GROUND GAS PROTECTION
GP® TITANBOND®
INSTALLATION GUIDANCE

JUTA | TITANTECH®

GP® TITANBOND®

Installation Guidance

GP® TITANBOND® is a pre-applied fully bonded waterproofing membrane incorporating the GP® TITANFLEX® membrane and a heavy duty virgin polypropylene geotextile. The geotextile is laminated to the membrane to provide a dual function; protecting the membrane from damage, and providing an integrated 'bond' to poured concrete, ensuring a fully bonded waterproofing barrier which has exceptionally high resistance to ground gas and VOCs.

GP® TITANBOND is used for the Gas/ waterproofing/tanking of underground structures where harmful ground gases are anticipated.

JUTA UK – radon, ground gas, vapour, air and moisture barrier characteristic properties:

- Exceptional Chemical Resistance
- High resistance to Ground Gasses
- Long Term Durability (Performance guaranteed for the lifetime of the building)
- Compatible with all building materials
- Manufactured to meet the most up to date British Standards and guidance.
- Waterproofing Barrier (TYPE A – BS8102:2009)
- Gas Barrier (Radon, Methane, Carbon Dioxide - BS8485:2015)
- Hydrocarbon (Liquid and Vapour phase) and VOC barrier (C748)

Width	2 m
Length	50 m
Coverage	100 m^2 / roll
Weight	50 kg

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GP® TITANTECH® family of membranes are high performance, hydrocarbon barriers, manufactured from a unique HDPE resin. The primary membrane has excellent chemical resistance and is ideal for use on sites affected by hydrocarbon and VOC contamination. It will also effectively prevent the ingress of a number of other harmful gases, including radon, methane and carbon dioxide. Available in three primary forms:

- **GP® TITANFLEX®** - Loose Laid Membrane
- **GP® TITANBOND®** - Pre-applied fully bonded waterproofing membrane
- **GP® TITANTANK®** -Post-applied tanking membrane

NOTE - Installation guidance is provided for information only, and should be read in conjunction with standard details. Site specific detailing and installation methodology should be considered on a case by case basis.

Additional Products & Accessories:

- **GP® TITAN TAPE** is a 100mm wide double sided pressure sensitive high tack tape for GP® TITANTECH® roll edge sealing.
- **GP® TITAN OVERTAPE** is a 100mm adhesive fleece backed tape designed for sealing over joints of GP® Titanbond®.
- **GP® TITAN PRE-FABRICATED TOP HATS AND CORNER UNITS** is available in a range of sizes, but standard sizes are 110mm ID Top hat with 150mm wide skirt, 500mm x 500mm x 500mm internal and external corners.
- **GP® LIQUID GAS BARRIER** is a styrene butadiene latex based liquid applied membrane with gas resistant additives for use on pile head detailing and penetrations to enable a continuous barrier.
- **GP® DPC** is a ground gas and VOC resistant DPC for use with the GP® TITANTECH® system at Damp Proof Course level to facilitate a continuous barrier across the cavity.
- **GP® SEALANT** is xpansion joint sealant and adhesive used to seal/ secure GP® TITANTECH® membranes to pile heads and pile caps.
- **GP® VOID VENT** is a gas venting geocomposite and ground level/raised vent boxes.
- **PD1700** is a 1m wide drainage protector (PD1700) for use externally to provide protection to the membrane and provide a preferential drainage pathway (normally to a suitable land drain) to alleviate pore water pressure on the structure.
- **HYDROLOCK PASTE** is a water resistant bentonite grout, for use around penetrations and perforations in the GP® TITANTECH® system.
- **HYDROLOCK STRIP** is a5mm x 20mm x 5000mm hydrophilic water bar, for use in concrete construction joints to restrict the passage of water.
- **GP® PILE HEAD COLLAR** is a preformed pile head collar used to seal to concrete pile head and GP® TITANTECH® systems.
- **300 TT PROTECTION FLEECE** is a 1.9m and 2m wide protection geotextiles for use with GP® TITANTECH® system. PF2000 of PF3 can be specified dependant on the anticipated traffic and loading conditions.
- **(PHS) PILE HEAD SEALER** is a crystalline cementitious waterproof slurry to create a monolithic bond to structure and seal the pile head to form a waterproof coating.

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General Precautions:

- It is recommended that JUTA Gas Barrier systems are installed in ambient air temperatures in excess of 5ºC.
- Ingress of water into the installation area should be prohibited.
- In all cases, the surface onto which the barrier is to be laid should be smooth, dry, clean and free from debris or detritus material which may cause damage to the Barrier.
- In all cases it is recommended the installation of barrier geomembranes is completed by a suitably qualified and accredited installer (NVQ level 2/TWI/CSWIP or equivalent). JUTA UK can offer advice as to suitable/recommended installers.
- Appropriate PPE should be worn at all times during handling, placement and fixing of the Barrier.
- Vehicular traffic directly on top of the Barrier should be avoided.
- Foot traffic directly on top of the Barrier should be restricted.
- Where either Vehicular or Foot traffic is unavoidable, protective measures should be utilised to prevent damage to the Barrier. (Use of protection fleece and/or protection boards)
- GP® Membrane should not be left exposed for prolonged periods and should be covered as soon as practically possible, and within 1 month of installation. Where extended periods of exposure to UV are anticipated, protection measures should by employed to reduce exposure of the GP® membranes.
- Smoking, and naked flames are strictly prohibited.

Preparation:

- Prior to laying the GP® membrane ascertain that any sub floor gas venting or ventilation components are in their respective and appropriate positions. Individual components should be secured to avoid potential disruption or undue movement during the installation process.
- Where geo-composite void formers or graded stone venting layers are being deployed, sand, granite dust, etc., requires to be isolated to prevent fines from infiltrating ventilation voids. An appropriate separation layer / geotextile should be installed to prevent such occurrences.
- Masonry and other substructure elements within the membrane footprint should be checked for sharps and rough surfaces that may cause unintentional damage to overlying membrane(s).
- Warning signs should be displayed to discourage unwarranted foot traffic.
- All unnecessary vehicular access should be denied.

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Substrate Preparation:

Substrates for installation of the GP® membrane systems need to have sufficient stability to avoid movement during the installation and subsequent construction works. The substrate preparation should include the following:

- A clean, dry, uniform, smooth surface free from debris and detritus, ponding water (damp or slightly wet is acceptable), oil and grease.
- Open Voids (> 12mm depth or width) must be filled before the installation of the membrane system.
- Where the substrate contains changes in elevation of >12mm, or particle protrusions from the substrate exceed 12mm, a protection fleece should be utilised to protect the membrane from damage from the substrate.
- Generally a sand blinding with a minimum thickness of 30mm, or a 300TT protection fleece would provide a suitable laying surface in lieu of concrete blinding.

We would encourage the use of a subgrade acceptance form prior to installation of the GP® membranes. Any issues of concern with the suitability of the subgrade can be highlighted and addressed prior to laying of the membrane.

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General installation procedure GP® TITANBOND® :

- Installation works should begin at the perimeter detail (edges/ corners), followed by the floor (horizontal) and then the wall (vertical) application.
- Installation works should only begin on a suitably prepared subgrade/subsurface. Note – defects in the membrane are most commonly caused by subgrade/subsurface penetrations owing to insufficient surface preparation.
- Install the GP® TITANBOND® pre-fabricated internal and external corner units to all corners; then install the GP® TITANBOND® EDGE STRIP to the perimeter edges and connections on the walls and upstands, and joint the corner units to the edge strip. **See Internal (appendix A) and External (appendix B) 3D Corner Details at end of document for further information**.
- Lay out the GP® TITANBOND® membrane sheets in the floor area, overlapping to cover the 100mm selvedge on all rolls (horizontal) and joint the sheets together with either GP® TITAN TAPE (roll edge) or GP® TITAN EXT TAPE (roll end) or with welded joints. **See Overlapping Details (appendix C) at the end of the document**.
- Form all of the necessary details to the floor area (horizontal), such as pipe penetrations, connections, sumps or lift pits, pile caps, expansion joints and any others that are required using the appropriate accessory items. **See Standard Pipe Penetration Details (appendix D) at end of document**.
- Hang the GP® TITANBOND® membrane sheets to the wall area (vertical) overlapping to cover the 100mm selvedge on all rolls and joint the sheets together with either GP® TITAN TAPE (roll edge) or GP® TITAN EXT TAPE (roll end) or with welded joints as required. Note – fixing for vertical application should be restricted above the top of the formwork or to the selvedge. Mechanical fixing should never occur through the geotextile covered area of the GP® TITANBOND®.
- Form all of the necessary details to the wall area (vertical), such as pipe penetrations, connections, sumps or lift pits, pile caps, expansion joints and any others that are required using the appropriate accessory items.
- For applications with a Ground Gas protection requirement, periodic validation and inspection of the install should occur in accordance with C735. For waterproofing applications only – upon completion of the install, check all joints, seams and sheet area for signs of damage/ defect/tears and repair as necessary.
- If using a double formwork, and the GP® TITANBOND® is to be backfilled against on the outside – ensure protection is in place before backfilling.

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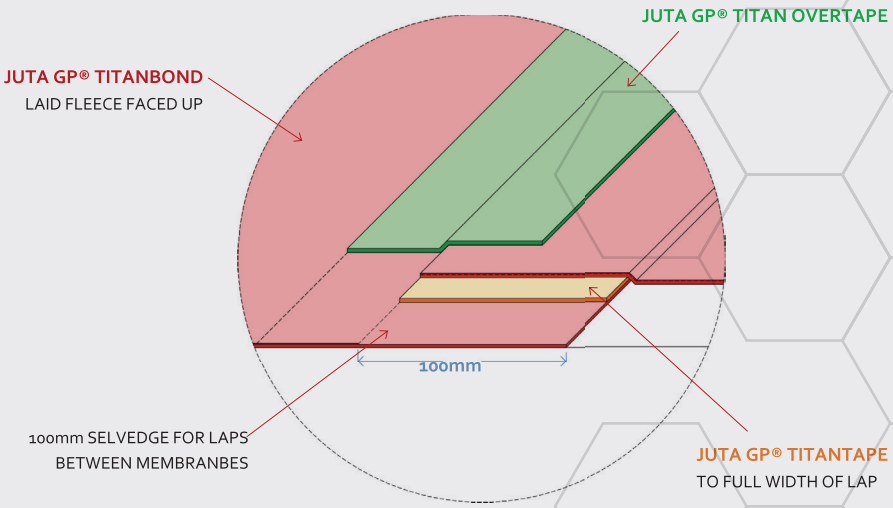
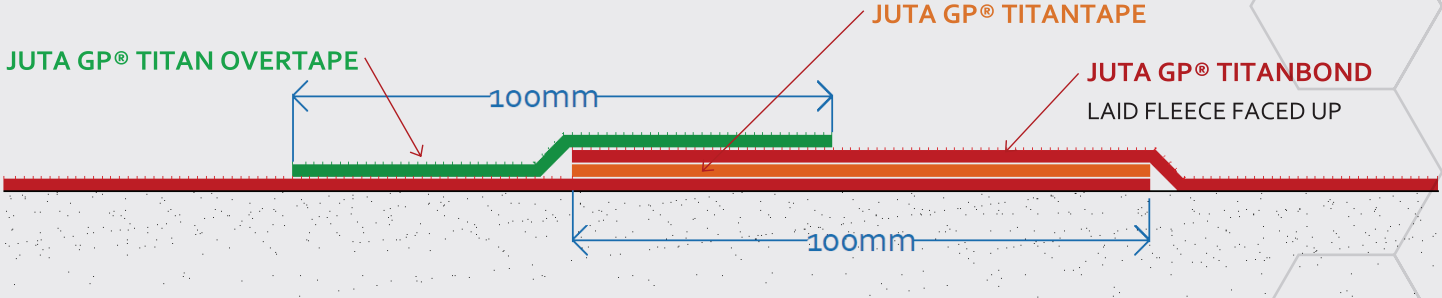
Jointing and Sealing using Tapes:

Where design service life does not exceed 25 years:

- A 100mm overlap selvedge is provided on all rolls of GP® TITANBOND®, and GP® TITANBOND® EDGE STRIP.
- GP® TITAN TAPE (100mm wide) should be utilised for all taped GP® TITANBOND® overlap joints where welding is not required
- To joint using tapes, ensure the first panel of Barrier is laid, and the surface of the selvedge is clean, dry, and free from dust. Begin by peeling one side of the protective coating from the tape, applying the tape along the outside edge of the selvedge; such that the tape is applied across the full width of the selvedge.
- Unroll the second layer of Barrier ensuring a full selvedge overlap, slowly removing the upper layer of protective film from the Tape, and pressing firmly on the taped joint with a silicone roller to remove trapped air. (Note – taped joints have the highest failure rate when tested in accordance with C735 to ASTM D4437-08:2013 – therefore it is imperative that pressure sealing with silicone roller is implemented).
- GP® TITAN OVERTAPE® should be applied over the leading edhe pf the lap joint with the fleece backing faced up ready for concrete pour over.





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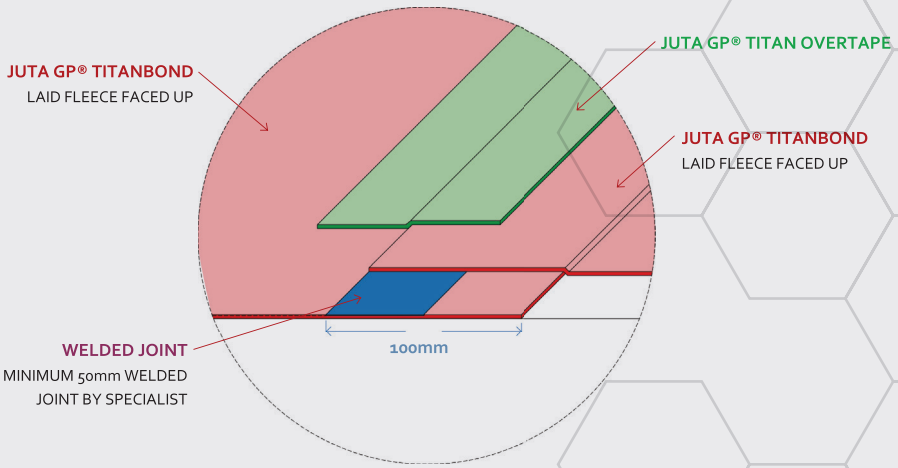
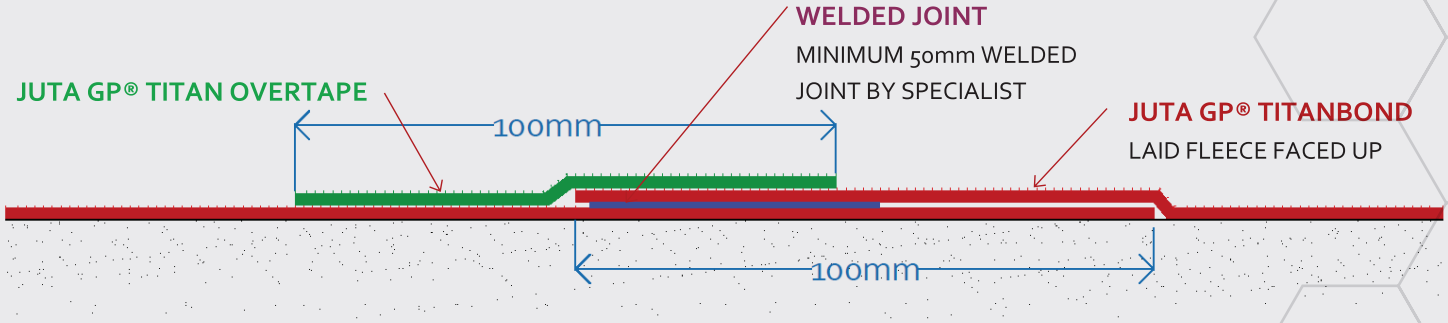
Jointing and Sealing using welding:

Where design service life is required to exceed 60 years:

- For applications with elevated VOC/ Hydrocarbon concentrations, welded joints are necessary to provide an effective seal.
- For applications with elevated Methane and Carbon Dioxide concentrations, welded joints are recommend-ed to provide the most effective seal.
- For applications as a waterproofing and Radon barrier only, welded joints are recommended to provide the most effective seal; taped joints are acceptable.
- Before welding work is carried out trials must be completed to determine the operating window for the welding equipment and materials. It is noted that ambient air temperature, power supply and the condition of welding equipment can affect the working window.
- Welding window for JUTA GP® TITANTECH gas barriers is 180-240 oC at a suggested rate of 1.5mm/min on low air flow.
- JUTA UK recommends that any heat welding is carried out by a Construction Skills NVQ Level 2 quali-fied installer (or equivalent).
- JUTA UK recommends that any heat welding is carried out by a Construction Skills NVQ Level 2 quali-fied installer (or equivalent).
- A minimum welded overlap joint of 50mm wide should be achieved – it should be noted that the suitability of the welded joint is defined by the joint integrity, as tested in accordance with C735 (most commonly air lance – ASTM D4437-08:2013), if a welded joint passes integrity testing, it would be deemed acceptable.





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Repairing Punctures:

Should tears, or punctures occur in the membrane, these can be patched using a piece of GP® TITAN EXT TAPE sized to overlap at least 100mm beyond the extent of the puncture/ tear, the patch being applied with firm pressure from a silicone roller. Preferably, repairs should be completed with a heat welded patch of membrane (100mm oversized – membrane to membrane contact) to provide an optimal seal.

Pile Head/Rebar Penetrations:

Sealing around pile heads and concrete reinforcement is achieved by application of GP® LIQUID BARRIER and preformed GP® Pile Head Collars. Apply the GP® LIQUID BARRIER sealant thoroughly to the penetration areas, to achieve a coated thickness of at least 1.00mm (two coats). In certain cases a coating of Pile Head Sealer (PHS) may be required to provide a monolithic bond to the concrete pile. See **Standard Pipe Penetration Details (appendix E)** at end of document. ®

Standard Details

Standard installation details are available from JUTA UK directly. Be advised that standard details are not always relevant or applicable to bespoke site specific conditions. We would recommend consulting with JUTA UK, or an appropriately qualified installer with regards to site specific detailing.

- **Appendix A** - 3D Internal Corner Detailing
- **Appendix B** - 3D External Corner Detailing
- **Appendix C** - Plan View and Roll End Lapping Details
- **Appendix D** - Standard Pipe Penetration Detail
- **Appendix E** - Standard Pile Head Sealing Details

Additional Information:

For additional information or assistance, please contact JUTA UK directly.

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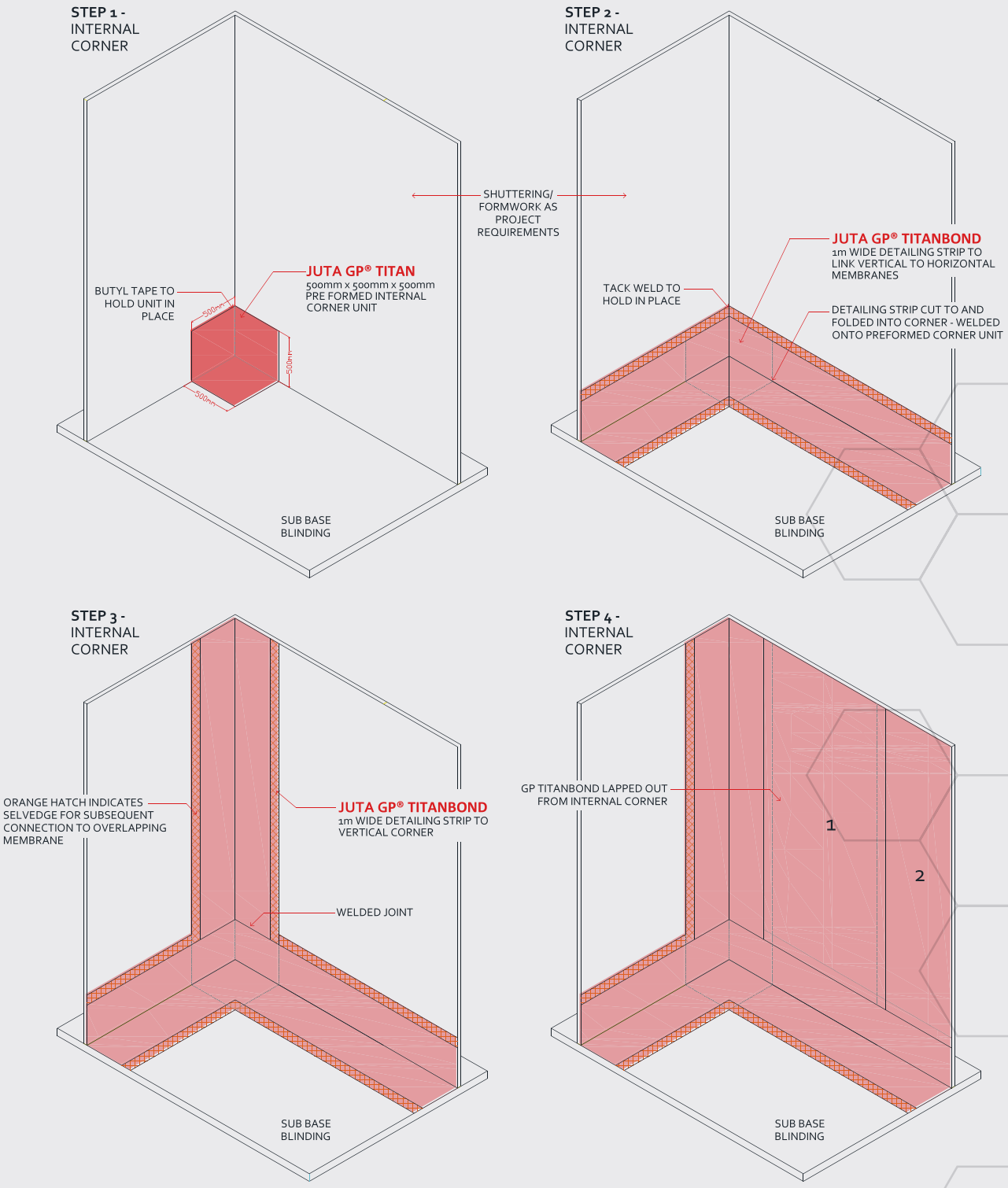
Appendix A

GP® Titanbond® Internal Corner Configuration



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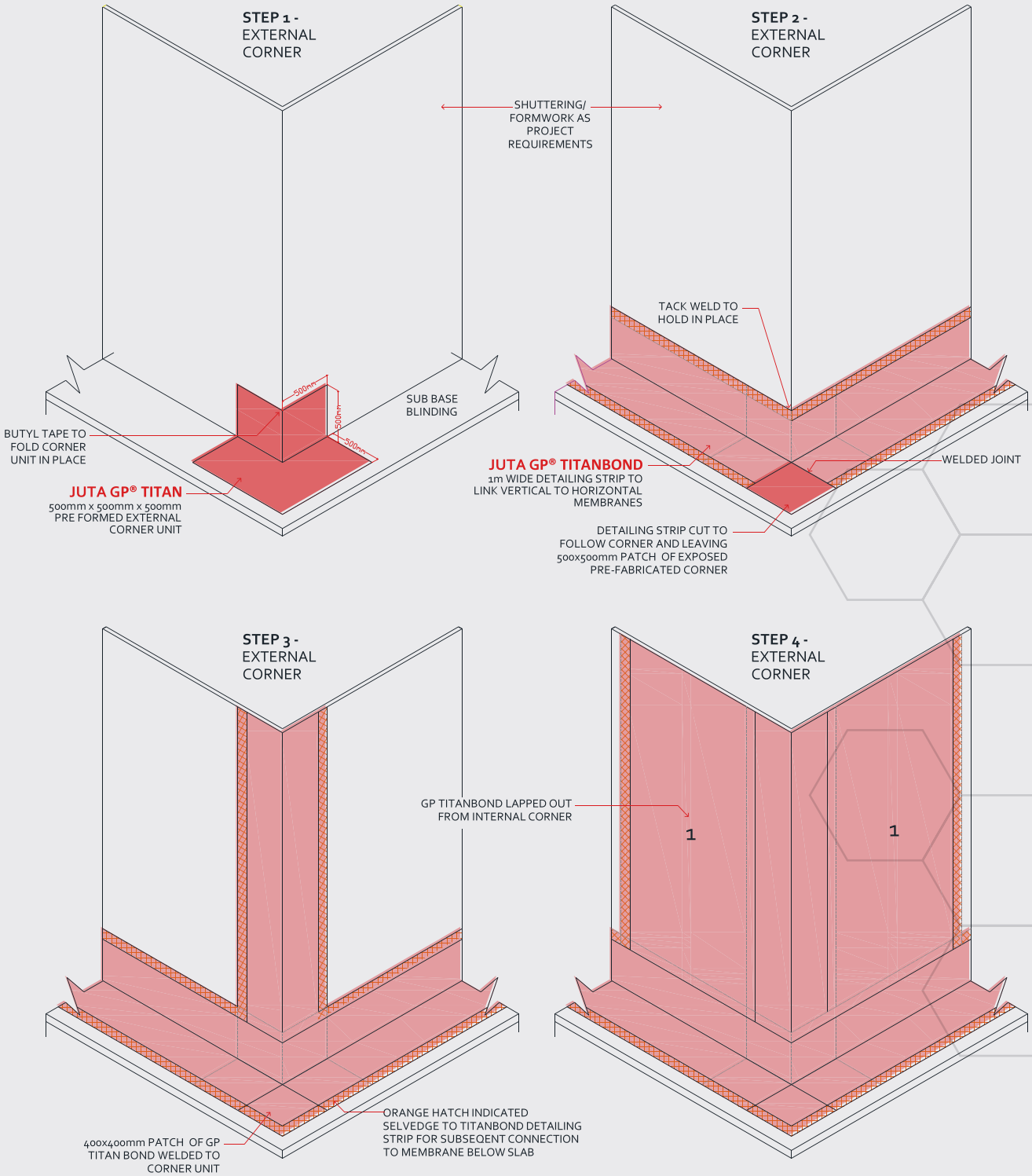
Appendix B

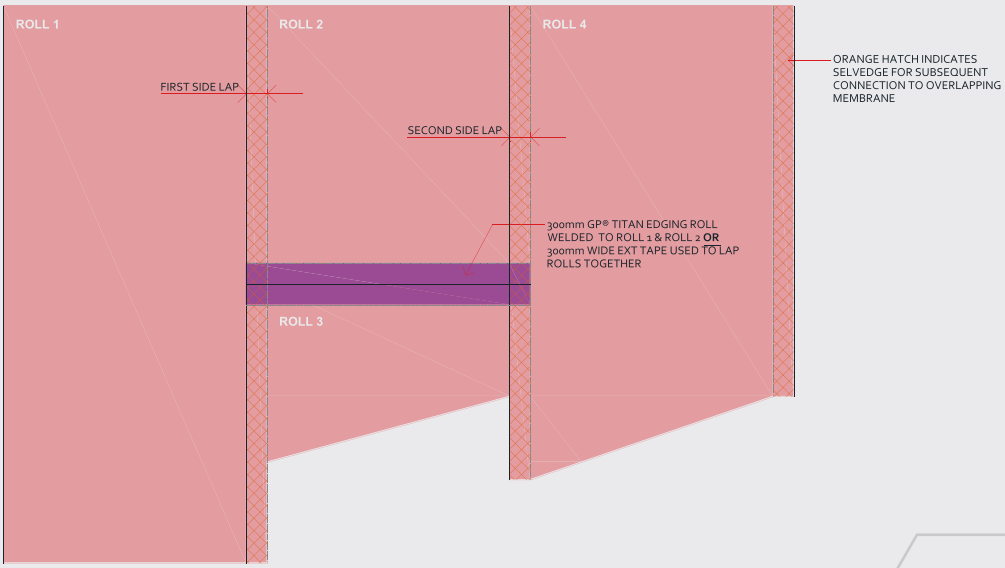
GP® Titanbond® External Corner Configuration



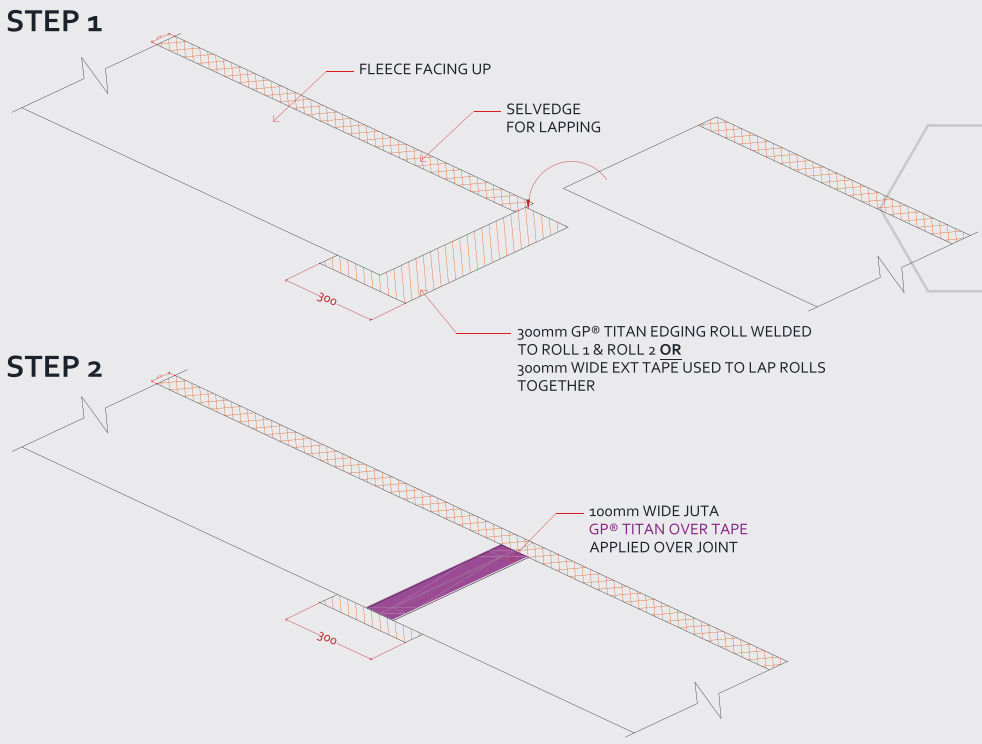
Appendix C

GP® Titanbond® Overlapping Details

Plan View – Lapping Configuration



Roll End - Lapping Details



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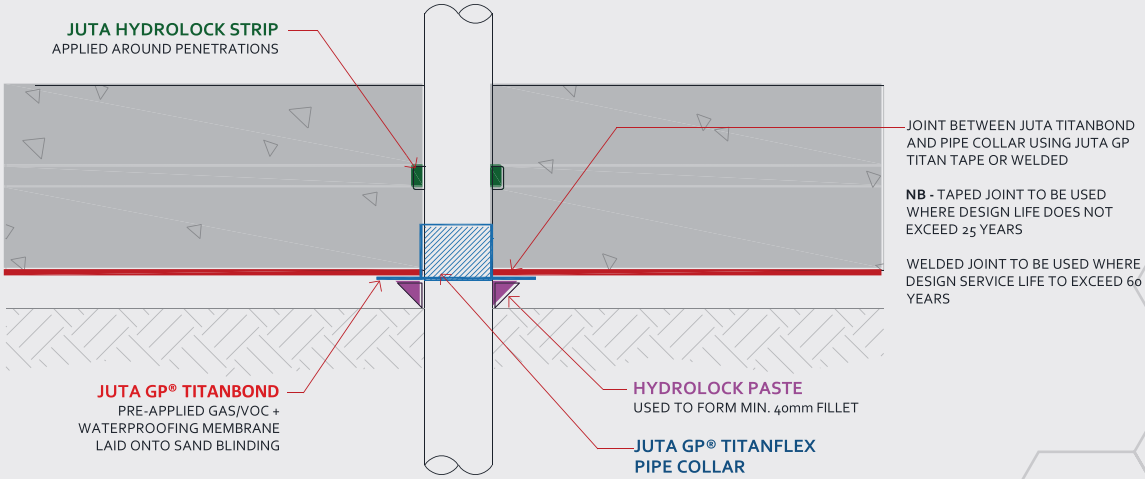
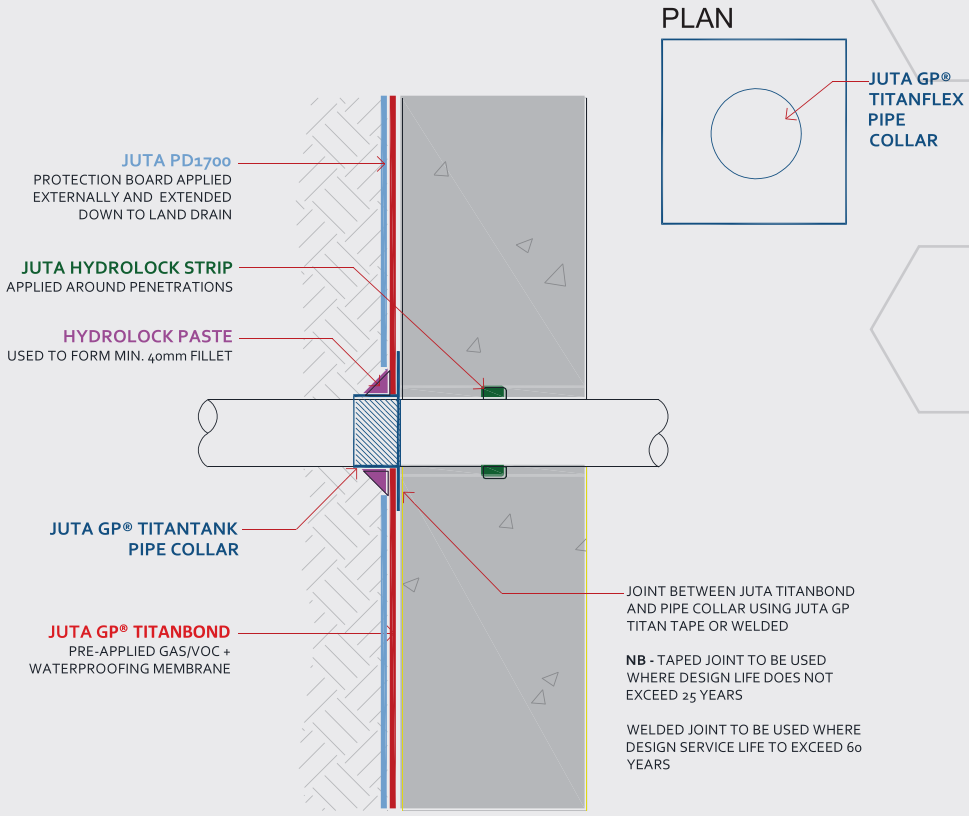
Appendix D

GP® Titanbond® Penetration Details

Slab Pipe Penetration



Wall Pipe Penetration



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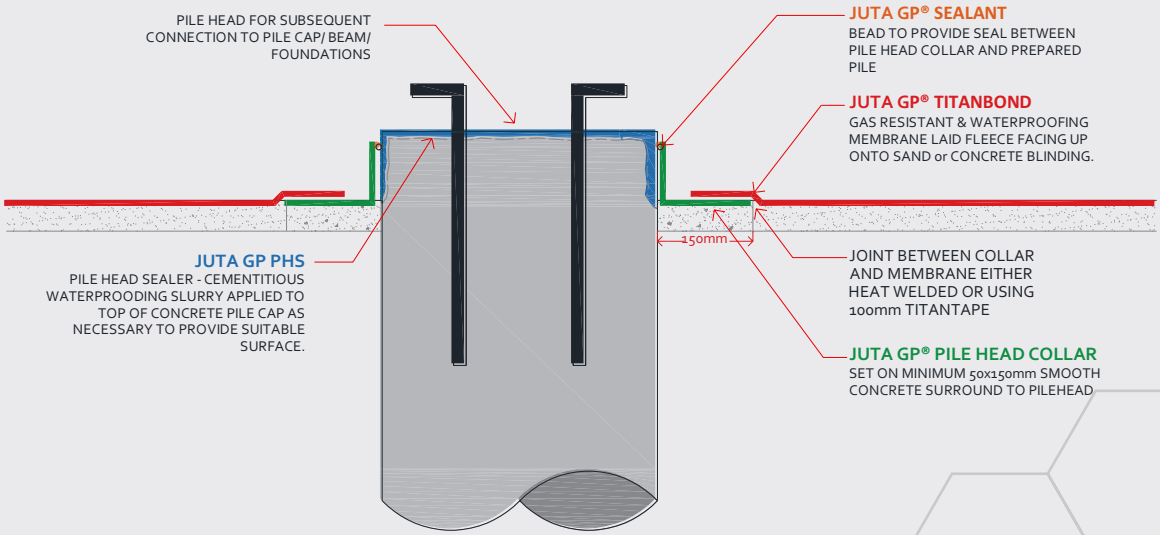
Appendix E

GP® Titanbond® Pile Head Sealing Details

Pile Cap Sealing Detail – Option 1

No Liquid Gas Barrier over Pile Head



Pile Cap Sealing Detail – Option 2

Liquid Gas Barrier over Pile Head