

I BUILT™ MULTISTRUT

MULTISTRUT INSTALLATION GUIDE

March 2023

MultiStrut joists are easy and fast to install. The single trimmable end ensures web alignment, while the unique nail plate location allows unobstructed cutting.

The open web system provides complete access for plumbing, electrical and ducting services through the midfloor.





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Purpose

This guide will help correctly design, specify and install IBuilt™ Multistrut floor joists.

Important documents

This document must be read in conjunction with the following publications and documentation:

- The Architectural Building Consent documents.
- The Engineers Building Consent documents.
- NZS3604: Timber Framed Buildings
- The IBuilt layout plan supplied with the project.

The information and construction details contained in this document have been developed primarily for domestic/residential applications in accordance with the principles and intent of NZS3604:2011 'Timber Framed Buildings'; NZS3603:1993 'Timber Structures Standard'; AS1720.1:2010 'Timber Structures – Design Methods'. Loading data is taken from AS/NZS1170:2002 'Structural Design Actions' to satisfy the requirements of Section B1 of the New Zealand Building Code.

New Zealand Wood Products (NZWOOD) Ltd accepts no liability or responsibility if the information contained in this document is incorrectly interpreted, inappropriately applied, or used in a manner other than explicitly set out in this design guide.

The information in this guide has been checked and verified, however, it should only be used by designers who are suitably qualified. For the most up to date information please refer to the online guide found on the **IBuilt website** - www.ibuilt.co.nz.

Note: Other manufacturers' products may have different properties and therefore cannot be substituted or designed using information contained in this document.

Skills required

The use of this guide is intended for suitably qualified licenced building practitioners that are licensed to the relevant class.

Design assistance

For additional technical or engineering assistance please call 0800 022 352 or email the technical team at enquiries@ibuilt.co.nz



For our warranty

Refer to www.ibuilt.co.nz



Compliance, Warranty and Quality Assurance

Compliance with the New Zealand Building Code (NZBC)

This guide offers information for designing and installing IBuilt's MultiStrut floor joist system in residential construction.

Additional design guidance can also be requested by contacting the IBuilt technical team on 0800 022 352.



When correctly designed, specified and installed IBuilt's MultiStrut floor joists meet the provisions of the NZBC:

Refer to the IBuilt MultiStrut Product Assurance Supplier Statement (PASS)



Scope and limitations of use

For scope and limitations.

Quality assurance

Nelson Pine LVL11

Nelson Pine Industries Ltd has stringent quality systems covering the management systems, the LVL production process and LVL product properties. Nelson Pine Industries is independently third party audited by the Engineered Wood Products Association of Australasia (EWPPAA) and by Telarc.

The EWPPAA Product Certification Scheme provides the framework for the Nelson Pine LVL certification to AS/NZS 4357 Structural Laminated Veneer Lumber. Conformance with AS/NZS 4357 makes Nelson Pine LVL suitable for NZS 3603 and NZS 3604 structural applications. Nelson Pine Industries Ltd is accredited by Telarc with ISO 9001 Quality Management Systems Certification.

Multinail Componentry

Nail plates and metal webs from Multinail are manufactured using grade G300 steel which is manufactured to AS1397 Steel sheet and strip—Hot-dip zinc coated or aluminium/zinc coated

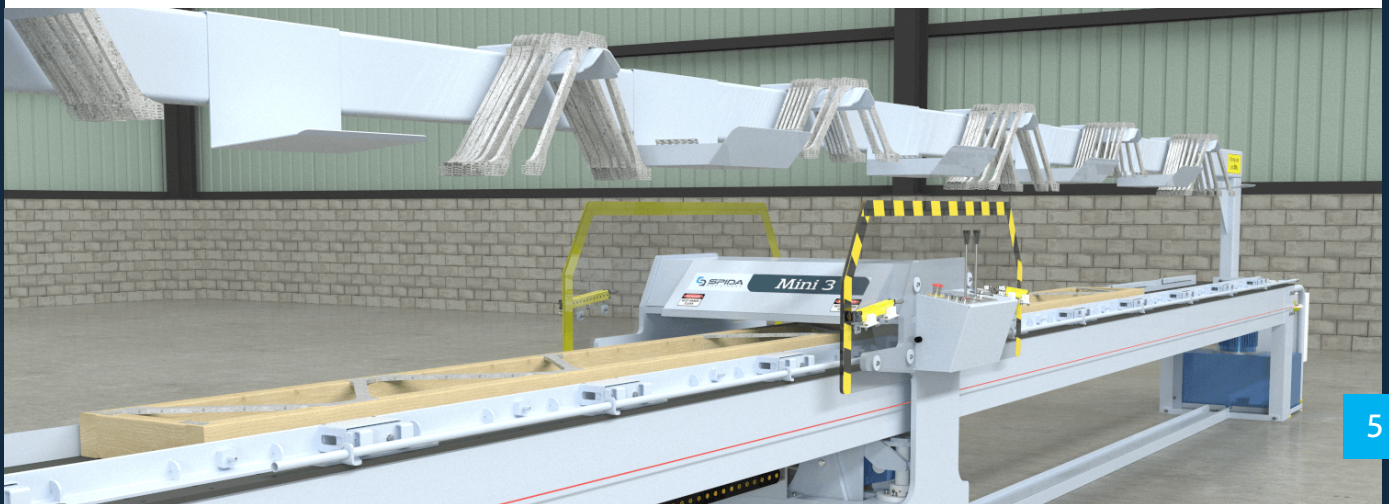
IBuilt Manufacturing

IBuilt's Auckland based manufacturing facility includes pneumatic table presses for the assembly of floor trusses.

Location of chords, webs and plates are laid out on the assembly in accordance with the engineering drawing for the joist. The components are positively clamped to ensure timber members have good bearing at all contact points before being pressed together.

IBuilt's floor truss manufacturing team follow a quality assurance schedule. It includes checks such as:

- Timber condition and damage.
- Squareness of cuts.
- Nail plate locations.
- Nail plate teeth embedment.
- Joints free of defects.
- Tolerances checks for joist depth, length and straightness.





Multinail Australia Pty Ltd
ABN 79 003 999 586

PRODUCER STATEMENT - PS1 - DESIGN

ISSUED BY: Multinail Australia Pty Ltd

TO BE SUPPLIED TO: Building Consent Authorities in New Zealand

IN RESPECT OF: Standard MultiStrut Floor Joist Design

AT: Various Locations in New Zealand

Multinail has provided engineering design services in respect of the requirement of Clause B1 of NZ Building Code for:

All **Part only as specified – Standard MultiStrut Floor Joist design of the proposed work**

Selected span of 300mm & 240mm deep MultiStrut floor joists with 1.5kPa Live Load have been prepared in accordance with Compliance Documents and Verification Method B1/VM1 of the NZ Building Code and in accordance with sound and widely accepted engineering principles.

On behalf of Multinail, and subject to:

1. Verification of the design assumptions within the guide
2. All proprietary products meeting their performance specification requirements

I, David Zhang, believe on reasonable grounds that the use of MultiStrut floor joists in the proposed building, if constructed in accordance with the drawings, specifications, and other documents provided will comply with the relevant provisions of the NZ Building Code.

Multinail holds a current policy of Professional Indemnity Insurance of not less than \$500,000.

On behalf of Multinail Australia Pty Ltd:

DAVID ZHANG
BEng(hons), CPEng, NER, CMEngNZ (2010320)

Lead Structural Engineering Manager

Date: January 2023

IBuilt MultiStrut Joists

IBuilt™ MultiStrut joist

IBuilt's MultiStrut floor joists are an open webbed, parallel chord, floor truss joist utilising steel web brackets and LVL11 top and bottom chords, and vertical webs.

IBuilt MultiStrut joists provide increased spanning capabilities over standard framing while also being lightweight and efficient to install. They are ideal for domestic construction as both joists and rafters.

The open web joist design enables building services such as plumbing, electrical and service ducting to run between the chords without the need for drilling, notching or cutting.

Large open floor plans are a common requirement in modern residential homes. With larger span capabilities the need for internal walls can be reduced.

Typical spans of up to 6m are achievable for residential floors which allows for larger open spaces or fewer structural beams.

Practical benefits

- Open web system gives almost uninterrupted access for the passage of services.
- 90mm wide flanges provide a large area for the fixing of flooring and ceiling material.
- Depth compatible with other engineered timber products.
- Supplied in 150mm increments with a trimmable end.
- Lightweight and efficient construction.

Components of IBuilt MultiStrut joists

LVL11 Top and Bottom Chords

NZ made laminated veneer lumber (LVL) supplied by Nelson Pine, 90x35mm LVL11 chords have a higher strength:stiffness ratio and more predictable performance over sawn timber.

Nelson Pine LVL H1.2 framing is glue line treated plus surface coating with Azotek, which gives it a complete cross section treatment. LVL is an Acceptable Solution as per NZS 3640 for treatment and NZS 3604 Clause 2.3.9 for timber framing.

MultiStrut Steel Webs

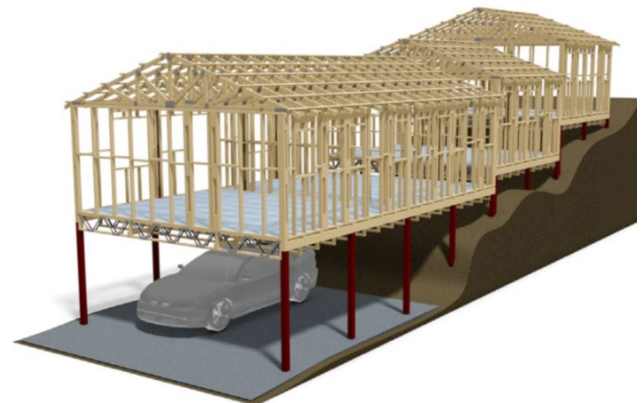
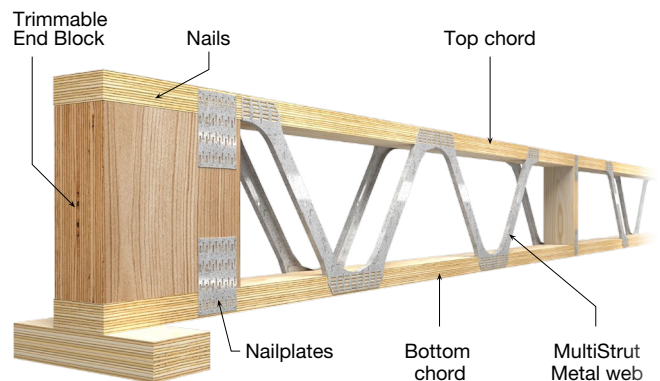
Multinail's steel webs are pre-pressed and formed for the fast and reliable manufacture of parallel chord timber floor joists and rafters. Steel webs are made from galvanised Z275 grade G300 steel to meet the requirements of NZS 3604:2011 Section 4 – Durability Table 4.2 (Galvanising of steel components).

IBuilt MultiStrut joists can be used in both midfloor and subfloor applications providing moisture levels, ventilation requirements and ground clearances are met.

Multinail – Industry leaders since 1979

With over 40 years of history, Multinail are at the forefront of providing innovative solutions to the connector, design software and frame and truss machinery industry worldwide.

With a dedicated engineering team providing product development and support, IBuilt's new MultiStrut floor joists have been designed with pre fabrication in mind while also providing the need for adjustability during installation on site.



Span Tables

Design criteria

Refer to New Zealand standards NZS 3604 and AS/NZS 1170.

MAXIMUM JOIST SPAN (M)			
Floor type	MultiStrut Size	300crs	400crs
Standard floor	MSJ300	6.0	5.7
Heavy Floor	MSJ300	5.7	5.4
Standard floor	MSJ240	5.1	4.8
Heavy Floor	MSJ240	4.8	4.2

Joist design data

- Standard Floor Dead Load - 0.4 kPa (40 kg/m² in total incl. flooring and ceiling)
- Heavy Floor Dead Load - 0.65 kPa (65 kg/m² in total incl. flooring and ceiling)
- Distributed Live Load - 1.5 kPa
- Concentrated Live load - 1.8 kN
- Continuous span joists are required to be specifically detailed.
- Joists supporting load bearing walls must be specific engineer designed.
- Large baths or other fixed loads may require additional support.
- Contact IBuilt (0800 022 352) for spans using alternative or heavier floor loadings.



Length availability

240mm and 300mm deep MultiStruts are manufactured and stocked in 150mm increments. .

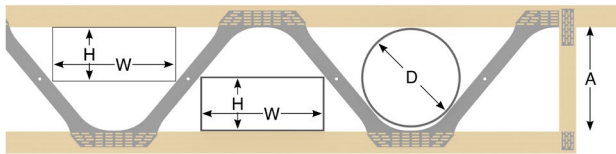
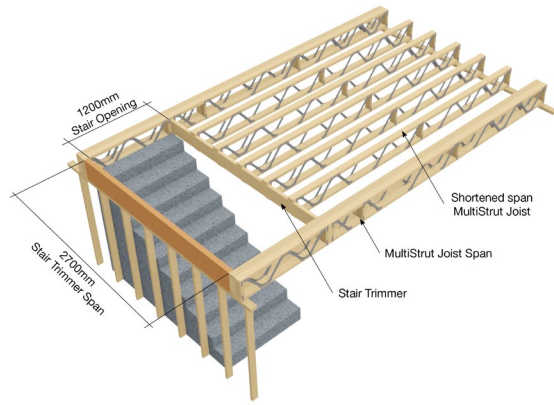
STANDARD LENGTHS (M):	
240x90mm	1.2m, 1.35m, 1.5m, 1.65m, 1.8m, 1.95m, 2.1m, 2.25m, 2.4m, 2.55m, 2.7m, 2.85m, 3.0m, 3.15m, 3.3m, 3.45m, 3.6m, 3.75m, 3.9m, 4.05m, 4.2m, 4.35m, 4.5m, 4.65m, 4.8m, 4.95m, 5.1m, 5.25m, 5.4m.
300x90mm	1.2m, 1.35m, 1.5m, 1.65m, 1.8m, 1.95m, 2.1m, 2.25m, 2.4m, 2.55m, 2.7m, 2.85m, 3.0m, 3.15m, 3.3m, 3.45m, 3.6m, 3.75m, 3.9m, 4.05m, 4.2m, 4.35m, 4.5m, 4.65m, 4.8m, 4.95m, 5.1m, 5.25m, 5.4m, 5.55m, 5.7m, 5.85m, 6.0m.

General Floor Design

Designing for openings and voids

IBuilt MultiStrut joists can be utilized as trimming members for stairwell voids and also shower openings to allow for level entry showers.

LVL or Glulam timber can also be used when the trimming member is also supporting additional loads such as load bearing walls or balustrade loads.



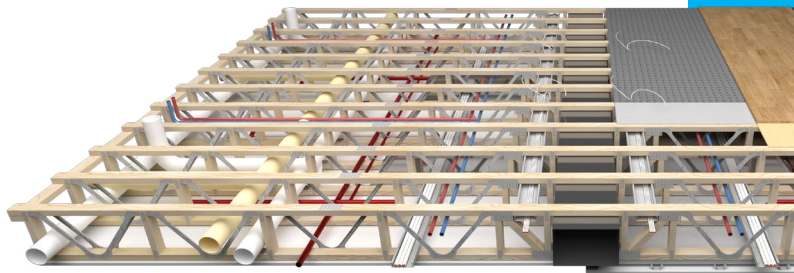
10mm min clearance required between all service lines and joist components.

Service penetrations

IBuilt MultiStrut joists are designed to allow the easy accommodation of electrical, plumbing, waste water and ducting with no cutting on site. Maximum clearances between the webs is as shown

Note: If larger opening sizes are required please contact the IBuilt technical team.

	MSJ300	MSJ240
A (mm)	230	160
D (mm)	215	150
H (mm)	W (mm)	W (mm)
50	350	300
100	280	200
150	200	70
200	130	N/A



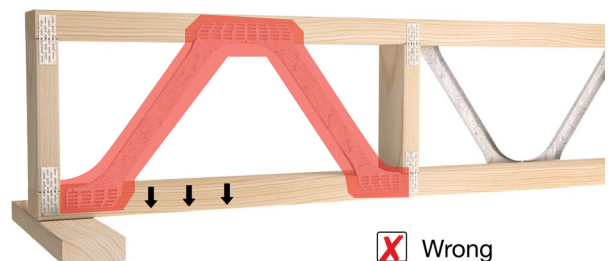
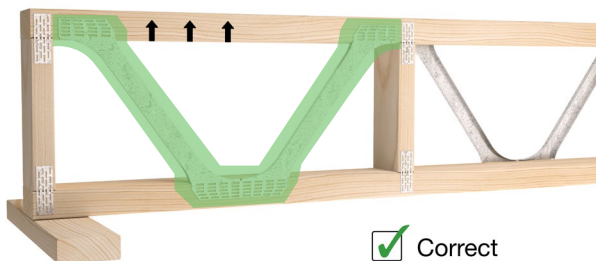
Orientation of IBuilt MultiStrut joists

Care must always be taken to ensure IBuilt MultiStrut joists are placed the correct way up to ensure their structural integrity is maintained.

Joists are always designed and manufactured so that the metal web starts at the top chord at each bearing point. During manufacture the joists are marked showing the correct orientation.

Note: If joists are installed incorrectly please contact IBuilt for remedial advice on 0800 022 352.

Bracket to start at top support

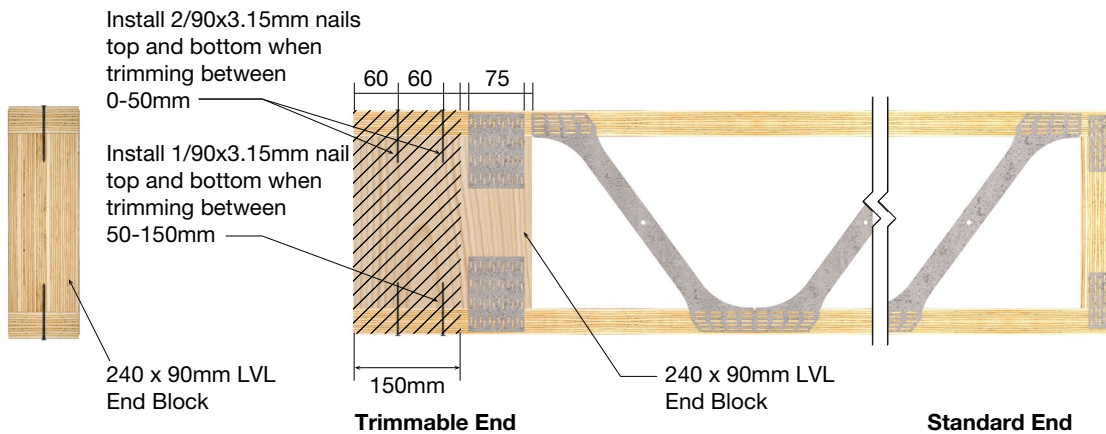


End trimming allowance

IBuilt MultiStrut joists have been engineered with a single trimmable end to allow for on site framing variations.

Joists are supplied to site as a set length (increments of 150mm) so that end trimming can be carried out on only one end as needed.

Note: The 90x35 chords and webs must not be removed, notched or cut.



Note: Power driven nails must be used from top and bottom to secure end block after trimming. If trim is 120mm+ then nailing is not required

Alterations to webs or chords

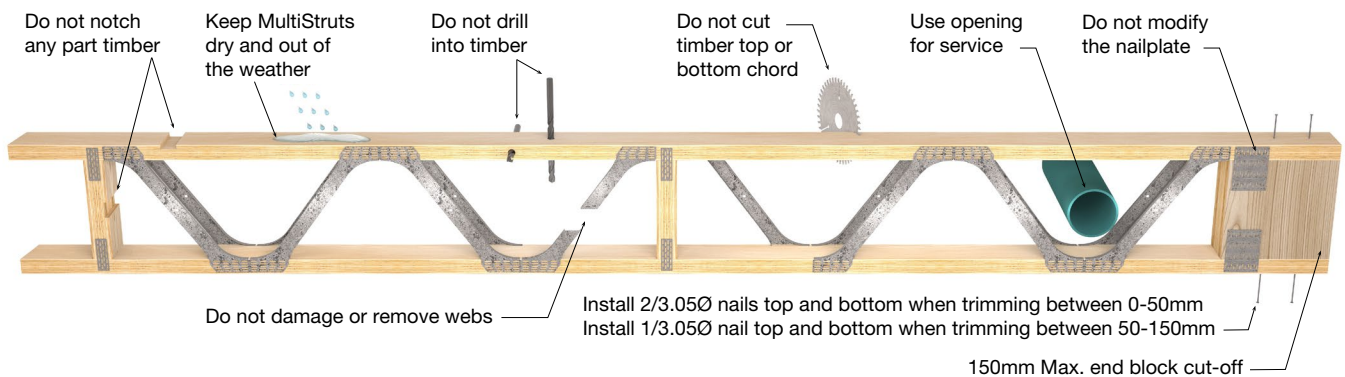
Modifications to IBuilt MultiStrut joists are not permitted as it can affect the structural integrity of the joist.

Types of modifications not permitted:

- Cutting or bending of metal webs.
- Removal of any metal webs or nail plates.
- Holes in top or bottom chords from wastes pipes.
- Notches of any kind in top or bottom chords.
- Cutting of any timber component.

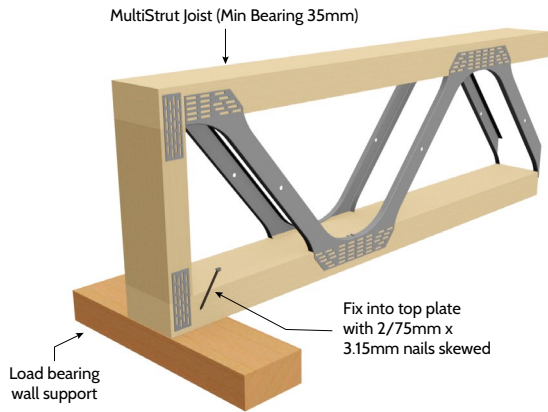
Joists should be positioned to avoid waste pipes from upper fixtures such as showers & WC etc.

Should the MultiStrut get damaged in any way please contact IBuilt on [0800 022 352](tel:0800022352) for a remedial solution.

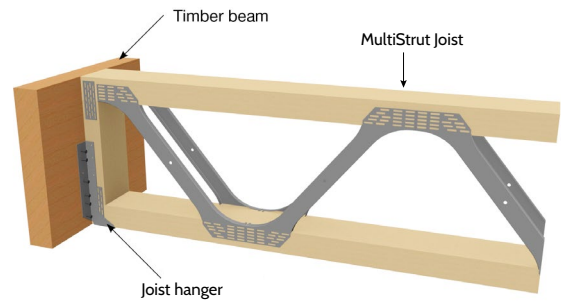


Typical Installation Details

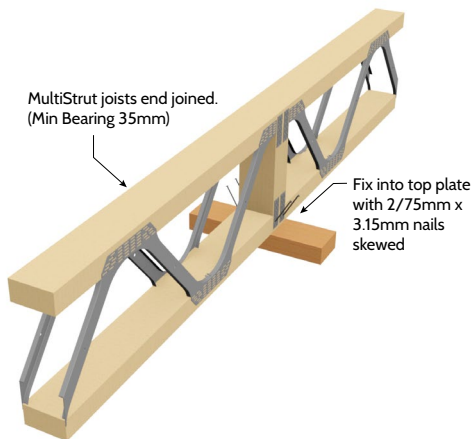
1.1 Fixing to wall top plate



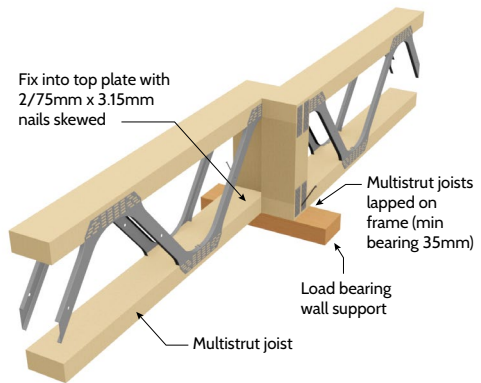
1.2 Joist hanger



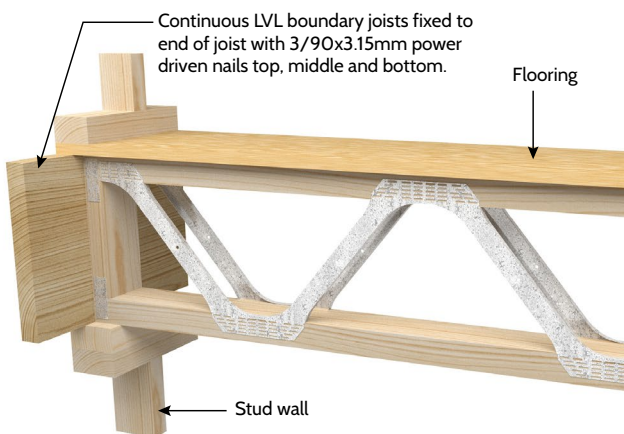
1.3 Fixing to internal walls (butt joint)



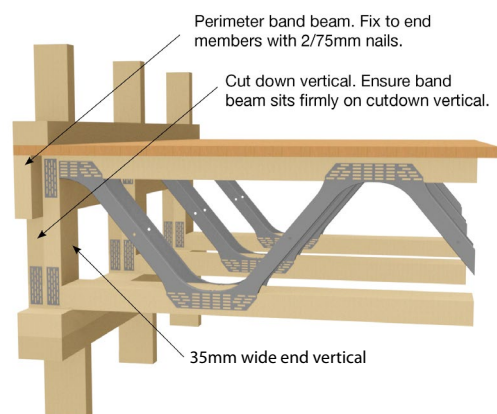
1.4 Fixing to internal walls (lap joint)



1.5 Fixing to exterior wall frame - A (continuous boundary joist)



1.6 Fixing to exterior wall frame - B (continuous band beam)

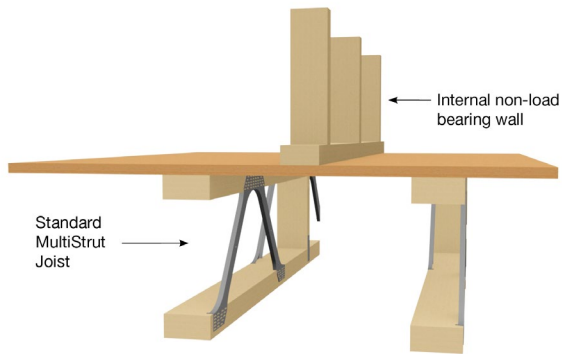


Typical Installation Details

1.7 Walls parallel to joists

Internal non-load bearing walls spaced between IBuilt MultiStrut joists do not require additional support.

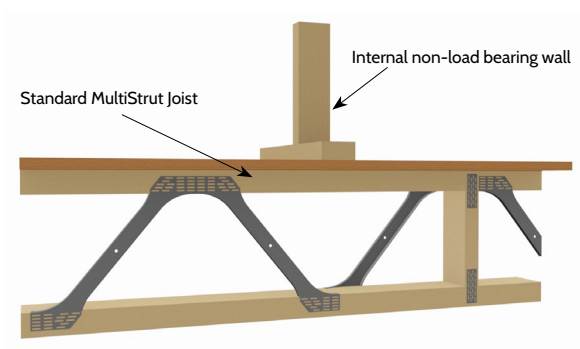
Note: 90x45 SG8 nogging on flat is acceptable if required. Fix with min 2/70mm x 3.15mm nails skewed into top chord.



1.8 Walls perpendicular to joists

Internal non-load bearing walls running across joists do not require additional support.

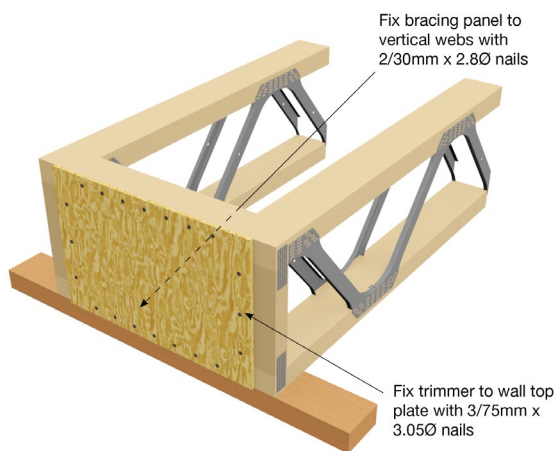
Note: Fix bottom plate of wall to joist with min 2/70mm x 3.15mm nails.



1.9 Blocking

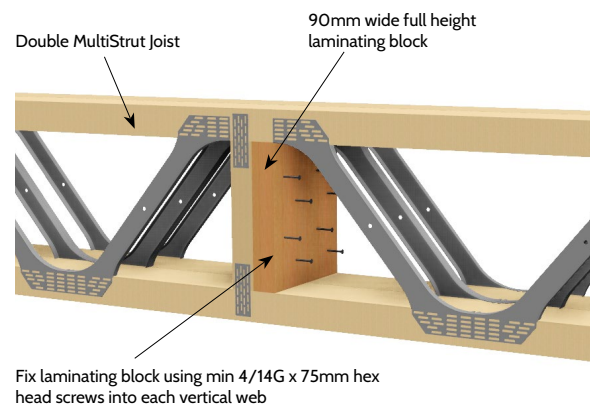
Bracing panel or solid LVL nog skew nailed top and bottom between joists.

Note: Midspan solid blocking is not required for joists.



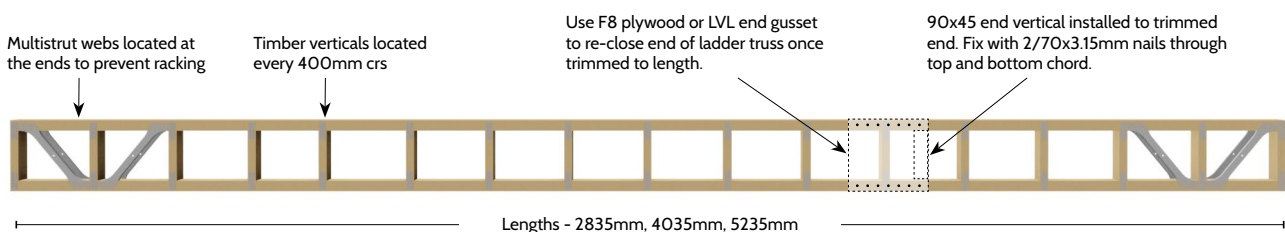
1.10 Double Joist fixing

When carrying additional loads joists can be joined with a connection block for extra stability. Metal webs and timber verticals must not be removed.



1.11 Boundary ladder truss

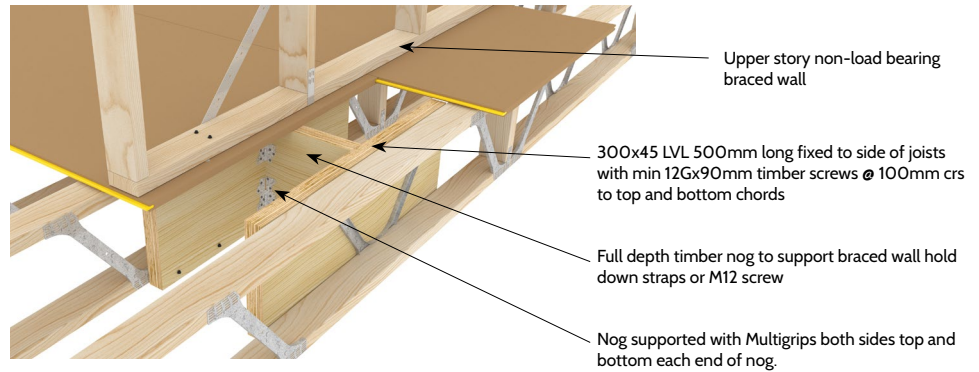
Manufactured in set lengths ladder trusses can be trimmed to length on site as required. Used as boundary members only fully supported on lower walls.



Typical Installation Details

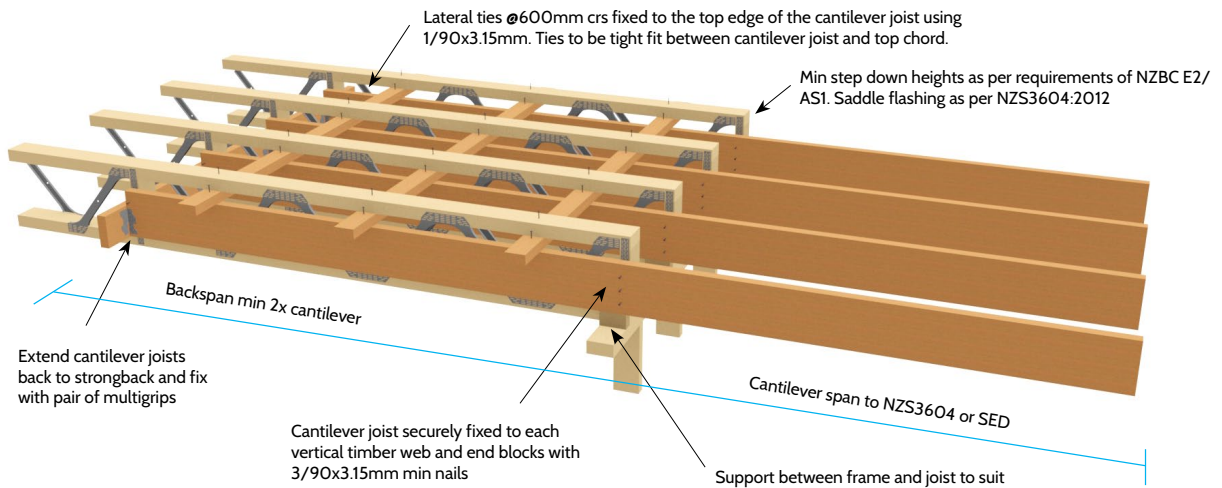
1.12 Parallel brace wall tie down

Upper storey braced walls parallel to joists require adequate fixing to transfer loads to the floor structure.



1.13 Cantilever deck joist

Deck joists running parallel to joists require fixing to transfer loads to the floor structure.



1.14 Cantilever floor joists

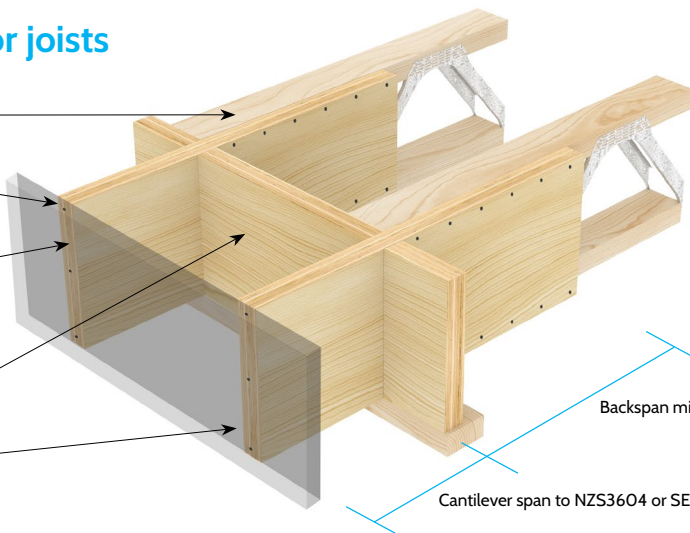
Multistrut joists bearing on wall frame

Uniformly distributed wall loads only to cantilever joists

300x45 LVL cantilever joist fixed to side of Multistrut. Fix with SST 12Gx89mm framing screw @ 75mm crs to top and bottom chords and x3 into end vertical

Solid LVL blocking to boundary

Continuous RB45 to end of cantilever fixed with 3/90x3.15mm nails



Note:

Point loads to cantilever joists must be specifically designed by engineer

Backspan min 2x cantilever

Cantilever span to NZS3604 or SED

Strongback Support

1.15 Strongback connection

Strongbacks are timber members installed within the IBuilt MultiStrut joists at right angles. These elements are used to dampen the vibrations by increasing the stiffness of the floor system and reduce the deflection via load sharing.

Proper installation of strongbacks together with flooring material at a later stage will provide adequate lateral bracing and support for floor diaphragms.

Fix strongback to all timber vertical with 3/90mm x3.15mm nails.



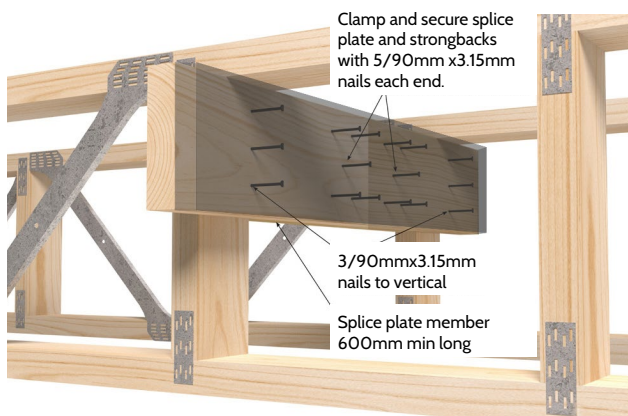
Note: Strong backs can be installed anywhere on the timber vertical, however they must have 5mm clearance from top or bottom flange.

Recommended strongback size

Recommended strongback size is minimum 140x45mm SG8.

1.17 Fixing & splicing

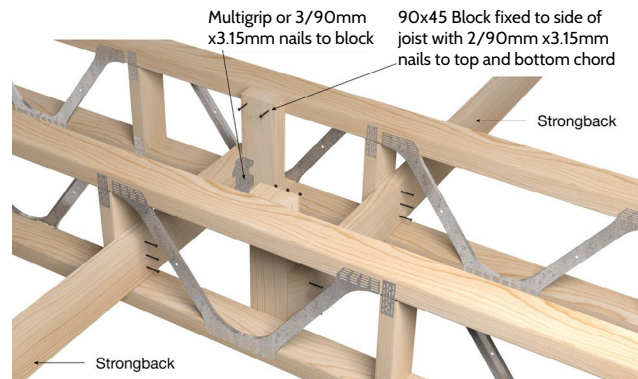
To ensure continuity, joins in strongbacks must be well flitched. Use min 600mm long 140x45 timber fixed with 5/90mm x3.15mm nails to each end.



1.16 Strongback connection at change of span

Where a strongback can not be continuous due to the timber verticals not aligning, they must overlap at least 1 joist to ensure continuity.

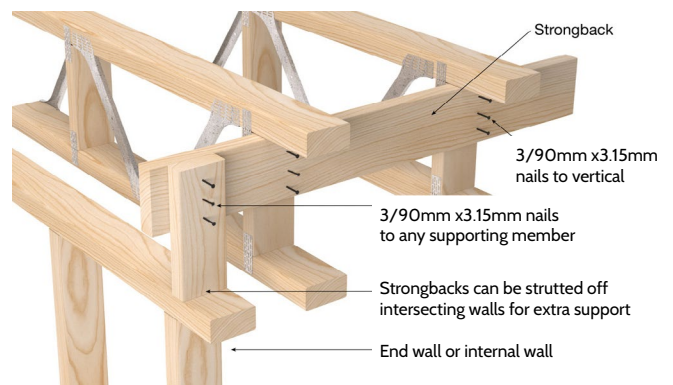
Note: Strongbacks must be continuous and be well supported at both ends



1.18 Strongback strutting

Strongbacks must be supported with blocks against boundary members and also over any internal walls below.

Note: Strutting strong backs over lower walls will improve rigidity to the joists.



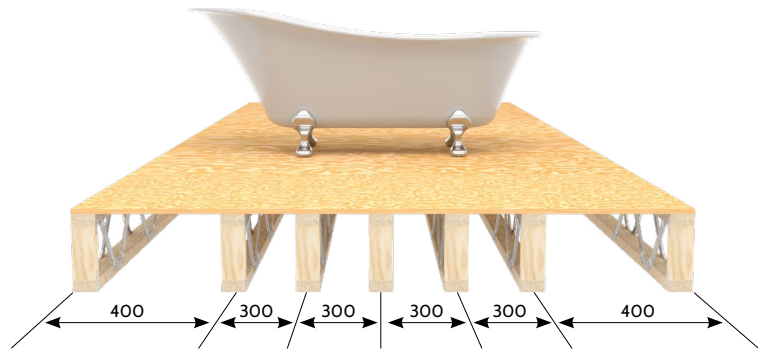
To ensure MultiStrut joists perform as intended it is critical that strongbacks are installed as per these details. Ensure strongbacks:

- Overlap joists on change of span.
- Are joined adequately.
- Are well supported at each end. I.e. Strutted over lower walls or secured against boundary members.
- Are installed tightly against timber verticals.

1.19 Supporting heavy fixtures

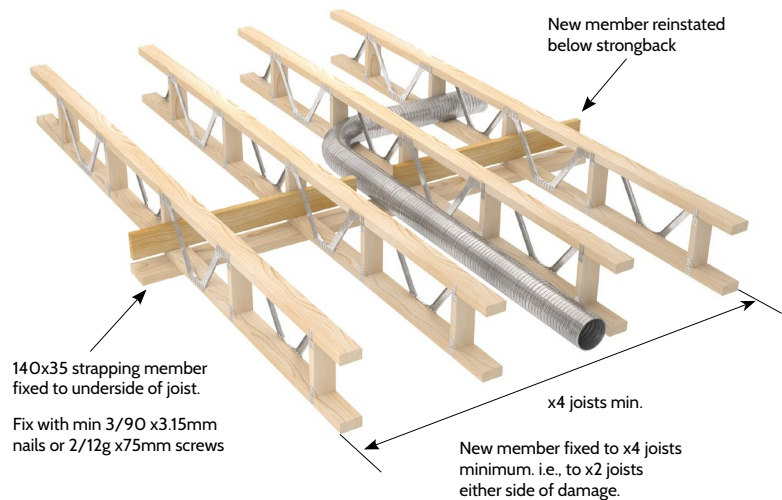
When supporting loads such as water beds and spa baths it is recommended that joist spacings are reduced to 300mm. An additional strongback should also be installed directly underneath and to continue for 2 joists either side of load.

For joists with spans longer than 5m and supporting spa baths please check with the IBuilt technical team for advice.



1.20 Discontinuous strongback

Strongbacks must be repaired or reinstated in another location when they are damaged or cut. This can be achieved using a 140x35 strapping 'top plate' fixed to the underside of the bottom chord. This member is concealed with the ceiling batten cavity.

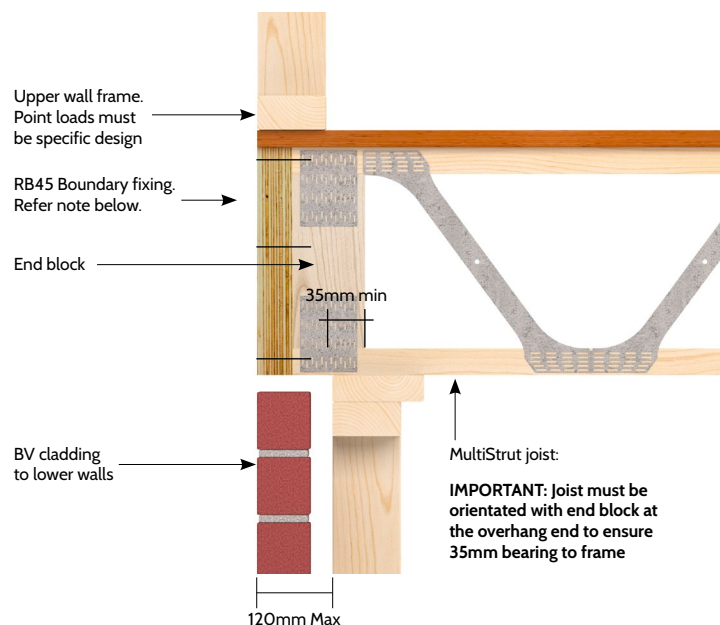


1.21 Small cantilevers - BV overhang

MultiStrut joists can overhang lower walls when upper frames are offset for brick veneer claddings.

Joists must be orientated so that the block is at the overhang end.

- Maximum overhang is 120mm.
- Min end block bearing 35mm.
- Point loads must be specifically designed.



RB45 boundary joist connection:

- For light weight wall and roof up to 3.5m RLW - Fix with 3/90mm x3.15mm nails as shown.
- For light weight wall and roof between 3.5m-6.0m RLW - Fix with 3/90mm x3.15mm nails + pair of multigrips.

For heavy wall or roof loads please contact the IBuilt technical team for advice on 0800 022 352.

Handling and Storage

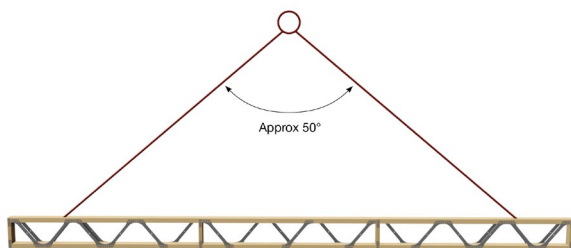
Lifting and transport

IBuilt MultiStrut joist may be lifted in a single unit or in packs but care should be taken to avoid twisting, bending, dropping or knocking against adjacent structure.

Slings should always be attached to the timber chords where a panel point occurs.

If using a forklift to move packs of joists do not place tynes through joists as it may damage the steel webs.

Slings must not be attached to steel webs.

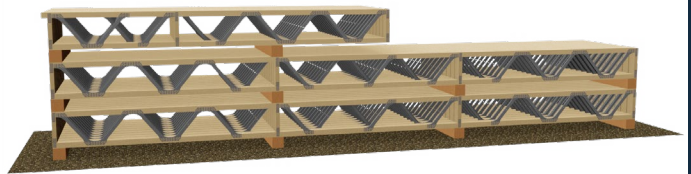


Storage on site

IBuilt MultiStrut joist should be strapped with steel or plastic bands.

Joists may be stacked vertically or horizontally but in both cases the chords should be clear of the ground and supported on bearer which are to be located directly under the web points.

Prior to installation joists should not be left exposed to the weather for extended periods without protection. This protection must ensure adequate air circulation.

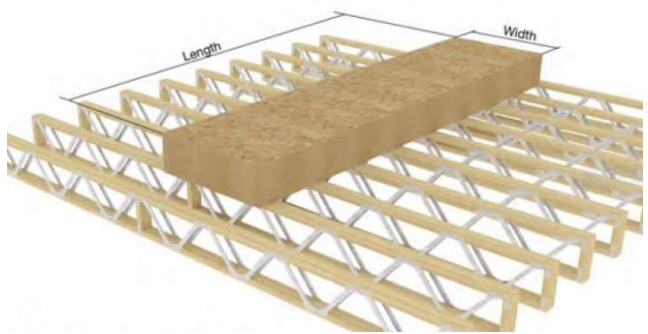
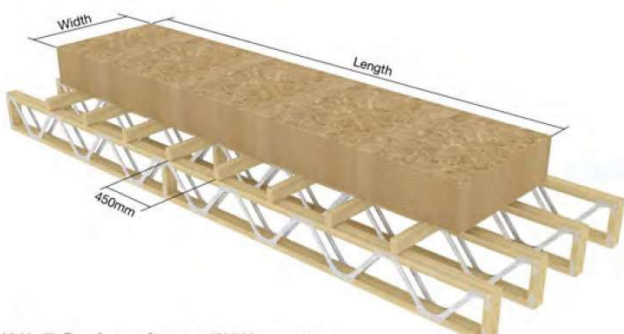


Storage of construction materials

Storage of materials on floor trusses during constructions is to be a maximum of 150kg/m², which is based on 1.5kPa typical floor live loads.

Ideally stacks of material must be placed directly over load bearing walls.

Where this is not possible material is to be supported on min 90x45 SG6 grade bearers at 450mm crs over a maximum of 4 floor trusses, or when perpendicular the material can load directly on the joists.



MAXIMUM LOAD FOR PRODUCT TYPE

Sheeting	Standard size
19mm Particleboard Flooring	12 sheets
22mm Particleboard Flooring	10 sheets
25mm Particleboard Flooring	7 sheets
10mm Plasterboard	20 sheets
13mm Plasterboard	17 sheets

Safety:

- Never walk on wrapped or unwrapped bundles.
- Do not walk on the joists until they are full installed or correctly braced, joists are unstable until braced laterally.
- During installation, a minimum of 90x45mm temporary bracing at 2.4m crs max is required.
- Only remove the bracing as the sheathing is being attached.
- Never overload joists with loads that exceed design limits.
- Stack building materials over walls or main beams only.
- Do not use joists as ramps, planks or walkways.
- Brace each joist as it is erected.
- All hangers, rimboards and blocking at the end supports of the joists must be installed and nailed properly.

The above are general recommendations and in some cases additional precautions may be required.

On site:

Joists should be inspected on arrival at site to ensure no damage has occurred in transit and unloading. Any damaged joists should be reported immediately.

MultiStrut joists can withstand normal levels of wetting during construction, however should not be exposed for extended periods of time as this will increase the potential for nail-plate withdrawal due to wet/dry weather cycles. If any metal connectors are showing signs of withdrawal please contact IBuilt in the first instance for rectification advice.

DO NOT LOAD any joists where nail-plates are exhibiting withdrawal (i.e. more than 1mm gap between nail-plate and timber surface).


DO NOT re-hammer nail-plates on site without prior approval.


DO NOT use joists that are showing signs of damage to either timber chords or metal webs.


DO NOT Leave MultiStrut joists in the weather. Keep dry and covered at all times.



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