed of by the Contractor and replaced with fresh materials. Patches shall be prepared by removing the non-conforming HaTelit C including the tack coat.

All the work associated with the removal, disposal and replacement of non-conforming areas of installed HaTelit C shall be carried out in accordance with this Specification at the Contractor's expense.

1.14 Schedules

1.14.1 Witness Points

The following mandatory Witness Points apply to the work covered by this section of the Specification.

Table 1-3 Schedule of Witness Points – HaTelit C

Number	Clause	Witness Point
Witness Point 1-1	1.7.2	Installation of HaTelit C
Witness Point 1-2	1.7.3	Installed surface finish
Witness Point 1-3	1.7.4	Verification of bond

1.14.2 Hold Points

The following mandatory Hold Points apply to the work covered by this section of the Specification.

Table 1-4 Schedule Hold Points – HaTelit C

Number	Clause	Witness Point
Hold Point 1-1	1.4.1	Daily Plant Inspection Checklist
Hold Point 1-2	1.6.1	Inspection prior to tack coat
Hold Point 1-3	1.10.1	Tack coat compliance
Hold Point 1-4	1.10.1	HaTelit C supply compliance
Hold Point 1-5	1.12.1	HaTelit C Lot compliance

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