

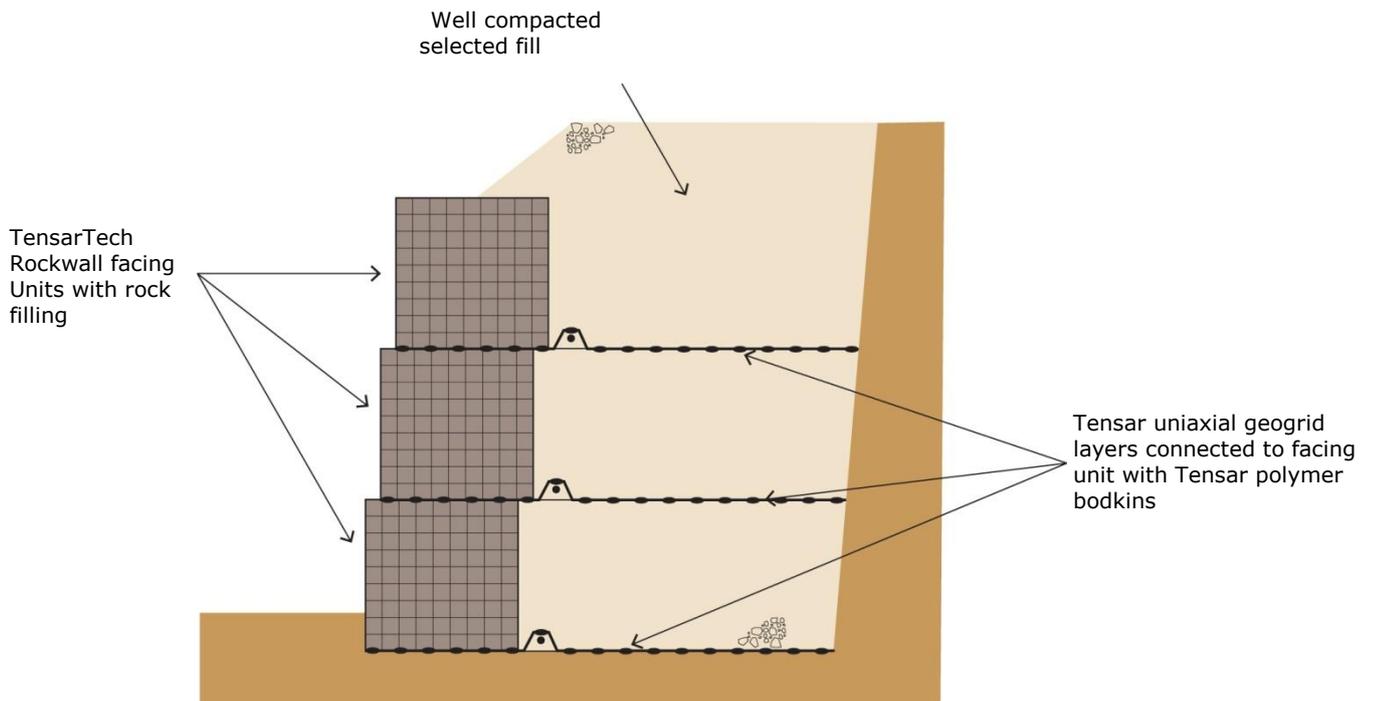
# TensarTech® RockWall™ Earth Retaining System

This Installation Guideline document provides a step-by-step guide intended for use by Contractors planning to construct a reinforced soil structure using the TensarTech® RockWall™ system

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 RockWall facing units are designed for the construction of reinforced soil walls with typical face angles in the range of 70° to 84°. Internal and overall stability of the structure is provided by the Tensar geogrid reinforced soil mass, which is positively connected to the rock filled Galfan® coated steel facing units using Tensar’s high efficiency bodkin joint.

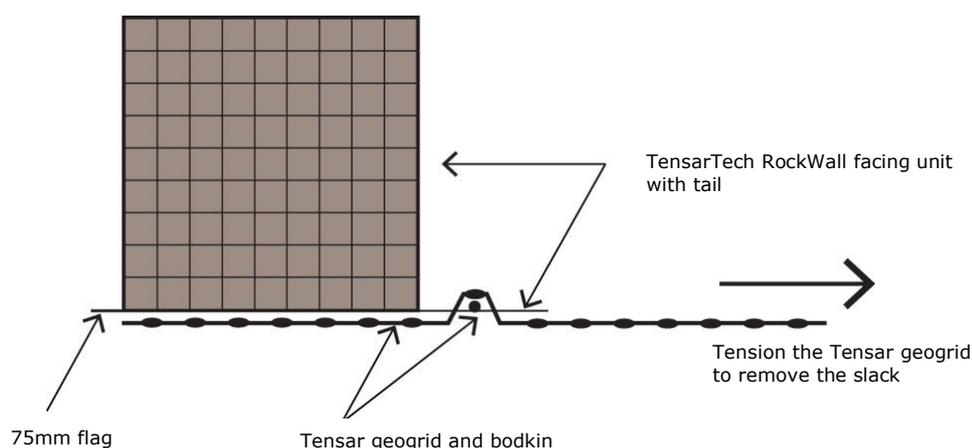


**Figure 1 Typical TensarTech® RockWall™ Section**

## Construction Sequence

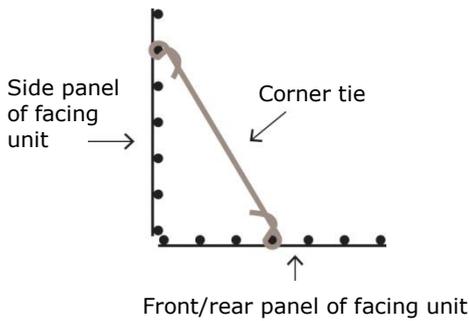
1. When handling wire or wire mesh, the cut ends may cause injury, therefore the Contractor should ensure that all operatives use the appropriate Personal Protective Equipment including: protective gloves, fluorescent jacket, eye wear and footwear.
2. Where wire mesh has been cut, any free ends should be trimmed or turned inwards so that they do not protrude outside the facing unit.
3. Guard rails should be installed where safety is an issue on unprotected embankment edges.
4. TensarTech RockWall facing units are supplied on pallets, partially assembled and flat packed, and may be stored outside.

5. Tensar uniaxial geogrid is supplied in rolls, 1.3m wide x 50m or 75m length, unwrapped and bound using coloured identifying tape. The material is UV protected and may be stored outside until use.
6. Tensar HDPE bodkins are supplied in cardboard boxes of 40No. These may be stored outside until use but may benefit from being stored undercover to prevent water damage to the cardboard box.
7. Open out the Rockwall facing unit flat and rotate front, rear, end and internal diaphragm panels vertically and make all joints by manual lacing using the tie wire provided. Refer to Notes<sup>[1]</sup> for lacing requirements.
8. Alternatively, where helical binders are specified, these should be used on all vertical joints. The top and bottom helical turn should be rotated through 90 degrees to prevent movement. All horizontal joints are to be laced as described in the Notes<sup>[1]</sup>.
9. Prepare the formation to line and level in accordance with the contract documents.
10. Cut the lengths of the required grade of Tensar geogrid from the roll as indicated by the design drawings. Place on to the formation with the leading edge at the front face of the structure. Ensure that the Tensar geogrid is orientated in the correct direction with the continuous transverse bars parallel to the wall face. Adjacent lengths of geogrid are butt jointed side by side at the face with no overlap required.
11. Place the assembled TensarTech RockWall units in position to the correct line, level and inclination as required by the design and form the joints to the adjacent units using either helical binders (where specified for vertical joints) or tie wire provided referring to the Notes<sup>[1]</sup>.
12. The same procedure is to be carried out to the rear of the unit. Ensure that the 'tail' at the base of the unit is facing backwards, away from the front face.
13. Connect the tail at the base of the facing units to the Tensar geogrid using the polymer bodkins provided. The Tensar geogrid should run all the way through to the front of the unit with the bodkin joint formed at midpoint of the tail (refer to Figure 2).

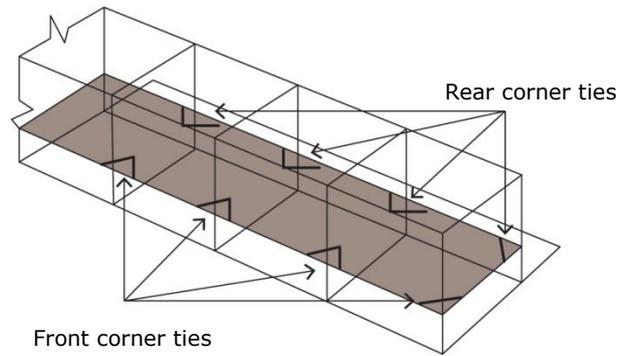


**Figure 2 – Positive connection between Tensar geogrid and facing unit using bodkin joint**

14. Where specified and supplied geotextile should be cut and fixed to the inside rear face of the facing unit. It should be turned back through 90° into the facing unit at the top, bottom and sides by a minimum of 150mm. It may be fixed in place using the wire provided or with plastic cable ties.
15. Selected rock fill for the facing unit should be hard, durable, non-frost susceptible rock, stone or clean crushed concrete as specified by design. The grading of the fill is to be 100 to 150mm or 100 to 200mm.
16. Rock fill material at the face should be hand placed to achieve a neat finish as possible and with the effect of a dry-stone wall. Working in this fashion will help to control bulging and movement at the face.
17. Fill the TensarTech RockWall unit to half-height ensuring no large voids are present. The fill should be manually distributed to ensure, as far as possible, that the fill is tightly packed to avoid later internal settlement. The internal pre-formed steel corner ties must now be installed.
18. Hook each pre-formed corner tie 3 mesh apertures in from the corner around a mesh joint intersection on the face and rear panel. Diagonally brace to the side panels 5 meshes back and rotate the free end around a mesh joint intersection, wrapping around to secure by twisting the return end over its own stem (refer to Figures 3 & 4).

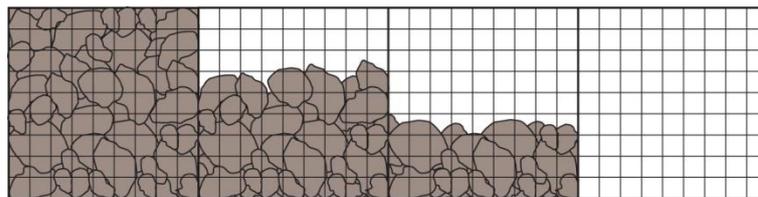


**Figure 3 – Plan view of corner tie location**



**Figure 4 – corner ties installed**

19. Ensure the corner ties have been correctly installed. Loose or over-tightened ties will allow bulging to occur when filling. Timber or scaffold tubes can be temporarily wired to the face externally to act as a formwork to prevent bulging and removed when filling is complete.
20. Repeat the filling operation to the full height of the facing unit. Ensure that the cells are filled sequentially such that the difference in fill in adjacent cells is never greater than half of the cell height.
21. If a complete run of facing units is not positioned and/or filled in one phase, then always step down the filling at the end otherwise facing unit distortion will occur. This also allows further facing units to be connected later (refer to Figure 5). At no time try to completely fill one cell at a time, unless the unit has internal bracing in both directions.

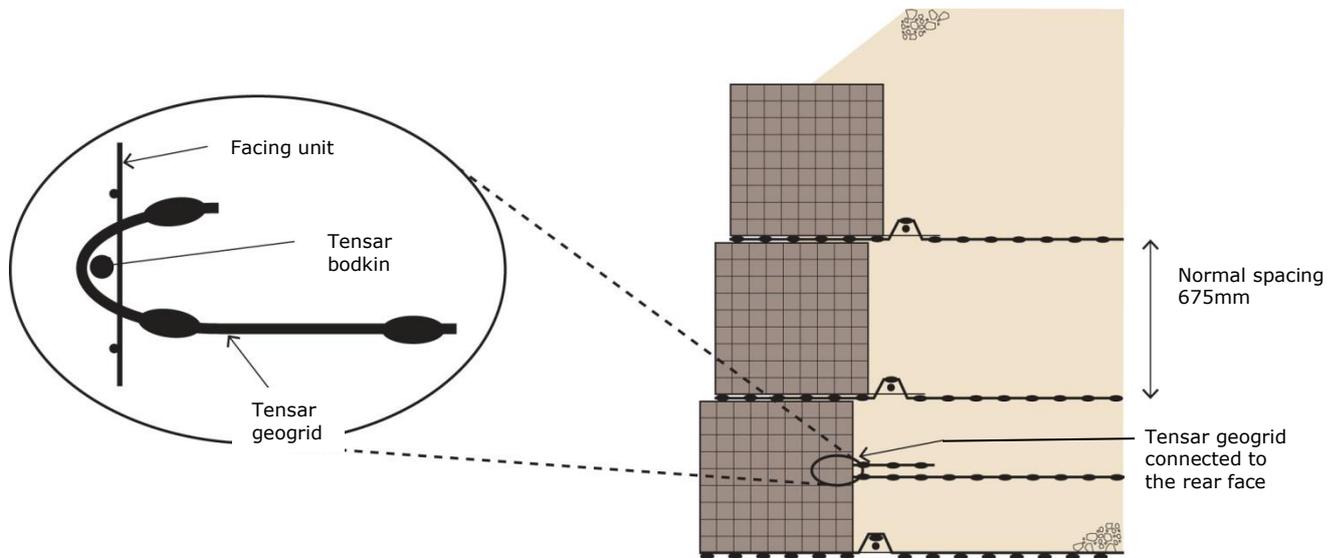


**Figure 5 – Stepping down the fill at the end to avoid distortion**

22. When filled to full height, ensure that when the lid is closed there is a tight fit onto the rock fill without the need to apply too much force so as to cause the lid panel to distort or risk breaking the welds in the lid. Use the tie wire provided to lace the lid to all side, end and diaphragm panels as per Notes<sup>[1]</sup>.
23. When the first course of facing units is filled and the lids laced down, the structural earth fill may be placed behind. Selected structural fill material should be in full compliance with the needs of the design and have the approval of the Engineer.
24. Before placing the first layer of fill the bodkin joint must be tightened. Insert the tensioning beam<sup>[2]</sup> through the apertures at the free end of the Tensar geogrid & 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.
25. Whilst maintaining tension, place a layer of fill on the Tensar geogrid, which will be sufficient to restrain it when the load is removed. Release the tension and remove the beam and compact the fill in accordance with Contract specification, up to the level of the next Tensar geogrid layer.
26. 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 Tensar geogrid. A minimum of 150mm thick cover of fill must be maintained between the tracks of any plant and the Tensar geogrid to avoid damage. Care should be taken during this operation to maintain the alignment of the facing units.
27. All construction plant, including compaction equipment with a mass exceeding 1000kg should be kept at least 2m from the face of the wall. Compaction plant within 2m of the wall should be restricted to vibrating rollers having a mass per metre width not exceeding 1300kg or plate compactors with a mass less than 1000kg.
28. Compaction should always commence nearest the facing units, working away towards the free end of the geogrid.
29. Once the structural fill has reached the top of the facing unit, the next Tensar geogrid layer and course of facing units may be placed. It is recommended that the facing units are tiered to achieve the necessary face angle. The facing units should be aligned so that the bottom edge wire of the upper unit lines up with a longitudinal wire on the mesh of the lower facing unit. Each course should be continually joined to the course below along the horizontal joints at the front of the wall using tie wire supplied. Refer to Notes<sup>[1]</sup> for lacing requirements.

Standard facing units have a 75mm flag at the base of the front which allows a constructed face angle of 84 degrees to be maintained.

30. Wherever possible the next course should be offset horizontally by a half unit width to ensure vertical joints are not coincident (stretcher bond).
31. Construction should proceed as described in steps 10 to 30.
32. In some circumstances such as in particularly high structures, additional Tensor geogrid reinforcement layers may be detailed at half or even one-third height of the facing units. In this situation the Tensor geogrid may be connected to the rear face of the TensorTech RockWall facing unit with a Tensor bodkin (refer to Figure 6). The bodkin connection should be made prior to commencement of rock filling of the face unit. After the unit has been filled, the full length of connected geogrid can be folded forward to hang over the face of the units allowing placement and compaction of the structural fill. Filling should continue up to the geogrid level. The geogrid can then be folded back and laid flat. Tighten the bodkin joint as in Item 24 and continue with the fill process.



**Figure 6 – Additional Tensor geogrid connected to rear of facing unit if specified**

## Notes

1. Lacing is to be one continuous wiring operation along all joints both vertically and horizontally using single and double twists on alternative apertures ensuring that it forms a tight joint. Start and termination of lacing is formed by three turns ensuring the free end is turned into the unit. Tie wire supplied is 2.5mm.
2. Tensor Technical Note – TN/UniaxialBeam.
3. The Contractor must fully assess the safety risk associated with working at height and where appropriate install the necessary temporary edge protection.
4. The Contractor is responsible for checking wall geometry during construction and taking all necessary actions to ensure that wall tolerance is met in accordance with Tensor recommendations.

**Please refer to Tensor International Limited if more specific advice is required.**

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