

Design

PROJECT SPECIFICATION

Graham Brown Residence

116 Richard Street

Opotiki

Issued for Consent

PROJECT OVERVIEW

Scope

Re-site second hand dwelling onto a new timber pile foundation as outlined in the plans attached.

Address

Site Address	116 Richard Street
City	Opotiki
Lot #	2
DP #	3037

Site Conditions

Wind Zone	H - High Wind Speed
Earthquake Zone	Zone 3
Exposure Zone	Zone C - Medium
Snow Loading Zone	Zone N0

Related Parties

Design

JT Architectural designs, John Thompson-Harawira, LBP 116894, jtdesigns@clear.net.nz, 07 5788534

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1 PILING

1.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

1.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

3109:1997(NZS)	Concrete construction
3602:2003(NZS)	Timber and wood-based products for use in building
3604:2011(NZS)	Timber-framed buildings
3605:2001(NZS)	Timber piles and poles for use in building
3640:2003(NZS)	Chemical preservation of round and sawn timber
4210:2001(NZS)	Masonry construction: Materials and workmanship
NZBC B1	Structure

1.3 House Piles

1.3.1 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Check documents for existing underground drains, cables or other buried service within the proposed works area prior to pile excavation. Co-ordinate with trades the locations of new underground drains, pipes and cables etc. where not already installed.

1.3.2 Ordinary Piles

Square Timber Ordinary Piles shall comply with the requirements of NZS 3605, and NZS 3640 timber treatment H5, and comply with and installed to the requirements of NZS 3604 and as shown on the drawings.

Accurately set-out the piles and concrete in place to the required height, true to line and plumb, to the layout and details shown on the drawings.

Excavate pile footings to the required footing plan dimension and depth, with neatly formed sides and flat base to undisturbed good ground. Concrete footing thickness, concrete material and strength, and pile embedment and loading, all in accordance with NZS 3604.

All cut pile surfaces shall be re-treated in accordance with NZS 3604 as required during installation.

Pile-to-bearer connections as noted on the drawings and to the requirements on NZS 3064.

Round Timber Ordinary Piles shall comply with the requirements of NZS 3605, and NZS 3640 timber treatment H5, and comply with and installed to the requirements of NZS 3604 and as shown on the drawings.

Accurately set-out the piles and concrete in place to the required height, true to line and plumb, to the layout and details shown on the drawings.

Excavate pile footings to the required footing plan dimension and depth, with neatly formed sides and flat base to undisturbed good ground. Concrete footing thickness, concrete material and strength, and pile embedment and loading, all in accordance with NZS 3604.

All cut pile surfaces shall be re-treated in accordance with NZS 3604 as required during installation.

Pile-to-bearer connections as noted on the drawings and to the requirements on NZS 3604.

Driven Timber Ordinary Piles shall comply with the requirements of NZS 3605, and NZS 3640 timber treatment H5, and comply with and installed to the requirements of NZS 3604.

Accurately set-out the piles and mechanically drive in place to the required resistance and minimum depth, true to line and plumb, to the layout and details shown on the drawings and to the requirements of NZS 3604. Piles, maximum 3600mm long, driven small-end-down without damage to the pile, reject damaged piles and install new piles as required. Pile tops to the required level without packing under bearers. All cut pile surfaces shall be re-treated in accordance with NZS 3604 as required during installation.

Pile-to-bearer connections as noted on the drawings and to the requirements on NZS 3604.

1.3.3 Driven Cantilever Piles

Driven Round Timber Cantilever Piles shall comply with the requirements of NZS 3605, and NZS 3640 timber treatment H5, and comply with and installed to the requirements of NZS 3604.

Accurately set-out the piles and mechanically drive in place to the required resistance and minimum depth, true to line and plumb, to the layout and details shown on the drawings and to the requirements of NZS 3604. Piles driven small-end-down without damage to the pile, reject damaged piles and install new piles as required. Pile tops, maximum 1200mm above cleared ground level, to the required level without packing under bearers. All cut pile surfaces shall be re-treated in accordance with NZS 3604 as required during installation.

Pile-to-bearer connections as noted on the drawings and to the requirements on NZS 3604.

2 STRUCTURAL STEELWORK

2.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

2.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

2.3 Materials

3 CARPENTRY

3.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

3.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1080.1:2012(AS/NZS)	Timber - Methods of test - Method 1: Moisture content
1491:1996(AS/NZS)	Finger jointed structural timber
1748.1:2011(AS/NZS)	Timber - Solid - Stress-graded for structural purposes - General requirements
1859.1:2004(AS/NZS)	Reconstituted wood-based panels - Specifications - Particleboard
1859.2:2004(AS/NZS)	Reconstituted wood-based panels - Specifications - Dry-processed fibreboard
2269.0:2008(AS/NZS)	Plywood - Structural - Specifications
2270:2006(AS/NZS)	Plywood and blockboard for interior use
2271:2004(AS/NZS)	Plywood and blockboard for exterior use
2295:2006(NZS)	Pliable, permeable building underlays
2904:1995(AS/NZS)	Damp-proof courses and flashings
2908.2:2000(AS/NZS)	Cellulose-cement products - Flat sheets
3601:1973(NZS)	Metric dimensions for timber
3602:2003(NZS)	Timber and wood-based products for use in building
3603:1990(NZS)	Timber Structures Standard
3603:1993(NZS)	Timber Structures Standard
3604:2011(NZS)	Timber-framed buildings
3617:1979(NZS)	Specification for profiles of weatherboards, fascia boards, and flooring
3618:1984(NZS)	Mechanical stress grading of timber
3622:2004(NZS)	Verification of timber properties
3631:1988(NZS)	New Zealand timber grading rules
3640:2003(NZS)	Chemical preservation of round and sawn timber

3.3 General

This section includes the receiving, stacking and storage of all Carpenter's materials and the fabrication, erection and fixing of all framing, sheathings and finishing timbers, including all work incidental to neatly finishing in other trades and all temporary work and temporary bracing.

The Carpenter shall attend upon all trades, and shall supply and fix all obviously necessary but not specifically mentioned fixings and materials.

3.4 Workmanship & Materials

3.4.1 Workmanship

3.4.1.1 Supervision

Where required by the NZ Building Amendment Act 2012 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner. It is the main contractor's responsibility to ensure that the construction of all structural timber complies in all respects with the drawings and the specification.

All non-restricted building work shall be carried out by or under the direct supervision of competent tradespersons, suitably qualified for the work undertaken, and in accordance with the best and latest trade practice.

3.4.1.2 Timberwork

All timber shall be worked and cut to be true and square and free from wind and warp with all joints matching and mating to a proper contact fit over the full surface of the joint. All connections whether nailed screwed, glued, mortised or dovetailed shall be accurately made and properly executed to provide sound satisfactory connections for the class of work required.

Timber containing unacceptable defect or distortion shall not be cramped to provide mating at connections but shall be discarded and replaced by true defect-free timber before connections are made. Distribute any acceptable defects in timber so as not to impair the strength or the appearance of the finished work. Do not cut studs across the grain to straighten them.

The checking and cutting away of timbers shall be avoided where possible and shall be limited to such dimensions as will not prejudice the purpose for which the timber is used. Observe NZS 3604 restrictions on holing and checking of timber joists and beams. Concealed services pipes and wiring shall not project beyond the framing face and where possible shall be beyond the linings/claddings fixings reach.

Neatly punch exposed nailing to the diameter of the nail head below the surface. Completely remove bruises and tool marks, and replace all split timbers and hammer-marked finishing timbers.

Fit a 3-ply bituminous DPC or a single layer high impact polyethylene DPC at all timber to concrete junctions to provide complete separation. Ensure that the DPC material is compatible with the timber treatment.

Clean out framing voids before fixing sheathings or linings. Ensure framing voids are fully vermin proofed to the exterior. Build in as necessary all required flashings (supplied by others) to windows, doors, roof edges, etc.

3.4.1.3 Existing Timberwork

Check the condition of existing timber framing, flooring, weatherboards/cladding, timber facings and trim, etc., as access is available during the contract, and report any deterioration to the Architect/Designer. Any remedial works to be proceeded with will be directed as Variations to the Contract.

3.4.2 Timber

3.4.2.1 Timber Materials

All timber shall be graded in accordance with NZS 3631 - Structural Grade MSG8 or better for all framing timber - (to meet the requirements of Table 2.3 of NZS 3603 for mechanically graded timber), and Dressing Grade for all finishing timber. Timber that is deemed below standard, in the opinion of the Architect/Designer, shall be removed from the site.

All non-durable timber, including components in manufactured items, shall be appropriately treated against moisture and/or insect decay by a member of the NZ Timber Industry Federation Inc.

Treatment of timber and wood-based building products shall be to the requirements of NZS 3602 as an absolute minimum, and all treated timber shall be identified and marked as required.

Ensure that similar timbers with different treatment levels are carefully managed during construction to avoid accidental use of an H1 treated item where H3 hazard class treatment is required by the NZS 3602.

Do not use LOSP (light organic solvent-based preservative) treated timber that has not adequately 'flushed-off'.

Ensure that all cut or drilled surfaces of H4 and H5 hazard class treated timbers are flood coat re-treated, with the product recommended by the original treatment plant, before installation.

All timber shall be seasoned or kiln dried, to the stable moisture content, be straight and true and free from wind, warp and distortion, and in lengths suitable for the members required and the location in the finished construction. All framing timber shall have a moisture content between 12% and 18 % before being installed. If the use of inadequately seasoned timber results in damage or opening joints in the finished building the timber shall be replaced. Fixing of internal linings shall be delayed after closing in until the timber framing has dried back below 20% moisture content and to allow for the maximum settling of substrates.

All kiln dried, dressed and/or finishing timbers shall be stacked under cover on delivery to the site, and all timber shall be full to the nominal sizes shown or specified, subject only to normal cutting and dressing tolerances.

All finishing timber shall have machine marks, stains and roughness removed and shall be sanded smooth.

Ensure that enclosed surfaces and ends of paint-finished exterior finishing timbers are fully primed before fixing. If this trade (Carpentry) carries out the priming it shall be to the specification and standard required of the Painter.

Unless specified otherwise, exposed framing timbers shall be unfinished to the exterior, and be fine bandsawn milled, treated with a minimum of discolouration, handled carefully at all times to avoid surface damage, and delivered free of crayon or pencil or other markings. Hazard class treatment markings shall be on the ends, NOT on the faces.

3.4.3 Fixings

3.4.3.1 Nails

Comply with the requirements of NZS 3604 Section 2.4.4 and the Nailing Schedules of NZS 3604 as applicable. Unless noted or specified on the drawings or elsewhere in this specification, all nails fixing exterior timbers shall be Grade 304 or 316 stainless steel. Nails that will be covered with plaster or any similar material shall be hot-dipped galvanised, unless noted or specified otherwise.

Finishing brads to all finishing timbers shall be set out neatly and punched to the diameter of the nail below the surface. Bore slightly undersize holes for nailing that could cause splitting of the timber. Power-driven staples are completely unacceptable in finishing timbers.

3.4.3.2 Screws

Screw fastenings shall be of suitable gauge, head type, thread design, and length to provide secure fastening into the substrate material, and be suitable for the assembly/construction of the fixed item/element and the substrate material.

Unless noted or specified otherwise, screws exposed to the exterior shall be Grade 304/316 stainless steel or hot-dipped galvanised, and hot-dipped galvanised or similar corrosion resistant for damp situations.

Self-drilling screws shall be in accordance with AS 3566 for fastener type and corrosion resistance class.

Unless noted or specified otherwise, screws fixing hardware or similar shall be of the same material and finish as the hardware. Except where raised head screws are shown or specified, screws shall be countersunk flush or recessed where stopped/filled.

3.4.3.3 Bolts

Where bolts are used they shall be complete with nuts and washers unless specified otherwise. All bolts, nuts and washers are to be hot-dipped galvanised finish unless noted otherwise. The diameter of a hole for a bolt shall not be less than the bolt diameter nor exceed it by 1.5mm.

For the following bolt diameters use washer sizes as below unless noted otherwise on the drawings:

up to M8 - 25 x 25 x 1.5mm

up to M12 - 50 x 50 x 3mm

up to M20 - 65 x 65 x 5mm

up to M20 - 75 x 75 x 6mm

Round washers may be used providing they are of a thickness and area not less than those specified above.

Subfloor framing - unless noted otherwise on the drawings, cast-in holding down bolts for subfloor framing fixed to concrete foundation walls shall be M12 Grade 304 stainless steel, embedded minimum 150mm into concrete, to the spacings required by NZS 3604, and located centrally on the timber.

Bottom plates - unless noted otherwise on the drawings, cast-in holding down bolts for bottom plates fixed to a concrete slab shall be M12 galvanised, embedded minimum 120mm into concrete, to the spacings required by NZS 3604, and located centrally on the timber.

Framing - timber/timber and timber/steel - Unless noted otherwise on the drawings, M16, hot-dipped galvanised, hexagonal head mild steel and with 50 x 50 x 3mm washers.

Timber/concrete (dry situations) - Unless noted otherwise on the drawings, Ramset Trubolts, T12140 at maximum 900mm centres - for damp or exterior situations use stainless steel Trubolts.

Bolts shall be tightened until the washer just indents the timber surface. Exposed bolts shall be re-tightened just prior to Practical Completion to remove any slack consequent on timber shrinkage. Allow to countersink bolt heads and nuts as necessary to clear linings.

3.4.3.4 Framing Hardware

Proprietary timber framing hardware and fixings, including multigrips, joist shoes, Z nails, gang nails and similar hardware, may be used where specifically approved, or where required on the drawings or by NZS 3604 schedules, in accordance with the manufacturer's requirements.

Proprietary timber framing structural brackets and ties, including post and bearer brackets, beam supports, angle brackets, tie cleats and similar hardware, shall be as noted on the drawings and installed in accordance with the manufacturer's requirements.

Refer to Metalwork or Structural Steel section of this specification for specific design engineered fabricated steel components that connect structural timber framing.

3.5 Laserframe® Structural Timber

3.5.1 Scope

Supply and install the selected Laserframe® Structural Timber from Carter Holt Harvey Woodproducts to the floors, walls, roofs, and building elements identified on the drawings. All aspects of this work shall be in complete accordance with CHH Woodproducts Laserframe® Structural Timber guides, technical manuals and specifications (check www.chhwoodproducts.co.nz for the latest editions), and other relevant product manufacturer's recommendations, and as shown on the drawings.

No substitutions are permitted for Laserframe® Structural Timber from CHH Woodproducts.

3.5.2 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with other trades to ensure that Laserframe® framing correctly allows for the installation of exterior claddings, roofing, joinery, interior linings, fixtures and fittings, and any specific detailing shown on the approved drawings; and generally to install Laserframe® framing as required.

3.5.3 Laserframe® Structural Timber

3.5.3.1 Laserframe® SG8 - H1.2

Laserframe® SG8 - H1.2.

3.5.3.2 Laserframe® SG8 - H3.2

Laserframe® SG8 - H3.2.

3.5.4 Treatment

Timber treatment shall be to the requirements of NZBC B2/AS1 Paragraphs 3.2.1 and 3.2.2, as a minimum. Refer to the drawings for the locations of timber framing treatment classes.

3.5.5 Workmanship

Where required by the NZ Building Act 2004 it is the building contractor's responsibility to ensure that all restricted building work is carried out by a Licensed Building Practitioner.

All timber framing work shall be carried out by experienced and competent tradesmen who are familiar with the use of the specified product and installation and fixing techniques. All work shall be such as to leave a neat, efficient, robust, and structurally sound and stable installation.

3.5.6 Delivery & Handling

Check for damage upon delivery and reject damaged material. Store Laserframe® in neat packs under cover, away from damage, on level gluts, well clear of the ground and avoid stacking packs on top of each other. Keep dry and protect from damage until use. Do not use defective or damaged Laserframe® Structural Timber. Ensure all appropriate personal protection equipment is worn at all times when handling and cutting Laserframe®.

3.5.7 Installation

All Laserframe® Structural Timber framing members, including all nogging/dwanging, strutting, blocking, bracing, etc., shall be sized, set-out, fitted and fixed to the requirements of NZS 3604 to accommodate structural loadings, cladding and lining set-out and support, and the installation of other building components, fixtures and fittings, all as shown on the drawings.

All framing shall be erected without deviation, true to line, plumb, evenly aligned and square within the tolerances allowed in NZS 3604: Table 2.1.

Separate timber framing with an approved continuous damp proof course when in direct contact with concrete or masonry.

Free-draining separations to external vertical surfaces shall be 12mm minimum and as noted on the drawings.

Neatly cut the framing to the required angle to ensure full sectional bearing at component junctions.

Temporarily prop, brace, tie and secure framing members and elements as required until the framing is complete and self supporting.

Close in framing as soon as possible and allow to dry to below 20% moisture content prior to lining and full enclosure. Avoid ponding of water on floor around plates.

For visually exposed framing slightly arris member ends and clean rough cuts with sandpaper. Accurately cut rebates, grooves, mortises and holes before erection. Neatly set out all exposed fixings, set nails slightly below the framing surface, leave the framing free of hammer marks and bruising. For exposed external framing, treat cut ends, holes rebates, etc., with an approved protective coating.

3.5.8 Completion

Remove any temporary props, bracing and ties. Check that all framing has been fixed correctly, that all dawning, strutting, blocking, bracing, etc., have been completed and correctly located. Check that all framing members and elements are true to line, plumb, and aligned and square accordingly. Check that no damage has occurred to any member or fastening component and replace as necessary.

Remove all associated waste from the site.

3.6 Ecoply Bracing

3.6.1 Scope

Supply 7mm or thicker Ecoply or Shadowclad structural plywood and install it as structural bracing or ceiling diaphragm in the positions identified on the Bracing Plan.

3.6.2 Preparation

Check that the timber wall framing complies with NZS 3604, is plumb and in true alignment, and has a maximum moisture content of 20% at the time of Ecoply Bracing installation. Ensure that the bottom plate hold-downs are correctly installed. Upon delivery store plywood on four evenly spaced level bearers, and protect the plywood from rain dirt etc. Ecoply Bracing installation work shall be carried out by competent tradesmen.

3.6.3 Installation

Handle the plywood carefully, and reject any damaged sheets. Fix sheets vertically, incorporating 2 - 3mm expansion gaps at joins. All sheet edges fully supported. Install with cut sheet ends to the top.

Fasten with 50 x 2.8mm galvanised flat head nails for direct fix. Refer to the Ecoply Specification and Installation Guide for preservative treatment and fastener durability requirements. Fix at 150mm centres around the perimeter of each sheet and 300 mm centres to intermediate studs. Ensure that base clearances to E2/AS1 are provided.

Where Shadowclad plywood is used as both cladding and bracing refer to the Shadowclad Specification and Installation Guide for durability requirements. (Ph 0800 326 759 to confirm the date of the most recent edition).

4 INSULATION

4.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

4.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

4246:2016(NZS)	Energy efficiency - Installing bulk thermal insulation in residential buildings
NZBC B2/AS1	Durability
NZBC F2	Hazardous Building Materials
NZBC H1	Energy Efficiency

4.3 EXPOL Timber UnderFloor Insulation

4.3.1 Scope

Supply and install EXPOL Timber Underfloor Insulation, floors, mid-floors areas as identified on the drawings, complete with accessories required for proper installation and performance. All aspects of this work shall be in complete accordance with EXPOL timber underfloor insulation product manuals and installation guides, (visit www.expol.co.nz, or call 0800 86 33 73 for the latest editions), EXPOL timber underfloor insulation BRANZ Appraisals were applicable, other relevant product manufacturers' recommendations, and as shown on the drawings.

Further information can be found [HERE](#) regarding perimeter insulation of concrete slab foundations, BRANZ Study Report SR352

No substitutions are permitted for the specified EXPOL insulation products.

4.3.2 Requirements

Safety

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, particularly those for construction and building maintenance.

Extent of Work

The following is a list and a general description of the extent of the EXPOL timber underfloor insulation works, which are more specifically defined in the contract documents, required for the completion of the contract works:

Defective Materials & Work

Should defective materials and/or work be found at any time before the final acceptance of the work, it shall be rejected. Rejected EXPOL materials and work shall be repaired and/or replaced to the satisfaction of the Architect/Designer, without delay and at no additional cost to the principal.

Should a problem be encountered with any EXPOL product during use or delivery, immediately contact EXPOL on 0800 86 33 73 or email tech@expol.co.nz. Contact EXPOL within 48 hours of finding the defective product. Do not continue to use the product that is not performing to specification or expectation. Keep the product in question, and where possible, the document batch numbers and/or manufacturing details.

Transportation

When transporting, storing or installing, ensure the EXPOL EPS Sheet is not exposed to:

Petroleum based solvents, or

Fire, or

Do not store in direct sunlight. Product could be damaged and warranty will be void.

4.3.3 Workmanship

4.3.3.1 Workmanship

Installation of EXPOL Timber Underfloor Insulation must be completed by an installer with an understanding of insulation installation. In accordance with the manufacturer's installation requirements, NZS 4246 and as noted and detailed on the drawings.

Store and handle all materials and products in accordance with the manufacturer's recommendations.

4.3.4 EXPOL Timber UnderFloor Insulation

EXPOL R2.5 UnderFloor Insulation

EXPOL R2.5 UnderFloor Insulation - Made from Expanded Polystyrene that contains recycled content it is

1200mm in length, 100mm thick and manufactured in four standard widths 360, 410, 470, 560.

Width: 360, 410, 470, 560

Installed Location:

4.3.5 System Components

EXPOL L Brackets - Existing Floors R2.5 & R3.1

EXPOL L Brackets are designed as a push fit - fixed with the supplied stainless steel nail to the joist.

4.3.6 Installation

EXPOL Timber UnderFloor Insulation - Existing Floors

Install polystyrene insulation panels, complete with accessories, friction fitted between the floor joists against the underside of the flooring and secure in place in accordance with the manufacturer's recommendations. Ensure all perimeter insulation edges and all insulation joints are fully closed as the work progresses, seal gaps with a manufacturer approved urethane foam sealant the thickness of

the insulation panels. Neatly cut insulation panels around pipes etc. and seal gaps as above. Separate polystyrene panels from installed electrical cables with EXPOL WireGuard barrier strip only. Do not insulate over electrical cables, leave cables exposed and uncovered.

Take extreme care when working around electrical cables.

For recessed luminaires LEDs & Control-gear, rated IC, IC-F & IC-4 to cover, follow manufactures instruction on insulation in line with NZS4246.

For all other separate insulation 200mm from recessed light fittings and other recessed electrical fittings; refer to the drawings for containment requirements around recessed electrical fittings. A minimum gap of 200mm must be left around metal heating flues and a 50mm gap is required around brick/concrete chimneys.

4.3.7 Completion

Completion

EXPOL Timber UnderFloor Insulation has been installed allowing no gaps. Check for damage and faults and repair as necessary. Leave the surrounding area clear of rubbish and any EXPOL off-cuts, remove from site.

Complete the EXPOL "UNDERFLOOR 50 YEAR PRODUCT WARRANTY" at [EXPOL Underfloor Warranty](#). Upload a photo of EXPOL receipt.

5 DRAINLAYING

5.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

5.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1254:2010(AS/NZS)	PVC-U pipes and fittings for stormwater and surface water applications
1260:2017(AS NZS)	PVC-U pipes and fittings for drain, waste and vent applications
1546.1:2008(AS/NZS)	On-site domestic wastewater treatment units - Septic tanks
1547:2012(AS/NZS)	On-site domestic wastewater management
2032:2006(AS/NZS)	Installation of PVC pipe systems
3500.0:2003(AS/NZS)	Plumbing and drainage - Glossary of terms
3500.2:2018(AS NZS)	Plumbing and drainage Part 2: Sanitary plumbing and drainage
3500.3:2018(AS NZS)	Plumbing and drainage Part 3: Stormwater drainage
7643:1979(NZS)	Code of practice for the installation of unplasticized PVC pipe systems

5.3 General

Carry out all required works to leave the sewer and stormwater systems shown on the drawings in correct working order complete with all normal incidentals.

Comply with Local Authority By-laws and Health Department Regulations as appropriate. Obtain all necessary permits and consents, serve all necessary notices, arrange all tests and pay all fees and customary charges in connection with the works.

5.4 Workmanship

5.4.1 General

Carry out all required works to leave the sewer and stormwater systems shown on the drawings in correct working order complete with all normal incidentals. Comply with Local Authority By-laws and Health Department Regulations as appropriate. Obtain all necessary permits and consents, serve all necessary notices, arrange all tests and pay all fees and customary charges in connection with the works.

5.4.2 Co-operation

Cooperate with all trades and attend upon the Concretor and Plumber to set out exact pipe runs before any adjacent work is put in hand and ensure that all sleeves etc. are correctly incorporated as work proceeds.

5.4.3 Materials

All pipes and other materials shall comply with the appropriate Standards, and shall be protected from damage of any kind until installation is complete. All incidentals appropriate for the applications involved. Concrete shall be 17.5MPa and as specified under Concretor, Mortar shall be as specified in Blocklayer.

5.4.4 Workmanship

All drainlaying shall be carried out by, or under direct control of, properly qualified tradesmen, and shall be to recognised high standards. Ensure cast-in items are installed when required so that no delay is caused by this trade. Adequately protect all adjacent surfaces - clean down to remove dirt etc., and any damage shall be made good by the appropriate trade at the Drainlayer's expense.

On completion of drainlaying clean up full area affected by this trade to the condition it was in before drainlaying commenced.

Site is to be returned as close as possible to its present condition on completion of the contract.

5.4.5 Excavation

As required for sewer and stormwater. Check for other service lines before excavation - the Drainlayer is responsible for making good any damage. Trenches true to line and with even gradients between gullies, soil stack terminations or downpipes, etc.

Keep the bottom of trenches clear of loose material. All pipes shall be laid in appropriate bedding material, compacted as required. Shore trenches if required to suit ground conditions. Backfilling shall be by this trade, to the standards required in Siteworks.

5.5 Foul Water Drainage

5.5.1 Scope

Supply, install, test and commission new, gravity-flow foul water drains on the site, to the locations, layout and details shown on the drawings, complete with all necessary components and accessories required for satisfactory completion and performance of the foul water drainage system. All aspects of this works shall comply with the requirements of the NZ Building Code, related compliance Standards, Regulations and Acts, and to the requirements of the Territorial Authority, and as specified herein and on the approved drawings and schedules. Ancillary work and/or services not specifically mentioned but necessary to complete the work to specified levels of performance shall be deemed included.

Install foul water drains in natural ground, beneath and external to the building, for the distances indicated on the drawings. Allow for all ventilation requirements, inspection openings, bends,

branches, manholes, inspection chambers, overflow gully traps, etc., as required and indicated on the drawings. Unless shown otherwise, the foul water drains shall be connected to the building's sanitary drainage system, and discharge to the foul water network.

The foul water drainage plans are diagrammatic only. Allow for all necessary vents, inspection fittings, cleaning eyes, traps and venting in accordance with AS/NZS 3500.2 and to comply with the New Zealand Building Code, and as required by the Territorial Authority. Refer to the drawings for the dimensioned locations of sanitary waste pipes and outlets.

The following is a list and a general description of the extent of Foul Water Drainage works, which are more specifically defined in the contract documents, required for the completion of the contract works:

5.5.2 Requirements

5.5.2.1 Safety

Comply with the Health and Safety at Work Act 2015 (HSWA), and with all relevant Health and Safety at Work Regulations 2016, and with all relevant WorkSafe New Zealand (WorkSafe) Approved Codes of Practice and WorkSafe Information and Guidance, in particular the '[Worksafe Guidelines For the Provision of Facilities and General Safety in the Construction Industry](#)', and the '[Excavation Safety - Good Practice Guidelines](#)'

Carry out all construction operations in accordance with the Contractor's project-specific Health and Safety Plan.

5.5.2.2 Compliance

Obtain all necessary permits and consents, serve all necessary notices, arrange all tests and pay all fees and customary charges in connection with the foul water drainage works.

The Drain Layer shall be deemed to have allowed for all work associated with the safe and orderly execution of the foul water drainage work, including complying with all Territorial Authority requirements, Building Consent, Building Act, Health and Safety requirements, and all other acts, laws, by-laws and regulations that may affect the execution of the work.

5.5.2.3 Work on Public Property

Excavation and reinstatement of public property shall comply with the requirements of the relevant controlling authorities.

Obtain all necessary approvals and permits from the controlling authorities before commencing work on public property.

Arrange and pay for any excavation and reinstatement inspections of public property required by the controlling authorities.

Before commencing any excavation in or reinstatement work to public footpaths, driveway crossings, roads or other public property, make all necessary enquiries to the relevant controlling authority for their standards for excavation and reinstatement.

Provide at all times, adequate safeguards to the public in respect of temporary fences, signals, signs and lights. Where traffic signs are necessary, these shall be provided and operated in accordance with the Regulatory Authority or NZ Transport Agency (NZTA) guidelines, as applicable, but erected only with the prior written approval of the Regulatory Authority or NZTA and the Contract Administrator.

Where a Traffic Management Plan (TMP) is required, prepare, operate and update this plan as necessary throughout the duration of the works. The TMP shall conform to the requirements of the Regulatory Authority or NZTA, as applicable. Obtain TMP prior-approvals, and maintain the TMP for the entire construction duration.

Remove dirt and contamination deposited on public property to the satisfaction of the controlling authorities.

5.5.2.4 Notifiable Work

Notify WorkSafe NZ of work that is notifiable (particular hazardous work) under the Health and Safety in Employment Regulations 1995, 24 hours before starting the work.

5.5.2.5 Inspections

Inspections of foul water drainage works shall take place at each of the stages as scheduled in the Building Consent. Confirm a written programme to facilitate these inspections, including notification when each stage of the work is ready for inspection.

Obtain and pay all fees for any required inspections which are additional to the Building Consent.

5.5.2.6 Testing

Carry out all necessary testing of the foul water drainage installations, and demonstrate to the Contract Administrator and the controlling Territorial Authority that the installations are watertight and comply with the requirements of the New Zealand Building Code, related compliance Standards, and the design documents.

5.5.2.7 Co-operation

Co-operate with other trades to ensure that all preliminary and preparatory works are completed to specification and as shown on the drawings.

Coordinate with other trades as necessary to install foul water drains to the required locations and layouts.

5.5.2.8 Workmanship

Foul water drainage work shall be carried out by qualified and experienced tradespersons, familiar with the required installation requirements, under the direct supervision of a NZ certified Registered

Drainlayer, in accordance with AS/NZS 3500.2 in compliance with the New Zealand Building Code, and all local codes and regulatory authority requirements, and the conditions of the Building Consent.

All pipe cutting, jointing, and supporting techniques shall be exactly as recommended by the pipe manufacturer. Pipes, fittings and accessories shall be handled and installed in such a manner that prevents any damage to the component.

All work shall be such as to leave a neat, efficient, robust and watertight installation.

Carry out all necessary inspections and tests during installation to ensure compliance with the design specifications and regulatory requirements. Provide test result sheets to the Contract Administrator to show compliance has been achieved.

Take all necessary measures during installation to protect the foul water drainage system from damage, and to prevent the entry of:

- extraneous water;
- soil, sand, or rock,
- the contents of any septic tank; or
- any other substance, the discharge or which could impede the operation of the foul water drainage network.

Ensure that any installed drain is adequately protected from any damage and excessive loading during the remaining construction period.

Protect adjacent finished work and surfaces from damage and contamination during installation. Any damage to fittings or finished surfaces shall be made good by the appropriate trade at the Drain Layer's expense.

Any associated electrical wiring and prescribed electrical work (by others) shall be carried out by a qualified electrician in accordance with the electrical standards and regulations and the Electrical specification.

5.5.2.9 Delivery & Handling

Store foul water drain pipes and accessories undercover, out of direct sunlight, clear of the ground, on an even surface, and protected from damage and contamination in accordance with the manufacturer's requirements. Keep pipes and accessories out of direct sunlight and protected from damage and contamination at all times.

Where possible, store pre-packed PVC pipes in the original delivery crate.

Store loose PVC pipes on evenly spaced bearers at maximum 1.0m centres, with pipe sockets alternated so the the sockets do not bear on each other, and with side supports if pipes are stacked more than two layers high. When loose PVC pipes are stacked in a pyramid, the maximum stack height shall be 1.0m and the bottom pipes shall be chocked.

Do not use damaged or faulty materials or products, or products that are beyond their designated shelf life. Do not use PVC materials that have been exposed to or stored in direct sunlight longer than the period specified by the manufacturer.

Handle all products and materials in accordance with the manufacturer's requirements, and in a manner that prevents damage or deterioration of the material/product.

Installers shall be familiar with and comply with manufacturer's Material Safety Data Sheet precautions for use, and use appropriate safety gear when handling materials.

Conform with all relevant [WorkSafe NZ](#) Guidelines and Codes of Practice - in particular the '[OSH Guidelines For the Provision of Facilities and General Safety in the Construction Industry](#)' and the '[Excavation Safety - Good Practice Guidelines](#)'.

5.5.2.10 As-Built Drawings

On completion and before application for Code Compliance Certificate, prepare As-Built Drawings of the foul water drainage system, that accurately record the new and/or modified foul water drainage installation.

Information shall include, but not limited to, type, class and size of all pipes, the location, grade and direction of flow of all pipes, the location of all bends, changes in direction, cleaning access positions, manholes, and all dimensions, levels, inverts, etc.

Submit prepared as-built drawings to the Contract Administrator for review. Issue as-built drawings in accordance with the Contract Administrator's instruction, and in the required format.

5.5.2.11 Warranties

On completion and before Practical Completion, provide all relevant manufacturer/supplier warranties in favour of the Principal, covering materials, equipment, proprietary products, etc., supplied and installed.

5.5.3 Materials

5.5.3.1 PVC-U Pipes & Fittings

PVC-U foul water drain pipes and fittings for non-pressure applications shall comply with AS/NZS 1260: 'PVC-U pipes and fittings for drain, waste and vent application'. Installed in accordance with AS/NZS 3500.2, and AS/NZS 2032 or AS/NZS 2566.2.

Pipe Classification:

Class SN4-SN6 - Rubber Ring Joint or Solvent Welded Joint. For domestic and residential applications, and low load areas.

Class SN8-SN10 - Rubber Ring Joint or Solvent Welded Joint. For commercial and industrial applications, and medium load areas.

Class SN16 - Rubber Ring Joint or Solvent Welded Joint. For heavy traffic load areas.

5.5.3.2 Gullies

Gully traps shall be of an approved type and installed in accordance with AS/NZS 3500.2 and the requirements of the Territorial Authority.

Gully traps shall be PVC construction, including dish and lid.

The overflow level of gully dishes shall be set no less than 25mm above paved surfaces, and no less than 100mm above unpaved surfaces.

Provide adequate support to gully riser and dish with compacted bedding or concrete.

Where subject to damage, protect gully traps with a smooth-finished concrete surround, or with 2:1 sand/cement mortar, surrounding the entire gully and separated from the building foundation, in accordance with AS/NZS 3500.2 and as shown on the drawings.

5.5.3.3 Bedding & Surround Material

Except where specified otherwise on the drawings, bedding (underlay, side support, overlay) material shall be compacted clean granular non-cohesive material - crushed rock or gravel screenings - of nominal particle size range of 7-10mm with a maximum particle size of 20mm, that is free from organic material and clay, and have a moisture content appropriate to the degree of compaction required. If the bedding material is contaminated or an excessive amount of oversized particles are present, the bedding material shall be rejected and not used.

5.5.3.4 Backfill Material

Except where specified otherwise, backfill material above the pipe embedment layer (150mm above the top of pipe) shall be selected excavated material that is free from any builder's waste, any organic material, any rocks or hard matter larger than 20mm, and any soil lumps larger than 75mm.

Except where specified otherwise, pipes beneath private roadways and where subject to vehicular traffic - all backfill from the top of the embedment layer (150mm above top of pipe) to the underside of the pavement layer shall be GAP 65 - General All Passing 65mm.

Mechanically compact backfill material in layers not exceeding 300mm to a relative compaction no less than 95% of the NZ Standard Compaction.

Trenches in public footpaths and roads shall be backfilled in accordance with the requirements of the controlling authority.

5.5.3.5 Marking Tape

Marking tape shall be located just above the top of the pipe embedment zone, and centred over the pipe.

Non-Detectable Marking Tape:

- Non-detectable marking tape shall comply with AS/NZS 2648.1.
- Tape width shall be 100mm minimum.
- Height of message letters shall be 40mm minimum.

Detectable Marking Tape:

- Detectable marking tape shall comply with AS/NZS 2648.1.
- Tape width shall be 100mm minimum.
- Tracer wire shall be stainless steel grade 316 or copper alloy designation 122.
- Tracer wire shall allow at least 25% elongation of the plastic tape before breakage of the wire.
- Height of message letters shall be 40mm minimum.

5.5.4 Trench Excavation**5.5.4.1 Clearing of Surfaces**

Where trenches are to be excavated in a grassed area, garden or a berm, the topsoil shall be stripped from the area of the excavation and stockpiled separately adjacent to the trench for use in reinstating the surface.

Where trenches are to be excavated in existing concrete or asphalt paved areas, the paving shall be cut to neat, straight lines, parallel to the trench prior to excavation, with a nominal 100mm trimming allowance either side of the excavation width. The excavation shall be carried out with minimal damage to the existing paved surface.

Where trenches are to be excavated in existing segmental paved areas, the pavers shall be removed by hand, cleaned and set aside for later reinstatement.

Subsequent trench backfill shall be adequately compacted to avoid subsidence of reinstated surfaces.

5.5.4.2 Excavation

Locate all existing buried services before commencing excavation work in any area.

Excavations for trenches and pits shall be properly executed and supported in accordance with the requirements of AS/NZS 3500.2.

Carry out excavation work to comply with all relevant health and safety regulations and guidelines, including the '[Excavation Safety - Good Practice Guidelines](#)' where appropriate.

Unless specified otherwise, the excavation of trenches shall be taken out by open cut to the levels and grades shown or implied on the drawings. Excavate trenches to the depths which will provide for the appropriate type of bedding.

Trench excavations shall be of sufficient width to allow all operations necessary for the jointing of pipes and placing of the specified backfill. The bottom width of the trenches shall at least be the combined measurement of the outside diameter of the pipe plus 200mm - with a minimum clearance of 100mm on each side of the drain barrel. The trench width at the top of the pipe shall not exceed the outside diameter of the pipe plus 600mm unless the pipe in the trench is covered with concrete. The trench above the top of the pipe may be cut wider, either by excavating a wider bench or by battering the trench wall.

5.5.4.3 Shoring

Make all necessary provisions for shoring trench walls to comply with all regulations and for health and safety measures.

Trench shoring materials and equipment must be suitable for the purpose for which they are to be used, of sound quality, and adequate in strength for the particular use.

Shoring shall be placed by experienced operators under competent supervision, and shall not be altered, dismantled, or interfered with except on the instruction of the authorised supervisor.

Ensure no voids are left in the backfill when shoring is removed, and the required compaction density of the backfill is achieved.

5.5.4.4 Dewatering

Take all necessary precautions to keep trenches and pits free from water. Provide all necessary pumps, drainage pipes and other equipments required for dewatering. Install all necessary filtering and detention measures required by the Territorial Authority.

If the bottom of the trench is likely to be adversely affected by rain, remove the final 80mm of excavation as a separate operation immediately before placing the bedding material.

5.5.5 Pipe Laying

5.5.5.1 Bedding Pipes

Provide a minimum 75mm thick underlay layer of well compacted bedding material for all pipes. A chase shall be excavated in the bedding to accommodate any jointing socket or fitting in the drain. The pipe embedment material shall be laid and compacted so that the pipe is evenly and continuously supported along its length on either side of the pipe, and with an overlay layer minimum 150mm thick.

When trench support systems are used, the bedding material shall be placed and compacted in a manner so that no loss of compaction results from removal of the trench side support systems. The trench support shall be removed in such a way as to ensure that the placing and compaction of the bedding material occurs below the trench supports and directly against the undisturbed ground of the trench walls.

After completion of the jointing and inspection of drain pipes, place and compact the bedding surround material around the pipe to the required depth over the pipe. The material shall be carefully placed around and over the pipe using hand tamping and in a manner that ensures the pipe is uniformly supported all round its perimeter and without voids. Take care during placement and compaction to ensure the pipe is not displaced or damaged.

5.5.5.2 Laying Pipes

Install foul water drains in accordance with AS/NZS 3500.2 to the layout, levels and grades shown on the drawings. Drain pipes shall be laid to provide maximum falls, in straight lines and at an even grade, without obstruction to flow, and with full allowance for bedding.

Before installing the pipes, check the bore of each pipe is free from foreign matter and that the pipe exterior and the socket have not been damaged in handling or storage. All pipelines shall be kept clean and free of dirt and debris at all times during installation, testing and commissioning.

PVC-U foul water drain pipes shall be properly jointed (rubber ring joint or solvent welded joint) to produce a watertight seal in accordance with the manufacturer's instructions.

Start laying main drains at the point of outfall and insert junctions for branch drains as the work proceeds. Pipes shall be laid with the least number of bends, in the centre of the trench, in straight lines between bends, and to the grades and locations shown on the drawings.

Install all necessary fittings, including vents, inspection openings and access points, bends and junctions, to the locations shown on the drawings and in accordance with the manufacturer's instructions. Where not specified on the drawings or schedules, fittings for inspection openings, bends, junctions, etc., shall be selected from the PVC pipe system range of products and installed in accordance with the manufacturer's instructions.

Other than precautions against damage by displacement or floating pipes, no bedding surround material or backfill shall be placed until the laying of the drain has been inspected by the Territorial Authority.

5.5.5.3 Steep Gradients

Where the gradient of a foul water drain pipe exceeds 1:5 (20%), anchor blocks shall be installed at the bend or junction at the top and bottom of the inclined drain, and at intervals not exceeding 3m. Anchor blocks shall be constructed in accordance with AS/NZS 3500.2: Section 3.4.4.

5.5.5.4 Underground Drains Near & Under Buildings

Protect underground drains near and under buildings against damage in accordance with AS/NZ 3500.2 where the minimum cover specified cannot be provided.

5.5.5.5 Jointing - Rubber Ring Joints

PVC-U drain pipes shall be jointed using rubber ring seals in preference to the solvent welded method - which shall be used where rubber ring jointed fittings are not manufactured. Only use seals and lubricants recommended by the pipe or fitting manufacturer. The marking of pipes by scoring is not permitted. All joints shall be watertight and prevent the infiltration of groundwater and the intrusion of tree roots.

Rubber ring joints shall be assembled in accordance with the pipe manufacturer's instructions and generally as follows:

- Ensure that all components are clean and free of dirt and debris during all stages of the jointing process;
- Ensure the pipe spigot is correctly chamfered and has a clearly visible witness mark to the correct insertion length;
- Clean and generously lubricate with jointing lubricant, especially the chamfer. Do not lubricate the ring groove;
- Where elastomeric seals are required to be fitted, clean and fit the seal, and check the elastomeric

seal sits evenly in the housing;

- Apply the manufacturer's specified lubricant to the end of the spigot and chamfer of the pipe;
- Keep the elastomeric seal and its housing free of lubricant, unless otherwise recommended by the manufacturer;
- Align the pipes so there is no deflection at the joint, then insert the spigot in the socket and push home to the witness mark;
- Hold the socket end firmly during the jointing to prevent previously assembled joints from moving;
- If excessive force is required and/or the jointing process does not comply with the manufacturer's instructions, disassemble and remake the joint.

Field cutting pipes:

- cut the spigot end square and remove all burrs;
- chamfer the cut end of the pipe with a taper of 15° to approx. half the wall thickness, or as specified by the pipe manufacturer;
- as appropriate, witness mark the pipe at the specified insert by the manufacturer.

5.5.5.6 Pipe Cover

Unless specified otherwise on the drawings, the minimum pipe cover (finished surface to top of pipe) shall be:

- where not subject to vehicular loading: 300mm.
- where subject to vehicular loading - not in roadways: 500mm.
- where subject to vehicular loading - in sealed roadways: 500mm.
- where subject to vehicular loading - in unsealed roadways: 500mm.
- pipes in embankment conditions or subject to loading from heavy construction equipment: 750mm.

5.5.5.7 Marking Tape

Install marking tape on top of the pipe embedment zone and centred over the pipe before commencing backfilling.

5.5.6 Manholes

5.5.6.1 Manholes

Construct foul water manholes (circular access chambers) to the locations, dimensions, levels and details shown on the drawings, and make all necessary connections to the private foul water drainage system.

Manholes shall be circular precast concrete manholes, constructed to NZS 4404 and the requirements of the Territorial Authority, and to the dimensions and details shown on the drawings.

- Concrete precast manhole risers: manufactured to the requirements of AS/NZS 4058.
- Concrete precast manhole flanged bases and lids: manufactured to NZS 3109, with a surface finish to NZS 3114.
- Manhole covers and cover frames: cast iron or steel construction conforming to AS 3996 and the requirements of the Territorial Authority.

Connect foul water drains to concrete precast manholes using purpose-made manhole connectors and pipe stubs/shorts in accordance with the requirements of the Territorial Authority and as shown on the drawings.

5.5.7 Connection

5.5.7.1 On-Site - to Existing Foul Water Drain

Connect to discharge the new foul water drainage line to the existing, operational foul water drainage line on-site in accordance with the requirements of the Territorial Authority and as shown on the drawings.

5.5.8 Testing

5.5.8.1 Foul Water Drains

Test the foul water drainage installation, including all drains, connections and system components, for water tightness in accordance with the requirements of the Territorial Authority (TA).

Where required by the Territorial Authority, the testing shall be undertaken in the presence of a representative of the TA. Demonstrate to the Contract Administrator and the Territorial Authority that the installation complies with the requirements of the contract documents, related standards and regulatory bodies. Lodge all certificates of approval with the Contract Administrator.

Unless specified otherwise by the Territorial Authority, the test method shall be the Water Test procedure for non-pressure pipelines as defined in AS/NZS 2302. Where appropriate, the procedures in NZBC E1/VM1 may be used as an alternative. The acceptability of other test methods are be subject to the approval of the Territorial Authority and the Contract Administrator.

Provide all necessary plant, equipment and instruments required for the specified testing procedure. All testing and commissioning shall be undertaken by suitably skilled and experienced technicians.

Pressure testing shall be carried out after the pipes have been laid and the bedding material has been placed over the pipes as specified.

Prior to testing ensure that all pipe junctions and inspection eyes are exposed, and pipelines have been flushed and all residual debris cleaned out.

Foul water manholes shall be tested for watertightness by plugging all pipes and filling with water. After absorption has taken place the water level shall remain constant for thirty minutes.

Test results shall be recorded clearly on properly formatted Test Result sheets, and submitted to the Contract Administrator within 48 hours of completion of testing.

Repair or replace any materials or workmanship found to be defective or faulty during testing, and repeat the test until a satisfactory test result is achieved.

Leave the installation watertight and free of defects, and operating to the required performance standard.

The work shall be deemed incomplete unless all required testing and commissioning has been carried out and has passed the requirements of the testing specification and the Territorial Authority.

5.5.8.2 Water Test Procedure - to AS/NZS 2302

Water test procedure of foul water drains (non-pressure) - to AS/NZS 2302: Section 7.3.2.

- The pipeline shall be filled with water to a height of not less than 1m above the natural ground level at the highest point of the section being tested, or to the flood level of the lowest sanitary fixture, but not exceeding 5m at the lowest point of the test section.
- The pressure shall be maintained without leakage for at least 15 minutes.
- The source of any leaks shall then be ascertained and any defects repaired.
- The pipeline shall then be retested.

Note: Testing should not be carried out if groundwater is present above the pipeline. If groundwater is present, the test pressure should be increased to compensate for the depth of groundwater at a rate of 10 kPa for every 1m of groundwater depth.

5.5.9 Backfilling

5.5.9.1 Backfilling

Trenches shall be backfilled as soon as possible after the laying, inspecting and testing of the pipeline.

Where required, lay marker tape along the length of the drain, just above the top of the pipe embedment zone, before backfilling.

Trench backfill materials shall be placed over the pipe embedment, and compacted to restore the trench as near as practicable to the normal surrounding ground surface level and reduce the likelihood of subsidence. Backfill material shall be placed in uncompacted layers not exceed 300mm, then mechanically compacted to the required density.

Temporary trench support systems shall be lifted progressively above each layer of backfill to ensure each layer is compacted against undisturbed ground.

Any deficiencies of trench filling exposed by settlement shall be corrected to the required standard.

5.5.10 Reinstatement of Surfaces

5.5.10.1 Reinstatement of Surfaces

Refer to separate specification section - Siteworks - Reinstatement of Surfaces.

Ground and paved surfaces above excavated foul water drainage trenches shall be reinstated to the standard specified. Reinstatement shall generally achieve a standard equal to or better than the pre-existing situation - in no case will a lower standard be accepted.

Hedges, fences and other features to be retained that have been damaged or removed during the work shall be reinstated to the satisfaction of the Contract Administrator.

5.5.10.2 Public Property

Reinstatement of surfaces to public property shall comply with the requirements of the relevant controlling authorities.

6 ELECTRICAL

6.1 Preliminary

Refer to General Conditions of Contract and the Special Conditions in this Specification as appropriate. Read this section in conjunction with all other trade sections.

6.2 Compliance

Comply with the New Zealand Building Code 1992 including all revisions and amendments, Verification Methods where appropriate, and construction principles that are embodied in the Acceptable Solutions.

Comply with all relevant provisions and recommendations of:

1125:2001(AS/NZS)	Conductors in insulated electric cables and flexible cords
2201.1:2007(AS/NZS)	Intruder alarm systems - Client's premises - Design, installation, commissioning and maintenance
2293.2:1995(AS/NZS)	Emergency evacuation lighting for buildings - Inspection and maintenance
3000:2007(AS/NZS)	Electrical installations (known as the Australia/New Zealand Wiring Rules)
3085.1:2004(AS/NZS)	Telecommunications installations - Basic requirements
3191:2008(AS/NZS)	Electrical flexible cords
3350.2.35:1999(AS/NZS)	Safety of household and similar electrical appliances - Particular requirements - Instantaneous water heaters
5000.1:2005(AS/NZS)	Electric cables - Polymeric insulated - For working voltages up to and including 0.6/1 (1.2) kV
60227.5:2003(AS/NZS)	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Flexible cables (cords)
60335.2.30:2009(AS/NZS)	Household and similar electrical appliances - Safety - Particular requirements for room heaters
60898.1:2004(AS/NZS)	Electrical accessories - Circuit-breakers for overcurrent protection for household and similar installations - Circuit-breakers for a.c. operation
61009.1:2015(AS/NZS)	Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) - Part 1: General rules
6104:1981(NZS)	Specification for emergency electricity supply in buildings
AS/NZS 2053	Specification for unplasticized PVC conduit and fittings for electrical wiring
AS/NZS 3012	Electrical installations - Construction and demolition sites
AS/NZS 3018	Domestic electrical installations
AS/NZS 3100	Requirements for electrical apparatus
AS/NZS 3439	Electrical switchgear and controlgear
AS/NZS 3947	Low-voltage switchgear
AS/NZS 60598	Luminaires - Particular requirements - Recessed luminaires

NZEC 54	Recessed luminaires
NZS 1989	Plugs and socket outlets
NZS 6206	Electric meter boxes

6.3 Workmanship

6.3.1 General

Supply and install all materials, including all necessary minor and incidental items, for proper completion of all of the electrical services specified or shown on the drawings. The contract will not be deemed to be complete until the Electrician has provided an Electrical Certificate of Compliance in accordance with NZEC 11 (made available to the Contractor in time for the Code Compliance Certificate application).

Obtain all necessary permits and consents, serve all notices and pay all fees in and customary charges connection with the works.

The position of switches, light and power outlets and other fittings, although shown specifically in some instances, are in general only shown diagrammatically. The exact location of each of these items will be as directed on site by the Architect/Designer; the Electrician shall give reasonable notice of when this information is required. Items positioned in contravention of this shall be repositioned if directed, including rewiring if necessary, all at the Electrician's expense.

Unless drawn (on 1:20 wall elevations) or specified otherwise the mounting height to the centreline of the following items above the floor shall be:

- 1000mm for lighting switches;
- 2000mm for wall mounted lights;
- 2100mm for the bayonet of pendant lights;
- 300mm for power points, except at benches.

(Notify the Architect/Designer if either the actual fitting or mounting position seem to make the mounting height noted above inappropriate).

Warranty cards and manufacturers guarantees for items supplied and installed by this trade shall be filled in correctly and handed over at Practical Completion. Arrange all circuits to obtain an optimum balance of the system, and check and reconnect where necessary to achieve this on completion. Leave the works clean and tidy and in full operational order.

6.3.2 Co-operation

Co-operate with all other trades and attend upon the Concretor and Carpenter to set out all required penetrations and to ensure that all wiring and fittings are correctly incorporated as work proceeds. The Carpenter will provide and fix all necessary dwangs and timber supports in locations determined by the Electrician.

6.3.3 Workmanship

All electrical work shall be carried out by, or under the direct control of, registered tradesmen, and shall be to recognized high standards. All work shall be such as to leave a neat, efficient and robust installation. Neatly label switchboards to identify each circuit.

The cutting away and checking of timbers shall be limited to such dimensions as will not prejudice the purpose for which the timber is used; observe NZS 3604: 2011 restrictions on the holing and checking of joists and beams. Chasing and checking of other materials shall be only to approval.

Adequately protect all surfaces. Any damage to fittings or surfaces made good by the appropriate trade at the Electrician's expense.

6.3.4 Wiring

Joints within cable runs will not normally be accepted. TPS cable shall be adequately supported, and clipped at regular intervals. At terminations all strands of conductors shall be fully secured in a terminal block or clamped under a screw head washer; do not cut away any strands. Wiring which terminates in enclosed fittings and/or where subject to heat liable to cause deterioration, shall be high temperature type, with the tails made off with heat resisting sleeves, to protect the permanent wiring.

Wire lights in 1.5mm 3 core - 7.5 amps loading max per circuit (allow for 100w to all light fittings unless identified otherwise).

Wire power outlets in 2.5mm 3 core - 7 maximum GPO singles or doubles per circuit. Assess power outlets for specific equipment and allow accordingly.

Conceal all wiring except as noted on drawings or below. All wiring cast into concrete shall be run in conduit pipes. All cables shall be stranded (single core is unacceptable).

Wire more or less parallel to and at right angles to the structural elements - avoid any diagonal wiring. Layout of the principal distribution wiring shall be to approval. Position all wires to minimise the risk of damage from subsequent nailing of linings etc.

Wire exterior lighting in screened cable.

1. EXPOL R2.5 Underfloor Insulation – Technical Data Sheet
2. EXPOL-Technical-Guide-2022-UnderFloor

EXPOL R2.5 UNDERFLOOR INSULATION – TECHNICAL DATA SHEET

1.0 - Product Overview

Trusted by Kiwis for more than 25 years, **EXPOL UnderFloor** Insulation (UnderFloor) is easy-to-install and is available in 4 convenient joist widths 360, 410, 470, 560 (mm). It is the DIY solution that will keep your home warm, dry and healthy.

Suitable for use in both new and existing homes, **EXPOL UnderFloor** Insulation comes with a 50-year product warranty and requires no maintenance.

EXPOL provides EXPOL R1.4 White, EXPOL R1.8 Black, R2.5 and R3.1 Black UnderFloor Insulation for insulating between the joists under timber floors. **EXPOL UnderFloor** is specifically designed for both new and existing floors.



2.0 - Installation

2.1 There are no special requirements for UnderFloor when handling or installing UnderFloor. It is an inert, non-toxic material.

2.2 When transporting, storing or installing, ensure the UnderFloor is not exposed to:

- Petroleum based solvents, or
- Fire, or
- Sustained direct sunlight.

2.3 PVC sheathed electrical cables should not be allowed direct contact with UnderFloor.

2.4 UnderFloor is compatible with all common construction products.

3.0 - Maintenance

3.1 No maintenance required

For further technical information please contact us.

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EXPOL R2.5 UNDERFLOOR INSULATION – TECHNICAL DATA SHEET

4.0 - Warranty

We believe we manufacture and supply the highest quality UnderFloor, EPS and XPS Foam Insulation products and that is why we stand behind them with some of the best warranties in the industry.

4.1 We provide a 50-year warranty on our UnderFloor Foam Insulation Products – for full warranty details visit www.expol.co.nz/expol-underfloor-warranty/

5.0 - Compliance with the New Zealand Building Code

UnderFloor, when installed and maintained in accordance with the requirements outlined in this technical data sheet, will meet or contribute to meeting the following provisions of the New Zealand Building Code:

- 5.1 Clause B2 Durability, performance B2.3.1 (a), B2.3.1(b)
- 5.2 Clause F2 Hazardous building materials performance F2.3.1(a)
- 5.3 Clause H1 Energy Efficiency, Performance H1.3.1 (a) and H1.3.2 E.

EXPOL UnderFloor is not subject to a warning or ban under the Building Act 2004.

6.0 - Quality Assurance

- 6.1 BRANZ, H1 Energy efficiency performance H1.3.1(a), H1.3.2(e)

For further technical information please contact us.

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EXPOL R2.5 UNDERFLOOR INSULATION – TECHNICAL DATA SHEET

7.0 - Technical Data

Properties	Test / Method / Standard	Test Results
Material	Expanded Polystyrene	
Density	12 kg / m ³	
Sheet Size	1200 mm x 100 mm x 360 mm 1200 mm x 100 mm x 410 mm 1200 mm x 100 mm x 470 mm 1200 mm x 100 mm x 560 mm	
Thickness / R Value	100mm	R 2.5
Thermal Conductivity	ATSM 168	K – Value 0.043
Rate of water vapour transmission (max) measured parallel to rise at 23 deg C	AS 2498.5	630 mg/m ² s
Permeability m/s	-	
Compressive Resistance KPA at 1%	AS 2498.3	- KPA
Compressive Resistance KPA at 2%		- KPA
Compressive Resistance KPA at 5%		- KPA
Compressive Resistance KPA at 10%		70 KPA
Youngs Modulus	-	- MPA
Cross breaking strength KPA	AS 2498.4	135 KPA
Dimensional stability of length, width & thickness (max) at 70 deg C for 7 days	AS2498.6	1%
Long term water absorption by immersion	ASTM C72	- %v / v
Determination of flame propagation surface ignition	AS2122.1-1993	2 sec
Medium flame duration (max)		3 sec
Eighth vale		
Fire behavior	AS/NZS 1530.3:1999	
Spread of flame index (0 – 10)		0
Smoke developed index (0 – 10)		5
Recycled Content	30%	
Recyclability	UnderFloor is 100% recyclable	
Environmental Statement	UnderFloor is inert and non-toxic. There are no chemicals or gases harmful to the environment emitted from UnderFloor either during manufacture or within use.	
Ozone Depleting Potential	UnderFloor does not contain ozone-depleting CFC or HCFC gases, nor use them in its manufacture. As a result, UnderFloor has zero ozone depletion potential.	
Vermin Resistance	UnderFloor does not offer any nutritive value.	

For further technical information please contact us.

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SOLID INSULATION AND LIGHTWEIGHT POLYSTYRENE CONSTRUCTION SOLUTIONS



TIMBER UNDERFLOOR INSULATION R1.4 & R1.8

EXPOL UnderFloor has been used to insulate under timber floors for over 25 years and is an iconic New Zealand solution when it comes to creating a warmer, healthier home.

New Building Code changes are coming into effect on 1 May, 2023 which could affect the circumstances where these traditional insulation products can be used within the Building Code.

For the latest information please visit:
www.expol.co.nz/insulation-code-update

For Underfloor Insulation products which have been specifically designed to meet the new insulation regulations see pages 12-13.



THE PRODUCTS

EXPOL R1.4 UnderFloor Insulation

is a rigid white panel manufactured from Expanded Polystyrene material, 1200mm in length, 60mm thick and manufactured in four standard widths 360, 410, 470, 560.

It is the ideal solution for normal New Zealand suburban environments or rural areas which do not have extreme temperatures and has been in the market for 25 years. EXPOL R1.4 contains recycled content and can be recycled.

BRANZ appraised with a 50 year EXPOL product warranty gives you the satisfaction of knowing that you will have a warmer, drier, healthier home in winter.

EXPOL R1.8 Black UnderFloor Insulation

is a rigid black panel infused with graphite making it up to 30% more efficient than other polystyrene panels.

Manufactured from Expanded Polystyrene material, 1200mm in length, 60mm thick in four standard widths 360, 410, 470, 560 (see Table 3.1). EXPOL R1.8 is ideal for extremely cold temperatures and windy environments and can be recycled.

Backed by a 50 year EXPOL product warranty giving you the satisfaction of knowing that you will have a warmer, drier, healthier home in winter.

DO NOT STORE IN DIRECT SUNLIGHT! Product could be damaged and warranty will be void.

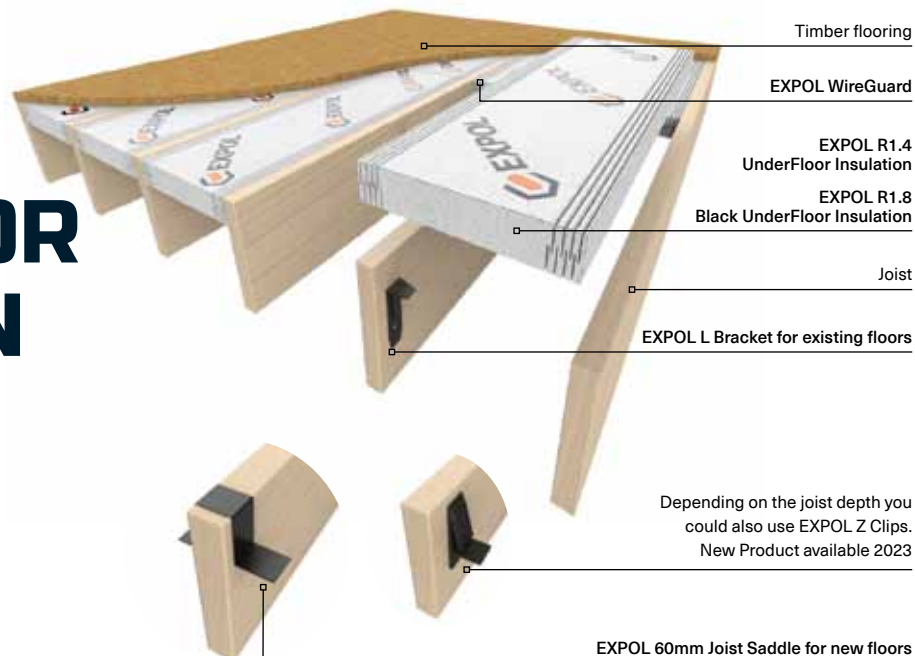


Table 3.1

PRODUCT OPTIONS & SIZES

Dimensions (mm)	Thickness	Length	Width
EXPOL R1.4 UnderFloor Insulation	60	1200	360
	60	1200	410
	60	1200	470
	60	1200	560
EXPOL R1.8 Black UnderFloor Insulation	60	1200	360
	60	1200	410
	60	1200	470
	60	1200	560

SYSTEM COMPONENTS

WIREGUARD

EXPOL WireGuard is a waxed paper strip used to separate exposed electrical cables from EXPOL insulation. Expanded Polystyrene in some cases reacts with the plasticiser and degrades the elastic properties of some electrical cables over a prolonged period.

FIXINGS

There are two types of fixings specific to existing floors and new floors. They are made from non-corrosive nylon and are used to fix the EXPOL panels in place.

- **Existing Floors:** EXPOL L Brackets for R1.4 & R1.8 are designed to fit under the panel (supplied with stainless steel nails). *Depending on the joist depth you could also use EXPOL Z Clips - see page 12.*
- **New Floors:** EXPOL Joist Saddles for R1.4 & R1.8 (short length) are designed to slip over the joist to support and secure the 60mm panel.



STYRO-FIX CONSTRUCTION ADHESIVE

Styro-Fix is an advanced single component polyurethane-based construction adhesive.

This powerful adhesive is developed especially for the construction industry and will bond most types of construction materials including timber (damp and dry), concrete, plasterboard, polystyrene and many other porous and non-porous substrates.

It bonds expanded polystyrene to most surfaces, delivers strong adhesion and rapid cure, it is gun-able and non-drip.



Table 3.2

PRODUCT PROPERTIES

Property	Unit	EXPOL R1.4 UnderFloor Insulation	EXPOL R1.8 Black UnderFloor Insulation	Test Reference
Material		Expanded Polystyrene	Expanded Polystyrene	
Density	kg/m ³	12	18	
Thickness / Product R-value	m ² K/W 60mm 120mm (Double Layer)	R 1.40 R 2.80	R 1.80 R 3.60	ASTM C518-04
Compressive strength at 10% deformation (min)	KPA	70	105	AS 2498.3
Cross breaking strength	KPA	135	200	AS 2498.4
Determination of flame propagation surface ignition				
Medium flame duration (max)	sec	2	2	AS2122.1-1993
Eighth value	sec	3	3	
Fire behaviour - Spread of Flame Index (0-10)		0	0	AS/NZS 1530.3:1999
- Smoke Developed Index (0-10)		5	5	
Dimensional stability of length, width & thickness (max) at 70 deg C for 7 days	%	1	1	AS2498.6
Recycled content	%	30	0	
Rate of water vapour transmission (max) measured parallel to rise at 23°C	mg/m ² s	630	520	AS 2498.5
Long term water absorption by immersion	% v/v	-	-	ASTM C272

INSTALLATION

For detailed installation instructions, please refer to EXPOL's technical literature or BRANZ appraisal, both available on our website www.expol.co.nz/installing-timber-floor-insulation

Scan the code to access
Installation Guide



FURTHER INFORMATION

For further detailed information on all products refer page 36 & 37 or contact EXPOL 0800 86 33 73.
For Expanded Polystyrene Densities and Colour Coding refer page 37.

SPECIFIERS, ARCHITECTS AND PLANNERS

For all specifying information, relevant product testing and other detailed information please refer to MasterSpec documents on www.masterspec.co.nz or contact EXPOL for an electronic copy.

BRANZ APPRAISAL

EXPOL R1.4 UnderFloor has a BRANZ appraisal.
See BRANZ certificate number 256.

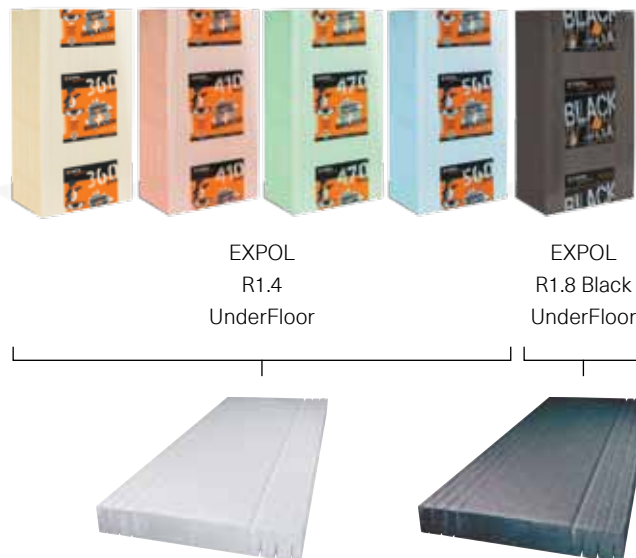
INSULATION STANDARD

All EXPOL timber floor insulation solutions comply with the Australian and New Zealand Standard AS/NZS 4859.

MANUFACTURING STANDARD

All panels have a yellow stripe down one edge to confirm compliance with manufacturing standard AS 1366 Part 3 1992 for SL grade.

R1.4 bags are colour coded to joist width



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Details www.miproducts.co.nz

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EXPOL and the Environment
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EXPOL
www.expol.co.nz

TIMBER UNDERFLOOR INSULATION R2.5 & R3.1

EXPOL's New Generation, high performance insulation range is specifically designed to meet the new insulation regulations.

Our goal is to reduce our carbon footprint and deliver dryer, warmer, healthier and environmentally friendly spaces.

New Building Code changes coming into effect 1 May, 2023 - more information on the new Building Code Regulations, and **EXPOL's New Generation** products see our detailed guide at:
www.expol.co.nz/insulation-code-update



THE PRODUCTS

EXPOL R2.5 UnderFloor Insulation is EXPOL's New Generation Underfloor R2.5 panel consciously designed and engineered to meet the new insulation regulations that will be introduced on 01 May, 2023.

Made from Expanded Polystyrene that contains recycled content it is 1200mm in length, 100mm thick and manufactured in four standard widths 360, 410, 470, 560 (see Table 4.1).

It is the ideal solution for normal New Zealand suburban environments or rural areas which do not have extreme temperatures. EXPOL R2.5 contains recycled content and can be recycled.

BRANZ appraised with a 50 year EXPOL product warranty gives you the satisfaction of knowing that you will have a warmer, drier, healthier home in winter.



EXPOL R3.1 Black UnderFloor Insulation

is the ultimate underfloor insulation. A rigid panel infused with graphite makes it up to 24% more efficient than EXPOL R2.5.

EXPOL R3.1 is ideal for extremely cold temperatures and windy environments and can be recycled. Manufactured from Expanded Polystyrene material, 1200mm in length, 100mm thick in four standard widths 360, 410, 470, 560.

Backed by a 50 year EXPOL product warranty giving you the satisfaction of knowing that you will have a warmer, drier, healthier home in winter.

DO NOT STORE IN DIRECT SUNLIGHT! Product could be damaged and warranty will be void.

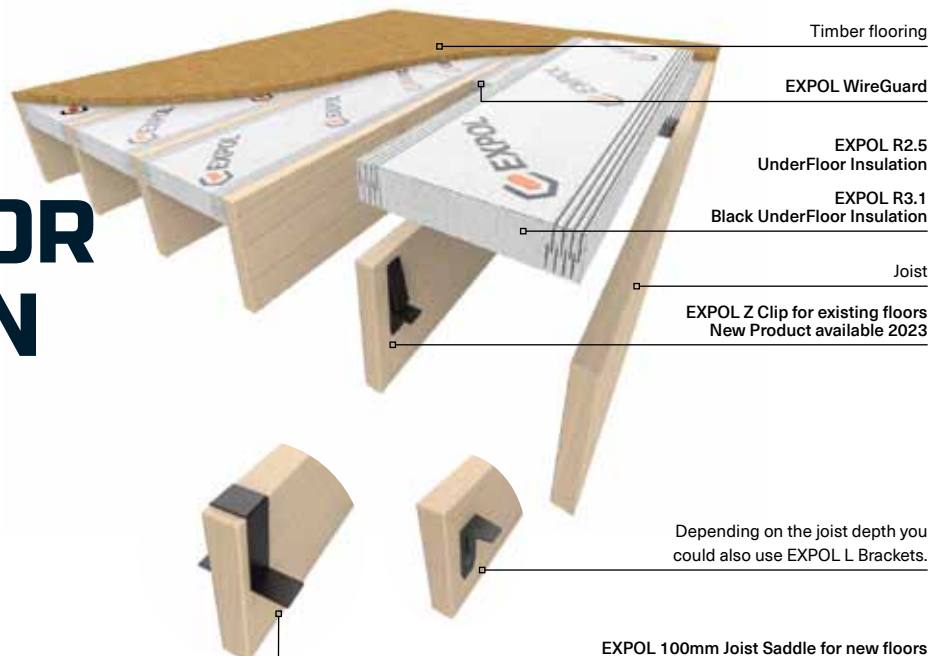
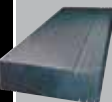


Table 4.1

PRODUCT OPTIONS & SIZES

Dimensions (mm)		Thickness	Length	Width
EXPOL R2.5 UnderFloor Insulation		100	1200	360
		100	1200	410
		100	1200	470
		100	1200	560
EXPOL R3.1 Black UnderFloor Insulation		100	1200	360
		100	1200	410
		100	1200	470
		100	1200	560

SYSTEM COMPONENTS

WIREGUARD

EXPOL WireGuard is a waxed paper strip used to separate exposed electrical cables from EXPOL insulation. Expanded Polystyrene in some cases reacts with the plasticiser and degrades the elastic properties of some electrical cables over a prolonged period.



FIXINGS

There are two types of fixings specific to existing floors and new floors. They are made from non-corrosive nylon and are used to fix the EXPOL panels in place.



- Existing Floors: EXPOL Z Clips for R2.5 & R3.1 are designed as a push fit - no nails bracket to squeeze between the panel and the joist. *Depending on the joist depth you could also use EXPOL L Brackets - see page 10.*
- New Floors: EXPOL Joist Saddles for R2.5 & R3.1 (extended length) are designed to slip over the joist to support and secure the 100mm panel.



STYRO-FIX CONSTRUCTION ADHESIVE

Styro-Fix is an advanced single component polyurethane-based construction adhesive.

This powerful adhesive is developed especially for the construction industry and will bond most types of construction materials including timber (damp and dry), concrete, plasterboard, polystyrene and many other porous and non-porous substrates.

It bonds expanded polystyrene to most surfaces, delivers strong adhesion and rapid cure, it is gun-able and non-drip.



Table 4.2

PRODUCT PROPERTIES

Property	Unit	EXPOL R2.5 UnderFloor Insulation	EXPOL R3.1 Black UnderFloor Insulation	Test Reference
Material		Expanded Polystyrene	Expanded Polystyrene	
Density	kg/m3	12	18	
Thickness / Product R-value	m2K/W 100mm	R 2.50	R 3.10	ASTM C518-04
Compressive strength at 10% deformation (min)	KPA	70	105	AS 2498.3
Cross breaking strength	KPA	135	200	AS 2498.4
Determination of flame propagation surface ignition				
Medium flame duration (max)	sec	2	2	AS2122.1-1993
Eighth value	sec	3	3	
Fire behaviour - Spread of Flame Index (0-10)		0	0	AS/NZS 1530.3:1999
- Smoke Developed Index (0-10)		5	5	
Dimensional stability of length, width & thickness (max) at 70 deg C for 7 days	%	1	1	AS2498.6
Recycled content	%	30	0	
Rate of water vapour transmission (max) measured parallel to rise at 23°C	mg/m2s	630	520	AS 2498.5
Long term water absorption by immersion	% v/v	-	-	ASTM C272

INSTALLATION

For detailed installation instructions, please refer to EXPOL's technical literature, available on our website www.expol.co.nz/installing-timber-floor-insulation

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FURTHER INFORMATION

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INSULATION STANDARD

All EXPOL timber floor insulation solutions comply with the Australian and New Zealand Standard AS/NZS 4859.

MANUFACTURING STANDARD

All panels have a yellow stripe down one edge to confirm compliance with manufacturing standard AS 1366 Part 3 1992 for SL grade.

R2.5 bags are colour coded to joist the width



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