

Installation Guideline for TensarTech® GreenSlope™ Earth Retaining Systems

This Installation Guideline provides a step-by-step guide intended for use by Contractors planning to construct TensarTech® GreenSlope™ earth retaining systems.

Where applicable, the Contractor shall ensure that the installation fully complies with CDM Regulations 2015 and should refer to the Designer's Risk Assessment and COSHH statements.

Introduction

TensarTech GreenSlope System has been developed to provide Engineers, Architects and Builders with an attractive and economical earth retaining solution. The system, comprising proprietary steel facing units and Tensar uniaxial geogrid reinforcement, is one of a range of earth retaining systems available from Tensar International in the UK.



Figure 1 Fully vegetated TensarTech GreenSlope

Construction Sequence

1. The Steel Facing Units are delivered to site bundled together and tied using steel tying wire, together with brace bars (3 per unit) and anchor pins. They may be stored outside. The units have a sloping upright face and a horizontal base
2. The primary Tensar geogrid reinforcement is delivered in either 75m or 50m long x 1.3m wide rolls and may be stored outside
3. Tensar bodkins are delivered in cardboard boxes of 40No. These may be stored outside but may benefit from being stored undercover to prevent water damage to the cardboard box.
4. Prepare the formation to line and level in accordance with the contract documents.
5. The structure must be constructed in accordance with the contract drawings using the required number of Tensar geogrid layers, of the correct grade, at the specified vertical spacing and length.
6. Cut the lengths of Tensar geogrid from a roll of the required grade, as indicated by the design drawings.
7. For the first layer of Tensar geogrid. Place the cut lengths of Tensar geogrid on the formation with the leading edge at the front edge of the structure. Ensure that the Tensar geogrid is orientated in the correct direction with the thick transverse ribs parallel to the facing. Adjacent lengths of Tensar geogrid need only be butt-jointed side to side, there is no necessity for an overlap.
8. Position the facing units along the line of the structure, overlapping side to side by 100mm. Connect adjacent units using steel tying wire fix.
9. Drive two anchor pins into the ground behind the longitudinal bars on the base of the facing unit. This will ensure no movement of the steel facing unit when the geogrid is lightly tensioned using the tensioning beam[1].
10. Using the appropriate Tensar polymer bodkin, connect the Tensar geogrid reinforcement to the horizontal base of the steel facing unit, at the first aperture away from the face. This is done by pulling the longitudinal geogrid ribs up through the base bars of the steel mesh and sliding the bodkin into the space between.

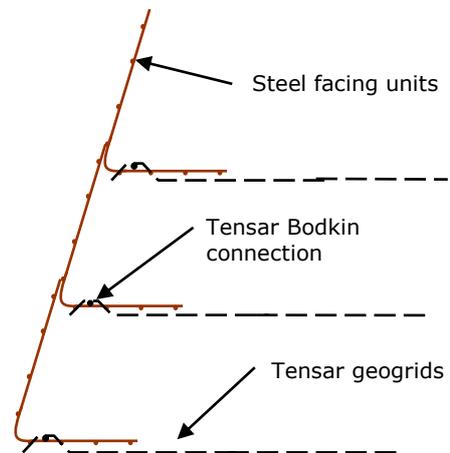


Figure 2 Typical section

11. To tighten the bodkin joint, insert the tensioning beam[1] through the apertures at the free end of the Tensar geogrid and apply a load sufficient to remove any slack in the bodkin joint. Leverage on a steel bar dug into the fill through the loop on the beam is usually sufficient.
12. Whilst maintaining tension, place a layer of fill on the Tensar geogrid which is sufficient to restrain it in position when the load is released or alternatively retain the tension by driving 2 steel pins through the last row of apertures at the rear end of the geogrid.
13. Cut and place the biodegradable face liner mat or geotextile/net supplied inside the face, fixing it temporarily to the steel mesh with cable ties or tying wire. The face liner should fold back horizontally over the panel base by a minimum of 100mm. Care should be taken at this stage if using the biodegradable mat to avoid exposing it to naked flame or spark, as it may be readily flammable until it has had the opportunity to absorb moisture. It is recommended that positive measures are taken to ensure the establishment of vegetation within 4 months of installation if the biodegradable mat liner option is chosen.
14. Fix the brace bars in position at a rate of 3 per facing unit (Figures 3 and 4). They should hook around a steel bar junction in the uppermost horizontal bar of the face and a junction point at the rear-most horizontal bar of the base.
15. Where a vegetated face is specified, place horticultural topsoil in accordance with BS3882, behind the face liner at lift heights compatible with the compacted structural fill layers. This is continued up to the level of the next layer of Tensar geogrid in tandem with the structural fill material, to a typical width in cross section not exceeding 150mm.
 - * If the Landscape Architect requires a greater topsoil width than 150mm, they should consult Tensar International in advance who can then advise on an appropriate construction approach and facing detail.
16. The topsoil should be consolidated by light hand tamping or 'heeling-in' to avoid over compaction.
17. Fold back the face liner horizontally over the uppermost topsoil layer, before placing the next row of face panels above. Pull taught and pin.
18. Selected suitable fill material should be in full compliance with the needs of the design and have the approval of the engineer.
19. Fill should be placed by plant such as an excavator bucket or a dozer with an opening bucket, which causes the fill to cascade onto the geogrid. A minimum of 150mm thick cover of fill must be maintained between the tracks of any plant and the geogrid to avoid damage. Care should be taken during this operation to maintain the alignment of the facing units.
20. Compact the approved structural fill in accordance with the latest version of UK Manual of Contract Documents for Highway works (MCHW), Volume 1, Series 600 for Earthworks, or as specified in the contract documents. With the important restriction within 2m of the face panel to use only a vibrating plate compactor or vibrating roller with a mass per metre width less than 1300kg and a total mass less than 1000kg.
21. Care should be taken to avoid compaction of the topsoil behind the face panels.
22. Compaction should always commence nearest the facing units, working towards the free end of the Tensar geogrid.
23. If secondary geogrid reinforcement is specified, this should be cut from the roll and incorporated at the specified vertical location. The secondary geogrid should be butted-up to the steel facing unit but no bodkin connection is necessary.
24. Placement of the topsoil layer and fill material should be continued as described in steps 15 – 23 up to the level of the next layer of primary Tensar geogrid reinforcement. At this point the next course of steel facing units may be installed to stretcher bond. The construction procedure is then repeated to the required height.
25. Upon completion grass seed may be scattered, or appropriate planting take place over the finished face of the structure (Figure 7).



Figure 3 Steel brace bars fixed in position to maintain the required 70° face angle



Figure 4 TensarTech GreenSlope facing panels in place prior to backfilling

26. Where there is step-back or terrace to the next facing unit, protruding vertical bars should be bent down to the horizontal. This is to prevent the possibility snagging when operatives are climbing on or abseiling down the face for planting or maintenance purposes.
27. The Contractor must fully assess the safety risk associated with working at height and where appropriate install any necessary temporary edge protection.
28. As well as following procedures for health and safety, it is essential when handling wire products that suitable protective glasses and gloves are worn.

Notes

1 Tensar Technical Note TN/UniaxialBeam

This document was formerly published with the reference: CS_GreenSlope

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