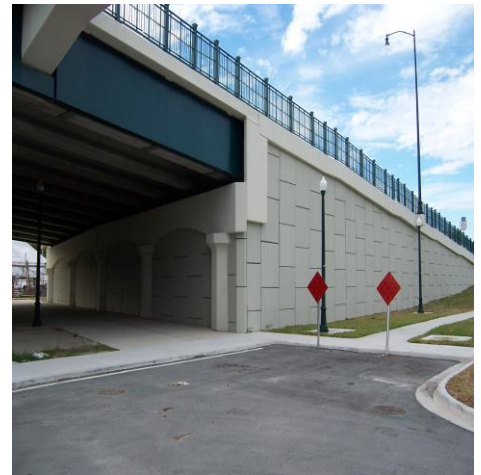


Installation Guideline for TensorTech® ARES™ Panel Wall System

Introduction

This Installation Guideline provides a step-by-step guide intended for use by Contractors planning to construct Tensor reinforced soil structures with TensorTech® ARES™ concrete incremental facing panels (herein referred to as 'panels').

Any drawings or photographs are typical only and the Contractor should satisfy himself that the techniques discussed and shown are suitable for the specific conditions they are working under. Retaining wall design and preparation of the foundation soils is outside the scope of this document. This document should be read in conjunction with the specification and drawings for each individual contract. The system, comprising of panels and Tensor geogrid reinforcement is one of a range of retaining wall options available from Tensor International Limited.



Construction Sequence

Where applicable, the Contractor shall ensure that the installation fully complies with CDM Regulations 2007 and should refer to the Designer's Risk Assessment and COSHH statements.

Foundations and Footings:

1. The level formation should be prepared in accordance with the requirements of the contract.
2. Evaluation and suitability of the bearing capacity of the foundation soils is the responsibility of the Engineer and should be commensurate with the requirements of the design brief.
3. The in-situ concrete levelling pad should be cast to the line and level required by the setting-out drawing. The levelling pad shall be allowed to cure for a minimum 24 hours prior to the erection of panels. It is recommended that a 12mm steel rebar be cast into the footing to assist with the setting out and support of the panel prior to placing the reinforced fill.
4. Temporary reaction baulks should be set into the ground ready for the props to be fixed in to place.

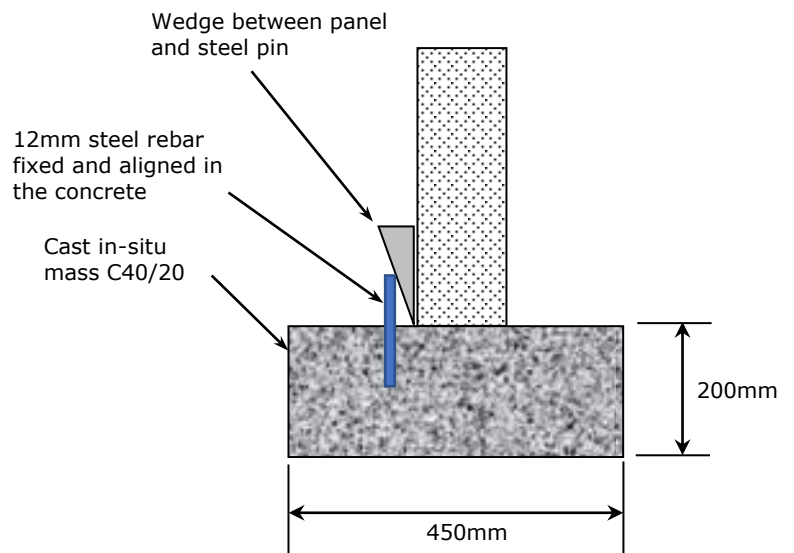


Figure 1 – Levelling pad and setting bottom panels

Transportation and Handling of Panels:

5. The TensarTech ARES panels should be transported laid flat, face downward with cast-in Tensar geogrid starter tabs (geogrid tabs) uppermost. Subsequent panels, if laid on top of each other, must be separated and supported by timber battens, with cross-sectional dimensions not less than 100mm x 100mm. Care must be taken to prevent damage to the geogrid tabs when stacking the panels. (See IG/Ares_Panel_Fabrication for information on the manufacture of panels).
6. Off-loaded panels should be inspected and any panel found to be defective, e.g. cracked or broken corners, damaged geogrid tabs, stains on exposed face, cracks in panel surface etc. should be set aside for further inspection by the Engineer to determine their suitability as to repair, incorporation into the works, or rejection.
7. Storage of panels is as suggested in Step 5. Subsequent panels may be stored on top of each other up to a maximum of 6 panels high, provided that they are separated by the timber battens and laid on a clean level surface.

Erection of Panels and Filling:

8. The ARES concrete panels may now be carefully lifted into position using the appropriate lifting equipment.
9. Install a timber wedge between the toe of the panels and the steel rebar cast-in to the footing.
10. Full height panels and half height panels should be installed alternately along the line of the in-situ footing and propped accordingly. All temporary works are the responsibility of the main contractor and should be designed and checked to the relevant guidance and standards

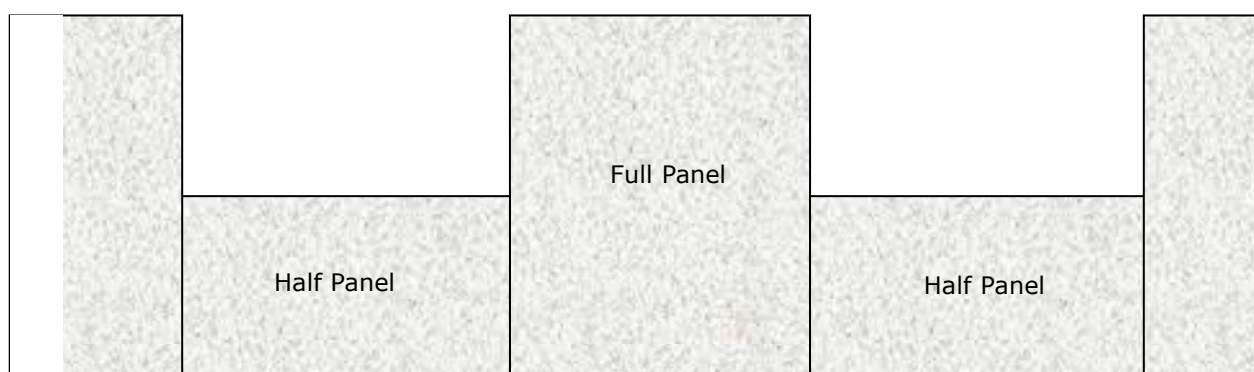


Figure 2 - Alternate full-height half-height panels to be installed

11. Care should be taken to space the panels accurately with regular 20mm gaps between.
12. The longitudinal and vertical alignment should be checked and adjusted using shims.
13. Temporary props should be positioned and connected to each full panel. They should be inclined between 450 and 600 to the horizontal ensuring that they have a solid bearing at formation level and are securely anchored to the panel face using proprietary cast in fixings or purpose made clamps.

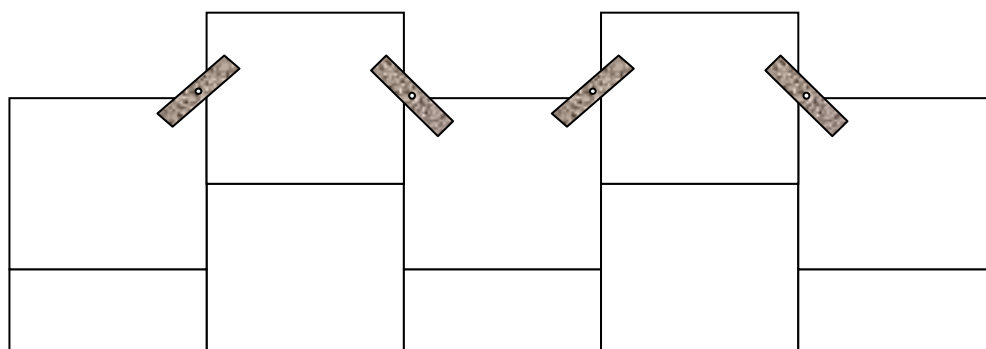


Figure 3. Diagonal bracing plates front and rear secured by tie-bar and waling plates

14. Individual panels, whether full or half height must have diagonal clamps tightened to prevent individual panel movement.

15. The ARES facing panel should be adjusted to the required batter; 1H to 150V is normally recommended.
16. To help prevent possible loss of fines through joints between panels, a geotextile strip 200mm wide should be cut from the rolls supplied. These geotextile strips are fixed across the vertical and horizontal joints at the rear of the concrete panel. Only after the geotextile is secured should commencement of the filling operation occur.
17. Place and compact the approved fill in accordance with UK Specification for Highway Works or other equivalent local specification, up to the level of the first layer of geogrid. Use a vibrating plate compactor or vibrating roller with a mass per metre width less than 1300kg and a total mass less than 1000kg within 2m of the face.
18. Cut the required grade of RE500 uniaxial geogrid from the roll to the required design length and place into position. The length (L) of geogrid to be cut is the design length (DL) read from the appropriate scheme drawing, minus the sum of panel thickness (PT) added to one aperture length (AL) from the geogrid starter tab.

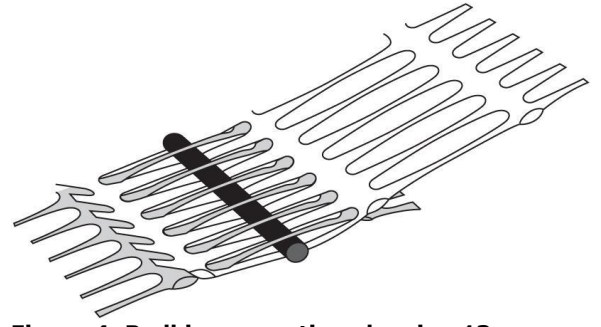


Figure 4. Bodkin connection showing 13mm round bodkin supplied

Typically, PT = 140mm and AL = 160mm.
Therefore $L = DL - (140 + 160)$

Grids should be installed to the levels, lengths and orientations as shown on the scheme drawings issued for construction. Use the HDPE bodkin (see TN/Bodkin) to connect the geogrid reinforcement to the cast-in geogrid tail as per Figure 4.

19. The first layer of grid may need to be cut longitudinally to allow for positioning of the temporary props, which will be removed at a later stage [see 25].
20. Apply a load to the free end of the grid using a tensioning beam (see TN/Uniaxial_Beam) inserted through the apertures towards the rear of the grid, until all the slack is removed from the joint.
21. Whilst maintaining tension, place a layer of fill on the grid that is sufficient to restrain it in position when the load is released.
22. Release the tension and remove the beam. Do not allow construction plant to travel on the geogrid until it is covered by at least 150mm of fill.
23. Placing and compaction of the fill should continue to the top level of the first half panel. It is essential to carefully position the rubber bearing pads into the recess on top of the panels in accordance with the construction drawing, to prevent concrete-to-concrete contact in the horizontal joints. Horizontal joints should be kept clean and free of fill material.

Removal of Push/Pull props and Diagonal Bracings:

24. Push/pull props are only to be removed from the half height panels when fill behind that half panel is level with the top of that panel.
25. Push/pull props are only to be removed from the full panels after the placing of the second course of adjacent full height panels have been diagonally clamped and the fill is at the top of the first course of full panels. Horizontal joints shall be kept free from contamination by the fill material. Diagonal bracings are only to be removed immediately prior to the placing of subsequent panels.
26. Remove the timber wedges from the footing kicker once all push/pull props have been removed.

Second and Subsequent Panel Courses:

27. Vertical alignment - horizontal alignment and vertical alignment must be checked regularly and corrected if necessary. Guidance can be sought from BS EN 14475 on alignment guidelines
28. Tolerance on horizontal alignment should not exceed 20mm when measured with a 3m straight edge on any selected wall section.
29. The overall vertical alignment tolerance from top to bottom of the wall should not exceed 13mm per 3m of wall height.

30. Erection of TensarTech ARES panels and subsequent placing of fill are the same as the first course with the exception that push/pull props are not required. Diagonal clamps should be secured, tightened and checked to ensure that alignment and batter are maintained throughout.
31. The Contractor must fully assess the safety risks, particularly those associated with working at height and where necessary install temporary edge protection.



Figure 5 – Header clamp



Figure 6 – Header clamp and brace in position on full panels



Figure 7 – Diagonal clamp



Figure 8 – Diagonal clamp used to hold the panel in place

Use of No-Fines Concrete in Confined Spaces

When directed to do so by the Engineer, the use of no-fines concrete may be appropriate in areas behind the facing panels where anchorage length for the geogrid reinforcement is limited. Areas such as acute corners or where piles supporting bridge bank-seats are located close behind the facing panels, may mean that full geogrid design length cannot be achieved, or placement and compaction of granular fill is not possible. A specification for a suitable no-fines concrete as well as details regarding its placement and compaction is available from Tensar International.

Notes

1. Tensar Technical Note – TN_UniaxialBeam
2. The Contractor is responsible for checking wall geometry during construction and taking necessary action to ensure that wall tolerance is met in accordance with Tensar recommendations.
3. Please refer to Tensar International Limited if more specific advice is required.

This document was formerly published with reference CS_ARES_Panel_Wall_System

The information in this document supersedes any and all prior Installation Guideline for the products/system designated above and is supplied by Tensar International Limited without charge. Tensar International Limited excludes to the fullest extent lawfully permitted any and all liability whatsoever for any loss or damage howsoever arising out of the use of and reliance upon this information. It is your sole responsibility and you must assume all risk and liability for the final determination as to the suitability of any Tensar International Limited product and/or design for the use and in the manner contemplated by you in connection with a particular project.

Tensar, TensarTech and **TriAx** are registered trademarks

Copyright © Tensar International Limited 2020

Tensar International Limited
Tel: **+44 (0) 1254 262431**
Fax: **+44 (0) 1254 266867**
E-mail: **sales@tensar.co.uk**
www.tensar-international.com

UK Head Office
Units 2 - 4 Cunningham Court
Shadsworth Business Park
Blackburn
BB1 2QX
United Kingdom

