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| AUSTROADS TECHNICAL SPECIFICATION ATS 3466  High Friction Surface Treatment | A close up of a flag  Description automatically generated |
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# Scope

Austroads Technical Specification ATS 3466 sets out the requirements for the supply and application of High Friction Surface Treatment (HFST), which is used to provide very high skid resistance on the road pavement surface.

# Referenced Documents

The following documents are referenced in this Specification:

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| **Australian / New Zealand Standards**  AS 1141.40 Methods for sampling and testing aggregates Polished aggregate friction value - Vertical road-wheel machine  AS 1141.41 Methods for sampling and testing aggregates Polished aggregate friction value - Horizontal bed machine  AS 1141.42 Methods for sampling and testing aggregates Pendulum friction test  AS 4663 Slip resistance measurement of existing pedestrian surfaces |
| **Austroads**  AP-C87-15 Austroads Glossary of Terms  ATM-250 Modified Surface Texture Depth (Pestle Method)  ATM-055 Polished Stone Value  ATM-020 Random Selection of Sampling or Test Locations |

# Definitions

In addition to the definitions in AP-C87-15, the following definitions apply to this Specification.

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| **Binder:** | Resin used to bond the aggregate to the existing road surface |
| **Defect: (1)** | Includes loss of aggregate, bleeding, fatty areas, flushing, loss of skid resistance, delamination and a non-conformance with the requirements of Clause 9. |
| **Defect Liability Period: (1)** | The period during which the Contractor is responsible for repair of Defects in the HFST |
| **Priming Material:** | A substance used to clean and prepare the existing road prior to the application of binder. Priming materials may be used to improve the adhesion of the binder to the existing road surface. |
| **Principal’s Registration Scheme:** | Any scheme for the prequalification, registration or approval of products, quarries, manufacturers and/or suppliers in operation in the jurisdiction where the HFST is to be placed. |
| **Protective Sealer:** | A substance used to protect and seal the high friction surface treatment from fuel and oils spills from traffic |
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Note:

1. These definitions apply for the purpose of this Specification only, notwithstanding any other definition in the Contract documents

# Quality System Requirements

The Contractor must prepare and implement a Quality Plan that includes the documentation in Table 4.1.

Table 4.1: Quality Plan

| Clause | Description of Document |
| --- | --- |
| 5.4 | Design details |
| 6.1 | Details of constituent materials |
| 6.6 | Evidence of satisfactory product performance (if a Principal’s Registration Scheme does not apply) |
| 7.1 | Procedures and / or the manufacturer's instructions for surface preparation, application and clean-up. |
| 10.1 | Details of the proposed treatment to repair a Defect |

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| **HOLD POINT 1.** | |
| Process Held | Commencement of the application of HFST. |
| Submission Details | The Quality Plan must be provided to the Principal at least 10 working days prior to the commencement of work on site. |

# Design and Performance Requirements

## General

The Contractor must design and apply a HFST which meets the performance requirements of this Specification until the expiry of the Defects Liability Period.

The Contractor is responsible for:

1. the design of the HFST, including selection of the materials;
2. inspection of each site and making any adjustment necessary to the design to account for the condition of the substrate;
3. road surface preparation, supply and application of the HFST and clean up; and
4. repair of any defects until the expiry of the Defect Liability Period.

Unless specified otherwise, HFST must not be applied to open graded asphalt.

The Quality Plan must include details of the HFST design, including:

1. the methodology for the inspection of each site and making any adjustment necessary to the design to account for the design traffic loading and the condition and texture of the substrate; and
2. application rates (including tolerances) of binder, priming materials (if the system uses a primer) and aggregate.

The design must take the following into consideration:

1. The condition and stability of the underlying materials;
2. The local environment including, rainfall, temperature, humidity, dew-point, wind profiles, and the presence of water conditions;
3. Existing surface texture and porosity;
4. Geometry including cross fall and grade;
5. Drainage including surface drainage; and
6. The construction methodology and traffic management.

In addition to meeting the requirements of Clause 9, the HFST must be:

1. able to withstand the action of traffic (e.g. acceleration, braking, turning and scrubbing forces) without damage;
2. resistant to fuel and oil spills;
3. non-flammable after placement and curing;
4. free from offensive odours after placement and curing;
5. able to be swept using a mechanical broom and cleaned with high pressure water without damage;
6. free from any environmental contaminants such as lead and other heavy metals; and
7. chemically stable when subjected to prolonged ultraviolet radiation exposure; and
8. match the colour nominated in Contract documents and / or approved Quality Plan.

If the Contractor proposes to change the design from that approved by the Principal at any stage, the details of the revised design must be submitted to the Principal and Hold Point 1 will reapply.

# Constituent Materials

## General

The Quality Plan must include the following:

1. Properties, manufacturer’s instructions, safety data sheets and other relevant details for the:
2. materials used for cleaning the existing pavement surface (where required for removal of surface contaminants): type and source;
3. priming materials: type and source;
4. binder: type and source; and
5. aggregate type, source, target particle size distribution and production tolerances, together with test results evidencing compliance with this Specification, including the friction rating;
6. Evidence of registration (where applicable under Clause 6.5) or evidence of satisfactory previous performance (if applicable under Clause 6.6).

The materials used in the HFST must be the same as those nominated in the Quality Plan. Substitution of materials is not permitted (refer Clause 5.7).

The colour of the HFST must be a grey, black or buff colour, unless otherwise shown on the Drawings or approved under Clause 6.5.

All test certificates must be prepared by a laboratory which is accredited for the test method to meet the requirements of AS ISO/IEC 17025 by National Association of Testing Authorities (NATA) or International Accreditation New Zealand (IANZ). Certificates must not be more than 6 months old when submitted to the Principal.

## Approved Products

Where a Principal’s Registration Scheme is in place for the supply of HFST material, the material must be a registered product which has been approved in accordance with that scheme.

If a Principal’s Registration Scheme is not in place for the supply of HFST material, the Quality Plan must include evidence of satisfactory performance of the proposed HFST in a heavy urban traffic environment, including records of the ability of the treatment to achieve and maintain the required texture, skid resistance, colour and durability of the HFST over the entirety of the treated area for a period of at least 5 years.

## Binder

The binder must be multi-component thermosetting resin that will achieve the performance requirements of this Specification. The use of paint or thermoplastic binders is not acceptable under this Specification.

## Aggregate

The aggregate must be clean, hard, angular, durable, free from dirt, clay and organic matter, of uniform shape and uniform quality. Unless specified otherwise in the Contract documents, the aggregate must comply with this Clause 5.

The aggregate must comprise of one of the following:

1. calcined bauxite; or
2. a crushed aggregate sourced from a quarry where the source rock complies with Clause 6.10.

The source rock used for any crushed aggregate must comply with either the Polished Aggregate Friction Value (PAFV) or the Polished Stone Value (PSV) specified in Table 6.10. Testing of calcined bauxite for friction rating is not required.

Table 6.10: Friction Rating

| Property | Test Method | Minimum Test Frequency (1) | Acceptance Criteria |
| --- | --- | --- | --- |
| PAFV: | Either:   * + AS 1141.40 and AS 1141.42; or   + AS 1141.41 and AS 1141.42 | 1 per 6 months of production | ≥ 65 |
| PSV | ATM-055 | 1 per 6 months of production | ≥ 65 |

Notes:

1. Unless the Principal approves a reduced frequency of testing.

# Construction

## General

The Quality Plan must include procedures and / or the manufacturer's instructions for:

1. surface preparation, including removal of loose and foreign materials;
2. supply and application of the priming material (if applicable);
3. binder mix quantities and tolerances on mixing components;
4. mixing of binder (and components);
5. pot life of binder, i.e. maximum time between mixing and application of binder;
6. the method of measuring the pavement surface temperature;
7. placement of binder, including limitations on placement temperatures;
8. curing;
9. use of accelerants to reduce the curing time of the binder (if applicable);
10. supply and application of protective sealers (if applicable);
11. placement of the aggregate, including the spread rate;
12. method to determine the actual binder application rate and the aggregate spread rate; and
13. clean up.

## Road Surface Preparation

Unless specified otherwise, HFST must not be applied to an asphalt surface until at least 4 months have elapsed since the asphalt was placed.

Immediately prior to the application of the HFST, the Contractor must clean and prepare the road surface to ensure that all raised pavement markers, oil, grease, dirt and any foreign material are removed from the road surface. The cleaning must be in accordance with the manufacturer’s instructions to ensure that the HFST adheres to the road surface.

Cleaning and preparation must not cause damage to the road surface or structural damage to the pavement. If the pavement has been damaged by the removal of raised pavement markers, the pavement must be repaired prior to the application of the HFST. All cleaning agents used to remove dirt, grime, fuel, oil and other materials from the existing surface and collected material must be removed from the site and disposed in accordance with the environmental management requirements included in the Contract documents.

Prior to the application of HFST, the Contractor must inspect the site to confirm the suitability of the road surface for the HFST and prepare a report recording all relevant details of the inspection. The report must identify any areas of an existing pavement that require repair prior to the application of the HFST. If requested by the Principal, the Contractor must permit the Principal to also attend the inspection.

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| **HOLD POINT 2.** | |
| Process Held | Application of HFST |
| Submission Details | Records of the joint inspection must be submitted to the Principal at least 2 working days prior to the commencement of the application of the HFST. However, if the report identifies that the existing pavement requires repair prior to the application of the HFST, the Hold Point is not released until the repair is complete. |

Unless specified otherwise in the Contract documents:

1. the following must be masked to prevent the application of HFST to the surface:
2. the outside boundaries of the Lot, including kerb and channel;
3. existing road surface delineation;
4. lifting mechanisms and joins between the lid and frame of pits so that the HFST does not impede lifting and replacing lids;
5. drainage grates and frames; and
6. Service pits and valve covers less than 0.03 m²;
7. the following must not be masked so that the HFST is applied to the surface:
8. saw cuts that exist due to the installation of traffic detector loops; and
9. large pits and valve covers.

## Application

The Contractor must apply the HFST to achieve:

1. an effective bond between the binder and the road surface;
2. an effective bond between the binder and aggregate; and
3. visually uniform, high friction and textured surface with edges that provide a neat and clean line onto the adjacent surface.

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| **WITNESS POINT 1.** | |
| Process | Application of HFST |
| Notification Period | At least 1 working day (not less than 24 hours) before the commencement of the application of the HFST. |

The following applies to the application of the HFST:

1. the surface on which the HFST is to be placed must be dry;
2. precipitation or dew formation must not be occurring or likely to commence during application; and
3. the pavement temperature and weather conditions must be within the range specified in the manufacturer’s instructions or applicable installation procedure.

The Contractor must measure and record air temperature, any adverse weather conditions (e.g., dust, strong wind), humidity, dew point and pavement temperature at the Site. The records must be taken at the following times:

1. one hour before application of the binder, and
2. hourly thereafter until the binder is cured and the HFST is ready for trafficking.

A wet / dry bulb hygrometer must be used to measure the dew point and relative humidity.

Priming material (where applicable), binder and aggregate must be uniformly applied over the area to be treated in accordance with the manufacturer’s instructions. The actual application rate of each constituent material must be recorded and included in the record for each Lot.

The Contractor must take all necessary precautions to:

1. prevent unintended application onto adjacent surfaces; and
2. protect the newly placed HFST from damage and/or contamination until it has developed sufficient strength to carry vehicular traffic without damage.

The Contractor must record the weather conditions, location, width, area, application rates of binder, priming material and aggregate immediately after completion of each Lot and submit a report of the information to the Principal within 24 hours of the work being performed. The report must identify any non-conforming work and the proposed corrective action.

# Clean Up

All surplus material must be removed from the Site. Prior to opening the HFST to traffic:

1. all masking tape must be removed, and
2. excess aggregate must be removed from the Site, including the roadway, kerb and channel, driveways and any adjacent trafficked and un-trafficked areas.

Unless directed otherwise by the Principal, the Contractor must inspect the Site at 24 hours, 3 days and 14 days after placement and remove any loose material which has been identified at the inspection.

# Conformance

Unless specified otherwise in the Contract documents, from the time of placement until the end of the Defects Liability Period, the HFST must have a visually uniform appearance and comply with the requirements in Table 9.1.

Table 9.1: Conformance Requirements

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| Property | Test Method or Inspection Procedure | Test Frequency | Requirement |
| Skid Resistance Value (SRV) (1) | AS 4663 Appendix A (2) | 5 tests from the first Lot. (3)  Testing must be completed in the trafficked wheel paths. | ≥ 65 Mean SRV British Pendulum Number |
| Surface Texture Depth | ATM-250 (2) | 5 tests from the first Lot. (3)  Testing must be completed in the trafficked wheel paths. | ≥ 1.0 mm |
| Delamination | Visual inspection | One per Lot. | Area of HFST that has delaminated from underlying road surface:  ≤ 1% in any square metre, and  ≤ 0.1% of the total area of work. |
| Stripping or Ravelling | Visual inspection | One per Lot. | Area of HFST that has stripped (i.e. loss of aggregate and/or binder):  ≤ 1% in any square metre, and  ≤ 0.1% of the total area of work. |

Notes:

1. Testing must be performed in the direction of vehicle travel using Slider 55 (TRL rubber) with temperature corrections applied to the SRV. The lane designation (inner wheelpath, outer wheelpath or between the wheelpaths) must be reported for each test location.
2. Random stratified sampling in accordance with ATM-020 must be used to determine the longitudinal location of the test. However, the Principal may direct additional testing at any location prior to the expiry of the Defects Liability Period.
3. Additional testing of subsequent Lots is required where a non-conformance is recorded, or lots are not visually consistent with the first lot, unless directed otherwise by the Principal.

Testing of each property specified in Table 9.1 must be carried out twice, at the following times:

1. Test 1 to be undertaken between 14 and 28 days after placement.
2. Test 2 to be undertaken no sooner than 2 months before the end of the Defects Liability Period.

A Lot must comply with the following:

1. the Lot must be a single batch or area of like work which has been constructed under essentially uniform conditions and is essentially homogeneous with respect to material and appearance; and
2. the maximum area of the Lot is the lesser of the day’s production and 500 m2.

Discrete portions of a Lot which do not comply with Clause 9.3 must be excluded from the Lot and either treated as a separate Lot or rectified. Where the areas excluded from a Lot exceed 20% of the total lot area, the whole of the Lot is non-conforming and must rectified.

Within 5 working days of completing the testing, the Contractor must submit a report to the Principal, which at a minimum includes the following information for each Lot:

1. date, commencement time and completion time;
2. location and dimensions;
3. weather conditions (refer Clause 7.9);
4. actual application rate of each constituent material (refer Clause 7.11); and
5. test records (including records of the inspections) demonstrating compliance with Table 9.1.

# Maintenance and Repairs

The Quality Plan must include details of the proposed treatment to repair a Defect in the HFST.

From the time of completion of the HFST until the expiry of the Defect Liability Period, the Contractor must:

1. carry out any work necessary to protect and maintain the surface; and
2. repair any Defect so that the surface complies with the requirements of this Specification.

Where a Defect is repaired, the new HFST must extend to the full width of the originally treated area and the other edges of the repair must be perpendicular to the lane lines.

The Contractor is not responsible for Defects caused by:

1. settlement or failure of the existing pavement (unless the pavement was constructed by the Contractor); and
2. damage (including gouging and vehicle fire) caused by traffic incidents.

The Contractor must undertake the repair within 28 days of becoming aware of a Defect. If the Defect is likely to create a hazardous situation for road users or the Principal advises that the repair is urgent, the repair must commence within 24 hours of the Contractor becoming aware of the Defect.

The following areas are excluded from this Clause 10:

1. all service pits and valve covers with a surface area < 0.03 m2; and
2. traffic detector loops.

If the Contractor has repaired defective work, the Contractor must submit a report to the Principal within one month (or such other time directed by the Principal), which at a minimum includes the following information for each Defect:

1. the date the Contractor became aware of the Defect;
2. the date the Defect was rectified;
3. the method of rectification;
4. the dimensions of the new HFST; and
5. a photographic record of the completed repair.

Annexure A: Summary of Hold Points, Witness Points and Records

The following is a summary of the Witness Points / Hold Points that apply to this Specification and the Records that the Contractor must submit to the Principal to demonstrate compliance with this Specification.

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| --- | --- | --- | --- |
| **Clause** | **Hold Point** | **Witness Point** | **Record** |
| 4.1 | Commencement of the application of HFST |  | Quality Plan |
| 7.5 | Application of HFST |  | Record of Site inspection |
| 7.7 |  | 1. Application of HFST |  |
| 9.5 |  |  | Report for each Lot |
| 10.8 |  |  | Report of Defect repairs |

Amendment Record

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| --- | --- | --- | --- |
| Amendment no. | Clauses amended | Action | Date |
| - | New specification | New | November 2023 |
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| --- | --- |
| **Key** |  |
| Format | Change in format |
| Substitution | Old clause removed and replaced with new clause |
| New | Insertion of new clause |
| Removed | Old clauses removed |