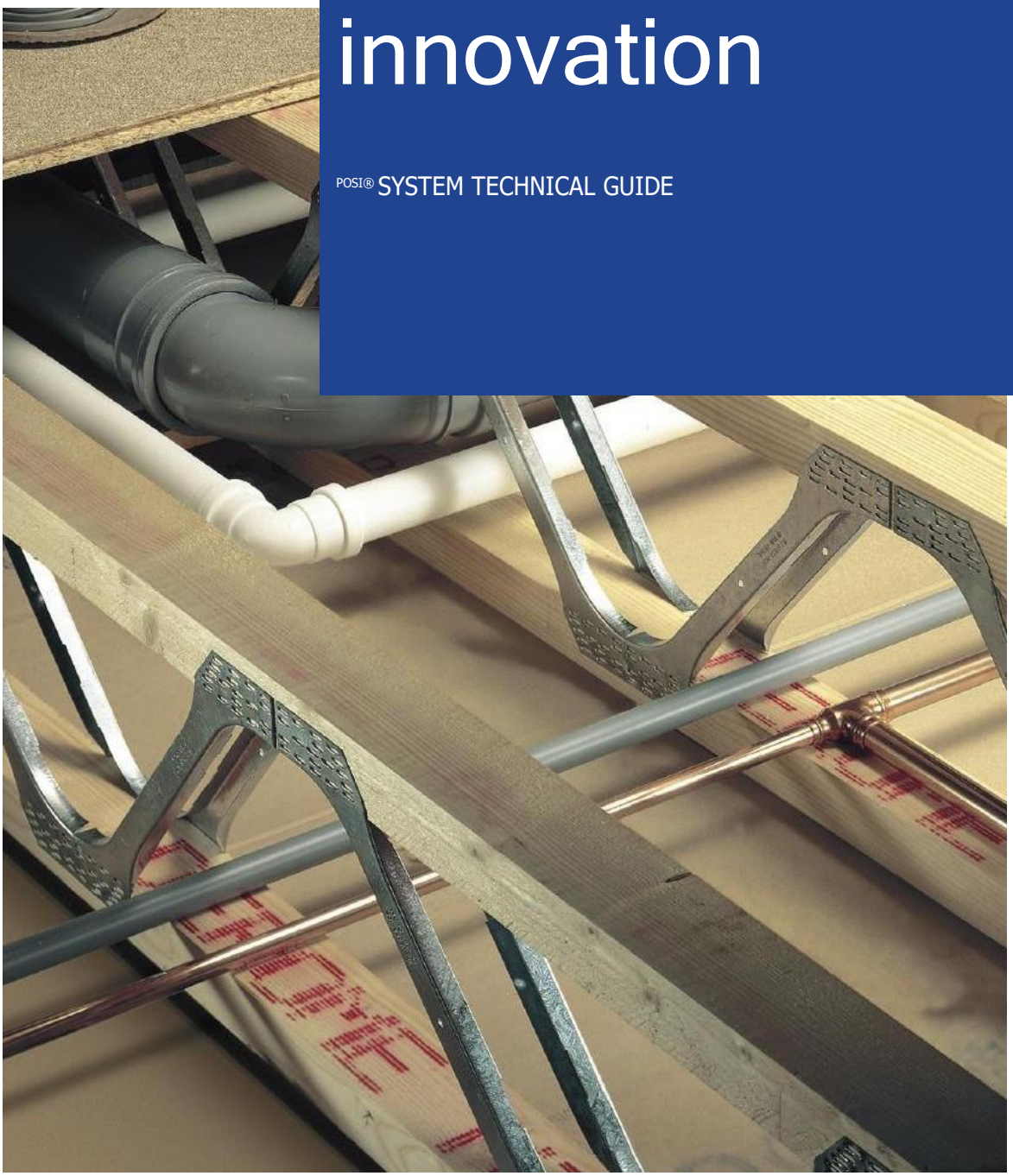
MiTek®

The world of POSI® innovation

POSI® SYSTEM TECHNICAL GUIDE



INNOVATIVE SOLUTIONS

MiTek®

THE WORLD OF POSI® INNOVATION

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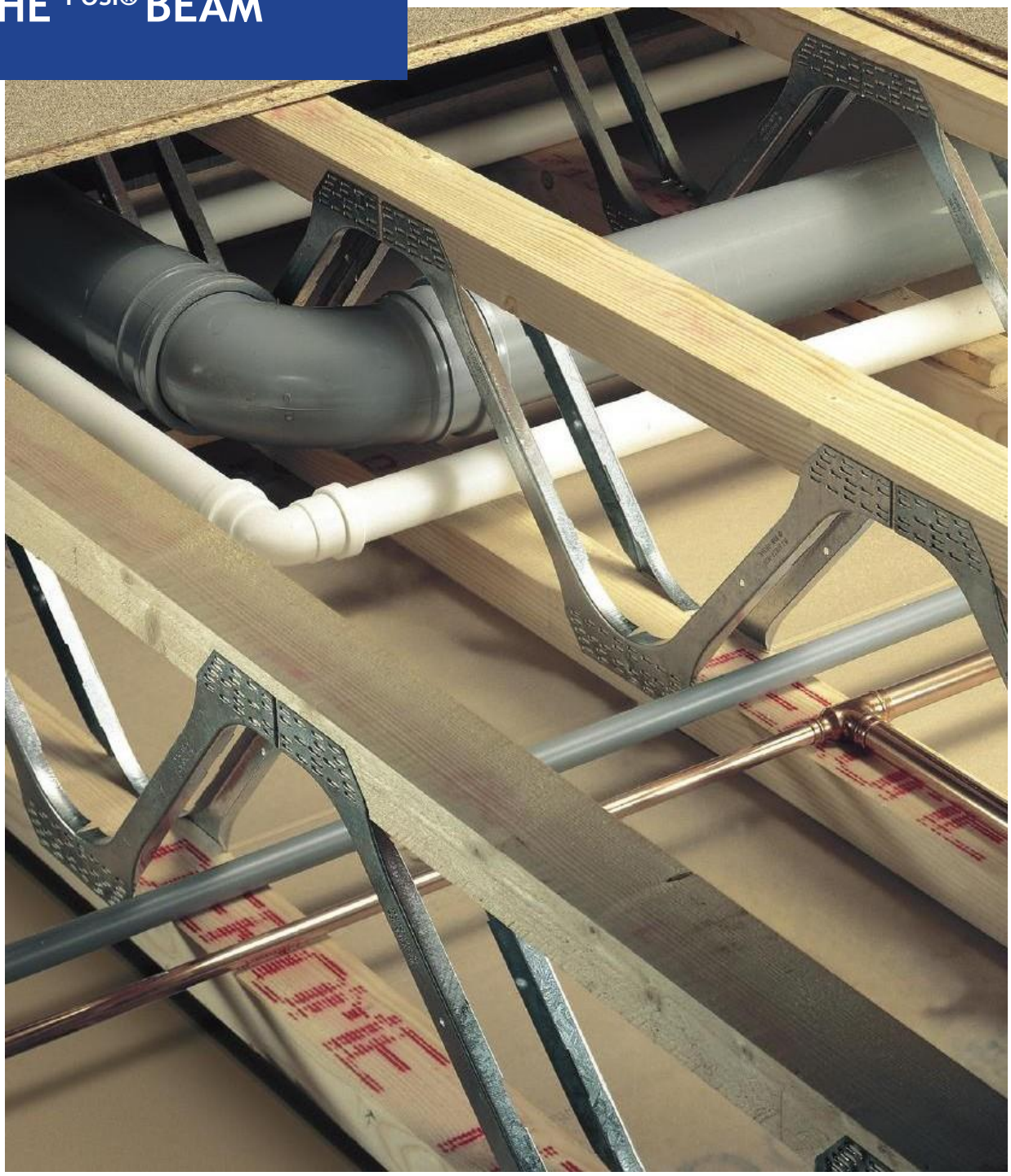
MiTek

INTRODUCTION TO THE POSI® BEAM



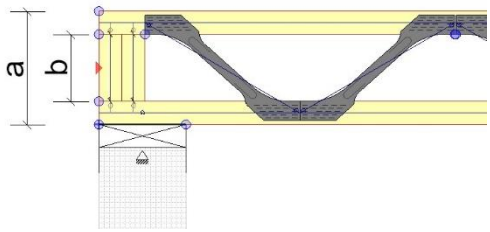
MITEK BALTIC

WHY WE CHOOSE POSI BEAM?

The POSI® beam combines the lightness of wood with the rigidity of metal structures, this system gives you design freedom for a wide range of applications, from floors to roofs, in residential and commercial buildings.

STANDARTIZED POSI BEAMS IN A WIDE RANGE OF SIZES:

Web type	Clearance between flanges [b]	Standard depth [a]
PS8	108mm	198mm
PS9	131mm	221mm
PS10	159mm	249mm
PS12	210mm	300mm
PS14	279mm	369mm
PS16	327mm	417mm



MANUFACTURERS

All Posi - Joist products are manufactured offsite in factory-controlled conditions. All our manufacturers use Pamir calculation program.

The network of POSI® beam manufacturers in Baltics is at your service.

To find your nearest manufacturer visit:

- www.posi-joist.se/lv/producers-lv
- www.posi-joist.se/lt/producers-lt
- www.posi-joist.se/ee/producers-ee

ECONOMY

While a simple comparison of cost per linear meter might not highlight its advantages, the POSI® Beam, with its superior performance and flexible openwork design, offers builders significant savings.

Its high performance allows for increased spacing, reducing the amount of material needed compared to solid wood. The installation of ventilation networks and ducts becomes quicker and simpler, thus reducing labour costs and time spent on site.

POSI® beams are manufactured within an industrial environment that ensures consistent quality control. They are custom designed, calculated, and manufactured specifically for each site, facilitating quick and straightforward installation. Due to their performance, they often eliminate the need for intermediate load-bearing walls, further reducing overall construction costs.

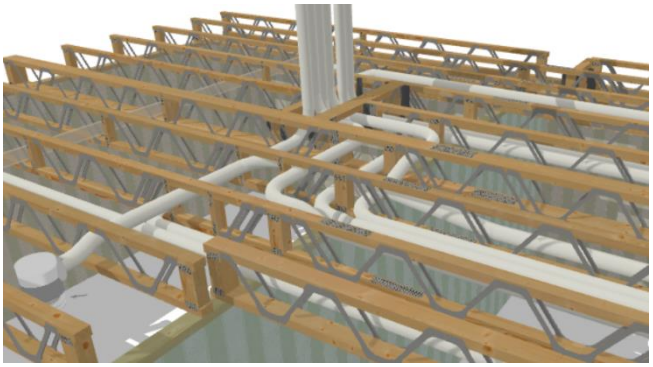
PERFORMANCE

The POSI® beam is an industrial, controlled, made-to-measure product that enables floors to be produced in record time.

This innovative solution can help you avoid having to return to the site to repair beams damaged by last-minute improvisations.

Its exclusive openwork metal makes plumbers, electricians and air-conditioning installers work easier and more comfortable.

An easy-to-install solution saves you time and therefore money for the manufacturer.

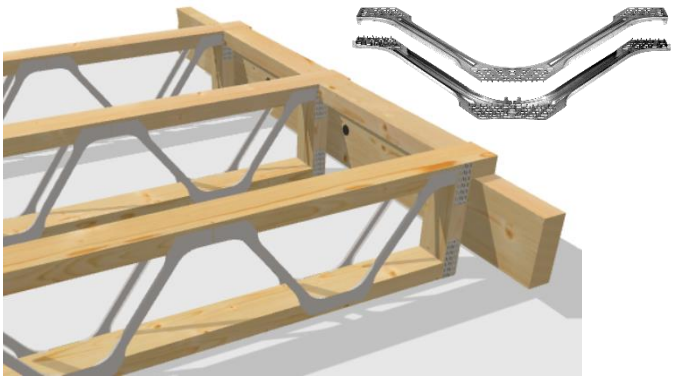


DESIGN FLEXIBLITY

Design flexibility is inherent in the concept of the Posi-Joist. They are prefabricated to fit the specific project with many different connection options for different materials, building techniques, environments etc.

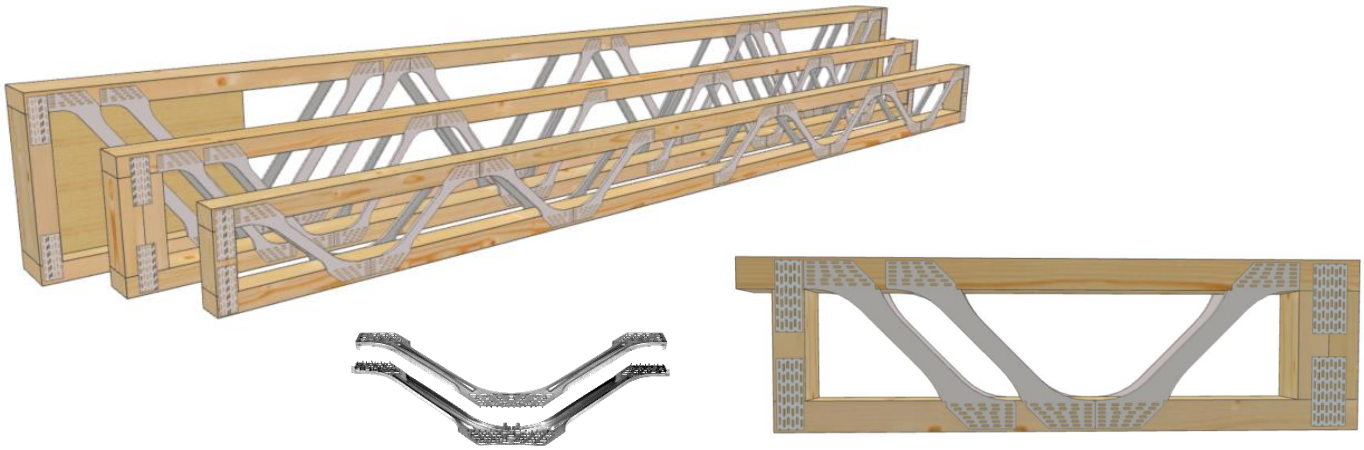
Design variations at the ends allow adaptation to a wide range of bearing conditions. The wedge can be cut to a maximum length of 130 mm to fit existing walls.

POSI® beams can be used as roof rafters, providing attractive living space and architectural variety. Easy access for the installation and maintenance of services in the floor zone is the clear advantage of the Posi-Joist system, and with the ever-increasing need for MVHR (Mechanical Ventilation and Heat Recovery) systems, Posi-Joist provides a perfect and simple solution that just isn't possible with alternative solid timber products.



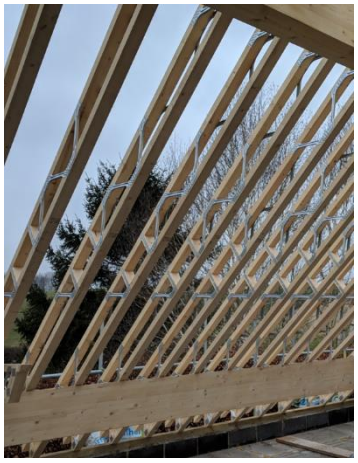
OPTIMIZATION OF MATERIALS

To reduce material costs - beams can be designed to include alternating metal Vs in low-stress zones.



LIGHTWEIGHT AND EASY TO HANDLE

A stiffener must be installed to ensure stability and efficient load transfer between adjacent beams. This way, no bracing is required to prevent the structures from tilting.

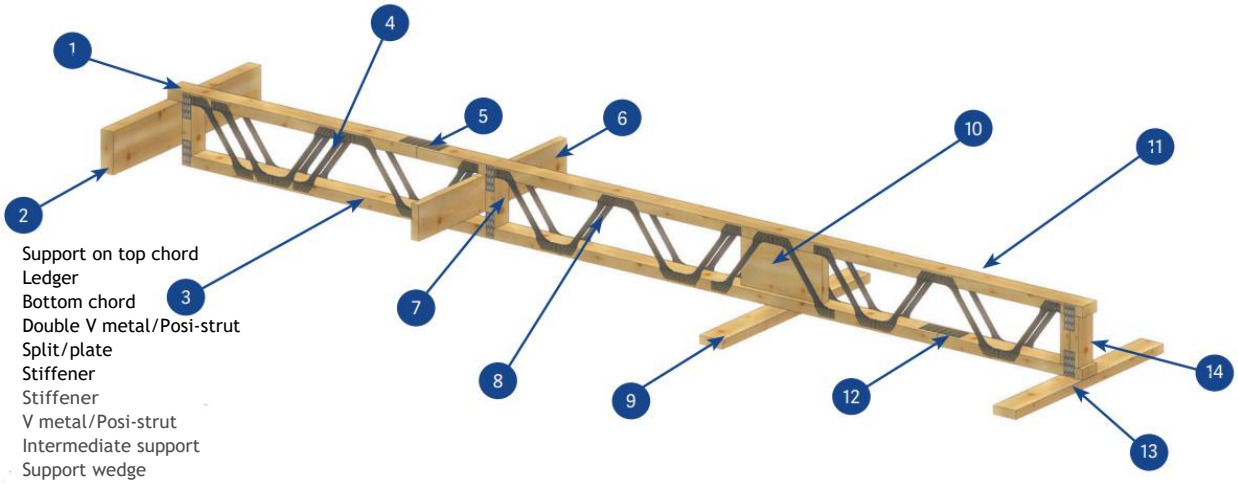


SOLUTION FOR FLOORS

INTERMEDIATE FLOORS

The intermediate floor is a horizontal structure, usually fixed at its ends to a wall and braced with a wooden panel. Combining lightness and strength, POSI® joists are economical technical solution for creating floors in new-build and renovation projects with spans of 4.50 m or more.

POSI® BEAM



1. Support on top chord
2. Ledger
3. Bottom chord
4. Double V metal/Posi-strut
5. Split/plate
6. Stiffener
7. Stiffener
8. V metal/Posi-strut
9. Intermediate support
10. Support wedge
11. Top chord
12. Split/plate
13. Support
14. End vertical/Post

SINGLE AND DOUBLE DIAGONALS

In openwork beams, the shear forces are primarily absorbed by the diagonals, often made of metal in the form of 'V' shapes. To enhance the shear capacity of open web beams, these metal 'V's can be doubled, particularly at points of increased stress such as the support levels.

This reinforcement at critical points ensures that the beam can adequately handle the shear forces encountered, especially in areas where these forces are greatest.

ADVANTAGES

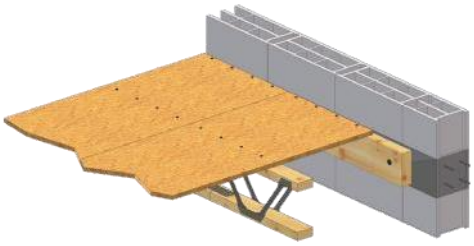
- Lightweight structure simplifies on-site installation.
- Design freedom.
- Wide fixing surface makes fixing of floor deck and ceilings simple and minimises shrinkage.
- Industrial manufacturing guarantees a quality product, delivered made-to-measure.
- The system's technical features meet the requirements of new construction and current regulations (Eurocodes, RE2020, etc.).

MASONRY WALL MOUNTING

LEDGER ANCHORED TO THE CONCRETE REINFORCEMENT

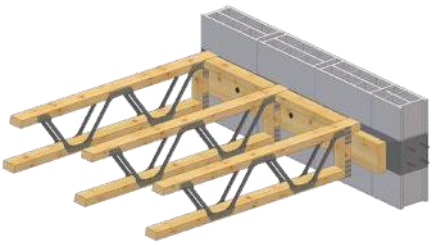
A POSI® joist or a solid wood ledger can be attached to the wall to support the floor panel.

In this case, a second ledger may be added at the same level as the bottom chord to attach the ceiling.



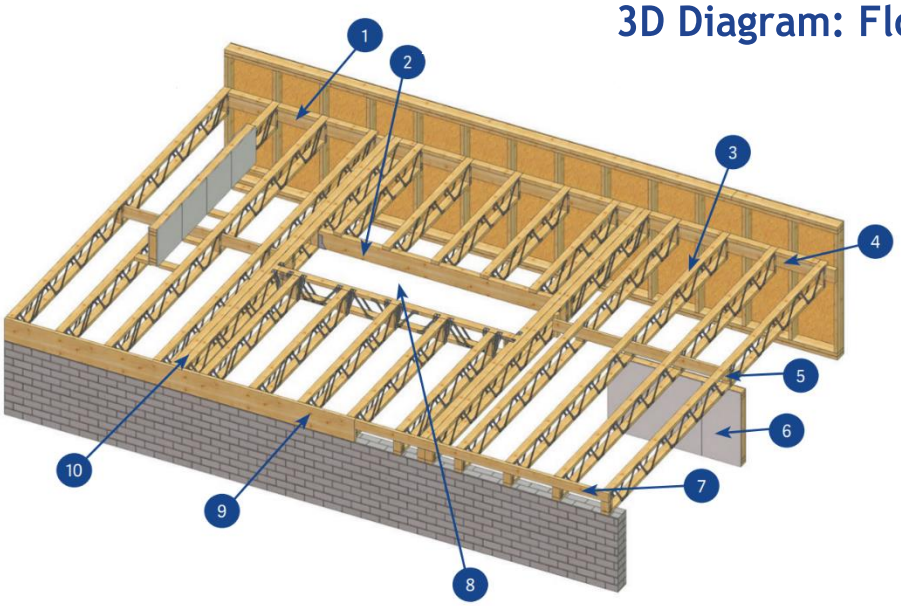
UPPER CHORD SUPPORTED ON THE WALL

The support on the top chord enables the openwork beam to be installed quickly, eliminating the need for a metal shoe. For a design it is important, however, that the metal V anchor overlaps the support.



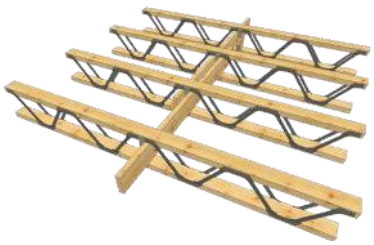
3D Diagram: Floor

1. Spacer
2. Load bearing beam
3. Posi joist
4. Ledger
5. Stiffener
6. Intermediate wall
7. Perimeter rail
8. Opening
9. Perimeter beam
10. Load bearing Posi beam



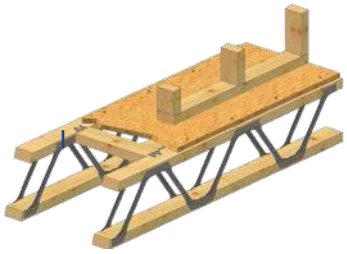
STIFFENER

The stiffener, positioned every 4 meters, plays an important role in open-web beam floor systems. It helps to ensure a uniform load transfer between the joists, in addition to significantly improving the floor's behaviour in response to vibratory phenomena.



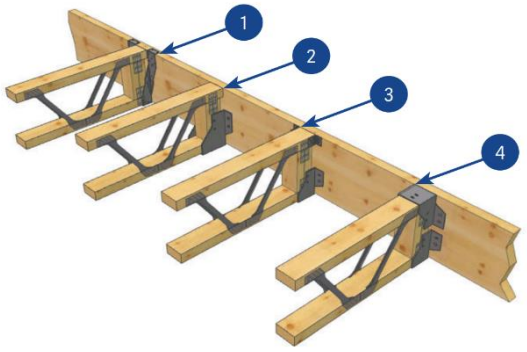
INTERMEDIATE PARTITIONS

When an intermediate partition is located between two joists, the floor panel must be reinforced, and the loads must be transferred to the adjacent joist via spacers.



METAL SHOE FIXING

Openwork beams can be installed against a wall or beam using a metal shoe. In this case, POSI® beams must be held in place for at least 2/3 of their height. The width of the shoe must be adapted to the width of the beam. If this condition is not met, we recommend using a shim to fill the existing gap.



1. Shoe with straps where the height of the shoe holds the top and bottom chord.

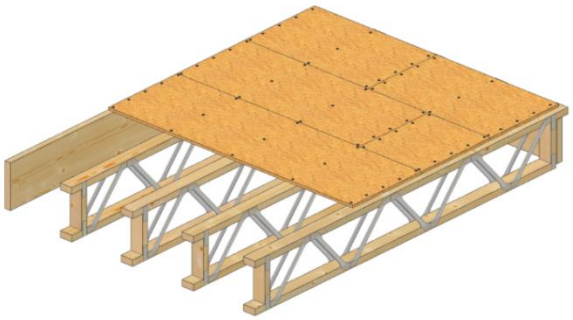
2. Shoe with external or internal flanges whose height is ≥ 2/3 of the height of the beam.

3. Metal shoe height < 2/3 of beam height + a bracket on each side to prevent tipping at supports.

4. Metal shoe to support the bottom chord, and an inverted shoe to prevent tipping at the supports. This device is particularly useful when the beam may be lifted.

FLOOR MOUNTING

The installation of floor support panels must be verified and checked by the designer, but the main provisions are listed below:

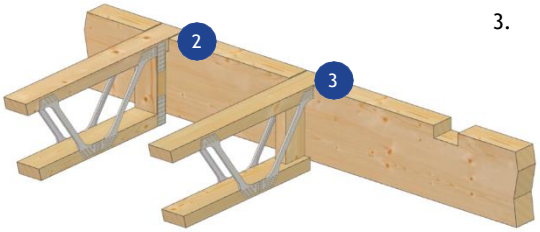


- laying with staggered joints (stone-cutting)
- panels must rest on a minimum of 3 supports
- the longitudinal axis of the panel is perpendicular to the POSI® beams
- the ends of the panels must be regularly and continuously attached to a support

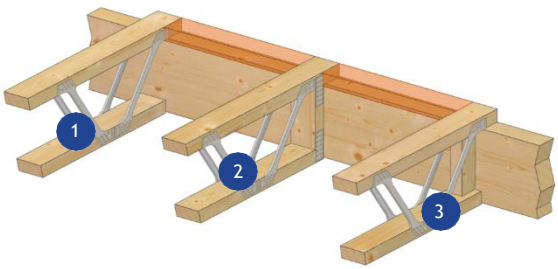
TOP CHORD SUPPORT DESIGNS

HIGH SUPPORT ON NOTCHED WOODEN BEAM

1. High support without a post
2. High support with a connected post
3. High support with an unconnected post



HIGH SUPPORT ON WOODEN BEAM WITH SPACERS



Fasten the top chords to the wall plate with nails or screws

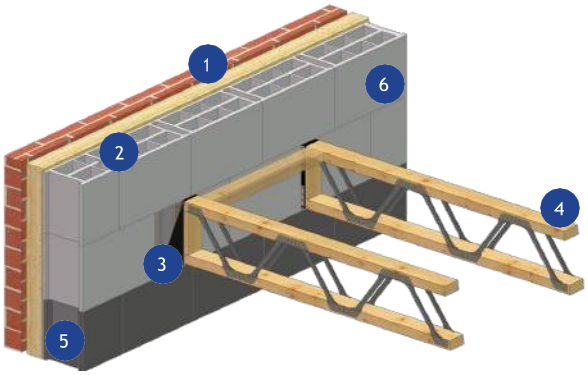
DESIGN DETAILS - CAVITY WALLS

There are several solutions for supporting floor joists. As illustrated, POSI® beams can be embedded in the wall. A waterproofing membrane must be installed to protect the beams. At the embedding point, the vapour seal must be reinforced to avoid the risk of condensation.

Alternatively, POSI® beams can be supported on metal shoes. The choice of shoe mainly depends on the wall on which the floor rests. In the case of hollow breeze-block walls, we recommend using shoes 2/3 the height of the beams. The shoes are pegged to the concrete chaining.

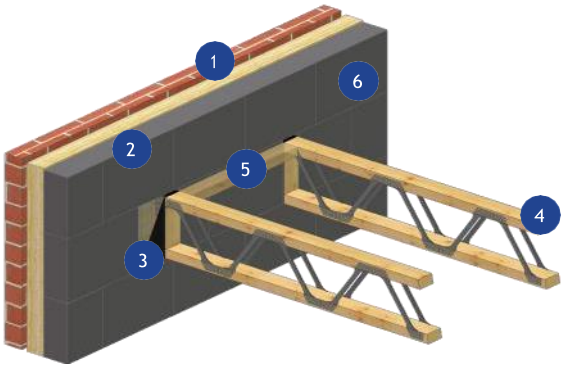
In the case of solid brick walls, it is possible to use flanged shoes placed between the masonry joints.

Embedding in a hollow breeze-block wall



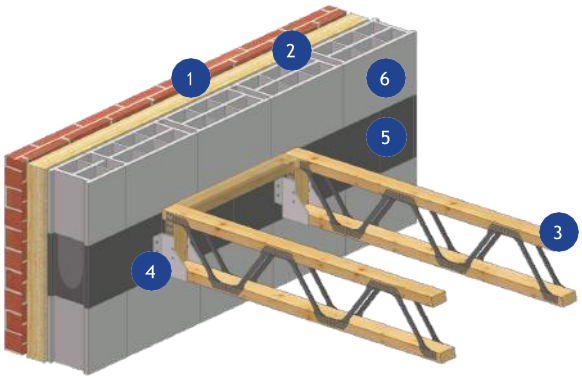
1. Outer wall
2. Insulation
3. Waterproofing
4. POSI® Beam
5. Reinforcement block

Embedding in a solid brick wall

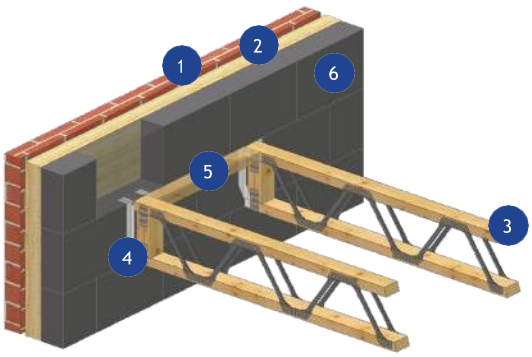


1. Outer wall
2. Insulation
3. Waterproofing
4. POSI® Beam
5. Spacer
6. Solid brick wall

External flange clamp, height 2/3



Masonry support shoe



1. Outer wall
2. Insulation
3. POSI® Beam

Diagram 1: SAE shoe (2/3 beam height)

5. Reinforcement
6. Cinder block

Diagram 2: support shoe against masonry

5. Spacer
6. Solid brick wall

SOLUTIONS FOR ROOFS

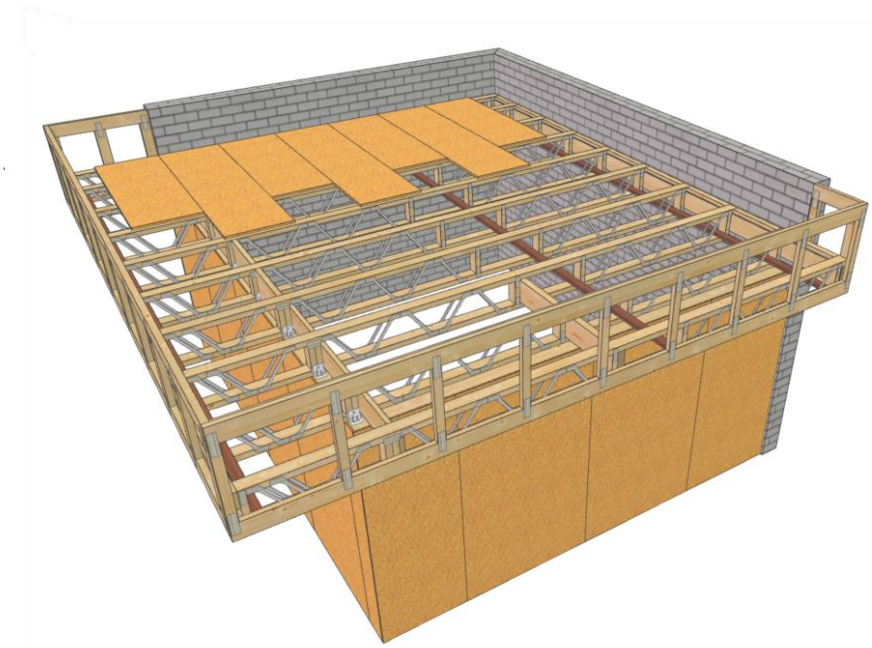
FLAT ROOFS

A flat roof is a roof with a slope of less than 10%.

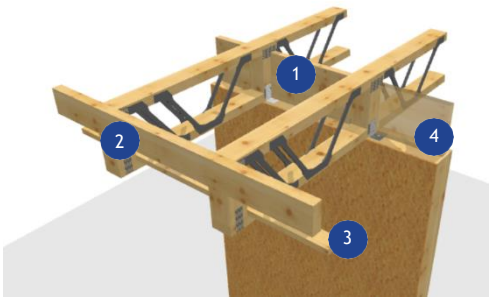
The wooden terrace roof is made up of joists fixed at the ends to a load-bearing belt or wall.
The roof's stability is ensured by a diaphragm made up of roof panels. There are 2 configurations of flat roofs, depending on loads and use:

* Non-accessible flat roofs with a multi-layer waterproofing system or layers of substrates and plants (green roofs)
* Accessible flat roofs

In the case of a green roof terrace, the load borne by the roof is particularly high. In some cases, the roof panel can act as a diaphragm, in which case the Eurocodes require mechanical continuity at the longitudinal edges of the panels.

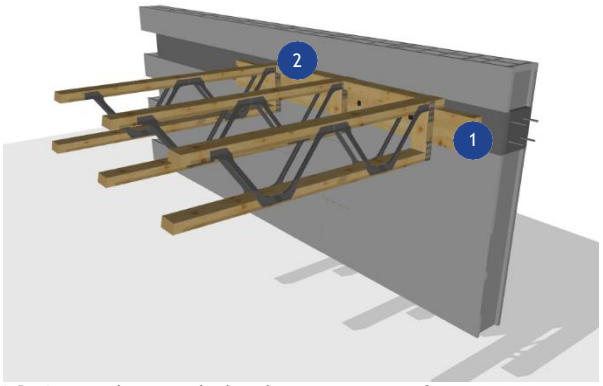


OVERHANG



1. Bracket
2. Perimeter band
3. Rafter brace
4. Spacer

SUPPORT OF TOP CHORD ON WALL PLATE



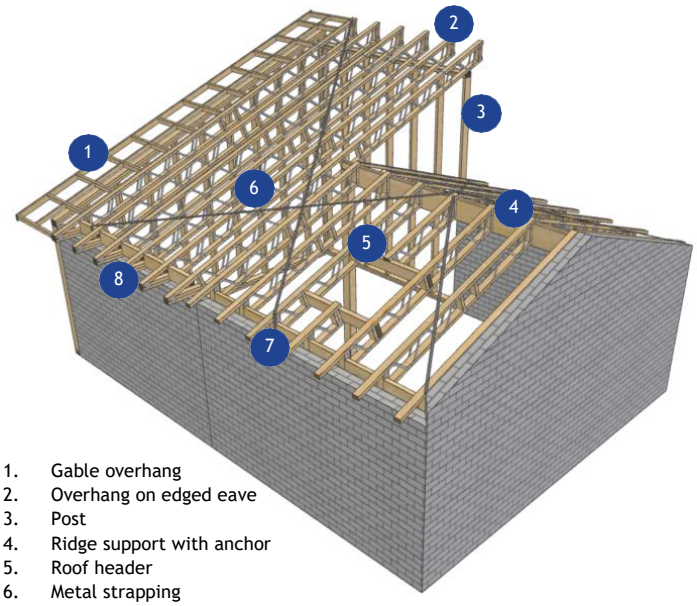
1. Perimeter plate attached to the outer concrete frame
2. Spacer for securing floor panel

POSI® RAFTERS

More and more POSI® structures are being incorporated into roofs, giving builders the opportunity to take advantage of the many benefits they offer.

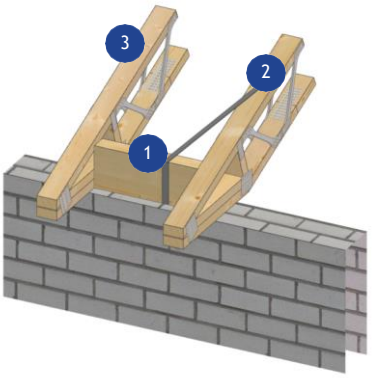
POSI® rafters are parallel-chord trusses, clad with steel V-plates. As POSI® beam floors, they are designed and manufactured off-site and tailored to the requirements of each individual project. They are delivered made-to-measure, complete with layout drawings for rapid installation.

POSI® rafters are suitable for both pitched and flat roofs.



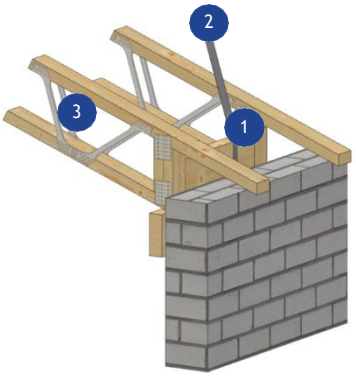
1. Gable overhang
2. Overhang on edged eave
3. Post
4. Ridge support with anchor
5. Roof header
6. Metal strapping
7. Cow-tail overhang
8. Straight edge overhang

STRAIGHT EDGE OVERHANG



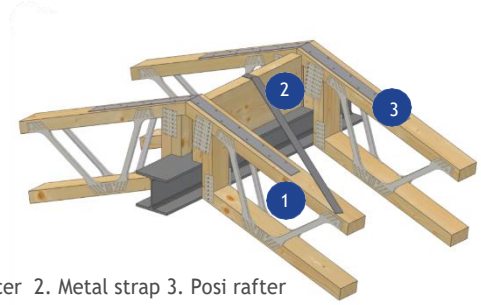
1. Spacer 2. Metal strap 3. Posi rafter

COW TAIL OVERHANG

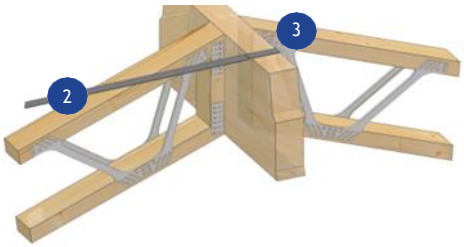


1. Spacer 2. Metal strap 3. Posi rafter

RIDGE SUPPORT SOLUTION EXAMPLES



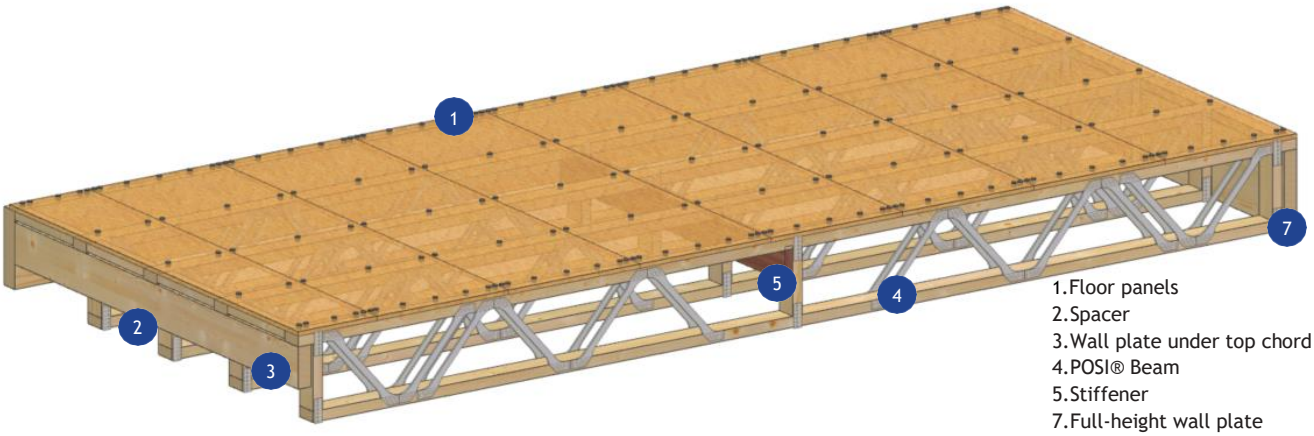
1. Spacer 2. Metal strap 3. Posi rafter



MODULAR SOLUTIONS

®POSI CASSETTE

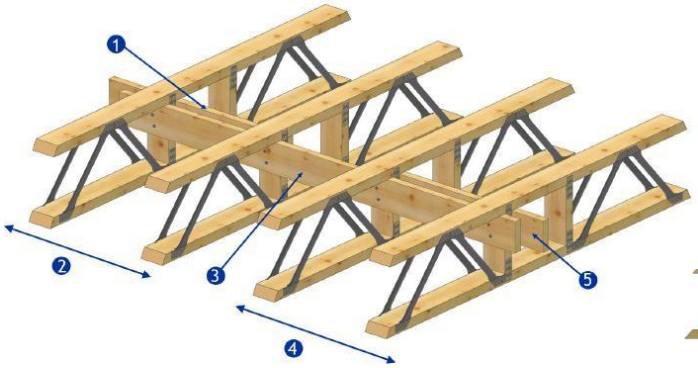
The cassette is a modular element composed of uniformly distributed structures and panels.
The POSI® beam-type structures are attached at the ends to a wall plate to form a modular element that facilitates transport and handling. These wall brackets ensure distributed transmission of forces to the walls.



1.Floor panels
2.Spacer
3.Wall plate under top chord
4.POSI® Beam
5.Stiffener
7.Full-height wall plate

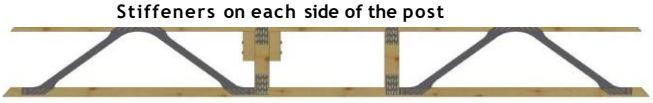
CONTINUITY OF STIFFENERS BETWEEN MODULES

The stiffeners must be joined every time the cassettes are joined.



1. Cassete stiffener 1
2. 1st cassete
3. Join cassettes with stiffeners in 3 points
4. 2nd cassete
5. Cassette stiffener 2

Stiffeners on each side of the post



CONCRETE LAYER

Attached concrete layer on top of Posi Joist provides the joist with stiffness reduced vibrations and improved acoustic performance.

Further research is required to determine the best adhesion method between the concrete layer and Posi Joist.

ADVANTAGES

The advantages of using prefabricated modules extend to both factory production and on-site installation. Indeed, these modules allow for:

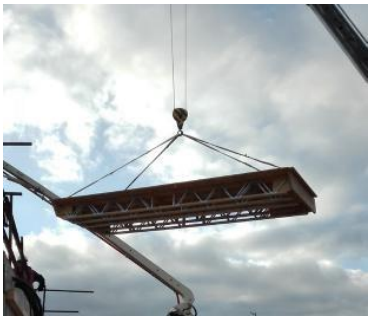
* Time savings at the construction site
* Increased overall speed of construction
* Weather protection, as modules are prefabricated indoors
* Enhanced safety through reduced high-rise work

HANDLING AND STORAGE

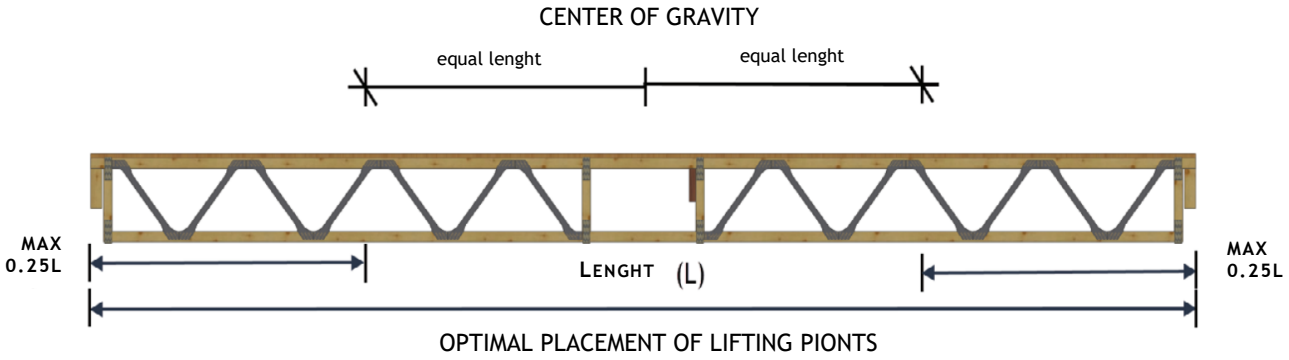
The time savings offered by cassettes depend mainly on-site preparation prior to installation.
The supporting walls and beams, as well as the temporary bracing, must be in place before the cassettes arrive on site. Finishing the installation while cassettes are still in place leads to costly delays installation time.

A number of considerations must be taken into account before starting work on the site:

* Instalation of bracing
* Site access
* Power lines or other infrastructure
* Truck and crane locations
* Lifting method



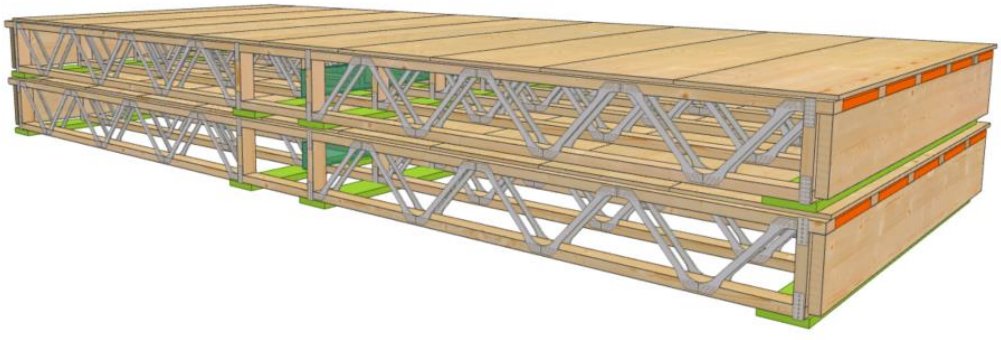
The choice of lifting method should be considered based on the load being lifted, the terrain, and access to the site. Preferably, the containers should be lifted and installed directly from the truck. Otherwise, they can be stored on a clean and flat surface.



To avoid any damage to the structure, it is recommended to keep them horizontal and to focus handling at the lifting points

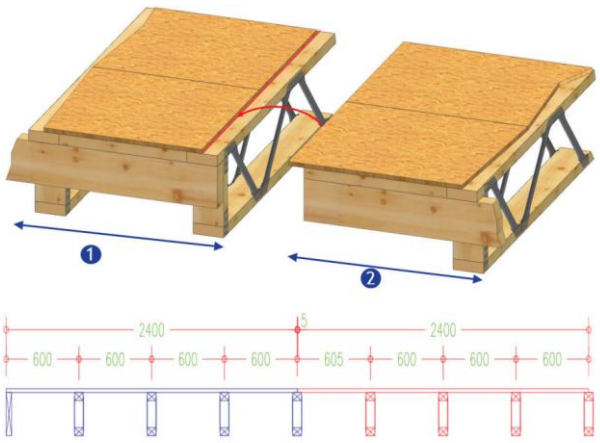
STORAGE

During storage, structural elements must not come into contact with the ground. If this is not possible, the best solution is horizontal storage laid flat on rafters no more than 3 meters apart

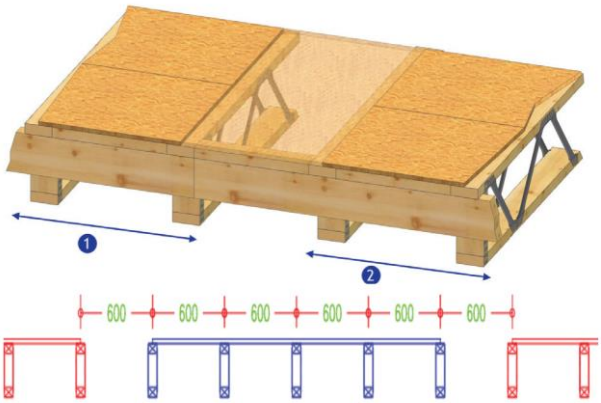


JUNCTION BETWEEN BOXES

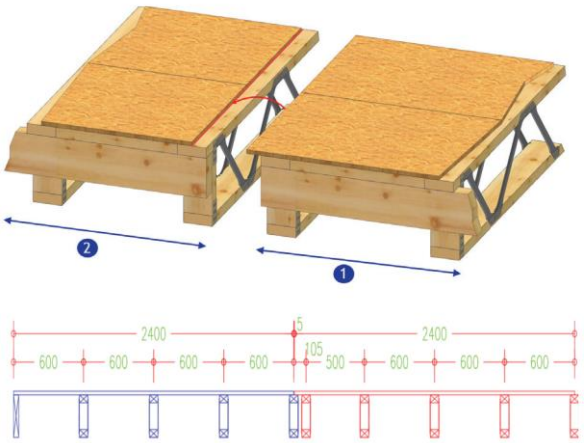
The cassettes must be connected to avoid discontinuities in the load transfer.
There are several ways to join the containers together:



By joining the containers, which are a set distance apart, with a panel that fits into the beam at the end of the next container.



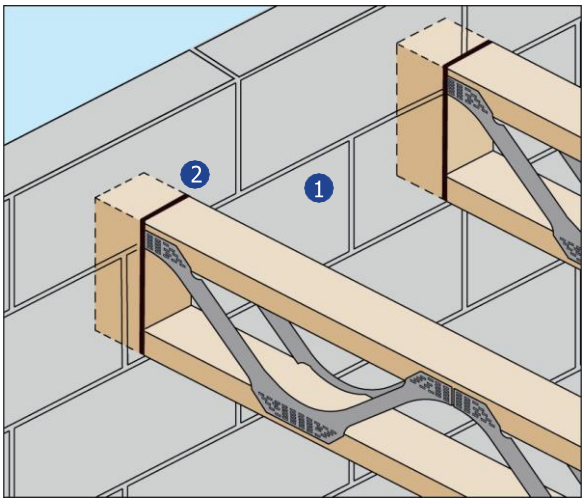
By connecting them with a gap equal to the width of a panel.



By positioning a beam at each end and extending one panel to overlap the other. This method is primarily used for wooden frame walls.

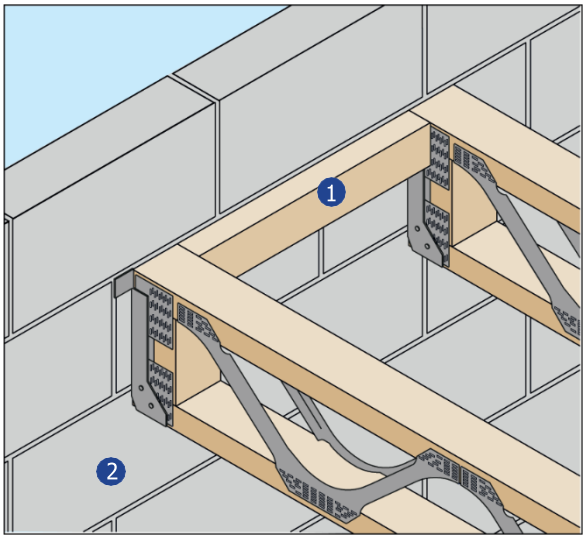
TIPS AND IMPLEMENTATION

POSI® BEAM DETAILS



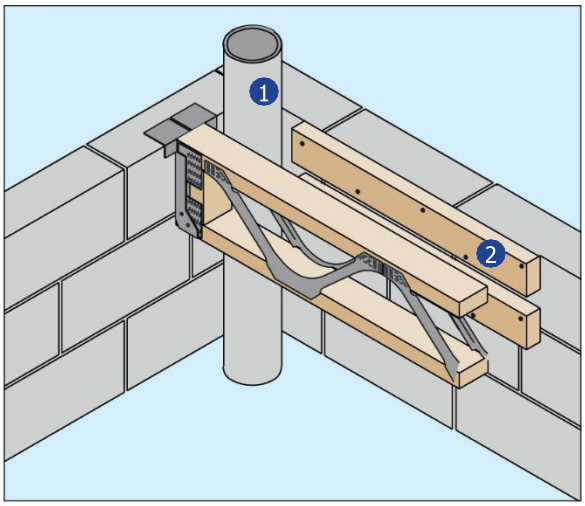
PSD 01: Support on bottom chords: beams embedded in masonry wall

1. The wall provides support between the beams
2. Apply a protective film for waterproofing



PD 02: Support on bottom chords: on metal shoes with spacers

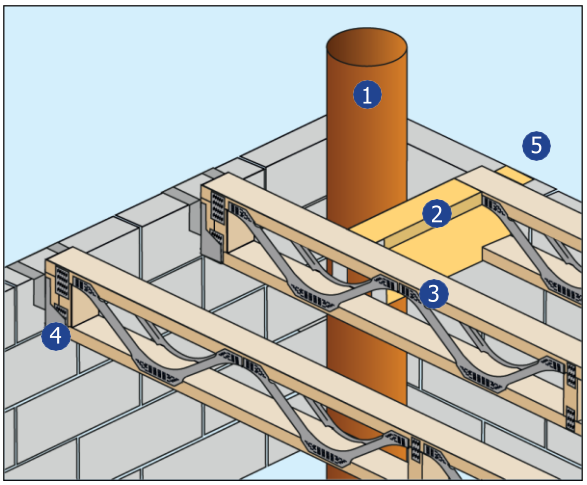
1. A spacer is fixed between the POSI® beams.
2. Metal shoes. The width of the shoe is adapted to the width of the beam. If the shoe is wider provide a thickness adjustment.



PD03: Fixing around a ventilation duct with ties

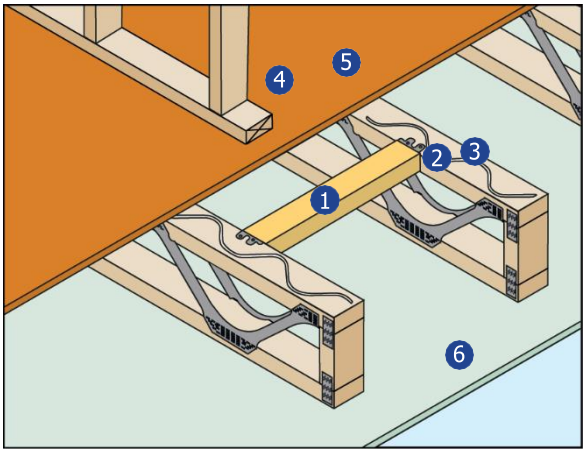
1. Ventilation duct
2. Beams are attached at ceiling and floor level
3. Posi beam shown in full depth masonry hanger

Note: This detail may not perform well acoustically as sound will be transmitted directly from the floor to the bearer through the inner leaf of the wall..



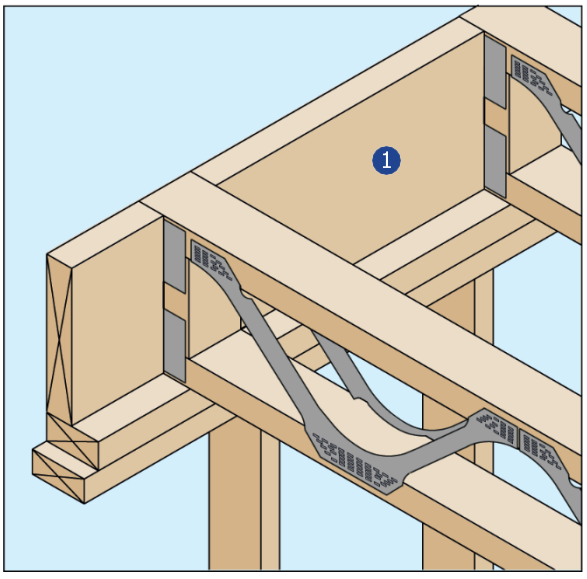
PD04: Ventilation duct with **solid timber**

1. Ventilation duct
2. Solid wood hopper
3. Mounting with shoe
4. The beam fixation to the masonry
5. Solid timber built in the wall



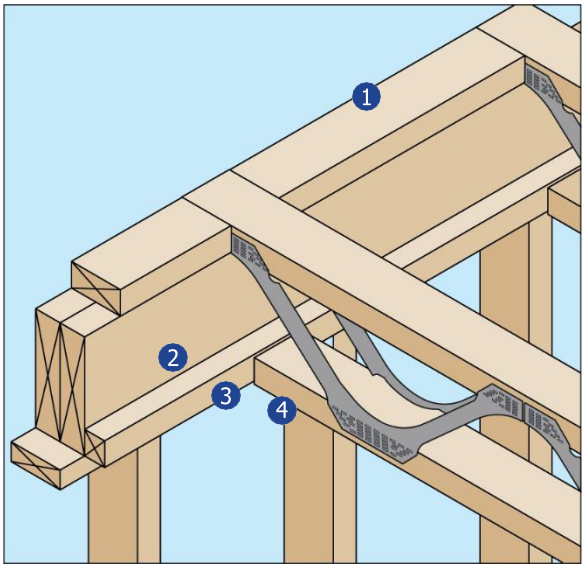
PD05: **Non Load bearing wall parallel with joists**

1. Nogginsat 600mm centers
2. Z-clip
3. Adhesive glue for floor fixing
4. Bottom rail nailed to noggins
5. Decking
6. Plasterboard



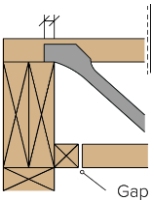
PD06: Bottom chord support: timber frame with restraint blocking

1. The support chord is fixed between the POSI® beams.

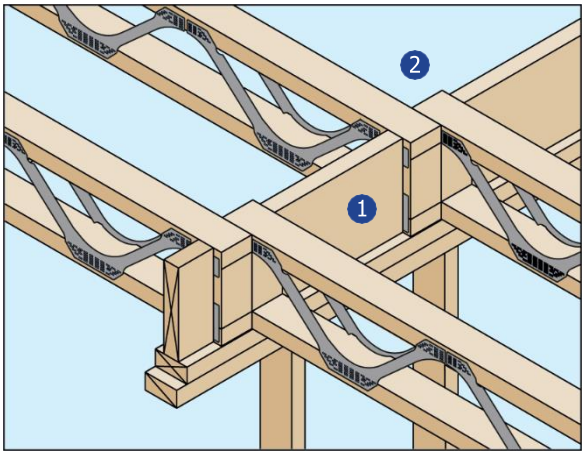


PD07: Top chord support - frame connection with ring beam

1. Floor support spacer maintains beam spacing
2. Ring Beam to suit Posi-Joist depth
3. Continuous plasterboard runner
4. Gap between end of Posi-Joist Bottom Chord and plasterboard runner

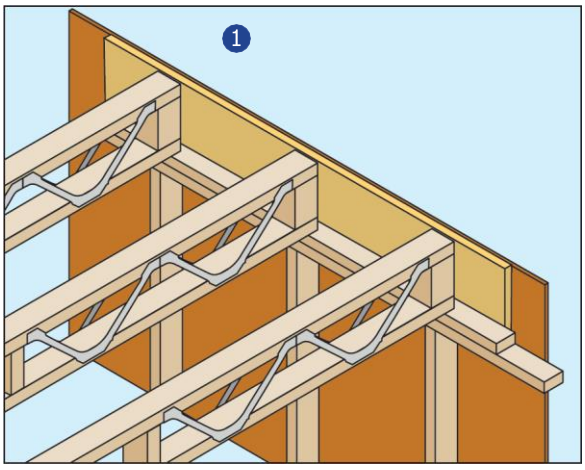


We recommend that unless proven by design the Posi-Strut should overhang the bearing by 15mm



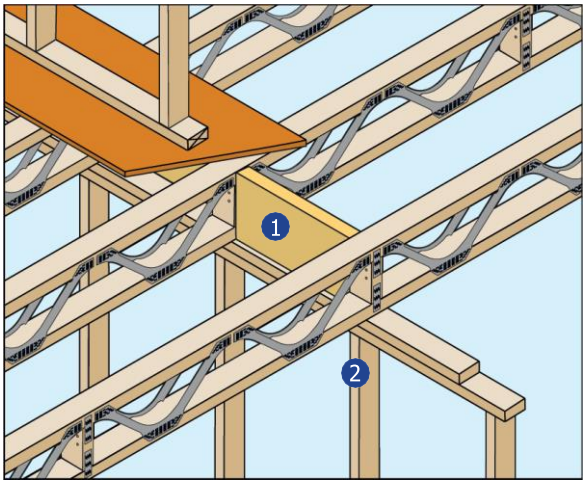
PD08: Support on bottom chord against an internal wall

1. Single or double wedge fixed between POSI® beams
2. Beams overlap over wall



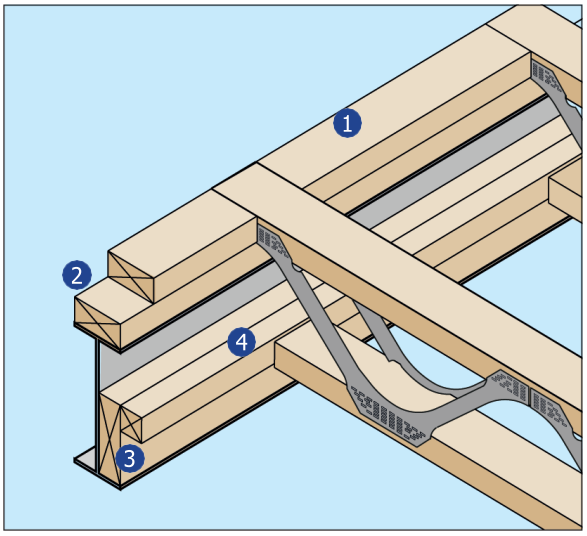
PD09: Bottom chord support: framework with rimboard

1. Solid or EWP rimboard



PD10: Intermediate partition bearing over wood-frame wall

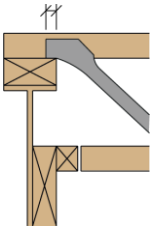
1. Solid or EWP full depth nogginn
2. Studs positioned under beams

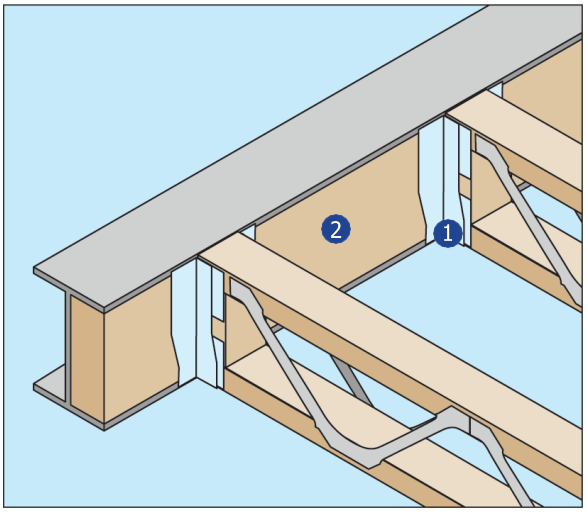


PD11: Top chord support on a steel beam

1. Floor support spacer
2. Top plate fixed to a steel beam
3. Wall plate inserted in steel profile
4. Gap between end of Posi-Joist bottom Chord and plasterboard runner

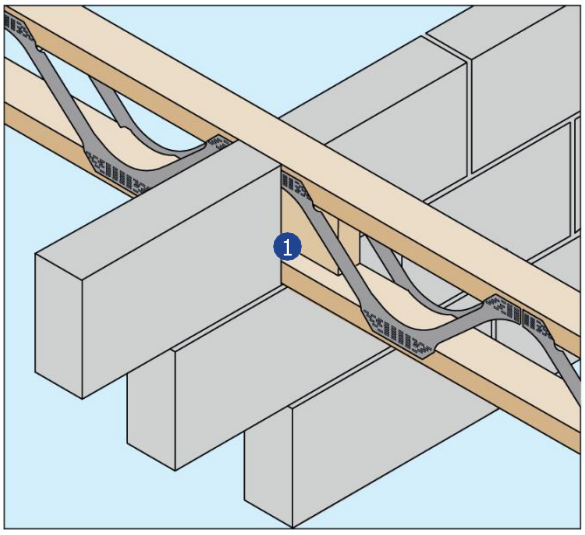
We recommend that V metal rests on at least 15 mm of the structure





PD12: Bottom chord support against a metal profile

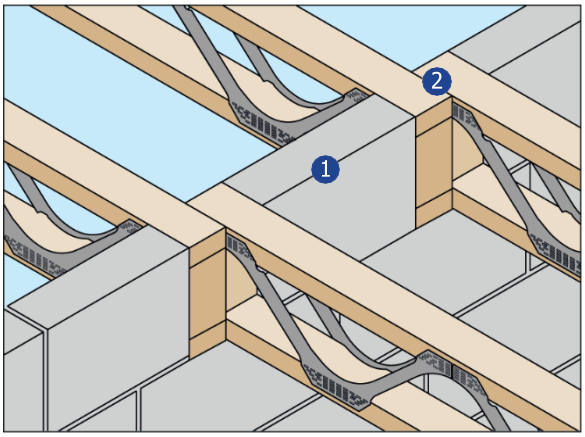
1. Posi joist fixed with a hamger
2. BeTimber packer as specified by building designer fixed to beam (size to suit)



PD13:Bottom Chord Support: Internal Masonry Continuous Joist with solid timber block

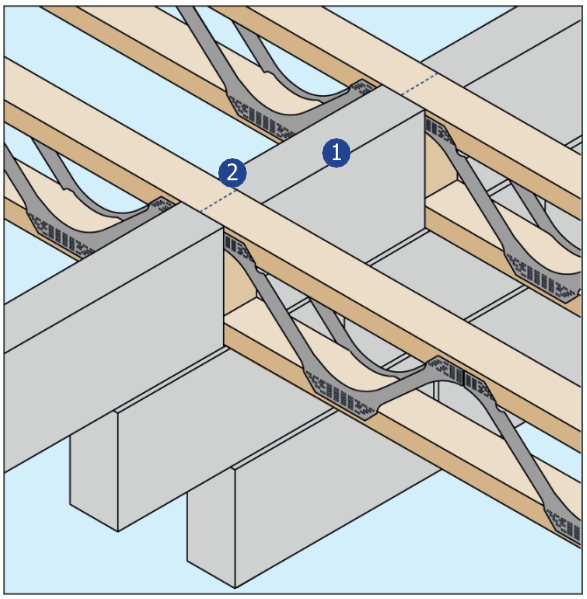
1. Solid timber block over bearing with grain parallel to spani. Gap to be filled to provide air tightness.

Note: avoid this design for a fire wall



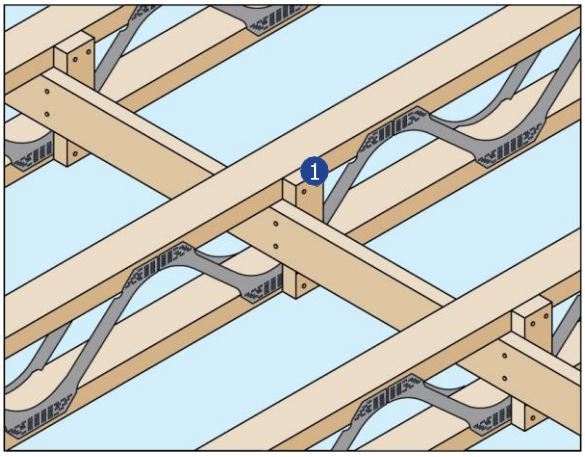
PD14: Bottom chord support: masonry wall with overlap

1. Masonry built up to underside of floor to provide restraint
2. Overlapping beams on the wall



PD15: Low sill against load-bearing wall: interior masonry wall with continuous or butt ends

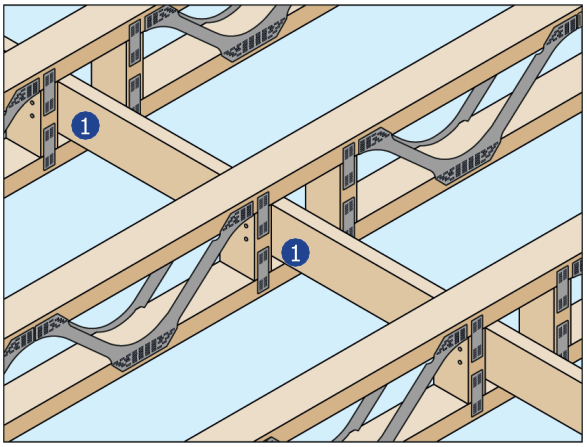
1. Masonry rises above the beams to ensure their verticality
2. Beams must have a minimum support of 45 mm on the wall



PD16: Stiffener against inner posts

1. The 38x75mm bollard inserts are nailed to the top and bottom chords. The stiffener is attached by two 3.1X75mm galvanized ring nails.

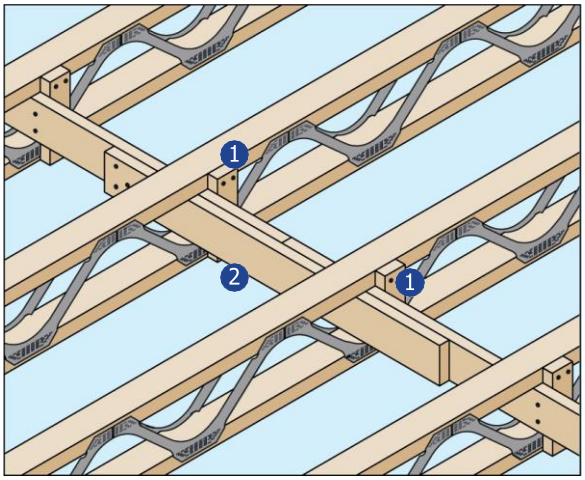
Note: The dimension of the stiffener corresponds to the height of the POSI® beam.



PD17: Stiffener inside the beam

1. The stiffener is attached to the beam by two 3.1x90mm galvanized ringed shank nails.

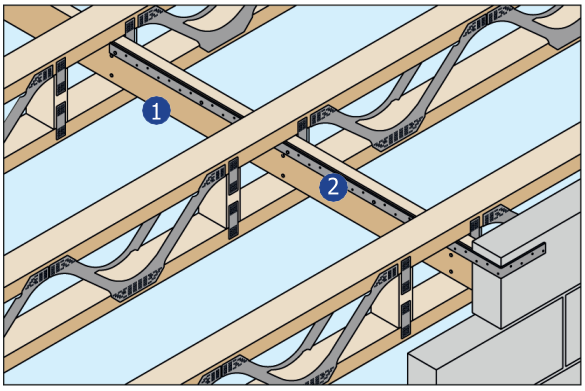
Note: The dimension of the stiffener corresponds to the height of the POSI® beam.



PD18: Continuity of stiffener against inside posts

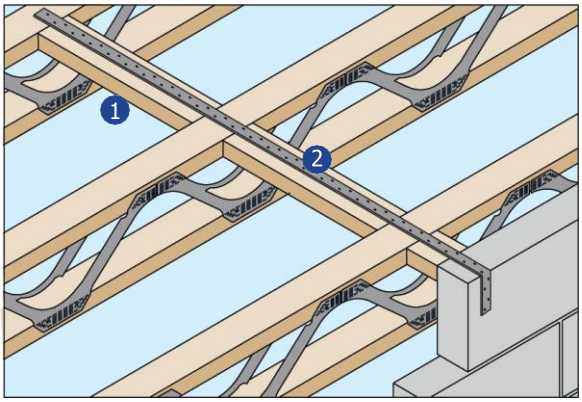
1. The 38x75mm posts are nailed to the chords. The stiffener is fastened with two nails. 3.1x90mm galvanized rings.
2. 1200mm long splice fixed with 10no 3.1x75mm galvanised annular ring shank nails each side of splice, nailed through and clenched over on far side.

Note: The dimension of the stiffener corresponds to the height of the POSI® beam.



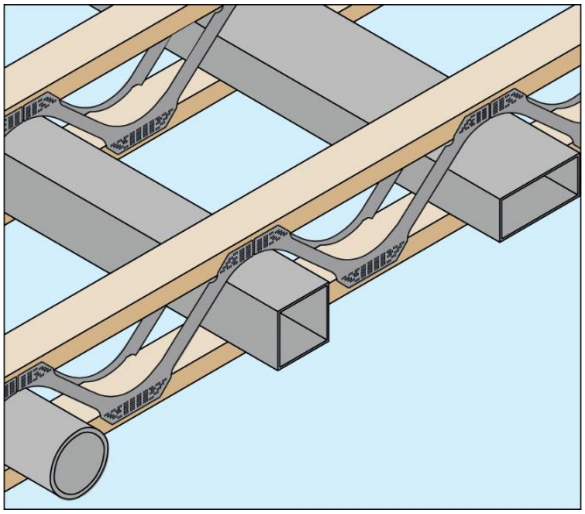
PD19: Metal strap attached to stiffener

1. Stiffener
2. Strap fixed along top edge of strongback.
   Refer to strap manufacturers details for fixing method

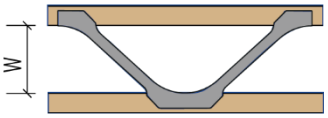


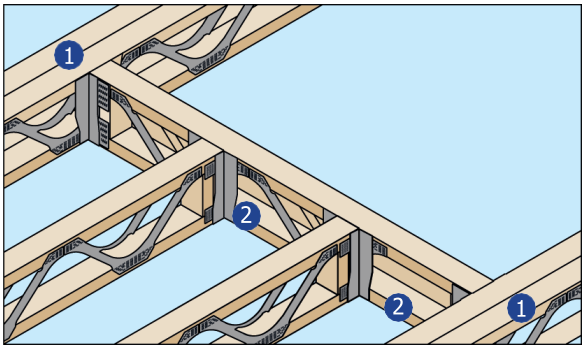
PD21: : Horizontal Restraint Strap Fixed to Noggin

1. Minimum 35x72 spacer between beams
2. The metal strap is fastened along the noggins. The end is fixed to the wall.



PD24: Piping and ventilation ducts

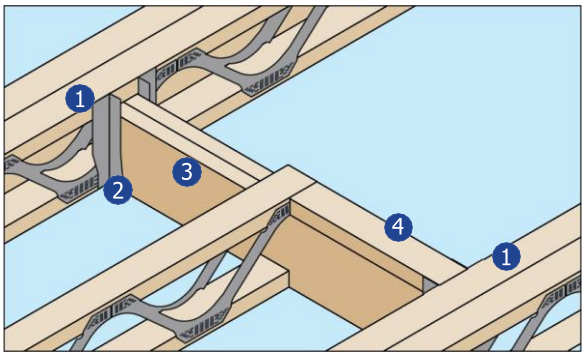




PD22: Structure with 2-ply load-bearing beam and POSI® beams as headers

1. Load-bearing beams are fastened together with screws
2. Posi-Joist hanger

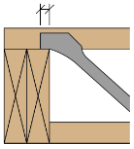
Note: do not notch bottom chord of Posi-Joist over bottom flange of hanger



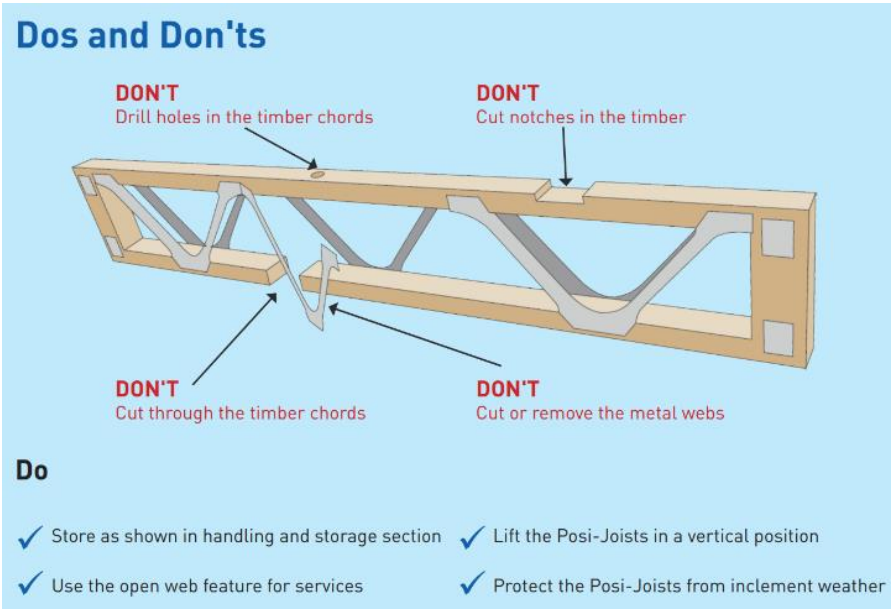
PD23: Opening with 2-Ply Posi-Joist Girder and EWP Trimmer Beam. Top Chord Supported Joists

1. 2-ply load-bearing beams are fastened together with screws
2. Posi-Joist hanger
3. Solid or EWP trimmer (depth to suit)
4. Spacer

Unless proven by design the Posi-Strut should overhang the bearing by 15mm.



POINTS TO CONSIDER



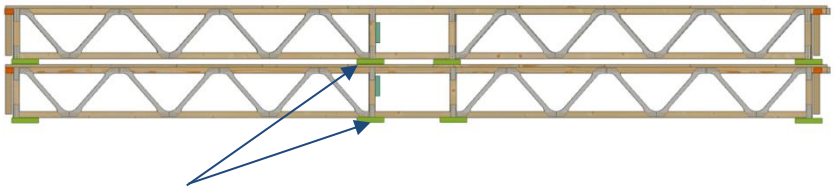
HANDLING AND STORAGE

To ensure the long-term integrity of your framework, MiTek advises a good understanding of the provided documents.

Storage

To ensure the integrity of the structure during storage, it is crucial to avoid any direct contact with the ground. Ideally, the structure should be stored vertically. If vertical storage is not feasible, it should be laid flat on rafters spaced no more than 3 meters apart.

For storage periods extending beyond two weeks, it is necessary to shield the frames from weather conditions using a ventilated protective system.

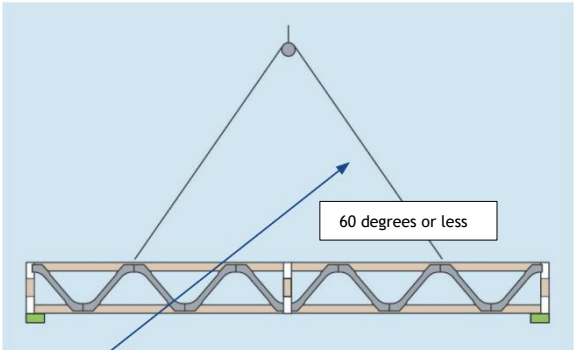


Place supports as close as possible to the metallic V-shaped points

Handling

Lifting and moving should always be done using harnesses/slings (not chains or ropes).

When loading and unloading with a crane, lifting harnesses must always be attached to the wooden frame on the beam or to the lifting points of the cassette.



Use harnesses/slings (not chains or ropes)

Labelling

Labelling is typically done on the left side of the upper frame, more than 20 cm from the end to prevent it from being covered by walls. A corresponding label is also made on the floor plan to prevent incorrect orientation.

MiTek®

MITEK BALTIC

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