FTK M1:2015

FRAMETEK
STEEL FRAMING SPECIALISTS

# SYSTEM DESIGN MANUAL

System Design Manual
November 15

Freephone 0800 50 STEEL
www.frametek.co.nz

# Contents

Please note:

There may have been subsequent iterations to the Frametek System Design Manual since the date of its publication.

It is the responsibility of the user to ensure they are using the latest version.

| Revision | Date | Prepared By | Approved By | Reviewed By |
|---|---|---|---|---|
| 1.0 | 23 Nov 2015 | Frametek | Extramile | Redco |
| | | | | |

## 1.1. REFERENCE DOCUMENTS

- AS/NZS 4600: 2005 Cold Formed Steel Structures
- NZBC Handbook B1/VM1
- NZBC Handbook G5 and H1
- NASH Standard: Residential and Low-rise Steel Framing Part 1: Design Criteria V40 14-04-14
- NASH 3405: 2011 Alternative solution. Steel Framed Buildings
- AS/NZS 1170.0: 2002 General Principles
- AS/NZS 1170.1: 2002 Permanent, Imposed and Other Actions
- AS/NZS 1170.2: 2011 Wind actions
- AS/NZS 1170.3: 2003 Snow and Ice Actions
- AS/NZS 1170.5: 2004 Earthquake Actions – New Zealand
- AS/NZS 1397: 2011 Hot dipped zinc-coated or Aluminium/Zinc Coated Sheet and Strip
- NASH N-11 2011: House Insulation Guide
- HERA Report R4-72 Thermal insulation performance of Light-weight Steel Framed Exterior Wall Elements
- NZS 3604: 2011 Timber Frame Buildings

- FRAMETEK 2007 LIMITED

- FRAMETEK 2007 limited is a company committed to quality in managing the development of a sustainable and cost effective steel framing system that meets all the required criteria of the NZBC.
- The company is a member and actively supports the National Association of Steel-Frame Housing New Zealand (NASH NZ) in the development of the New Zealand steel framing industry.

*Objective;*

*To provide suitable methods and details for the design, construction and inspection of* ***FRAMETEK 2007 LIMITED*** *steel frame and truss systems.*

- Sections 1 – 7 of this FTK M1:2015 will meet the following requirements of the New Zealand Building Code (NZBC)

  | | |
  |---|---|
  | B1: | Structure |
  | B2: | Durability. |
  | E2: | External Moisture. |

  E2/AS1 Requirements;

  Framing stiffness: The steel framing size requirements of this document complies with the serviceability criteria of AS/NZS 1170 and hence meet the requirements of E2/AS1.

  With these aspects appropriately addressed, the provisions on E2/AS1 are deemed to be applicable to FRAMETEK steel framed buildings.

- When designed in accordance with generally accepted principles and the philosophy and loads set out in AS/NZS 1170 parts 0, 1, 2, 3 and NZS 1170.5 will therefore comply with the performance requirements of the NZBC Handbook B1/VM1.

- The thermal efficiency of FRAMETEK walls, floors and roof framing will comply with the NZBC Handbook G5 and H1 provided the external framing is insulated in accordance with the requirements of the NASH N-11 House insulation guide.

- Compliance of Frametek framing with clause C6 of the building code can be achieved using Winstone Wallboard linings – refer to GIB standard details.

Building Code Clause(s).....B1, B2.....

# PRODUCER STATEMENT – PS1 – DESIGN

(Guidance notes on the use of this form are printed on page 2)

**ISSUED BY:**.....ExtraMile Consulting Ltd.....
(Design Firm)

**TO:**.....Frametek 2007 Limited.....
(Owner/Developer)

**TO BE SUPPLIED TO:**.....various.....
(Building Consent Authority)

**IN RESPECT OF:**.....Frametek FTK M1:2015 System Manual.....
(Description of Building Work)

**AT:**.....various sites.....
(Address)
.....-..... **LOT**.....-..... **DP** .....-..... **SO** .....-.....

We have been engaged by the owner/developer referred to above to provide .....
.....Structural Engineering Design..... services in respect of the requirements of
(Extent of Engagement)
Clause(s) .....B1 and B2 where related to B1..... of the Building Code for
All ☒ or Part only ☐ (as specified in the attachment to this statement), of the proposed building work.

The design carried out by us has been prepared in accordance with:

☒ Compliance Documents issued by the Ministry of Business, Innovation & Employment.....B1/VM1.....or
(verification method / acceptable solution)

☐ Alternative solution as per the attached schedule.....

The proposed building work covered by this producer statement is described on the drawings titled .....-.....

.....and numbered .....-.....;
together with the specification, and other documents set out in the schedule attached to this statement.
**On behalf of the Design Firm,** and subject to:
(i) Site verification of the following design assumptions .....as described in the document.....
(ii) All proprietary products meeting their performance specification requirements;

I **believe on reasonable grounds** that a) the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the attached schedule, will comply with the relevant provisions of the Building Code and that b), the persons who have undertaken the design have the necessary competency to do so. I also recommend the following level of construction monitoring/observation:
☐CM1 ☒CM2 ☐CM3 ☐CM4 ☐CM5 (Engineering Categories) or ☐ as per agreement with owner/developer (Architectural)

I, .....Paul M. Milewski..... am: ☒CPEng ....1021657.....#
(Name of Design Professional)
☐Reg Arch ..... .#

I am a Member of : ☒ IPENZ ☐NZIA and hold the following qualifications:...MEng(Hons) CPEng MIPENZ IntPE.....
The Design Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than $200,000*.
The Design Firm is a member of ACENZ: ☐

SIGNED BY .....Pawel M. Milewski..... ON BEHALF OF .....ExtraMile Consulting Ltd.....
(Design Firm)

Date..16 November 2015.. (signature).....

*Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Design Firm only. The total maximum amount of damages payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of $200,000*.*

This form is to accompany **Form 2 of the Building (Forms) Regulations 2004** for the application of a Building Consent.

Building Code Clause(s) B1 and B2 wher

# PRODUCER STATEMENT – PS2 – DESIGN REVIEW

(Guidance notes on the use of this form are printed on page 2)

**ISSUED BY**: Redco NZ Ltd
*(Design Firm)*

**TO:** Frametek 2007 Ltd
*(Owner/Developer)*

**TO BE SUPPLIED TO:** various
*(Building Consent Authority)*

**IN RESPECT OF:** Frametek FTK M1:2015 System Manual Peer Review (Redco Project No. 14330)
*(Description of Building Work)*

**AT:** ……
(Address)
…… **LOT**…… **DP** …… **SO** ……

We Redco NZ Ltd have been engaged by Frametek 2007 Ltd
*(Design Review Firm)*
to review the design documents for this project in respect of the requirements of Clause(s) B1 and B2 where related to I of the Building Code.
The Review is for ☐All ☑Part only of the design work prepared by ExtraMile Consulting Ltd
*(Design Firm)*
as described in drawings titled Frametek FTK M1:2015 System Manual and numbered

…… the specification, and other documents set out in the schedule attached to this statement according to which the building is proposed to be constructed.

The Review is in respect of Structural Engineering or per attached schedule.
*(aspects of design)*
The Review confirms that these aspects of the design are in accordance with:
☑Compliance Documents issued by the Ministry of Business, Innovation & Employment B1/VM1 or
*(verification method / acceptable solution)*
☐Alternative Solution as per attached schedule……

**On behalf of the firm undertaking this review**, on the basis of the review undertaken, and subject to:

(i) site verification of the following design assumptions as described in the document
(ii) all proprietary products meeting their performance specification requirements;

**I believe on reasonable grounds** that a) the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the attached schedule, will comply with the relevant provisions of the Building Code, and that b), the persons who have undertaken the review have the necessary competency to do so.

I, Franswa Jooste - Producer Statement Author # 3030 am: ☑CPEng No. 232746
*(Name of Design Professional)*
☐Reg Arch No……

I am a Member of : ☑IPENZ ☐NZIA and hold the following qualifications: BE (Hons) M.IPENZ CPEng IntPE
The Design Review Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than $200,000*.
The Design Review Firm is a member of ACENZ : ☐

**SIGNED BY** Franswa Jooste ON BEHALF OF Redco NZ Ltd
*(Name of Design Review Firm)*

Date: 23/11/2015 (signature) ……

*Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Design Review Firm only. The total maximum amount of damages payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of $200,000*.*

This form is to accompany **Forms 2 of the Building (Forms) Regulations 2004** for the application of a Building Consent.

# GUIDANCE ON USE OF PRODUCER STATEMENTS

Producer statements were first introduced with the Building Act 1991. The producer statements were developed by a combined task committee consisting of members of the New Zealand Institute of Architects, Institution of Professional engineers New Zealand, Association of Consulting Engineers New Zealand in consultation with the Building Officials Institute of New Zealand. The original suit of producer statements has been revised at the date of this form as a result of enactment of the Building Act (2004) by these organisations to ensure standard use within the industry.

The producer statement system is intended to provide Building Consent Authorities (BCAs) with reasonable grounds for the issue of a Building Consent or a Code Compliance Certificate, without having to duplicate design or construction checking undertaken by others.

**PS1 Design** Intended for use by a suitably qualified independent design professional in circumstances where the BCA accepts a producer statement for establishing reasonable grounds to issue a Building Consent;

**PS2 Design Review** Intended for use by a suitably qualified independent design professional where the BCA accepts an independent design professional's review as the basis for establishing reasonable grounds to issue a Building Consent;

**PS3 Construction** Forms commonly used as a certificate of completion of building work are Schedule 6 of NZS 3910:2013 or Schedules E1/E2 of NZIA's SCC 2011[2]

**PS4 Construction Review** Intended for use by a suitably qualified independent design professional who undertakes construction monitoring of the building works where the BCA requests a producer statement prior to issuing a Code Compliance Certificate.

This must be accompanied by a statement of completion of building work (Schedule 6).

The following guidelines are provided by ACENZ, IPENZ and NZIA to interpret the Producer Statement.

**Competence of Design Professional**

This statement is made by a Design Firm that has undertaken a contract of services for the services named, and is signed by a person authorised by that firm to verify the processes within the firm and competence of its designers.

A competent design professional will have a professional qualification and proven current competence through registration on a national competence based register, either as a Chartered Professional Engineer (CPEng) or a Registered Architect.

Membership of a professional body, such as the Institution of Professional Engineers New Zealand (IPENZ) or the New Zealand Institute of Architects (NZIA), provides additional assurance of the designer's standing within the profession. If the design firm is a member of the Association of Consulting Engineers New Zealand (ACENZ), this provides additional assurance about the standing of the firm.

Persons or firms meeting these criteria satisfy the term "suitably qualified independent design professional".

***Professional Indemnity Insurance**

As part of membership requirements, ACENZ requires all member firms to hold Professional Indemnity Insurance to a minimum level.

The PI Insurance minimum stated on the front of this form reflects standard, small projects. If the parties deem this inappropriate for large projects the minimum may be up to $500,000.

**Professional Services during Construction Phase**

There are several levels of service which a Design Firm may provide during the construction phase of a project (CM1-CM5 for Engineers[3]). The Building Consent Authority is encouraged to require that the service to be provided by the Design Firm is appropriate for the project concerned.

**Requirement to provide Producer Statement PS4**

Building Consent Authorities should ensure that the applicant is aware of any requirement for producer statements for the construction phase of building work at the time the building consent is issued as no design professional should be expected to provide a producer statement unless such a requirement forms part of the Design firm's engagement.

**Attached Particulars**

Attached particulars referred to in this producer statement refer to supplementary information appended to the producer statement.

**Refer Also:**

1 Conditions of Contract for Building & Civil Engineering Construction NZS 3910: 2013

2 NZIA Standard Conditions of Contract SCC 2011

3 Guideline on the Briefing & Engagement for Consulting Engineering Services (ACENZ/IPENZ 2004)

4 PN Guidelines on Producer Statements

**www.acenz.org.nz**
**www.ipenz.org.nz**
**www.nzia.co.nz**

# 1 SCOPE AND INTERPRETATION

## 1.1. INTRODUCTION

FTK M1:2015 sets out the requirements for the FRAMETEK 2007 LIMITED steel frame and truss building system. The document is only for use with this system.

The building system is constructed from sections cold rolled using CNC roll-forming machines with a swage, dimple and screw jointing process.

The framing is designed to be of at least equivalent stiffness to the framing provisions of NZS 3604 and complies with the serviceability criteria of AS/NZS 1170. The framing system is therefore within the scope of Verification Method E2/VM1.

Should any queries arise or additional engineering and design information be required please contact:

FRAMETEK 2007 Limited P.O. Box 89, Paraparaumu. (04) 902 9170.

## 1.2. SCOPE

Buildings covered by this Manual are as per NASH Standard: Residential and Low-rise Steel Framing Part 1: Design Criteria V40 14-04-14 Section 1.1.3

This Manual shall apply to buildings within the following limits:

a) Buildings founded on good ground;
b) Importance level 1 and 2 Buildings (Table 1.1)
c) Total height from the lowest ground level to the highest point of the roof up to 10m;
d) The open ground snow loading up to 1.5 kPa.
e) Buildings with floor loads not exceeding 2 kPa uniformly distributed live load, or 2.7 kN concentrated live load on the floor, or 0.25 kPa uniformly distributed live load on the roof. The floor and roof live loadings shall be as given in table 1.2, provided that the floor loading does not exceed 1.5 kPa for the uppermost floor of three storey buildings. (see Fig 1.1)
f) Single-*Storey* buildings may include a *part* Storey basement or a *part Storey* in the *roof* space. Single-*Storey* buildings shall be supported on any one of the following *foundation* structures:
    (i) *Piles*
    (ii) *Foundation walls*
    (iii) Concrete slab-on-ground;

g) Two-*storey* buildings shall comprise a steel upper floor and upper *storey* steel w*alls.* The lower *storey* walls may be steel, or full height masonry to NZS 4229. The lower floor may be slab on ground, suspended steel or timber as follows:

(i) For buildings with slab-on-ground the lower *storey walls* shall be in steel *framing*, or full height masonry to NZS 4229

(ii) Buildings with the lower floor of suspended steel or timber and lower-*storey* steel *walls* shall be supported on either or a combination of *foundation walls* and *piles.*

(iii) Buildings with the lower floor of suspended steel or timber and lower *Storey* full height masonry *walls* shall be supported on *foundations* to NZS 4229;

h) Three-*storey* buildings shall consist of all the following:

i) No more than two *storeys* supported on steel *framing.*

ii) One *storey* shall be a *part Storey* in a *roof* space.

iii) The middle *storey* and *part storey* shall be directly supported on a lower *storey* of concrete masonry *walls* and *foundation walls* to the provisions of NZS 4229.

iv) The ground floor shall be either concrete slab-on-ground or a suspended steel, timber or concrete floor to the provisions of NZS4229;

i) The slope of any roof plane shall not be steeper than 40° to the horizontal;

j) For the purpose of forming a *mansard roof* only, a wall of an uppermost *storey* may slope up to 20°;

k) The building wind zone determined from section 4 shall be Low, Medium, High, Very high or Extra high (i.e. L-32m/s, M-37m/s, H-44m/s, VH-50m/s or EH-55m/s). *Specific engineering design (SED)* indicates the application is outside the scope of this document;

l) Roof weights described as *Light* 20kg/m2 (Max. 0.2kPa), and *Heavy* 65kg/m2 (Max. 0.65kPa), and floor weight not to exceed 0.7kPa.

m) The *plan floor area* shall:

i) Be unlimited for one or two-*storey* buildings all *storeys* of steel framing construction.

ii) Not exceed 300$m_2$ total for two-*storey* buildings of other forms of construction

iii) Not exceed 200$m_2$ total for three-*storey* buildings of other forms of construction;

n) Buildings with *wings* or *blocks* shall be designed as if the *wing* or *block* is a separate building;

o) Concrete slab-on-ground floors in accordance with NZS 3604:2011 section 7.5 may be used for vehicle garages for vehicles up to 2500 kg tare;

p) Masonry veneer *cladding* shall have wall ties in accordance with E2 and manufacturers specifications.

Beware of substitution

Substitution risks non-compliance with the requirements of the NZ Building Code, in particular structural and durability requirements.

**Building not covered by this Standard**

(a) Buildings without external walls, such as carports and pergolas:
(b) Buildings outside the limitation of Clause 1.2 such buildings shall be the subject of specific engineering design, or an alternative solution.

*Table 1.1 Classification of buildings*

| Importance Level | AS/NZS 1170 Description | Typical examples of structures constructed in accordance with this manual |
|---|---|---|
| 1 | Structures presenting a low degree of hazard to life and other property | Freestanding uninhabited garages and farm buildings with a total floor area of < 30m2 |
| 2 | Normal structures | Single family dwellings (houses). Buildings and facilities as follows:<br>• Where fewer than 300 people can congregate in one area;<br>• Day-care facilities with a capacity less than 150;<br>• Primary school or secondary school facilities with a capacity less than 250;<br>• Collages or adult education facilities with a capacity less than 500;<br>• Healthcare facilities with a capacity less than 50 resident patients but not having surgery or emergency treatment facilities;<br>• Multi-occupancy residential, commercial (including Shops), industrial, offices and retailing buildings designed to accommodate fewer than 5000 people and with a gross area less than 10,000m2;<br>• Public assembly buildings, theatres and cinemas less than 1,000m2. |

*Table 1.2 Imposed floor live loads*

| Type of activity or occupancy | Specific use | Floor load in kPa |
|---|---|---|
| Domestic self-contained dwellings | General areas, balconies <1m of the ground | 1.5 |
| | Balconies >1m of the ground | 2.0 |
| Residential | General areas, bedrooms, hospital wards, hotel rooms, toilet areas but not balconies and roofs used for floor activities | |
| Residential | Communal kitchens | |
| Offices and work areas | Workrooms, offices, communal kitchens, laundries and laboratories | 3.0 |

NOTE-

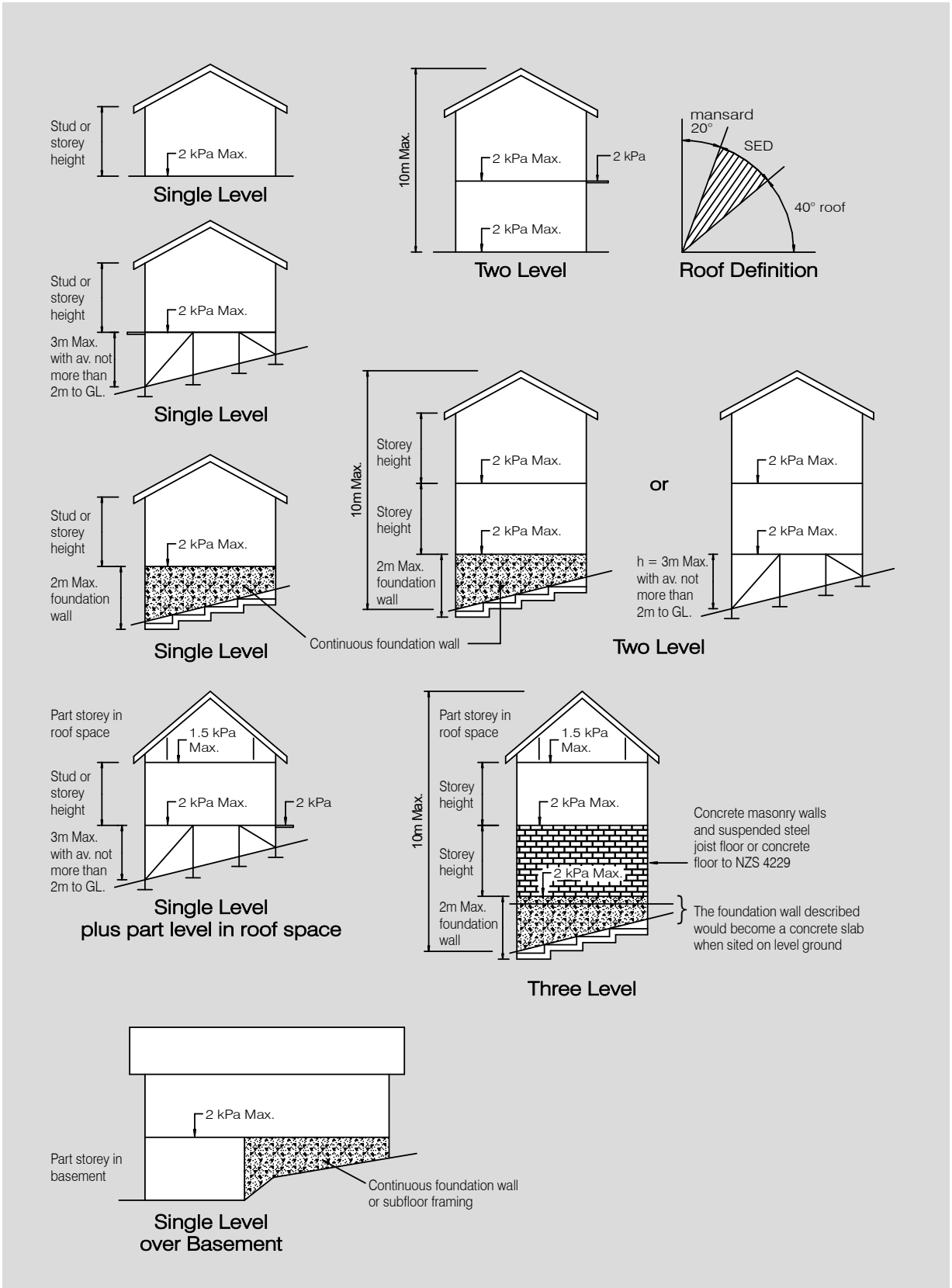
(1) For full details of floor loading requirements see table 3.1 of AS/NZS 1170.1

(2) For domestic and residential occupancy a 1.8kN concentrated load applies.

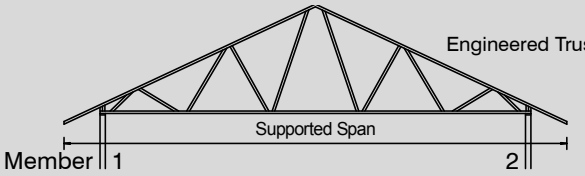
(3) For offices and work areas a 2.7kN concentrated load applies.

(4) Some 3 kPa applications that have concentrated load requirements exceeding 2.7 kN are outside the scope of this Standard (see AS/NZS 1170.1).

*Figure 1.1 Buildings covered by this system design manual*

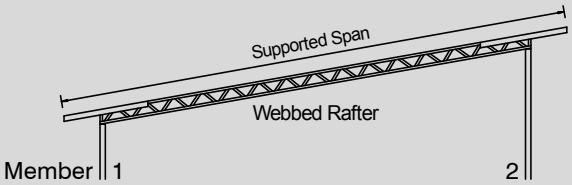


## *Figure 1.2 Definitions of spans and loaded dimensions*



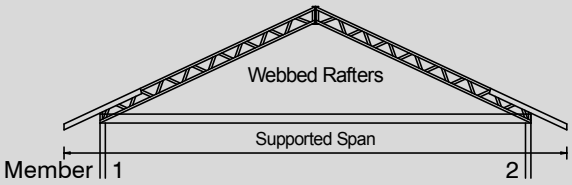

( A ) Support Span

( A ) For members 1 and 2:
Loaded dimension = $\frac{\text{Supported span}}{2}$



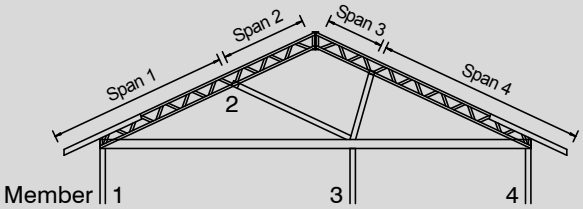

( B ) Mono-Pitch Roof

( B ) For members 1 and 2:
Loaded dimension = $\frac{\text{Supported span}}{2}$




( C ) Couple Close Roof
or Tied Rafters

( C ) For members 1 and 2:
Loaded dimension = $\frac{\text{Supported span}}{2}$



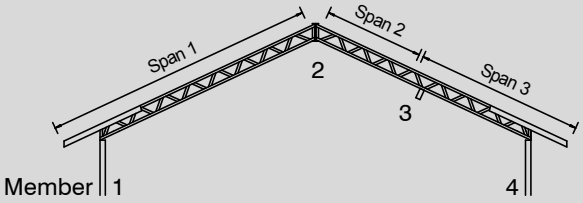

( D ) Framed Ceiling Panels
or Strutted Roof

( D ) For member 1: Loaded dimension = $\frac{\text{Span 1}}{2}$

For member 2: Loaded dimension = $\frac{\text{Span 1} + \text{Span 2}}{2}$

For member 3:
Loaded dimension = $\frac{\text{Span 1}}{2}$ + Span 2 + Span 3 + $\frac{\text{Span 4}}{2}$

For member 4: Loaded dimension $\frac{\text{Span 4 3}}{2}$



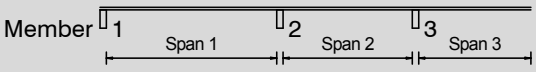

( E ) Webbed Rafters supported
on Beams or Walls

( E ) For member 1: Loaded dimension = $\frac{\text{Span 1}}{2}$

For member 2: Loaded dimension = $\frac{\text{Span 1} + \text{Span 2}}{2}$

For member 3: Loaded dimension = $\frac{\text{Span 2} + \text{Span 3}}{2}$

For member 4: Loaded dimension = $\frac{\text{Span 3}}{2}$




( F ) Floor Structure

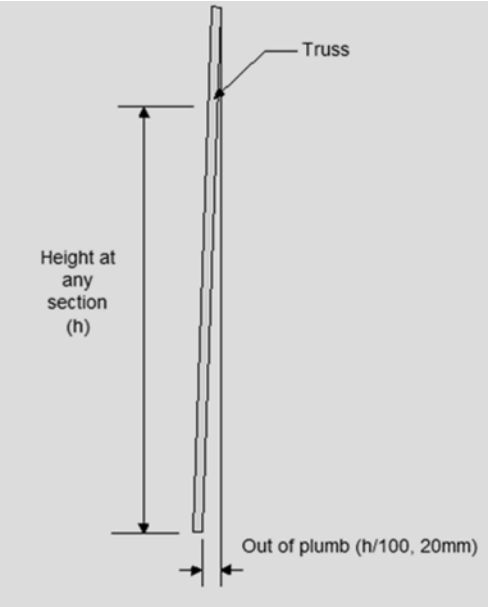
( F ) For member 1: Loaded dimension = $\frac{\text{Span 1}}{2}$

For member 2: Loaded dimension = $\frac{\text{Span 1} + \text{Span 2}}{2}$

For member 3: Loaded dimension = $\frac{\text{Span 2}}{2}$ + Span 3

NOTE - A Maximum eaves overhang dimension of 750. Such overhangs need to be **included** when calculating Loaded Dimensions.

*Figure 2.5 Plumb length*




1.2.1. Spacing

The spacing of trusses, rafters and floor joists must not vary from the specified dimension by more than 20mm.

1.2.2. Floor surface

The flatness of the floor surface is to be within ±10mm over the entire room, but not exceeding ± 5mm over any 3 metre length. Abutting floors between rooms must be aligned unless specifically designed otherwise. E.g. steps, different finishes.

1.2.3. Vertical alignment of members

When standard trusses or rafters are designed to be vertically aligned with structural wall studs in the walls below (between levels), the centre lines of the members must not be more than 150mm apart as shown in Figures 2.6 and 2.7 unless the top plate of the lower wall has been assessed by an engineer for strengthening. However, in all cases for girder trusses, SED trusses or specifically positioned joists their associated studs must be aligned.

For top plate loading see Section 6.6 Plate Tables

*Figure 2.6*

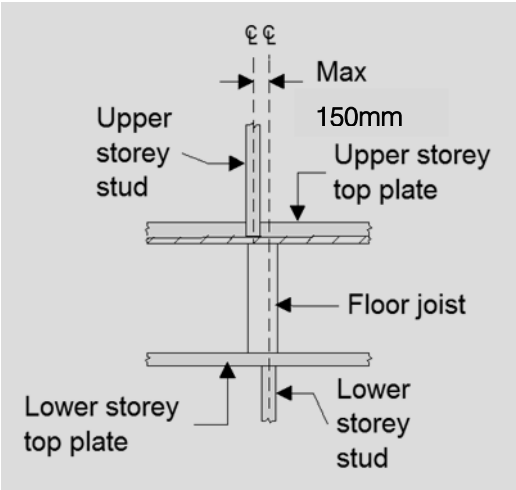
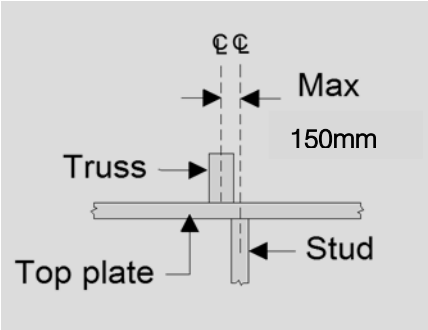



*Figure 2.7*




## 1.3. STANDARD SECTIONS

### 1.3.1. Section materials

FRAMETEK sections are roll-formed from hot-dipped zinc-coated high strength steel strip conforming to AS 1397. All sections are manufactured from coil supplied by New Zealand Steel.

All steel is galvanised to a minimum of Z275 or higher standard if required (refer to durability section of this manual).

### 1.3.2. Steel grades and properties

Cold rolled metallic coated steel in accordance with AS 1397 are designated as follows:

GXXX Z YYY
GXXX AZ YYY
GXXX AM YYY

GXXX is the grade of steel e.g. G550, G500, G300, G250
Z is the coating class where Z represents zinc coating
AZ is the coating class where AZ represents aluminium/zinc coating
AM is the coating class where AM represents aluminium/zinc/magnesium coating
YYY is the total mass of coating ($g/m^2$) on both sides

The grade typically used for sections up to and including 0.95mm BMT is G550, the 1.15mm BMT material used for special applications is G500, whereas thicker material (including joists) is typically G250, G300.

BMT means Base Metal Thickness and refers to the nominal thickness of the coil material (excluding its zinc coating) before forming.

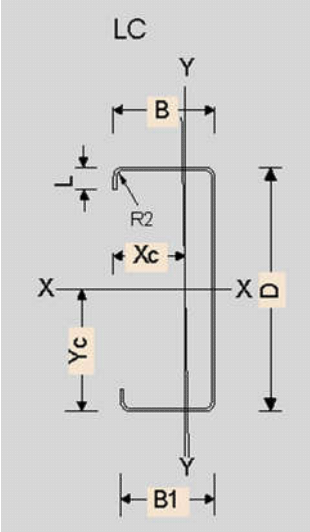
1.3.3. Section identification

FRAMETEK profiles are identified by a three-part code which describes the size, shape and thickness.

| Sections: (fig 2.8) | Group 1 | Group 2 |
|---|---|---|
| | 89LC75 | 150LC75 |
| | 89LC95 | 150LC95 |

Where: 89 – Nominal size (Web or Height) – 89mm or 150mm
LC – Shape – Lipped Channel
75 – Nominal thickness – 0.75mm or 0.95mm BMT

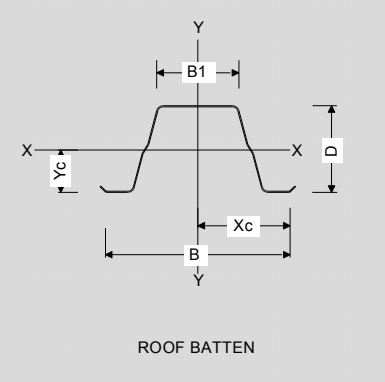
*Figure 2.8 Standard Lipped Channel section*




**IMPORTANT - PLEASE NOTE**

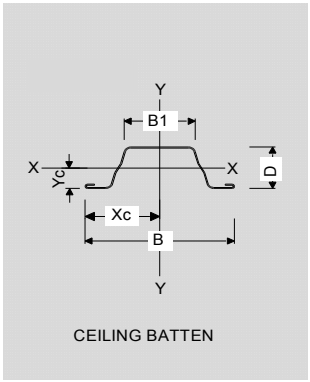
Please be aware that in the process of designing a building that only one section from either group listed above is chosen to work with. Swapping between sections within groups will incur increased costs and undue time delays.

*Figure 2.9 Roof Batten / Purlin*



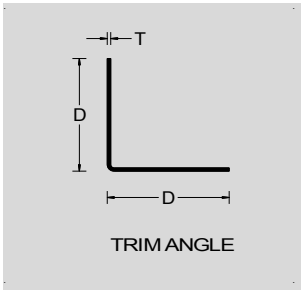

Section: 40RB55 (fig 2.9)
Where: 40 – Nominal size (Height) – 40mm
RB – Roof Batten – 'Tophat'
55 – Nominal thickness – 0.55mm BMT

*Figure 2.10 Ceiling Batten*



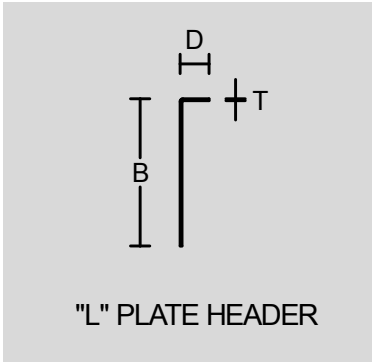

Section: 20CB55 (fig 2.10)
Where: 20 – Nominal size (Height) – 20mm
CB – Ceiling Batten – 'Tophat'
55 – Nominal thickness – 0.55mm BMT

*Figure 2.11 Angle*




Section: 35A75 (fig 2.11)
Where: 35 – Nominal size (Height) – 35mm
A – Shape – 90° Angle
75 – Nominal thickness – 0.75mm BMT

*Figure 2.12 Angle*




Section: 152x30A95 (fig 2.12)
Where: 152 – Nominal size (Height) – 152mm
30– Nominal size (Width) – 30mm
A – Shape – 90° Angle
95 – Nominal thickness – 0.95mm BMT

### 1.3.4. Section dimensions

*Table 1.3*

Table below presents selected dimensions of commonly used sections:

| Section Dimensions | | | | | |
|---|---|---|---|---|---|
| Section | T | D | B | B1 | L |
| Code | [mm](BMT) | [mm] | [mm] | [mm] | [mm] |
| 89LC75 | 0.75 | 89 | 41 | 38 | 9 |
| 89LC95 | 0.95 | 89 | 41 | 38 | 9 |
| 150LC95 | 0.95 | 150 | 41 | 38 | 9 |
| 150LC75 | 0.75 | 150 | 41 | 38 | 9 |
| 40RB55 | 0.55 | 40 | 88 | 38 | - |
| 20CB55 | 0.55 | 20 | 65 | 25 | - |
| 35A75 | 0.75 | 35 | - | - | - |
| 152x30A95 | 0.95 | 30 | 152 | - | - |

## 1.4. FASTENERS

### 1.4.1. Screws

All screws used with FRAMETEK frames and trusses are min Class 3 as defined in AS3566.2 and therefore exceed requirement for internal use and meet the requirement for mild to moderate industrial or marine environment (zones 1, 2 and 3 as defined in NZS3404.1).

All screws used in the sea spray zone shall be class 4.

**SCREW TENSION IMPORTANT - PLEASE NOTE**

**Over driving of screws may result in thread stripping, the recommended approach into light gauge steel is a two-step process.**

**Step 1, using an impact driver, drive screw and allow the screw head to coast into contact with the connecting surface.**

**Step 2, then follow with 3~4 "ratchet clicks" to confirm torque setting.**

Fasteners used for the connection of wall, floor and roof framing shall be selected from the following table:

*Figure 2.13 Screw types*

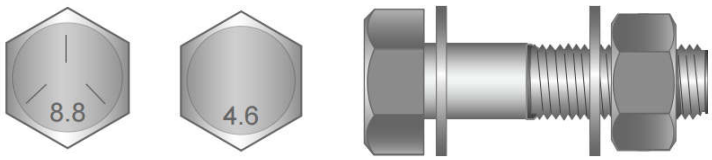
| Image | Description | Sizes |
|---|---|---|
| NOTE: MINIMUM DISTANCE FROM EDGE OF STEEL TO FIXING HOLE = 10mm | | |
|  (assembly screw) | Screw used in the factory for production of steel frames with pre-punched holes<br>Wafer Fine/coarse grey electrocoat | 10g x 16/24 tpi |
|  (Flat Head Self Drilling) | Screw used in the factory for production of steel frames, where there are no pre-punched holes<br>Flat head Tek Phillips drive | 10g x 16 tpi |
|  (Hextek Self Drilling) | TEK screws used for connection of frames on site<br>Hex W/F – Hex head / washer face | 10g x16 tpi x16mm<br>12g x14 tpi x20mm<br>12g x14 tpi x35mm<br>12g x14 tpi x45mm |
|  (Series 500) | Connection of frames or strapping on site to structural steel where low profile head is required | 12g x 24 tpi x 38mm |

1.4.2. Bolts

Hexagonal metric bolts strength class 4.6 are used for assembly of frames on site. Where connection to structural steel is involved strength class 8.8 may be necessary.

All bolts are to be hot dip galvanised in accordance with AS/NZS4680 to a minimum of 600g/m2 average.

*Figure 2.14 Bolt types*

| Image | Description | Sizes |
|---|---|---|
|   | Standard hexagonal bolt assembly comprising bolt, nut and 2 washers (One under head and one under nut) | M8<br>M10<br>M12<br>M16 |

### 1.4.3. Other fasteners

A range of other fasteners are used in conjunction with FRAMETEK steel frames and trusses to connect steel framing to other materials or to connect elements not forming part of FRAMETEK system to the frames (e.g. hold-down bolts/anchors to concrete or timber substructure).

Such fasteners are covered by this manual where specified on typical details.

Specific types of hold down fasteners used to connect frames to concrete foundation or substructure are presented in the table below:

*Figure 2.15 Concrete Fasteners*

| Image | Description | Sizes |
|---|---|---|
|  Heavy Duty Screw Anchor | Medium duty mechanical concrete anchor used typically for hold down constraints with limited edge distance applications for bracing ends, each side of door openings and spaced throughout the building.<br>(refer Appendix for Specifications ensure that the correct length anchor is selected to suit the Frametek hold down bracket and bottom plate )<br>Length = 6mm + embedment depth | THD 10 x 80<br>THD 10 x 100<br>THD 10 x 120 |

All other fixings referenced by details forming part of this manual are covered by the manufacturer's durability statements.

# 2 DURABILITY

## 2.1. GENERAL

Steel frames and their fixings will have a durability of 50 years if used and maintained in accordance with the Axxis steel for framing Durability Statement. (See Appendix A)

## 2.2. SECTIONS AND PLATING

All coil and plate used in steel frames and trusses produced by FRAMETEK are sourced from New Zealand Steel and its durability is covered by the Axxis durability statement.

Subfloor construction is considered through a specific engineering design process, please contact FRAMETEK directly for details.

# 3 BRACING DESIGN AND CALCULATIONS

## 3.1. GENERAL

Permanent bracing must be provided to enable the roof, wall and floor framework to resist horizontal forces applied to the building (racking forces). Appropriate connections to the ceiling and floor diaphragms must also be provided to transfer these forces through the framework and subfloor structure to the building's foundation.

Bracing demands as a result of Wind and Earthquake forces are determined and expressed in Bracing Units (BUs). These demands represent design forces which have a 10% probability of exceedance in 50 years, which is the accepted norm for housing. Demands must be resisted by the sum of evenly distributed bracing elements tested in accordance with the BRANZ P21 (2010) Test and Evaluation Procedure.

For the BRANZ Technical Paper P21 see:
http://www.branz.co.nz/cms_show_download.php?id=208234abaa662c8a234900bd027c47cf5cc23125

Bracing elements forming part of FRAMETEK system are described below together with other bracing elements based around light gauge steel framing. All elements listed below can be used together in a bracing system.

## 3.2. WIND AND EARTHQUAKE BRACING DEMAND

Wind and earthquake bracing demand shall be calculated in accordance with section 8 of NZS3604

## 3.3. WALL BRACING DESIGN

The capacity of wall bracing elements shall be determined in accordance with the BRANZ Technical Paper P21 or justified through specific engineering design certified by a New Zealand Chartered Professional Engineer.

Bracing elements longer than those tested shall have their capacity determined by multiplying the tested or calculated capacity rating per metre by the length of the element. The end of the longer element shall have the equivalent hold down capacity to the tested/calculated element.

Adjustment of bracing capacity for walls of different height and walls with sloping top plates shall be:

a) Bracing elements of height greater than 2.4m, the brace rating of the tested or calculated element shall be multiplied by:

| 2.4 |
| --- |
| Element height in metres |

Elements less than 2.4m in height shall be rated as if they were 2.4m high.

b) Walls of varying heights shall have their bracing capacity adjusted in accordance with a) above, using their average height.

Where bracing walls are at angles to the bracing lines they shall contribute to the bracing:

c) 30° to one direction and 60° in the other direction, 0.87 and 0.5 times the rated value.

d) 45° in both directions, 0.7 times the rated value.

e) Values of other angles shall be obtained by multiplying the rated value by the cosine of the angle between the element and the bracing line being considered.

## 3.4. TOP PLATE CONNECTIONS

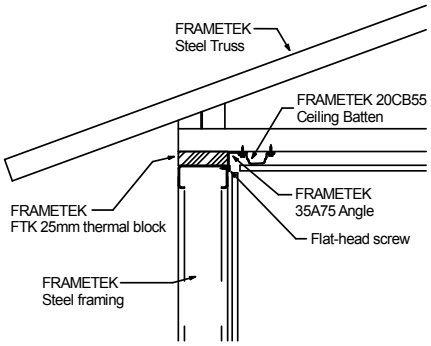
Each wall that contains one or more wall bracing elements shall be connected at the top plate level to external walls at right angles to it.

a) For each bracing wall with a **total** bracing capacity of not more than 125 BU to one or more external walls, a connection of 6kN is required;
b) For each bracing wall with a **total** bracing capacity of not more than 250 BU to two or more external walls, a connection of 6kN is required to each;
c) For each bracing wall with a **total** bracing capacity of more than 250 BU to two or more external walls, a connection of not less than 2.4kN per 100BU is required.

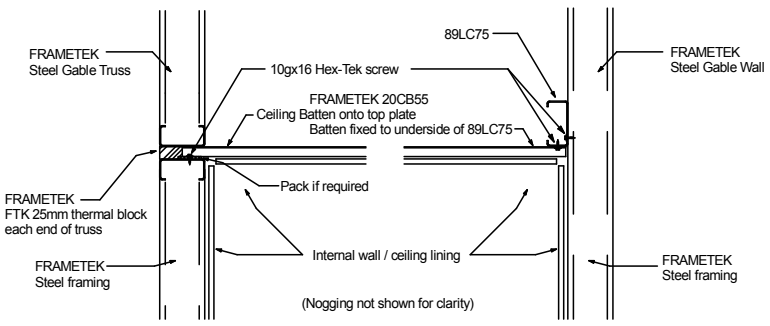
Walls can be connected with a 0.75mm x 50mm min. G300 flat plate with 3 /10g-12 TEK screws to, both, connected and connecting wall (6 total) to achieve 6kN connection with an additional two screws for each additional 100BU.

Above requirement does not apply if the wall in question is connected to the ceiling diaphragm as shown on typical details below

Ceiling Diaphragm
20CB55 Parallel to frame




Ceiling Diaphragm
20CB55 Perpendicular to frame




Fix ceiling to walls at 150mm centres for diaphragm, otherwise 300mm centres elsewhere. (All screws 10gx16 unless otherwise noted)

## 3.5. LATERAL SUPPORT OF TOP PLATES

Top plates shall be laterally supported / constrained by one of the following:

a) A ceiling with a sheet lining material having a density of no less than 600kg/m3 or;
b) Intersecting joists, rafters, trusses / purlins or;
c) Framing sections connecting the top plate to members such as joists, rafters or trusses, running parallel to the top plate and spaced at no greater than 1.2 metres apart.

## 3.6. WALL BRACING DISTRIBUTION

Bracing within the building, shall be located as close as possible to the corners of external walls and be distributed evenly throughout the building.

Where buildings are more than one storey in height, wall bracing must be designed for each storey.

## 3.7. SPACING OF BRACING LINES

Bracing lines in any storey shall not be spaced at more than 6m centres in any direction.

## 3.8. MINIMUM BRACING LINE VALUES

No bracing line shall have a value less than the greater of 100 bracing units or 50% of the total bracing demand divided by the number of bracing lines in the direction being considered. For this purpose bracing lines less than 1m apart shall be considered as one line.

## 3.9. BRACING OF INTERNAL WALLS

Each internal brace line shall have a bracing capacity contributed by either of the following or any combination of them:

a) Wall bracing elements in internal walls on the bracing line:
b) Pairs of wall bracing elements in internal walls not more than 2m apart, one on each side of the bracing line and parallel to it.

## 3.10. MINIMUM BRACING CAPACITY OF EXTERNAL WALLS

Each external wall in any story shall have a total bracing capacity not less than the greater of:

a) 100 bracing units or 50% of the total bracing demand divided by the number of bracing lines in the direction being considered, or
b) 15 bracing units per meter of external wall length.

Parallel external walls offset no more than 2m from each other may be treated as one bracing line.

## 3.11. FLOOR AND CEILING DIAPHRAGMS

For bracing design, please refer to the NASH Standard, Part 1. The standard provides instruction on design method and different materials suitable for bracing.

When specifying and designing floor and ceiling diaphragms it is useful to note that the main difference between timber and lightweight steel construction is the fixings type required.

The Frametek screw preference, when fixing plasterboard to steel, is an 8 gauge self-drilling bugle head, otherwise please follow the Gib EzyBrace system, or other approved system, for all fixing requirements.

## 3.12. ROOF BRACING DESIGN

All roof members including roof battens, roof trusses or rafters, ceiling battens and bracing shall be designed to act together as a structural unit to transfer all the actions imposed on the roof to appropriate supports.

Roof bracing for both trussed and framed roofs shall be provided in accordance with the NASH Standard, Part 1.

Small roof planes of less than 6 m2, such as dormers or porches, do not require bracing.

## 3.13. SUBFLOOR BRACING

Subfloor bracing shall be designed in accordance with NZS3604 for bracing demand calculated in accordance with the NASH Standard, Part 1.

## 3.14. SELECTED BRACING ELEMENTS CAPACITIES

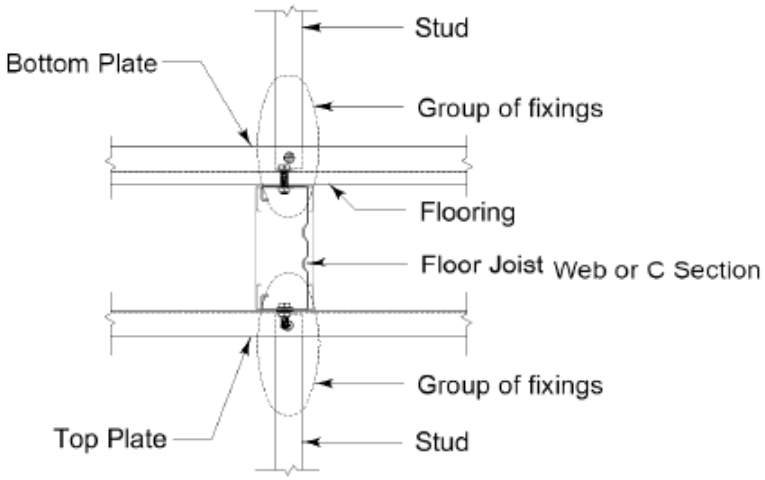
The Frametek screw preference, when fixing plasterboard to steel, is an 8 gauge self-drilling bugle head, otherwise please follow the Gib EzyBrace system, or other approved system, for all bracing requirements.

# 4 FLOORS

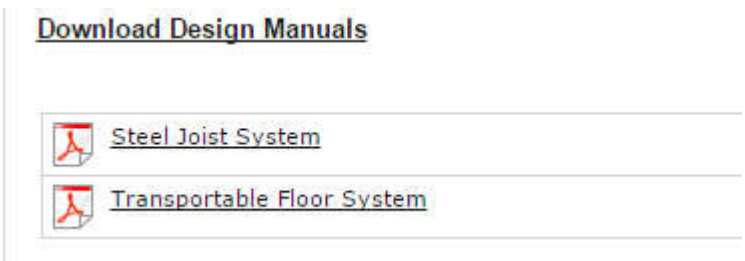
FRAMETEK is a licensed distributor of Speedfloor light gauge floor system.

Span tables for Speedfloor and for additional information and certification of compliance refer link below

## *Typical framing connection to a Speedfloor Joist system*




Please follow this link to the Speedfloor website *www.speedfloor.co.nz* then download the latest Design Manual:



# 5 WALLS

## 5.1. GENERAL

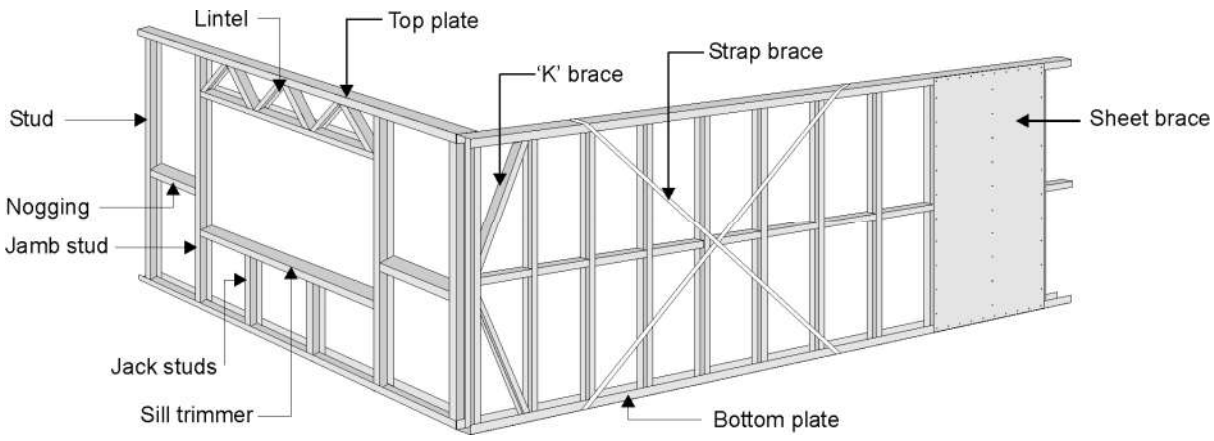
**IMPORTANT - PLEASE NOTE**

Please be aware that in the process of designing a building that only one section from either group listed above is chosen to work with. Swapping between sections within groups will incur increased costs and undue time delays.

This Section sets out the requirements for the construction of conventional stud-framed walls.

- The ultimate loads and load combinations are computed in accordance with the NASH Standard: Residential and Low-rise Steel Framing Part 1: Design Criteria.
- Boxed or inaccessible studs in external walls shall have either EPS or similar insulation installed inside the box section (unless it can be demonstrated by calculation in accordance with NZBC H3 that applicable stud areas have a rating of R0.15m$^2$ K/W)
- Load bearing members have been designed to withstand the appropriate loadings. It is imperative that any alterations to these members not covered elsewhere in this standard are assessed by a suitably qualified person. For example cutting members fully or partially, moving bracing members etc.
- Roof weights described as *Light* 20kg/m2 (Max. 0.2kPa), and *Heavy* 65kg/m2 (Max. 0.65kPa), floor weight shall not exceed 0.7kPa.

### *Typical wall framing system*



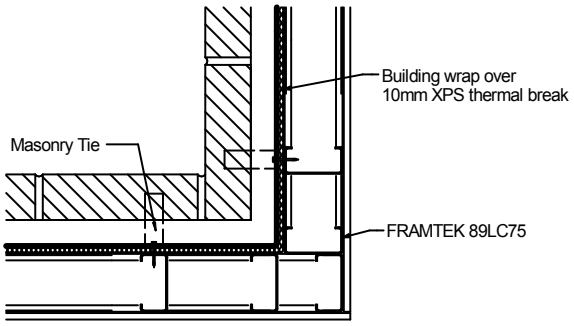
## 5.2. STUDS

Common studs must be evenly spaced to suit loads, lining and fixing for cladding.

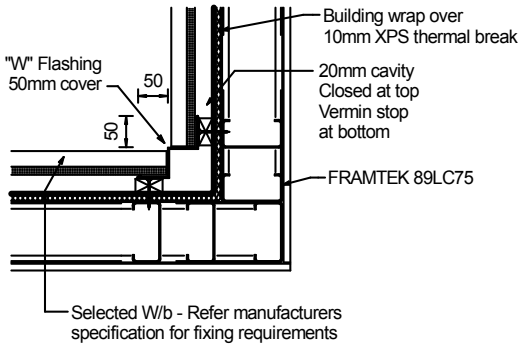
Larger point loads can be accommodated by a number of common studs installed in a frame next to each other or back-to-back fixed together by TEK screws.

All wall junctions shall have sufficient studs located so as to allow adequate fixing of linings whether internal or external.

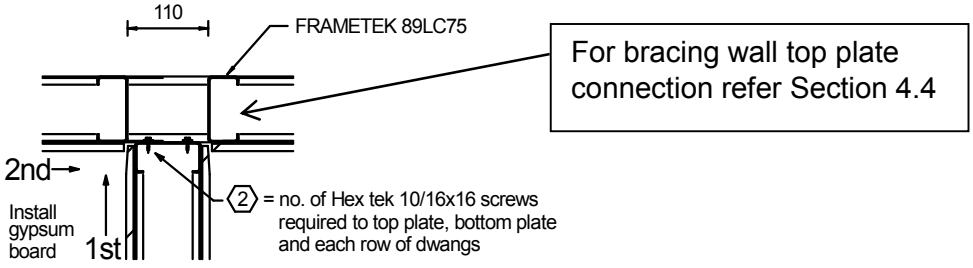
### Internal Corner Detail




### Internal Corner Detail




### Wall Junction




## 5.3. STUD SERVICE HOLES

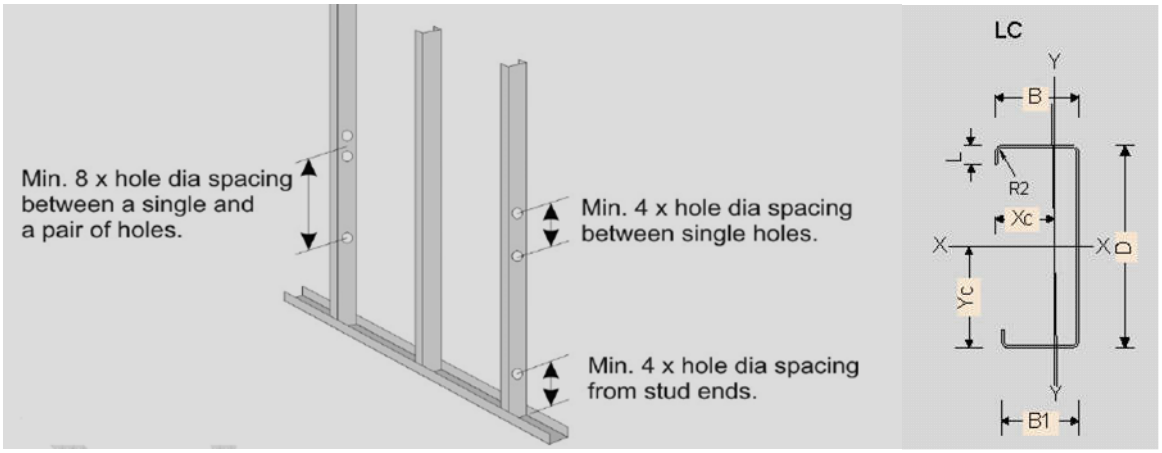
Hole sizes up to 50% of the Web dimension (D) may be punched or drilled in **load bearing studs and plates** as per figure 6.1 below, so for 89mm studs - holes up to 44mm in diameter are acceptable.

**Non load bearing studs** and any nog may have holes up to 75% of the Web width (D), so for 89mm studs - holes up to 66mm in diameter are acceptable and for 78mm studs - holes up to 58mm in diameter are acceptable) punched, notched or drilled.

Service holes must **not** be placed in the **flanges** (B) of steel members. Holes made by fasteners are acceptable.

For service holes of diameter less than D/2 in the Webs of studs, the hole spacing must be in accordance with fig 6.1 Other holes are not permitted.

*Figure 6.1 Service holes*




For non-load bearing and non-bracing walls, the top and bottom plate may be cut to allow the passing of services within the wall provided the top and bottom plate are fixed within 100 mm of the cut as required for internal wall restraint.

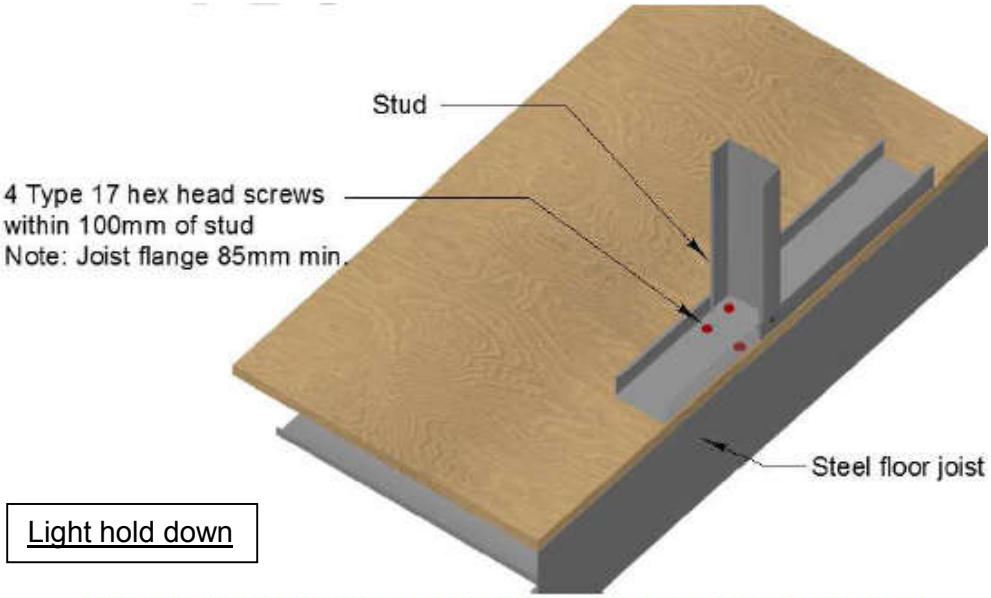
## 5.4. STUD HOLD DOWNS

"Light" wall hold-downs (washers and bolts / screws) are required each side of openings of up to 2m width, at all wall corners and at a maximum of 1.2m centres (beside studs).

"Heavy" hold downs (washers, bolts and brackets) are required at ends of braces, each side of openings above 2m, beside posts supporting girder trusses and beams.

*Figure 6.2 "Light" and "Heavy" hold downs*

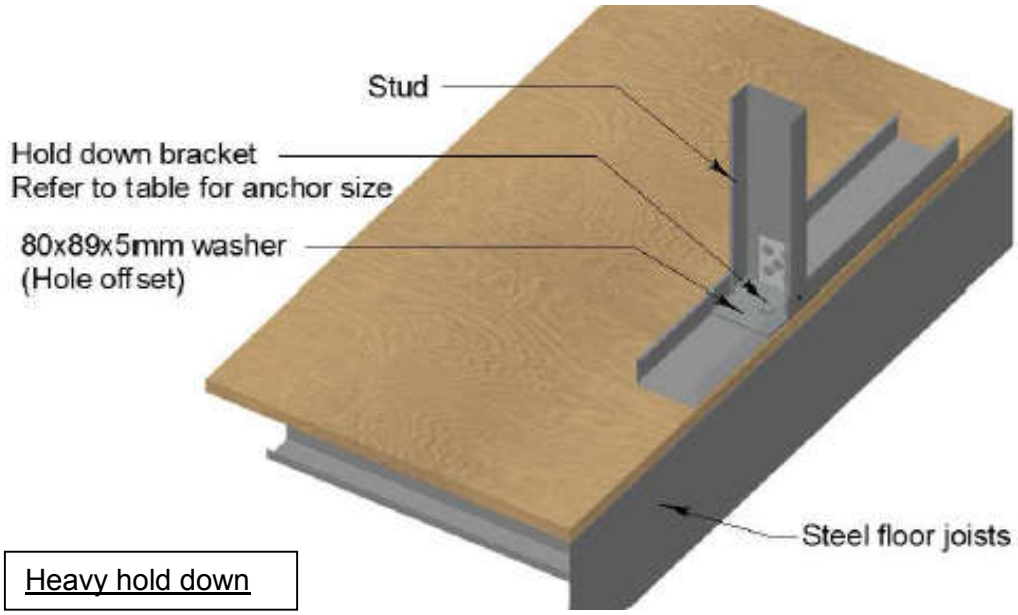
Fixing to steel joists




Light hold down

NOTE: Screws must fix into a joist or the boundary joist below.

Steel floor joist screw Standard hold down




Heavy hold down

## Fixings to concrete slab

Fixing to concrete slabs shall be by proprietary anchors with a capacity confirmed by the manufacturer to meet the requirement of the bracing system used. For example refer to the Fortress appraisal in the appendix.

FTK Hold-down assembly fixed to slab

- FTK Hold-down bracket,
- FTK Off-set washer (80x89x5mm),
- Screw fixings,
- THD 10 x 120 Heavy Duty Screw Anchor

Non-Load bearing walls

For hold down fixing in non-load bearing walls use 2x driven concrete pins or screws to each side of openings and at 1.2m centres.

Light hold down

For light hold down leave out the FTK Hold-down bracket, using only the FTK Off-set washer beside studs.

## 5.5. STUD TABLES – SINGLE OR UPPER LEVEL

The tables below allow for the maximum unrestrained stud height in external load bearing walls for the given Roof/Floor loaded dimension (as defined in fig. 1.2), wind zone and stud spacing's.

The number of screw fixings per stud connection to both the top and bottom plates is provided in the tables for Single or Upper Level. Where the number of screws is highlighted, double studs back-to-back are required. For tables relating to studs in the Lower of Two Levels, two screw fixings per stud connection to both the top and bottom plates are required.

Strapping with this number of fixings can be discussed in engineering specific applications.

* For the definition of Loaded Dimension see fig. 1.2
H, VH and XH refer to wind zones as defined in NZS3604:2011

## 5.6. STUD TABLES – SINGLE OR UPPER LEVEL – 89LC 75

| Section | 89LC 75 | | | | | | SINGLE OR UPPER FLOOR (Light Roof) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Loaded Dim. * | NO SNOW | | | | | | | | | | | | | | |
| | H | | | | | | VH | | | | | | XH | | |
| | MAXIMUM STUD SPACING (mm) | | | | | | | | | | | | | | |
| | 300 | | 400 | | 600 | | 300 | | 400 | | 600 | | 300 | | 400 | | 600 | |
| 2.0 | 4020 | 2 | 3740 | 2 | 3210 | 2 | 3770 | 2 | 3510 | 2 | 3110 | 2 | 3590 | 2 | 3340 | 2 | 2780 | 2 |
| 3.0 | 4020 | 2 | 3740 | 2 | 3210 | 2 | 3770 | 3 | 3460 | 3 | 2900 | 3 | 3460 | 3 | 3070 | 3 | 2560 | 3 |
| 4.0 | 4020 | 3 | 3740 | 3 | 3180 | 3 | 3570 | 3 | 3190 | 3 | 2680 | 3 | 3130 | 4 | 2780 | 4 | 2330 | 4 |
| 5.0 | 3880 | 3 | 3500 | 3 | 2980 | 3 | 3260 | 4 | 2920 | 4 | 2460 | 4 | 2790 | 6 | 2480 | 6 | 2080 | 6 |
| 6.0 | 3580 | 4 | 3250 | 4 | 2770 | 4 | 2940 | 6 | 2640 | 6 | 2220 | 6 | 2420 | 6 | 2160 | 6 | 1810 | 6 |
| | 1kPa SNOW | | | | | | | | | | | | | | | | | |
| 2.0 | 4020 | 2 | 3740 | 2 | 3210 | 2 | 3770 | 2 | 3510 | 2 | 3050 | 2 | 3590 | 2 | 3340 | 2 | 2780 | 2 |
| 3.0 | 4020 | 2 | 3720 | 2 | 3150 | 2 | 3760 | 3 | 3360 | 3 | 2810 | 3 | 3460 | 3 | 3070 | 3 | 2560 | 3 |
| 4.0 | 3720 | 3 | 3370 | 3 | 2870 | 3 | 3400 | 3 | 3050 | 3 | 2570 | 3 | 3130 | 4 | 2780 | 4 | 2330 | 4 |
| 5.0 | 3320 | 3 | 3010 | 3 | 2570 | 3 | 3050 | 4 | 2730 | 4 | 2310 | 4 | 2790 | 6 | 2480 | 6 | 2080 | 6 |
| 6.0 | 2910 | 4 | 2640 | 4 | 2250 | 4 | 2670 | 6 | 2390 | 6 | 2020 | 6 | 2420 | 6 | 2160 | 6 | 1810 | 6 |
| | 1.5kPa SNOW | | | | | | | | | | | | | | | | | |
| 2.0 | 4020 | 2 | 3740 | 2 | 3210 | 2 | 3770 | 2 | 3410 | 2 | 2860 | 2 | 3550 | 2 | 3140 | 2 | 2620 | 2 |
| 3.0 | 3640 | 2 | 3290 | 2 | 2810 | 2 | 3330 | 3 | 2980 | 3 | 2510 | 3 | 3100 | 3 | 2760 | 3 | 2300 | 3 |
| 4.0 | 3070 | 3 | 2790 | 3 | 2380 | 3 | 2820 | 3 | 2530 | 3 | 2130 | 3 | 2620 | 4 | 2340 | 4 | 1960 | 4 |
| 5.0 | 2450 | 3 | 2210 | 3 | 1890 | 3 | 2240 | 4 | 2000 | 4 | 1690 | 4 | 2080 | 6 | 1850 | 6 | 1550 | 6 |
| 6.0 | 1600 | 4 | 1440 | 4 | 1320 | 4 | 1450 | 6 | 1340 | 6 | 1290 | 6 | 1350 | 6 | 1320 | 6 | 1270 | 6 |

| Section | 89LC 75 | | | | | | SINGLE OR UPPER FLOOR (Heavy Roof) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Loaded Dim. * | NO SNOW | | | | | | | | | | | | | | |
| | H | | | | | | VH | | | | | | XH | | |
| | MAXIMUM STUD SPACING (mm) | | | | | | | | | | | | | | |
| | 300 | | 400 | | 600 | | 300 | | 400 | | 600 | | 300 | | 400 | | 600 | |
| 2.0 | 4020 | 2 | 3740 | 2 | 3210 | 2 | 3770 | 2 | 3510 | 2 | 3060 | 2 | 3590 | 2 | 3310 | 2 | 2750 | 2 |
| 3.0 | 4020 | 2 | 3740 | 2 | 3210 | 2 | 3770 | 3 | 3370 | 3 | 2820 | 3 | 3390 | 3 | 3010 | 3 | 2510 | 3 |
| 4.0 | 3940 | 3 | 3550 | 3 | 3020 | 3 | 3420 | 3 | 3060 | 3 | 2580 | 3 | 3040 | 4 | 2700 | 4 | 2260 | 4 |
| 5.0 | 3580 | 3 | 3240 | 3 | 2770 | 3 | 3070 | 4 | 2750 | 4 | 2320 | 4 | 2670 | 6 | 2380 | 6 | 1990 | 6 |
| 6.0 | 3230 | 4 | 2930 | 4 | 2510 | 4 | 2690 | 6 | 2420 | 6 | 2040 | 6 | 2260 | 6 | 2010 | 6 | 1680 | 6 |
| | 1kPa SNOW | | | | | | | | | | | | | | | | | |
| 2.0 | 4020 | 2 | 3740 | 2 | 3210 | 2 | 3770 | 2 | 3510 | 2 | 3020 | 2 | 3590 | 2 | 3310 | 2 | 2750 | 2 |
| 3.0 | 4020 | 2 | 3640 | 2 | 3090 | 2 | 3680 | 3 | 3280 | 3 | 2760 | 3 | 3390 | 3 | 3010 | 3 | 2510 | 3 |
| 4.0 | 3600 | 3 | 3260 | 3 | 2780 | 3 | 3300 | 3 | 2950 | 3 | 2490 | 3 | 3040 | 4 | 2700 | 4 | 2260 | 4 |
| 5.0 | 3160 | 3 | 2870 | 3 | 2460 | 3 | 2900 | 4 | 2610 | 4 | 2200 | 4 | 2670 | 6 | 2380 | 6 | 1990 | 6 |
| 6.0 | 2710 | 4 | 2450 | 4 | 2090 | 4 | 2480 | 6 | 2230 | 6 | 1880 | 6 | 2260 | 6 | 2010 | 6 | 1680 | 6 |
| | 1.5kPa SNOW | | | | | | | | | | | | | | | | | |
| 2.0 | 4020 | 2 | 3740 | 2 | 3210 | 2 | 3770 | 2 | 3430 | 2 | 2870 | 2 | 3570 | 2 | 3160 | 2 | 2630 | 2 |
| 3.0 | 3670 | 2 | 3320 | 2 | 2830 | 2 | 3360 | 3 | 3010 | 3 | 2530 | 3 | 3120 | 3 | 2780 | 3 | 2320 | 3 |
| 4.0 | 3110 | 3 | 2820 | 3 | 2410 | 3 | 2850 | 3 | 2560 | 3 | 2160 | 3 | 2660 | 4 | 2370 | 4 | 1980 | 4 |
| 5.0 | 2500 | 3 | 2270 | 3 | 1930 | 3 | 2290 | 4 | 2050 | 4 | 1730 | 4 | 2130 | 6 | 1900 | 6 | 1590 | 6 |
| 6.0 | 1710 | 4 | 1540 | 4 | 1340 | 4 | 1550 | 6 | 1390 | 6 | 1310 | 6 | 1440 | 6 | 1330 | 6 | 1280 | 6 |

## 5.7. STUD TABLES – SINGLE OR UPPER LEVEL – 89LC 95

| Section | 89LC 95 | | | | | | | | | SINGLE OR UPPER FLOOR (Light Roof) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Loaded Dim. * | NO SNOW | | | | | | | | | | | | | | | | | |
| | H | | | | | | VH | | | | | | XH | | | | | |
| | MAXIMUM STUD SPACING (mm) | | | | | | | | | | | | | | | | | |
| | 300 | | 400 | | 600 | | 300 | | 400 | | 600 | | 300 | | 400 | | 600 | |
| 2.0 | 4250 | 2 | 3950 | 2 | 3570 | 2 | 3980 | 2 | 3700 | 2 | 3350 | 2 | 3790 | 2 | 3530 | 2 | 3190 | 2 |
| 3.0 | 4250 | 2 | 3950 | 2 | 3570 | 2 | 3980 | 2 | 3700 | 2 | 3350 | 2 | 3790 | 2 | 3530 | 2 | 3160 | 2 |
| 4.0 | 4250 | 2 | 3950 | 2 | 3570 | 2 | 3980 | 3 | 3700 | 3 | 3350 | 3 | 3790 | 3 | 3530 | 3 | 2980 | 3 |
| 5.0 | 4250 | 3 | 3950 | 3 | 3570 | 3 | 3980 | 3 | 3700 | 3 | 3190 | 3 | 3710 | 4 | 3330 | 4 | 2810 | 4 |
| 6.0 | 4250 | 3 | 3950 | 3 | 3560 | 3 | 3920 | 4 | 3540 | 4 | 3020 | 4 | 3450 | 4 | 3100 | 4 | 2630 | 4 |
| | 1kPa SNOW | | | | | | | | | | | | | | | | | |
| 2.0 | 4250 | 2 | 3950 | 2 | 3570 | 2 | 3980 | 2 | 3700 | 2 | 3350 | 2 | 3790 | 2 | 3530 | 2 | 3190 | 2 |
| 3.0 | 4250 | 2 | 3950 | 2 | 3570 | 2 | 3980 | 2 | 3700 | 2 | 3350 | 2 | 3790 | 2 | 3530 | 2 | 3160 | 2 |
| 4.0 | 4250 | 2 | 3950 | 2 | 3570 | 2 | 3980 | 3 | 3700 | 3 | 3270 | 3 | 3790 | 3 | 3530 | 3 | 2980 | 3 |
| 5.0 | 4250 | 3 | 3950 | 3 | 3420 | 3 | 3980 | 3 | 3610 | 3 | 3080 | 3 | 3710 | 4 | 3330 | 4 | 2810 | 4 |
| 6.0 | 4020 | 3 | 3690 | 3 | 3190 | 3 | 3720 | 4 | 3380 | 4 | 2880 | 4 | 3450 | 4 | 3100 | 4 | 2630 | 4 |
| | 1.5kPa SNOW | | | | | | | | | | | | | | | | | |
| 2.0 | 4250 | 2 | 3950 | 2 | 3570 | 2 | 3980 | 2 | 3700 | 2 | 3350 | 2 | 3790 | 2 | 3530 | 2 | 3190 | 2 |
| 3.0 | 4250 | 2 | 3950 | 2 | 3570 | 2 | 3980 | 2 | 3700 | 2 | 3230 | 2 | 3790 | 2 | 3530 | 2 | 2970 | 2 |
| 4.0 | 4150 | 2 | 3790 | 2 | 3280 | 2 | 3830 | 3 | 3470 | 3 | 2960 | 3 | 3590 | 3 | 3220 | 3 | 2730 | 3 |
| 5.0 | 3710 | 3 | 3410 | 3 | 2970 | 3 | 3450 | 3 | 3130 | 3 | 2680 | 3 | 3240 | 4 | 2920 | 4 | 2470 | 4 |
| 6.0 | 3300 | 3 | 3040 | 3 | 2640 | 3 | 3070 | 4 | 2790 | 4 | 2390 | 4 | 2880 | 4 | 2600 | 4 | 2200 | 4 |

| Section | 89LC 95 | | | | | | | | | SINGLE OR UPPER FLOOR (Heavy Roof) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Loaded Dim. * | NO SNOW | | | | | | | | | | | | | | | | | |
| | H | | | | | | VH | | | | | | XH | | | | | |
| | MAXIMUM STUD SPACING (mm) | | | | | | | | | | | | | | | | | |
| | 300 | | 400 | | 600 | | 300 | | 400 | | 600 | | 300 | | 400 | | 600 | |
| 2.0 | 4250 | 2 | 3950 | 2 | 3570 | 2 | 3980 | 2 | 3700 | 2 | 3350 | 2 | 3790 | 2 | 3530 | 2 | 3190 | 2 |
| 3.0 | 4250 | 2 | 3950 | 2 | 3570 | 2 | 3980 | 2 | 3700 | 2 | 3350 | 2 | 3790 | 2 | 3530 | 2 | 3120 | 2 |
| 4.0 | 4250 | 2 | 3950 | 2 | 3570 | 2 | 3980 | 3 | 3700 | 3 | 3280 | 3 | 3790 | 3 | 3490 | 3 | 2940 | 3 |
| 5.0 | 4250 | 3 | 3950 | 3 | 3560 | 3 | 3980 | 3 | 3630 | 3 | 3090 | 3 | 3620 | 4 | 3250 | 4 | 2750 | 4 |
| 6.0 | 4250 | 3 | 3900 | 3 | 3370 | 3 | 3740 | 4 | 3390 | 4 | 2900 | 4 | 3340 | 4 | 3010 | 4 | 2550 | 4 |
| | 1kPa SNOW | | | | | | | | | | | | | | | | | |
| 2.0 | 4250 | 2 | 3950 | 2 | 3570 | 2 | 3980 | 2 | 3700 | 2 | 3350 | 2 | 3790 | 2 | 3530 | 2 | 3190 | 2 |
| 3.0 | 4250 | 2 | 3950 | 2 | 3570 | 2 | 3980 | 2 | 3700 | 2 | 3350 | 2 | 3790 | 2 | 3530 | 2 | 3120 | 2 |
| 4.0 | 4250 | 2 | 3950 | 2 | 3570 | 2 | 3980 | 3 | 3700 | 3 | 3210 | 3 | 3790 | 3 | 3490 | 3 | 2940 | 3 |
| 5.0 | 4220 | 3 | 3850 | 3 | 3330 | 3 | 3890 | 3 | 3520 | 3 | 3000 | 3 | 3620 | 4 | 3250 | 4 | 2750 | 4 |
| 6.0 | 3880 | 3 | 3560 | 3 | 3090 | 3 | 3600 | 4 | 3270 | 4 | 2790 | 4 | 3340 | 4 | 3010 | 4 | 2550 | 4 |
| | 1.5kPa SNOW | | | | | | | | | | | | | | | | | |
| 2.0 | 4250 | 2 | 3950 | 2 | 3570 | 2 | 3980 | 2 | 3700 | 2 | 3350 | 2 | 3790 | 2 | 3530 | 2 | 3190 | 2 |
| 3.0 | 4250 | 2 | 3950 | 2 | 3570 | 2 | 3980 | 2 | 3700 | 2 | 3240 | 2 | 3790 | 2 | 3530 | 2 | 2980 | 2 |
| 4.0 | 4180 | 2 | 3820 | 2 | 3300 | 2 | 3860 | 3 | 3490 | 3 | 2980 | 3 | 3610 | 3 | 3240 | 3 | 2740 | 3 |
| 5.0 | 3750 | 3 | 3450 | 3 | 3000 | 3 | 3480 | 3 | 3160 | 3 | 2710 | 3 | 3270 | 4 | 2950 | 4 | 2500 | 4 |
| 6.0 | 3340 | 3 | 3080 | 3 | 2680 | 3 | 3110 | 4 | 2830 | 4 | 2420 | 4 | 2920 | 4 | 2630 | 4 | 2230 | 4 |

## 5.8. STUD TABLES – LOWER OF TWO LEVELS – 89LC 75

| 89LC 75 | | Max. stud height for section in external load bearing wall | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Loaded* Dimension | | LOWER OF TWO LEVELS (Light Roof) | | | | | | | | |
| | | NO SNOW | | | | | | | | |
| Roof | Floor | H | | | VH | | | XH | | |
| | | MAXIMUM STUD SPACING (mm) | | | | | | | | |
| | | 300 | 400 | 600 | 300 | 400 | 600 | 300 | 400 | 600 |
| 2.0 | 2.0 | *4170* | *3880* | *3500* | *3910* | *3640* | *3170* | *3720* | *3460* | *2910* |
| 4.0 | 3.0 | *4170* | *3880* | *3260* | *3910* | *3640* | *SED* | *3720* | *3440* | *SED* |
| 6.0 | 4.0 | *4170* | *3880* | *SED* | *3910* | *SED* | *SED* | *3720* | *SED* | *SED* |
| | | 1kPa SNOW | | | | | | | | |
| | | H | | | VH | | | XH | | |
| 2.0 | 2.0 | *4170* | *3880* | *3500* | *3910* | *3640* | *3170* | *3720* | *3460* | *2910* |
| 4.0 | 3.0 | *4170* | *3880* | *3260* | *3910* | *3640* | *SED* | *3720* | *3440* | *SED* |
| 6.0 | 4.0 | *4170* | *3880* | *SED* | *3910* | *SED* | *SED* | *3720* | *SED* | *SED* |
| | | 1.5kPa SNOW | | | | | | | | |
| | | H | | | VH | | | XH | | |
| 2.0 | 2.0 | *4170* | *3880* | *3500* | *3910* | *3640* | *3170* | *3720* | *3460* | *2910* |
| 4.0 | 3.0 | *4170* | *3880* | *3260* | *3910* | *3640* | *SED* | *3720* | *3440* | *SED* |
| 6.0 | 4.0 | *4170* | *3880* | *SED* | *3910* | *SED* | *SED* | *3720* | *SED* | *SED* |

| 89LC 75 | | Max. stud height for section in external load bearing wall | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Loaded* Dimension | | LOWER OF TWO LEVELS (Heavy Roof) | | | | | | | | |
| | | NO SNOW | | | | | | | | |
| Roof | Floor | H | | | VH | | | XH | | |
| | | MAXIMUM STUD SPACING (mm) | | | | | | | | |
| | | 300 | 400 | 600 | 300 | 400 | 600 | 300 | 400 | 600 |
| 2.0 | 2.0 | *4170* | *3880* | *3460* | *3910* | *3640* | *3100* | *3720* | *3460* | *2840* |
| 4.0 | 3.0 | *4170* | *3880* | *SED* | *3910* | *3620* | *SED* | *3720* | *3320* | *SED* |
| 6.0 | 4.0 | *4170* | *SED* | *SED* | *3910* | *SED* | *SED* | *SED* | *SED* | *SED* |
| | | 1kPa SNOW | | | | | | | | |
| | | H | | | VH | | | XH | | |
| 2.0 | 2.0 | *4170* | *3880* | *3460* | *3910* | *3640* | *3100* | *3720* | *3460* | *2840* |
| 4.0 | 3.0 | *4170* | *3880* | *SED* | *3910* | *3620* | *SED* | *3720* | *3320* | *SED* |
| 6.0 | 4.0 | *4170* | *SED* | *SED* | *3910* | *SED* | *SED* | *SED* | *SED* | *SED* |
| | | 1.5kPa SNOW | | | | | | | | |
| | | H | | | VH | | | XH | | |
| 2.0 | 2.0 | *4170* | *3880* | *3460* | *3910* | *3640* | *3100* | *3720* | *3460* | *2840* |
| 4.0 | 3.0 | *4170* | *3880* | *SED* | *3910* | *3620* | *SED* | *3720* | *3320* | *SED* |
| 6.0 | 4.0 | *4170* | *SED* | *SED* | *3910* | *SED* | *SED* | *SED* | *SED* | *SED* |

## 5.9. STUD TABLES – LOWER OF TWO LEVELS – 89LC 95

| 89LC 95 | | Max. stud height for section in external load bearing wall | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Loaded* Dimension | | LOWER OF TWO LEVELS (Light Roof) | | | | | | | | |
| | | NO SNOW | | | | | | | | |
| Roof | Floor | H | | | VH | | | XH | | |
| | | MAXIMUM STUD SPACING (mm) | | | | | | | | |
| | | 300 | 400 | 600 | 300 | 400 | 600 | 300 | 400 | 600 |
| 2.0 | 2.0 | *4420* | *4110* | *3720* | *4150* | *3860* | *3490* | *3950* | *3680* | *3320* |
| 4.0 | 3.0 | *4420* | *4110* | *3720* | *4150* | *3860* | *3490* | *3950* | *3680* | *3320* |
| 6.0 | 4.0 | *4420* | *4110* | *3720* | *4150* | *3860* | *SED* | *3950* | *3680* | *SED* |
| | | 1kPa SNOW | | | | | | | | |
| | | H | | | VH | | | XH | | |
| 2.0 | 2.0 | *4420* | *4110* | *3720* | *4150* | *3860* | *3490* | *3950* | *3680* | *3320* |
| 4.0 | 3.0 | *4420* | *4110* | *3720* | *4150* | *3860* | *3490* | *3950* | *3680* | *3320* |
| 6.0 | 4.0 | *4420* | *4110* | *3720* | *4150* | *3860* | *SED* | *3950* | *3680* | *SED* |
| | | 1.5kPa SNOW | | | | | | | | |
| | | H | | | VH | | | XH | | |
| 2.0 | 2.0 | *4420* | *4110* | *3720* | *4150* | *3860* | *3490* | *3950* | *3680* | *3320* |
| 4.0 | 3.0 | *4420* | *4110* | *3720* | *4150* | *3860* | *3490* | *3950* | *3680* | *3320* |
| 6.0 | 4.0 | *4420* | *4110* | *3720* | *4150* | *3860* | *SED* | *3950* | *3680* | *SED* |

| 89LC 95 | | Max. stud height for section in external load bearing wall | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Loaded* Dimension | | LOWER OF TWO LEVELS (Heavy Roof) | | | | | | | | |
| | | NO SNOW | | | | | | | | |
| Roof | Floor | H | | | VH | | | XH | | |
| | | MAXIMUM STUD SPACING (mm) | | | | | | | | |
| | | 300 | 400 | 600 | 300 | 400 | 600 | 300 | 400 | 600 |
| 2.0 | 2.0 | *4420* | *4110* | *3720* | *4150* | *3860* | *3490* | *3950* | *3680* | *3320* |
| 4.0 | 3.0 | *4420* | *4110* | *3720* | *4150* | *3860* | *3490* | *3950* | *3680* | *SED* |
| 6.0 | 4.0 | *4420* | *4110* | *SED* | *4150* | *3860* | *SED* | *3950* | *SED* | *SED* |
| | | 1kPa SNOW | | | | | | | | |
| | | H | | | VH | | | XH | | |
| 2.0 | 2.0 | *4420* | *4110* | *3720* | *4150* | *3860* | *3490* | *3950* | *3680* | *3320* |
| 4.0 | 3.0 | *4420* | *4110* | *3720* | *4150* | *3860* | *3490* | *3950* | *3680* | *SED* |
| 6.0 | 4.0 | *4420* | *4110* | *SED* | *4150* | *3860* | *SED* | *3950* | *SED* | *SED* |
| | | 1.5kPa SNOW | | | | | | | | |
| | | H | | | VH | | | XH | | |
| 2.0 | 2.0 | *4420* | *4110* | *3720* | *4150* | *3860* | *3490* | *3950* | *3680* | *3320* |
| 4.0 | 3.0 | *4420* | *4110* | *3720* | *4150* | *3860* | *3490* | *3950* | *3680* | *SED* |
| 6.0 | 4.0 | *4420* | *4110* | *SED* | *4150* | *3860* | *SED* | *3950* | *SED* | *SED* |

## 5.10. NOGS

Nogging can be a continuous length of “C” section with Web cut-outs for the studs to pass through.

Maximum allowable spacing of nogs in FRAMETEK walls is 1360mm between screw centres.

Site fixed and “Flat” nogs may be needed for specific applications, i.e. in bathrooms where furniture is attached to the walls, these may be fixed to studs on either their flange or web and may be of varying widths to suit.

## 5.11. PLATES

Plates are continuous lengths of “C” section running along the top or bottom of the wall, connecting studs and in some cases transferring loads to them.

Plates that have point or distributed loads applied to them not at stud locations are considered loadbearing. Loadbearing plates have to be designed in accordance with the tables below.

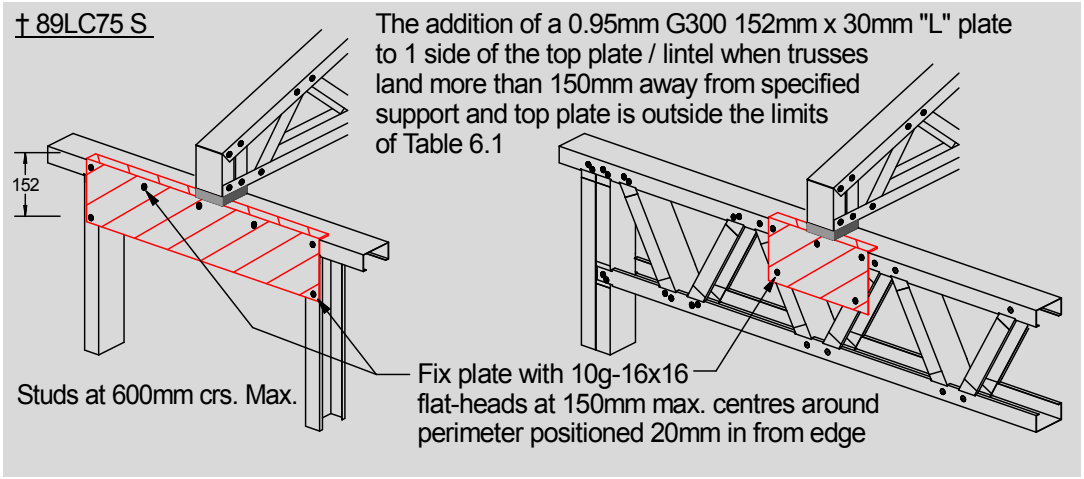
Refer also section 4.5 Lateral support of top plate.

## 5.12. PLATE TABLES

Top plates of loadbearing walls shall be of the dimensions and type given in table 6.1 except for any of:

(a) Where substituted by a lintel.
(b) Where trusses land more than 150mm away from a specifically positioned stud top plate stiffening / plate support shall be required (see description for †89LC75S below).
(c) Where low density ceilings (<600kg / m3), or ceiling tiles are installed and bracing lines are between 5.0 and 6.0m apart a second top plate positioned below the primary top plate is required.

*Figure 6.3 89LC75S “L” plate fitted between support studs / webs*



Tables below provide the maximum plate spans for a given Roof loaded dimension (as defined in figure 1.2), wind zone and section. For section designations and descriptions – see Section 2.4.3

*Table 6.1 Plate tables.*

| MAXIMUM PLATE SPANS FOR LOAD BEARING TOP PLATES (mm) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Loaded Dim. * | SINGLE OR UPPER FLOOR (Light Roof) | | | | | | | | |
| | NO SNOW | | | | | | | | |
| | H | | | VH | | | XH | | |
| | 89LC75 | †89LC75S | 89LC95 | 89LC75 | †89LC75S | 89LC95 | 89LC75 | †89LC75S | 89LC95 |
| 1400 | 840 | 900 | 900 | 840 | 900 | 900 | 810 | 900 | 900 |
| 2500 | 590 | 900 | 890 | 480 | 900 | 720 | 400 | 900 | 610 |
| 3400 | 390 | 900 | 590 | SED | SED | 480 | SED | SED | 400 |
| | 1kPa SNOW | | | | | | | | |
| | H | | | VH | | | XH | | |
| 1400 | 840 | 900 | 900 | 840 | 900 | 900 | 810 | 900 | 900 |
| 2500 | 590 | 900 | 890 | 480 | 900 | 720 | 400 | 900 | 610 |
| 3400 | 390 | 900 | 590 | SED | SED | 480 | SED | SED | 400 |
| | 1.5kPa SNOW | | | | | | | | |
| | H | | | VH | | | XH | | |
| 1400 | 840 | 900 | 900 | 840 | 900 | 900 | 810 | 900 | 900 |
| 2500 | 450 | 900 | 680 | 450 | 900 | 680 | 400 | 900 | 610 |
| 3400 | SED | SED | 450 | SED | SED | 450 | SED | SED | 400 |

* For the definition of Loaded Dimensions see fig. 1.2

H, VH and XH refer to wind zones as defined in NZS3604:2011

| MAXIMUM PLATE SPANS FOR LOAD BEARING TOP PLATES (mm) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Loaded Dim. * | SINGLE OR UPPER FLOOR (Heavy Roof) | | | | | | | | |
| | NO SNOW | | | | | | | | |
| | H | | | VH | | | XH | | |
| | 89LC75 | †89LC75S | 89LC95 | 89LC75 | †89LC75S | 89LC95 | 89LC75 | †89LC75S | 89LC95 |
| 1400 | 660 | 900 | 900 | 660 | 900 | 900 | 660 | 900 | 900 |
| 2500 | 460 | 900 | 690 | 380 | 900 | 580 | 330 | 900 | 500 |
| 3400 | SED | SED | 460 | SED | SED | 380 | SED | SED | SED |
| | 1kPa SNOW | | | | | | | | |
| | H | | | VH | | | XH | | |
| 1400 | 660 | 900 | 900 | 660 | 900 | 900 | 660 | 900 | 900 |
| 2500 | 440 | 900 | 670 | 380 | 900 | 580 | 330 | 900 | 500 |
| 3400 | SED | SED | 440 | SED | SED | 380 | SED | SED | SED |
| | 1.5kPa SNOW | | | | | | | | |
| | H | | | VH | | | XH | | |
| 1400 | 660 | 900 | 900 | 660 | 900 | 900 | 660 | 900 | 900 |
| 2500 | 350 | 900 | 520 | 350 | 900 | 520 | 330 | 900 | 500 |
| 3400 | SED | SED | SED | SED | SED | SED | SED | SED | SED |

## 5.13. LINTELS

Lintels that have a nominal point load or distributed load applied to them shall be designed in accordance with the tables below for lintel types “A 2” or “C 2”.
Where a truss lands on a lintel between webs refer to Table 6.1, Plate tables, to ensure the top plate loading is within an acceptable span as measured between screw centres.
Jamb Studs Required Per Side (in brackets) up to 3.1m high

## 5.14. SILL AND HEAD TRIMMERS

The table below describes the addition of an extra “L” plate (fig.2.12), to the outside of framing, both the underside of lintel and top of the bottom trimmer in all wind zones. Fixing at 150mm centres to the outside flange of the sill and head trimmer.

| Maximum clear width of opening (mm) | Minimum requirements for sill and header members |
|---|---|
| 2500 | 1x member |
| 3000 | 1x member + 1x “L” plate (outside) |
| 3600 | 1x member + 2x “L” plates (1x outside, 1x inside) |
| 4200 | SED |

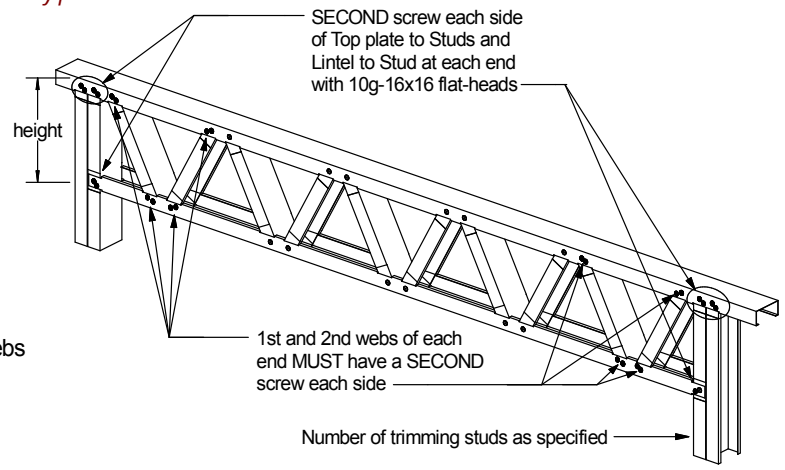
*Figure 6.4 Webbed Lintel Types*

### Type "A2"

Standard webbed lintel
Basis for ALL lintels on this page

Maximum height: 600mm
Minimum height: 150mm

ALL webs to be fixed at each dimpled connection with one 10g-16x16 screw both sides - then SECOND screwed at each end of lintel and the 1st and 2nd webs

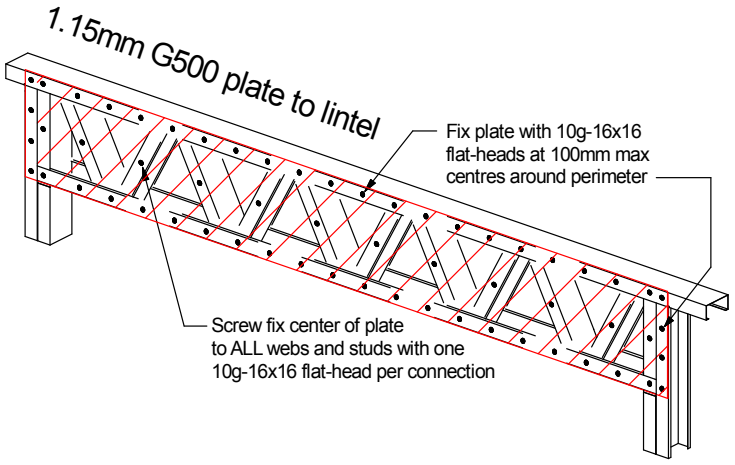



### Type "C2"

Type "A2" lintel with the addition of Full height FLAT plate to 1 side

Maximum height: 600mm
Minimum height: 150mm

ALL webs to be fixed at each dimpled connection with one 10g-16x16 screw both sides - then SECOND screwed at each end of lintel and the 1st and 2nd webs



## 5.15. LINTEL TABLES

The lintel tables below are to cover all wind zones up to and including "Very High"

*Tables for Lintel types in a SINGLE or UPPER LEVEL – figure 6.5*

For Webbed Lintel Type "A 2" Light Roof (see figure 6.4)

| Lintel type: A 2 | Jamb Studs Required Per Side (in brackets) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Loaded Dim. * | SINGLE OR UPPER FLOOR (Light Roof) | | | | | | | | |
| | NO SNOW LOAD | | | | | | | | |
| | Maximum span for lintel depths listed below (mm) | | | | | | | | |
| | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 |
| 2.0 | 2350(3) | 2800(3) | 3300(3) | 3700(4) | 4000(4) | 4200(4) | 4400(4) | 4550(4) | 4800(4) |
| 3.0 | 1900(2) | 2300(3) | 2600(3) | 2950(3) | 3250(3) | 3450(3) | 3600(3) | 3650(3) | 3850(4) |
| 4.0 | 1600(2) | 2000(2) | 2250(2) | 2350(3) | 2500(3) | 2550(3) | 2700(3) | 2750(3) | 2950(3) |
| 6.0 | 1150(2) | 1250(2) | 1400(2) | 1450(2) | 1600(2) | 1650(2) | 1800(2) | 1850(2) | 2050(2) |
| 1kPa SNOW LOAD | | | | | | | | | |
| 2.0 | 2350(3) | 2800(3) | 3300(3) | 3700(4) | 4000(4) | 4200(4) | 4400(4) | 4550(4) | 4800(4) |
| 3.0 | 1900(2) | 2300(3) | 2600(3) | 2950(3) | 3250(3) | 3450(3) | 3600(3) | 3650(3) | 3850(4) |
| 4.0 | 1600(2) | 2000(2) | 2250(2) | 2350(3) | 2500(3) | 2550(3) | 2700(3) | 2750(3) | 2950(3) |
| 6.0 | 1150(2) | 1250(2) | 1400(2) | 1450(2) | 1600(2) | 1650(2) | 1800(2) | 1850(2) | 2050(2) |
| 1.5kPa SNOW LOAD | | | | | | | | | |
| 2.0 | 2050(2) | 2400(3) | 2750(3) | 3100(3) | 3400(3) | 3700(4) | 3900(4) | 3900(4) | 4100(4) |
| 3.0 | 1600(2) | 2000(2) | 2250(2) | 2350(3) | 2500(3) | 2550(3) | 2600(3) | 2750(3) | 2900(3) |
| 4.0 | 1250(2) | 1450(2) | 1600(2) | 1650(2) | 1800(2) | 1850(2) | 2000(2) | 2050(2) | 2250(2) |
| 6.0 | 600(1) | 750(1) | 1000(2) | 1100(2) | 1300(2) | 1400(2) | 1500(2) | 1550(2) | 1750(2) |

* For the definition of Loaded Dimension see fig. 1.2

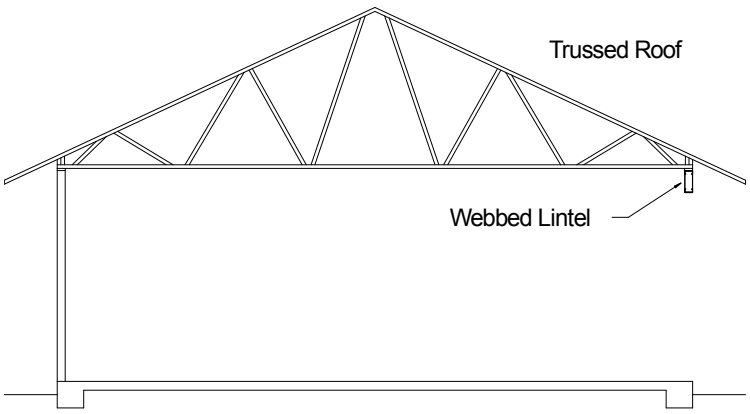



*Figure 6.5 Lintel in Single or Upper Level*

## *Tables for Lintel types in a SINGLE or UPPER LEVEL (cont.) – figure 6.5*

For Webbed Lintel Type "A 2" Heavy Roof (see figure 6.4)

| Lintel type: A 2 | | | | | | | | Jamb Studs Required Per Side (in brackets) | |
|---|---|---|---|---|---|---|---|---|---|
| Loaded Dim. * | SINGLE OR UPPER FLOOR (Heavy Roof) | | | | | | | | |
| | NO SNOW LOAD | | | | | | | | |
| | Maximum span for lintel depths listed below (mm) | | | | | | | | |
| | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 |
| 2.0 | *1800(2)* | *2250(2)* | *2550(3)* | *2800(3)* | *3100(3)* | *3350(3)* | *3400(3)* | *3500(3)* | *3650(3)* |
| 3.0 | *1650(2)* | *2000(2)* | *2350(3)* | *2600(3)* | *2800(3)* | *2850(3)* | *3000(3)* | *3050(3)* | *3150(3)* |
| 4.0 | *1450(2)* | *1700(2)* | *1900(2)* | *2000(2)* | *2100(2)* | *2200(2)* | *2300(3)* | *2400(3)* | *2550(3)* |
| 6.0 | *1000(2)* | *1100(2)* | *1200(2)* | *1300(2)* | *1500(2)* | *1550(2)* | *1700(2)* | *1750(2)* | *1850(2)* |
| 1kPa SNOW LOAD | | | | | | | | | |
| 2.0 | *1800(2)* | *2250(2)* | *2550(3)* | *2800(3)* | *3100(3)* | *3350(3)* | *3400(3)* | *3500(3)* | *3650(3)* |
| 3.0 | *1600(2)* | *1950(2)* | *2300(3)* | *2550(3)* | *2700(3)* | *2750(3)* | *2900(3)* | *2950(3)* | *3100(3)* |
| 4.0 | *1400(2)* | *1700(2)* | *1800(2)* | *1900(2)* | *2000(2)* | *2100(2)* | *2250(2)* | *2300(3)* | *2450(3)* |
| 6.0 | *1000(2)* | *1050(2)* | *1200(2)* | *1300(2)* | *1400(2)* | *1500(2)* | *1600(2)* | *1700(2)* | *1850(2)* |
| 1.5kPa SNOW LOAD | | | | | | | | | |
| 2.0 | *1750(2)* | *2150(2)* | *2500(3)* | *2750(3)* | *3000(3)* | *3150(3)* | *3250(3)* | *3350(3)* | *3500(3)* |
| 3.0 | *1450(2)* | *1700(2)* | *1900(2)* | *2000(2)* | *2100(2)* | *2250(2)* | *2300(3)* | *2450(3)* | *2550(3)* |
| 4.0 | *1200(2)* | *1350(2)* | *1500(2)* | *1550(2)* | *1700(2)* | *1750(2)* | *1900(2)* | *1950(2)* | *2050(2)* |
| 6.0 | *800(2)* | *950(2)* | *1000(2)* | *1050(2)* | *1200(2)* | *1250(2)* | *1300(2)* | *1400(2)* | *1550(2)* |

* For the definition of Loaded Dimension see fig. 1.2

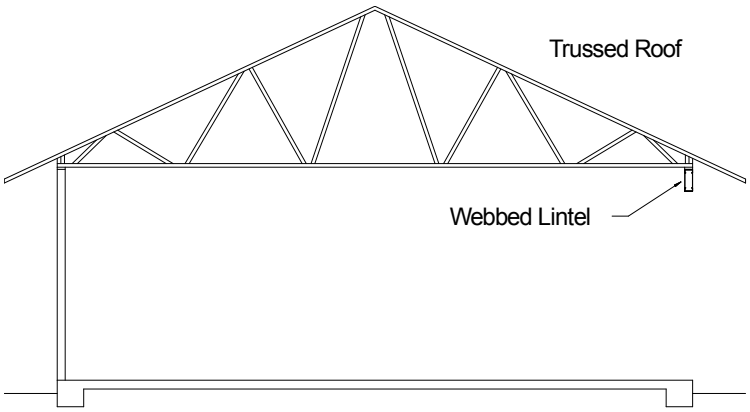



*Figure 6.5 Lintel in Single or Upper Level*

## *Tables for Lintel types in a SINGLE or UPPER LEVEL (cont.) – figure 6.5*

For Webbed Lintel Type “C 2” Light Roof (see figure 6.4)

| Lintel type: C 2 | Jamb Studs Required Per Side (in brackets) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Loaded Dim. * | SINGLE OR UPPER FLOOR (Light Roof) | | | | | | | | |
| | NO SNOW LOAD | | | | | | | | |
| | Maximum span for lintel depths listed below (mm) | | | | | | | | |
| | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 |
| 2.0 | *2350(3)* | *2800(3)* | *3300(3)* | *3700(4)* | *4000(4)* | *4200(4)* | *4400(4)* | *4550(4)* | *4800(4)* |
| 3.0 | *1900(2)* | *2300(3)* | *2600(3)* | *2950(3)* | *3250(3)* | *3500(3)* | *3750(4)* | *3950(4)* | *4200(4)* |
| 4.0 | *1600(2)* | *2000(2)* | *2250(2)* | *2500(3)* | *2750(3)* | *3000(3)* | *3250(3)* | *3450(3)* | *3800(4)* |
| 6.0 | *1150(2)* | *1550(2)* | *1850(2)* | *2050(2)* | *2200(2)* | *2400(3)* | *2550(3)* | *2700(3)* | *2750(3)* |
| 1kPa SNOW LOAD | | | | | | | | | |
| 2.0 | *2350(3)* | *2800(3)* | *3300(3)* | *3700(4)* | *4000(4)* | *4200(4)* | *4400(4)* | *4550(4)* | *4800(4)* |
| 3.0 | *1900(2)* | *2300(3)* | *2600(3)* | *2950(3)* | *3250(3)* | *3500(3)* | *3750(4)* | *3950(4)* | *4200(4)* |
| 4.0 | *1600(2)* | *2000(2)* | *2250(2)* | *2500(3)* | *2750(3)* | *3000(3)* | *3250(3)* | *3450(3)* | *3800(4)* |
| 6.0 | *1150(2)* | *1550(2)* | *1850(2)* | *2050(2)* | *2200(2)* | *2400(3)* | *2550(3)* | *2700(3)* | *2750(3)* |
| 1.5kPa SNOW LOAD | | | | | | | | | |
| 2.0 | *2050(2)* | *2400(3)* | *2750(3)* | *3100(3)* | *3400(3)* | *3700(4)* | *3900(4)* | *4100(4)* | *4500(4)* |
| 3.0 | *1600(2)* | *2000(2)* | *2250(2)* | *2450(3)* | *2700(3)* | *2950(3)* | *3150(3)* | *3400(3)* | *3750(4)* |
| 4.0 | *1250(2)* | *1700(2)* | *1950(2)* | *2150(2)* | *2350(3)* | *2500(3)* | *2700(3)* | *2850(3)* | *2950(3)* |
| 6.0 | *850(2)* | *1200(2)* | *1550(2)* | *1750(2)* | *1950(2)* | *1950(2)* | *2000(2)* | *1950(2)* | *2050(2)* |

* For the definition of Loaded Dimension see fig. 1.2

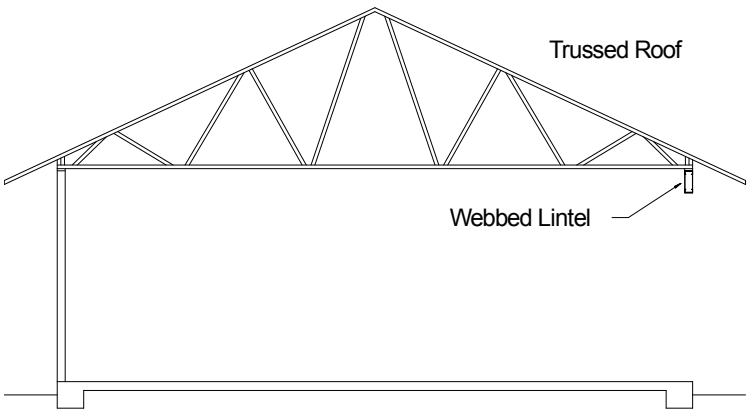



*Figure 6.5 Lintel in Single or Upper Level*

## *Tables for Lintel types in a SINGLE or UPPER LEVEL (cont.) – figure 6.5*

For Webbed Lintel Type "C 2" Heavy Roof (see figure 6.4)

| Lintel type: C 2 | Jamb Studs Required Per Side (in brackets) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Loaded Dim. * | SINGLE OR UPPER FLOOR (Heavy Roof) | | | | | | | | |
| | NO SNOW LOAD | | | | | | | | |
| | Maximum span for lintel depths listed below (mm) | | | | | | | | |
| | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 |
| 2.0 | *1800(2)* | *2250(2)* | *2550(3)* | *2800(3)* | *3100(3)* | *3350(3)* | *3550(3)* | *3750(4)* | *4100(4)* |
| 3.0 | *1650(2)* | *2000(2)* | *2350(3)* | *2600(3)* | *2800(3)* | *3000(3)* | *3200(3)* | *3450(3)* | *3750(4)* |
| 4.0 | *1450(2)* | *1700(2)* | *1950(2)* | *2250(2)* | *2450(3)* | *2600(3)* | *2800(3)* | *2950(3)* | *3250(3)* |
| 6.0 | *1150(2)* | *1400(2)* | *1600(2)* | *1750(2)* | *1950(2)* | *2150(2)* | *2300(3)* | *2300(3)* | *2350(3)* |
| 1kPa SNOW LOAD | | | | | | | | | |
| 2.0 | *1800(2)* | *2250(2)* | *2550(3)* | *2800(3)* | *3100(3)* | *3350(3)* | *3550(3)* | *3750(4)* | *4100(4)* |
| 3.0 | *1600(2)* | *1950(2)* | *2300(3)* | *2550(3)* | *2750(3)* | *2950(3)* | *3150(3)* | *3400(3)* | *3700(4)* |
| 4.0 | *1400(2)* | *1700(2)* | *1950(2)* | *2200(2)* | *2400(3)* | *2600(3)* | *2750(3)* | *2900(3)* | *3150(3)* |
| 6.0 | *1150(2)* | *1400(2)* | *1550(2)* | *1750(2)* | *1900(2)* | *2100(2)* | *2200(2)* | *2250(2)* | *2300(3)* |
| 1.5kPa SNOW LOAD | | | | | | | | | |
| 2.0 | *1750(2)* | *2150(2)* | *2500(3)* | *2750(3)* | *3000(3)* | *3250(3)* | *3450(3)* | *3650(3)* | *4000(4)* |
| 3.0 | *1450(2)* | *1700(2)* | *2000(2)* | *2250(2)* | *2450(3)* | *2650(3)* | *2800(3)* | *2950(3)* | *3250(3)* |
| 4.0 | *1250(2)* | *1500(2)* | *1700(2)* | *1900(2)* | *2100(2)* | *2300(3)* | *2450(3)* | *2550(3)* | *2600(3)* |
| 6.0 | *950(2)* | *1200(2)* | *1400(2)* | *1550(2)* | *1650(2)* | *1800(2)* | *1900(2)* | *1900(2)* | *1950(2)* |

* For the definition of Loaded Dimension see fig. 1.2

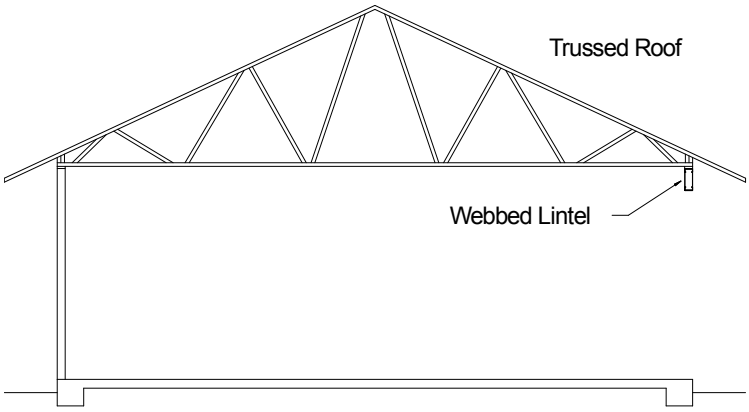



*Figure 6.4 Lintel in Single or Upper Level*

## *Lintel tables - with joists set PARALLEL to lintel – figure 6.6*

For Webbed Lintel Type “A 2” Light Roof (see figure 6.4)

| Lintel type: | A 2 | Jamb Studs Required Per Side (in brackets) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Loaded * Dimension | | LOWER OF TWO STORIES (Light Roof) | | | | | | | | |
| | | NO SNOW LOAD | | | | | | | | |
| Roof | Floor | Maximum span for lintel depths listed below (mm) | | | | | | | | |
| | | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 |
| 2.0 | 0.3 | *2450(3)* | *2900(3)* | *3300(3)* | *3650(3)* | *4000(4)* | *4250(4)* | *4550(4)* | *4750(4)* | *5000(4)* |
| 3.0 | 0.3 | *2000(2)* | *2400(3)* | *2750(3)* | *3050(3)* | *3300(3)* | *3550(3)* | *3800(4)* | *4000(4)* | *4100(4)* |
| 4.0 | 0.3 | *1750(2)* | *2100(2)* | *2400(3)* | *2650(3)* | *2900(3)* | *3100(3)* | *3150(3)* | *3200(3)* | *3300(3)* |
| 6.0 | 0.3 | *1450(2)* | *1700(2)* | *1950(2)* | *2150(2)* | *2200(2)* | *2250(2)* | *2300(3)* | *2350(3)* | *2450(3)* |
| 1kPa SNOW | | | | | | | | | | |
| 2.0 | 0.3 | *2400(3)* | *2850(3)* | *3250(3)* | *3600(3)* | *3900(4)* | *4200(4)* | *4450(4)* | *4700(4)* | *5000(4)* |
| 3.0 | 0.3 | *2000(2)* | *2350(3)* | *2700(3)* | *3000(3)* | *3250(3)* | *3500(3)* | *3700(4)* | *3850(4)* | *3950(4)* |
| 4.0 | 0.3 | *1750(2)* | *2100(2)* | *2350(3)* | *2600(3)* | *2850(3)* | *3000(3)* | *3050(3)* | *3100(3)* | *3200(3)* |
| 6.0 | 0.3 | *1400(2)* | *1700(2)* | *1950(2)* | *2100(2)* | *2150(2)* | *2200(2)* | *2250(2)* | *2300(3)* | *2400(3)* |
| 1.5kPa SNOW | | | | | | | | | | |
| 2.0 | 0.3 | *2050(2)* | *2450(3)* | *2800(3)* | *3100(3)* | *3350(3)* | *3600(3)* | *3850(4)* | *4050(4)* | *4150(4)* |
| 3.0 | 0.3 | *1700(2)* | *2000(2)* | *2300(3)* | *2550(3)* | *2800(3)* | *2900(3)* | *2950(3)* | *3000(3)* | *3100(3)* |
| 4.0 | 0.3 | *1500(2)* | *1750(2)* | *2000(2)* | *2200(2)* | *2250(2)* | *2300(3)* | *2350(3)* | *2400(3)* | *2500(3)* |
| 6.0 | 0.3 | *1200(2)* | *1450(2)* | *1550(2)* | *1600(2)* | *1650(2)* | *1700(2)* | *1750(2)* | *1800(2)* | *1950(2)* |

* For the definition of Floor and Roof Loaded Dimensions see fig. 1.2

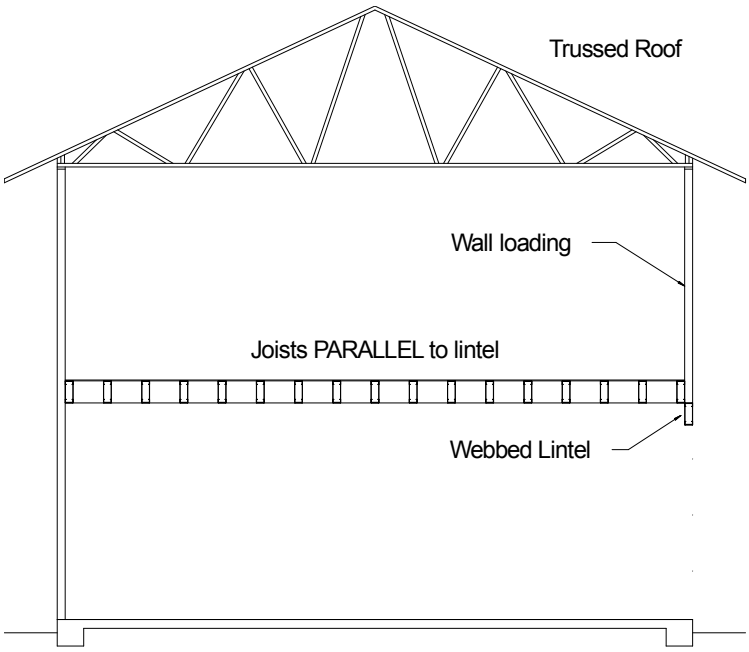



*Figure 6.5 Lintel in Lower of Two Levels with joists set PARALLEL to lintel*

## *Lintel tables - with joists set PARALLEL to lintel – figure 6.6 (cont.)*

For Webbed Lintel Type “A 2” Heavy Roof (see figure 6.4)

| Lintel type: A 2 | | Jamb Studs Required Per Side (in brackets) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Loaded * Dimension | | LOWER OF TWO STORIES (Heavy Roof) | | | | | | | | |
| | | NO SNOW LOAD | | | | | | | | |
| Roof | Floor | Maximum span for lintel depths listed below (mm) | | | | | | | | |
| | | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 |
| 2.0 | 0.3 | *2050(2)* | *2450(3)* | *2800(3)* | *3100(3)* | *3350(3)* | *3600(3)* | *3850(4)* | *4050(4)* | *4150(4)* |
| 3.0 | 0.3 | *1700(2)* | *2050(2)* | *2300(3)* | *2550(3)* | *2800(3)* | *2900(3)* | *2950(3)* | *3000(3)* | *3100(3)* |
| 4.0 | 0.3 | *1500(2)* | *1750(2)* | *2000(2)* | *2200(2)* | *2300(3)* | *2300(3)* | *2400(3)* | *2450(3)* | *2550(3)* |
| 6.0 | 0.3 | *1200(2)* | *1450(2)* | *1550(2)* | *1600(2)* | *1650(2)* | *1700(2)* | *1800(2)* | *1850(2)* | *1950(2)* |
| 1kPa SNOW | | | | | | | | | | |
| 2.0 | 0.3 | *2050(2)* | *2400(3)* | *2750(3)* | *3050(3)* | *3300(3)* | *3550(3)* | *3800(4)* | *4000(4)* | *4100(4)* |
| 3.0 | 0.3 | *1700(2)* | *2000(2)* | *2300(3)* | *2550(3)* | *2750(3)* | *2850(3)* | *2900(3)* | *2950(3)* | *3050(3)* |
| 4.0 | 0.3 | *1450(2)* | *1750(2)* | *2000(2)* | *2150(2)* | *2200(2)* | *2250(2)* | *2300(3)* | *2350(3)* | *2450(3)* |
| 6.0 | 0.3 | *1200(2)* | *1450(2)* | *1500(2)* | *1550(2)* | *1600(2)* | *1650(2)* | *1700(2)* | *1750(2)* | *1900(2)* |
| 1.5kPa SNOW | | | | | | | | | | |
| 2.0 | 0.3 | *1800(2)* | *2150(2)* | *2450(3)* | *2700(3)* | *2950(3)* | *3200(3)* | *3300(3)* | *3300(3)* | *3400(3)* |
| 3.0 | 0.3 | *1500(2)* | *1800(2)* | *2050(2)* | *2250(2)* | *2300(3)* | *2350(3)* | *2400(3)* | *2450(3)* | *2550(3)* |
| 4.0 | 0.3 | *1300(2)* | *1550(2)* | *1700(2)* | *1750(2)* | *1800(2)* | *1850(2)* | *1950(2)* | *2000(2)* | *2100(2)* |
| 6.0 | 0.3 | *1050(2)* | *1200(2)* | *1250(2)* | *1300(2)* | *1350(2)* | *1400(2)* | *1450(2)* | *1500(2)* | *1650(2)* |

* For the definition of Floor and Roof Loaded Dimensions see fig. 1.2

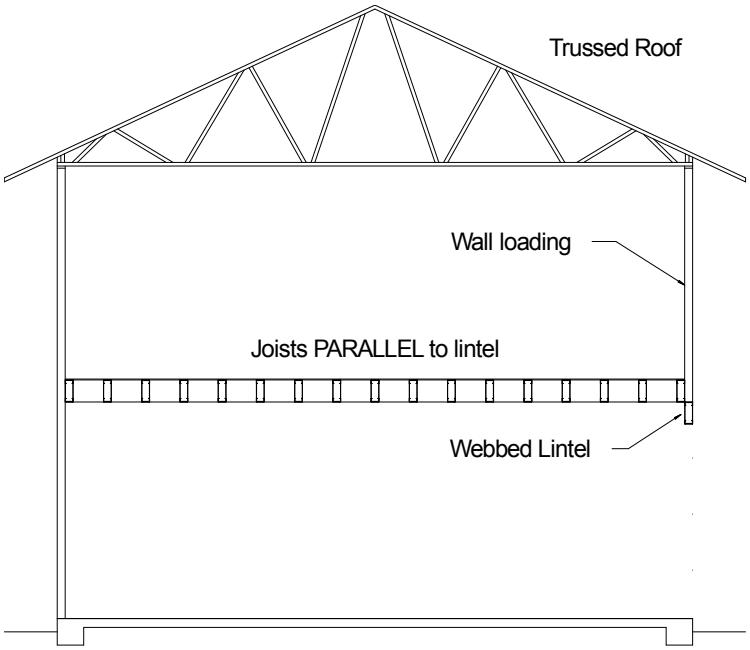



*Figure 6.6 Lintel in Lower of Two Levels with joists set PARALLEL to lintel*

## *Lintel tables - with joists set PARALLEL to lintel – figure 6.6 (cont.)*

For Webbed Lintel Type “C 2” Light Roof (see figure 6.4)

| Lintel type: C 2 | | Jamb Studs Required Per Side (in brackets) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Loaded * Dimension | | LOWER OF TWO STORIES (Light Roof) | | | | | | | | |
| | | NO SNOW LOAD | | | | | | | | |
| Roof | Floor | Maximum span for lintel depths listed below (mm) | | | | | | | | |
| | | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 |
| 2.0 | 0.3 | *2450(3)* | *2900(3)* | *3300(3)* | *3650(3)* | *4000(4)* | *4250(4)* | *4550(4)* | *4750(4)* | *5000(4)* |
| 3.0 | 0.3 | *2000(2)* | *2400(3)* | *2750(3)* | *3050(3)* | *3300(3)* | *3550(3)* | *3800(4)* | *4000(4)* | *4350(4)* |
| 4.0 | 0.3 | *1750(2)* | *2100(2)* | *2400(3)* | *2650(3)* | *2900(3)* | *3100(3)* | *3300(3)* | *3500(3)* | *3850(4)* |
| 6.0 | 0.3 | *1450(2)* | *1700(2)* | *1950(2)* | *2200(2)* | *2400(3)* | *2550(3)* | *2750(3)* | *2900(3)* | *3150(3)* |
| 1kPa SNOW | | | | | | | | | | |
| 2.0 | 0.3 | *2400(3)* | *2850(3)* | *3250(3)* | *3600(3)* | *3900(4)* | *4200(4)* | *4450(4)* | *4700(4)* | *5000(4)* |
| 3.0 | 0.3 | *2000(2)* | *2350(3)* | *2700(3)* | *3000(3)* | *3250(3)* | *3500(3)* | *3700(4)* | *3950(4)* | *4300(4)* |
| 4.0 | 0.3 | *1750(2)* | *2100(2)* | *2350(3)* | *2600(3)* | *2850(3)* | *3050(3)* | *3250(3)* | *3450(3)* | *3800(4)* |
| 6.0 | 0.3 | *1400(2)* | *1700(2)* | *1950(2)* | *2150(2)* | *2350(3)* | *2550(3)* | *2700(3)* | *2850(3)* | *3050(3)* |
| 1.5kPa SNOW | | | | | | | | | | |
| 2.0 | 0.3 | *2050(2)* | *2450(3)* | *2800(3)* | *3100(3)* | *3350(3)* | *3600(3)* | *3850(4)* | *4050(4)* | *4450(4)* |
| 3.0 | 0.3 | *1700(2)* | *2000(2)* | *2300(3)* | *2550(3)* | *2800(3)* | *3000(3)* | *3200(3)* | *3350(3)* | *3700(4)* |
| 4.0 | 0.3 | *1500(2)* | *1750(2)* | *2000(2)* | *2250(2)* | *2450(3)* | *2600(3)* | *2800(3)* | *2950(3)* | *3200(3)* |
| 6.0 | 0.3 | *1200(2)* | *1450(2)* | *1650(2)* | *1850(2)* | *2000(2)* | *2150(2)* | *2300(3)* | *2350(3)* | *2350(3)* |

* For the definition of Floor and Roof Loaded Dimensions see fig. 1.2

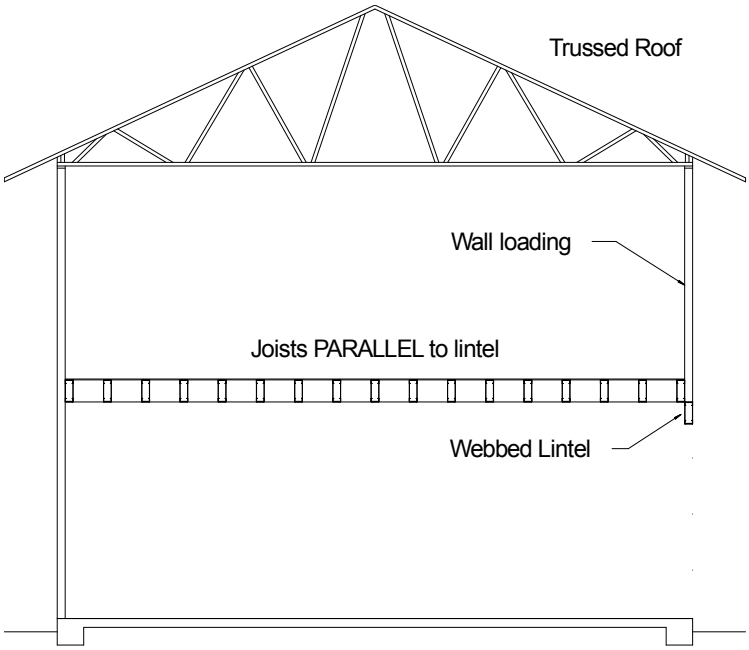



*Figure 6.6 Lintel in Lower of Two Levels with joists set PARALLEL to lintel*

## *Lintel tables - with joists set PARALLEL to lintel – figure 6.6 (cont.)*

For Webbed Lintel Type “C 2” Heavy Roof (see figure 6.4)

| Lintel type: C 2 | | Jamb Studs Required Per Side (in brackets) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Loaded * Dimension | | LOWER OF TWO STORIES (Heavy Roof) | | | | | | | | |
| | | NO SNOW LOAD | | | | | | | | |
| Roof | Floor | Maximum span for lintel depths listed below (mm) | | | | | | | | |
| | | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 |
| 2.0 | 0.3 | *2050(2)* | *2450(3)* | *2800(3)* | *3100(3)* | *3350(3)* | *3600(3)* | *3850(4)* | *4050(4)* | *4450(4)* |
| 3.0 | 0.3 | *1700(2)* | *2050(2)* | *2300(3)* | *2550(3)* | *2800(3)* | *3000(3)* | *3200(3)* | *3400(3)* | *3700(4)* |
| 4.0 | 0.3 | *1500(2)* | *1750(2)* | *2000(2)* | *2250(2)* | *2450(3)* | *2600(3)* | *2800(3)* | *2950(3)* | *3200(3)* |
| 6.0 | 0.3 | *1200(2)* | *1450(2)* | *1650(2)* | *1850(2)* | *2000(2)* | *2150(2)* | *2300(3)* | *2350(3)* | *2400(3)* |
| 1kPa SNOW | | | | | | | | | | |
| 2.0 | 0.3 | *2050(2)* | *2400(3)* | *2750(3)* | *3050(3)* | *3300(3)* | *3550(3)* | *3800(4)* | *4000(4)* | *4400(4)* |
| 3.0 | 0.3 | *1700(2)* | *2000(2)* | *2300(3)* | *2550(3)* | *2750(3)* | *2950(3)* | *3150(3)* | *3350(3)* | *3650(3)* |
| 4.0 | 0.3 | *1450(2)* | *1750(2)* | *2000(2)* | *2200(2)* | *2400(3)* | *2600(3)* | *2750(3)* | *2900(3)* | *3150(3)* |
| 6.0 | 0.3 | *1200(2)* | *1450(2)* | *1650(2)* | *1800(2)* | *1950(2)* | *2100(2)* | *2250(2)* | *2350(3)* | *2350(3)* |
| 1.5kPa SNOW | | | | | | | | | | |
| 2.0 | 0.3 | *1800(2)* | *2150(2)* | *2450(3)* | *2700(3)* | *2950(3)* | *3200(3)* | *3400(3)* | *3600(3)* | *3950(4)* |
| 3.0 | 0.3 | *1500(2)* | *1800(2)* | *2050(2)* | *2250(2)* | *2450(3)* | *2650(3)* | *2800(3)* | *2950(3)* | *3250(3)* |
| 4.0 | 0.3 | *1300(2)* | *1550(2)* | *1750(2)* | *1950(2)* | *2150(2)* | *2300(3)* | *2450(3)* | *2600(3)* | *2600(3)* |
| 6.0 | 0.3 | *1050(2)* | *1250(2)* | *1450(2)* | *1600(2)* | *1750(2)* | *1900(2)* | *1950(2)* | *1950(2)* | *1950(2)* |

* For the definition of Floor and Roof Loaded Dimensions see fig. 1.2

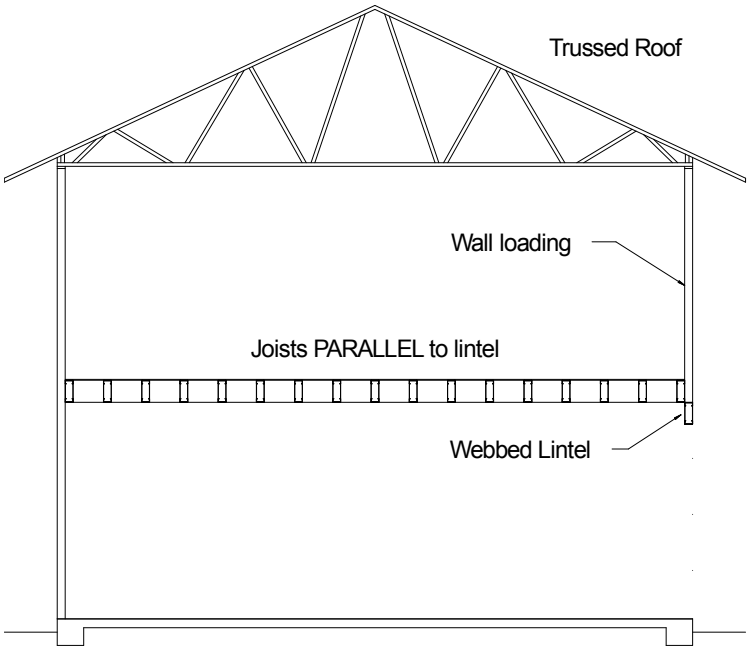



*Figure 6.6 Lintel in Lower of Two Levels with joists set PARALLEL to lintel*

## *Lintel tables - with joists set PERPENDICULAR to lintel – figure 6.7*

For Webbed Lintel Type “A 2” Light Roof (see figure 6.4)

| Lintel type: A 2 | | Jamb Studs Required Per Side (in brackets) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Loaded * Dimension | | LOWER OF TWO STORIES (Light Roof) | | | | | | | | |
| | | NO SNOW LOAD | | | | | | | | |
| Roof | Floor | Maximum span for lintel depths listed below (mm) | | | | | | | | |
| | | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 |
| 2.0 | 2.0 | *1550(2)* | *1850(2)* | *2100(2)* | *2300(3)* | *2400(3)* | *2450(3)* | *2500(3)* | *2550(3)* | *2650(3)* |
| 3.0 | 3.0 | *1250(2)* | *1500(2)* | *1650(2)* | *1700(2)* | *1750(2)* | *1800(2)* | *1850(2)* | *1900(2)* | *2000(2)* |
| 4.0 | 3.0 | *1250(2)* | *1500(2)* | *1600(2)* | *1650(2)* | *1700(2)* | *1750(2)* | *1800(2)* | *1850(2)* | *1950(2)* |
| 6.0 | 3.0 | *1200(2)* | *1450(2)* | *1550(2)* | *1600(2)* | *1650(2)* | *1700(2)* | *1750(2)* | *1800(2)* | *1900(2)* |
| 1kPa SNOW | | | | | | | | | | |
| 2.0 | 2.0 | *1550(2)* | *1850(2)* | *2100(2)* | *2300(3)* | *2400(3)* | *2450(3)* | *2500(3)* | *2550(3)* | *2650(3)* |
| 3.0 | 3.0 | *1250(2)* | *1500(2)* | *1650(2)* | *1700(2)* | *1750(2)* | *1800(2)* | *1850(2)* | *1900(2)* | *2000(2)* |
| 4.0 | 3.0 | *1250(2)* | *1500(2)* | *1600(2)* | *1650(2)* | *1700(2)* | *1750(2)* | *1800(2)* | *1850(2)* | *1950(2)* |
| 6.0 | 3.0 | *1200(2)* | *1450(2)* | *1550(2)* | *1600(2)* | *1650(2)* | *1700(2)* | *1750(2)* | *1800(2)* | *1900(2)* |
| 1.5kPa SNOW | | | | | | | | | | |
| 2.0 | 2.0 | *1550(2)* | *1850(2)* | *2100(2)* | *2300(3)* | *2400(3)* | *2450(3)* | *2500(3)* | *2550(3)* | *2650(3)* |
| 3.0 | 3.0 | *1250(2)* | *1500(2)* | *1650(2)* | *1700(2)* | *1750(2)* | *1800(2)* | *1850(2)* | *1900(2)* | *2000(2)* |
| 4.0 | 3.0 | *1250(2)* | *1500(2)* | *1600(2)* | *1650(2)* | *1700(2)* | *1750(2)* | *1800(2)* | *1850(2)* | *1950(2)* |
| 6.0 | 3.0 | *1100(2)* | *1250(2)* | *1300(2)* | *1350(2)* | *1400(2)* | *1450(2)* | *1550(2)* | *1600(2)* | *1700(2)* |

* For the definition of Loaded Dimension see fig. 1.2

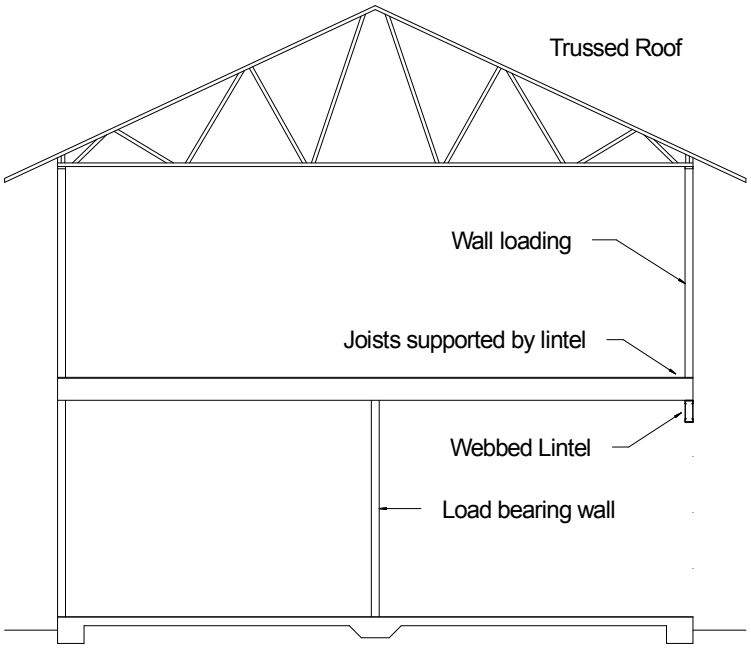



*Figure 6.7 For Lintels with joists set PERPENDICULAR to lintel*

## *Lintel tables - with joists set PERPENDICULAR to lintel – figure 6.7 (cont.)*

For Webbed Lintel Type “A 2” Heavy Roof (see figure 6.4)

| Lintel type: A 2 | | Jamb Studs Required Per Side (in brackets) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Loaded * Dimension | | LOWER OF TWO STORIES (Heavy Roof) | | | | | | | | |
| | | NO SNOW LOAD | | | | | | | | |
| Roof | Floor | Maximum span for lintel depths listed below (mm) | | | | | | | | |
| | | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 |
| 2.0 | 2.0 | *1400(2)* | *1700(2)* | *1950(2)* | *2050(2)* | *2150(2)* | *2150(2)* | *2250(2)* | *2300(3)* | *2400(3)* |
| 3.0 | 3.0 | *1150(2)* | *1400(2)* | *1450(2)* | *1500(2)* | *1550(2)* | *1600(2)* | *1650(2)* | *1700(2)* | *1850(2)* |
| 4.0 | 3.0 | *1100(2)* | *1300(2)* | *1400(2)* | *1450(2)* | *1500(2)* | *1550(2)* | *1600(2)* | *1650(2)* | *1750(2)* |
| 6.0 | 3.0 | *1050(2)* | *1200(2)* | *1250(2)* | *1300(2)* | *1350(2)* | *1400(2)* | *1450(2)* | *1500(2)* | *1650(2)* |
| 1kPa SNOW | | | | | | | | | | |
| 2.0 | 2.0 | *1400(2)* | *1700(2)* | *1950(2)* | *2050(2)* | *2150(2)* | *2150(2)* | *2250(2)* | *2300(3)* | *2400(3)* |
| 3.0 | 3.0 | *1150(2)* | *1400(2)* | *1450(2)* | *1500(2)* | *1550(2)* | *1600(2)* | *1650(2)* | *1700(2)* | *1850(2)* |
| 4.0 | 3.0 | *1100(2)* | *1300(2)* | *1400(2)* | *1450(2)* | *1500(2)* | *1550(2)* | *1600(2)* | *1650(2)* | *1750(2)* |
| 6.0 | 3.0 | *1050(2)* | *1200(2)* | *1250(2)* | *1300(2)* | *1350(2)* | *1400(2)* | *1450(2)* | *1500(2)* | *1650(2)* |
| 1.5kPa SNOW | | | | | | | | | | |
| 2.0 | 2.0 | *1400(2)* | *1700(2)* | *1950(2)* | *2050(2)* | *2150(2)* | *2150(2)* | *2250(2)* | *2300(3)* | *2400(3)* |
| 3.0 | 3.0 | *1150(2)* | *1400(2)* | *1450(2)* | *1500(2)* | *1550(2)* | *1600(2)* | *1650(2)* | *1700(2)* | *1850(2)* |
| 4.0 | 3.0 | *1100(2)* | *1300(2)* | *1400(2)* | *1450(2)* | *1500(2)* | *1550(2)* | *1600(2)* | *1650(2)* | *1750(2)* |
| 6.0 | 3.0 | *1000(2)* | *1050(2)* | *1100(2)* | *1150(2)* | *1200(2)* | *1250(2)* | *1300(2)* | *1350(2)* | *1450(2)* |

* For the definition of Loaded Dimension see fig. 1.2

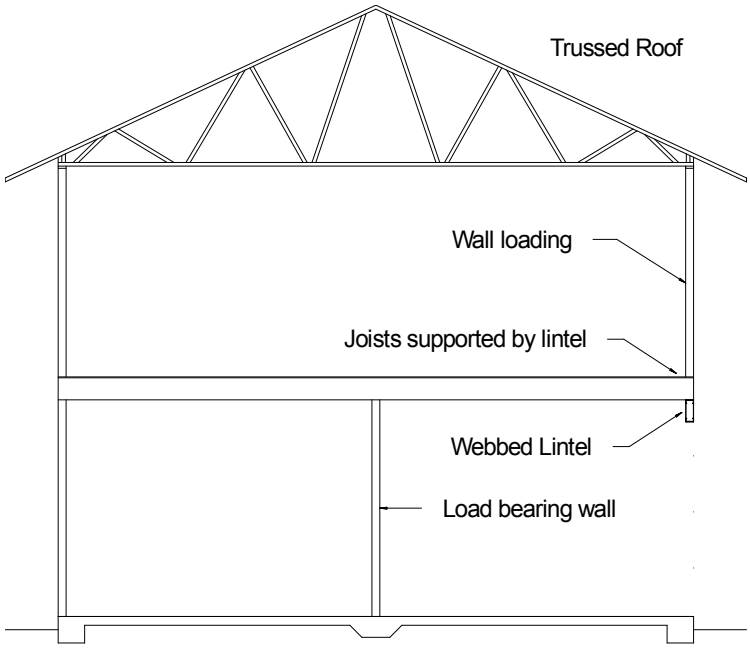



*Figure 6.7 For Lintels with joists set PERPENDICULAR to lintel*

## *Lintel tables - with joists set PERPENDICULAR to lintel – figure 6.7 (cont.)*

For Webbed Lintel Type “C 2” Light Roof (see figure 6.4)

| Lintel type: C 2 | | Jamb Studs Required Per Side (in brackets) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Loaded * Dimension | | LOWER OF TWO STORIES (Light Roof) | | | | | | | | |
| | | NO SNOW LOAD | | | | | | | | |
| Roof | Floor | Maximum span for lintel depths listed below (mm) | | | | | | | | |
| | | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 |
| 2.0 | 2.0 | *1550(2)* | *1850(2)* | *2100(2)* | *2300(3)* | *2550(3)* | *2700(3)* | *2900(3)* | *3050(3)* | *3350(3)* |
| 3.0 | 3.0 | *1250(2)* | *1500(2)* | *1700(2)* | *1900(2)* | *2050(2)* | *2200(2)* | *2350(3)* | *2500(3)* | *2500(3)* |
| 4.0 | 3.0 | *1250(2)* | *1500(2)* | *1700(2)* | *1850(2)* | *2050(2)* | *2200(2)* | *2350(3)* | *2450(3)* | *2450(3)* |
| 6.0 | 3.0 | *1200(2)* | *1450(2)* | *1650(2)* | *1850(2)* | *2000(2)* | *2150(2)* | *2300(3)* | *2350(3)* | *2350(3)* |
| 1kPa SNOW | | | | | | | | | | |
| 2.0 | 2.0 | *1550(2)* | *1850(2)* | *2100(2)* | *2300(3)* | *2550(3)* | *2700(3)* | *2900(3)* | *3050(3)* | *3350(3)* |
| 3.0 | 3.0 | *1250(2)* | *1500(2)* | *1700(2)* | *1900(2)* | *2050(2)* | *2200(2)* | *2350(3)* | *2500(3)* | *2500(3)* |
| 4.0 | 3.0 | *1250(2)* | *1500(2)* | *1700(2)* | *1850(2)* | *2050(2)* | *2200(2)* | *2350(3)* | *2450(3)* | *2450(3)* |
| 6.0 | 3.0 | *1200(2)* | *1450(2)* | *1650(2)* | *1850(2)* | *2000(2)* | *2150(2)* | *2300(3)* | *2350(3)* | *2350(3)* |
| 1.5kPa SNOW | | | | | | | | | | |
| 2.0 | 2.0 | *1550(2)* | *1850(2)* | *2100(2)* | *2300(3)* | *2550(3)* | *2700(3)* | *2900(3)* | *3050(3)* | *3350(3)* |
| 3.0 | 3.0 | *1250(2)* | *1500(2)* | *1700(2)* | *1900(2)* | *2050(2)* | *2200(2)* | *2350(3)* | *2500(3)* | *2500(3)* |
| 4.0 | 3.0 | *1250(2)* | *1500(2)* | *1700(2)* | *1850(2)* | *2050(2)* | *2200(2)* | *2350(3)* | *2450(3)* | *2450(3)* |
| 6.0 | 3.0 | *1100(2)* | *1300(2)* | *1500(2)* | *1650(2)* | *1800(2)* | *1950(2)* | *2050(2)* | *2050(2)* | *2050(2)* |

* For the definition of Loaded Dimension see fig. 1.2

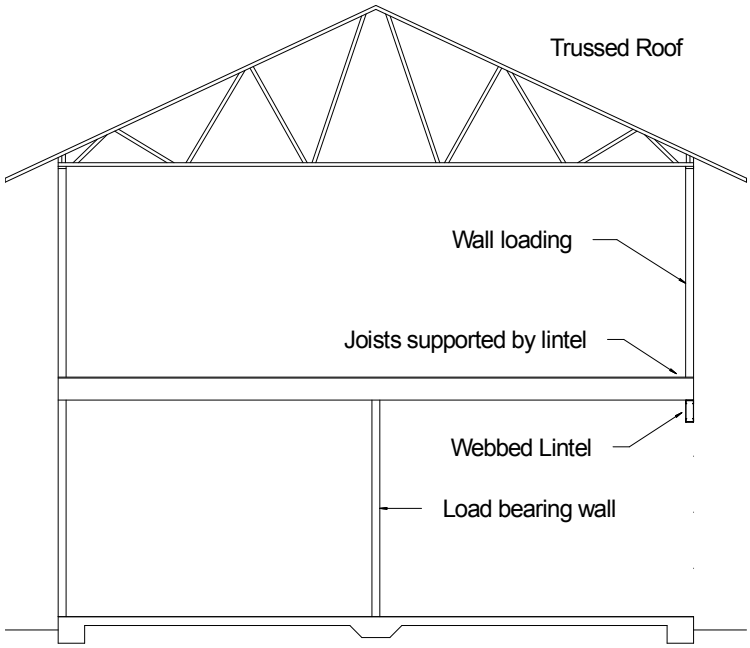



*Figure 6.7 For Lintels with joists set PERPENDICULAR to lintel*

## *Lintel tables - with joists set PERPENDICULAR to lintel – figure 6.7 (cont.)*

For Webbed Lintel Type “C 2” Heavy Roof (see figure 6.4)

| Lintel type: C 2 | | Jamb Studs Required Per Side (in brackets) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Loaded * Dimension | | LOWER OF TWO STORIES (Heavy Roof) | | | | | | | | |
| | | NO SNOW LOAD | | | | | | | | |
| Roof | Floor | Maximum span for lintel depths listed below (mm) | | | | | | | | |
| | | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 |
| 2.0 | 2.0 | *1400(2)* | *1700(2)* | *1950(2)* | *2150(2)* | *2350(3)* | *2500(3)* | *2700(3)* | *2850(3)* | *3050(3)* |
| 3.0 | 3.0 | *1150(2)* | *1400(2)* | *1600(2)* | *1750(2)* | *1900(2)* | *2050(2)* | *2200(2)* | *2250(2)* | *2250(2)* |
| 4.0 | 3.0 | *1100(2)* | *1350(2)* | *1550(2)* | *1700(2)* | *1850(2)* | *2000(2)* | *2100(2)* | *2100(2)* | *2150(2)* |
| 6.0 | 3.0 | *1050(2)* | *1250(2)* | *1450(2)* | *1600(2)* | *1750(2)* | *1900(2)* | *1950(2)* | *1950(2)* | *1950(2)* |
| 1kPa SNOW | | | | | | | | | | |
| 2.0 | 2.0 | *1400(2)* | *1700(2)* | *1950(2)* | *2150(2)* | *2350(3)* | *2500(3)* | *2700(3)* | *2850(3)* | *3050(3)* |
| 3.0 | 3.0 | *1150(2)* | *1400(2)* | *1600(2)* | *1750(2)* | *1900(2)* | *2050(2)* | *2200(2)* | *2250(2)* | *2250(2)* |
| 4.0 | 3.0 | *1100(2)* | *1350(2)* | *1550(2)* | *1700(2)* | *1850(2)* | *2000(2)* | *2100(2)* | *2100(2)* | *2150(2)* |
| 6.0 | 3.0 | *1050(2)* | *1250(2)* | *1450(2)* | *1600(2)* | *1750(2)* | *1900(2)* | *1950(2)* | *1950(2)* | *1950(2)* |
| 1.5kPa SNOW | | | | | | | | | | |
| 2.0 | 2.0 | *1400(2)* | *1700(2)* | *1950(2)* | *2150(2)* | *2350(3)* | *2500(3)* | *2700(3)* | *2850(3)* | *3050(3)* |
| 3.0 | 3.0 | *1150(2)* | *1400(2)* | *1600(2)* | *1750(2)* | *1900(2)* | *2050(2)* | *2200(2)* | *2250(2)* | *2250(2)* |
| 4.0 | 3.0 | *1100(2)* | *1350(2)* | *1550(2)* | *1700(2)* | *1850(2)* | *2000(2)* | *2100(2)* | *2100(2)* | *2150(2)* |
| 6.0 | 3.0 | *1000(2)* | *1150(2)* | *1350(2)* | *1500(2)* | *1600(2)* | *1750(2)* | *1750(2)* | *1750(2)* | *1800(2)* |

* For the definition of Loaded Dimension see fig. 1.2

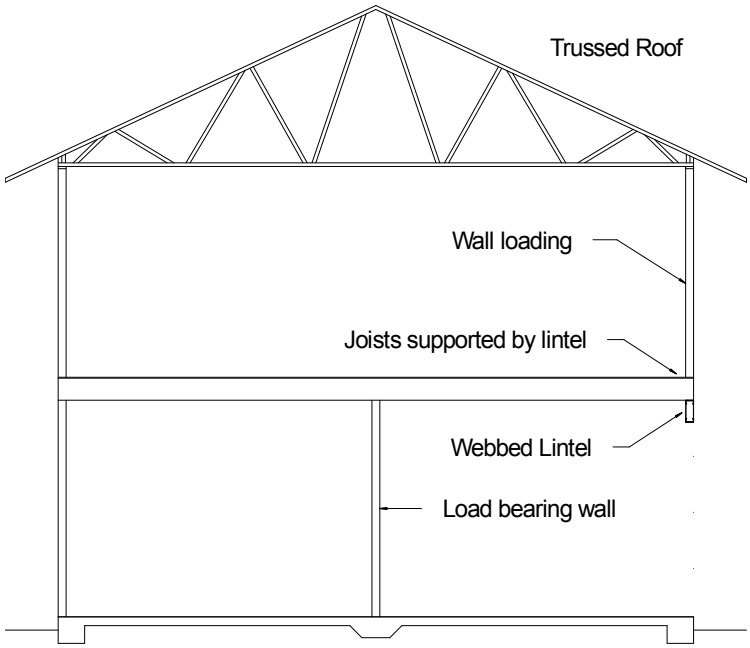



*Figure 6.7 For Lintels with joists set PERPENDICULAR to lintel*

## *Lintel tables – For Lintels with FLOOR AND WALL LOAD ONLY – figure 6.8*

For Webbed Lintel Type "A 2" Light Roof (see figure 6.4)

| Lintel type: A 2 | | Jamb Studs Required Per Side (in brackets) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Loaded * Dimension | | LOWER OF TWO STORIES (Light Roof) | | | | | | | | |
| | | NO SNOW LOAD | | | | | | | | |
| Roof | Floor | Maximum span for lintel depths listed below (mm) | | | | | | | | |
| | | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 |
| 0.6 | 1.5 | *1800(2)* | *2150(2)* | *2450(3)* | *2750(3)* | *2950(3)* | *3200(3)* | *3300(3)* | *3350(3)* | *3450(3)* |
| 0.6 | 2.0 | *1550(2)* | *1900(2)* | *2150(2)* | *2400(3)* | *2500(3)* | *2550(3)* | *2600(3)* | *2650(3)* | *2750(3)* |
| 0.6 | 2.5 | *1400(2)* | *1700(2)* | *1900(2)* | *2050(2)* | *2100(2)* | *2150(2)* | *2200(2)* | *2250(2)* | *2350(3)* |
| 0.6 | 3.0 | *1300(2)* | *1550(2)* | *1700(2)* | *1750(2)* | *1800(2)* | *1850(2)* | *1900(2)* | *1950(2)* | *2100(2)* |
| 1kPa SNOW | | | | | | | | | | |
| 0.6 | 1.5 | *1800(2)* | *2150(2)* | *2450(3)* | *2750(3)* | *2950(3)* | *3200(3)* | *3300(3)* | *3350(3)* | *3450(3)* |
| 0.6 | 2.0 | *1550(2)* | *1900(2)* | *2150(2)* | *2400(3)* | *2500(3)* | *2550(3)* | *2600(3)* | *2650(3)* | *2750(3)* |
| 0.6 | 2.5 | *1400(2)* | *1700(2)* | *1900(2)* | *2050(2)* | *2100(2)* | *2150(2)* | *2200(2)* | *2250(2)* | *2350(3)* |
| 0.6 | 3.0 | *1300(2)* | *1550(2)* | *1700(2)* | *1750(2)* | *1800(2)* | *1850(2)* | *1900(2)* | *1950(2)* | *2100(2)* |
| 1.5kPa SNOW | | | | | | | | | | |
| 0.6 | 1.5 | *1800(2)* | *2150(2)* | *2450(3)* | *2750(3)* | *2950(3)* | *3200(3)* | *3300(3)* | *3350(3)* | *3450(3)* |
| 0.6 | 2.0 | *1550(2)* | *1900(2)* | *2150(2)* | *2400(3)* | *2500(3)* | *2550(3)* | *2600(3)* | *2650(3)* | *2750(3)* |
| 0.6 | 2.5 | *1400(2)* | *1700(2)* | *1900(2)* | *2050(2)* | *2100(2)* | *2150(2)* | *2200(2)* | *2250(2)* | *2350(3)* |
| 0.6 | 3.0 | *1300(2)* | *1550(2)* | *1700(2)* | *1750(2)* | *1800(2)* | *1850(2)* | *1900(2)* | *1950(2)* | *2100(2)* |

* For the definition of Loaded Dimension see fig. 1.2

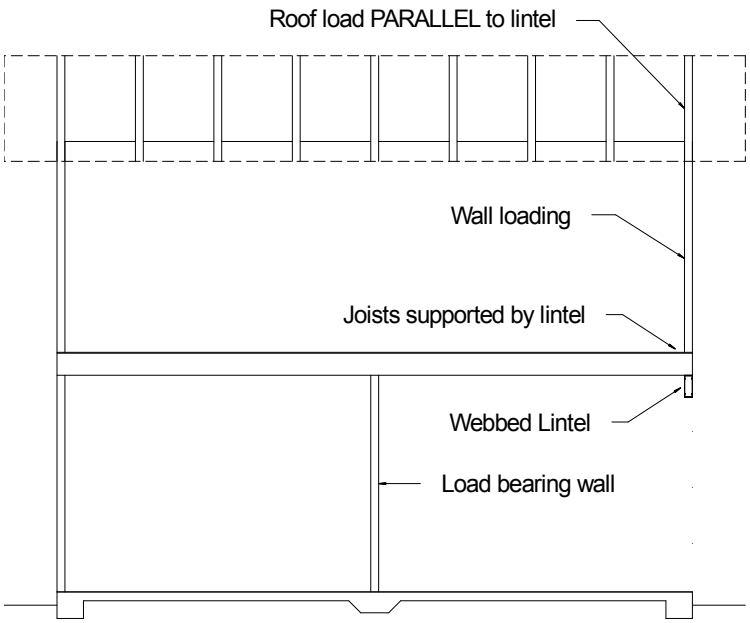



*Figure 6.8 Lintels with FLOOR AND WALL LOAD ONLY*

## *Lintel tables – For Lintels with FLOOR AND WALL LOAD ONLY – figure 6.8 (cont.)*

For Webbed Lintel Type "A 2" Heavy Roof (see figure 6.4)

| Lintel type: A 2 | | Jamb Studs Required Per Side (in brackets) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Loaded * Dimension | | LOWER OF TWO STORIES (Heavy Roof) | | | | | | | | |
| | | NO SNOW LOAD | | | | | | | | |
| Roof | Floor | Maximum span for lintel depths listed below (mm) | | | | | | | | |
| | | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 |
| 0.6 | 1.5 | *1750(2)* | *2100(2)* | *2400(3)* | *2650(3)* | *2850(3)* | *3050(3)* | *3100(3)* | *3150(3)* | *3250(3)* |
| 0.6 | 2.0 | *1550(2)* | *1850(2)* | *2100(2)* | *2300(3)* | *2400(3)* | *2450(3)* | *2500(3)* | *2550(3)* | *2650(3)* |
| 0.6 | 2.5 | *1400(2)* | *1650(2)* | *1900(2)* | *1950(2)* | *2000(2)* | *2050(2)* | *2150(2)* | *2200(2)* | *2300(3)* |
| 0.6 | 3.0 | *1250(2)* | *1500(2)* | *1650(2)* | *1700(2)* | *1800(2)* | *1850(2)* | *1900(2)* | *1950(2)* | *2050(2)* |
| 1kPa SNOW | | | | | | | | | | |
| 0.6 | 1.5 | *1750(2)* | *2100(2)* | *2400(3)* | *2650(3)* | *2850(3)* | *3050(3)* | *3100(3)* | *3150(3)* | *3250(3)* |
| 0.6 | 2.0 | *1550(2)* | *1850(2)* | *2100(2)* | *2300(3)* | *2400(3)* | *2450(3)* | *2500(3)* | *2550(3)* | *2650(3)* |
| 0.6 | 2.5 | *1400(2)* | *1650(2)* | *1900(2)* | *1950(2)* | *2000(2)* | *2050(2)* | *2150(2)* | *2200(2)* | *2300(3)* |
| 0.6 | 3.0 | *1250(2)* | *1500(2)* | *1650(2)* | *1700(2)* | *1800(2)* | *1850(2)* | *1900(2)* | *1950(2)* | *2050(2)* |
| 1.5kPa SNOW | | | | | | | | | | |
| 0.6 | 1.5 | *1750(2)* | *2100(2)* | *2400(3)* | *2650(3)* | *2850(3)* | *3050(3)* | *3100(3)* | *3150(3)* | *3250(3)* |
| 0.6 | 2.0 | *1550(2)* | *1850(2)* | *2100(2)* | *2300(3)* | *2400(3)* | *2450(3)* | *2500(3)* | *2550(3)* | *2650(3)* |
| 0.6 | 2.5 | *1400(2)* | *1650(2)* | *1900(2)* | *1950(2)* | *2000(2)* | *2050(2)* | *2150(2)* | *2200(2)* | *2300(3)* |
| 0.6 | 3.0 | *1250(2)* | *1500(2)* | *1650(2)* | *1700(2)* | *1800(2)* | *1850(2)* | *1900(2)* | *1950(2)* | *2050(2)* |

* For the definition of Loaded Dimension see fig. 1.2

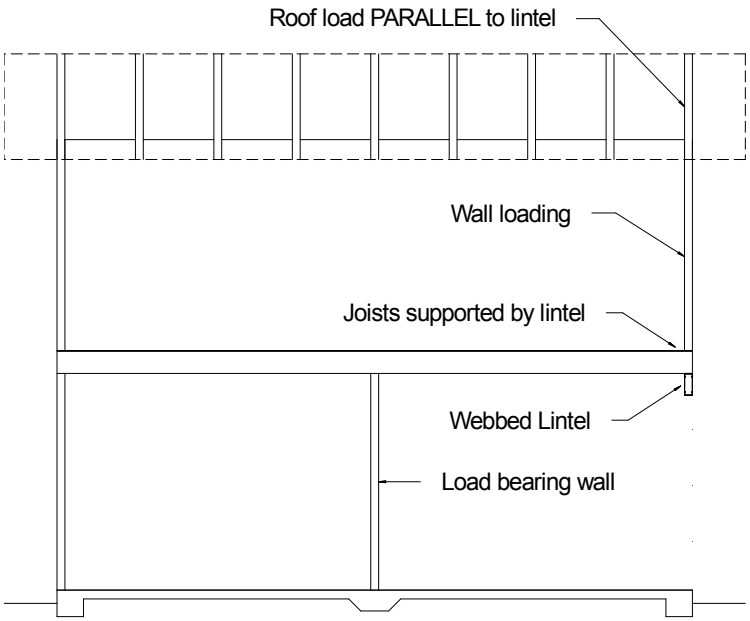



*Figure 6.8 Lintels with FLOOR AND WALL LOAD ONLY*

## *Lintel tables – For Lintels with FLOOR AND WALL LOAD ONLY – figure 6.8 (cont.)*

For Webbed Lintel Type "C 2" Light Roof (see figure 6.4)

| Lintel type: C 2 | | Jamb Studs Required Per Side (in brackets) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Loaded * Dimension | | LOWER OF TWO STORIES (Light Roof) | | | | | | | | |
| | | NO SNOW LOAD | | | | | | | | |
| Roof | Floor | Maximum span for lintel depths listed below (mm) | | | | | | | | |
| | | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 |
| 0.6 | 1.5 | *1800(2)* | *2150(2)* | *2450(3)* | *2750(3)* | *2950(3)* | *3200(3)* | *3400(3)* | *3600(3)* | *3950(4)* |
| 0.6 | 2.0 | *1550(2)* | *1900(2)* | *2150(2)* | *2400(3)* | *2600(3)* | *2800(3)* | *2950(3)* | *3150(3)* | *3450(3)* |
| 0.6 | 2.5 | *1400(2)* | *1700(2)* | *1900(2)* | *2150(2)* | *2300(3)* | *2500(3)* | *2650(3)* | *2800(3)* | *2950(3)* |
| 0.6 | 3.0 | *1300(2)* | *1550(2)* | *1750(2)* | *1950(2)* | *2150(2)* | *2300(3)* | *2450(3)* | *2600(3)* | *2600(3)* |
| 1kPa SNOW | | | | | | | | | | |
| 0.6 | 1.5 | *1800(2)* | *2150(2)* | *2450(3)* | *2750(3)* | *2950(3)* | *3200(3)* | *3400(3)* | *3600(3)* | *3950(4)* |
| 0.6 | 2.0 | *1550(2)* | *1900(2)* | *2150(2)* | *2400(3)* | *2600(3)* | *2800(3)* | *2950(3)* | *3150(3)* | *3450(3)* |
| 0.6 | 2.5 | *1400(2)* | *1700(2)* | *1900(2)* | *2150(2)* | *2300(3)* | *2500(3)* | *2650(3)* | *2800(3)* | *2950(3)* |
| 0.6 | 3.0 | *1300(2)* | *1550(2)* | *1750(2)* | *1950(2)* | *2150(2)* | *2300(3)* | *2450(3)* | *2600(3)* | *2600(3)* |
| 1.5kPa SNOW | | | | | | | | | | |
| 0.6 | 1.5 | *1800(2)* | *2150(2)* | *2450(3)* | *2750(3)* | *2950(3)* | *3200(3)* | *3400(3)* | *3600(3)* | *3950(4)* |
| 0.6 | 2.0 | *1550(2)* | *1900(2)* | *2150(2)* | *2400(3)* | *2600(3)* | *2800(3)* | *2950(3)* | *3150(3)* | *3450(3)* |
| 0.6 | 2.5 | *1400(2)* | *1700(2)* | *1900(2)* | *2150(2)* | *2300(3)* | *2500(3)* | *2650(3)* | *2800(3)* | *2950(3)* |
| 0.6 | 3.0 | *1300(2)* | *1550(2)* | *1750(2)* | *1950(2)* | *2150(2)* | *2300(3)* | *2450(3)* | *2600(3)* | *2600(3)* |

* For the definition of Loaded Dimension see fig. 1.2

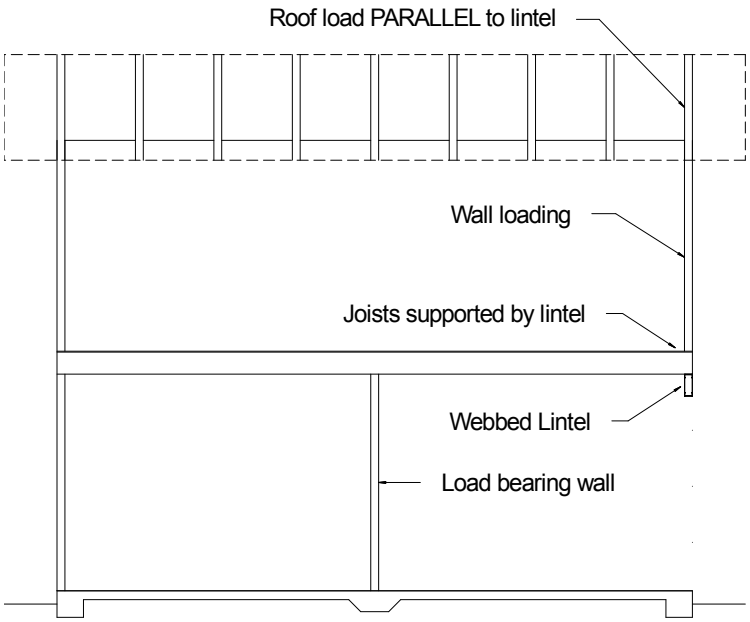



*Figure 6.8 Lintels with FLOOR AND WALL LOAD ONLY*

## *Lintel tables – For Lintels with FLOOR AND WALL LOAD ONLY – figure 6.8 (cont.)*

For Webbed Lintel Type "C 2" Heavy Roof (see figure 6.4)

| Lintel type: C 2 | | Jamb Studs Required Per Side (in brackets) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Loaded * Dimension | | LOWER OF TWO STORIES (Heavy Roof) | | | | | | | | |
| | | NO SNOW LOAD | | | | | | | | |
| Roof | Floor | Maximum span for lintel depths listed below (mm) | | | | | | | | |
| | | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 |
| 0.6 | 1.5 | *1750(2)* | *2100(2)* | *2400(3)* | *2650(3)* | *2900(3)* | *3100(3)* | *3300(3)* | *3500(3)* | *3850(4)* |
| 0.6 | 2.0 | *1550(2)* | *1850(2)* | *2100(2)* | *2300(3)* | *2550(3)* | *2700(3)* | *2900(3)* | *3050(3)* | *3350(3)* |
| 0.6 | 2.5 | *1400(2)* | *1650(2)* | *1900(2)* | *2100(2)* | *2300(3)* | *2450(3)* | *2600(3)* | *2750(3)* | *2900(3)* |
| 0.6 | 3.0 | *1250(2)* | *1500(2)* | *1750(2)* | *1900(2)* | *2100(2)* | *2250(2)* | *2400(3)* | *2550(3)* | *2550(3)* |
| 1kPa SNOW | | | | | | | | | | |
| 0.6 | 1.5 | *1750(2)* | *2100(2)* | *2400(3)* | *2650(3)* | *2900(3)* | *3100(3)* | *3300(3)* | *3500(3)* | *3850(4)* |
| 0.6 | 2.0 | *1550(2)* | *1850(2)* | *2100(2)* | *2300(3)* | *2550(3)* | *2700(3)* | *2900(3)* | *3050(3)* | *3350(3)* |
| 0.6 | 2.5 | *1400(2)* | *1650(2)* | *1900(2)* | *2100(2)* | *2300(3)* | *2450(3)* | *2600(3)* | *2750(3)* | *2900(3)* |
| 0.6 | 3.0 | *1250(2)* | *1500(2)* | *1750(2)* | *1900(2)* | *2100(2)* | *2250(2)* | *2400(3)* | *2550(3)* | *2550(3)* |
| 1.5kPa SNOW | | | | | | | | | | |
| 0.6 | 1.5 | *1750(2)* | *2100(2)* | *2400(3)* | *2650(3)* | *2900(3)* | *3100(3)* | *3300(3)* | *3500(3)* | *3850(4)* |
| 0.6 | 2.0 | *1550(2)* | *1850(2)* | *2100(2)* | *2300(3)* | *2550(3)* | *2700(3)* | *2900(3)* | *3050(3)* | *3350(3)* |
| 0.6 | 2.5 | *1400(2)* | *1650(2)* | *1900(2)* | *2100(2)* | *2300(3)* | *2450(3)* | *2600(3)* | *2750(3)* | *2900(3)* |
| 0.6 | 3.0 | *1250(2)* | *1500(2)* | *1750(2)* | *1900(2)* | *2100(2)* | *2250(2)* | *2400(3)* | *2550(3)* | *2550(3)* |

* For the definition of Loaded Dimension see fig. 1.2

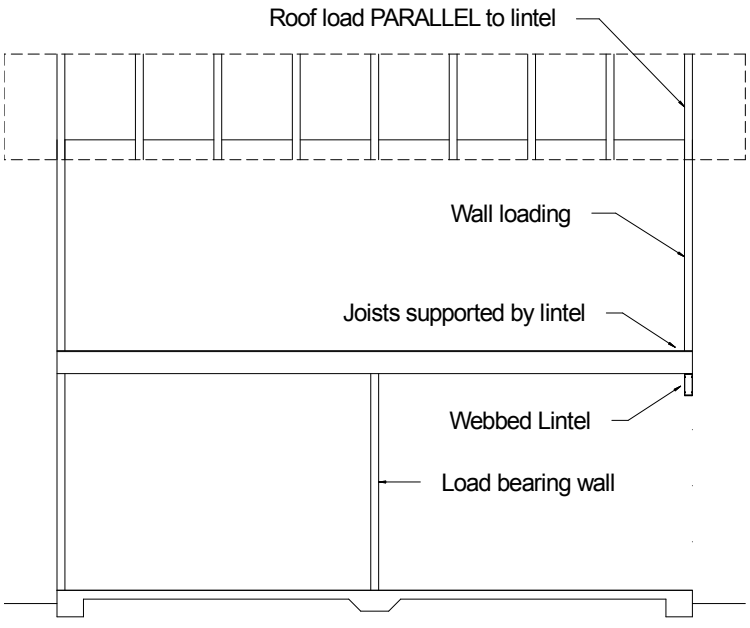



*Figure 6.8 Lintels with FLOOR AND WALL LOAD ONLY*

*Lintel tables – For Lintels with FLOOR LOAD ONLY – figure 6.9*

For Webbed Lintel Type "A 2" (see figure 6.4)

| Lintel type: A 2 | | Jamb Studs Required Per Side (in brackets) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Loaded * Dimension | | LOWER OF TWO STORIES (Light & Heavy Roof) | | | | | | | | |
| | | FLOOR LOAD ONLY | | | | | | | | |
| Roof | Floor | Maximum span for lintel depths listed below (mm) | | | | | | | | |
| | | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 |
| 0.0 | 1.5 | *1850(2)* | *2200(2)* | *2500(3)* | *2750(3)* | *3000(3)* | *3250(3)* | *3400(3)* | *3400(3)* | *3500(3)* |
| 0.0 | 2.0 | *1600(2)* | *1900(2)* | *2150(2)* | *2400(3)* | *2600(3)* | *2600(3)* | *2700(3)* | *2700(3)* | *2800(3)* |
| 0.0 | 2.5 | *1400(2)* | *1700(2)* | *1950(2)* | *2050(2)* | *2150(2)* | *2200(2)* | *2250(2)* | *2300(3)* | *2400(3)* |
| 0.0 | 3.0 | *1300(2)* | *1550(2)* | *1750(2)* | *1800(2)* | *1850(2)* | *1900(2)* | *1950(2)* | *2000(2)* | *2100(2)* |

For Webbed Lintel Type "C 2" (see figure 6.4)

| Lintel type: C 2 | | Jamb Studs Required Per Side (in brackets) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Loaded * Dimension | | LOWER OF TWO STORIES (Light & Heavy Roof) | | | | | | | | |
| | | FLOOR LOAD ONLY | | | | | | | | |
| Roof | Floor | Maximum span for lintel depths listed below (mm) | | | | | | | | |
| | | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 |
| 0.0 | 1.5 | *1850(2)* | *2200(2)* | *2500(3)* | *2750(3)* | *3000(3)* | *3250(3)* | *3450(3)* | *3650(3)* | *4000(4)* |
| 0.0 | 2.0 | *1600(2)* | *1900(2)* | *2150(2)* | *2400(3)* | *2600(3)* | *2800(3)* | *3000(3)* | *3150(3)* | *3500(3)* |
| 0.0 | 2.5 | *1400(2)* | *1700(2)* | *1950(2)* | *2150(2)* | *2350(3)* | *2500(3)* | *2700(3)* | *2850(3)* | *3050(3)* |
| 0.0 | 3.0 | *1300(2)* | *1550(2)* | *1750(2)* | *1950(2)* | *2150(2)* | *2300(3)* | *2450(3)* | *2600(3)* | *2650(3)* |

* For the definition of Loaded Dimension see fig. 1.2

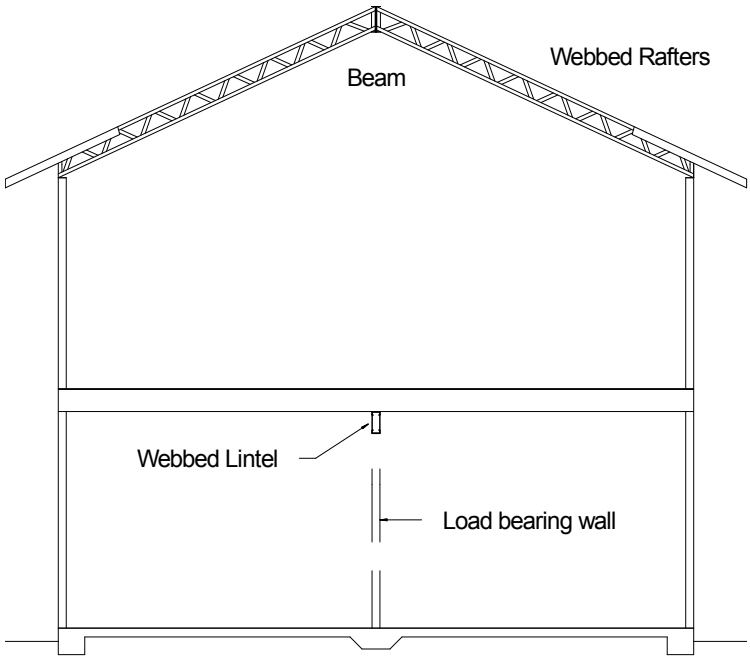
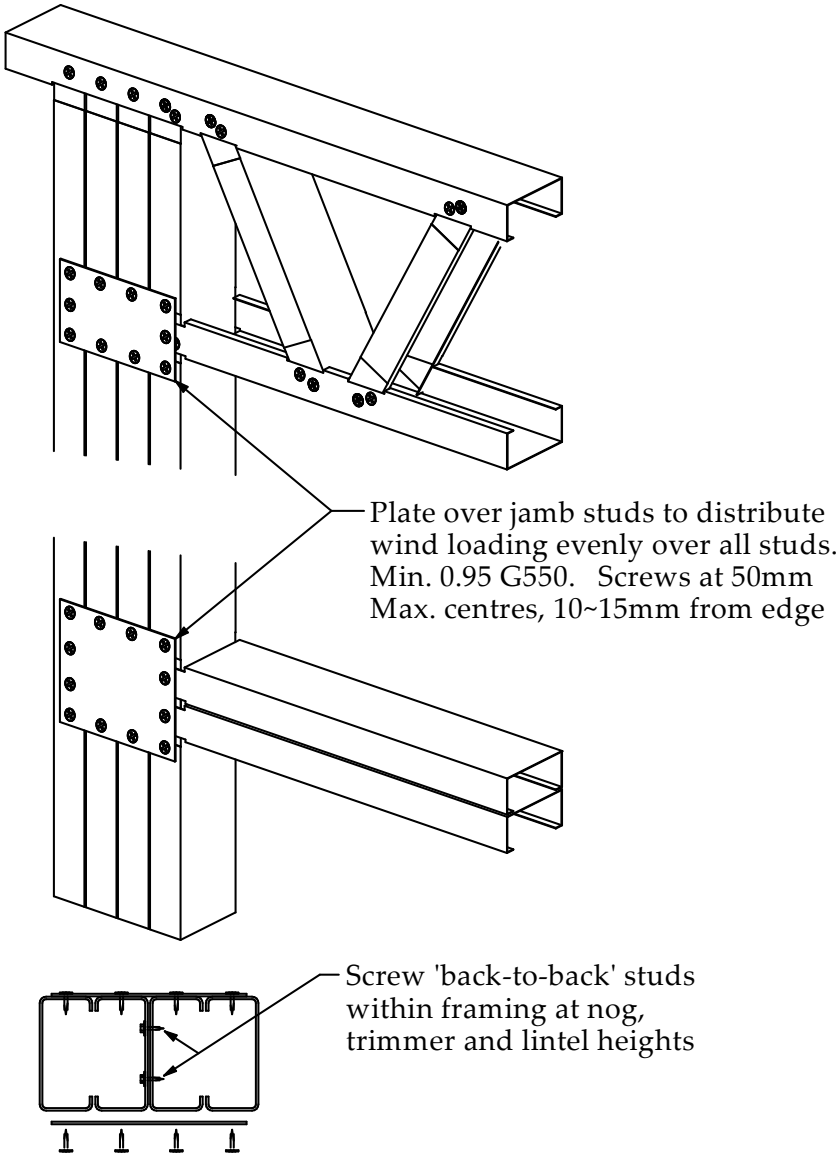



*Figure 6.9 Lintels with FLOOR LOAD ONLY*

## 5.16. JAMB STUDS

Jamb studs are located at each side of openings and can be formed from single or multiple sections.

All openings in loadbearing and non-loadbearing external walls must be designed in accordance with the detail below.




## 5.17. JAMB STUD TABLES

The Jamb stud tables are provided as "Jamb Studs Required Per Side (in brackets) " within the lintel tables giving the minimum number of jamb studs required at the side of openings for a given Roof/Floor Loaded Dimension (as defined in fig. 1.2), wind zone, lintel span and maximum stud height of 3.1 metres.

# 6 ROOF FRAMING

FRAMETEK steel framing system covers;

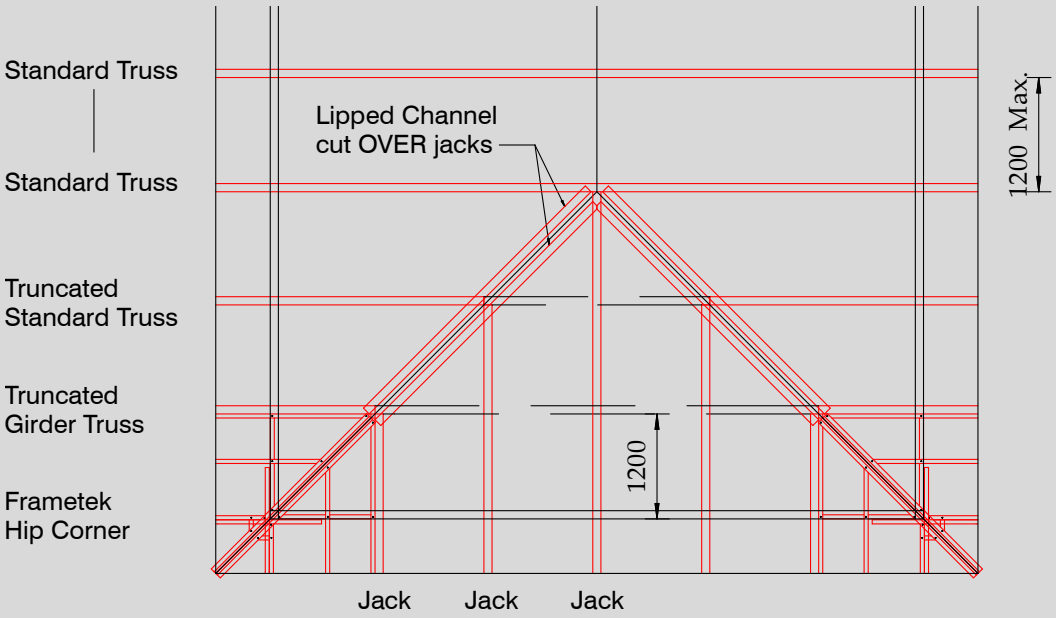
- Trusses
- Rafters (sections on their edge)
- Webbed rafters

## 6.1. TRUSSED ROOFS

In all cases girder trusses, trusses under point load and roofs in wind zones extra high and above, shall be subject to Specific Engineering Design, however, common gable trusses may be based on the tables below in Section 7.3.

Typical truss arrangements are shown in Figures 7.1 ~ 7.3 below.

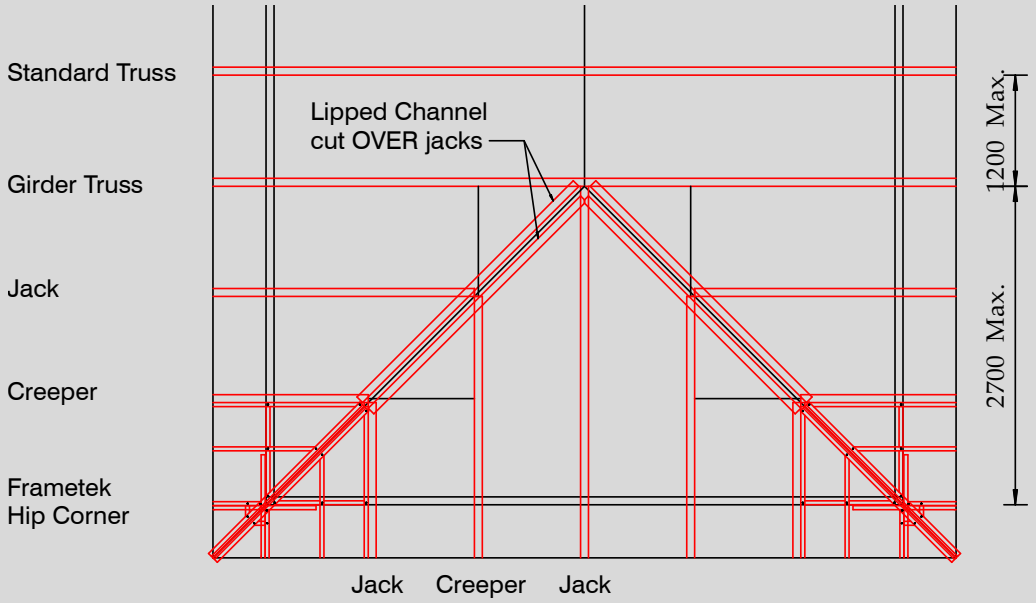
*Figure 7.1 Hip arrangements*



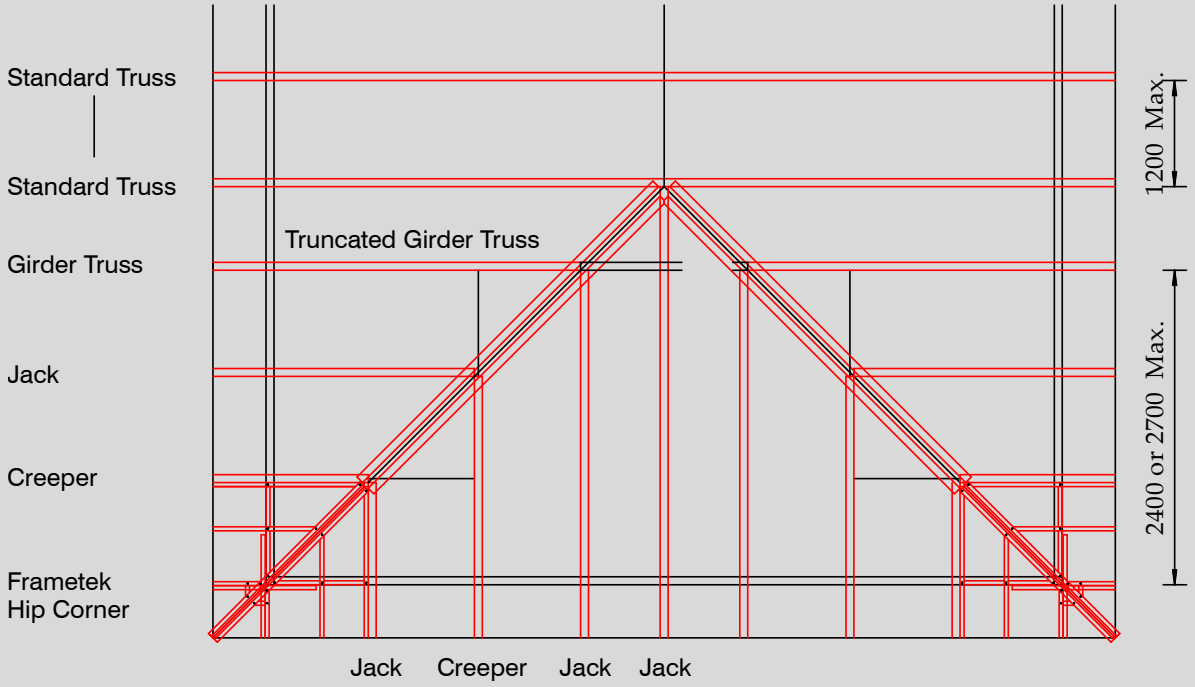

Light-Load-Hip Roof Layout
( for shorter spans or roof pitch >20° )

Dimensions are given in mm.

*Figure 7.2 Hip arrangements (cont.)*




Standard Hip Roof Layout
(Herring Bone)




Standard Hip Roof Layout
(Truncated Girder - Herring Bone)

Dimensions are given in mm.

*Figure 7.3 Gable arrangements*

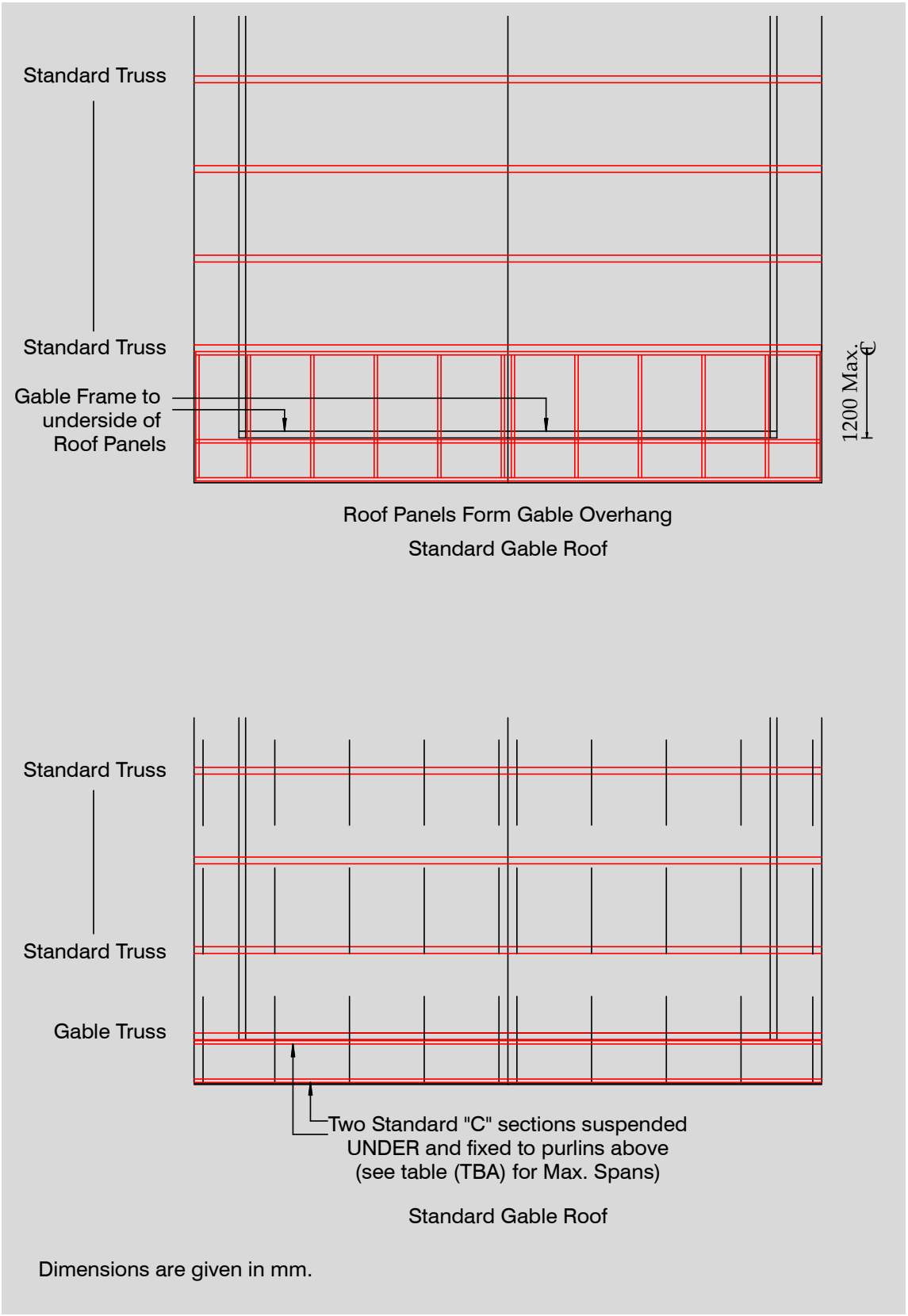


*Figure 7.4 Typical roof system*

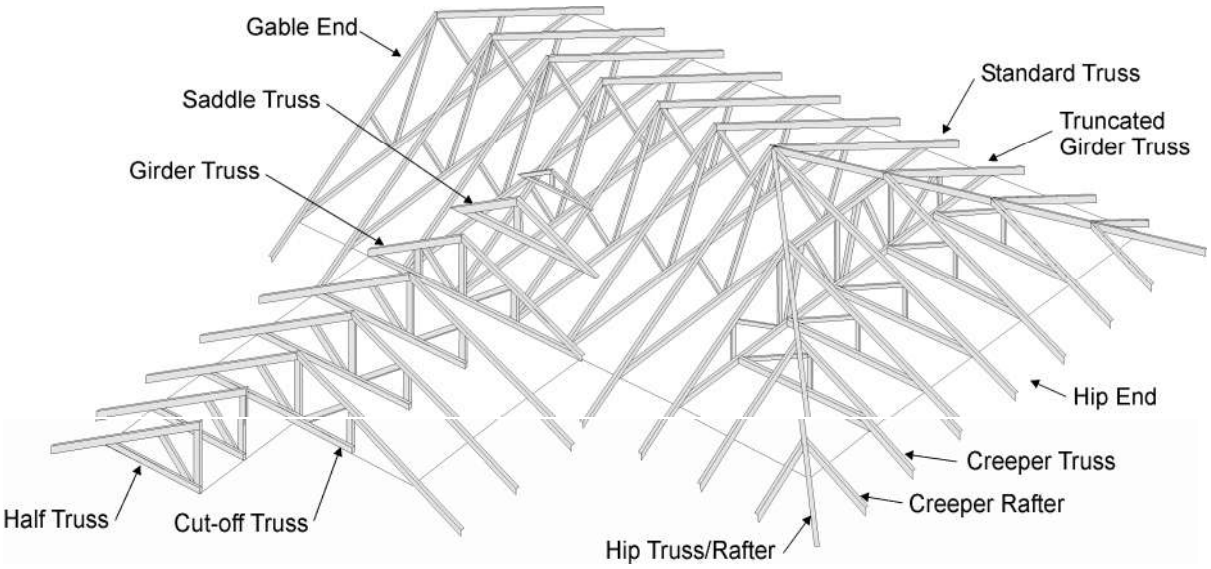
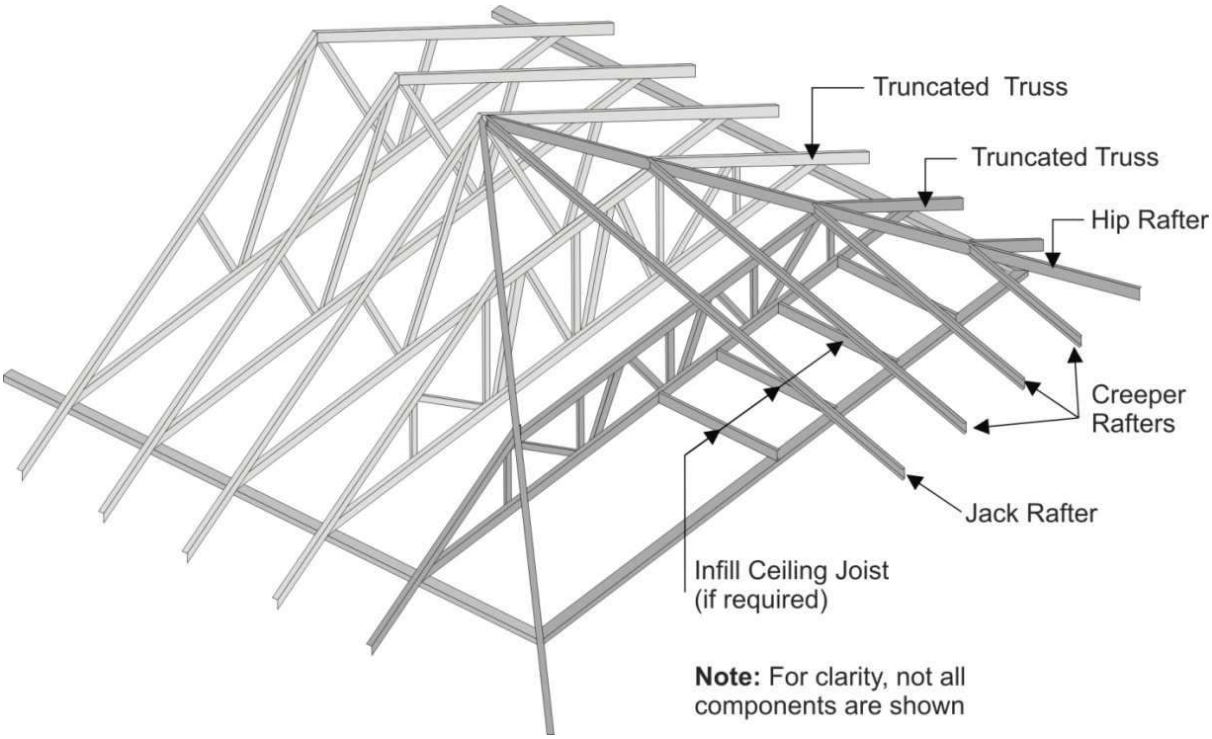



*Figure 7.3 Typical Light-Load-Hip system*

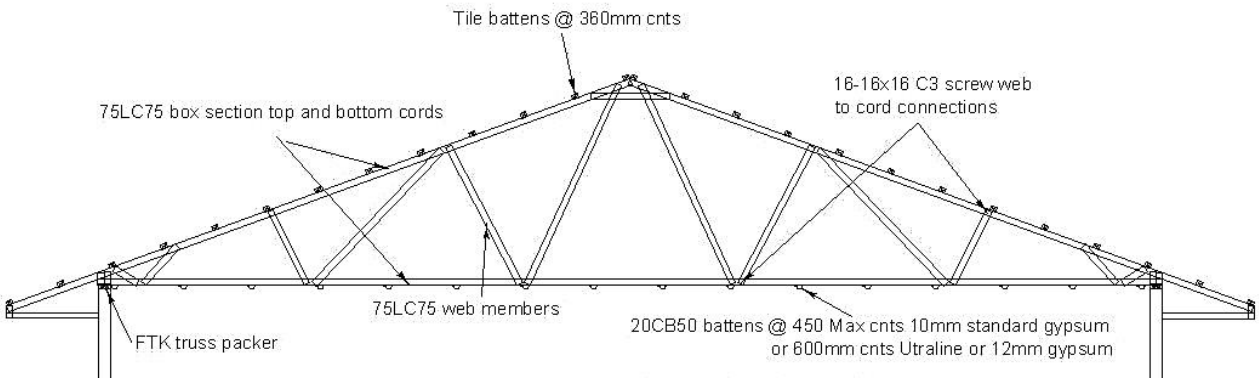


## 6.2. COMMON TRUSS TABLES

### 6.2.1. Truss tables

Trusses are required to be engineered for each specific situation. For your specific requirements contact FRAMETEK directly for an engineered design.

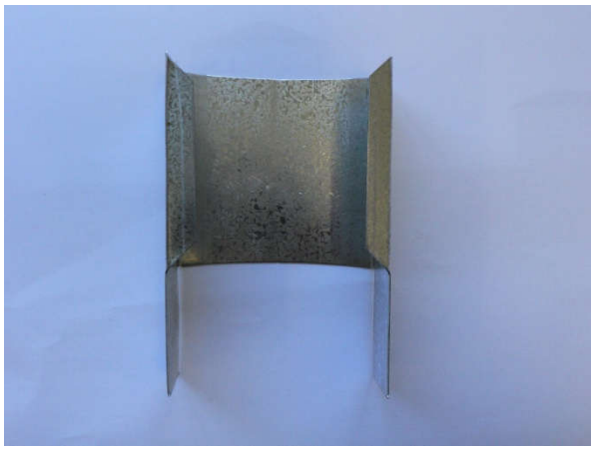
Below is a table for maximum spans of common, standard trusses in a gable end building with a **Minimum heel depth of 100mm and Maximum panel size (distance between nodes) of 1000mm**, using **89LC75** section.




| Light Roof (Max 0.25kPa) | | | | | | |
|---|---|---|---|---|---|---|
| NO SNOW | | | | | | |
| Roof Pitch in degrees | H | | | VH | | |
| | Maximum spans for truss centres (mm) | | | | | |
| | 600 | 900 | 1200 | 600 | 900 | 1200 |
| 6 - 8 | *9000* | *7000* | *5000* | *9000* | *6000* | *5000* |
| 9 - 15 | *12000* | *8000* | *6000* | *12000* | *8000* | *6000* |
| 16 - 35 | *15000* | *12000* | *9000* | *13000* | *11000* | *9000* |
| 1kPa SNOW | | | | | | |
| 6 - 8 | *6000* | *SED* | *SED* | *5000* | *SED* | *SED* |
| 9 - 15 | *8000* | *5000* | *3000* | *6000* | *5000* | *3000* |
| 16 - 35 | *11000* | *6000* | *5000* | *8000* | *6000* | *5000* |
| 1.5kPa SNOW | | | | | | |
| 6 - 8 | *SED* | *SED* | *SED* | *SED* | *SED* | *SED* |
| 9 - 15 | *3000* | *3000* | *SED* | *3000* | *3000* | *SED* |
| 16 - 35 | *4000* | *4000* | *4000* | *4000* | *4000* | *4000* |

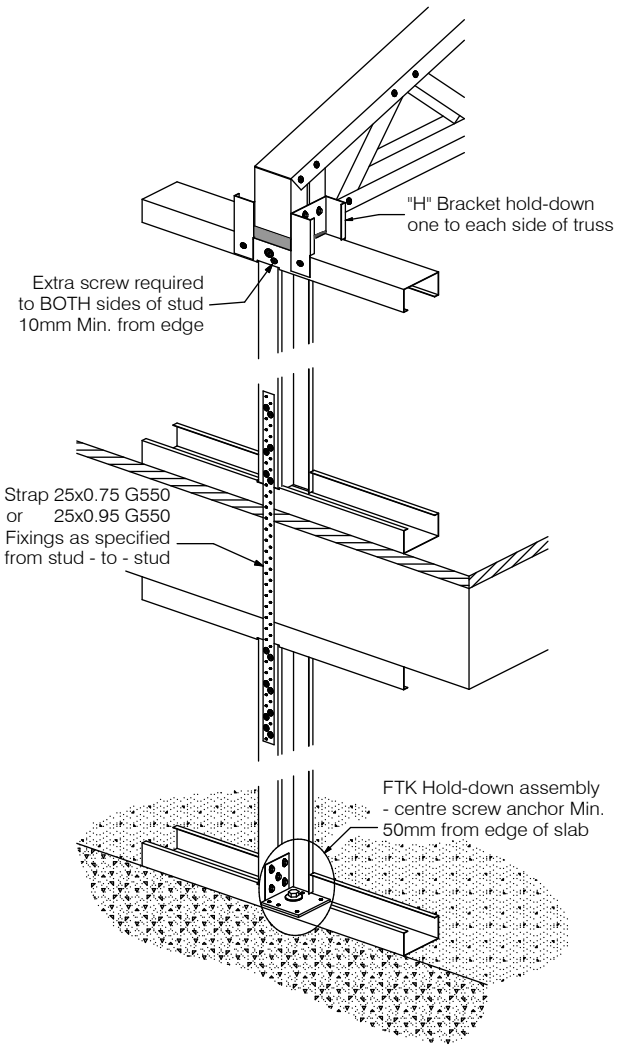
## 6.3. TRUSS HOLD DOWNS

*Figure 7.4 "H" brackets*



Standard "H" bracket as supplied

"H" bracket to side of truss




10kN hold down path

"H" bracket to rafter or extended top chord

Modified "H" bracket for Frametek Hip Corner

*Figure 7.5 Multi-grips*

**SCREW FIXING HOLD DOWNS**

10gx16 Hex-Tek screws as required.

Screws are designated for 'Pull-out' and 'Shear' values.

Working ONLY with shear values, multiply the Truss Spacing x Loaded Dimension = number of screws per connection (round up!) Min.= 2x screws

Multi-grip connecting standard truss, or jack truss, to top plate

Multi-grips connecting 'cut-off' trusses to a boxed 'girder' truss

## 6.4. TRUSS SPLICE

Trusses can be fabricated in sections to allow transport and can then be connected on site to form a larger span with a continuous splice.

Connections for top and bottom chords should be in accordance with engineers details provided specific for each situation.

Where both top and bottom chords of the truss are re-connected on site there should always be one continuous web running across the connection.

## 6.5. RAFTER ROOFS

Raftered roofs, consisting of single "LC" sections on their edge (fig 2.6) can be used for smaller spans or to create skillion or mono pitched roofs. For connections refer to Section 7.3 Multi-grips

Tables below are coded for snow loading purposes and different BMT -

| | | |
|---|---|---|
| 89LC75 | No Snow load | 89LC95 |
| 89LC75 | 1.0kPa Snow load | 89LC95 |
| 89LC75 | 1.5kPa Snow load | 89LC95 |

### 6.5.1. Rafter tables for No Snow load (single span section on edge)

| Wind Zone | 89LC75 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Maximum Spans for Rafter Spacing (m) for given Wind Zones | | | | | | | |
| | Light Roof | | | | Heavy Roof | | | |
| | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 4.03 | 3.66 | 3.20 | 2.90 | 3.21 | 2.92 | 2.55 | 2.32 |
| M | 3.66 | 3.32 | 2.90 | 2.64 | 3.21 | 2.92 | 2.55 | 2.32 |
| H | 3.26 | 2.96 | 2.59 | 2.35 | 3.21 | 2.92 | 2.55 | 2.32 |
| VH | 2.99 | 2.72 | 2.37 | 2.10 | 2.99 | 2.72 | 2.37 | 2.16 |
| XH | 2.81 | 2.55 | 2.19 | 1.90 | 2.81 | 2.55 | 2.23 | 2.02 |

| | 89LC95 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Light Roof | | | | Heavy Roof | | | |
| | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 4.35 | 3.95 | 3.45 | 3.14 | 3.47 | 3.15 | 2.75 | 2.50 |
| M | 3.95 | 3.59 | 3.13 | 2.85 | 3.47 | 3.15 | 2.75 | 2.50 |
| H | 3.52 | 3.19 | 2.79 | 2.54 | 3.47 | 3.15 | 2.75 | 2.50 |
| VH | 3.23 | 2.93 | 2.56 | 2.33 | 3.23 | 2.93 | 2.56 | 2.33 |
| XH | 3.03 | 2.75 | 2.40 | 2.19 | 3.03 | 2.75 | 2.40 | 2.185 |

6.5.2. Rafter tables for 1.0kPa Snow load (single span section on edge)

| Wind Zone | 89LC75 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Maximum Spans for Rafter Spacing (m) for given Wind Zones | | | | | | | |
| | Light Roof | | | | Heavy Roof | | | |
| | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 3.49 | 3.17 | 2.77 | 2.52 | 3.21 | 2.92 | 2.54 | 2.20 |
| M | 3.49 | 3.17 | 2.77 | 2.52 | 3.21 | 2.92 | 2.54 | 2.20 |
| H | 3.26 | 2.96 | 2.59 | 2.35 | 3.21 | 2.92 | 2.54 | 2.20 |
| VH | 2.99 | 2.72 | 2.37 | 2.10 | 2.99 | 2.72 | 2.37 | 2.16 |
| XH | 2.81 | 2.55 | 2.19 | 1.90 | 2.81 | 2.55 | 2.23 | 2.02 |

| | 89LC95 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Light Roof | | | | Heavy Roof | | | |
| | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 3.77 | 3.43 | 2.99 | 2.72 | 3.47 | 3.15 | 2.75 | 2.50 |
| M | 3.77 | 3.43 | 2.99 | 2.72 | 3.47 | 3.15 | 2.75 | 2.50 |
| H | 3.52 | 3.19 | 2.79 | 2.54 | 3.47 | 3.15 | 2.75 | 2.50 |
| VH | 3.23 | 2.93 | 2.56 | 2.33 | 3.23 | 2.93 | 2.56 | 2.33 |
| XH | 3.03 | 2.75 | 2.40 | 2.19 | 3.03 | 2.75 | 2.40 | 2.185 |

6.5.3. Rafter tables for 1.5kPa Snow load (single span section on edge)

| Wind Zone | 89LC75 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Maximum Spans for Rafter Spacing (m) for given Wind Zones | | | | | | | |
| | Light Roof | | | | Heavy Roof | | | |
| | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 3.05 | 2.77 | 2.42 | 2.20 | 3.05 | 2.77 | 2.27 | 1.97 |
| M | 3.05 | 2.77 | 2.42 | 2.20 | 3.05 | 2.77 | 2.27 | 1.97 |
| H | 3.05 | 2.77 | 2.42 | 2.20 | 3.05 | 2.77 | 2.27 | 1.97 |
| VH | 2.99 | 2.72 | 2.37 | 2.10 | 2.99 | 2.72 | 2.27 | 1.97 |
| XH | 2.81 | 2.55 | 2.19 | 1.90 | 2.81 | 2.55 | 2.23 | 1.97 |

| | 89LC95 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Light Roof | | | | Heavy Roof | | | |
| | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 3.29 | 2.99 | 2.61 | 2.38 | 3.29 | 2.99 | 2.61 | 2.31 |
| M | 3.29 | 2.99 | 2.61 | 2.38 | 3.29 | 2.99 | 2.61 | 2.31 |
| H | 3.29 | 2.99 | 2.61 | 2.38 | 3.29 | 2.99 | 2.61 | 2.31 |
| VH | 3.23 | 2.93 | 2.56 | 2.33 | 3.23 | 2.93 | 2.56 | 2.31 |
| XH | 3.03 | 2.75 | 2.40 | 2.19 | 3.03 | 2.75 | 2.40 | 2.185 |

## 6.6. WEBBED RAFTERS

Webbed rafters are a variation of rafter roofs allowing greater spans. Rafters used in this type of roof are in the form of parallel chord trusses (see fig. 7.6), or mono pitched trusses (see fig 7.7), with a minimum depth as per tables below. Hold downs can be used in the same manner as for trusses (see Section 7.3) Multi-grips.

Web angles are to be no less than 45° from the horizontal.

*Figure 7.6*

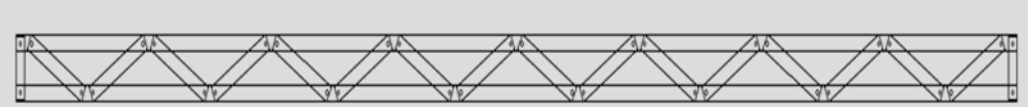
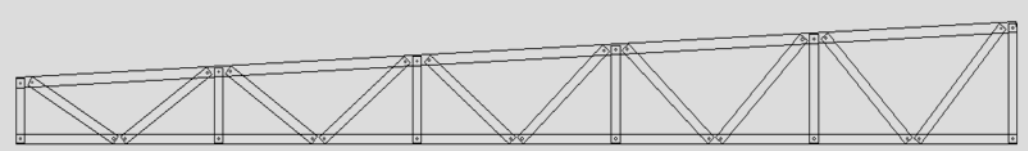


*Figure 7.7*



Tables below are for WEBBED RAFTERS and are coded for snow loading purposes, method of construction and different BMT -

| | | |
|---|---|---|
| 89LC75 | No Snow load | 89LC95 |
| 89LC75 | 1.0kPa Snow load | 89LC95 |
| 89LC75 | 1.5kPa Snow load | 89LC95 |

| | |
|---|---|
| 1 | Single Screwed per side for all webs |
| 2 | Double Screwed per side for the 1st two webs at each end with single screw per side for balance of webs |

6.6.1. Tables for 250mm Single Screwed Webbed Rafters - No Snow load

| 1 | 89LC75 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Maximum Spans for Rafter Spacing (m) for given Wind Zones | | | | | | | |
| | Light Roof | | | | Heavy Roof | | | |
| Wind | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 9.99 | 8.65 | 7.06 | 6.10 | 7.48 | 6.48 | 4.57 | 3.43 |
| M | 8.68 | 7.52 | 6.14 | 4.61 | 7.48 | 6.48 | 4.57 | 3.43 |
| H | 7.19 | 6.22 | 4.21 | 3.16 | 7.20 | 6.23 | 4.22 | 3.17 |
| VH | 6.27 | 4.81 | 3.21 | 2.41 | 6.82 | 5.69 | 3.79 | 2.84 |
| XH | 5.25 | 3.94 | 2.62 | 1.97 | 6.49 | 5.15 | 3.44 | 2.58 |

| Wind | 89LC95 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Light Roof | | | | Heavy Roof | | | |
| | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 11.93 | 10.84 | 9.30 | 7.98 | 9.52 | 8.53 | 5.98 | 4.48 |
| M | 10.83 | 9.84 | 8.04 | 6.03 | 9.52 | 8.53 | 5.98 | 4.48 |
| H | 9.46 | 8.19 | 5.51 | 4.13 | 9.47 | 8.20 | 5.52 | 4.14 |
| VH | 8.26 | 6.29 | 4.19 | 3.15 | 8.86 | 7.44 | 4.96 | 3.72 |
| XH | 6.86 | 5.15 | 3.43 | 2.57 | 8.32 | 6.74 | 4.49 | 3.369 |

6.6.1. Tables for 300mm Single Screwed Webbed Rafters - No Snow load

| 1 | 89LC75 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Maximum Spans for Rafter Spacing (m) for given Wind Zones | | | | | | | |
| | Light Roof | | | | Heavy Roof | | | |
| Wind | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 11.02 | 9.54 | 7.79 | 6.10 | 8.26 | 6.85 | 4.57 | 3.43 |
| M | 9.58 | 8.30 | 6.15 | 4.61 | 8.26 | 6.85 | 4.57 | 3.43 |
| H | 7.93 | 6.32 | 4.21 | 3.16 | 7.94 | 6.34 | 4.22 | 3.17 |
| VH | 6.42 | 4.81 | 3.21 | 2.41 | 7.52 | 5.69 | 3.79 | 2.84 |
| XH | 5.25 | 3.94 | 2.62 | 1.97 | 6.87 | 5.15 | 3.44 | 2.58 |

| Wind | 89LC95 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Light Roof | | | | Heavy Roof | | | |
| | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 13.61 | 12.36 | 10.26 | 7.98 | 10.85 | 8.96 | 5.98 | 4.48 |
| M | 12.35 | 10.92 | 8.04 | 6.03 | 10.85 | 8.96 | 5.98 | 4.48 |
| H | 10.44 | 8.26 | 5.51 | 4.13 | 10.45 | 8.29 | 5.52 | 4.14 |
| VH | 8.39 | 6.29 | 4.19 | 3.15 | 9.90 | 7.44 | 4.96 | 3.72 |
| XH | 6.86 | 5.15 | 3.43 | 2.57 | 8.98 | 6.74 | 4.49 | 3.369 |

6.6.1. Tables for 350mm Single Screwed Webbed Rafters - No Snow load

| 1 | 89LC75 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Maximum Spans for Rafter Spacing (m) for given Wind Zones | | | | | | | |
| | Light Roof | | | | Heavy Roof | | | |
| Wind | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 11.96 | 10.36 | 8.14 | 6.10 | 8.96 | 6.85 | 4.57 | 3.43 |
| M | 10.40 | 9.01 | 6.15 | 4.61 | 8.96 | 6.85 | 4.57 | 3.43 |
| H | 8.43 | 6.32 | 4.21 | 3.16 | 8.45 | 6.34 | 4.22 | 3.17 |
| VH | 6.42 | 4.81 | 3.21 | 2.41 | 7.58 | 5.69 | 3.79 | 2.84 |
| XH | 5.25 | 3.94 | 2.62 | 1.97 | 6.87 | 5.15 | 3.44 | 2.58 |

| Wind | 89LC95 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Light Roof | | | | Heavy Roof | | | |
| | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 15.18 | 13.64 | 10.64 | 7.98 | 11.80 | 8.96 | 5.98 | 4.48 |
| M | 13.69 | 11.86 | 8.04 | 6.03 | 11.80 | 8.96 | 5.98 | 4.48 |
| H | 11.02 | 8.26 | 5.51 | 4.13 | 11.05 | 8.29 | 5.52 | 4.14 |
| VH | 8.39 | 6.29 | 4.19 | 3.15 | 9.91 | 7.44 | 4.96 | 3.72 |
| XH | 6.86 | 5.15 | 3.43 | 2.57 | 8.98 | 6.74 | 4.49 | 3.369 |

6.6.2. Tables for 250mm Single Screwed Webbed Rafters - 1.0kPa Snow load

| 1 | 89LC75 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Maximum Spans for Rafter Spacing (m) for given Wind Zones | | | | | | | |
| | Light Roof | | | | Heavy Roof | | | |
| Wind | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 8.08 | 7.00 | 5.32 | 3.99 | 6.57 | 5.29 | 3.52 | 2.64 |
| M | 8.08 | 7.00 | 5.32 | 3.99 | 6.57 | 5.29 | 3.52 | 2.64 |
| H | 7.19 | 6.22 | 4.21 | 3.16 | 6.57 | 5.29 | 3.52 | 2.64 |
| VH | 6.27 | 4.81 | 3.21 | 2.41 | 6.57 | 5.29 | 3.52 | 2.64 |
| XH | 5.25 | 3.94 | 2.62 | 1.97 | 6.49 | 5.15 | 3.44 | 2.58 |

| Wind | 89LC95 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Light Roof | | | | Heavy Roof | | | |
| | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 10.35 | 9.21 | 6.96 | 5.22 | 8.65 | 6.91 | 4.61 | 3.46 |
| M | 10.35 | 9.21 | 6.96 | 5.22 | 8.65 | 6.91 | 4.61 | 3.46 |
| H | 9.46 | 8.19 | 5.51 | 4.13 | 8.65 | 6.91 | 4.61 | 3.46 |
| VH | 8.26 | 6.29 | 4.19 | 3.15 | 8.65 | 6.91 | 4.61 | 3.46 |
| XH | 6.86 | 5.15 | 3.43 | 2.57 | 8.32 | 6.74 | 4.49 | 3.369 |

6.6.1. Tables for 300mm Single Screwed Webbed Rafters - 1.0kPa Snow load

| 1 | 89LC75 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Maximum Spans for Rafter Spacing (m) for given Wind Zones | | | | | | | |
| | Light Roof | | | | Heavy Roof | | | |
| Wind | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 8.91 | 7.72 | 5.32 | 3.99 | 7.05 | 5.29 | 3.52 | 2.64 |
| M | 8.91 | 7.72 | 5.32 | 3.99 | 7.05 | 5.29 | 3.52 | 2.64 |
| H | 7.93 | 6.32 | 4.21 | 3.16 | 7.05 | 5.29 | 3.52 | 2.64 |
| VH | 6.42 | 4.81 | 3.21 | 2.41 | 7.05 | 5.29 | 3.52 | 2.64 |
| XH | 5.25 | 3.94 | 2.62 | 1.97 | 6.87 | 5.15 | 3.44 | 2.58 |

| Wind | 89LC95 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Light Roof | | | | Heavy Roof | | | |
| | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 11.73 | 10.16 | 6.96 | 5.22 | 9.22 | 6.91 | 4.61 | 3.46 |
| M | 11.73 | 10.16 | 6.96 | 5.22 | 9.22 | 6.91 | 4.61 | 3.46 |
| H | 10.44 | 8.26 | 5.51 | 4.13 | 9.22 | 6.91 | 4.61 | 3.46 |
| VH | 8.39 | 6.29 | 4.19 | 3.15 | 9.22 | 6.91 | 4.61 | 3.46 |
| XH | 6.86 | 5.15 | 3.43 | 2.57 | 8.98 | 6.74 | 4.49 | 3.369 |

6.6.1. Tables for 350mm Single Screwed Webbed Rafters - 1.0kPa Snow load

| 1 | 89LC75 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Maximum Spans for Rafter Spacing (m) for given Wind Zones | | | | | | | |
| | Light Roof | | | | Heavy Roof | | | |
| Wind | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 9.68 | 7.98 | 5.32 | 3.99 | 7.05 | 5.29 | 3.52 | 2.64 |
| M | 9.68 | 7.98 | 5.32 | 3.99 | 7.05 | 5.29 | 3.52 | 2.64 |
| H | 8.43 | 6.32 | 4.21 | 3.16 | 7.05 | 5.29 | 3.52 | 2.64 |
| VH | 6.42 | 4.81 | 3.21 | 2.41 | 7.05 | 5.29 | 3.52 | 2.64 |
| XH | 5.25 | 3.94 | 2.62 | 1.97 | 6.87 | 5.15 | 3.44 | 2.58 |

| Wind | 89LC95 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Light Roof | | | | Heavy Roof | | | |
| | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 12.74 | 10.44 | 6.96 | 5.22 | 9.22 | 6.91 | 4.61 | 3.46 |
| M | 12.74 | 10.44 | 6.96 | 5.22 | 9.22 | 6.91 | 4.61 | 3.46 |
| H | 11.02 | 8.26 | 5.51 | 4.13 | 9.22 | 6.91 | 4.61 | 3.46 |
| VH | 8.39 | 6.29 | 4.19 | 3.15 | 9.22 | 6.91 | 4.61 | 3.46 |
| XH | 6.86 | 5.15 | 3.43 | 2.57 | 8.98 | 6.74 | 4.49 | 3.369 |

6.6.1. Tables for 250mm Single Screwed Webbed Rafters - 1.5kPa Snow load

| 1 | 89LC75 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Maximum Spans for Rafter Spacing (m) for given Wind Zones | | | | | | | |
| | Light Roof | | | | Heavy Roof | | | |
| Wind | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 6.90 | 5.82 | 3.88 | 2.91 | 5.65 | 4.24 | 2.83 | 2.12 |
| M | 6.90 | 5.82 | 3.88 | 2.91 | 5.65 | 4.24 | 2.83 | 2.12 |
| H | 6.90 | 5.82 | 3.88 | 2.91 | 5.65 | 4.24 | 2.83 | 2.12 |
| VH | 6.27 | 4.81 | 3.21 | 2.41 | 5.65 | 4.24 | 2.83 | 2.12 |
| XH | 5.25 | 3.94 | 2.62 | 1.97 | 5.65 | 4.24 | 2.83 | 2.12 |

| Wind | 89LC95 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Light Roof | | | | Heavy Roof | | | |
| | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 9.04 | 7.61 | 5.07 | 3.80 | 7.39 | 5.55 | 3.70 | 2.77 |
| M | 9.04 | 7.61 | 5.07 | 3.80 | 7.39 | 5.55 | 3.70 | 2.77 |
| H | 9.04 | 7.61 | 5.07 | 3.80 | 7.39 | 5.55 | 3.70 | 2.77 |
| VH | 8.26 | 6.29 | 4.19 | 3.15 | 7.39 | 5.55 | 3.70 | 2.77 |
| XH | 6.86 | 5.15 | 3.43 | 2.57 | 7.39 | 5.55 | 3.70 | 2.773 |

6.6.1. Tables for 300mm Single Screwed Webbed Rafters - 1.5kPa Snow load

| 1 | 89LC75 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Maximum Spans for Rafter Spacing (m) for given Wind Zones | | | | | | | |
| | Light Roof | | | | Heavy Roof | | | |
| Wind | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 7.61 | 5.82 | 3.88 | 2.91 | 5.65 | 4.24 | 2.83 | 2.12 |
| M | 7.61 | 5.82 | 3.88 | 2.91 | 5.65 | 4.24 | 2.83 | 2.12 |
| H | 7.61 | 5.82 | 3.88 | 2.91 | 5.65 | 4.24 | 2.83 | 2.12 |
| VH | 6.42 | 4.81 | 3.21 | 2.41 | 5.65 | 4.24 | 2.83 | 2.12 |
| XH | 5.25 | 3.94 | 2.62 | 1.97 | 5.65 | 4.24 | 2.83 | 2.12 |

| Wind | 89LC95 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Light Roof | | | | Heavy Roof | | | |
| | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 10.02 | 7.61 | 5.07 | 3.80 | 7.39 | 5.55 | 3.70 | 2.77 |
| M | 10.02 | 7.61 | 5.07 | 3.80 | 7.39 | 5.55 | 3.70 | 2.77 |
| H | 10.02 | 7.61 | 5.07 | 3.80 | 7.39 | 5.55 | 3.70 | 2.77 |
| VH | 8.39 | 6.29 | 4.19 | 3.15 | 7.39 | 5.55 | 3.70 | 2.77 |
| XH | 6.86 | 5.15 | 3.43 | 2.57 | 7.39 | 5.55 | 3.70 | 2.773 |

6.6.1. Tables for 350mm Single Screwed Webbed Rafters - 1.5kPa Snow load

| 1 | 89LC75 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Maximum Spans for Rafter Spacing (m) for given Wind Zones | | | | | | | |
| | Light Roof | | | | Heavy Roof | | | |
| Wind | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 7.76 | 5.82 | 3.88 | 2.91 | 5.65 | 4.24 | 2.83 | 2.12 |
| M | 7.76 | 5.82 | 3.88 | 2.91 | 5.65 | 4.24 | 2.83 | 2.12 |
| H | 7.76 | 5.82 | 3.88 | 2.91 | 5.65 | 4.24 | 2.83 | 2.12 |
| VH | 6.42 | 4.81 | 3.21 | 2.41 | 5.65 | 4.24 | 2.83 | 2.12 |
| XH | 5.25 | 3.94 | 2.62 | 1.97 | 5.65 | 4.24 | 2.83 | 2.12 |

| Wind | 89LC95 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Light Roof | | | | Heavy Roof | | | |
| | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 10.14 | 7.61 | 5.07 | 3.80 | 7.39 | 5.55 | 3.70 | 2.77 |
| M | 10.14 | 7.61 | 5.07 | 3.80 | 7.39 | 5.55 | 3.70 | 2.77 |
| H | 10.14 | 7.61 | 5.07 | 3.80 | 7.39 | 5.55 | 3.70 | 2.77 |
| VH | 8.39 | 6.29 | 4.19 | 3.15 | 7.39 | 5.55 | 3.70 | 2.77 |
| XH | 6.86 | 5.15 | 3.43 | 2.57 | 7.39 | 5.55 | 3.70 | 2.773 |

6.6.2. Tables for 250mm Double Screwed Webbed Rafters - No Snow load

| 2 | 89LC75 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Maximum Spans for Rafter Spacing (m) for given Wind Zones | | | | | | | |
| | Light Roof | | | | Heavy Roof | | | |
| Wind | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 9.99 | 8.65 | 7.06 | 6.12 | 7.48 | 6.48 | 5.29 | 4.58 |
| M | 8.68 | 7.52 | 6.14 | 5.32 | 7.48 | 6.48 | 5.29 | 4.58 |
| H | 7.19 | 6.22 | 5.08 | 4.40 | 7.20 | 6.23 | 5.09 | 4.41 |
| VH | 6.27 | 5.43 | 4.43 | 3.84 | 6.82 | 5.90 | 4.82 | 4.17 |
| XH | 5.67 | 4.91 | 4.01 | 3.47 | 6.49 | 5.62 | 4.59 | 3.97 |

| Wind | 89LC95 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Light Roof | | | | Heavy Roof | | | |
| | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 11.93 | 10.84 | 9.30 | 8.05 | 9.52 | 8.53 | 6.97 | 6.03 |
| M | 10.83 | 9.84 | 8.08 | 7.00 | 9.52 | 8.53 | 6.97 | 6.03 |
| H | 9.46 | 8.19 | 6.69 | 5.79 | 9.47 | 8.20 | 6.70 | 5.80 |
| VH | 8.26 | 7.15 | 5.84 | 5.06 | 8.86 | 7.77 | 6.35 | 5.50 |
| XH | 7.47 | 6.47 | 5.28 | 4.57 | 8.32 | 7.40 | 6.04 | 5.232 |

6.6.2. Tables for **300**mm **Double** Screwed Webbed Rafters - **No** Snow load

| 2 | 89LC75 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Maximum Spans for Rafter Spacing (m) for given Wind Zones | | | | | | | |
| | Light Roof | | | | Heavy Roof | | | |
| Wind | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 11.02 | 9.54 | 7.79 | 6.75 | 8.26 | 7.15 | 5.84 | 5.06 |
| M | 9.58 | 8.30 | 6.77 | 5.87 | 8.26 | 7.15 | 5.84 | 5.06 |
| H | 7.93 | 6.87 | 5.61 | 4.86 | 7.94 | 6.88 | 5.61 | 4.86 |
| VH | 6.92 | 5.99 | 4.89 | 4.24 | 7.52 | 6.51 | 5.32 | 4.61 |
| XH | 6.26 | 5.42 | 4.43 | 3.83 | 7.16 | 6.20 | 5.06 | 4.38 |

| Wind | 89LC95 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Light Roof | | | | Heavy Roof | | | |
| | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 13.61 | 12.36 | 10.26 | 8.88 | 10.85 | 9.42 | 7.69 | 6.66 |
| M | 12.35 | 10.92 | 8.92 | 7.72 | 10.85 | 9.42 | 7.69 | 6.66 |
| H | 10.44 | 9.04 | 7.38 | 6.39 | 10.45 | 9.05 | 7.39 | 6.40 |
| VH | 9.11 | 7.89 | 6.44 | 5.58 | 9.90 | 8.58 | 7.00 | 6.06 |
| XH | 8.24 | 7.14 | 5.83 | 5.05 | 9.43 | 8.16 | 6.67 | 5.773 |

6.6.2. Tables for **350**mm **Double** Screwed Webbed Rafters - **No** Snow load

| 2 | 89LC75 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Maximum Spans for Rafter Spacing (m) for given Wind Zones | | | | | | | |
| | Light Roof | | | | Heavy Roof | | | |
| Wind | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 11.96 | 10.36 | 8.46 | 7.33 | 8.96 | 7.76 | 6.34 | 5.49 |
| M | 10.40 | 9.01 | 7.35 | 6.37 | 8.96 | 7.76 | 6.34 | 5.49 |
| H | 8.61 | 7.45 | 6.09 | 5.27 | 8.62 | 7.46 | 6.09 | 5.28 |
| VH | 7.51 | 6.50 | 5.31 | 4.60 | 8.16 | 7.07 | 5.77 | 5.00 |
| XH | 6.79 | 5.88 | 4.80 | 3.94 | 7.77 | 6.73 | 5.50 | 4.76 |

| Wind | 89LC95 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Light Roof | | | | Heavy Roof | | | |
| | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 15.18 | 13.64 | 11.14 | 9.64 | 11.80 | 10.22 | 8.35 | 7.23 |
| M | 13.69 | 11.86 | 9.68 | 8.39 | 11.80 | 10.22 | 8.35 | 7.23 |
| H | 11.33 | 9.81 | 8.01 | 6.94 | 11.35 | 9.83 | 8.02 | 6.95 |
| VH | 9.89 | 8.56 | 6.99 | 6.06 | 10.75 | 9.31 | 7.60 | 6.58 |
| XH | 8.94 | 7.75 | 6.32 | 5.15 | 10.23 | 8.86 | 7.24 | 6.267 |

6.6.3. Tables for 250mm Double Screwed Webbed Rafters - 1.0kPa Snow load

| 2 | 89LC75 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Maximum Spans for Rafter Spacing (m) for given Wind Zones | | | | | | | |
| | Light Roof | | | | Heavy Roof | | | |
| Wind | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 8.08 | 7.00 | 5.71 | 4.95 | 6.57 | 5.69 | 4.65 | 4.02 |
| M | 8.08 | 7.00 | 5.71 | 4.95 | 6.57 | 5.69 | 4.65 | 4.02 |
| H | 7.19 | 6.22 | 5.08 | 4.40 | 6.57 | 5.69 | 4.65 | 4.02 |
| VH | 6.27 | 5.43 | 4.43 | 3.84 | 6.57 | 5.69 | 4.65 | 4.02 |
| XH | 5.67 | 4.91 | 4.01 | 3.47 | 6.49 | 5.62 | 4.59 | 3.97 |

| Wind | 89LC95 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Light Roof | | | | Heavy Roof | | | |
| | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 10.35 | 9.21 | 7.52 | 6.51 | 8.65 | 7.49 | 6.12 | 5.30 |
| M | 10.35 | 9.21 | 7.52 | 6.51 | 8.65 | 7.49 | 6.12 | 5.30 |
| H | 9.46 | 8.19 | 6.69 | 5.79 | 8.65 | 7.49 | 6.12 | 5.30 |
| VH | 8.26 | 7.15 | 5.84 | 5.06 | 8.65 | 7.49 | 6.12 | 5.30 |
| XH | 7.47 | 6.47 | 5.28 | 4.57 | 8.32 | 7.40 | 6.04 | 5.232 |

6.6.2. Tables for 300mm Double Screwed Webbed Rafters - 1.0kPa Snow load

| 2 | 89LC75 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Maximum Spans for Rafter Spacing (m) for given Wind Zones | | | | | | | |
| | Light Roof | | | | Heavy Roof | | | |
| Wind | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 8.91 | 7.72 | 6.30 | 5.46 | 7.25 | 6.28 | 5.13 | 4.44 |
| M | 8.91 | 7.72 | 6.30 | 5.46 | 7.25 | 6.28 | 5.13 | 4.44 |
| H | 7.93 | 6.87 | 5.61 | 4.86 | 7.25 | 6.28 | 5.13 | 4.44 |
| VH | 6.92 | 5.99 | 4.89 | 4.24 | 7.25 | 6.28 | 5.13 | 4.44 |
| XH | 6.26 | 5.42 | 4.43 | 3.83 | 7.16 | 6.20 | 5.06 | 4.38 |

| Wind | 89LC95 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Light Roof | | | | Heavy Roof | | | |
| | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 11.73 | 10.16 | 8.30 | 7.19 | 9.55 | 8.27 | 6.75 | 5.85 |
| M | 11.73 | 10.16 | 8.30 | 7.19 | 9.55 | 8.27 | 6.75 | 5.85 |
| H | 10.44 | 9.04 | 7.38 | 6.39 | 9.55 | 8.27 | 6.75 | 5.85 |
| VH | 9.11 | 7.89 | 6.44 | 5.58 | 9.55 | 8.27 | 6.75 | 5.85 |
| XH | 8.24 | 7.14 | 5.83 | 5.05 | 9.43 | 8.16 | 6.67 | 5.773 |

6.6.2. Tables for 350mm Double Screwed Webbed Rafters - 1.0kPa Snow load

| 2 | 89LC75 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Maximum Spans for Rafter Spacing (m) for given Wind Zones | | | | | | | |
| | Light Roof | | | | Heavy Roof | | | |
| Wind | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 9.68 | 8.38 | 6.84 | 5.93 | 7.87 | 6.82 | 5.57 | 4.82 |
| M | 9.68 | 8.38 | 6.84 | 5.93 | 7.87 | 6.82 | 5.57 | 4.82 |
| H | 8.61 | 7.45 | 6.09 | 5.27 | 7.87 | 6.82 | 5.57 | 4.82 |
| VH | 7.51 | 6.50 | 5.31 | 4.60 | 7.87 | 6.82 | 5.57 | 4.82 |
| XH | 6.79 | 5.88 | 4.80 | 3.94 | 7.77 | 6.73 | 5.50 | 4.76 |

| Wind | 89LC95 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Light Roof | | | | Heavy Roof | | | |
| | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 12.74 | 11.03 | 9.01 | 7.80 | 10.36 | 8.98 | 7.33 | 6.35 |
| M | 12.74 | 11.03 | 9.01 | 7.80 | 10.36 | 8.98 | 7.33 | 6.35 |
| H | 11.33 | 9.81 | 8.01 | 6.94 | 10.36 | 8.98 | 7.33 | 6.35 |
| VH | 9.89 | 8.56 | 6.99 | 6.06 | 10.36 | 8.98 | 7.33 | 6.35 |
| XH | 8.94 | 7.75 | 6.32 | 5.15 | 10.23 | 8.86 | 7.24 | 6.267 |

6.6.2. Tables for 250mm Double Screwed Webbed Rafters - 1.5kPa Snow load

| 2 | 89LC75 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Maximum Spans for Rafter Spacing (m) for given Wind Zones | | | | | | | |
| | Light Roof | | | | Heavy Roof | | | |
| Wind | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 6.90 | 5.97 | 4.88 | 4.22 | 5.89 | 5.10 | 4.16 | 3.60 |
| M | 6.90 | 5.97 | 4.88 | 4.22 | 5.89 | 5.10 | 4.16 | 3.60 |
| H | 6.90 | 5.97 | 4.88 | 4.22 | 5.89 | 5.10 | 4.16 | 3.60 |
| VH | 6.27 | 5.43 | 4.43 | 3.84 | 5.89 | 5.10 | 4.16 | 3.60 |
| XH | 5.67 | 4.91 | 4.01 | 3.47 | 5.89 | 5.10 | 4.16 | 3.60 |

| Wind | 89LC95 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Light Roof | | | | Heavy Roof | | | |
| | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 9.04 | 7.86 | 6.42 | 5.56 | 7.75 | 6.71 | 5.48 | 4.75 |
| M | 9.04 | 7.86 | 6.42 | 5.56 | 7.75 | 6.71 | 5.48 | 4.75 |
| H | 9.04 | 7.86 | 6.42 | 5.56 | 7.75 | 6.71 | 5.48 | 4.75 |
| VH | 8.26 | 7.15 | 5.84 | 5.06 | 7.75 | 6.71 | 5.48 | 4.75 |
| XH | 7.47 | 6.47 | 5.28 | 4.57 | 7.75 | 6.71 | 5.48 | 4.746 |

6.6.2. Tables for 300mm Double Screwed Webbed Rafters - 1.5kPa Snow load

| 2 | 89LC75 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Maximum Spans for Rafter Spacing (m) for given Wind Zones | | | | | | | |
| | Light Roof | | | | Heavy Roof | | | |
| Wind | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 7.61 | 6.59 | 5.38 | 4.66 | 6.49 | 5.62 | 4.59 | 3.98 |
| M | 7.61 | 6.59 | 5.38 | 4.66 | 6.49 | 5.62 | 4.59 | 3.98 |
| H | 7.61 | 6.59 | 5.38 | 4.66 | 6.49 | 5.62 | 4.59 | 3.98 |
| VH | 6.92 | 5.99 | 4.89 | 4.24 | 6.49 | 5.62 | 4.59 | 3.98 |
| XH | 6.26 | 5.42 | 4.43 | 3.83 | 6.49 | 5.62 | 4.59 | 3.98 |

| Wind | 89LC95 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Light Roof | | | | Heavy Roof | | | |
| | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 10.02 | 8.67 | 7.08 | 6.13 | 8.55 | 7.41 | 6.05 | 5.24 |
| M | 10.02 | 8.67 | 7.08 | 6.13 | 8.55 | 7.41 | 6.05 | 5.24 |
| H | 10.02 | 8.67 | 7.08 | 6.13 | 8.55 | 7.41 | 6.05 | 5.24 |
| VH | 9.11 | 7.89 | 6.44 | 5.58 | 8.55 | 7.41 | 6.05 | 5.24 |
| XH | 8.24 | 7.14 | 5.83 | 5.05 | 8.55 | 7.41 | 6.05 | 5.236 |

6.6.2. Tables for 350mm Double Screwed Webbed Rafters - 1.5kPa Snow load

| 2 | 89LC75 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Maximum Spans for Rafter Spacing (m) for given Wind Zones | | | | | | | |
| | Light Roof | | | | Heavy Roof | | | |
| Wind | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 8.26 | 7.15 | 5.84 | 5.06 | 7.05 | 6.11 | 4.99 | 4.24 |
| M | 8.26 | 7.15 | 5.84 | 5.06 | 7.05 | 6.11 | 4.99 | 4.24 |
| H | 8.26 | 7.15 | 5.84 | 5.06 | 7.05 | 6.11 | 4.99 | 4.24 |
| VH | 7.51 | 6.50 | 5.31 | 4.60 | 7.05 | 6.11 | 4.99 | 4.24 |
| XH | 6.79 | 5.88 | 4.80 | 3.94 | 7.05 | 6.11 | 4.99 | 4.24 |

| Wind | 89LC95 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Light Roof | | | | Heavy Roof | | | |
| | 0.45 | 0.60 | 0.90 | 1.20 | 0.45 | 0.60 | 0.90 | 1.20 |
| L | 10.87 | 9.42 | 7.69 | 6.66 | 9.28 | 8.04 | 6.56 | 5.55 |
| M | 10.87 | 9.42 | 7.69 | 6.66 | 9.28 | 8.04 | 6.56 | 5.55 |
| H | 10.87 | 9.42 | 7.69 | 6.66 | 9.28 | 8.04 | 6.56 | 5.55 |
| VH | 9.89 | 8.56 | 6.99 | 6.06 | 9.28 | 8.04 | 6.56 | 5.55 |
| XH | 8.94 | 7.75 | 6.32 | 5.15 | 9.28 | 8.04 | 6.56 | 5.545 |

## 6.7. ROOF BATTENS

Roof battens (40RB55 see fig 2.9), span between trusses or rafters and provide direct support to the roof cladding. Fix using 2/10g x16 self-drilling Hex-Tek screws per connection.

Maximum spans and spacing of roof battens are described in the tables below.

Roof battens can be joined between supports with a 600mm overlap fixed both sides of "Tophat" at 300mm maximum centres.

Edge Zone of roof

Described as the area marked out 0.2w from the edge of the building (where 'w' is the width of the building), battens can be doubled-up if the need arises.

## 6.8. SPAN TABLES FOR ROOF BATTENS (LOW, MEDIUM, HIGH WIND ZONE)

| Roof Batten | 40RB55 | | | | Values for Low, Medium and High wind zones | | | |
|---|---|---|---|---|---|---|---|---|
| | NO SNOW LOAD | | | | | | | |
| | Light Roof | | | | Heavy Roof | | | |
| | Max. spans for spacing (mm) | | | | Max. spans for spacing (mm) | | | |
| | 400 | 600 | 900 | 1200 | 400 | 600 | 900 | 1200 |
| Continuous | 1250 | 1250 | 1250 | 1250 | 1250 | 1250 | 1225 | 1150 |
| End of run | 1150 | 1150 | 1125 | 1125 | 1125 | 1100 | 1075 | 1050 |
| Single Span | 1000 | 1000 | 1000 | 975 | 975 | 950 | 925 | 900 |
| | Edge Zone of roof | | | | | | | |
| | NO SNOW LOAD | | | | | | | |
| Continuous | 1250 | 1250 | 1250 | 1200 | 1250 | 1250 | 1225 | 1150 |
| End of run | 1150 | 1150 | 1125 | 1125 | 1125 | 1100 | 1075 | 1050 |
| Single Span | 1000 | 1000 | 1000 | 975 | 975 | 950 | 925 | 900 |
| | 1.0kPa SNOW LOAD | | | | | | | |
| Continuous | 1250 | 1250 | 1250 | 1250 | 1250 | 1250 | 1225 | 1050 |
| End of run | 1150 | 1150 | 1125 | 1125 | 1125 | 1100 | 1075 | 1050 |
| Single Span | 1000 | 1000 | 1000 | 975 | 975 | 950 | 925 | 900 |
| | Edge Zone of roof | | | | | | | |
| | 1.0kPa SNOW LOAD | | | | | | | |
| Continuous | 1250 | 1250 | 1250 | 1200 | 1250 | 1250 | 1225 | 1050 |
| End of run | 1150 | 1150 | 1125 | 1125 | 1125 | 1100 | 1075 | 1050 |
| Single Span | 1000 | 1000 | 1000 | 975 | 975 | 950 | 925 | 900 |
| | 1.5kPa SNOW LOAD | | | | | | | |
| Continuous | 1250 | 1250 | 1250 | 1075 | 1250 | 1250 | 1075 | 925 |
| End of run | 1150 | 1150 | 1125 | 1075 | 1125 | 1100 | 1075 | 925 |
| Single Span | 1000 | 1000 | 1000 | 975 | 975 | 950 | 925 | 850 |
| | Edge Zone of roof | | | | | | | |
| | 1.5kPa SNOW LOAD | | | | | | | |
| Continuous | 1250 | 1250 | 1250 | 1075 | 1250 | 1250 | 1075 | 925 |
| End of run | 1150 | 1150 | 1125 | 1075 | 1125 | 1100 | 1075 | 925 |
| Single Span | 1000 | 1000 | 1000 | 975 | 975 | 950 | 925 | 850 |

## 6.9. SPAN TABLES FOR ROOF BATTENS (VERY HIGH WIND ZONE)

| Roof Batten | 40RB55 | | | | Values for V/High wind zone | | | |
|---|---|---|---|---|---|---|---|---|
| | NO SNOW LOAD | | | | | | | |
| | Light Roof | | | | Heavy Roof | | | |
| | Max. spans for spacing (mm) | | | | Max. spans for spacing (mm) | | | |
| | 400 | 600 | 900 | 1200 | 400 | 600 | 900 | 1200 |
| Continuous | 1250 | 1250 | 1250 | 1225 | 1250 | 1250 | 1225 | 1075 |
| End of run | 1150 | 1150 | 1125 | 1125 | 1125 | 1100 | 1075 | 1050 |
| Single Span | 1000 | 1000 | 1000 | 975 | 975 | 950 | 925 | 900 |
| | Edge Zone of roof | | | | | | | |
| | NO SNOW LOAD | | | | | | | |
| Continuous | 1250 | 1250 | 1200 | 1025 | 1250 | 1250 | 1225 | 1075 |
| End of run | 1150 | 1150 | 1125 | 1025 | 1125 | 1100 | 1075 | 1050 |
| Single Span | 1000 | 1000 | 1000 | 950 | 975 | 950 | 925 | 900 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1.0kPa SNOW LOAD | | | | | | | |
| Continuous | 1250 | 1250 | 1250 | 1225 | 1250 | 1250 | 1225 | 1050 |
| End of run | 1150 | 1150 | 1125 | 1125 | 1125 | 1100 | 1075 | 1050 |
| Single Span | 1000 | 1000 | 1000 | 975 | 975 | 950 | 925 | 900 |
| | Edge Zone of roof | | | | | | | |
| | 1.0kPa SNOW LOAD | | | | | | | |
| Continuous | 1250 | 1250 | 1200 | 1025 | 1250 | 1250 | 1225 | 1050 |
| End of run | 1150 | 1150 | 1125 | 1025 | 1125 | 1100 | 1075 | 1050 |
| Single Span | 1000 | 1000 | 1000 | 950 | 975 | 950 | 925 | 900 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1.5kPa SNOW LOAD | | | | | | | |
| Continuous | 1250 | 1250 | 1250 | 1075 | 1250 | 1250 | 1075 | 925 |
| End of run | 1150 | 1150 | 1125 | 1075 | 1125 | 1100 | 1075 | 925 |
| Single Span | 1000 | 1000 | 1000 | 975 | 975 | 950 | 925 | 850 |
| | Edge Zone of roof | | | | | | | |
| | 1.5kPa SNOW LOAD | | | | | | | |
| Continuous | 1250 | 1250 | 1200 | 1025 | 1250 | 1250 | 1075 | 925 |
| End of run | 1150 | 1150 | 1125 | 1025 | 1125 | 1100 | 1075 | 925 |
| Single Span | 1000 | 1000 | 1000 | 950 | 975 | 950 | 925 | 850 |

## 6.10. SPAN TABLES FOR ROOF BATTENS (EXTRA HIGH WIND ZONE)

| Roof Batten | 40RB55 | | | | Values for Extra High wind zone | | | |
|---|---|---|---|---|---|---|---|---|
| | NO SNOW LOAD | | | | | | | |
| | Light Roof | | | | Heavy Roof | | | |
| | Max. spans for spacing (mm) | | | | Max. spans for spacing (mm) | | | |
| | 400 | 600 | 900 | 1200 | 400 | 600 | 900 | 1200 |
| Continuous | 1250 | 1250 | 1250 | 1100 | 1250 | 1250 | 1175 | 1025 |
| End of run | 1150 | 1150 | 1125 | 1100 | 1125 | 1100 | 1075 | 1025 |
| Single Span | 1000 | 1000 | 1000 | 975 | 975 | 950 | 925 | 900 |
| | Edge Zone of roof | | | | | | | |
| | NO SNOW LOAD | | | | | | | |
| Continuous | 1250 | 1250 | 1075 | 925 | 1250 | 1250 | 1175 | 1025 |
| End of run | 1150 | 1150 | 1075 | 925 | 1125 | 1100 | 1075 | 1025 |
| Single Span | 1000 | 1000 | 1000 | 850 | 975 | 950 | 925 | 900 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1.0kPa SNOW LOAD | | | | | | | |
| Continuous | 1250 | 1250 | 1250 | 1100 | 1250 | 1250 | 1175 | 1025 |
| End of run | 1150 | 1150 | 1125 | 1100 | 1125 | 1100 | 1075 | 1025 |
| Single Span | 1000 | 1000 | 1000 | 975 | 975 | 950 | 925 | 900 |
| | Edge Zone of roof | | | | | | | |
| | 1.0kPa SNOW LOAD | | | | | | | |
| Continuous | 1250 | 1250 | 1075 | 925 | 1250 | 1250 | 1175 | 1025 |
| End of run | 1150 | 1150 | 1075 | 925 | 1125 | 1100 | 1075 | 1025 |
| Single Span | 1000 | 1000 | 1000 | 850 | 975 | 950 | 925 | 900 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1.5kPa SNOW LOAD | | | | | | | |
| Continuous | 1250 | 1250 | 1250 | 1075 | 1250 | 1250 | 1075 | 925 |
| End of run | 1150 | 1150 | 1125 | 1075 | 1125 | 1100 | 1075 | 925 |
| Single Span | 1000 | 1000 | 1000 | 975 | 975 | 950 | 925 | 850 |
| | Edge Zone of roof | | | | | | | |
| | 1.5kPa SNOW LOAD | | | | | | | |
| Continuous | 1250 | 1250 | 1075 | 925 | 1250 | 1250 | 1075 | 925 |
| End of run | 1150 | 1150 | 1075 | 925 | 1125 | 1100 | 1075 | 925 |
| Single Span | 1000 | 1000 | 1000 | 850 | 975 | 950 | 925 | 850 |

## 6.11. CEILING BATTENS

Ceiling battens (20CB55 see fig. 2.10), can be joined in a similar manner to 7.7. Roof Battens above, between supports with a 300mm overlap fixed both sides of “Tophat” at 150mm maximum centres.

The Maximum Span of ceiling battens is 1200mm in a continuous run.

# APPENDIX A



NEW ZEALAND STEEL

Axxis® STEEL FOR FRAMING

## DURABILITY STATEMENT

## Axxis® steel for framing

Axxis® steel used for framing will have a durability of 50 years when used and maintained as referred to below.

**Scope:**

Residential and similar types of construction (including fully enclosed offices, apartment buildings and school classrooms) erected in New Zealand with a minimum 50 year design life.

Axxis® steel for framing used for wall framing, roof framing and mid floors within a closed building envelope will achieve the 50 year durability requirement of New Zealand Building Code Clause B2 Durability when it is located in a lined dry internal environment, with an effective thermal break used with roof and wall frames in accordance with NASH N11 House Insulation Guide.

All other applications including sub-floor framing, battens, purlins and girts are excluded from this Durability Statement and are covered by the Galvsteel™ (galvanised steel) Durability Statement available on request from New Zealand Steel.

This Durability Statement does not apply to any composite wall or composite roof systems whether or not the system includes AXXIS® steel. Composite systems include AXXIS® steel embedded into concrete panels.

**The above statements are subject to the following:**

**1. Specifications**

| | |
|---|---|
| Zinc coating weight; | 275g/m² (Z275). |
| Complying with; | AS 1397:2011. |
| Steel grade; | G250, G300, G450, G500 and G550. |
| Steel thickness range; | 0.55mm to 1.55mm. |
| Bend diameter; | G250 & G300 ≥2T<br>G450, G500 & G550 ≥6T<br>(where T = total coated thickness). |

**2. Fixing, Handling and Maintenance according to the following publications:**

a) New Zealand Steel Limited, *Specifiers and Builders Guide,* and *Installers Guide* (refer www.nzsteel.co.nz for most current version).
b) *NZ Metal Roof & Wall Cladding, Code of Practice,* (refer www.metalroofing.org.nz for most current version and updates).
c) Instructions and literature published by individual purlin and steel framing manufacturers.
d) NASH Handbook Best Practice for Design and Construction of Residential and Low-Rise Steel Framing
e) NASH N11 House Insulation Guide.- Version 2.2 – April 2012.

**3. Additional Fixing, Handling and Design Requirements.**

a) The bottom plate detail must ensure that the bottom plate remains dry in service and is not subject to water ingress from internal or external sources. Damp-proof course (DPC) must be used and be at least 10mm wider than the steel building element.
b) Separation methods as described in the NZMRM Code of Practice 2.7 are required between AXXIS® steel and any incompatible materials which include, but are not limited to, timber treated with copper based preservative, concrete, copper and other dissimilar metals and also materials which may be moisture bearing during the life of the building.
c) Site storage conditions must ensure that the Axxis® steel for framing is kept dry when in a stacked condition and must be free of corrosion prior to installation.
d) Prior to installation of external and internal linings AXXIS® steel for framing must be clean, dry, corrosion free, clear of debris and swarf.
e) During storage and erection the Axxis® steel for Framing must be kept as dry as possible and the building closed in as soon as practicable to limit exposure to the elements. (As a guide, this should be within 3 weeks in marine or geothermal environments and within 12 weeks in moderate environments.)
f) AXXIS® steel used in frames must be carried and not dragged when being moved.
g) AXXIS® steel must not be exposed to spatter from any welding activity.
h) Wall wraps and roof underlays must comply with the requirements of NZS2295:2006 *Pliable, permeable building underlays* for use with steel framing.

**4. Maintenance**

Regular inspections of accessible AXXIS® steel roof framing must be carried out and at the first sign of a breakdown of the galvanising coating, maintenance undertaken as described below will extend the durability of the sections.

# APPENDIX B

**BRANZ Appraised**
Appraisal No.687 [2010]

BRANZ Appraisals

Technical Assessments of products for building and construction

**BRANZ APPRAISAL No. 687 (2010)**

Amended 17 June 2013

**FORTRESS BOTTOM PLATE ANCHORS**

**Manufacturing Suppliers Limited**
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WFTAO

## Product

1.1 Fortress Bottom Plate Anchors are used to resist earthquake and wind loads on the bottom plates of timber frame buildings designed and constructed in accordance with NZS 3604. The range consists of screw-type and wedge-type anchors for proprietary bracing systems hold downs to concrete slab-on-ground construction. They are also for fixing non-bracing internal and external walls to concrete slab-on-ground.

FORTRESS® FASTENERS

## Scope

2.1 The Fortress Bottom Plate Anchors have been appraised for use as wall bracing system hold downs and bottom plate fixings to concrete slab-on-ground in buildings designed and constructed in accordance with NZS 3604. They are for use in internal, dry, protected environments.

## Building Regulations

### New Zealand Building Code (NZBC)

**3.1 In the opinion of BRANZ, the Fortress Bottom Plate Anchors, if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:**

**Clause B1 STRUCTURE:** Performance B1.3.1, B1.3.2 and B1.3.4. The Fortress Bottom Plate Anchors meet these requirements for loads from imposed gravity loads arising from use, earthquake, snow, wind and impact [i.e. B1.3.3 (b), (f), (g), (h), and (j)]. See Paragraphs 8.1 - 8.2.

**Clause B2 DURABILITY:** Performance B2.3.1 (a) not less than 50 years. The Fortress Bottom Plate Anchors meet this requirement. See Paragraph 9.1.

**Clause F2 HAZARDOUS BUILDING MATERIALS:** Performance F2.3.1. The Fortress Bottom Plate Anchors meet this requirement and will not present a health hazard to people.

3.2 This is an appraisal of an **Alternative Solution** in terms of New Zealand Building Code compliance when used with proprietary bracing systems.

3.3 This is an appraisal of an **Acceptable Solution** in terms of New Zealand Building Code compliance. The Fortress Bottom Plate Anchors meet the requirements of Section 7.5.12 of NZS 3604 which is a NZBC Compliance Document.

## Technical Specification

### Description

4.1 The following fasteners are covered by this Appraisal:

**Fortress 12 x 150 Screw Bolt**

The screw bolts are manufactured from steel and are coated with a nominal 5 micron zinc layer. The screw anchor has a hexagonal head and a nominal shank diameter of 12 mm. The under-head anchor or shank length is 150 mm. They are identified with "F 12 x 150" stamped on the head.

**Fortress 10 x 120 Screw Bolt**

The screw bolts are manufactured from steel and are coated with a nominal 5 micron zinc layer. The screw anchor has a hexagonal head and a nominal shank diameter of 10 mm. The under-head anchor or shank length is 120 mm. They are identified with "F 10 x 120" stamped on the head.

**Fortress 12 x 135 Through Bolt**

The wedge anchor rods are manufactured from steel and are coated with a nominal 45 micron zinc layer. The wedge is manufactured from grade 316 stainless steel.

**Fortress 12 x 120 Through Bolt**

The wedge anchor rods are manufactured from steel and are coated with a nominal 45 micron zinc layer. The wedge is manufactured from grade 316 stainless steel. These fasteners have only been assessed for use with internal walls. They have not been assessed for use as hold down fixings for proprietary bracing systems.

### Handling and Storage

5.1 Fortress Bottom Plate Anchors should be stored in a clean, dry area until they are used. Their exposure to the elements after installation should be kept to a minimum. Closing the building in within the required time to protect the framing timber from the environment will be suitable.

## Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for the Fortress Bottom Plate Anchors. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

## Design Information

### General

7.1 The Fortress Bottom Plate Anchors are concrete fasteners used to resist earthquake and wind loads on timber frame buildings designed and constructed in accordance with NZS 3604. They are for fixing the bottom plates of walls to concrete slab-on-ground construction. They include fasteners for in situ concrete foundation edge detail, concrete masonry foundation edge detail and internal slab detail.

**Proprietary Bracing Systems**

7.2 The Fortress Bottom Plate Anchors are for use as hold downs for proprietary bracing systems rated up to 150 BU/m (bracing units per metre) for the Fortress 12 x 150 screw bolt and the Fortress 12 x 135 through bolt, and bracing systems rated up to 120 BU/m (bracing units per metre) for the Fortress 10 x 120 screw bolt, as described in Table 1.

**Formed Concrete Foundations**

7.3 When Fortress Bottom Plate Anchors are used as fixings for external walls with formed concrete foundations the minimum concrete strength must be 17.5 MPa in Zone B, 20 MPa in Zone C and 25 MPa in Zone D (refer 4.8.2 of NZS 3604). These concrete strength requirements are as prescribed by NZS 3604 and are not a special requirement for Fortress Bottom Plate Anchors.

**Concrete Masonry Header Block Foundations**

7.4 In Zone D, as defined by NZS 3604, insufficient cover is able to be achieved and so Fortress Bottom Plate Anchors must not be used in external walls in concrete masonry header block foundations.

7.5 When Fortress 12 x 150 screw bolts are used as fixings for external walls with concrete masonry header block foundations in Zone B as defined by NZS 3604, then the minimum grout/concrete strength is 17.5 MPa. In Zone C the minimum grout/concrete srength is 20MPa. Fortress 10 x 120 Screw Bolts and Fortress 12 x 135 Through Bolts have not been assessed for use with concrete masonry header block foundations.

**Internal Walls**

7.6 When Fortress Bottom Plate Anchors are used as fixings for internal walls the minimum concrete strength is 17.5 MPa.

7.7 Holes that are drilled for the fasteners must be 10 mm deeper than their embedment depth. Care should be taken as this may require slab thickening in some situations, and this must be taken into account when the slab is laid.

### Structure

**Bracing systems hold downs**

8.1 The Fortress Bottom Plate Anchors may be used for proprietary bracing systems hold down bolts to concrete slab-on-ground construction. The maximum characteristic uplift strengths for the fasteners are given in Table 1. The Technical Literature of the proprietary bracing system must be referenced to determine the required hold down characteristic strength for the bracing elements.

**NZS 3604 Fixing of Timber**

8.2 Table 2 gives the maximum fastener spacing allowed for the Fortress Bottom Plate Anchors to meet the requirements of NZS 3604 Paragraphs 7.5.12.3 and 7.5.12.4.

### Durability

**Serviceable Life**

9.1 The Fortress Bottom Plate Anchors are expected to have a serviceable life of at least 50 years, provided they are designed, used, installed and maintained in accordance with this Appraisal and the Technical Literature.

**Table 1: Bracing hold-down characteristic tensile strengths**

| Fastener | Wall Type | Characteristic Strength | Maximum BU/m | Minimum Embedment Depth |
|---|---|---|---|---|
| Fortress 10 x 120 Screw Bolt | Internal wall | 11 kN | 120 | 70 mm |
| | External wall - formed concrete foundation | 11 kN | 120 | |
| | External wall - masonry header block foundation | Not Tested | Not Tested | |
| Fortress 12 x 150 Screw Bolt | Internal wall* | 15 kN | 150 | 100 mm |
| | External wall - formed concrete foundation | 15 kN | 150 | |
| | External wall - masonry header block foundation | 15 kN | 150 | |
| Fortress 12 x 135 Through Bolt | Internal wall | 15 kN | 150 | 65 mm |
| | External wall - formed concrete foundation | 15 kN | 150 | |
| | External wall - masonry header block foundation | Not Tested | Not Tested | |

* Slab thickening required

**Table 2: Bottom plate fastener spacings**

| Fastener | Wall Type | Maximum Fastener Spacing | Minimum Edge Distance* | Minimum Embedment Depth |
|---|---|---|---|---|
| Fortress 10 x 120 | Internal wall | 900 mm | 60 mm | 70 mm |
| | External wall - formed concrete foundation | 900 mm | | |
| | External wall - masonry header block foundation | 600 mm | | |
| Fortress 12 x 150 | Internal wall** | 900 mm | 60 mm | 100 mm |
| | External wall - formed concrete foundation | 900 mm | | |
| | External wall - masonry header block foundation | 900 mm | | |
| Fortress 12 x 135 Through Bolt | Internal wall | 900 mm | 60 mm | 65 mm |
| | External wall - formed concrete foundation | 900 mm | | |
| | External wall - masonry header block foundation | 600 mm | | |
| Fortress 12 x 120 Through Bolt | Internal Wall | 900 mm | N/A | 50 mm |

*This edge distance is to the centre of the fastener (which is 55 mm cover).
** Slab thickening required.

### Maintenance

10.1 The Fortress Bottom Plate Anchors will not normally require maintenance. However, if damage occurs to the cladding or lining covering the Fortress Bottom Plate Anchors, then repairs or replacement of the cladding or lining must be carried out to ensure the integrity of the Bracing System.

### External and Internal Moisture

11.1 The Fortress Bottom Plate Anchors are protected from moisture by the exterior cladding and internal lining systems of the building, which must meet the provisions of NZBC Clause E2 and Clause E3.

## Installation Information

### Installation Skill Level Requirement

12.1 Installation of the Fortress Bottom Plate Anchors can be carried out by any competent building contractor.

### Fastener Installation

13.1 The Fortress Bottom Plate Anchors must be installed in accordance with the Technical Literature.

13.2 Fortress Bottom Plate Anchors are installed by drilling a hole into the concrete of a diameter and to the depth specified in the Technical Literature and tightening up the anchor with a torque wrench to the required load given in the Installation Instructions.

13.3 Prior to wall lining application, when all timber framing moisture content is 20% or less, as required by the wall lining manufacturer, fasteners must be checked for tightness.

### Inspections

14.1 The Technical Literature of Fortress Bottom Plate Anchors and the bracing system proprietor must be referred to during the inspection of installations.

14.2 Critical areas of inspection for wall bracing systems are:

- The bracing schedule; and,
- Bracing rating and fastener strength; and,
- Hold down fastener type by checking the markings on the top of the anchor; and,
- Edge detail and distance; and,
- Fasteners are not to be used in header block foundations in Zone D as defined in NZS 3604.

## Health and Safety

15.1 Suitable precautions should be taken when drilling concrete to prevent the inhalation of concrete dust. Care should also be taken when using power tools.

## Basis of Appraisal

The following is a summary of the technical investigations carried out:

### Tests

16.1 Testing of the Fortress Bottom Plate Anchors was carried out by BRANZ in accordance with BRANZ Evaluation Method EM1 (1999), as required by NZS 3604.

### Other Investigations

17.1 Structural and durability assessments have been provided by BRANZ technical experts.

17.2 Observations have been made by BRANZ to assess the practicability of installation, and to examine completed installations.

17.3 The Technical Literature has been examined by BRANZ and found to be satisfactory.

### Quality

18.1 The manufacture of Fortress Bottom Plate Anchors has not been examined by BRANZ, but details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory. BRANZ carries out random sampling and testing of the Fortress Bottom Plate Anchors to ensure ongoing quality.

18.2 The quality of Fortress Bottom Plate Anchors supplied is the responsibility of Manufacturing Suppliers Limited.

18.3 Designers are responsible for the design of buildings incorporating the Fortress Bottom Plate Anchors and the proprietary bracing systems.

18.4 The building contractors are responsible for the quality of construction of the building structure in accordance with the Technical Literature.

18.5 Building owners are responsible for the maintenance of wall claddings and linings as applicable so that the Fortress Bottom Plate Anchors remain protected during their service life.

### Sources of Information

- BRANZ Evaluation Method EM1 Method for Evaluating the Strength and Stiffness of Structural Joints, 1999.
- NZS 3604:2011 Timber-framed buildings.
- Ministry of Business, Innovation and Employment Record of Amendments for Compliance Documents and Handbooks.
- The Building Regulations 1992.

**Amendment No. 1, dated 18 February 2011.**
This Appraisal has been amended to update fastener spacings.
**Amendment No. 2, dated 31 January 2012.**
This Appraisal has been amended to update clause changes as required by the introduction of NZS 3604: 2011.
**Amendment No. 3, dated 17 June 2013.**
This Appraisal has been amended to include the Fortress 12 x 135 Through Bolt and 12 x 120 Through Bolt.

BRANZ

**In the opinion of BRANZ, Fortress Bottom Plate Anchors are fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided they are used, designed, installed and maintained as set out in this Appraisal.**
**The Appraisal is issued only to Manufacturing Suppliers Limited, and is valid until further notice, subject to the Conditions of Appraisal.**

### Conditions of Appraisal

1. This Appraisal:
a) relates only to the product as described herein;
b) must be read, considered and used in full together with the technical literature;
c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
d) is copyright of BRANZ.
2. Manufacturing Suppliers Limited:
a) continues to have the product reviewed by BRANZ;
b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
c) abides by the BRANZ Appraisals Services Terms and Conditions.
d) Warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
3. BRANZ makes no representation or warranty as to:
a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
c) any guarantee or warranty offered by Manufacturing Suppliers Limited.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to Manufacturing Suppliers Limited or any third party.

For BRANZ

P Burghout
Chief Executive

Date of issue: 29 April 2010

# APPENDIX C

## 6.12. TOLERANCES

### 6.12.1. Section tolerances

a) Material thickness must conform to AS/NZS 1365.
b) Tolerances of sections, assuming design thickness, must be determined such that the relevant actual sectional properties are not more than ±5% from the design section properties.
c) Tolerances appropriate for particular sections must be specified to comply with the above.

### 6.12.2. Member length

The length of a component must not deviate from its specified length by more than ± 2mm.

### 6.12.3. Member straightness

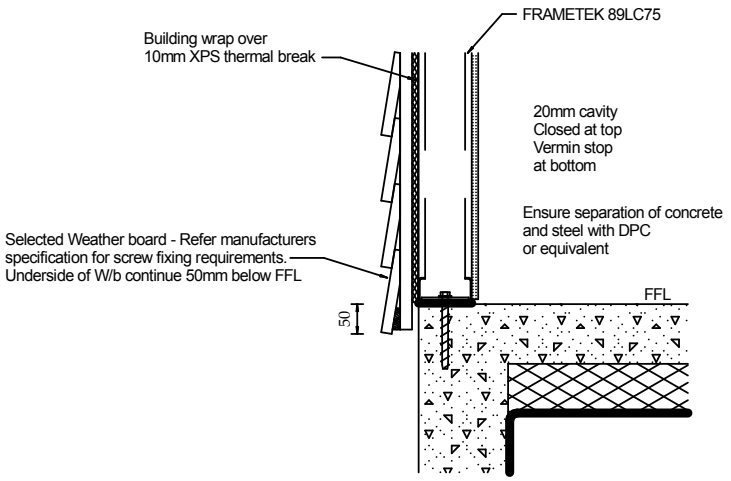
A component specified as straight, must not deviate about any axis from a straight line drawn between the end points by an amount exceeding 1/1000 or 1mm/m whichever is greater.

### 6.12.4. Assembly

Assembled wall panels must not deviate from the specified dimension by more than:

- Length ± 4mm.
- Height ± 2mm.

## 6.13. FRAMING DETAILS




FRAMETEK 89LC75

Standard nominal 89x41mm steel framing

"Lipped Channel"

0.75mm nominal steel thickness zinc coated to -
G550 Z275 for BMT 0.42 ~ 1.0mm
G500 Z275 for BMT 1.2mm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Drawing Title:
Weatherboard
Bottom Plate to Slab

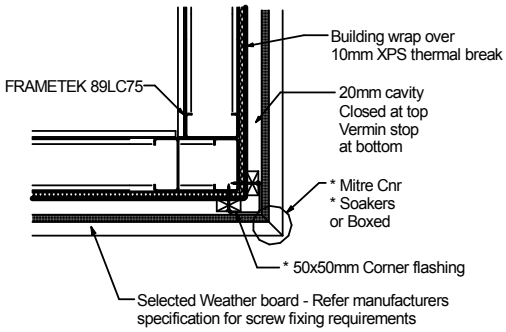
Drawn: RBH

Date: 30-06-2015

Scale: NTS

Sheet No.

# External Corner Detail

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Drawing Title:
Weatherboard
External Corner

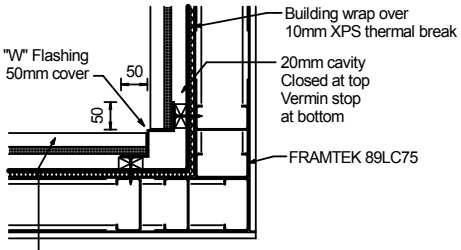
Drawn: RBH

Date: 30-06-2015

Scale: NTS

Sheet No.

# Internal Corner Detail

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Drawing Title:
Weatherboard
Internal Corner

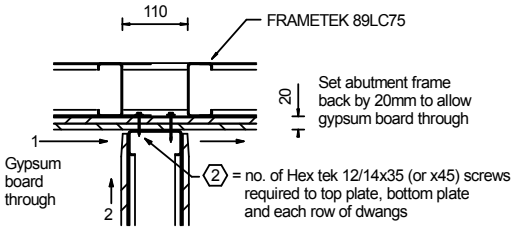
Drawn: RBH

Date: 30-06-2015

Scale: NTS

Sheet No.

# Fire Wall Junction

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Drawing Title:
Details - Fire wall (per tenancy)

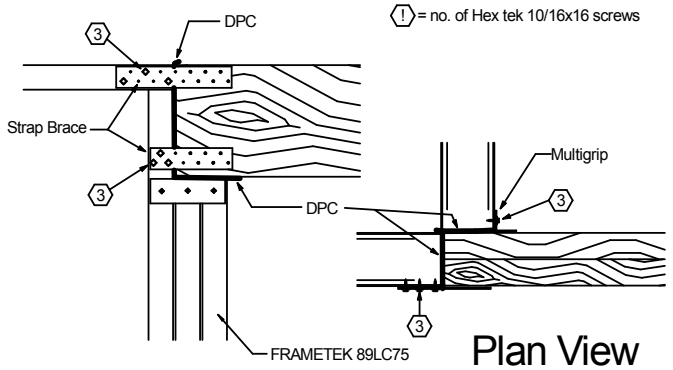
Drawn: RBH

Date: 30-06-2015

Scale: NTS

Sheet No.

# Typical Timber Beam to Steel Detail




Plan View

FRAMETEK 89LC75

Standard nominal 89x41mm steel framing

"Lipped Channel"

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Drawing Title:
Details - Timber Beam Pocket

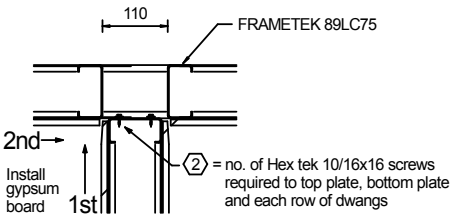
Drawn: RBH

Date: 30-06-2015

Scale: NTS

Sheet No.

# Wall Junction

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Drawing Title:
Details - Wall Junction -1

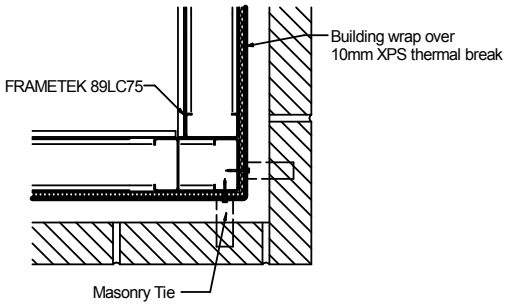
Drawn: RBH

Date: 30-06-2015

Scale: NTS

Sheet No.

## External Corner Detail

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Drawing Title:
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External Corner

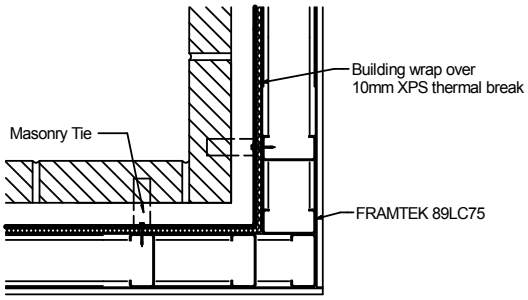
Drawn: RBH

Date: 30-06-2015

Scale: NTS

Sheet No.

# Internal Corner Detail

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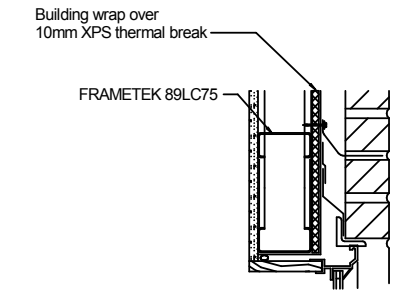
Drawing Title:
Masonry Veneer
Internal Corner

Drawn: RBH

Date: 30-06-2015

Scale: NTS

Sheet No.

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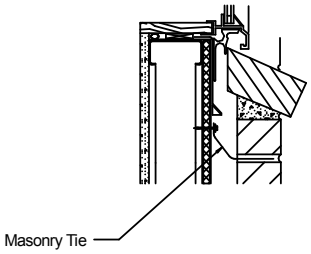


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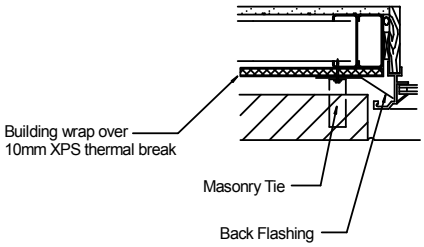


Jamb

FRAMETEK 89LC75

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Drawing Title:
Masonry Veneer
Head, Cill & Jamb

Drawn: RBH

Date: 30-06-2015

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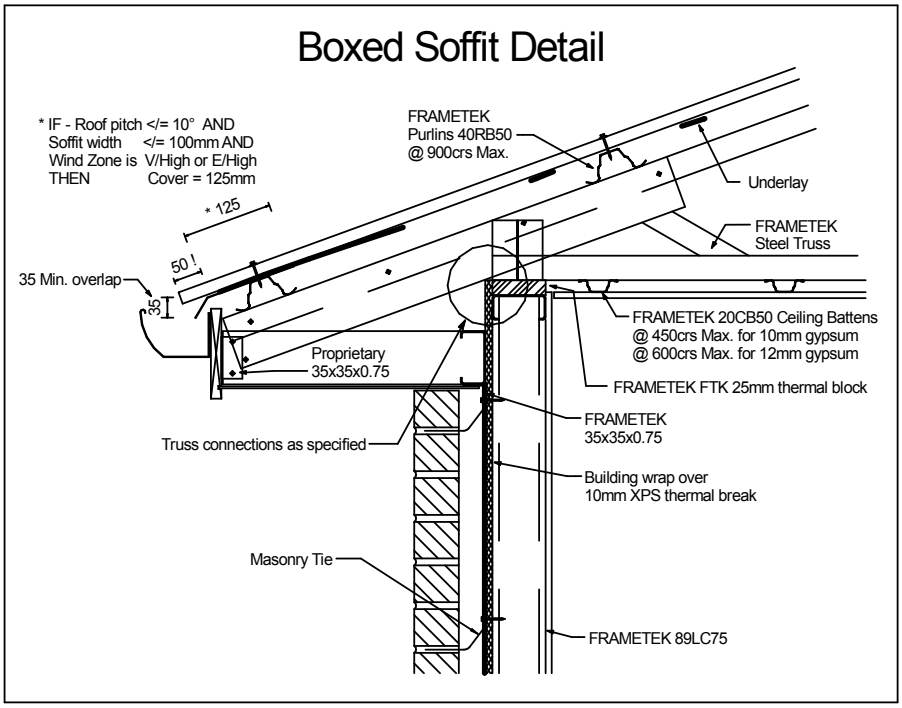
Sheet No.

# Boxed Soffit Detail

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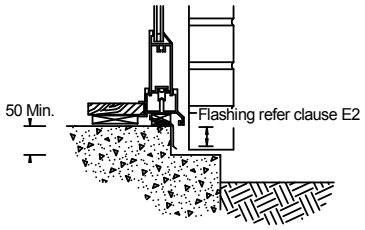
Drawing Title:
Masonry Veneer
Boxed Soffit

Drawn: RBH

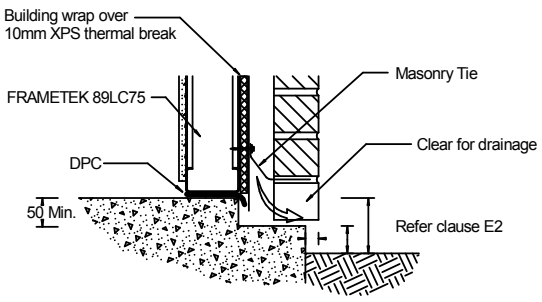
Date: 30-06-2015

Scale: NTS

Sheet No.




## Door Cill




## Masonry Rebate

FRAMETEK 89LC75

Standard nominal 89x41mm steel framing

"Lipped Channel"

0.75mm nominal steel thickness zinc coated to -
G550 Z275 for BMT 0.42 ~ 1.0mm
G500 Z275 for BMT 1.2mm

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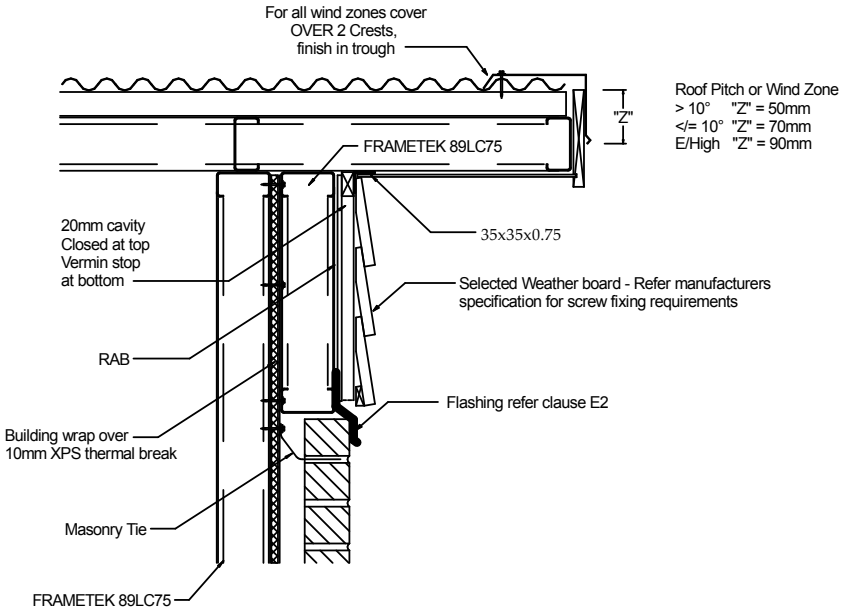
Drawing Title:
Masonry Veneer to Concrete Slab

Drawn: RBH

Date: 30-06-2015

Scale: NTS

Sheet No.




# Masonry Veneer to Weatherboard Detail

FRAMETEK 89LC75

Standard nominal 89x41mm steel framing

"Lipped Channel"

0.75mm nominal steel thickness zinc coated to -
G550 Z275 for BMT 0.42 ~ 1.0mm
G500 Z275 for BMT 1.2mm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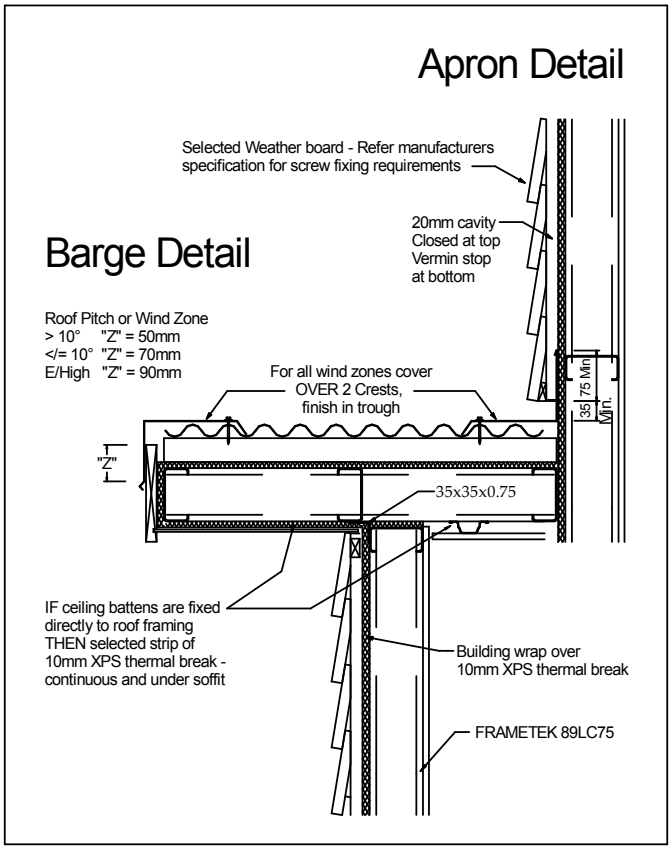
Drawing Title:
Masonry Veneer to Weatherboard Gable

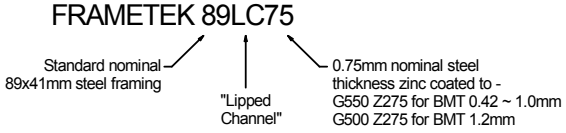
Drawn: RBH

Date: 30-06-2015

Scale: NTS

Sheet No.

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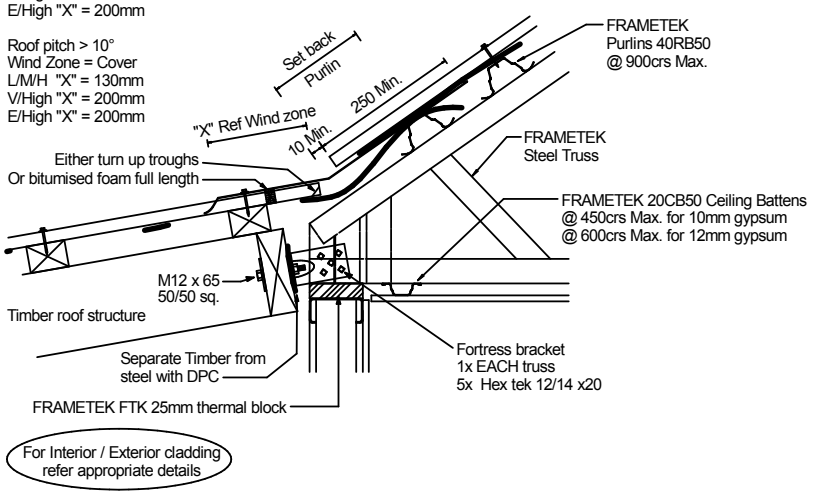
Drawing Title:
Weatherboard
Apron and Barge

Drawn: RBH
Date: 30-06-2015
Scale: NTS
Sheet No.

# Change of Pitch Detail - Timber/Steel

Roof pitch </= 10°
Wind Zone = Cover
L/M/H "X" = 200mm
V/High "X" = 200mm
E/High "X" = 200mm

Roof pitch > 10°
Wind Zone = Cover
L/M/H "X" = 130mm
V/High "X" = 200mm
E/High "X" = 200mm




For Interior / Exterior cladding
refer appropriate details

FRAMETEK 89LC75

Standard nominal
89x41mm steel framing

"Lipped
Channel"

0.75mm nominal steel
thickness zinc coated to -
G550 Z275 for BMT 0.42 ~ 1.0mm
G500 Z275 for BMT 1.2mm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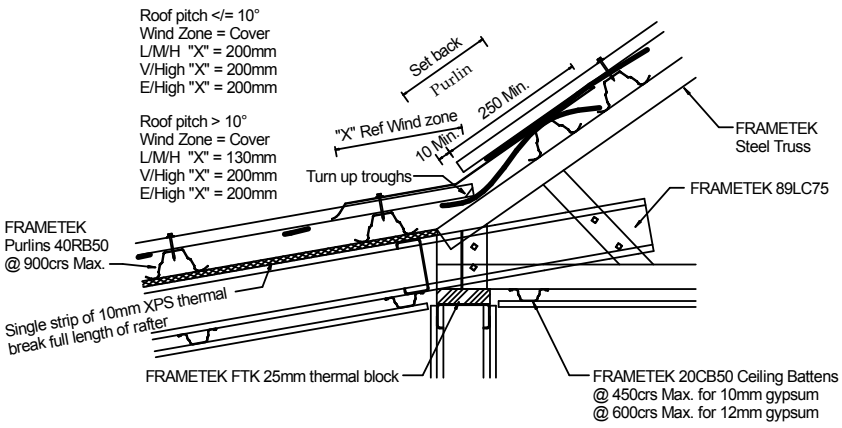
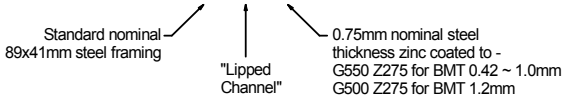
Drawing Title:
Details - Change of Pitch
Timber ~ Steel

Drawn: RBH
Date: 30-06-2015
Scale: NTS
Sheet No.

# Change of Pitch Detail




## FRAMETEK 89LC75




| Frametek Steel Framing Specialists | Drawing Title: | Drawn: | Sheet No. |
|---|---|---|---|
| www.frametek.co.nz | Details - Change of Pitch | RBH | |
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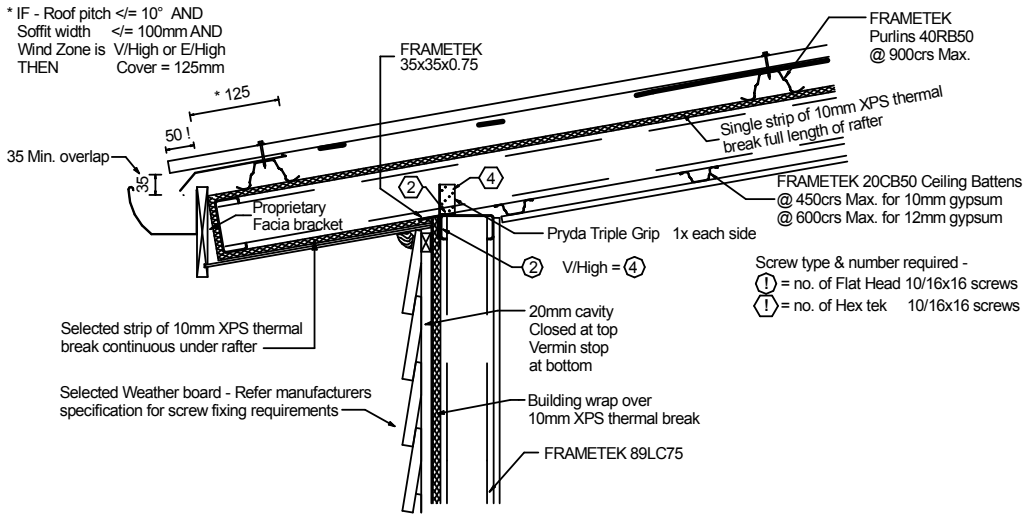
| Auckland Factory: 48 Fairfax Avenue, Auckland, NZ, (09) 972 1459 | | Scale: NTS | |
| Invercargill Factory: 183A Bond Street, Invercargill, NZ, (03) 214 9066 | | | |

# Rafter / Wall Detail




## FRAMETEK 89LC75

Standard nominal 89x41mm steel framing

"Lipped Channel"

0.75mm nominal steel thickness zinc coated to -
G550 Z275 for BMT 0.42 ~ 1.0mm
G500 Z275 for BMT 1.2mm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Drawing Title:
Weatherboard
Rafter / Lower Wall

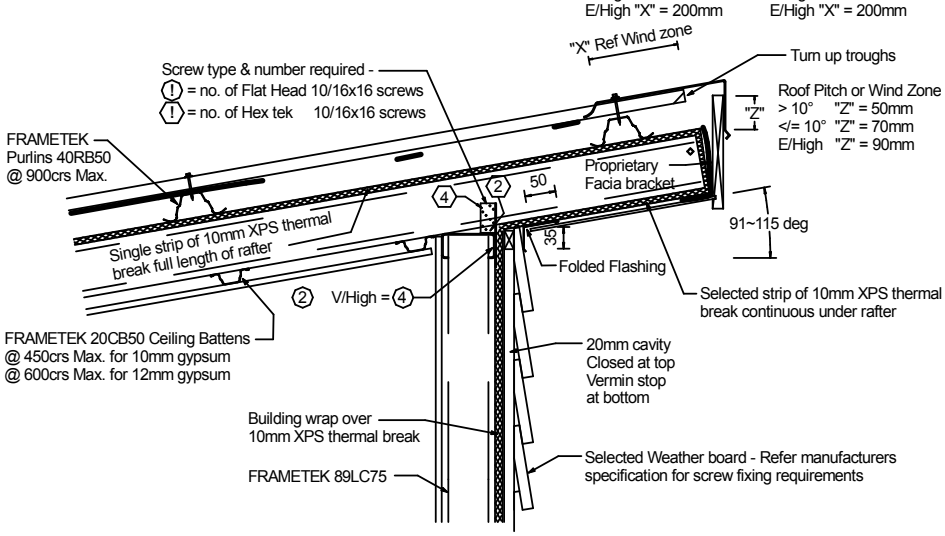
Drawn: RBH

Date: 30-06-2015

Scale: NTS

Sheet No.

# Rafter / Wall Detail




## FRAMETEK 89LC75

Standard nominal 89x41mm steel framing

"Lipped Channel"

0.75mm nominal steel thickness zinc coated to -
G550 Z275 for BMT 0.42 ~ 1.0mm
G500 Z275 for BMT 1.2mm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Drawing Title:
Weatherboard
Rafter to Upper Wall

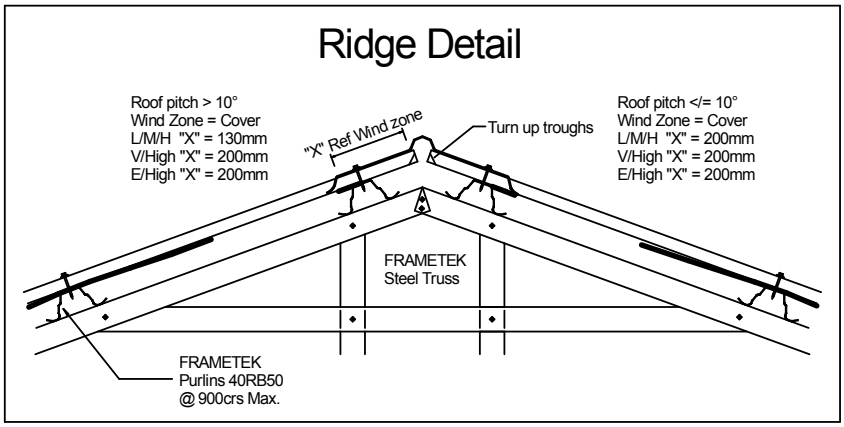
Drawn: RBH

Date: 30-06-2015

Scale: NTS

Sheet No.

# Ridge Detail





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Drawing Title:
Details - Ridge

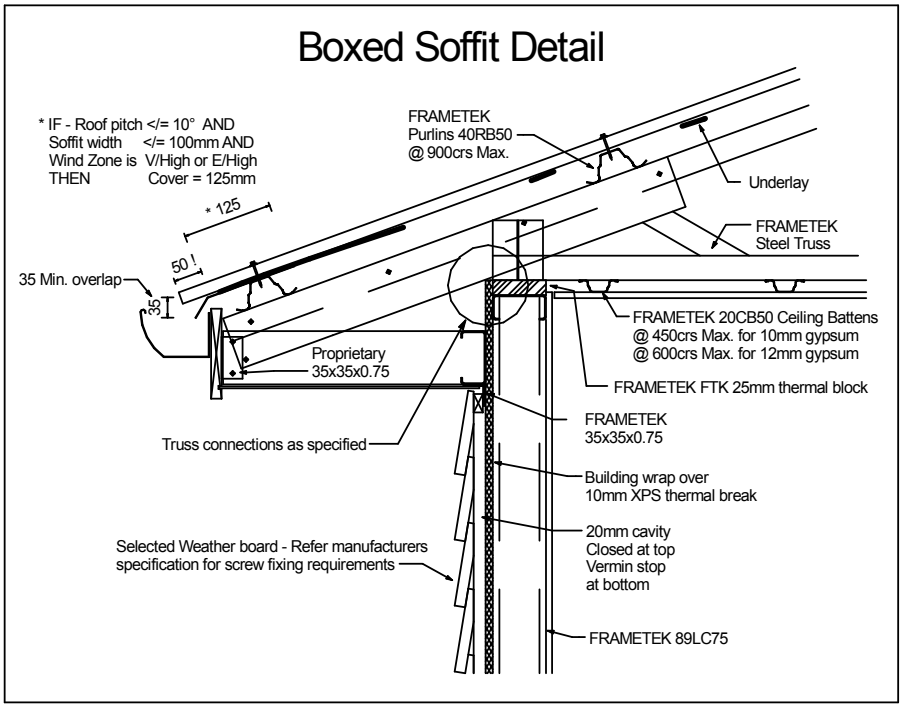
Drawn: RBH

Date: 30-06-2015

Scale: NTS

Sheet No.

# Boxed Soffit Detail




## FRAMETEK 89LC75

Standard nominal 89x41mm steel framing

"Lipped Channel"

0.75mm nominal steel thickness zinc coated to -
G550 Z275 for BMT 0.42 ~ 1.0mm
G500 Z275 for BMT 1.2mm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Drawing Title:
Weatherboard
Boxed Soffit

Drawn: RBH

Date: 30-06-2015

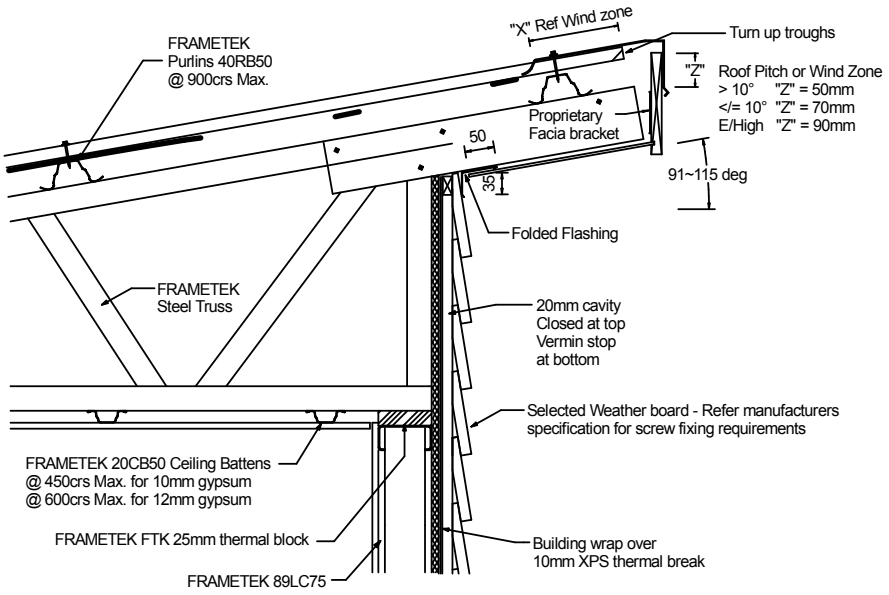
Scale: NTS

Sheet No.

# Mono Truss Soffit Detail

Roof pitch > 10°
Wind Zone = Cover
L/M/H "X" = 130mm
V/High "X" = 200mm
E/High "X" = 200mm

Roof pitch </= 10°
Wind Zone = Cover
L/M/H "X" = 200mm
V/High "X" = 200mm
E/High "X" = 200mm




## FRAMETEK 89LC75

Standard nominal
89x41mm steel framing

"Lipped
Channel"

0.75mm nominal steel
thickness zinc coated to -
G550 Z275 for BMT 0.42 ~ 1.0mm
G500 Z275 for BMT 1.2mm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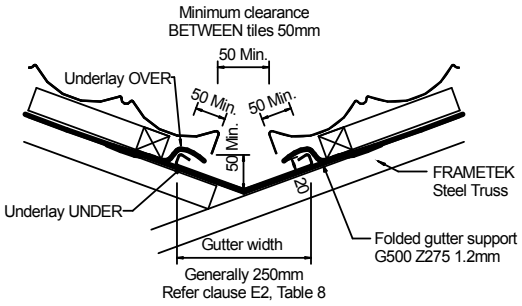
Drawing Title:
Weatherboard
Mono Truss Top End Soffit

Drawn: RBH
Date: 30-06-2015
Scale: NTS
Sheet No.

# Valley Detail for Metal Tile





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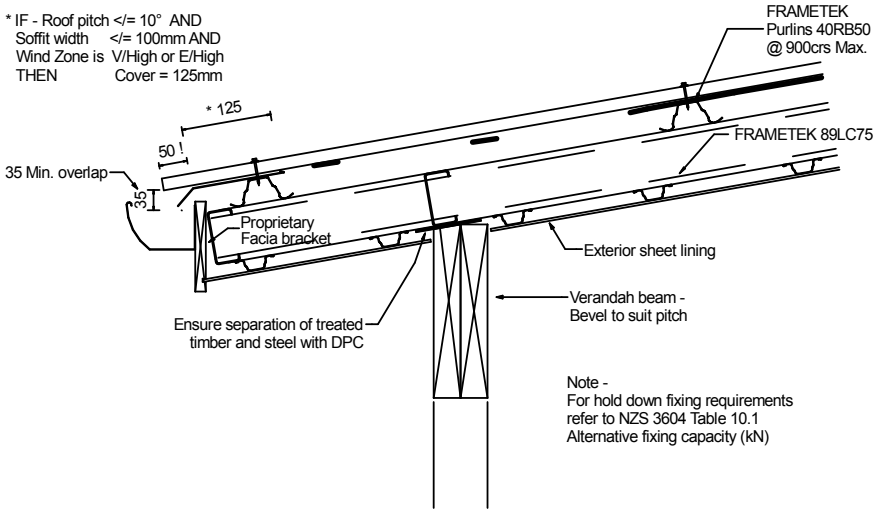
Drawing Title:
Details - Valley
Metal Tile

Drawn: RBH
Date: 30-06-2015
Scale: NTS
Sheet No.

# Verandah Detail - Steel to Timber




## FRAMETEK 89LC75

Standard nominal 89x41mm steel framing

"Lipped Channel"

0.75mm nominal steel thickness zinc coated to -
G550 Z275 for BMT 0.42 ~ 1.0mm
G500 Z275 for BMT 1.2mm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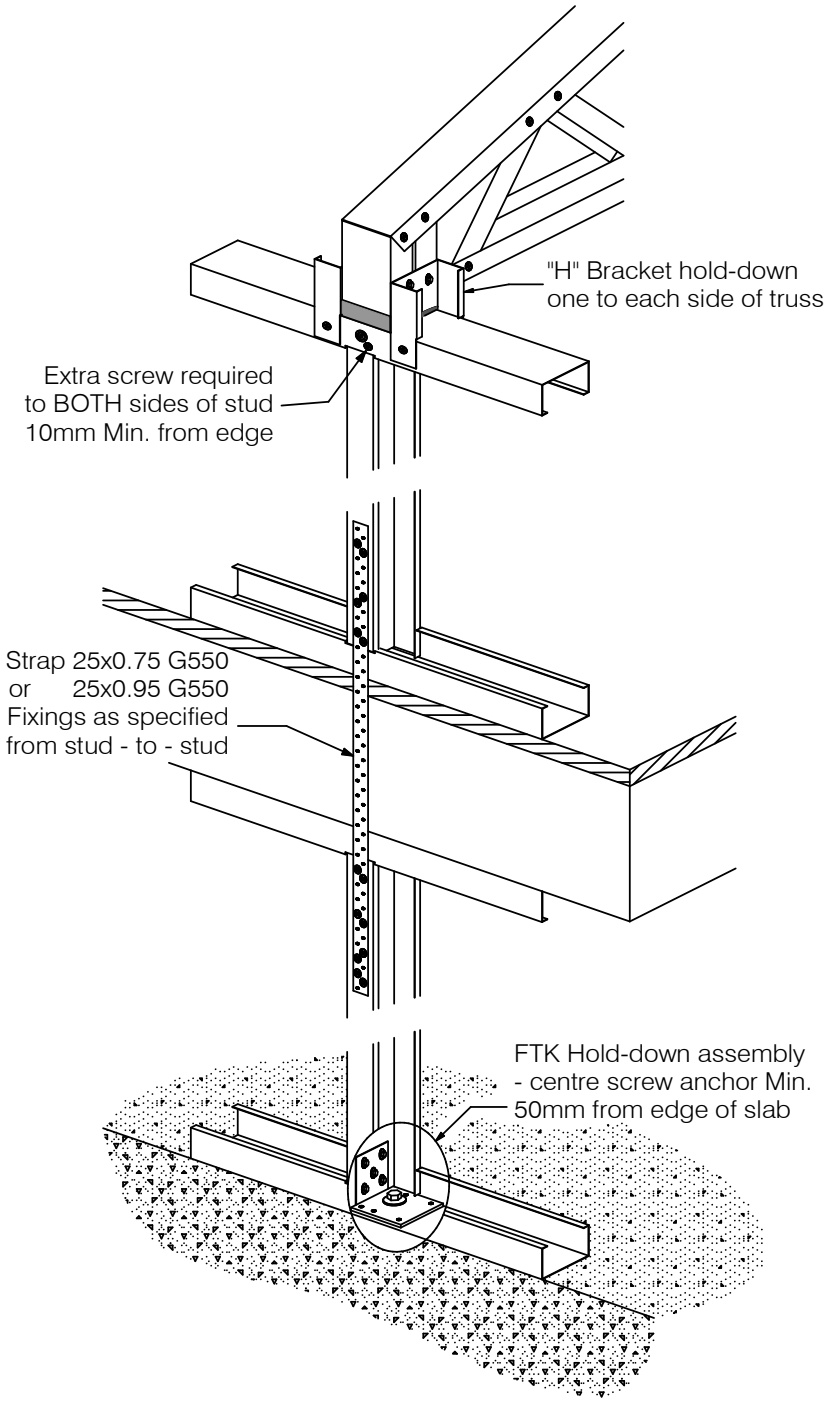
Drawing Title:
Weatherboard
Verandah Steel to Timber

Drawn: RBH

Date: 30-06-2015

Scale: NTS

Sheet No.

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| NZ | NZ | NZ |
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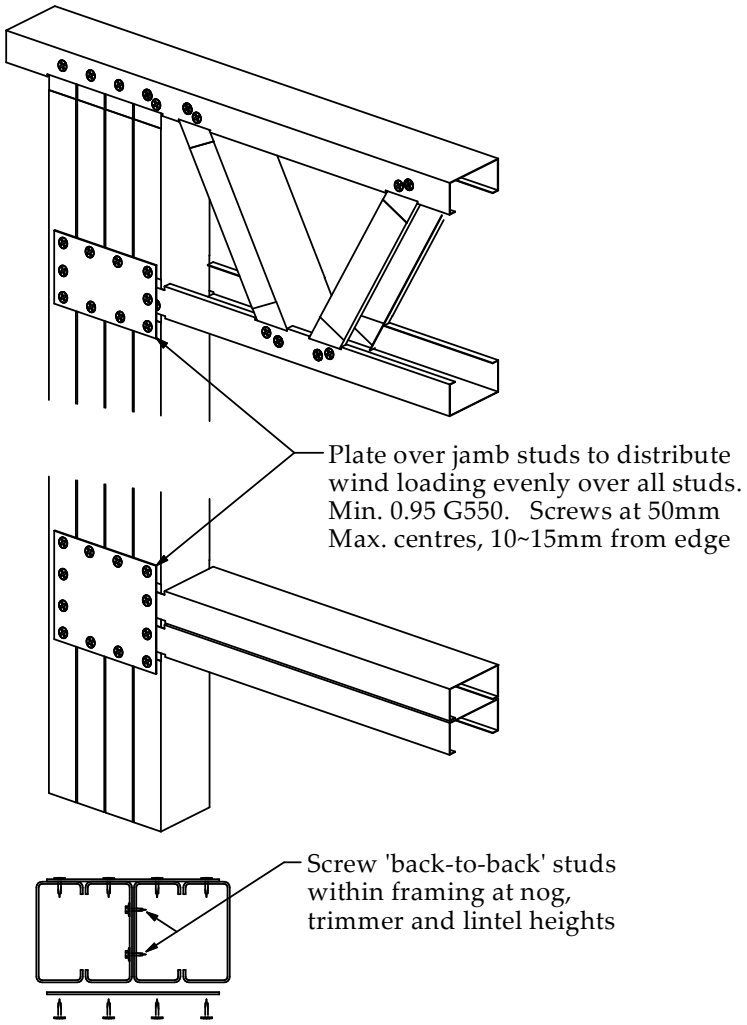
Drawing Title:
Truss Connections
12kN hold-down path

Drawn: RBH
Date: 23-11-2015
Scale: NTS
Sheet No.

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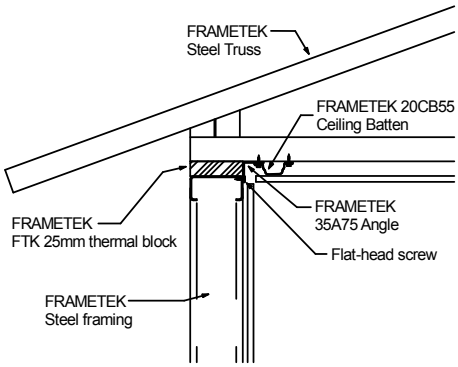
Drawing Title:
Jamb Stud Connections

Drawn: RBH
Date: 30-10-2015
Scale: NTS

Sheet No.

Ceiling Diaphragm
20CB55 Parallel to frame




FRAMETEK 89LC75

Standard nominal
89x41mm steel framing

"Lipped
Channel"

0.75mm nominal steel
thickness zinc coated to -
G550 Z275 for BMT 0.42 ~ 1.0mm
G500 Z275 for BMT 1.2mm

| | | | |
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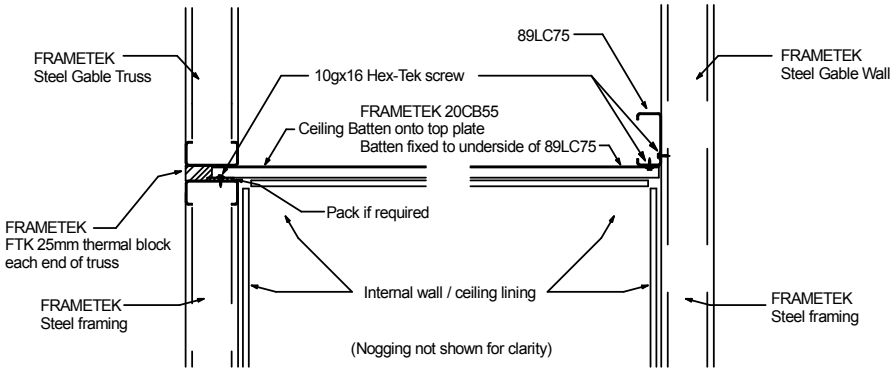
## Ceiling Diaphragm
20CB55 Perpendicular to frame




FRAMETEK 89LC75

Standard nominal 89x41mm steel framing

"Lipped Channel"

0.75mm nominal steel thickness zinc coated to -
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G500 Z275 for BMT 1.2mm


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Drawing Title:
Weatherboard
Boxed Soffit

Drawn: RBH
Date: 13-11-2015
Scale: NTS
Sheet No.

## 6.14. NOTES


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