

## INSTALLATION GUIDE

# TENSAR HX-AE™ Asphalt Interlayer

### Scope

This Installation Guideline provides a step-by-step guide to Contractors installing Tensar HX-AE™ asphalt interlayer supplied by Tensar International or any of its appointed distributors.

Tensar HX-AE is a composite asphalt interlayer product providing the combined functions of reinforcement, stress relief, and moisture barrier.

The product is composed of a polypropylene monolithic structural paving geogrid, factory bonded to a polypropylene paving fabric. The paving geogrid structure consists of non-continuous ribs forming three aperture geometries (hexagon, trapezoid and triangle) and an unimpeded suspended hexagon that is orientated in three directions such that the resulting ribs have a high degree of molecular orientation which continues through the area of the integral node and a rectangular cross section. The grid controls strains in the overlay by an optimal interlock with the asphalt mix due to the high-profile ribs, thus providing a structural reinforcing effect, which is more similar to stabilization mechanism. The fabric aids installation and provides, together with the bitumen absorbed from the bond coat, a stress relief effect and interlayer barrier against ingress of moisture and oxygen. The product functions (reinforcement, stress relief, and interlayer barrier) are in accordance with EN 15381.

The user should evaluate the suitability of the product for any specific project prior to installation. These general guidelines should be closely followed unless there is a conflict with the contract documents. In such cases clarification should be sought from the Engineer.

### Storage and transport

The rolls will be delivered to site wrapped in a polypropylene film. They must be transported carefully and stored in dry clean environment on even surfaces so that deformation of the rolls is avoided. The rolls should remain wrapped until use to protect the product from sunlight and water-ingress.

### Preparation of the substrate surface

- Bound substrates of asphalt and concrete are suitable for the installation.
- Potholes, joints, cracks or voids must be filled beforehand with a suitable material.
- The surface must be even to ensure a continuous contact between and the substrate.
- Finely milled substrates with a maximum rill depth  $\leq 10\text{mm}$  (see Figure 1) are acceptable for the installation of the product.
- The surface must be dry, clean, free of dust and debris, and be in accordance with the basic requirements for conventional asphalt paving.
- Uneven or coarsely milled surfaces must first be regulated or profiled with a suitable asphalt mix; the asphalt mix used for the regulating layer should be sufficiently dense to avoid absorption of the bond coat.
- The regulating layer or asphalt base course (if newly laid) onto which the bond coat is applied must have been allowed to cool to ambient temperature.

### Filling cracks and voids

- All cracks & voids must be cleaned thoroughly, and all dust and debris removed using a compressed air blower.
- The bond coat/asphalt emulsion should be sprayed manually in the cracks/voids area.
- Wait approx. 10-15 minutes for the water content to evaporate before filling potholes, joints, cracks or voids 5-10mm with fine asphalt mix or an appropriate sealant.
- The cracks should be filled with fine asphalt mix or a sealant.
- The surface should be levelled, and any excess material must be removed to avoid localized uneven surface, e.g. local heaves



Figure 1: Finely milled substrate

## Bond coat application

- The bond coat (referred to in EN 13808 as the tack-coat) can either be hot-applied bitumen or a bitumen emulsion; cut-back bitumen products (i.e. bitumen mixed with a volatile liquid, e.g. kerosene) should be avoided and are not recommended for the installation of Tensar HX-AE. For hot-applied bitumen, the penetration grade can vary from 160/220 for moderate climates (e.g. UK) to suitable lower penetration grades (harder bitumens) in hotter climates. The minimum air temperature at the time of applying the hot bitumen should be +5°C. Variances depending on site conditions should be agreed upon by the engineer and the installer of the product.
- For bitumen emulsions, these should be suitable for surface dressing (treatments) and provide a bitumen solids content of ≥69% (e.g. C 69 B3 according EN 13808). The most recommended one is polymer modified (PM) bitumen emulsion, e.g. C69 BP3 according EN 13808. However this type of bitumen emulsion must be used mandatory wherever HX-AE is being installed in conjunction with PMB asphalt layers. The minimum air temperature at the time of applying the bitumen emulsion should be +10°C. Variances depending on site conditions should be agreed upon by the engineer and the installer of the product.
- The bond coat bitumen or emulsion proposed for the interlayer should first be approved by the Engineer.
- The bond coat should be sprayed mechanically onto the surface at a uniform rate. Small or localized areas can be sprayed by hand.
- Spray rates:
  - ≥1.1 kg/m<sup>2</sup> in case of hot bitumen;
  - In the case of bitumen emulsion, sufficient to deliver for 1.2÷1.5 kg/m<sup>2</sup> of residual bitumen.

The quantity should be measured, controlled, and recorded. It may vary and needs to be adjusted according to surface conditions (for example, porous surfaces require more bitumen). As a visual help on site to indicate that the spray rate may be correct:

- the bitumen film should provide a reflective mirror effect (see Figure 3).
- the bitumen should leave "black prints" in the Tensar HX-AE fabric when installed (see Figure 2).

Note that these indicators do not replace the need for correctly calibrated spraying equipment and experienced staff on site ensuring the appropriate spray rate.

- For overlaps, where allowed, spray bond coat on top of the previously installed layer, slightly wider than the overlap width; avoid oversaturation (see Figure 2).



Figure 2: Black prints in the overlap after installations



Figure 3: HX-AE Close up

## Installation of the Tensar HX-AE asphalt interlayer

### Installation equipment and tools

The following tools are required to install HX-AE:

- A properly calibrated bond coat sprayer to ensure the correct and uniform spray rate.
- A hand or disk saw to cut rolls to width (if necessary).
- Nail gun(s) with adequate nails ( $d \geq 4\text{mm}$ ) with head plate ( $d \geq 30\text{ mm}$ ) of a length determined by the substrate that is sufficient to hold the product in place at the beginning and the end of the roll and where else necessary.
- Face shield to prevent from splashing bitumen emulsion.
- Snips or shears for product cutting.

**Mechanical installation:**

The preferred method of installation is with a purpose-built interlayer installation machine (see Figure 4).



*Figure 4: Mechanical Installation*

**Semi-mechanical installation:**

Whilst the installation with a purpose-built interlayer installation machine is the preferred method of installation, a semi-mechanical installation is also possible (see Figure 5).



*Figure 5: Semi-mechanical Installation*

**Manual installation:**

Manual installation is possible by rolling out the interlayer product immediately following the bond coat application. This can be greatly aided using 'Z' shaped handles inserted into the roll ends. (see Figure 5).

For longer lengths the manual process can be aided by connecting the roll to the bond coat spray truck using chains connected to a steel bar passed through the roll core (see Figure 6) with 'Z' shaped handles to control orientation.



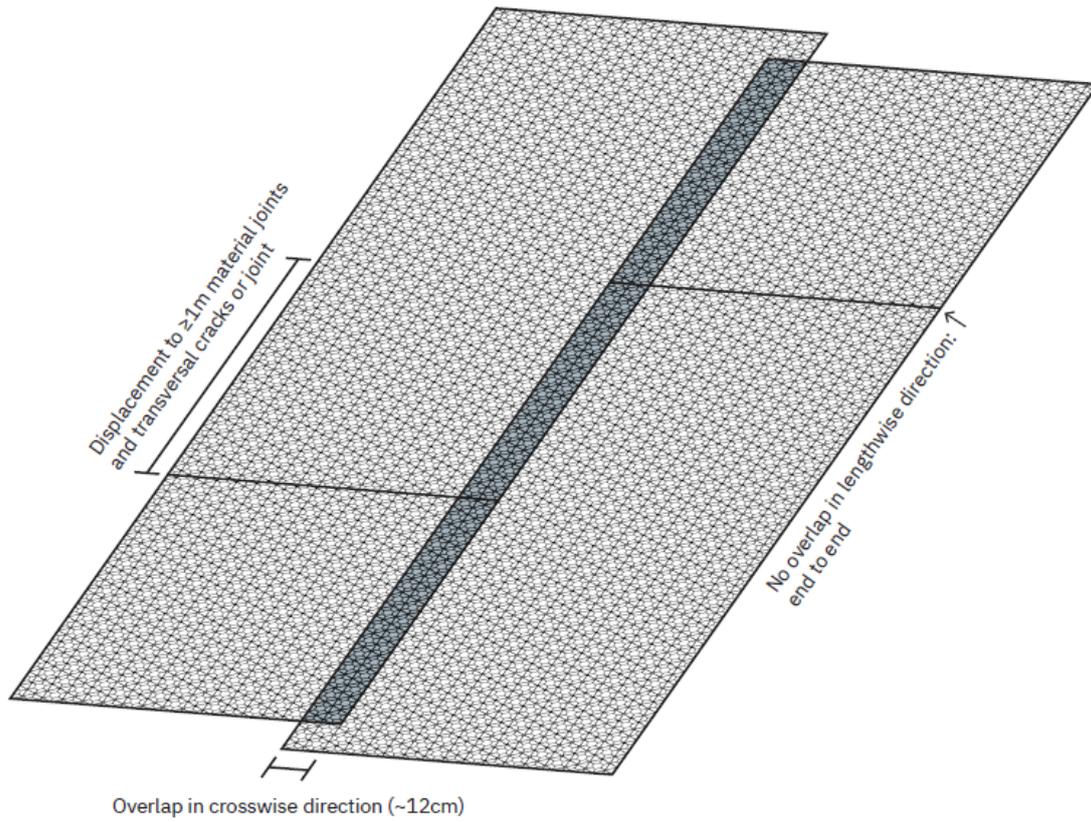
*Figure 6: Manual installation with chains and 'Z' bars*

## Installation procedure

- The installation should be carried out by trained and experienced staff.
- Installation should be performed in dry weather conditions.
- Installation can be performed by interlayer installation machine, semi-mechanically or manually.
- The product needs to be laid into the freshly sprayed bond coat.
- Due to the risk of getting water into the pavement through the not fully overlaid product, HXA-E Gecomposite should not be placed at the edges of the road. It's recommended to allow a gap of between 5 and max 15cm between the outer pavement edge and the product edge, wherever possible.
- A firm and wrinkle free contact between the product and the surface should be achieved by applying pressure with a broom, or suitable alternative. This process must immediately follow the installation of a product. In case of wrinkles, these must be cut and stuck down with bond coat.
- To obtain the better adhesion between product and the substrate, a few passes of Pneumatic Tyre Roller (PTR) on the fully installed product is also recommended (Figure 7). PTR should pass over the product when the curing process of bitumen emulsion is in progress, so after waiting for sufficient time for an increase in viscosity. It is not effective when using PTR in the very first phase of breaking process of bitumen emulsion (as there is too much water in the emulsion), and in the very last phase either (bitumen emulsion completely broken and cured).
- In most cases, no overlap in crosswise direction is required. Where rolls are laid side by side, a simple butt joint is required. It is important to avoid locating butt joints directly over existing cracks or joints in the substrate or in wheel/track lanes of the paving machine. Where a lap is specified in the Contract Documents, adjacent rolls should overlap 1.5 grid apertures (about 120 mm) (see Figure 8).
- Rolls are laid end to end, in lengthwise direction without an overlap. Joints should be staggered with a displacement of  $\geq 1\text{m}$  in adjacent roll lengths (see Figure 8). Avoid joints coinciding with transverse cracks. Roll ends need to be fixed with nails at a maximum spacing of 300mm according to the condition of the substrate.
- In curves, the product should be installed in short straight lengths to suit the curvature, ensuring that the product is overlapped correctly in some cases.
- For the rehabilitation of discrete or single cracks, or joints, the product should be installed with a minimum width of 1m centered over the crack or joint, however 2.0m wide roll is much more recommended in such cases.
- Traffic on the installed product should be restricted and limited to construction traffic necessary for the asphalt paving process.
- If necessary, e.g. in hot climates or where excessive construction traffic is anticipated before overlaying with asphalt, a protective stone chipping can be applied. Chipping should be evenly distributed over the installed product at a rate up to  $1.5\text{ kg/m}^2$ . The chipping should be dust-free and consist of solid, hard stones with a size of 5-8 mm. Loose chippings should be removed before the overlay.



Figure 7: PTR compaction process conducted after product installation and brushing processes



*Figure 8 Overlap detail*

*(only use when specified in the Contract Documents – otherwise a butt joint is used)*

## Asphalt Paving

- Low-temperature asphalt mixes and mastic asphalts cannot be placed directly over Tensar HX-AE interlayer.
- If an emulsion bond coat is used paving should not commence until the bond coat is fully cured.
- If it rains on the installed product, paving operations must stop until the surface is dry again. Where construction delays are not permitted, weather conditions must be taken into account before work commences.
- The compacted thickness of the first 'course' of asphalt placed directly over the product must be a minimum of 60mm.
- Operators of construction vehicles should avoid sudden braking, or acceleration, or turning the tires while stationary. Drivers of asphalt delivery trucks being pushed by the paver, must avoid full braking.
- Avoid locating paving joints over the product overlaps.
- Any damaged product must be cut out and replaced, with sufficient overlaps before paving.
- To ensure the integrity of the overlaps, if needed, at the start of paving, or over repaired areas, loose asphalt mix can be broadcast on the surface immediately before paving.

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