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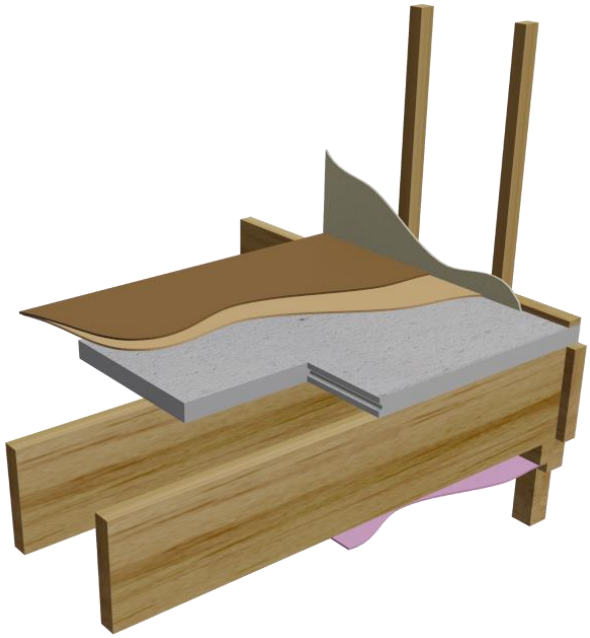
INTEGRA Lightweight Concrete Flooring System



TECHNICAL MANUAL

Version 2 – November 2022

Contents

1. General System Description

The INTEGRA Lightweight Concrete Flooring System is a proprietary high-performance flooring system that can provide both structural performance and vertical fire separation and prevent undue noise transmission in a building.

The panel includes two discrete layers of steel mesh for reinforcement and the panels are screw fixed into the joists to ensure the performance of the System.

The INTEGRA Lightweight Concrete Flooring System is suitable for the use in low, medium and high-density housing.

This system provides a quality floor solution with the feel of a concrete floor at a significantly reduced cost.

2. Terminology

Find below explanations of some of the acronyms that are used throughout this document, for further information you can refer to the Building Code Handbook for additional definitions this can be found at the following link.

https://www.building.govt.nz/building-codecompliance/building-code-and-handbooks/building-code-handbook/

AS –Acceptable Solution or Australia Standard

FRR – Fire Resistance Rating

FSTC – Field Sound Transmission Class

NZBC – New Zealand Building Code

NZS – New Zealand Standard

STC – Sound Transmission Class represents a single number system for quantifying the transmission loss through a building element. STC is based upon typical speech and domestic noises, and thus is most applicable to these areas. STC of a building element is measured in approved testing laboratories under ideal conditions.

FSTC - The 'field' or in situ measurement of Sound Transmission Class. Building tolerances and flanking noise have an effect on the performance of a partition when it is actually installed, which result in FSTC values lower than the laboratory derived STC values, typically 5 dB less.

Rw - Sound Reduction Index is a number used to rate the effectiveness of a soundproofing system or material

IIC – Impact Insulation Class measures a floor assembly's ability to absorb impact sound

FIIC - The 'field' or in situ measurement of Impact Insulation Class. Building tolerances and flanking noise have an effect on the performance of a partition when it is actually installed, which result in FIIC values lower than the laboratory derived IIC values, typically 5 dB less.

PPE – Personal Protective Equipment

SG – Stress Grade

VM – Verification Method

AS1530.4-2005 – Methods for fire tests on building materials, components and structures, Part 4: Fire-resistance tests of elements of construction

Sound Insulation - When sound hits a surface, some of the sound energy travels through the material. 'Sound insulation' refers to ability of a material to stop sound travelling through it.

Impact Sound - Sound produced by an object impacting directly on a building structure, such as footfall noise or chairs scrapping on a floor.

Flanking Paths/Transmission - Transmission of sound energy through paths adjacent to the building element being considered. For example, sound may be transmitted around a wall by travelling up into the ceiling space and then down into the adjacent room.

Structure-Borne Transmission - The transmission of sound from one space to another through the structure of a building.

3. Specification Reference Labelling

The specification label reference allows a quick reference to a system.

For example

IN T FC A 120 a

IN = 75mm Integra Panel

T = Timber Support Structure or

S = Steel Support Structure

FC= Floor Ceiling

A = Acoustic

120 = Fire Resistance Rating

a/b/c/d/e… = System Options

4. Product Substitution

The INTEGRA Lightweight Concrete Flooring System is a proprietary system that has been carefully designed to New Zealand conditions and has been independently tested and assessed to make sure that it meets the performance criteria as outlined in the NZBC. It is imperative to use only Resene Construction Systems proprietary products where specified and that the design and construction of the Flooring System is

followed so that you are safe in the knowledge that the level of fire safety, structural and sound performance has been achieved on site.

5. Components not supplied

GIB® Systems

A GIB® System is only required if you are looking to use the INTEGRA Lightweight Concrete Flooring System as part of a fire separation system.

The INTEGRA Lightweight Concrete Flooring System described in this document is partly based on test data from Winstone Wallboards Ltd. Resene Construction Systems has received authorisation and approval to utilise this data to achieve enhanced solutions for the INTEGRA Lightweight Concrete Flooring System. This means that the system must always incorporate the Winstone Wallboards Ltd products that are specified in the Technical Manual. Resene Construction Systems accepts no liability if system components are not used in accordance with the instructions contained within this publication.

6. Scope of use for the INTEGRA Lightweight Concrete Flooring System?

INTEGRA Lightweight Concrete Flooring System can be used: -

- As a replacement for conventional particleboard or plywood sheet flooring on a suspended timber or steel support structure with floor joists at 600 centres maximum
- Where a Fire Resistance Rating up to 120/120/120 is required
- Where up to a 3 kPa uniformly distributed live load is required
- Where a concentrated live load up to 3.7 kN is required (20 mm diameter foot – see Table 3.1 in AS/NZS 1170.1)
- Where a concentrated live load up to 7.5 kN is required (100 mm x100 mm square foot – see Table 3.1 in AS/NZS 1170.1)
- For buildings that have been designed and constructed in accordance with NZS 3604 Section 7
- Where you are seeking compliance with the NZBC

The designer should consider the various systems depending on the acoustic and fire performance that is required. The designer should factor in the following:

- Size of the floor
- Control Joint set out
- Potential building movement, earthquake zones
- Any lateral loads
- Floor loads
- That the timber framing needs to be designed for the individual project
- Fire Ratings if needed
- Acoustic Ratings if needed

7. Compliance with the NZBC

NZBC B1 – Structure

The design and specification for timber framing must be in accordance with the performance requirements of NZBC B1. Acceptable Solution B1/AS1 nominates NZS 3604:2011, so timber floor framing designed in accordance with NZS3604:2011 complies with NZBC B1 and is the best choice to use when using the INTEGRA Lightweight Concrete Flooring System. Where the timber framing falls outside the scope and the requirements of NZS3604:2011 we recommend that a structural engineer is engaged to ensure that NZBC B1 compliance is achieved.

The INTEGRA Lightweight Concrete floor panels can carry permanent and imposed actions (dead and live loads) but otherwise perform NO STRUCTURAL FUNCTION and cannot form part of a diaphragm floor.

In relation to the design of the timber floor framing, the framing must be designed in accordance with either B1/AS1 3.0 Timber (NZS 3604) or B1/VM1 6.0 Timber (NZS 3603).

The INTEGRA Lightweight Concrete Flooring System can be used with either a loadbearing or non-loadbearing wall.

During construction provision should be made for areas that may have increased foot traffic to prevent wear and tear if the INTEGRA panels are wet.

Provision should also be made if the INTEGRA Panel is being stored on the floor joists during the construction phase to ensure that the floor can take the load of the panels.

NZBC B2 – Durability

NZBC clause B2.3.1 requires that a floor continue to satisfy the performance requirements of the NZBC for a period not less than 50 years. Under normal conditions of internal use, the INTEGRA Lightweight Concrete Flooring System will achieve a service life in excess of 50 years and thus satisfies the requirements of NZBC B2.

NZBC C1-C6 – Protection from Fire

The INTEGRA Lightweight Concrete Flooring System can be used to provide passive fire protection in accordance with the requirement of NZBC C1-C6 – Protection from Fire. The INTEGRA Lightweight Concrete Flooring System has been peer reviewed and meets the provisions of NZBC C1-C6 when kept within

the scope as outlined in Section 6 - Scope of use for the INTEGRA Lightweight Concrete Flooring System?.

The INTEGRA Lightweight Concrete Flooring System has been designed to be used in conjunction with GIB® Fire Rated Floor/Ceiling Systems, where the INTEGRA system replaced the particle board or plywood sheet flooring material that is used in the GIB® system.

The fire resistance rating of the INTEGRA system has been established through a Technical Opinion from BRANZ. The non-combustibility of the INTEGRA system (i.e., the lightweight concrete panels) has been established through a report from CSIRO. These fire reports are available on request.

Fire cells and Fire Resistance Ratings

1. The fire engineer for the project will determine where the fire cells are in the building and what fire resistance ratings (FRRs) are required.
2. In most cases, the INTEGRA Lightweight Concrete Flooring System will be part of the common floor of a fire cell between adjacent tenancies and will require a FRR.
3. The INTEGRA Lightweight Concrete Flooring System has been assessed in accordance with AS 1530.4: 2005 and achieves up to a 120/120/120-minute FRR, depending on which GIB® Fire Rated Floor/Ceiling system is utilised.
4. The elements of the FRR required will depend on the specific scenario in the building in question. For example, if fire sprinklers are present, the INTEGRA LWC Flooring System will not require an insulation rating.
5. Specific requirements are contained within the Acceptable Solutions C/AS1 (Risk Group SH) and C/AS2 (all other Risk Groups)

Control of Internal Fire and Smoke Spread

1. Where the INTEGRA LWC Flooring System is required to have a FRR, any services penetration through the floor is required to be fire stopped – specialist advice will be required from the fire engineer in this case.
2. In situations (Risk Group other than SH) where floor coverings are used the floor covering shall be either non-combustible or, when tested have a critical radiant flux of not less than that specified in Table 4.5 of C/AS2 or, comply with Appendix of C/VM2.

NZBC F2 – Hazardous Building Materials

Under normal conditions of internal use, the INTEGRA Lightweight Concrete Flooring System does not constitute a health hazard and meets the provisions of the NZBC Clause F2.

NZBC G6 – Airborne and Impact Sound

The INTEGRA Lightweight Concrete Flooring System provides airborne noise control ratings that exceed the minimum requirements of NZBC Clause G6 – Airborne and Impact Sound. The INTEGRA Lightweight Concrete Flooring System has been peer reviewed and meets the provisions of NZBC G6 when kept within the scope as outlined in Section 6 - Scope of use for the INTEGRA Lightweight Concrete Flooring System?

The STC ratings have been established through full-scale sound testing at the University of Auckland and an opinion by Acoustic Engineering Solutions. These reports/opinions are available on our website.

8. Exposure to weather during construction

The INTEGRA Lightweight Concrete Flooring System can be exposed to the elements for up to 3 months before the building is closed in. Should the floor be exposed to the weather for a longer period then we recommend applying Resene Aquapel over the entire surface of the INTEGRA Lightweight Concrete Panels to protect it further.

9. Materials

Fasteners

INTEGRA Lightweight Concrete Flooring System Screws must be used; these are available in the following sizes

Timber Floor Joists

- 14gx100mm Galvanised Screws
  - Used to secure the Integra Panel to the Floor Joists
- 14gx125mm Galvanised Screws
  - Used to secure the Integra Panel to the Floor Joists, or if you are skewing screws at a sharp angle to the ends of panel
- 14gx150mm Galvanised Screws
  - Used to secure the Integra Panel to the Floor Joists
  - Used to secure the bottom plate to the joists on non-bracing walls

Steel Floor Joists

- 14gx100mm Galvanised Self-Tapping Screws
  - Used to secure the Integra Panel to the Floor Joists

INTEGRA Floor Panel

- Compressive strength: 4 MPa
- Modulus of Elasticity, E: 1800 MPa
- Thermal Conductivity: 0.1496 W/mK (Average 23°) (m2K/W)
- Thermal Resistivity, R: 0.501 m^2K/W

- Substrate Thickness: 75 mm
- Density: 550 kg/m^3
- Weight: 44.55 kg/m^2
- 1800 mm long, 600 mm wide
- Non-Combustible (AS1530.1-1994)

PSL AAC Adhesive

- Supplied in 20kg bags
- Used for bonding AAC together and patching panel

Anti-Corrosion Coating

- Use to prime any exposed steel that may be exposed when the INTEGRA panel is cut to length or width
- Zinc Rich protective Coating such as Wurth Zinc Spray Light Perfect

10. System Variations

Where fire or acoustic performance is not required the following variations are permitted

- The use of Steel Frame in accordance with the (NASH Handbook Best Practice for Design and Construction of Residential and Low Rise Steel Framing).
- Utilising LVL members
- Utilising proprietary joists systems.

11. Framing set out

The INTEGRA Lightweight Concrete Flooring System must be supported on either a light timber framed structure or a light steel framed structure. The light timber framed structure may comprise timber joists, ply webbed joists, trussed joists, laminated timber joists, timber and steel beams or any combination of the above.

It is recommended that the floor framing system have a joist set out of either 360, 450 or 600mm (whole-number multiples of the 1800 mm INTEGRA panel length) to ensure minimal wastage onsite. The joists, bearers and any other support framing should be sized according to the project engineer/architect.

The floor framing system should be designed for the appropriate live load plus the in-service mass of the panels. For framing designed to NZS3604 “Timber Framed Buildings” compensation needs to be made for the extra weight of the INTEGRA LWC flooring panels. Framing sizes should be selected from the appropriate table for a live load of the Design Live Load plus 0.5 kPa for the Floor Panel. For example, for normal domestic loading the floor joists should be chosen from the 2.0kPa live load tables (1.5kPa + 0.5 kPa). Alternatively, a tabular summary of joist spacing, spans and sizes is provided in Table 1, that specifically accounts for the increased self-weight of INTEGRA LWC floor panels compared to conventional sheet flooring products.

12. Floor Loading

The INTEGRA Lightweight Concrete Flooring System has been designed to support a concentrated live load of 2.7kN applied over a 0.1m x 0.1m area.

Concentrated loads from load bearing walls or point loads shall be supported by additional framing such as joists or blocking. The bearing stress in the panels shall be limited to 1.0MPa.

13. Panel Layout

Floor joists have been sized according to maximum spans for the following spacing: 360mm, 450mm, and 600mm. INTEGRA Lightweight Concrete Flooring Panels should be laid as full panels wherever possible. The panels shall be laid in a stretcher bond pattern. Integra Floor Panels can be readily cut to size to suit floor layout requirements and openings. Concentrated loads (eg. Supporting a load bearing wall must have additional blocking or be situated over a double joist).

Where the panels need to be cut down we recommend not using panel lengths less than 225mm wide.

14. Bracing Walls

Where a bracing wall occurs on top of the INTEGRA Lightweight Concrete Flooring System it shall have either supporting blocking or a joist directly underneath. A Gib® HandiBrac™ can be fastened through the bottom plate into the supporting floor joist/blocking. For bracing walls parallel with the floor joists the bracing wall shall either be over a joist or be supported by solid blocking. Blocking shall have a minimum width of 45mm

The INTEGRA Lightweight Concrete Flooring System is **not** considered to provide a horizontal diaphragm bracing system.

Coach screw for fixing bracket to be sized to achieve minimum embedment into joist/blocking as required by GIB specification.

15. Penetrations

Penetrations in a floor are generally required for foul water pipework, water pipework, air conditioning and electrical services.

Provided the penetrations are isolated, penetrations up to 80mm in diameter may be made in INTEGRA Lightweight Concrete Flooring Panels without reducing the structural performance of the floor system. Larger penetrations or groups of penetrations should be supported by additional blocking.

Penetrations should be finished using a collar or appropriate sealant. Where the penetration is part of a fire rated system then an appropriate fire collar and sealant should be installed according to the fire engineer's specification.

16. Lateral Load Transfer

INTEGRA Lightweight Concrete Flooring Panels are fixed to the floor joists using 14-gauge, 100mm long screws at maximum 150mm centres around the perimeter of the floor area, and at 300mm centres along all intermediate joists. A minimum edge distance of 50mm is recommended from the short edge to the first screw, although screwing in on an angle is permitted. If on the short edges the panel overhangs a floor joist it must be cut back so that it is flush and supported on this edge.

The INTEGRA Lightweight Concrete Flooring System is **not** considered to provide a horizontal diagram bracing system.

17. Wet Areas

Where INTEGRA Lightweight Concrete Flooring Panels are being used in a Wet Area, an appropriate waterproof membrane must be installed in accordance with the manufacturer's specifications. Please check that adhesion to the panels will not be compromised by having a dusty surface, a masonry sealer may be required prior to any membranes being installed.

18. Acoustic Performance

The New Zealand Building Code requires an acoustic barrier between two tenancies to have an STC rating of at least 55. In order for a material to have an STC rating of 55 each frequency band between 125Hz and 4000Hz must have a 'deficiency' of no more than 8 and the sum of all deficiencies must be no more than 32. For more information regarding the acoustic values of the Integra Flooring System, refer to the report from Acoustic Engineering Services.

Placement of insulation in the floor/ceiling cavity will enhance the acoustic performance of the INTEGRA Lightweight Concrete Flooring System.

A carpet with underlay with generally provides the best absorption of sound.

It should be noted that the INTEGRA Lightweight Concrete Flooring System is generally **NOT** suitable for an intertenancy floor. This is due to the difficulty in achieving a suitable STC/IIC rating where hard flooring finishes such as tiles are being used.

Further increases in acoustic performance can be obtained using resilient mounts, channels or cradle systems. For further information on acoustic systems please refer to GIB® Acoustic Systems or an Acoustic Engineer.

19. Construction Joints

Construction control joints should divide the INTEGRA Lightweight Concrete Flooring System.

Construction joint locations should be as follows:

- At changes in panel and joist direction
- Over support walls or beams
- At 6.0 m maximum spacing

20. Floor Protection

Once the INTEGRA Lightweight Concrete Flooring System has been laid, we recommend that the INTEGRA Lightweight Concrete Flooring Panels are protected prior to finished floor coverings and preparation being completed. Thin plywood, or RAM board can be laid on top of the flooring where high traffic is expected during construction (i.e., hallways and entrances). This will protect and minimise surface damage to the INTEGRA Lightweight Concrete Flooring Panels.

21. Floor Coverings

Where the floor covering specification calls for 'thin section' flooring such as Vinyl and Carpet tiles or other floor coverings with low surface defect tolerances then the floor will require the application of a Floor Levelling/surface preparation compound prior to installation of these. Carpet with underlay can generally be installed as per a standard concrete floor preparation guideline.

Carpets

Installation of carpet smooth edge prior to laying carpet requires the use of specifically selected nails (Annular Grooved) as well as an adhesive. Use appropriate primer with all adhesives.

Tiles

As per manufacturer's guidelines. Apply tiles to screed or adhesive as per a concrete floor. Screed floors to maintain fall and/or levelling. Refer to Tile Adhesive manufacturer for Primer suitable for AAC (porous materials) to promote adhesion

Timber Floors

All timber floors require a vapour barrier to be installed after the flooring has been installed. We also recommend the use of a Floor Levelling Compound to ensure the floor is flat. Batten fix – Anchor battens at the required centres using anchors suitable for AAC Floating Timber Floor - Underlay / backing installed as per normal for a concrete slab.

Vinyl (Linoleum)

Floor levelling is generally required: Installed as per manufacturer's requirements, always consult your floor covering specialist for advice.

22. Recommend Floor Levelling Screeds and Vapour Barriers

The recommend floor levelling compound is Bostik Ul-200. The recommend vapour barrier is Bostik Moisture Seal Epoxy Water Vapour Barrier. For a full specification please contact your local Bostik Representative.

23. Installation Guidelines

General

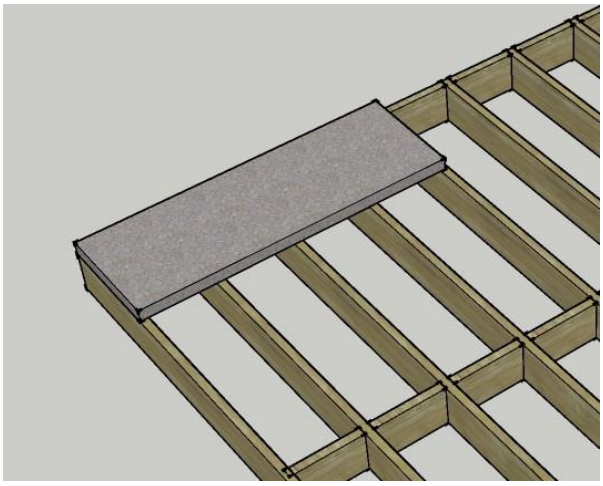
Check that sub-floor/joists are straight and true

Step 1 – Setting out

Measure 600mm in from perimeter/boundary joist at both ends of the floor. Mark this with a chalk line and continue this process across the floor

Step 2 – Installing first panel

Starting from the corner of one of the boundary joists you measured from, lay the first Integra Floor Panel so that it is parallel with that boundary joist. You should make sure that both of the narrower ends of the Integra Floor Panel are supported on joists/blocking. Make sure that the edge with the groove in it, is on the boundary joist edge.

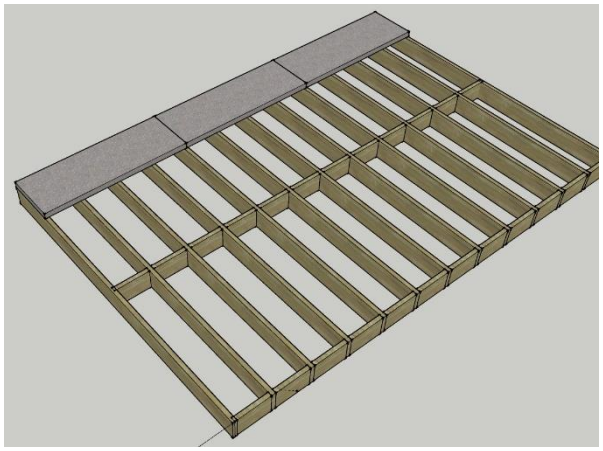


Step 3 – Joining panels

Make sure that all narrow ends of the Integra Floor Panels also have Resene Construction Systems AAC Adhesive applied to it before butting in the adjoining panel.

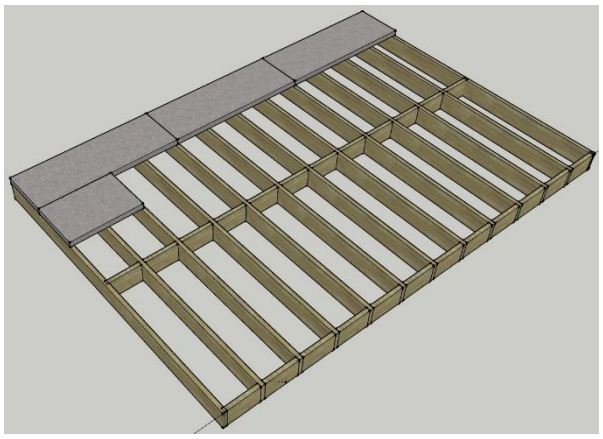
Step 4 – Finishing the first row

Around all boundary joists the fixing centres must be at a maximum 150mm. Where 2 Integra Floor Panels meet on a floor joist/blocking, screws can be fixed by screwing in on an angle from both sides. All full sheets of Integra Floor Panels must be supported by at least 2 intermediate joists



Step 5 – Installing the second row of panel

Before installing any of the second row of panels you will have to apply Resene Construction Systems AAC Adhesive. The easiest way to do this is to apply Resene Construction Systems AAC Adhesive into the groove of the panel you are about to install using a Broad-knife. Take care not to over-pack the groove then carefully install the Integra Floor Panel into the tongue of the first row of Integra Floor Panels in stretcher bond. The second row of Integra Floor Panels must be installed in a stretcher bond pattern. The Integra Floor Panels will have to be cut to allow this to happen. Make sure that all narrow panel ends are supported on joists.

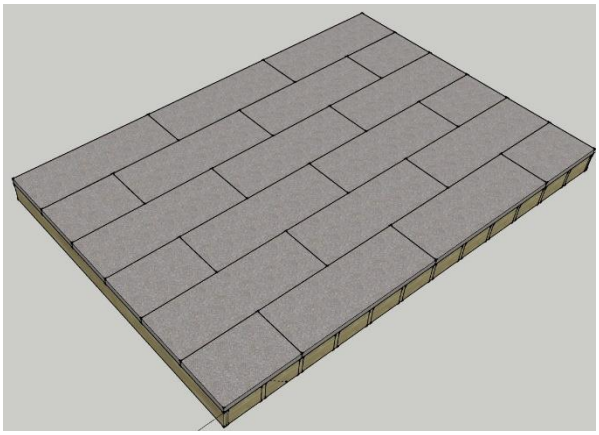


Step 6 – Screw Fixing the panel

Screw fix the panel a minimum of 150mm from either side of the panel following along the joist. Two screws are required in each panel at each joist. Screws in the end edge of the panel may be skewed to achieve the 50mm end distance requirement, larger screws (125mm) may be required in this area if you are skewing screws at a sharp angle. The screws must be wound into the panel until the head is 2mm – 3mm below the panel surface. Panels must be supported on a minimum of two joists. Screws into joists are driven without drilling of panels and excessive adhesive should be removed immediately. Screw holes are filled with Resene Construction Systems AAC Adhesive and any chips on panel edges should be filled with Resene Construction Systems AAC Adhesive.

Step 7 – Completing the floor

Continue across the entire floor making sure to keep a stretcher bond pattern. Try and keep all panel joins tidy by scraping off any Resene Construction Systems AAC Adhesive so that the joins are flush.



Once you have completed the flooring go around all the exposed edges of Integra Floor Panels and prime all the exposed steel using an anti-corrosion coating.

Step 8 - Securing the bottom plate

All Bottom Plates should be screwed down using a 150mm fasteners at 300mm centres. Panel around the boundary joists must be fastened at 150mm centres, this can be achieved by screwing your panel off at 300mm centres and fastening your perimeter plate between these fixings to achieve the 150mm centre requirement.

Step 9 – Cleaning Up

Ensure that any AAC Adhesive droppings on lower levels are cleaned up on the same day, if it is left to dry it can be difficult to remove.

Any joins in the panels may need to be flushed out with additional AAC Adhesive. Ensure that the floor is left in a tidy state for subsequent trades.

Table 1 below provides a summary of timber floor joist sizes and spans for three recommended joist spacings of 360 mm, 450 mm and 600 mm. Each of these recommended joist spacings is a whole number multiple for the INTEGRA panel length of 1800 mm, so as to minimise cutting time and material wastage on site. The spans and spacings have been specifically calculated to account for the self-weight of the INTEGRA LWC floor panel, and correspond to the 1.0 kPa, 2.0 kPa (Table 7.1) and 3.0 kPa (Table 14.8) tables in NZS 3604:2011.

Table 1 – Joist Sizes (corresponding to Tables 7.1 and 14.8 in NZS3604:2011)

Live Load (kPa)	Span (m)	360mm Joist Spacing	450mm Joist Spacing	600mm joist Spacing
1.5	1.2	90 x 35	90 x 35	90 x 35
	1.5	90 x 45	140 x 35	140 x 35
	1.8	140 x 35	140 x 35	140 x 35
	2.1	140 x 35	140 x 35	140 x 45
	2.4	140 x 45	190 x 45	190 x 45
	2.7	190 x 45	190 x 45	190 x 45
	3	190 x 45	190 x 45	240 x 45
	3.3	190 x 45	240 x 45	240 x 45
	3.6	240 x 45	240 x 45	240 x 45
	3.9	240 x 45	240 x 45	290 x 45
	4.2	240 x 45	290 x 45	290 x 45
	4.5	290 x 45	290 x 45	
	4.8	290 x 45		
2.0	1.2	90 x 35	90 x 35	90 x 45
	1.5	140 x 35	140 x 35	140 x 35
	1.8	140 x 35	140 x 35	140 x 35
	2.1	140 x 35	140 x 45	190 x 45
	2.4	190 x 45	190 x 45	190 x 45
	2.7	190 x 45	190 x 45	240 x 45
	3	190 x 45	240 x 45	240 x 45
	3.3	240 x 45	240 x 45	240 x 45
	3.6	240 x 45	240 x 45	290 x 45
	3.9	240 x 45	290 x 45	290 x 45
	4.2	290 x 45	290 x 45	
	4.5	290 x 45		

	4.8	290 x 45		
3.0	1.2	90 x 35	90 x 45	140 x 35
	1.5	140 x 35	140 x 35	140 x 35
	1.8	140 x 35	140 x 35	190 x 45
	2.1	140 x 45	190 x 45	190 x 45
	2.4	190 x 45	190 x 45	190 x 45
	2.7	190 x 45	240 x 45	240 x 45
	3	240 x 45	240 x 45	240 x 45
	3.3	240 x 45	240 x 45	290 x 45
	3.6	240 x 45	290 x 45	290 x 45
	3.9	290 x 45	290 x 45	
	4.2	290 x 45		
	4.5			
	4.8			

Table 2 – Serviceability Limit criteria

Serviceability Criteria	Joist Centres			
	360mm	400mm	450mm	600mm
Span/600	0.60mm	0.67mm	0.75mm	1.00mm
Span/500	0.72mm	0.80mm	0.90mm	1.20mm
Span/400	0.90mm	1.00mm	1.13mm	1.50mm
Span/300	1.20mm	1.50mm	1.50mm	2.00mm
Span/250	1.44mm	1.60mm	1.80mm	2.40mm