



Houses, Low
Rise Multi-
Residential and
Commercial
Floors

TECSLAB

**Design and
Installation
Guide**

This Design Guide has been prepared as a source of information to provide general guidance to consultants – and in no way replaces the services of the professional consultant and relevant engineers designing the project.

It is the responsibility of the architectural designer and engineering parties to ensure that the details in this Design and Installation Guide are appropriate for the intended application.

The recommendations of this guide are formulated along the lines of good building practice, but are not intended to be an exhaustive statement of all relevant data.

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The affordable Premium lightweight timber framed floor system that feels like a concrete floor.

TECSLAB™ is designed for low, medium and high-density construction. The TECSLAB™ system combines the properties of two exceptional construction products TECBEAM™ and Hebel® PowerFloor™ to provide a superior floor solution achieving quicker build times and significant cost savings.

Hebel® is a lightweight steel-reinforced Autoclaved Aerated Concrete (AAC) that has been used in Europe for over 70 years and here in Australia for over 20 years.

TECBEAM™ is a composite structural 'I'-Beam which has a continuous galvanized steel web and timber flanges resulting in a lightweight beam with structural properties closely resembling those of a steel beam rather than a solid beam. TECBEAM™ is designed and manufactured in Australia by licensed fabricators and holds worldwide patents for its technology.

A high-performance lightweight flooring system

TECSLAB™ is a high performance lightweight flooring system which provides:

- 1) a superior floor solution, with the qualities and feel of a concrete floor.
- 2) rigidity of a steel frame at a significantly reduced cost.

TECSLAB™ can be easily installed by on-site carpenters and is unaffected by wet or changing weather during installation. Unlike wet-pour concrete, TECSLAB™ is installed without the need for curing or propping.

Supremely comfortable, solid and low noise emission

The TECSLAB™ system reduces foot-fall, airborne noise between floors and eliminates squeaking that is often a problem with other joist systems and particle board flooring.

TECSLAB™ boasts superior thermal performance (particularly for suspended floors) and assists in achieving thermal ratings that reduce heating and cooling costs.

Proven in the market, Australian designed and made

All components of the TECSLAB™ system are 100% manufactured in Australia. Hebel® is manufactured by CSR Building Products Limited and TECBEAM™ is fabricated by licensed Australian fabricators. You can depend and rely on the product quality, technical expertise, warranty and continuity of stock supplies. With TECSLAB™ you can trust that everything has been proven and tested and the components are being continually improved with ongoing research and development.

TECSLAB™. Better to build with...

Lightweight yet solid and tough.

The TECSLAB™ system is comprised of TECBEAM™ composite joists made from timber flanges and galvanized steel web typically spaced at 450 or 600 centres; together with the Hebel® PowerFloor™ – a 75mm thick, steel reinforced building panel made from AAC (Autoclaved Aerated Concrete).



Faster construction period

TECSLAB™ is a timber frame solution and is faster to construct than suspended concrete. No propping and curing of concrete is required. Typical installation rates of 70m² per day can be achieved with follow on trades starting after 24 hours.

The TECBEAM™s can be installed quickly due to their bespoke, made to measure fabrication. On site installation time is accelerated as minimal modifications to the product need to be made in-situ.



A comforting thought for a comfortable living environment

Hebel®'s unique AAC construction provides superior insulation qualities for a masonry product. The unique combination of thermal resistance along with thermal mass, make building with Hebel® a smart choice for meeting Australia's stringent building regulations.

For unit and home owners, the thermal efficiencies of Hebel® reduce the reliance on heating and cooling appliances – the combined effects of using a heater less in winter and fans or air conditioning less in summer and warmer months can have a big impact on rising energy costs.

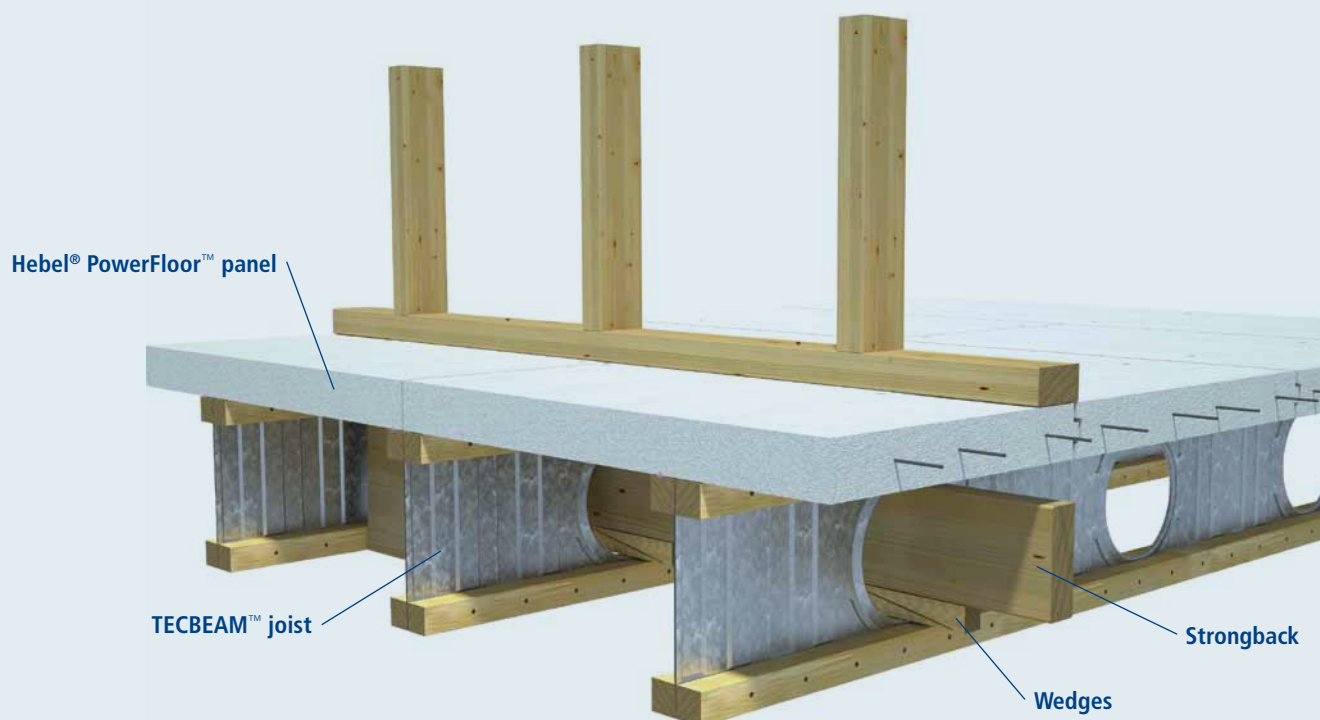
Highly fire resistant for peace of mind and added security, Hebel® is non-combustible and renowned for its highly fire resistant properties. The PowerFloor™ System achieves a FRL (Fire Resistance Levels tested at CSIRO) from 60–90 minutes below (with relevant fire-rated CSR Gyprock ceiling) and –/240/240 minutes from above.



A sound reason for better acoustic qualities

TECSLAB™ answers the practical issue of sound transfer between floors. Creaking timber is a thing of the past as the tongue and groove solid concrete floor locks together and is reinforced with the rigidity of the TECBEAM™.

TECSLAB™ provides superior airborne noise insulation particularly good for foot fall noise when installed with resilient mounts. With home theatres becoming standard in many modern homes, you can enjoy your entertainment without disturbing the rest of the family.



Sustainability for a better world in the long term starts today

TECBEAM™ achieves long spans and point load carrying capacity while using far less steel than standard structural steel bearers and joists. Without reducing structural performance, TECBEAM™ joists contain less than 15% of the embodied energy of the steel beams they replace. TECBEAM™ provides an ideal sub-structure for Hebel® due to its stiffness and low long-term creep and deflection properties.

Hebel® delivers a diverse number of environmental benefits over particle board and concrete. In an independent Life Cycle Assessment (the leading methodology used to quantify the environmental impacts of a product's entire life) undertaken by Good Environment Choice Australia, in accordance with international standard ISO 14 024, Hebel® was found to have clear environmental benefits across all key environmental criteria.

To be awarded the label, products must have a 30% lower impact than alternatives. Hebel® uses 64% and 43% less greenhouse gas emissions than the comparative products, concrete and particle board flooring.

As environmental consciousness and social responsibility increases, TECSLAB™ is striving to exceed further to set new sustainability standards in building materials and residential living.

...for all the best reasons

With the attributes and benefits shown above this innovative and versatile composite system provides confidence that TECSLAB™ is an ideal solid flooring solution, as is detailed throughout the remainder of this Design and Installation Guide.

TECSLAB™ eliminates the headaches of concrete truck queues and pumps on site, therefore creating fewer problems with site access and disruption on site.

Better Environmental Choice

Environmental studies have demonstrated the TECSLAB™ system replacing a suspended concrete slab results in greater than 75% reduction in embodied energy for an entire floor system. TECBEAM™ joists contain less than 15% of the embodied energy* of the steel beams they replace without reducing structural or other environmental performance. Hebel® is certified by Good Environment Choice Australia.

* This study has been checked and verified by environmental consultants The Ark Climate Group.
www.arkclimate.com or
www.tecslab.com.au/sustainability



HEB-2006
GECA 08-2005—
Environmentally
Innovative Products

1. Design

Typical Applications

TECSLAB™ systems detailed in this design and installation guide are flooring solutions for residential, low rise multi-residential, commercial* and industrial* construction. The floor applications consist of a Hebel® PowerFloor™ panel connected to TECBEAMS™ forming a platform floor.

Figures 1.1, 1.2, 1.3 show typical applications for TECSLAB™. For more details refer to Hebel® Technical Update TU-009 and TECBEAM™ Installation Guidelines.

* For commercial and industrial applications, Hebel® floor surface may need temporary protection from high wear and tear during construction. 10mm ply is normally sufficient. Please contact CSR Hebel® if more information is required.



Fig. 1.1 Residential – Suspended Ground Floors



Fig 1.2 Residential – Suspended First Floors



Fig 1.3 Commercial/Industrial Floors – schools, offices, warehouses & community centres

1.2 How to use this Design and Installation Guide

Systems Index – Table 1.4

This allows the designer to quickly locate a system that combines the acoustic rating (Rw), approximate floor thickness (excluding TECBEAM™ height), floor covering type and ceiling system requirement.

System Components, System Properties & Design Considerations

These sections provide relevant background information to enable designers to plan and select appropriate TECSLAB™ systems.

TECSLAB™ System Pages

These pages provide detailed performance information to assist in the selection of an appropriate TECSLAB™ system for the application under consideration.

Architectural Specification

This material can be copied for inclusion into working drawings or project specifications. This provides a pro-forma layout with fill in sections to quickly and easily create and customise project specifications.

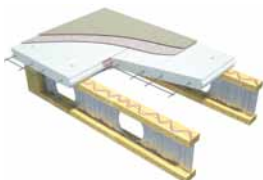
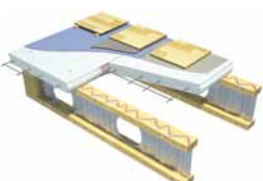
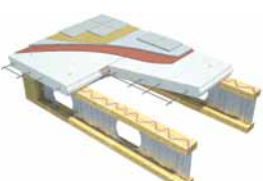
Installation Diagrams and Fixing Instructions

General design and installation information is provided for the various systems available. For more detailed information contact your CSR Hebel® representative. For further information on different TECBEAM™ types and their applications, please contact the TECBEAM™ joist manufacturer.

Selecting a system

- STEP 1.** Scan the 'System Index' for systems with the appropriate floor covering for the intended application.
- STEP 2.** Turn to the selected system page and select ceiling system that provides appropriate performance (FRL/Rw/R-Value).
- STEP 3.** Consult your chosen structural engineer to determine a joist size and spacing requirement.
- STEP 4.** Confirm structural adequacy. Contact TECBEAM™ or your chosen structural engineer.
- STEP 5.** Confirm acoustic and thermal performance by contacting the appropriate project engineer.

Table 1.4 System index for CSR Hebel® PowerFloor™ Systems

Hebel® PowerFloor™ System Description	Floor Covering Type	Applications & Benefits	System No.	System Details Page No.
	<ul style="list-style-type: none"> • Carpet • Medium duty underlay 	<ul style="list-style-type: none"> • Carpeted floor with a high level thermal performance. 	TECSLAB™ 1600-1604	19
	<ul style="list-style-type: none"> • 19mm T&G hardwood flooring • 70 x 35mm timber battens 	<ul style="list-style-type: none"> • Attractive solid timber finish with a high level of thermal performance. 	TECSLAB™ 1620-1629	20
	<ul style="list-style-type: none"> • 8mm Ceramic tiles • Flexible adhesive • Concrete topping slab • Waterproof membrane 	<ul style="list-style-type: none"> • Wet area applications where a finished level has to be built-up and/or a surface fall is required. 	TECSLAB™ 1610-1614	21

Note: Resilient mounts will help reduce footfall noise when using hard surface coverings such as tiles.

1.3 System Components

These components are compatible with TECBEAM™ joists.

- Hebel® PowerFloor™ Panel
- Floor Covering
- Proprietary Ceiling System
- Hebel® Adhesive
- Fuller® Max Bond™
- Fasteners & Fixings
- Caulking

CSR Building Products Limited, guarantees only the products that are manufactured by CSR Hebel®, not the components, products or services supplied by others.

Hebel® PowerFloor™ Panel

The Hebel® PowerFloor™ panel is available in a stock length of 1800mm x 600mm width x 75mm thick with a mass of up to 56kg/panel. Where necessary, panels can be cut on-site using a circular saw with diamond tipped cutting blade. The minimum recommended width of a cut panel is 270mm width and 900mm in length.

The panels are screw fixed and bonded to all floor joists except at panel butt joints. At butt joints, panels are fixed using two beads of adhesive, and the screws may be omitted. For further information on fixing Hebel® PowerFloor™ panels, please refer to relevant construction details outlined in this guide.

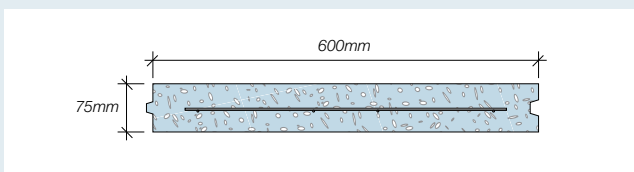


Fig 1.5 Hebel® PowerFloor™ Panel Cross Section

Ceiling System Description	Ceiling System Components
a) CSR821 	<ul style="list-style-type: none"> • CSR Resilient Mounts (No. CSR1) screw fixed to every joist at 600mm maximum centres. • RONDO Furring Channel (No. 129) at 600mm maximum centres, clipped into resilient mounts. • Bradford Glasswool Gold Batts R2.0 insulation infill. • 1 layer x 13mm GYPROCK Plasterboard CD fixed to furring channel.
b) CSR 826 	<ul style="list-style-type: none"> • CSR Resilient Mounts screw fixed to every joist at 600mm centres. • RONDO Furring Channel (No. 129) at 600mm maximum centres, clipped into resilient mounts. • 105mm Bradford Gold Insulation R2.0 GW insulation batts. • 1 layer x 16mm GYPROCK FYRCHEK Plasterboard CD fixed to furring channel.
c) CSR 827 	<ul style="list-style-type: none"> • CSR Resilient Mounts screw fixed to every joist at 600mm centres. • RONDO Furring Channel (No. 129) at 600mm maximum centres, clipped into resilient mounts. • Bradford Glasswool Gold Batts R2.0 insulation infill. • 2 layers x 16mm GYPROCK FYRCHEK Plasterboard CD fixed to furring channel.

Floor Coverings

A range of floor coverings can be installed over the Hebel® PowerFloor™ panels, such as, direct stick tiles, carpet and underlay, topping slab and tiles and timber (floating or on battens).

Proprietary Ceiling Systems

The underside of Hebel® PowerFloor™ can be lined with proprietary ceiling systems. These ceiling systems consist of combinations of components, such as furring channel, resilient mounts, clips, suspended steel framing, insulation, and plasterboard.

The most common combinations are detailed in the table on page 8.

Further information on floor/ceiling systems is available through CSR Gyprock, or the publications, CSR Gyprock Fibre Cement Fire & Acoustic Design Guide ('The Red Book™'), N°GYP500, and CSR Gyprock Ceiling Systems Installation Guide, N°GYP570 and TECBEAM™ Installation Guidelines.

Timber & Steel Support Systems

TECBEAM™ flooring can be used to support the Hebel® PowerFloor™ panels. The allowable spacing of the joists is 450mm or 600mm only. The joists, bearers and other supports shall be sized in accordance with the framing manufacturer's recommendations. Where steel joist framing is used it must be ensured that the PowerFloor panels are provided with uniform and complete bearing onto each steel joist.

Note: The designer should allow at least 51kg/m² for the selfweight of the Hebel® PowerFloor™ panel. A minimum joist flange width of 45mm is required.

Hebel® Adhesive

Hebel® Adhesive (supplied in 20kg bags) is used for gluing the panels together at all joints. Typically, panel joints are 2-3mm thick. Sufficient pressure is to be applied to the joint to ensure full coverage of adhesive in the joint. Adhesive is to be mixed to the proportions as stated on the bag.

Construction Adhesive

A 5mm (minimum) bead of Fuller Max Bond construction adhesive is applied to the top of the joists.

Where panel ends butt together over a common joist, two beads of adhesive shall be applied. Ensure the surface is free of coatings and loose material that may inhibit bond.

Fasteners

The correct sized fasteners for the construction of the floor systems must always be used. Install screws as shown in the Hebel® PowerFloor™ Panel Fixing Details section of this guide.

Screws for fixing Hebel® PowerFloor™ panels to TECBEAMs™ Joists: 14-10 x 100mm MP Bugle Head Batten Screws or equivalent.



Caulking

Hebel® PowerFloor™ requires that all gaps at openings, penetrations and control joints be caulked to provide an airtight floor system that maintains acoustic, thermal, vermin and fire resistance performance. All gaps must be carefully and completely filled with an appropriate flexible polyurethane sealant, installed in accordance with the sealant manufacturer's specifications.

Hebel® Patch

Minor chips or damage to panels are to be repaired using Hebel® Patch. Hebel® Patch is available in 10kg bags.



Hebel® anti-corrosion protection paint

Reinforcement exposed when panels are cut shall be coated with a liberal application of Hebel® anti-corrosion protection paint.

1.4 Design Considerations

Acoustics

Placement of insulation in the ceiling cavity can enhance the sound insulation performance of a floor/ceiling system. A carpet/underlay floor covering incorporated with TECSLAB™ will provide the best impact sound resistance. For hard surface floor coverings, we suggest using a floating floor and/or an independent ceiling system, incorporating resilient mounts or resilient furring channels.

For ceilings that have resilient mounts or resilient furring channels, flanking sound paths through adjacent walls are common, especially in timber framed buildings. To maintain Rw and IIC ratings, the wall linings may also need to be resiliently mounted. For multi-tenancy buildings, providing a control joint at the party wall will break a flanking path and maintain acoustic amenity.

Alternative Framing

TECBEAM™ joists may be used without reducing the TECSLAB™ system FRL rating for a fire source 'from above'. The design of joists shall allow for temperature effects. Alternative support framing systems may affect acoustic performance, and advice from an acoustic consultant is recommended.

Penetration Restrictions

Penetrations are required to accommodate services, such as plumbing and air conditioning ductwork, etc. Hebel® PowerFloor™ can accommodate an 80mm maximum circular penetration without a reduction in structural performance. Multiple penetrations in the same panel are to be in a straight line, parallel to the long edge of the panel.

For large or clustered multiple penetrations, additional joists or bridging should be included for support of the panel in this area. Refer to the 'Penetration & Notching Details' section of this guide. All penetrations are a potential source for water ingress or air leaks, and should be sealed with an appropriate flexible fire rated sealant or proprietary collar.

Control Joint Layout

Control joints are a necessary part of Hebel® PowerFloor™. Control joints provide a region in which to relieve stress due to movement of the structural system, and to control the location where movement can occur without a detrimental effect on the floor finish.

Recommended locations for control joints are:

- Typically at a max. spacing of 6000mm.
- Over lines of support for the TECBEAM™ joists. (Fig 3.10.)
- Locate at lines of bracing, avoid in-between to ensure diaphragm action between bracing lines.
- Locate at changes in joist orientation.

Wet Area Floor Construction

All wet areas require a waterproof membrane layer over the Hebel® PowerFloor™ panel. Waterproofing membranes shall be nominated by the designer or specifier, and installed in accordance with manufacturer's recommendations.

Serviceability Limits

The deflection limits of the floor joists are governed by the relevant standards, for houses AS 1684.1 and commercial AS 1170.0, Table C1. The following code-prescribed deflection limits provide acceptable behaviour and dynamic response:

- Dead Load (DL + Ψ_L LL): span/300 or 12.5mm max.
- Live Load (Ψ_L LL): span/360 or 9mm max. **
- Dynamic Response: 2mm max. under a 1kN point load. **

** 9mm limit to houses only. Allow for strongback load sharing with TECBEAM™ joists.

Concentrated Loads

For concentrated loads, such as a loadbearing wall or point loads, the designer should ensure additional joists, strongbacks or blocking are provided beneath the wall or bearing plate. Localised bearing stress in the AAC shall be limited to 1.0MPa.

Note:

- 1) Maximum point load without direct support is 2.7 kN.
- 2) The designer should select appropriate deflection limits to suit individual projects.

Bracing Walls

For bracing walls parallel to TECBEAM™ joists, a joist shall be positioned beneath the wall. For bracing walls perpendicular to TECBEAM™ joists, blocking shall be positioned beneath the wall. Blocking shall have a minimum width of 45mm. Bearing stress in the AAC shall be limited to 1.0MPa. Refer Fig. 3.7.

Panel Support

All Hebel® PowerFloor™ panels start, finish and must be joined on a TECBEAM™ joist.

1.5 Architectural Specification

This specification should be adopted as a guide only, and shall be superseded by the contract specifications of the project.

Please note * denotes areas to insert or select appropriate specifications.

Scope

The contractor shall furnish all material and equipment required to satisfactorily complete the installation and jointing of TECSLAB™ where indicated in the contract specification.

Materials

All AAC material shall be a Hebel® PowerFloor™ panel as manufactured by CSR Hebel®.

All accompanying fixings shall be those supplied by CSR Hebel®, TECBEAM™ fabricator or approved by the project engineer.

All lining materials shall be Gyprock plasterboard as manufactured and supplied by CSR Gyprock (or products of equivalent or better performance). All plasterboard shall be manufactured to meet the dimensional requirements of AS/NZS2588 'Gypsum Plasterboard'.

Construction adhesive shall be Fuller Max Bond as manufactured and supplied by Fuller (or products of equivalent or better performance).

All sealants shall be a polyurethane type with required fire and acoustic ratings, (or products of equivalent or better performance).

All infill materials shall be products manufactured and supplied by CSR Bradford® (or products of equivalent or better performance).

TECSLAB™ Floor System

The contractor shall supply and install the TECSLAB™ Floor System

*PF-.....(....), in accordance with CSR Hebel® Detached Houses & Low Rise Multi-Residential Floor Design Guide, TECBEAM™ Installation Guide, N°HBLA185, and CSR Gyprock Fibre Cement Fire & Acoustic Design Guide ('The Red Book™'), N°GYP500, and shall satisfy the following performance criteria.

The TECSLAB™ system shall have a Fire Resistance Level of *FRL.../.../... for a fire source 'from above' in accordance with the requirements of AS1530.4. Design of the joists shall allow for temperature effects.

Installation shall be carried out to the level specified for a field acoustic performance of *Dntw..... using cavity infill of *Bradford (or products of equivalent or better performance).

Levels of Finish – Floor Covering

Prior to installation of the floor covering, the contractor shall ensure the installed panels are within the tolerances of the project specifications. The contractor shall ensure that all control joints are installed as per project specifications, panel joints are completely filled with Hebel® Adhesive, minor chipping damage of the panels shall be patched with Hebel® Mortar, and all sealants are installed as per manufacturer's specifications.

Floor coverings shall be installed as per manufacturer's specifications, unless specified otherwise in the contract documentation.

Ceiling System

The contractor shall supply and install the Gyprock Ceiling System *N°CSR..... in accordance with CSR Gyprock Fibre Cement Fire & Acoustic Design Guide ('The Red Book'), N°GYP500. The ceiling framing shall be lined with *..... layers of..... mm Gyprock..... plasterboard.

**Denotes areas to insert or select appropriate specifications.*

Please note * denotes areas to insert or select appropriate specifications.

Levels of Finish – Ceiling Systems

All ceiling framing systems, plasterboard lining, jointing and finishing shall be carried out to *Level Level of Finish, in accordance with CSR Gyprock Plasterboard Residential Installation Guide, N°GYP547, AS/NZS2589.1 'Gypsum Linings in Residential and Light Commercial Construction - Application and Finishing'.

Plasterboard

The Hebel® PowerFloor™ system ceiling framing shall be lined with *..... layer/s ofmm Gyprock plasterboard.

Plasterboard fixing

All layers shall be fixed to the framing (ie., timber or steel floor joists and/or steel furring channels) as specified for the relevant system in the CSR Gyprock Ceiling Systems Installation Guide, N°GYP570, other relevant CSR Gyprock technical literature, and Rondo Building Services Pty Ltd literature or steel frame manufacturer's literature.

Jointing & Finishing

Jointing and finishing of the outer layer of plasterboard shall be in accordance with the CSR Gyprock Plasterboard Residential Installation Guide, N°GYP547.

Caulking

Where caulking is indicated in fire rated systems

*..... fire rated polyurethane sealant or fire rated backing rod with *..... acoustic rated polyurethane sealant shall be used, and installed in accordance with the manufacturer's recommendations.

Where caulking is indicated in wet areas, a

*..... polyurethane sealant must be used when caulking *non-fire rated/fire rated wet areas, as indicated, and installed in accordance with the manufacturer's recommendations.

Important

Any variation or substitution of materials or assembly requirements, or compromise in assembly may result in failure under critical conditions.

Note: This information can be downloaded from the CSR Hebel® website: www.hebelaustralia.com.au

**Denotes areas to insert or select appropriate specifications.*

Design notes:

2.1 System Properties

Structural Performance

TECSLAB™ systems can support a maximum uniformly distributed load of 5kPa, or concentrated (point) load of 1.8kN over a load area of 350mm² (with joists at 450mm or 600mm centres only) 3.9kN over a load area of 10,000mm². For loads outside this range, please contact CSR Hebel® or TECBEAM™.

The designer should specify the magnitude of the gaps between the Hebel® PowerFloor™ panel and structure. This gap will allow movement to release any confining stresses due to movement of the supporting structure.

Durability

Where TECSLAB™ is installed in a multi-residential or commercial application, the PowerFloor panels must be suitably protected against trafficability during construction to maintain the long term durability and integrity of the panels. It is the responsibility of the builder to provide and maintain such protective coverings to the PowerFloor panels until such time that the finished floor coverings are installed.

For application of TECSLAB™ in commercial projects Hebel® Technical Services must be contacted for advice on durability and protection of the PowerFloor panels during construction.

Fire Resistant Levels

Australian building regulations express the fire performance of a floor/ceiling with the rating system called the 'Fire Resistance Level' (FRL). The FRL rating of the systems detailed in this guide are opinions issued by the CSIRO based on test results.

Testing has been conducted in accordance with the Australian Standard AS1530 : Part 4 'Fire Resistance Tests of Elements of Building Construction'.

The FRL rating consists of three performance criteria, structural adequacy/integrity/insulation. For example, the FRL of a floor may be expressed as 180/120/90. Where '180' indicates a rating for 'structural adequacy' of 180 minutes, followed by 'integrity' for 120 minutes, and 'insulation' for 90 minutes. The Hebel® PowerFloor™ system has fire resistance of 240 minutes from a fire source above the floor. To achieve a FRL rating below the floor, a fire rated proprietary ceiling system must be installed.

Acoustic Considerations

Sound Ratings

Floor systems, consisting of the Hebel® PowerFloor™ and other products, have been laboratory tested to establish their sound insulation characteristics. A laboratory test involves the installation of a system between two massive concrete rooms, which are normally well isolated from one another, so that only direct transmission is via the system.

A steady sound level of various frequencies is generated on one side and measurements taken on both sides. These measurements are made in one-third octave bands from 100Hz to 5000Hz. For each specified frequency, the sound transmission loss is calculated. To assist in communication the performance is conveniently expressed as a single number called the 'Weighted Sound Reduction Index' (R_w).

Weighted Sound Reduction Index (R_w)

Recently, Australian building regulations have adopted the International Standard Organisation acoustic rating system called the 'Weighted Sound Reduction Index' (R_w). The R_w value replaces 'Sound Transmission Class' (STC) as a measure of the acoustic performance of a wall. A correction figure of C_{tr} is added to the R_w value to better quantify the acoustic performance of the building system.

C_{tr} Adaptation Term

The normal rating of R_w more closely defines the acoustic performance for speech frequencies. Where low frequency sound insulation performance is important, as may be the case with traffic noise or music and DVD systems, then a correction factor is applied to the airborne sound rating (R_w) to differentiate the systems with good sound insulation to these frequencies. The factor is C_{tr} and it is a negative value. A system with good low frequency performance will have a value of say -4; a system with poor performance will have a value of say -12.

Impact Isolation Class (IIC)

The 'Impact Isolation Class' (IIC) quantifies the transmission of impact sound through a floor/ceiling system. The test involves impacting the floor assembly with a standard tapping machine and measuring the sound level below in the same manner as described for the airborne sound insulation. Higher numbers indicate less sound is being transmitted. IIC is an American system and is now being replaced by L_{n,w}, which is the ISO equivalent.

Ln,w

This is the measure of the weighted and adjusted sound level below the floor when the tapping machine is operated above. In this case the lower the value the better the acoustic performance.

There is an approximate relationship between Ln,w and IIC, either can be subtracted from the numerical value of 110 to determine the other.

C1 Adaptation Term

The rating by Ln,w appears to work well where carpets or floating floors are employed on concrete or timber framed floors. With hard floor finishes, particularly with timber joist floors, the low frequency performance may require further consideration by your acoustic consultant.

Test Reports

All test reports quoted in this guide have been issued by the CSIRO, National Acoustic Laboratory or other NATA Registered Laboratories. Testing has been conducted in accordance with the relevant Australian Standard at the time of testing.

Sound Transmission Estimates

Computer models are used to determine sound transmission estimates for specific configurations, known as 'Acoustic Assessments'. The computer model predicts the Rw performance expected from the laboratory test on the system, with a 96% confidence limit of ± 2.5 db.

Performance – Laboratory vs Field.

When selecting the appropriate TECSLAB™ system, the designer or specifier must be aware that the laboratory Rw values are always higher than the field measured values (Rw). This is due to the field conditions, such as flanking paths, air leaks, floor frame construction type and stiffness, etc., which can be introduced by careless building design or construction. To avoid significant reductions in acoustic performance published construction details must be followed completely. Independent specific advice and confirmation should be sought for specific projects where the presence of flanking paths or any other acoustic effect may affect field performance.

Typically, the field performance of a system will be 2 to 5 Rw units lower than the laboratory performance, and allowance should be made for this by the acoustic consultant during the selection of the floor system.

Thermal Performance

Thermal performance is concerned with the energy retention or loss characteristics of a building system. One of the primary design objectives in planning a cost effective building is to provide a comfortable living/working environment for the building's inhabitants. Exploiting the inherent thermal qualities of Hebel® AAC enables the designer to achieve this objective.

R-Value Rating

The energy demand can be minimised by controlling the heat transfer, which is heat flowing from a hot region to a colder region, through a building system. The thermal resistance of a building system is expressed as the R-Value. The R-Value of the system is the sum of the R-Values of the individual components.

Thermal Integrity

Poor thermal integrity, due to bad construction practices can also significantly affect the comfort performance, as poor sealing and gaps allow air to infiltrate as drafts. The inherent construction tolerances of Hebel® PowerFloor™ provides a floor with a low infiltration rate and good thermal integrity.

2.2 Building Regulations

Intertenancy Floors

Floors constructed between separate tenancies are required to achieve a minimum acoustic and fire performance.

Acoustic Performance

For Class 2 and 3 Building with floors separating sole occupancies the following minimum acoustic requirements are described in the BCA:

- Airborne Sound Transmission:
 $R_w + C_{tr} \geq 50$
- Impact Sound Transmission:
 $L_{n,w} + C_I \leq 62$

Or, measured in-situ performance of:

- Airborne Sound Transmission:
 $D_{nt,w} + C_{tr} \geq 50$
- Impact Sound Transmission:
 $L_{nt,w} + C_I \leq 62$

Fire Performance

For Class 2 and 3 Building with floors separating sole occupancies the following fire requirements are described in the BCA:

- FRL - 90/90/90 (Structural Adequacy/ Integrity/ Insulation)

Please refer to section C of the BCA for certain exemptions to the above fire rating requirements.

Compliance with the Building Code of Australia (BCA)

All building solutions, such as walls, floors, ceilings, etc. must comply with the regulations outlined in the BCA or other authority.

The BCA is a performance based document, and is available in two volumes which align with two groups of 'Class of Building':

Volume 1: Class 2 to Class 9 Buildings; and

Volume 2: Class 1 & Class 10 Buildings – Housing Provisions.

Each volume presents regulatory Performance Requirements for different Building Solutions for various classes of buildings and performance provisions.

These Performance Provisions include: Structure; Fire Resistance; Damp & Weatherproofing; Sound Transmission & Insulation; and Energy Efficiency.

This design guide presents tables, charts and information necessary to design a Hebel® PowerWall™ that complies with the Performance Requirements of the BCA. The designer must check the adequacy of the building solution for Performance Requirements outlined by the appropriate authority.

Design notes:

3.1 TECSLAB™ Installation Sequence



1. Preparation of Framing for Hebel® PowerFloor™ Panel Installation

- Check floor framing is complete and within level tolerances.
- Provide set-out chalk lines, as required.
- Provide temporary installation platform where necessary.
- Ensure floor framing has adequate strength to support Hebel® PowerFloor™ bundles.
- Position Hebel® PowerFloor™ bundles on the floor framing.



2. Hebel® PowerFloor™ Panel Installation

- Panels are to be installed in a stretcher bond pattern, with a minimum overlap of 1 joist space and not less than 450mm.
- Use lifting handles or trolley to move the panels to installation area.
- Apply a 5mm min. bead of Fuller Max Bond construction adhesive (or equivalent) to top of joists in accordance with manufacturer's instructions, and apply Hebel® Adhesive to appropriate panel edges.
- Panels must be installed with minimal horizontal sliding on the joists to ensure a good bond. Force the tongue and groove joint closed as the panel is rolled and lowered onto the joists. Ensure all joints are tight and that adhesive makes full contact along all joints.
- Screw fix panel to the joists as required.
- Repeat process, removing excess Hebel® Adhesive.



3. Penetration Detailing

- Install blocking to support Hebel® PowerFloor™ panel at major openings.



4. Floor Finishes

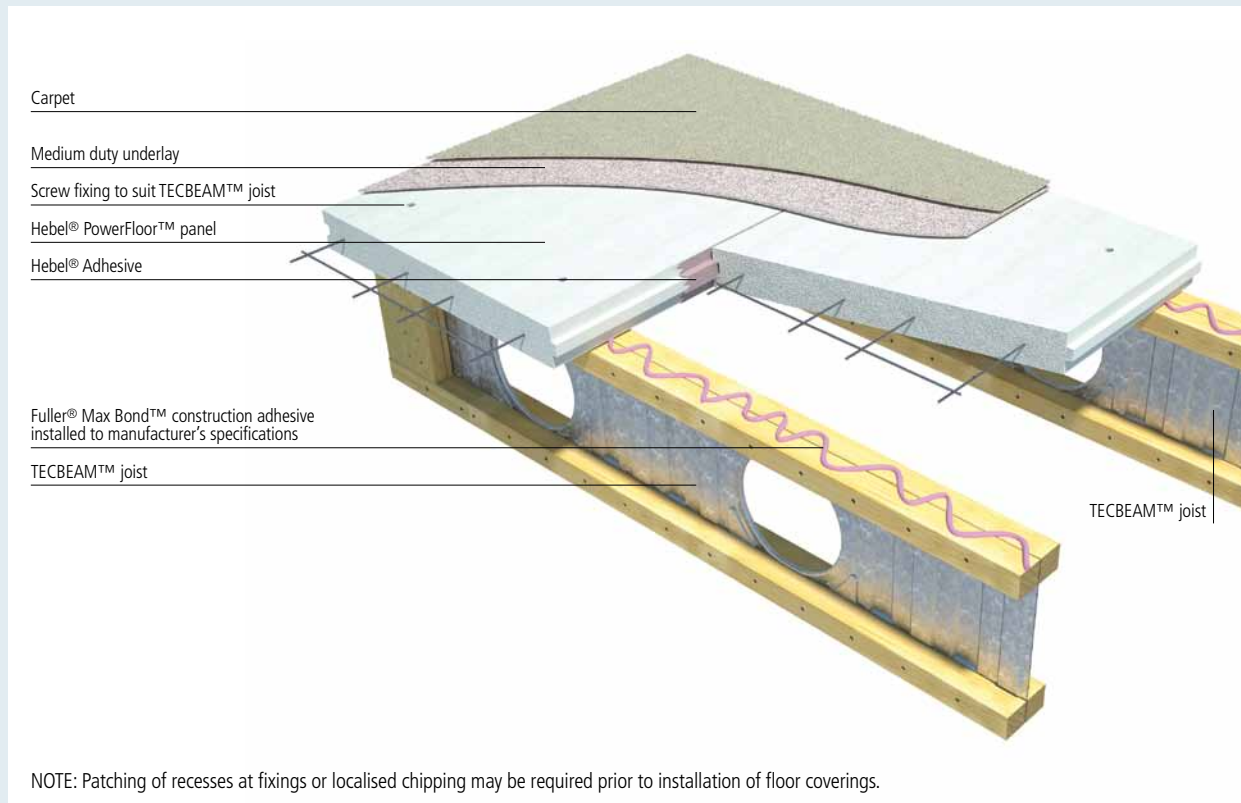
- Sweep the floor surface to remove debris and loose particles.
- Fill joints and screw holes with Hebel® Adhesive, as required.
- Ensure the Hebel® PowerFloor™ panel perimeter is not chipped.
- Install floor covering for Hebel® PowerFloor system in accordance with manufacturer's specifications.

Note: Ensure panel moisture content is within limits outlined by the floor covering manufacturer.

3.2 Construction Details

TECSLAB™ System Carpet

Recommended for: Rigid, lightweight floor system with high impact sound insulation.



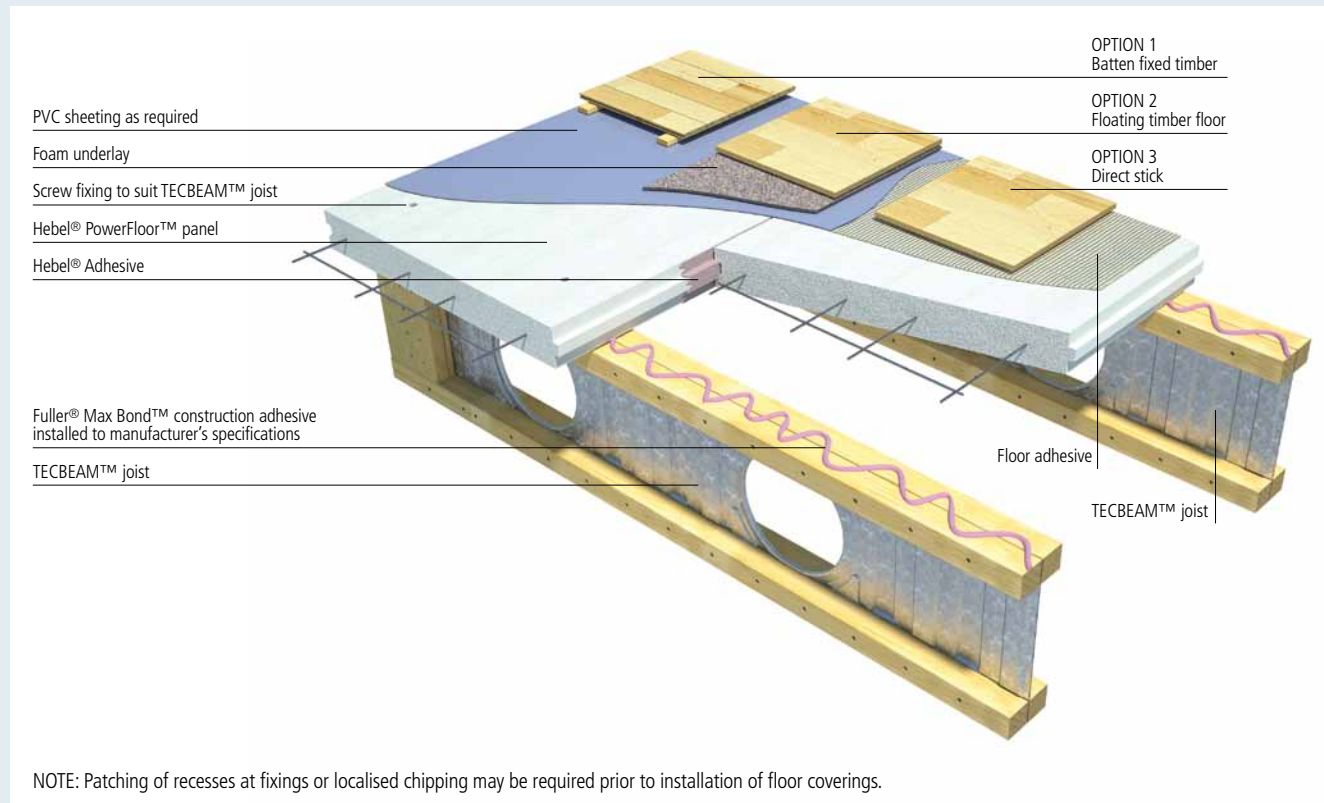
Carpet	Fire*	Acoustic			Thermal		
		FRL	Rw	Rw + Ctr	Lnw + C1	R-value up	R-value down
Code	System Description						
TECSLAB™ 1600	Houses, Low Rise and Commercial Floor Carpet Ground Floor Enclosed	240 minutes*	33	30	45	1.60	1.72
TECSLAB™ 1601	Houses, Low Rise and Commercial Floor Carpet Ground Floor Unenclosed	240 minutes*	33	30	45	1.01	1.06
TECSLAB™ 1602	Houses, Low Rise and Commercial Floor Carpet 2nd Storey Gyprock Ceiling (CSR 821)	-/-	55	48	35	3.20	3.50
TECSLAB™ 1603	Houses, Low Rise and Commercial Floor Carpet 2nd Storey Gyprock Ceiling (CSR 826)	60/60/60	56	49	34	3.17	3.56
TECSLAB™ 1604	Houses, Low Rise and Commercial Floor Carpet 2nd Storey Gyprock Ceiling (CSR 827)	90/90/90	58	52	32	3.31	3.61

Note *Fire source from above only.

Please refer to description on page 23 for all Acoustic, Thermal and Fire assessments.

TECSLAB™ System Timber Floors

Recommended for: Rigid, lightweight floor system with excellent thermal insulation and decorative timber flooring.



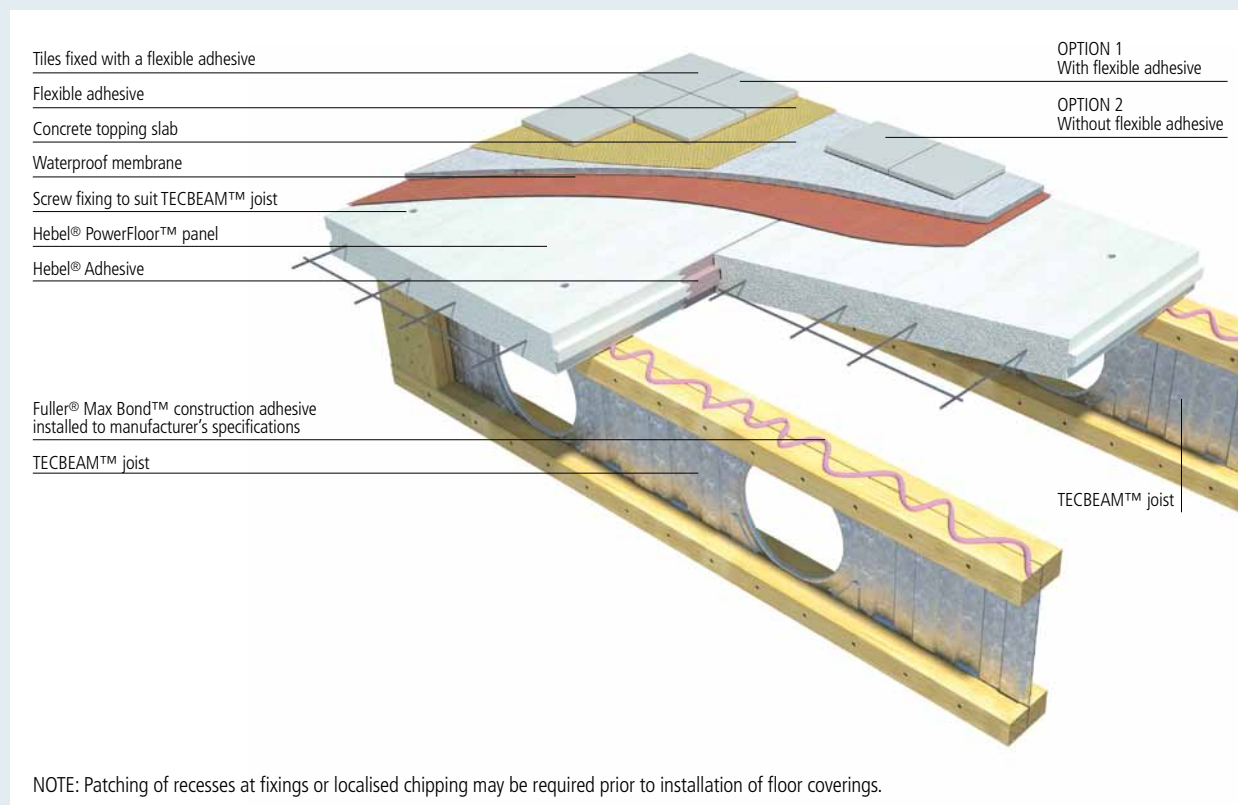
Timber on Battens	Fire*	Acoustic			Thermal		
Code	System Description	FRL	Rw	Rw+Ctr	Lnw + C1	R-value up	R-value down
TECSLAB™ 1620	Houses, Low Rise and Commercial Floor Timber Battens Ground Floor Enclosed	240 minutes*	37	33	83	1.65	1.74
TECSLAB™ 1621	Houses, Low Rise and Commercial Floor Timber Battens Ground Floor Unenclosed	240 minutes*	37	33	83	1.00	1.08
TECSLAB™ 1622	Houses, Low Rise and Commercial Floor Timber Battens 2nd Storey Gyprock Ceiling (CSR 821)	-/-/-	55	48	66	3.18	3.51
TECSLAB™ 1623	Houses, Low Rise and Commercial Floor Timber Battens 2nd Storey Gyprock Ceiling (CSR 826)	60/60/60	56	48	66	3.17	3.57
TECSLAB™ 1624	Houses, Low Rise and Commercial Floor Timber Battens 2nd Storey Gyprock Ceiling (CSR 827)	90/90/90	58	50	63	3.29	3.62

Note *Fire source from above only

Please refer to description on page 23 for all Acoustic, Thermal and Fire assessments.

TECSLAB™ System 8mm Ceramic Tiles on 50mm Topping Slab

Recommended for: Rigid, lightweight floor system where a fall is required for drainage.



8mm Ceramic Tiles on 50mm Topping Slab	Fire*	Acoustic			Thermal		
Code	System Description	FRL	Rw	Rw+Ctr	L _{nw} + C1	R-value up	R-value down
TECSLAB™ 1610	Houses, Low Rise and Commercial Floor Tiles on Topping Slab Ground Floor Enclosed	240 minutes*	37	33	72	1.42	1.49
TECSLAB™ 1611	Houses, Low Rise and Commercial Floor Tiles on Topping Slab Ground Floor Unenclosed	240 minutes*	37	33	72	0.77	0.82
TECSLAB™ 1612	Houses, Low Rise and Commercial Floor Tiles on Topping Slab 2nd Storey Gyprock Ceiling (CSR 821)	-/-	56	49	57	2.97	3.26
TECSLAB™ 1613	Houses, Low Rise and Commercial Floor Tiles on Topping Slab 2nd Storey Gyprock Ceiling (CSR 826)	60/60/60	57	50	56	2.94	3.32
TECSLAB™ 1614	Houses, Low Rise and Commercial Floor Tiles on Topping Slab 2nd Storey Gyprock Ceiling (CSR 827)	90/90/90	59	53	54	3.08	3.37

Description

Fire from above only – Opinion FCO 1303

Fire from below only – Opinion FCO 1373. (Refer to CSR Gyprock)

Combined floor and ceiling system thermal values are opinions determined for internal conditions above and internal conditions below. Airflow direction – Up = Summer, Down = Winter

Acoustic Test CSIRO – TL413 – airborne sound transmission

Acoustic Test CSIRO – TLI413 – impact sound transmission

Acoustic Assessment PKA – 210 091 A071

Thermal calculation by James Fricker 107.23 to 107.29 August 2011. Thermal calculations for second floor have assumed 140mm deep joist sections.

For detailed information on ceiling systems, please refer to 'System Components' Section of this design guide and the CSR Gyprock Fibre Cement Fire & Acoustic Design Guide (The Red Book™). For detailed information on acoustic

3.3 TECSLAB™ Panel Fixing Details

Fig 3.3.1 TECSLAB™ panel fixing details

Butt joint fixing, apply two beads of adhesive and omit screws

Internal fixing, two screws at each TECBEAM™ joist at 100mm min. from panel edge

Minimum overlap one TECBEAM™ joist spacing not less than 450mm

Tongue and groove joint

End screw fixing, two screws in every panel 100mm min. from long edge of panel

All joints (2–3mm width) completely filled with Hebel® Adhesive

TECBEAM™ joist

Ribbon plate

Wall frame

Two beads of construction adhesive at the ends of panels

TECBEAM™ joist at 600mm max. centres

Continuous 5mm bead of Fuller® Max Bond™ construction adhesive installed to manufacturer's specifications

Fig. 3.3.3 Fixing of Hebel® PowerFloor™ panel to TECBEAM™ joists

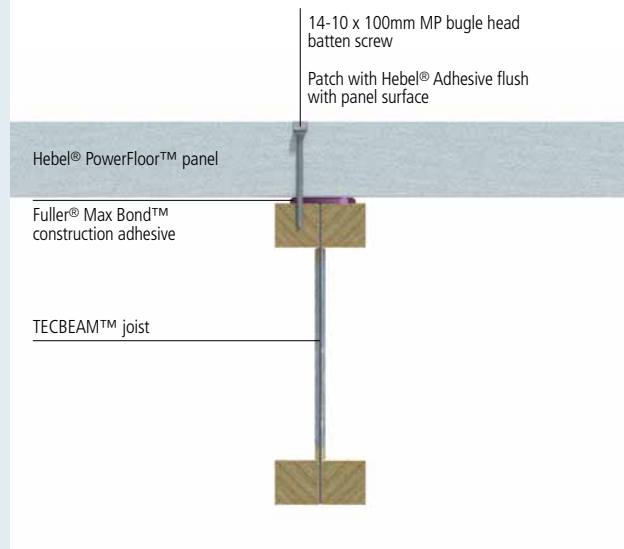


Fig. 3.3.4 Fixing at end of Hebel® PowerFloor™ panel to TECBEAM™ joists

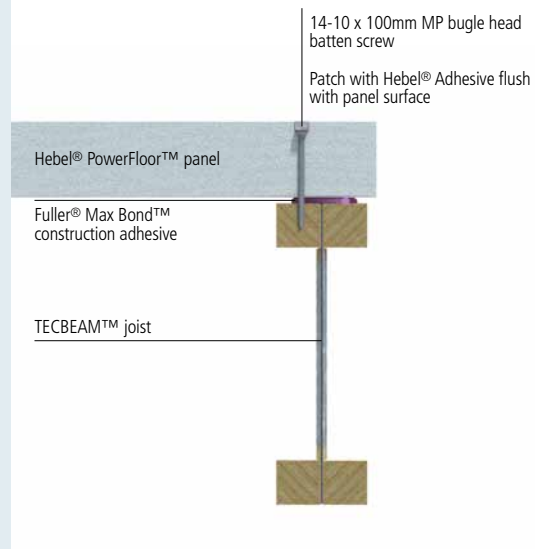


Fig. 3.3.5 Fixing to TECBEAM™ joists at change in joist orientation

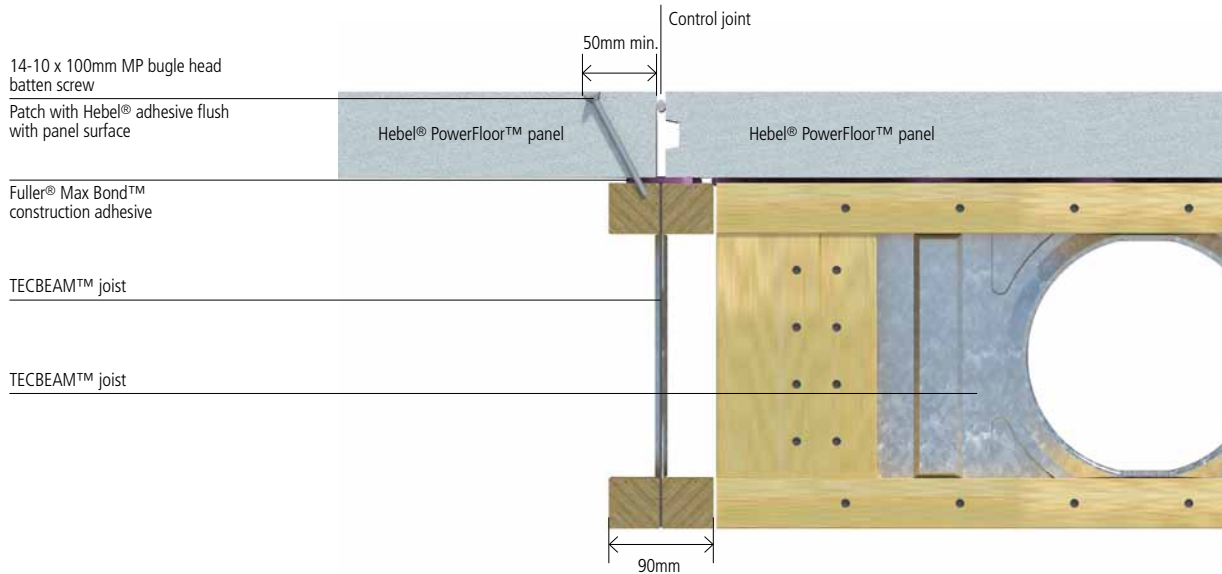
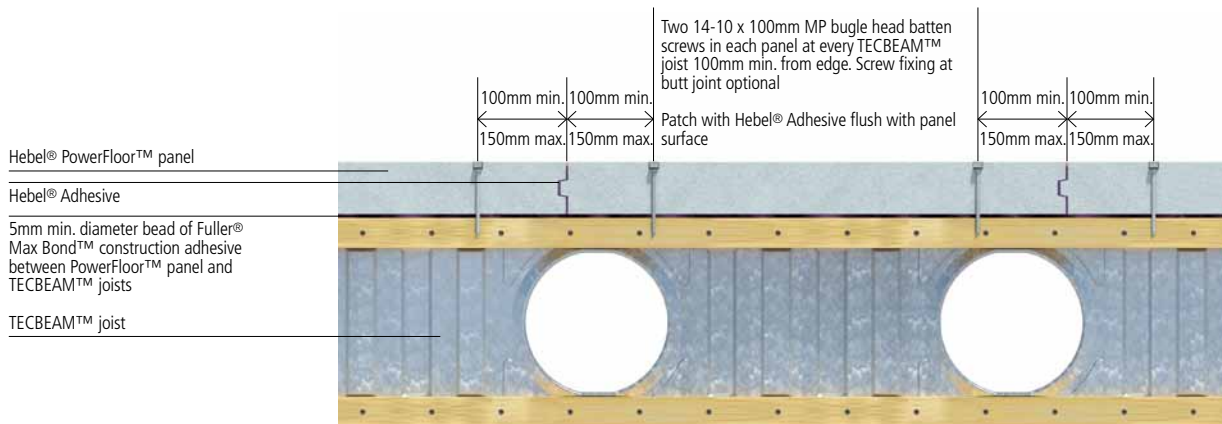


Fig. 3.3.6 Cross-section of TECSLAB™ installation



3.4 Control Joint Details

Fig. 3.4.1 Recommended Control Joint Location for Eccentric Loadbearing Wall

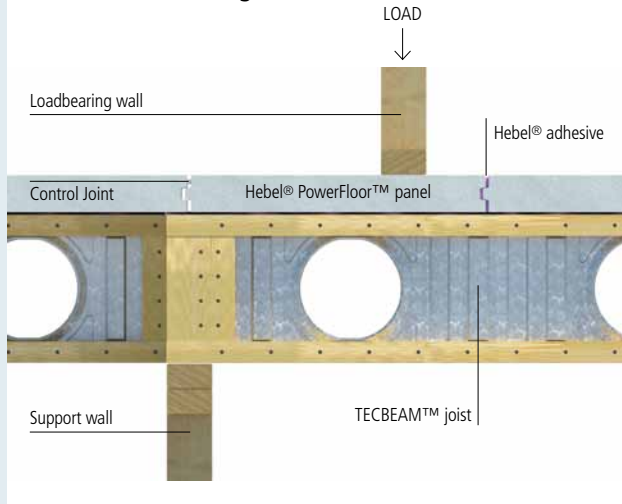


Fig. 3.4.2 Recommended Control Joint Location for change in TECBEAM™ joist orientation

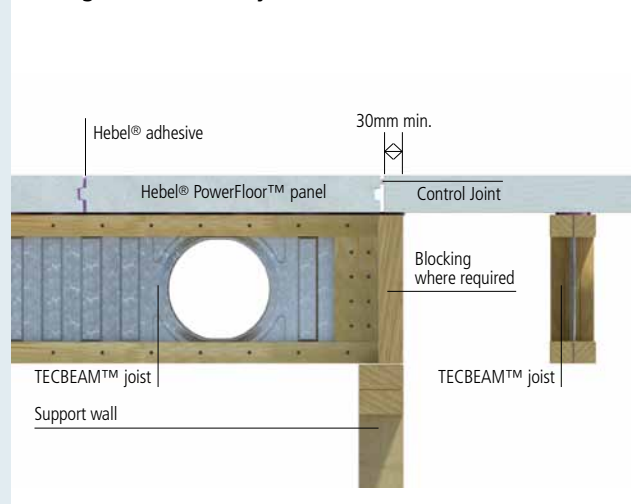


Fig. 3.4.3 Control Joint over Bearer/Support Wall

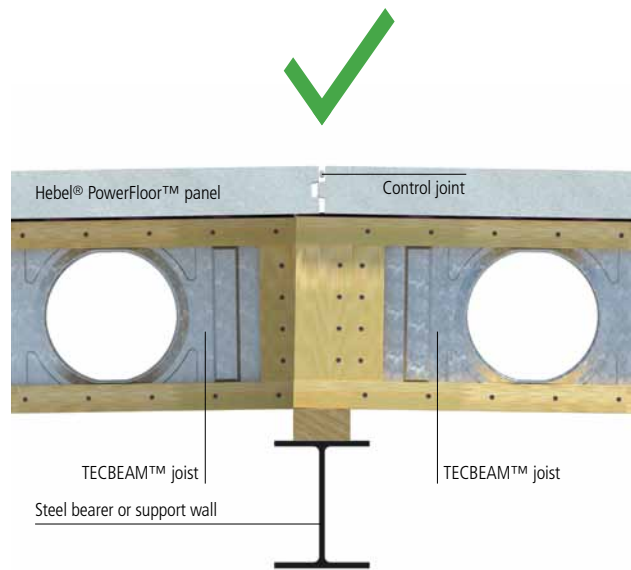
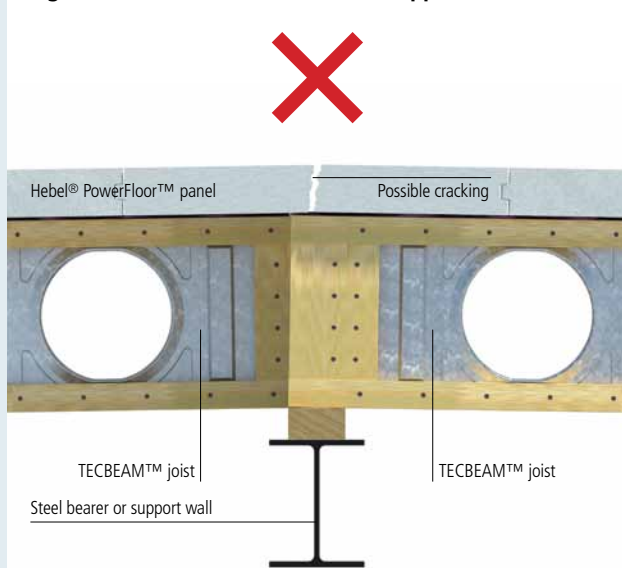


Fig. 3.4.4 Control joint Detail

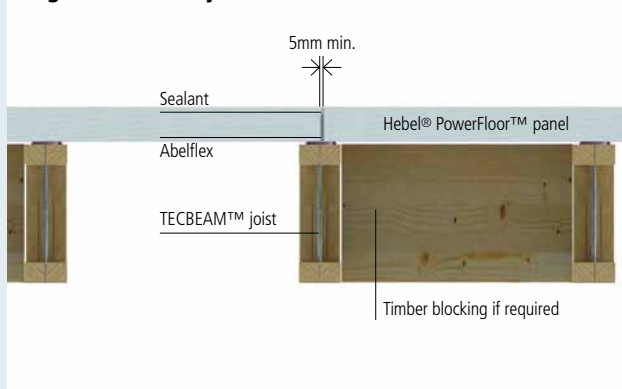
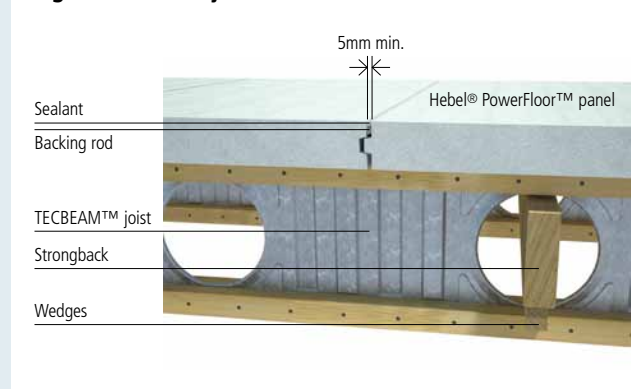


Fig. 3.4.5 Control joint Detail



3.5 Construction Details

Fig. 3.5.1 Cantilevered TECSLAB™ Detail

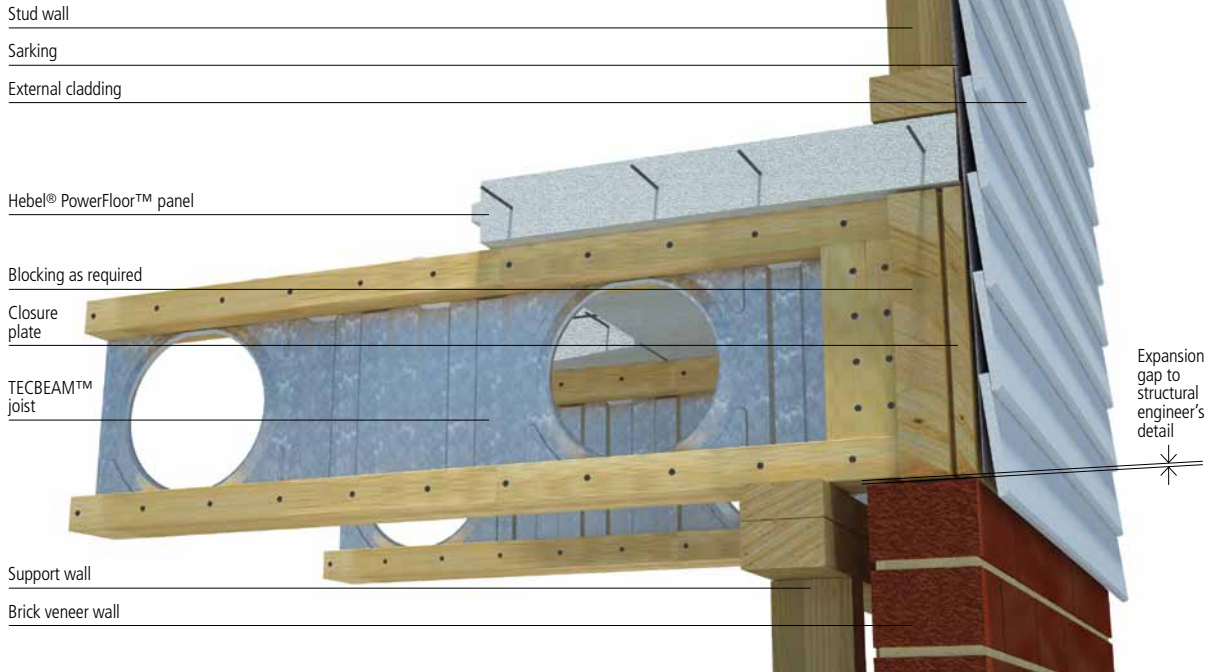


Fig. 3.5.2 TECSLAB™ End Support Detail



NOTE: The detailing of the cladding system shown below is for indicative purposes only. The project designer shall specify the construction details for the project.

Fig. 3.5.3 Typical Bottom Plate Fixing for Non-bracing Partition Walls

Stud wall

Bottom plate

Hebel® PowerFloor™ panel

14-10 x 100mm MP bugle head screws as required

TECBEAM™ joist

Min. 70mm wide

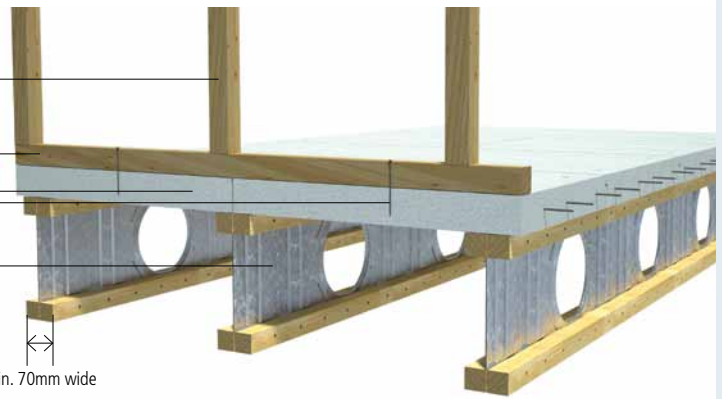


Fig. 3.5.4 TECSLAB™ Strongback Detail Under Loadbearing Walls Running Perpendicular to TECBEAM™ joists

Stud wall

Bottom plate

Hebel® PowerFloor™ panel

TECBEAM™ joist

Strongback

Wedges

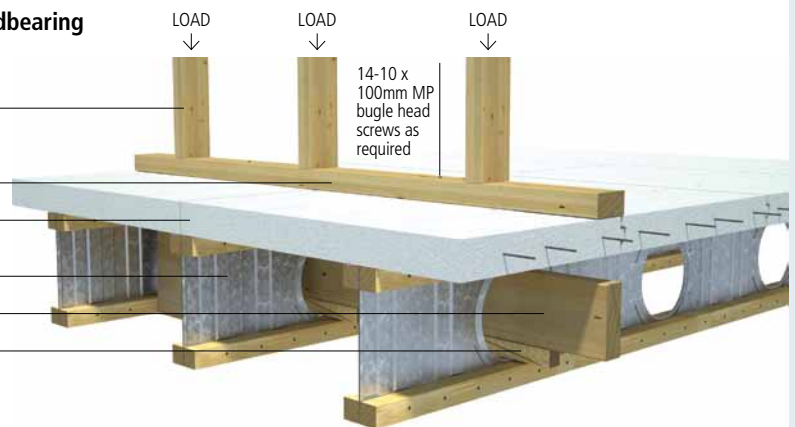


Fig. 3.5.5 Bottom Plate Stiffening at Concentrated Load

Stud wall

Bottom plate

Hebel® PowerFloor™ panel

TECBEAM™ joist

Solid blocking/trimmer beneath concentrated load

Timber packer to suit

Bearer

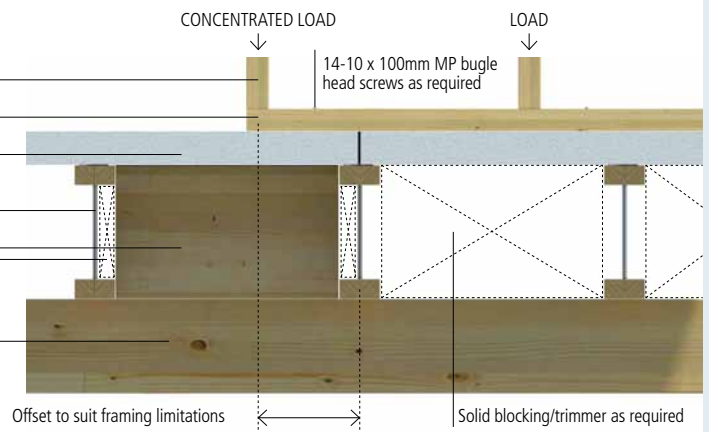


Fig. 3.5.6 Additional Support Detail Under Loadbearing Wall Parallel to TECBEAM™ joists

Loadbearing wall

Bottom plate

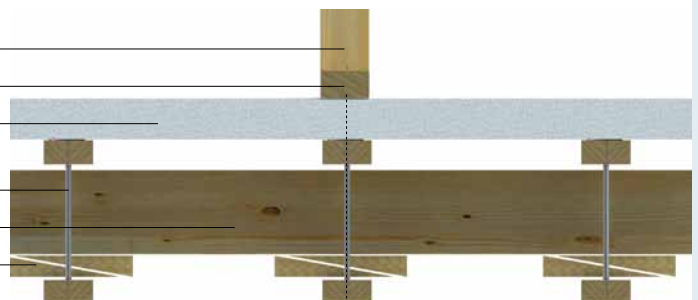
Hebel® PowerFloor™ panel

TECBEAM™ joist

Strongback

Wedges

Ensure TECBEAM™ joist is positioned directly beneath loadbearing wall



3.6 Multi-Level Construction Details

Fig. 3.6.1 Fitted Flooring with External Loadbearing Wall

Stud wall

Hebel® PowerFloor™ panel

TECBEAM™ joist

Brick veneer wall

Support stud wall

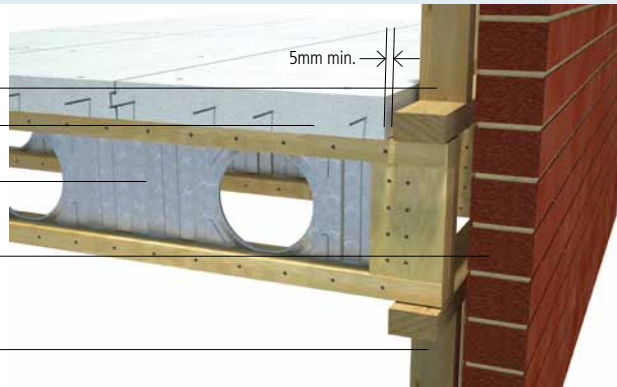


Fig. 3.6.2 TECSLAB™ End Support for Fitted Flooring

Stud wall

Hebel® PowerFloor™ panel

Solid timber beam

TECBEAM™ joist

Brick veneer wall

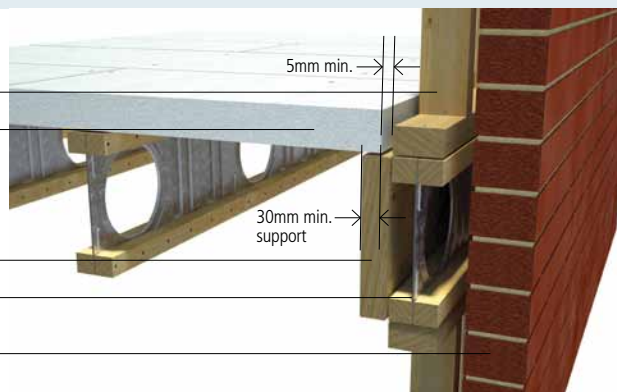


Fig. 3.6.3 Fitted Flooring with Internal Loadbearing Wall

Loadbearing stud wall

Hebel® PowerFloor™ panel

TECBEAM™ joist

To maintain gap, shave tongue profile

Solid timber blocking/trimming

Support stud wall

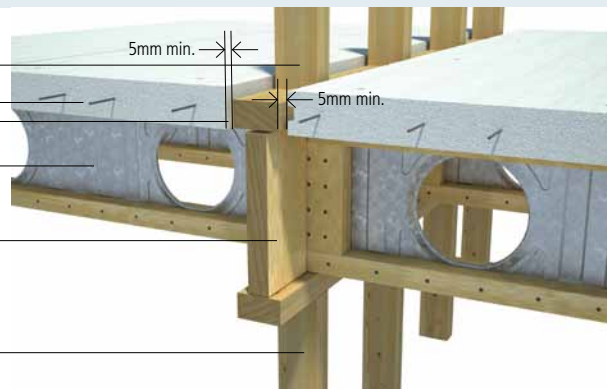


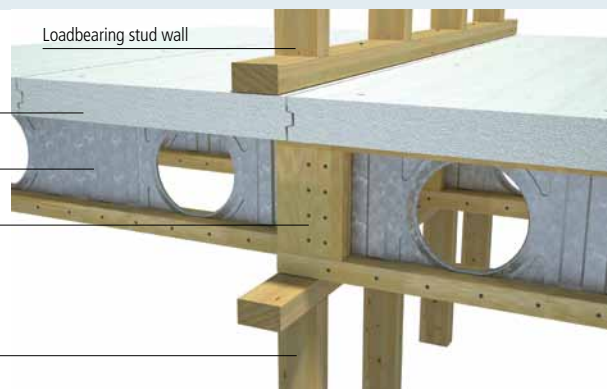
Fig. 3.6.4 Platform Flooring with Internal Loadbearing Wall

Hebel® PowerFloor™ panel

TECBEAM™ joist

Solid timber blocking/trimming in between joist and under loadbearing wall

Support stud wall



NOTE: Fitted flooring is required where the bearing stress in the Hebel PowerFloor panel, at the top of joists or the top of blocking between joists exceeds 1MPa. The detailing of the cladding system shown below is for indicative purposes only. The project designer shall specify the construction details for the project.

3.7 Hold-Down/Bracing Wall Details

Fig 3.7.1 Hold-down of external bracing wall over support wall

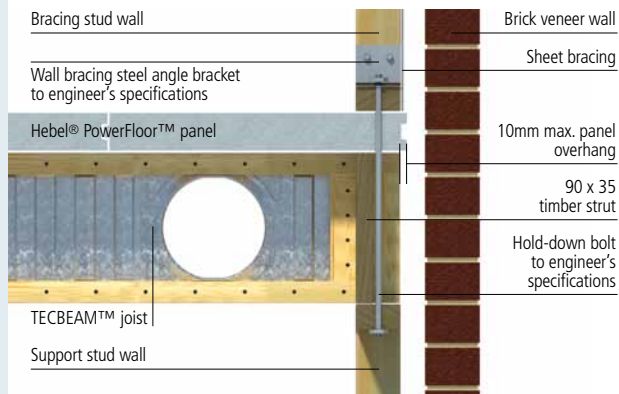


Fig 3.7.2 Hold-down of external bracing wall parallel to TECBEAM™ joists

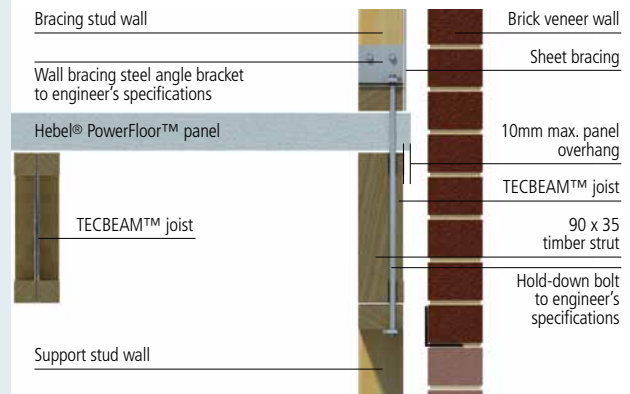


Fig 3.7.3 Hold-down of internal bracing wall parallel to TECBEAM™ joists

Wall bracing steel angle bracket to engineer's specifications

Hebel® PowerFloor™ panel

TECBEAM™ joist

Strongback

Pair of wedges

Double TECBEAM™ joists under bracing wall if hold-down bolts are specified (alternate detail ref. Fig. 3.7.3)

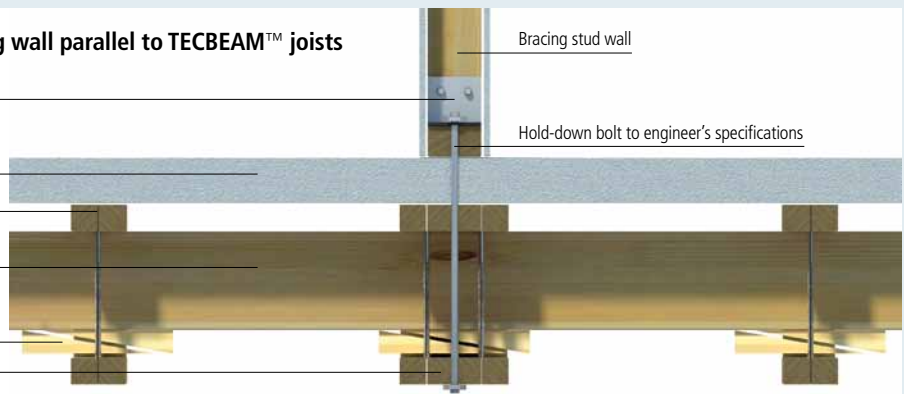
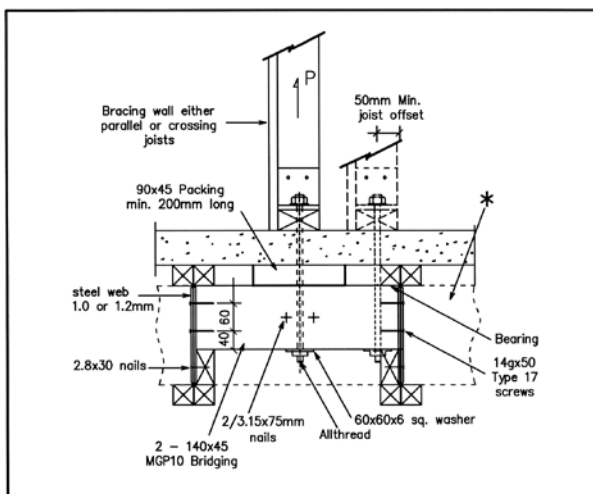


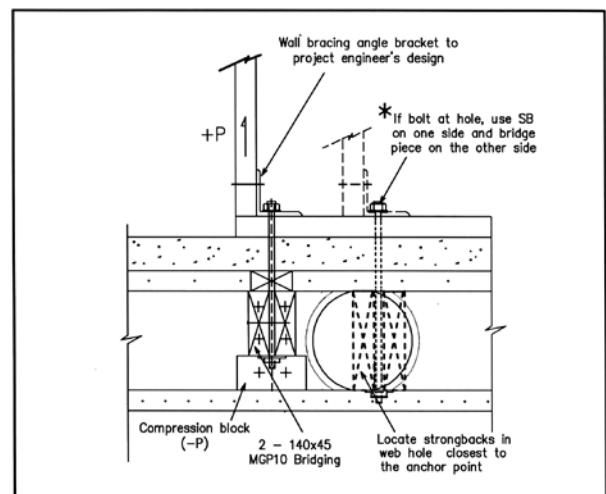
Fig. 3.7.4 Wall bracing tie-down (Alternative detail)

A) Sectional View



BOLT/ ALLTHREAD	TIE-DOWN CAPACITY ϕ -kN ULS		
	4/14g screws each end of bridging	Opposite webhole with Strongback	No end screws or extension at hole
M10	18.5	18.5	13.8
M12	25.1	25.1	13.8

B) Longitudinal View



- NOTE:
1. Floor Joist to be offset from wall by minimum of 50mm
 2. Check joist bending and shear capacity, allowing for strongback loadsharing, where the tie-down load exceeds 12kN.
 3. $\phi = 0.9$

3.8 Penetrations and Notching Details

Fig. 3.8.1 Large Penetration and Blocking

PVC pipe

Hebel® PowerFloor™ panel

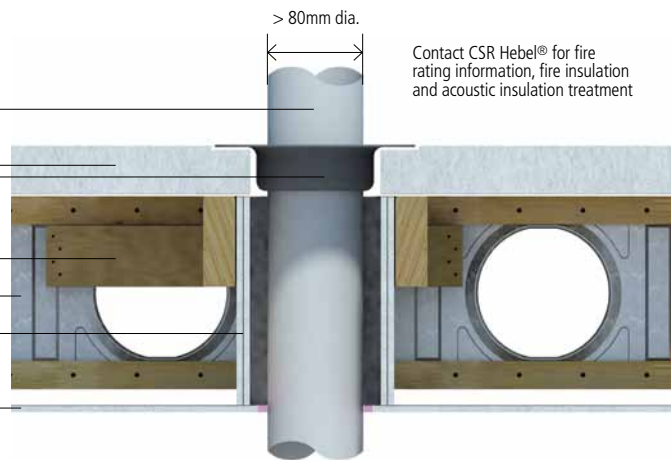
Fire collar to project specification

Solid timber blocking required for penetrations above 80mm

TECBEAM™ joist

Fire protection to ceiling manufacturer's specification

Ceiling system to project specification



3.9 Wet Area Detail

Fig. 3.9.1 In-situ-formed Wet Area

Masking tape

Floor covering

Hebel® PowerFloor™ panel

TECBEAM™ joist

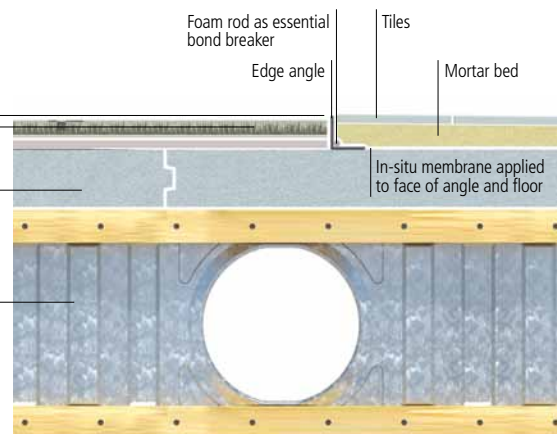


Fig. 3.9.2 Shower Recess Detail

Shower screen

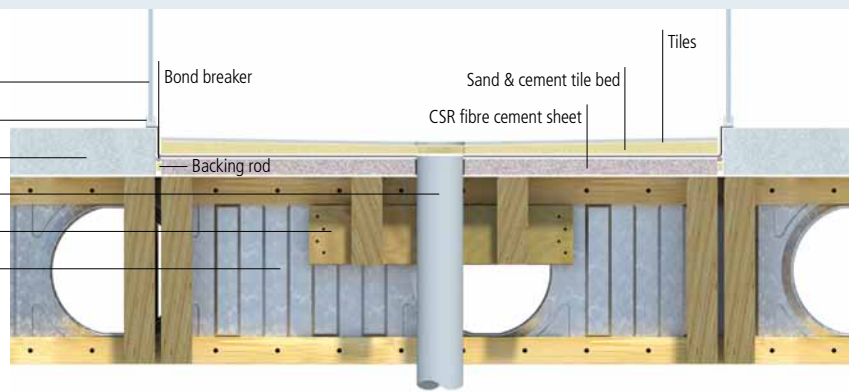
Waterproof membrane

Hebel® PowerFloor™ panel

Floor waste

Solid timber blocking

TECBEAM™ joist



3.10 Balcony and Staircase Details

Fig. 3.10.1 Step-down Balcony with Cantilevered Solid Timber Beam

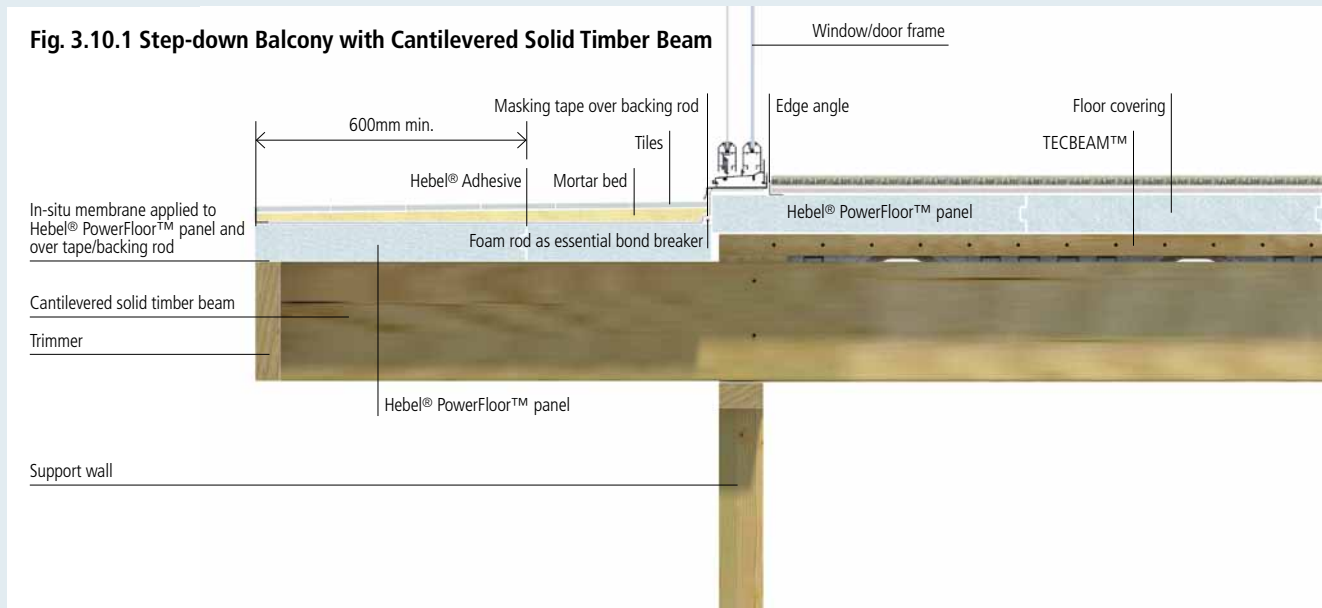
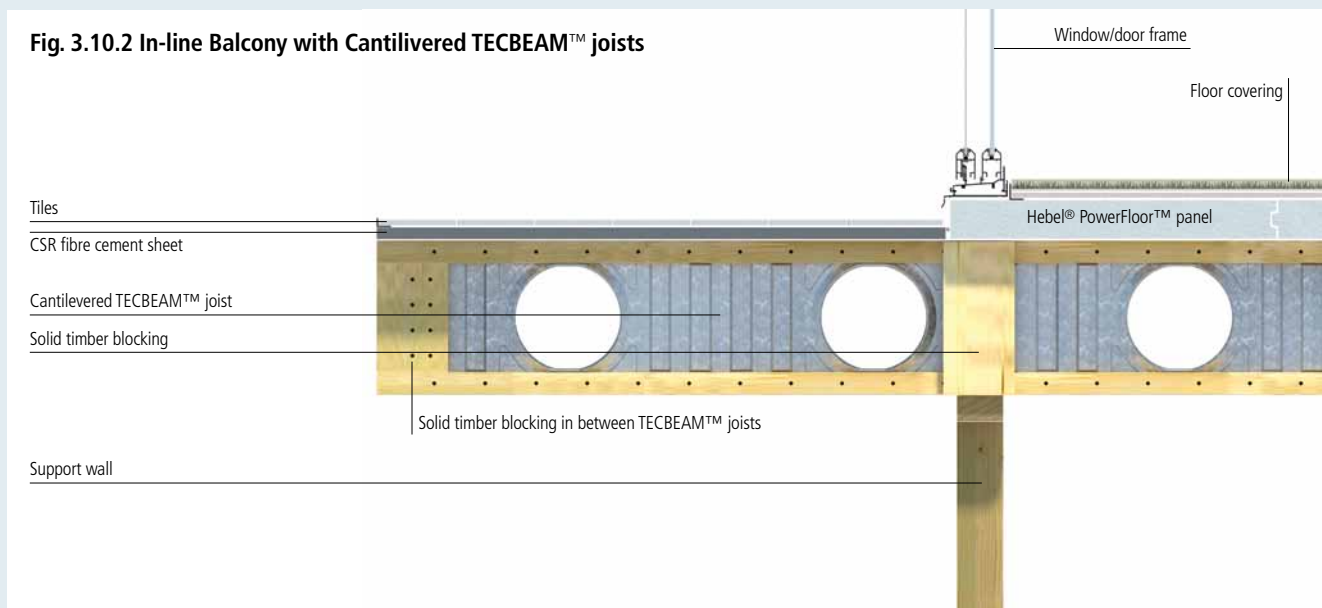


Fig. 3.10.2 In-line Balcony with Cantilivered TECBEAM™ joists



3.11 Floor Covering Installation

The following sections describe the type of preparation required and any special considerations for common floor coverings.

Carpet Installation

Panel Surface Preparation

Sweep the floor surface to remove debris and loose particles. Expose all surface blemishes such as chips, cracks, gaps, ridges or the like. Fill all unacceptable locations with an appropriate and compatible patching compound such as Hebel® Patch or levelling compound as required. Ensure panels are then dry.



Carpet Smooth Edge Installation

Installation of Carpet Smooth Edge (Gripper) is to be in accordance with AS/NZS 2455.1:1995.

Installation of carpet gripper prior to laying carpet requires the use of specifically selected nails or course threaded screws. Standard fixings supplied with the carpet gripper are not suitable for fixing to Hebel® PowerFloor™ panels. Carpet gripper strips are available without factory supplied nails. For carpet gripper installation near the panel edge, only glue is recommended. If relying on glue only, the carpet can not be stretched until the glue is set after approximately 24 hours.

Underlay Installation

Minimum medium duty underlay is to be used. No other special requirements.

Carpet Installation

As per carpet manufacturer's guidelines. No other special requirements.

Fig 3.40



Fig 3.41



Fixing Type	Description	Application Method	Installation Notes
Twist Nails	51mm dome head twist nail	Coil Nail Gun (Refer to Fig 7.1)	The head of the twist nail should finish flush with the surface of the gripper strip
Screws	Type 17 point – course thread No. 8g x 50mm – Countersinking screw	Makita 6834 Auto Feed Screwdriver (Refer to Fig 7.2)	The head of the twist nail should finish flush with the surface of the carpet gripper strip

3.12 Tile Installation

Panel Surface Preparation

Sweep the floor surface to remove debris and loose particles. Expose all surface blemishes such as chips, cracks, gaps, ridges or the like. Fill all unacceptable locations with an appropriate and compatible patching compound such as Hebel® Patch or levelling compound as required. Ensure panels are then dry.

Tile Installation

As per manufacturer's guidelines. Apply tiles to screed or adhesive as per normal floor.

*Notes: **Control Joints** – ensure Control Joints are installed in tiles at the appropriate location of floor Control Joints.*

Penetration – seal penetrations through waterproof membrane.

Case 1: Direct Stick Adhesive	Case 2: On Screed
Sealer as per manufacturer's recommendations Waterproof membrane as required, for balconies and wet areas	Sealer as per manufacturer's recommendations



3.13 Timber Installation

Panel Surface Preparation

Sweep the floor surface to remove debris and loose particles. Expose all surface blemishes such as chips, cracks, gaps, ridges or the like. Fill all unacceptable locations with an appropriate and compatible patching compound such as Hebel® Patch or levelling compound as required. Ensure panels are then dry.

Moisture

Timber is affected by changes in environmental conditions and it is good practice to allow the flooring to acclimatise to the environment before installation. If there is significant moisture in the Hebel® PowerFloor™ (>6%) a membrane, such as min. 200 micron polyethylene sheeting, should be placed over the top surface of the Hebel® PowerFloor™.

Timber Strip Flooring

Batten fix – ensuring flatness is not as critical as direct mechanical fix. Anchor battens at the required centres using anchors suitable for AAC, eg. Mungo MBSP1080. Direct mechanical fix – install min. 12mm plywood sheets to Hebel® PowerFloor™ using construction Maxbond or equivalent and 65-75mm coarse thread countersunk screws at max 600mm centres.

Floating Timber Floor

Underlay / backing installed as per normal for a concrete slab.

No special requirements for floating timber flooring installation.



4.1 Delivery and Storage

Unloading Panel Packs

Panel packs shall be unloaded and moved with only approved lifting devices. Before use, the lifting devices should be checked for the required lifting tags. Packs should be unloaded as close as possible to the intended installation area. This will increase work efficiency and minimise the need for secondary lifting.

Note: Secondary handling increases the risk of panel damage. The repair of damage sustained during lifting and moving is the responsibility of the lifter. Where damage is excessive, PowerClad panels must be replaced.

Storage

All materials must be kept dry and preferably stored undercover. Care should be taken to avoid sagging or damage to ends, edges and surfaces.

All Hebel® products must be stacked on edge and properly supported off the ground, on a level platform. Panel bundles can be stacked two high. The project engineer should be consulted as to the adequacy of the structure to support the stacked bundles.

If outside, Hebel® panels must be stored off the ground and protected from the weather. Only single bundles positioned on the ground can be opened. To provide a level surface, we recommend placing temporary joists beneath the supporting cleats.

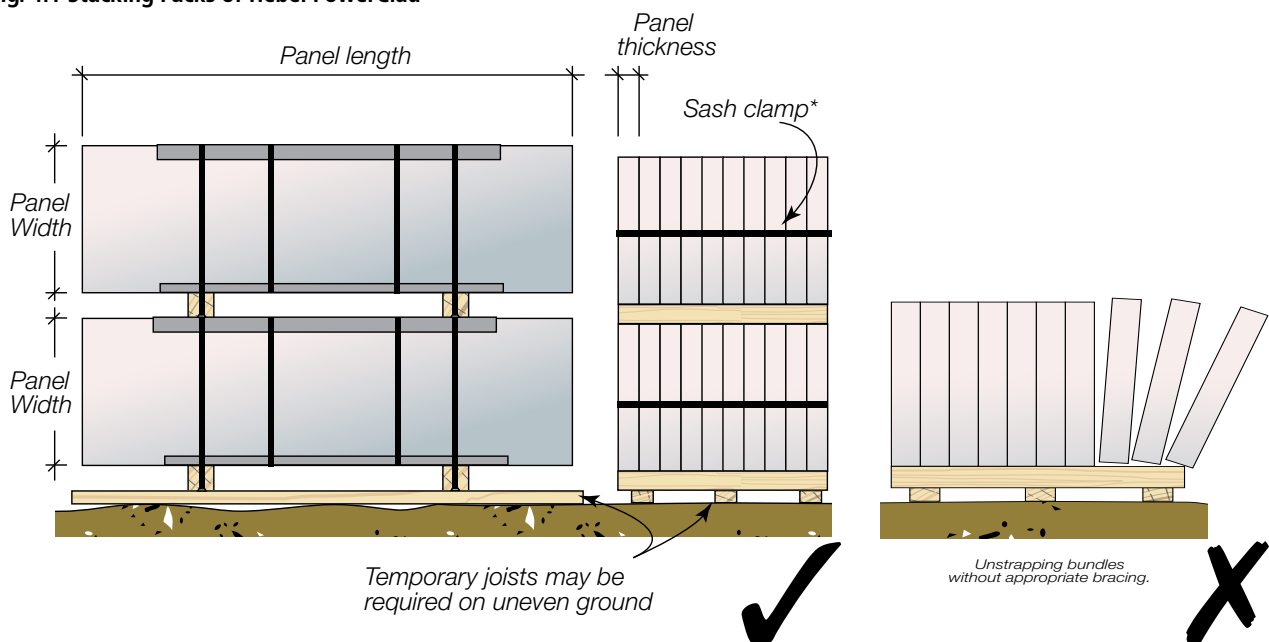
Unstrapping Packs

Ensure appropriate bracing is installed to packs prior to removal of strapping to prevent panels from falling. Panels can be held together with sash clamps, ratchet, straps or Hebel® stabilising bars.

Refer to TECBEAM™ Installation Guidelines for delivery and storage of TECBEAM™s.



Fig. 4.1 Stacking Packs of Hebel PowerClad



4.2 Tools and Equipment

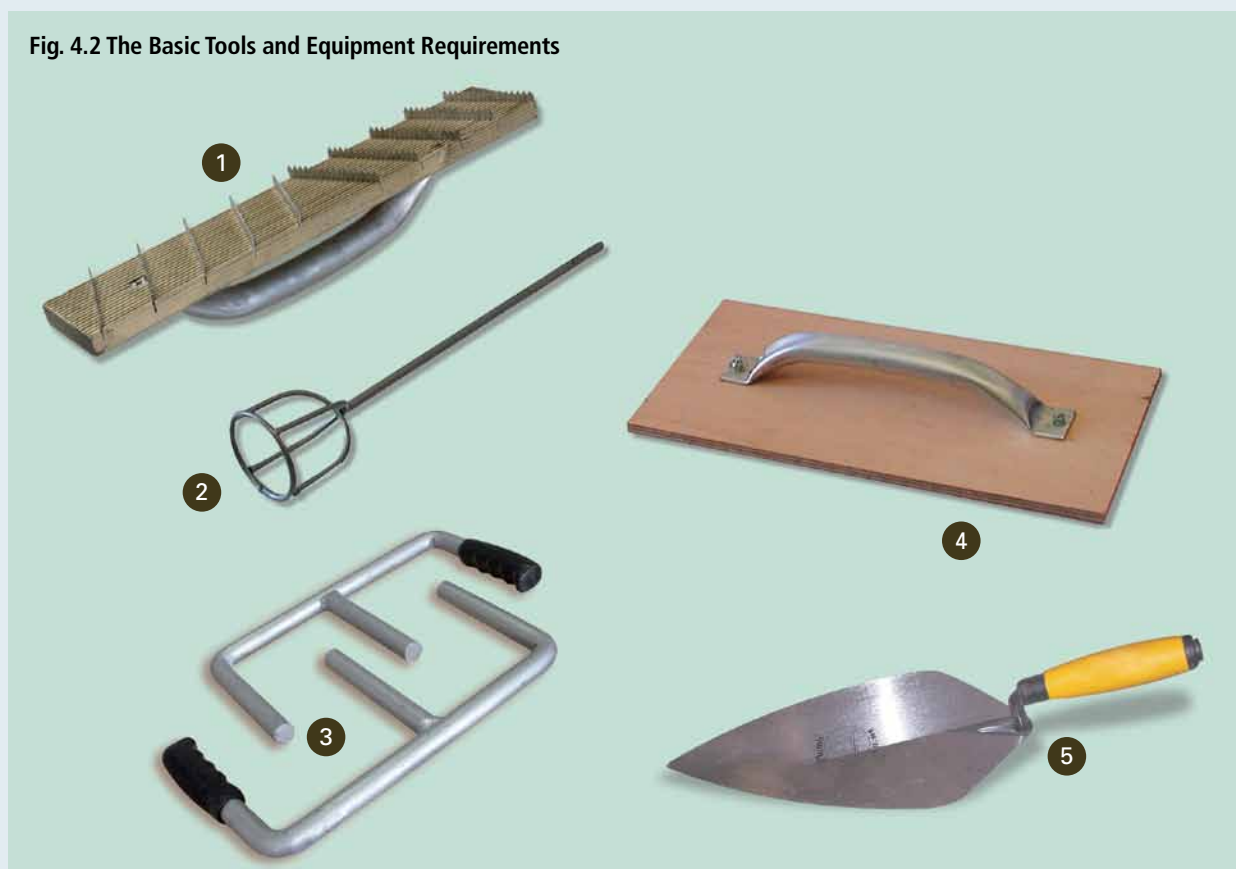
The basic tools required to assist in the installation of the TECSLAB™ are shown in Figure 4.1. These may be purchased through CSR Hebel® and include:

1. Levelling plane
2. Stirrer
3. Panel lifters
4. Sanding float
5. Trowel

Extra equipment will also be required and includes the following:

- Power drill (clutch driven)
- Power saw with metal or diamond tipped cutting blades
- Dust extraction system
- Sockets and bits for screws
- Personal Protective Equipment (PPE) such as goggles, face mask and P1/P2 dust masks, used when site cutting the panels

Fig. 4.2 The Basic Tools and Equipment Requirements



4.3 Panel Installation

Installation Procedures

CSR Hebel® promotes and advocates a safety conscious work place at all times. To assist builders and contractors to maintain their safety standards, CSR Hebel® has produced guidelines for the installation and handling of their products. Contact CSR Hebel® for additional information.

Mortars & Adhesives

The Hebel® bagged mortar and adhesive should be prepared in accordance with instructions on the packaging.

Damaged Panels

Chipped or damaged panels are to be repaired using Hebel® Patching Mortar. Your Hebel® supplier should be notified immediately of any panel damage or cracking that occurs during the handling of the panels. This damage may result in the panel being structurally inadequate, in which case it must be replaced.

Panel Cutting

Hebel® PowerFloor™ Panels to be cut with a circular saw fitted with a diamond tipped blade. The use of power tools may cause dust, which contains respirable crystalline silica, with the potential to cause bronchitis, silicosis and lung cancer after repeated and prolonged exposure. When using power or hand tools on Hebel® products, wear a P1 or P2 respirator and eye protection. When cutting, routing or chasing Hebel® products with power tools, use dust extraction equipment and wear hearing protection. Refer to CSR Hebel® MSDS sheets. For further information, contact CSR Hebel® or visit our website: www.hebelaustralia.com.au

Reinforcement exposed during cutting is to be coated with a liberal application of Hebel® anti-corrosion protection paint.

4.4 Panel Handling

Manual Handling

CSR Hebel® recommends using a trolley or other mechanical apparatus to move the panels around the work site. Manual handling, where people physically move a panel, should be kept to a minimum, with the weight being supported by an individual kept as small as possible. Any concerns

regarding the weight to be handled should be discussed with the panel installing contractor.

To minimise the possibility of manual handling injuries, CSR Hebel® suggests the following:

- Use mechanical aids, such as trolleys, fork lifts, cranes and levers, or team lifting to move panels.

- Keep the work place clean to reduce the risk of slips, trips and falls which can cause injury.
- Plan the sequence of installation to minimise panel movements and avoid awkward lifts.
- Keep the panels dry.
- Train employees in good lifting techniques to minimise the risk of injury.

Hebel® products are cement-based, which may irritate the skin, resulting in itching and occasionally a red rash. The wearing of gloves and suitable clothing to reduce abrasion and irritation of the skin is recommended when handling Hebel® products.



Appendix A: TECSLAB™ Material Properties

A.1 Manufacturing Tolerances

Length	± 5.0mm
Width	± 1.5mm
Thickness	± 1.5mm
Diagonals (Max.)	5mm
Edge straightness deviation (Max.)	1.5mm

A.2 Hebel® PowerFloor™ Physical Properties

- Hebel® PowerFloor™ profile and nominal dimensions are shown in Section 3.3.
- Panel reinforcement is a single layer of steel mesh with 4 longitudinal wires of 4mm diameter.
- Nominal dry density = 510 kg/m³.
- Average working density = 688 kg/m³ at 30% moisture content.
- Average service life density = 561 kg/m³ at 10% moisture content.

A.3 Hebel® PowerFloor™ Strength Properties

- Characteristic Compressive Strength or AAC, f'_{cm} = 2.8 MPa.
- Average Compressive Strength of AAC = 4.0 MPa.
- Characteristic Modulus of Rupture, f'_{ut} = 0.60 MPa.

A.4 Hebel® PowerFloor™ Acoustic Properties

- Panel only with no plasterboard or other lining R_w = 36dB, R_w+C_{tr} = 33dB (refer to acoustic test ATF-676).

A.5 Hebel® PowerFloor™ Thermal Properties

- R-Value of PowerPanel with no plasterboard or other lining = 0.48 m². K/W (6% moisture content).

A.6 Fire Hazard Indices

Hebel® products have BCA Group Number 1 and also the following early fire hazard indices, determined in accordance with AS1530.3:1990:

Ignitability Index	0
Spread of Flame Index	0
Heat Development Index	0
Smoke Development Index	0 - 1

A.7 Fire Resistance Level (FRL) Ratings

For fire performance characteristics of Hebel® PowerFloor™, refer to Section 2.1 of this guide.

Appendix B: Estimating TECSLAB™

Following is a guide to assist in working out quantities and costs for the required components of the Hebel® PowerFloor™ system.

Please consult a licensed fabricator for a quote on TECBEAMS™ for your project.

Step 1: Calculation of the Total Floor Area

First calculate the total floor area of the building, allowing for the panels to extend UNDER the external wall frames.

The easiest way for this to be calculated is to determine the overall wall length of the area being calculated, then minus the exterior wall material and cavity thickness. Below is a diagram of a house using the Hebel® Low Rise External Wall System. This system gives an overall exterior wall thickness of 185mm (90mm stud frame, 20mm tophat batten and 75mm thick Hebel® PowerPanel), so given the plan dimensions the area would be worked out as follows:

- $14.000 - 0.095 - 0.095 = 13.810 \text{ m}$ (0.095 = 75 mm Hebel® PowerPanel and 20 mm tophat)
- $7.000 - 0.095 - 0.095 = 6.810 \text{ m}$
- Total Floor Area (TFA) = $13.810 \times 6.810 = 94.0461 \text{ m}^2$ (total area to the outside of the stud frame)

Step 2: Panel Waste

This can be calculated in two ways:

An accurate calculation by completing a detailed panel layout and measuring the amount of waste that will

be generated due to the layout of the house. Or By applying a waste percentage to the Total Floor Area. Generally allow an additional 5% of area. Therefore multiply the Total Floor Area by 1.05. This calculation gives you the total Adjusted Floor Area (TAFA).

Step 3: Material Quantities

Now that the floor area has been worked out we can move on to working out the material quantities.

(A) Hebel® PowerFloor™ Panels:

- Area of one panel = $(1.8\text{m} \times 0.6\text{m}) = 1.08\text{m}^2$
- No. of panels = Total Adjusted Floor Area (TAFA) \div 1.08m^2

(B) Screws

- Joists @ 450cts = 8 screws required per m² of floor
- Joists @ 600cts = 6 screws required per m² of floor
- Total screws = (6 or 8) \times Total Floor Area (TFA)

Note: Packs come in 2 sizes, 100 or 250.

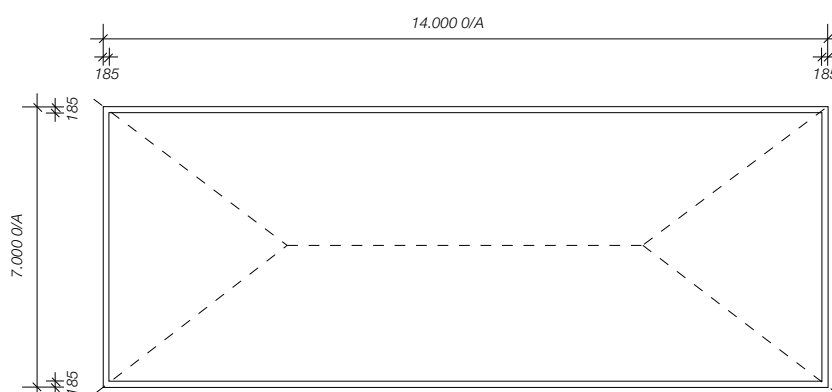
Screws to be estimated based on the pack sizes.

(C) Hebel® Adhesive

- Each 20kg bag of Hebel® Adhesive glues 20m² of floor area.
- Total bags = Total Floor Area (TFA) \div 20

(D) Construction Adhesive

- Each tube of construction adhesive glues approx. 10 panels to the sub floor joists. This is $10 \times 1.08\text{m}^2 = 10.8\text{m}^2$ of floor area.
- Total tubes of adhesive = Total Floor Area (TFA) \div 10.8



Appendix B: Estimating TECSLAB™ (cont.)

Client Details				
Date				
Client Name				
Client Address				
Client Phone				
Client Fax				
Client Email				
	Total Floor Area (TFA) =			m ²
	Total Adjusted Floor Area (TAFA) =	1.05 x TFA =		m ²
Item		Quantity	Cost / Unit	Total Cost
Panels	TFA ÷ 1.08 =			\$
Screws (Joists @ 600) OR (Joist @ 450)	TFA x 6 = OR TFA x 8 =		(250)	\$
			(100)	\$
Hebel Adhesive	TFA ÷ 20 =			\$
Construction Adhesive	TFA ÷ 10.8 =			\$
TOTAL				\$



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Appendix C: PowerFloor System Description

Code	System Description
TECSLAB™ 1600	Houses, Low Rise and Commercial Floor Carpet Ground Floor Enclosed
TECSLAB™ 1601	Houses, Low Rise and Commercial Floor Carpet Ground Floor Unenclosed
TECSLAB™ 1602	Houses, Low Rise and Commercial Floor Carpet 2nd Storey Gyprock Ceiling (CSR 821)
TECSLAB™ 1603	Houses, Low Rise and Commercial Floor Carpet 2nd Storey Gyprock Ceiling (CSR 826)
TECSLAB™ 1604	Houses, Low Rise and Commercial Floor Carpet 2nd Storey Gyprock Ceiling (CSR 827)
TECSLAB™ 1615	Houses, Low Rise and Commercial Floor Vinyl Ground Floor Enclosed
TECSLAB™ 1616	Houses, Low Rise and Commercial Floor Vinyl Ground Floor Unenclosed
TECSLAB™ 1617	Houses, Low Rise and Commercial Floor Vinyl 2nd Storey Gyprock Ceiling (CSR 821)
TECSLAB™ 1618	Houses, Low Rise and Commercial Floor Vinyl 2nd Storey Gyprock Ceiling (CSR 826)
TECSLAB™ 1619	Houses, Low Rise and Commercial Floor Vinyl 2nd Storey Gyprock Ceiling (CSR 827)
TECSLAB™ 1620	Houses, Low Rise and Commercial Floor Timber Battens Ground Floor Enclosed
TECSLAB™ 1621	Houses, Low Rise and Commercial Floor Timber Battens Ground Floor Unenclosed
TECSLAB™ 1622	Houses, Low Rise and Commercial Floor Timber Battens 2nd Storey Gyprock Ceiling (CSR 821)
TECSLAB™ 1623	Houses, Low Rise and Commercial Floor Timber Battens 2nd Storey Gyprock Ceiling (CSR 826)
TECSLAB™ 1624	Houses, Low Rise and Commercial Floor Timber Battens 2nd Storey Gyprock Ceiling (CSR 827)
TECSLAB™ 1625	Houses, Low Rise and Commercial Floor Timber Floating Ground Floor Enclosed
TECSLAB™ 1626	Houses, Low Rise and Commercial Floor Timber Floating Ground Floor Unenclosed
TECSLAB™ 1627	Houses, Low Rise and Commercial Floor Timber Floating 2nd Storey Gyprock Ceiling (CSR 821)
TECSLAB™ 1628	Houses, Low Rise and Commercial Floor Timber Floating 2nd Storey Gyprock Ceiling (CSR 826)
TECSLAB™ 1629	Houses, Low Rise and Commercial Floor Timber Floating 2nd Storey Gyprock Ceiling (CSR 827)
TECSLAB™ 1605	Houses, Low Rise and Commercial Floor Tiles Ground Floor Enclosed
TECSLAB™ 1606	Houses, Low Rise and Commercial Floor Tiles Ground Floor Unenclosed
TECSLAB™ 1607	Houses, Low Rise and Commercial Floor Tiles 2nd Storey Gyprock Ceiling (CSR 821)
TECSLAB™ 1608	Houses, Low Rise and Commercial Floor Tiles 2nd Storey Gyprock Ceiling (CSR 826)
TECSLAB™ 1609	Houses, Low Rise and Commercial Floor Tiles 2nd Storey Gyprock Ceiling (CSR 827)
TECSLAB™ 1610	Houses, Low Rise and Commercial Floor Tiles on Topping Slab Ground Floor Enclosed
TECSLAB™ 1611	Houses, Low Rise and Commercial Floor Tiles on Topping Slab Ground Floor Unenclosed
TECSLAB™ 1612	Houses, Low Rise and Commercial Floor Tiles on Topping Slab 2nd Storey Gyprock Ceiling (CSR 821)
TECSLAB™ 1613	Houses, Low Rise and Commercial Floor Tiles on Topping Slab 2nd Storey Gyprock Ceiling (CSR 826)
TECSLAB™ 1614	Houses, Low Rise and Commercial Floor Tiles on Topping Slab 2nd Storey Gyprock Ceiling (CSR 827)



The better way to build

TECSLAB™ is a quality building product, and is backed by CSR Building Products Limited and TECBEAM™ Australasia Pty Ltd. Further details on engineering and building with the TECSLAB™ system is available on our website www.tecslab.com.au

Health & Safety

Information on any known health risks of our products and how to handle them safely is on their packaging and/or the documentation accompanying them. Additional information is listed in the Material Safety Data Sheet (MSDS).

To obtain a copy of a MSDS, telephone 1800 807 668 or download from www.hebelaustralia.com.au. Contractors are required by law to perform their own risk assessments before undertaking work. Hebel has sample Safe Work Method Statements (SWMS) to assist in this. To obtain a sample SWMS, refer also to the above sources.

Performance & Certification

Hebel® products are manufactured in Australia by CSR Building Products.

A.B.N. 55 008 631 356. It is a manufacturer and supplier of Hebel Autoclaved Aerated Concrete (AAC) products. Because it is a manufacturer and supplier only, CSR does not employ people qualified as Accredited or Principal Certifiers. CSR is therefore unable to provide Construction Compliance Certificates or Statements of Compliance. CSR conducts appropriate testing of its products and systems to determine performance levels. These include structural, fire and acoustic tests. Testing is conducted and certified by appropriate specialists in these fields. When using Hebel products and systems in specific projects, such specialists should be consulted to ensure compliance with the Building Code of Australia and relevant Australian Standards.

Guarantee

Hebel® guarantees the products manufactured by itself and the systems described in Hebel literature for 7 years, subject to the terms and conditions of the Hebel® Guarantee which can be inspected in the Hebel website at hebelaustralia.com.au. Hebel does not however guarantee the components, products or services, such as installation, supplied by others. Hebel® recommends that only products, components and systems recommended by it be used.

IMPORTANT:

Updates may be made to this document without notice. Please check the websites for the latest issue.

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Other

The design of a floor system requires the services of professional consultants. This Design Guide has been prepared as a source of information to provide general guidance to those consultants – and in no way replaces the services of the professional consultant and relevant engineers designing the project.

No liability can therefore be accepted by CSR or other parties for the use of this Design Guide. Hebel products and systems undergo constant research and development to integrate new technology and reflect ongoing performance enhancement.

Hebel systems are also constantly reviewed so as to reflect any changes in legislative building requirements and or general developments in common building practice. Due to our commitment to continual development and improving our building systems.

We advise that all users of this manual: HEB1279 August 2011 should regularly check that this manual is current, and they are applying our latest design information.

The latest editions of our Design Guides and supplementary diagrams and technical data are always available on our website: www.hebelaustralia.com.au

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