Agrément Certificate 2010/372

The master copy of this document appears on the website: http://www.agrement.co.za

Validity

Users of any Agrément certificate should check its status: all currently valid certificates are listed on the website. In addition, check whether the certificate is Active or Inactive.

The certificate holder is in possession of a confirmation certificate attesting to his status.

SANS 10400 *The application of the National Building Regulations*

Quick guide

P O Box 395 Pretoria 0001
Telephone 012 841 3708
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E-mail agrement@csir.co.za
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Subject:
Blast Building System

Certificate holder:
Nare Housing (Pty) Ltd

P O BOX 15 RUIMSIG 1732
Telephone: 011-958 1765 Fax: 011-958 0759
Email:jcook@mweb.co.za

Use

The certificate covers the use of the Blast Building System in all areas of South Africa excluding the SCCP area, for the erection of single storey buildings for the uses **(SANS 10400: Table 1 of Regulation A (20) (1))** set out below:

- A3 places of instruction
- B2 and B3 moderate and low risk commercial
- G1 office and day clinics
- H4 dwelling house and related out-building

This certificate and Agrément South Africa's assessment apply only to Blast Building System buildings that are designed and erected as described and illustrated in this certificate, and where the terms and conditions of certification are complied with.

General description

The Blast Building System foundations consist of conventional concrete surface bed foundation with thickened edge beams and thickening under the internal load bearing walls. Surface bed is power floated to a smooth finish or screed at a later stage.

The structural frame comprises 90mm x 40mm x 0.6mm zincalume base rails, 90mm x 40mm x 10mm x 0.6mm zincalume lipped channel vertical studs at 600mm centres and 90mm x 40mm x 0.6mm zincalume ring beams. Horizontal reinforcing bars, 8mm diameter, are centrally placed passing through the vertical studs and spaced at 1.2m centres.

Internal walls are constructed from zincalume base rails, vertical studs and ring beam capping (no horizontal reinforcing) of similar dimensions as external wall and clad both sides with 10mm thick magboard. Internal load bearing walls are constructed as external walls.

The base rails are anchored to the surface bed with 10mm diameter expansion bolts with large diameter washes at 800mm centres. Bitumen 2mm thick forms the DPC below the base rail. The external base rail overlaps the edge of the foundation by 10mm.

Vertical studs, base rail and ring beams etc are secured to one another using three self drilling tapping tek screws per side.

Galvanised lipped channel roof beam 150mm or 100mm x 50mm x 10mm x 2mm thick span from gable to gable and can be supported on internal cross walls. Roof beams are anchored to ring beams with 32mm x 1.6mm galvanised mild steel straps taken over the beam and bolted to the ring beam on either side. Roof construction can also be conventional timber construction spanning from eaves to eaves. Roof cladding can be either light or heavy weight.

All external walls are internally clad with 6mm thick magnesium oxide boards (magboard) secured at 300mm centres to the structural frame .A 2mm wide gap is left between boards that is sealed with an acrylic sealant before painting. Internal walls are insulated with 100mm thick fibreglass blanket wedged between the magboard linings.

Window and door openings are lined with zincalume lipped channels, Timber or “clisco” type frames are secured in position with foamed polyurethane.

20 MPa concrete (1: 5 mix with 750 micron to 10mm graded aggregate) is spray applied to external walls in two layers filling the cavities between structural members and floated to a smooth finish. Walls externally are always rendered with 12mm to 15mm thick plaster.

Services are conventional.

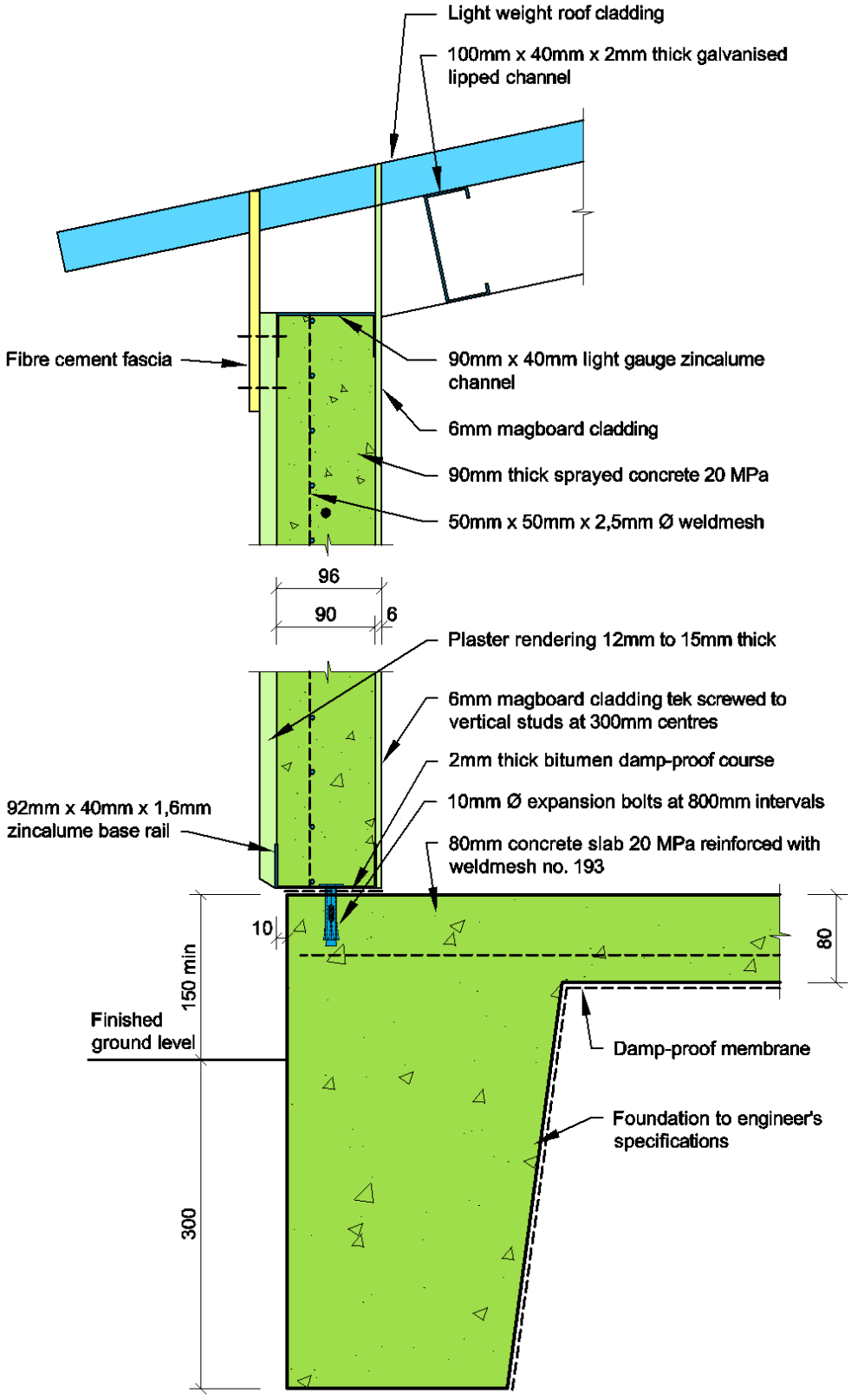


Figure 1: Section A-A

CONTENTS

PREAMBLE

This certificate is issued by Agrément South Africa in terms of the powers granted to it by the Minister of Public Works. This certificate:

- has been granted after a technical appraisal of the performance of Blast Building System buildings for the uses covered by the certificate,
- is independent of any patent rights that may or may not subsist in the subject of the certificate, and
- does not relieve the certificate holder from the obligation to obtain the prior approval of the building authority concerned for the use of the subject.

Agrément South Africa's opinion is that the quality and performance of the Blast Building System will be satisfactory, provided that the requirements stipulated in this certificate are adhered to. However, Agrément South Africa does not on behalf of itself, or the State, or any of its employees or agents guarantee such quality or performance.

Responsibility for compliance with the requirements of this certificate and the quality of the finished buildings resides with the certificate holder.

No action for damages, or any other claim whatsoever, lies against Agrément South Africa, its members, the State or any of its employees should the said components and materials fail to comply with the standard set out in this certificate.

Building authorities or users who are in any doubt about any detail or variation, should contact Agrément South Africa.

The validity of this certificate is reviewed every three years. The certificate shall remain valid as long as Agrément South Africa is satisfied that:

- the certificate holder complies with the general and specific conditions of certification and the technical requirements stipulated in the certificate,
- the performance-in-use of the subject is acceptable, and
- any changes in building legislation, regulations, relevant standards or Agrément performance criteria have not invalidated the technical assessment which formed the basis of certification.

Agrément South Africa reserves the right to withdraw the certificate at any time, should reasonable cause exist.

Notices affecting the validity of this certificate will be published in the *Government Gazette*.

PART 1: CONDITIONS OF CERTIFICATION

Licensee - any person or company appointed by the certificate holder and registered with Agrément South Africa to construct Blast Building System buildings in accordance with this certificate and authorized by him to claim compliance with the certificate. It is the certificate holder's responsibility to ensure that the licensee carries out the works in compliance with this certificate and in accordance with the approved quality system.

The Blast Building System described in this certificate must:

- be erected by the certificate holder or a licensee, registered with Agrément South Africa and under the control of a professional engineer or an approved competent person.
- be constructed in accordance with the technical description (see Part 3) and the certificate holder's detailed specifications and quality management documentation,
- comply with the Conditions of Certification.

Any person required to check on details of construction must refer to the documentation listed above, which is available from the certificate holder.

The Blast Building System is a combination of innovative and conventional construction. A change to any one aspect could result in one or more of the other aspects no longer complying with Agrément South Africa's performance criteria. For these reasons, no change may be made to the Blast Building System as described and illustrated in this certificate unless such change is approved in writing by Agrément South Africa before it is implemented.

General conditions

This certificate covers single storey buildings which are constructed in accordance with a rational design, prepared by a professional engineer, that.

- will ensure the structural integrity of the entire building
- adheres to construction details within this certificate

For which the professional engineer monitors those aspects of the works that are covered by the rational design, to verify that the design is being correctly interpreted and that the construction techniques being used are appropriate to the stability of the subject.

Blast Building System

Tested and approved fit for purpose when constructed as specified in

CERTIFICATE 2010/372

AGRÉMENT SOUTH AFRICA
innovative construction product assessments

Marking

A plaque at least 100 mm x 75 mm, with Agrément South Africa's identification logo together with the number of this certificate, as depicted, must be fixed at an appropriate position to an external wall of all Blast Building System buildings.

Validity

The continued validity of this certificate is subject to a satisfactory review by Agrément South Africa every three years.

Quality monitoring

The certificate holder is required to participate in Agrément South Africa's post-certification quality management system, which requires:

- that the certificate holder shall continue to implement and manage the quality management system approved by Agrément South Africa in the assessment of the Blast Building System
- the co-operation of the certificate holder in facilitating post-certification quality monitoring by Agrément South Africa or its authorised agents.

Reappraisal

- must be requested by the certificate holder prior to making changes to the building system
- will be required by Agrément South Africa if there are changes to the National Building Regulations or Agrément South Africa criteria.

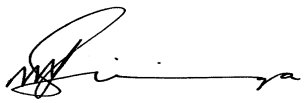
This certificate may be withdrawn if the certificate holder or a registered licensee fails to comply with these requirements.

Requirements of *Supplement to certificates* that must be met

The *Supplement to certificates: good building practice* (revised 2001) applies to those conventional aspects of the Blast Building System that have not been specifically assessed (see Part 2: *Scope of assessment* on next page). Cognisance should be taken of the recommendations contained in the *Supplement to certificates* to ensure that an acceptable standard of construction is consistently maintained.

On behalf of the Board of Agrément South Africa

Signed



Chairperson
26 May 2010

PART 2: ASSESSMENT

Scope of assessment

The conventional aspects of the construction are subject to the rules of good building practice (typically as described and illustrated in Agrément South Africa's *Supplement to certificates* and in the *Home building Manual Parts 1, 2 & 3* issued by the National Home Builders Registration Council), and must comply with the National Building Regulations.

This assessment applies to those innovative aspects of the Blast Building System described in Part 3 of the certificate. It also applies to those conventional aspects of the building system which, in the opinion of Agrément South Africa, are influenced by the innovative aspects. The innovative aspects referred to are:

- the construction of external wall stud frames clad internally with 6mmm thick magboards and the void between frames filled with sprayed concrete.
- the construction of internal walls from stud frames clad both sides with 10mm thick magboards
- the method of anchorage of window and door frames.

This assessment is based on:

- Documentation provided by the applicant
- Known behavior of the materials used in the building system
- The applicant's quality management system

Assessment

In the opinion of Agrément South Africa, the building system as described in the certificate is suitable for the construction of buildings of the type's specified (page 1).

The performance-in-use of buildings erected with this system will be such that they will satisfy:

- the relevant requirements for safety and health prescribed by Agrément South Africa
- the requirements of the National Building Regulations, where stated in Table 1
- Agrément South Africa's performance criteria and requirements for durability and habitability.

For details see Agrément South Africa's *Assessment criteria: building and walling systems*

Agrément South Africa's detailed comments on the assessment are set out in Tables 1; 2 and 3 below. Each aspect of performance was assessed by experts in that field.

Compliance with the National Building Regulations

Republic of South Africa. *National Building Regulations*, Government Notice R. 2378, Government Gazette No 12780, Pretoria, South Africa, 12 October 1990

The innovative aspects of the Blast Building System relate to the National Building Regulations as set out in Table 1. Any regulation not specifically referred to is considered to be outside the scope of this certificate and must be applied by the local authority in the normal manner.

Table 1: Performance

Aspects of performance	Opinion of Agrément South Africa	National Building Regulations satisfied
Fitness-for-purpose of materials used	The materials used in the building system as described in Part 3 meet the requirements of the National Building Regulations.	A13(1)(a) *Materials*
Behaviour in fire	External walls are classified non-combustible type FR with a fire resistance of 30 minutes. Internal walls a FRR of 30 minutes. **SANS 10400**: The application of the National Building Regulations	K4 Walls T1 (1) (b), (c) and (d) are satisfied in so far as the walls are concerned. Comments made in Supplement to certificates must be taken into account when building plans are scrutinized by local authorities, to check compliance with Regulations T 1(1) (a), T1 (1) (d) with regard to spread of smoke, and T1 (1) (e). Deemed-to-satisfy rules TT5.1(c) and TT5.2(c) of Section 3 of **SANS 10400** have been met. As defined in deemed-to-satisfy rule TT2.1 (a) of Section 3 of **SANS 10400**, the external walls of Blast buildings are classified as non-combustible with fire-resistance rating of 60 minutes. The building system wall panels can also be used for division separation requirements for H3 provided a suitable door assembly with a similar rating is used. The safety distances as set out in the relevant rules of Part T can therefore be applied.
Structural performance	Satisfactory, provided the requirements of this certificate are complied with.	J1(1) *Floors* K1, K3, K4 *Walls* Regulations B1 (1) and (2) are deemed to be satisfied when Blast buildings are built in accordance with the technical conditions and description set in Part 3. When these conditions are not complied with the structural design and erection of each building is the responsibility of a professional engineer or competent person and deemed-to-satisfy rule BB4 of SANS 10400 is applicable. Regulations H1(1) and H1 (2), *Foundations*, are deemed to be satisfied as follows: H1 (1) on non-problematic soils; H1 (2) in all buildings where foundations are designed by a professional engineer or approved competent person and deemed-to-satisfy rule HH 1(a) applies.

Water penetration and rising damp	Satisfactory. Blast Building System buildings meet Agrément South Africa's criteria for resistance to water penetration and rising damp throughout South Africa.	K2 *Walls* J1(4) *Floors*

Table 2: Health and Safety

Aspects of performance	Opinion of Agrément South Africa	Explanatory notes
Thermal performance and energy usage	The maximum temperature in Blast dwellings will be up to 6℃ warmer when no ceilings are installed, up to 2℃ warmer with insulated ceilings and similar when insulated ceiling are installed. Energy usage will be three times higher than the standard brick house when no ceilings are installed, twice with insinuated ceilings and one and a half times the energy usage when ceilings are insulated.	Agrément South Africa's opinion is based on the calculated likely maximum indoor air temperature in summer in a 53 m^2 Blast dwelling in Cape Town, Durban and Johannesburg, and the calculated energy required to maintain an indoor temperature of 16ºC in winter in Cape Town and Johannesburg. When assessing the thermal performance of a dwelling, the calculated performance of the subject is compared with that of the standard brick house. This is of similar size, orientation and fenestration as the Blast Building System dwelling and has: • external walls of 230 mm brick and internal walls of 110 mm brickwork; • plastered internal wall surfaces; • a concrete floor; • a sheeted roof that is fitted with a ceiling without insulation.
Condensation	Condensation is likely to be a problem in the Southern Coastal Condensation Problem Area (SCCP Area). Performance is such that Agrément criteria in this regard are not met.	Condensation is generally a problem in the Southern Coastal Condensation Problem Area (SCCP Area). The assessment of this aspect of performance only applies to dwellings in this area. Agrément South Africa requires that the performance in relation to condensation occurring on walls and under roofs of dwellings in the SCCP area be at least equivalent to that of the standard brick dwelling which is itself not immune to condensation problems.
Acoustic performance	Satisfactory. Agrément South Africa's performance criteria for sound attenuation between adjacent rooms and between adjacent dwellings have been met. **SANS 10218: Part 1:** *Acoustical properties of buildings*	Agrément South Africa's opinion is based on data from computer simulations. The insitu airborne sound insulation that is likely to be obtained between adjacent rooms in the Blast Building System is 48 dB (DnT,w). These values meet Agrément South Africa's criteria and most of the recommended sound insulation values set out in **SANS 10218: Part 1**. A description of the degree of acoustic privacy that can be expected between specific rooms for various degrees of sound insulation is given in supplement to certificates.

Durability	Given normal, regular and adequate maintenance, the durability of Blast Building System buildings will be similar to that of conventionally constructed buildings. Special attention to waterproofing requirements in wet areas will be required. **SANS 10005** The preservative treatment of timber	Agrément South Africa's opinion is based on knowledge of the materials used and on inspection of buildings constructed using the Blast system. For the external finishing a good quality alkali resistant primer and two coat pure acrylic emulsion paint should be used and the recesses for the sealant should be created in accordance with good joint design for the specific sealant. Door and window sub-frames must be treated in accordance with the requirements of SANS 10005: The preservative treatment of timber.

Table 3: Quality management system

Aspects of performance	Opinion of Agrément South Africa	Explanatory notes
Quality management system	The certificate holder's quality management system complies with Agrément South Africa's requirements. Properly applied, it will ensure that quality of erection of buildings will be consistently maintained.	Agrément South Africa's requirements are based on **SANS 9001.** **SANS 9001** *Quality management systems – Requirements'*

PART 3: TECHNICAL DESCRIPTION

General description

The Blast Building System foundations consist of conventional concrete surface bed foundation with thickened edge beams and thickening under the internal load bearing walls. Surface bed is power floated to a smooth finish or screed at a later stage.

The structural frame comprises 90mm x 40mm x 0.6mm zincalume base rails, 90mm x 40mm x 10mm x 0.6mm zincalume lipped channel vertical studs at 600mm centres and 90mm x 40mm x 0.6mm zincalume ring beams. Horizontal reinforcing bars, 8mm diameter, are centrally placed passing through the vertical studs and spaced at 1.2m centres.

Internal walls are constructed from zincalume base rails, vertical studs and ring beam capping (no horizontal reinforcing) of similar dimensions as external wall and clad both sides with 10mm thick magboard. Internal load bearing walls are constructed as external walls.

The base rails are anchored to the surface bed with 10mm diameter expansion bolts with large diameter washes at 800mm centres. Bitumen 2mm thick forms the DPC below the base rail. The external base rail overlaps the edge of the foundation by 10mm.

Vertical studs, base rail and ring beams etc are secured to one another using three self drilling tapping tek screws per side.

Galvanised lipped channel roof beam 150mm or 100mm x 50mm x 10mm x 2mm thick span from gable to gable and can be supported on internal cross walls. Roof beams are anchored to ring beams with 32mm x 1.6mm galvanised mild steel straps taken over the beam and bolted to the ring beam on either side. Roof construction can also be conventional timber construction spanning from eaves to eaves. Roof cladding can be either light or heavy weight.

All external walls are internally clad with 6mm thick magnesium oxide boards (magboard) secured at 300mm centres to the structural frame .A 2mm wide gap is left between boards that is sealed with an acrylic sealant before painting. Internal walls are insulated with 100mm thick fibreglass blanket wedged between the magboard linings.

Window and door openings are lined with zincalume lipped channels, Timber or “clisco” type frames are secured in position with foamed polyurethane.

20 MPa concrete (1: 5 mix with 750 micron to 10mm graded aggregate) is spray applied to external walls in two layers filling the cavities between structural members and floated to a smooth finish. Walls externally are always rendered with 12mm to 15mm thick plaster.

Services are conventional.

Erection

Foundations and surface beds (figure 1)

A competent person classifies the site in accordance with the site class designation set out in Table 3 of the South African Institute of Engineering Geologists (SAIGE) publication entitled *Guidelines for Urban Engineering and Geological Investigations.*

SANS 10161 The design of foundations for buildings

In abnormal or problematic ground conditions, foundations are designed by a professional engineer in accordance with the requirement of SANS 10161 and constructed in accordance with this design.

The foundations and surface bed are generally cast within the perimeters of factory produced jigs that follow the shape of the building.

The surface bed is generally 85mm to 100mm thick, reinforced with weld mesh if required by the engineer. External and internal wall foundations are formed by thickening the surface bed and reinforcing the foundation if necessary. The surface bed must be level to a tolerance of ± 5mm. The surface bed can be power floated or screeded at a later stage.

SANS 50197-1 Cement Part 1: Composition, specifications and conformity criteria for common cements

SANS 1090 Aggregates from natural sources – Fine aggregates for plaster and mortar.

SANS 1083 Aggregates from natural sources – aggregates for concrete

Common cement for concrete is used complying with SANS50197 -1, CEM I or CEM II A, sands complying with SANS 1090 (or blended by specialists to meet requirements) and aggregates comply with SANS 1083. Admixtures based on metallic chlorides e.g. calcium chloride, that promote corrosion of reinforcement are not to be used. Water must be potable

A damp proof membrane in accordance with SANS 952, or one covered by a valid Agrément certificate, is laid on compacted fill under the foundations and surface bed.

Erection / Installation (Fig 1, 3, 4 and 5)

SANS 952 Polyolefin film for damp and waterproofing in buildings

The structural frame comprises a 92mm x 4mm x 0.6mm thick zincalume (aluminum zinc) channel base rail secured with 10mm diameter expansion bolts and large diameter washers to the thickened edge beam at 800mm centres. The channel projects 10mm past the edge of the raft foundation and is laid on 2mm thick bitumen damp proof membrane.

SANS 317 Industrial bitumen

90mm x 40m x 10m x 0.6mm thick zincalume lipped channel vertical studs are secured to the base rail at 600 centres with two self drilling tapping galvanized screws to both sides. The tops of the studs are temporary slayed. Vertical studs occur on both sides of all openings.

Horizontal reinforcing bars, 8mm diameter, are threaded centrally through the studs at 1.2 m centres. Weldmesh reinforcing mat 50mm x 50mm x 2,5mm diameter is tied to the horizontal bars to aid with spraying concrete. Additional reinforcement is

incorporated at corners and comprise 8mm diameter rebars spaced at 600mmm centres (Figure 4)

A vertical stud occurs at every T-junction with 150mm x 2mm thick zincalume flat sheet secured to the stud with self drilling/tapping tek screws and extending the full length of the stud. The internal wall stud is secured to the vertical stud and flat plate .The plate projects either side of the internal wall for securing of the magboards (fig 6)

Zincalume channel ring beam 92mm x 40mm x 0.6mm occur over all external walls and are secured to the vertical studs with two self drilling tapping screws to both sides.

Zincalume lipped channels surround all openings forming sub-frames for securing all window and door frames.

Magnesium oxide boards (magboards), 6mm thick, are secured to the inside face of all external walls with self-drilling/tapping screws at 300m centres. A 2mm wide gap is left between boards and sealed with an acrylic sealant before painting.

A bonding liquid is applied to the magboard cavity face and 90mm thick 20 MPa concrete is spray applied in two applications to fill all cavities and floated to a smooth finish. A plaster (or similar) finish, 12mm to 15mm thick, is applied to the external face.

Roof construction (Fig 1 and 4)

Galvanised lipped channel roof beam 150mm or 100mm x 50mm x 10mm x 2mm thick span from gable to gable and can be supported on internal cross walls. Roof beams are anchored to ring beams with 32mm x 1.6mm galvanised hoop-iron strap taken over the beam and secured to the sides of the ring beam with two self drilling/tapping tek screws both sides of the beam. Purlins or tiling batterns can be either timber or galvanised mild steel top hat sections. Roof construction can also be conventional timber spanning from eaves to eaves and anchored to the sides of the ring beam with galvanised hoop-iron straps taken over the truss tie-beam. Roof cladding can be either light or heavy weight.Ceilings are optional, although advisable, and can be gypsum plasterboard, fibre cement or 30mm thick Lampboard (polyisocyanurate foamed board coated both sides with impregnated fibreglass tissue) installed in accordance with the manufacturers instructions. A galvanised wire mesh is secured to the zinc-alume external wall frame for the plaster adhesion and to prevent cracking.

Window and door frames (Fig 7 and 8)

Window and door sub-frames are constructed 15mm larger on all sides than the window and door frames, which are wedged into position and the gap, sealed with polyurethane foam. Frames can be either timber or steel, with steel window frames of" clisco" type.

Attachment of fittings

Light medium and heavy weight fittings can be secure to all walls with suitably sized expansion bolts. Dedicated zincalume lipped-channel member are provided to secure fittings to non-load bearing internal walls or fitting can be floor mounted.

Finishes

Two coats of an external quality acrylic paint are applied to walls externally. Internal magboards are painted with emulsion or alkyd paints. The boards are dampered before painting with emulsion paints. A bonding liquid is applied before painting with base paints.

In “wet” rooms such as bathrooms, kitchens, shower cubicles etc, the following measures are recommended.

(i) A plastic (PVC) skirting fully bonded with chloroprene type contact adhesive as recommended by the manufacturer is used. With tiled surfaces an acrylic sealant is used.

(ii) All walls surfaces whether exposed or covered by fittings, are either

- Painted with impervious coating such as two coats of polyurethane paint or
- Covered with a PVC type wall cladding glued with a flexible adhesive as recommended by the manufacturer or
- Tiled using an adhesive which remains flexible and unaffected by water.

Technical drawings

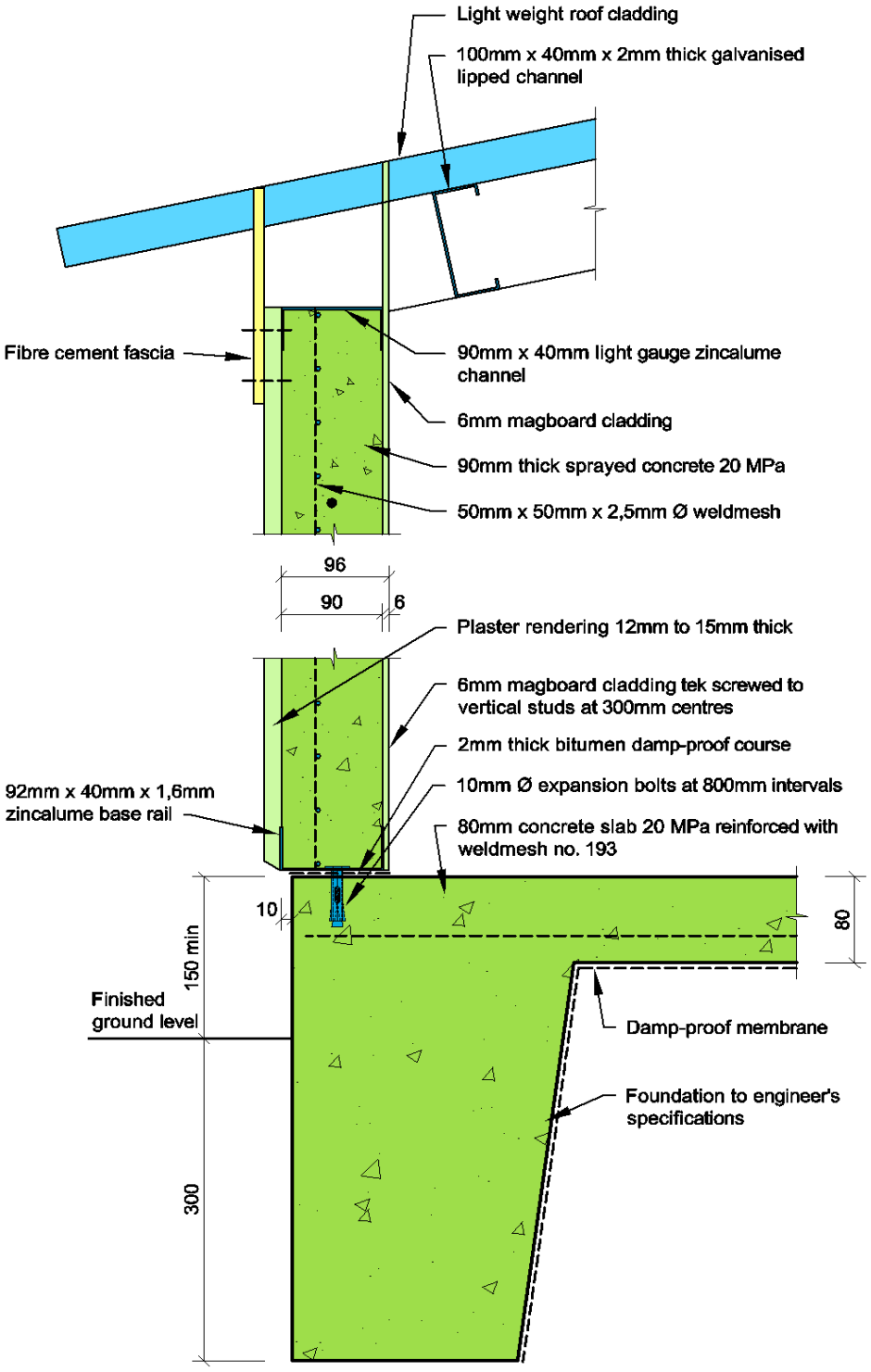


Figure 1: Section A-A

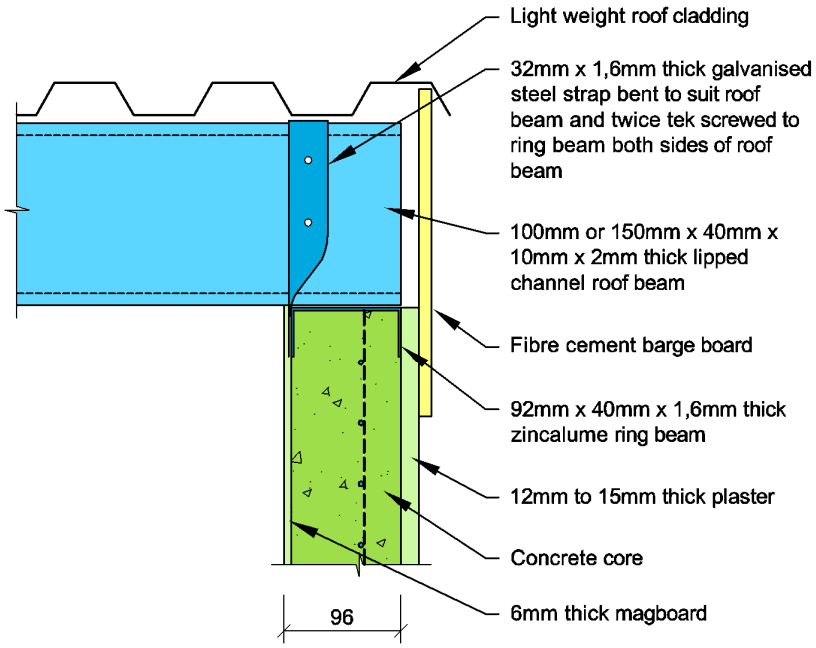


Figure 1a: Roof anchorage at gable

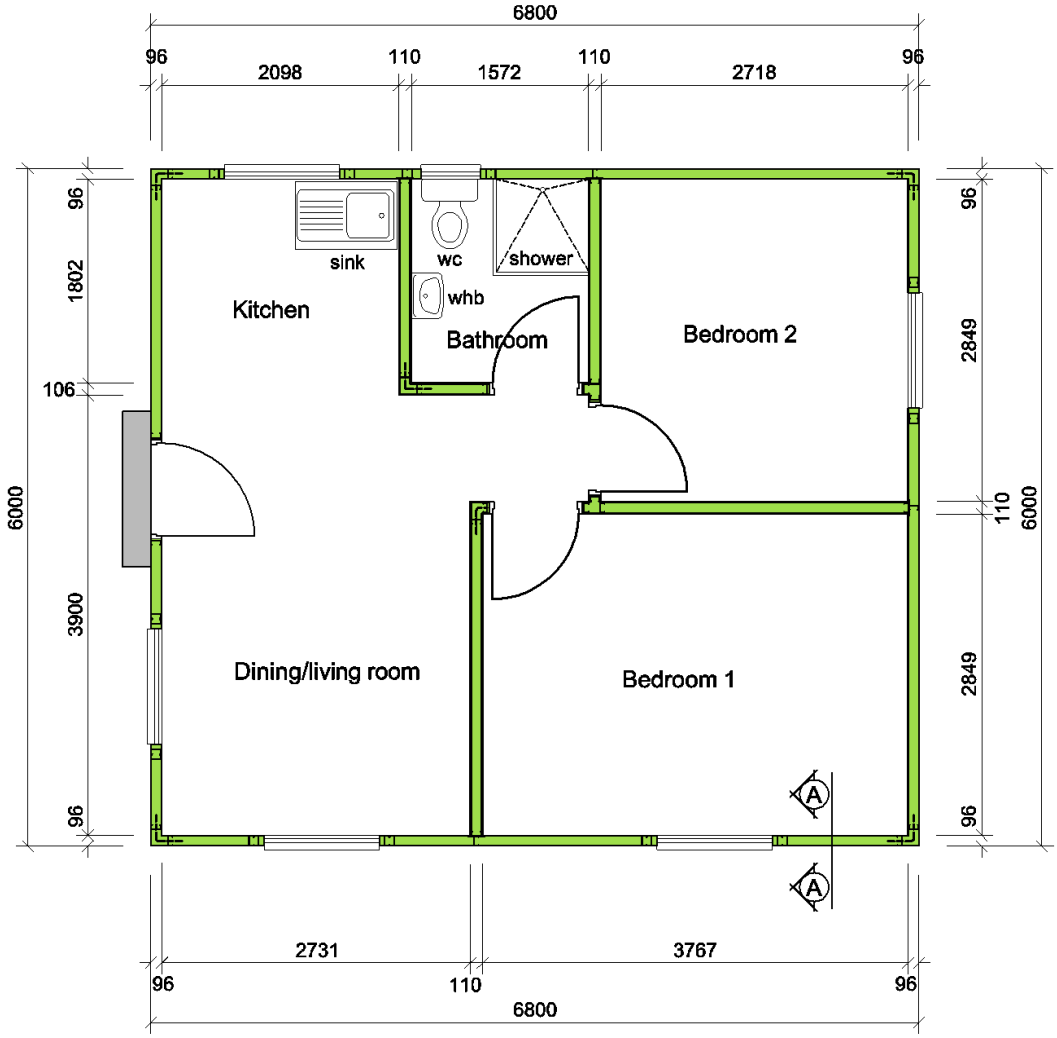
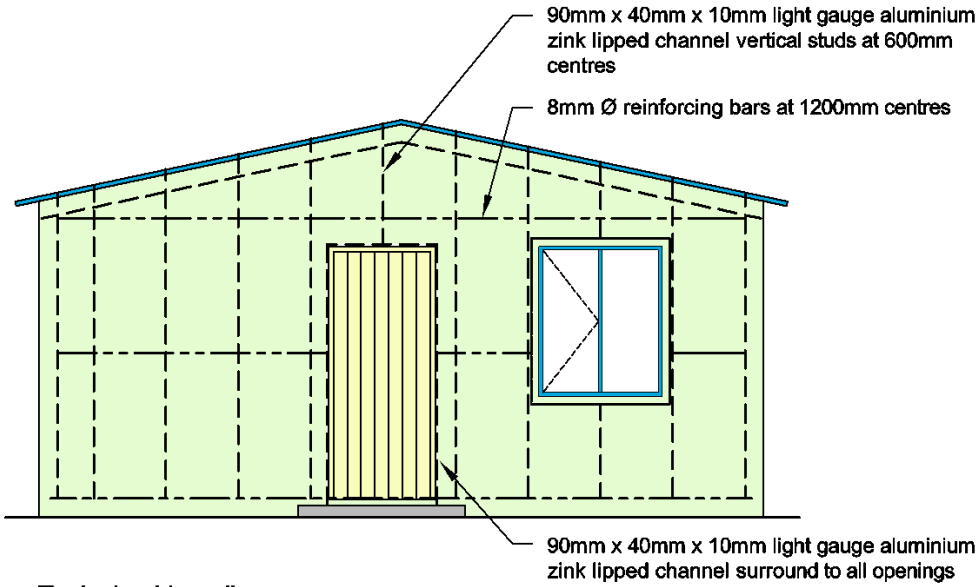
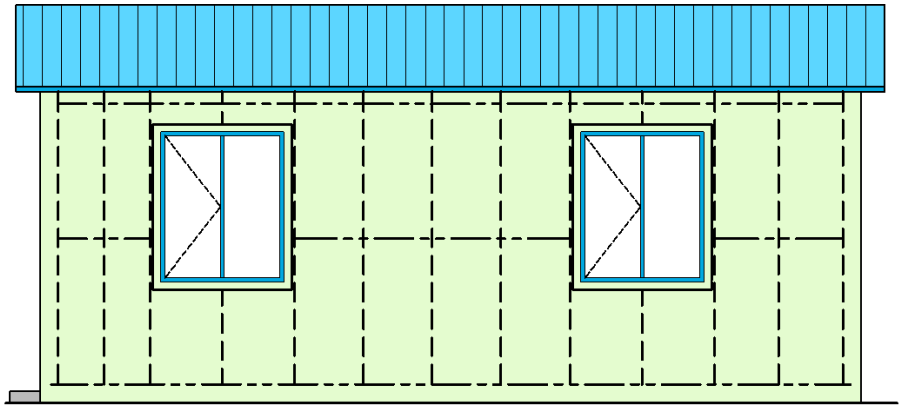


Figure 2: Typical plan layout



Typical gable wall



Typical eaves wall

Figure 3: Wall details

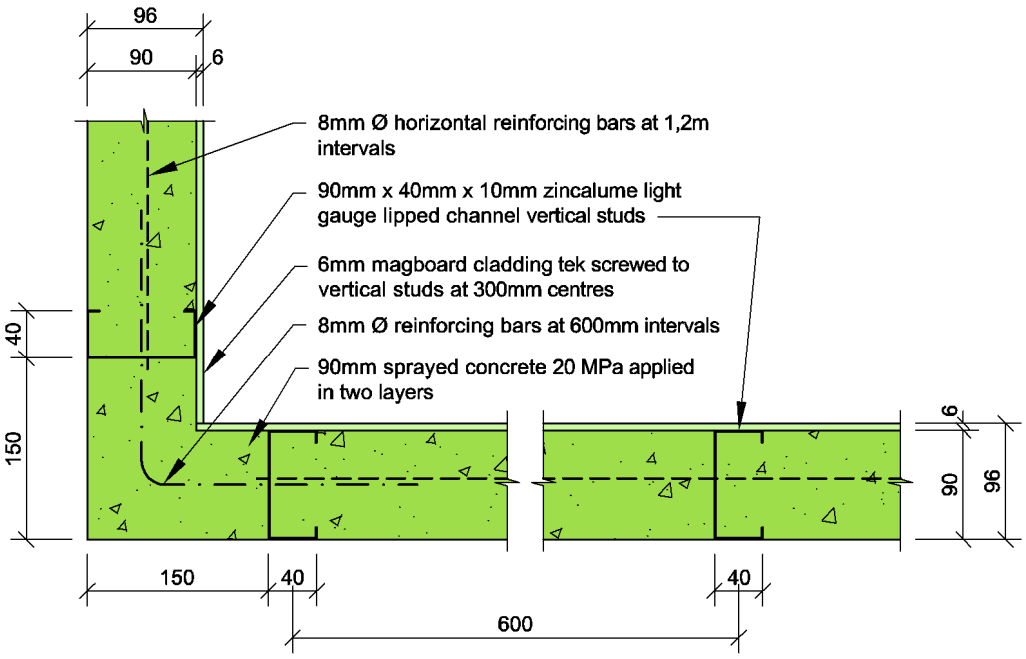


Figure 4: External corner

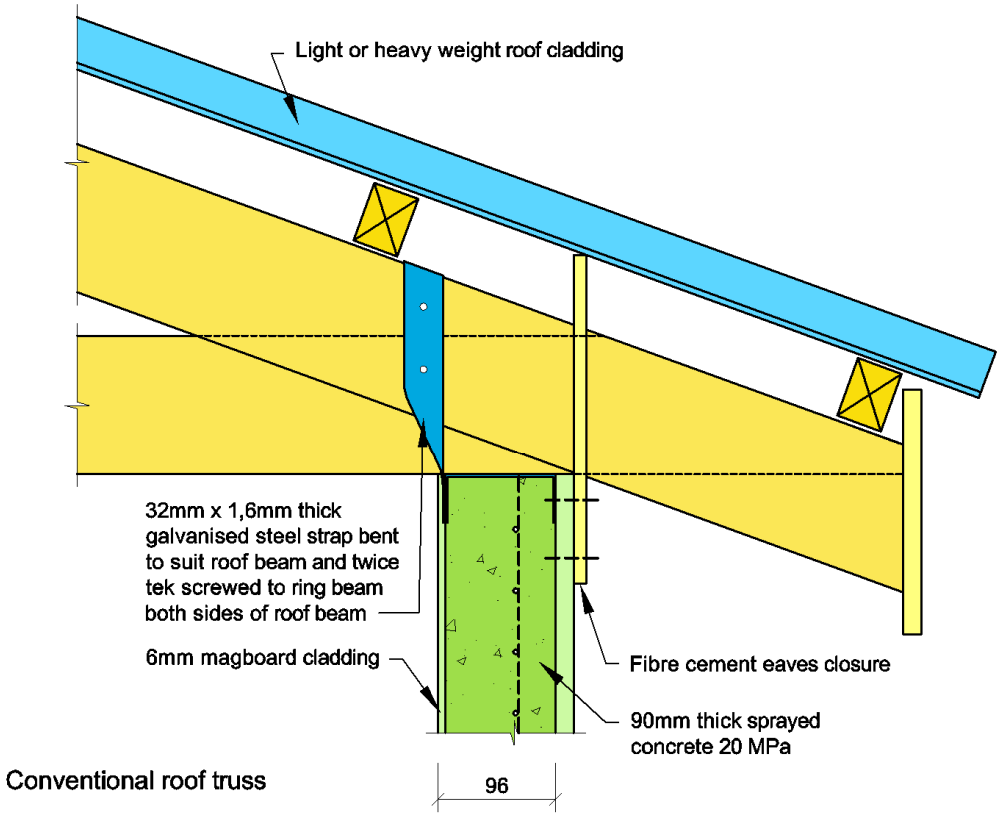


Figure 5: Alternate roof construction

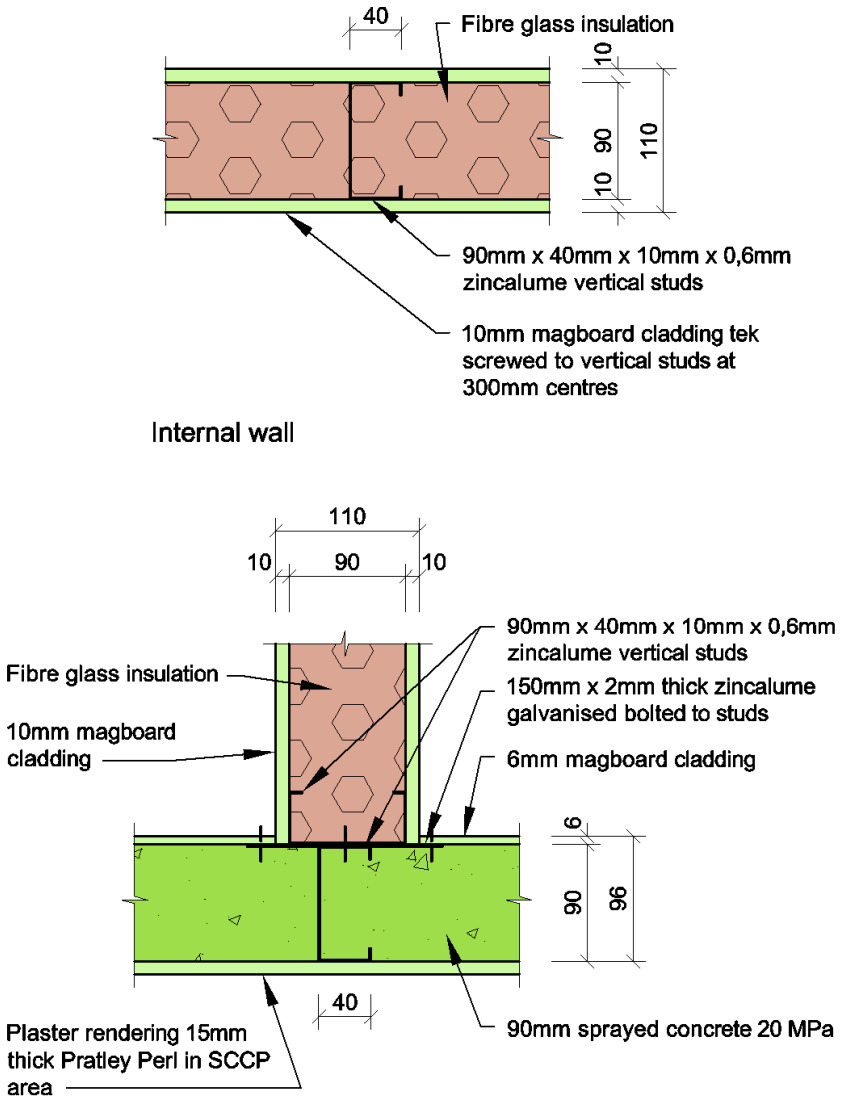
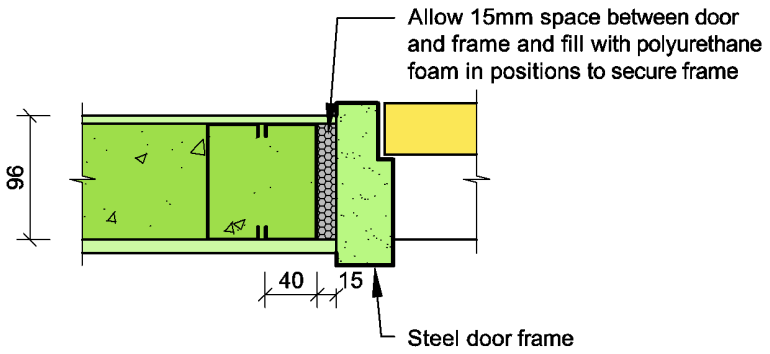
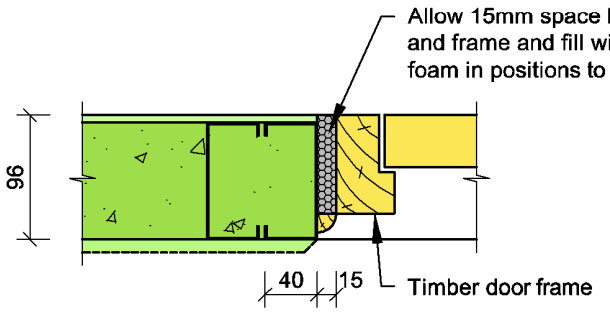


Figure 6: Wall details

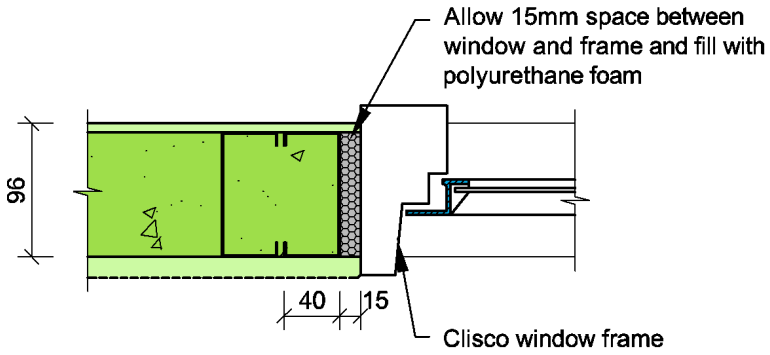


Steel door frame (plastered outside)

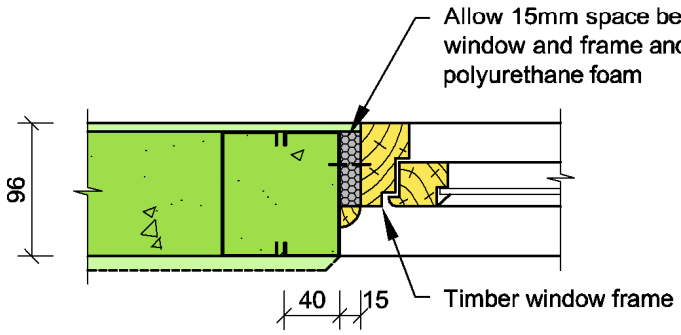


Timber door frame

Figure 7: Door details



Clisco window frame



Timber window frame

Figure 8: Window details