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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 10400-2011: *The application of the National Building Regulations*

Quick guide

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Subject:

UKUZWANA BUILDING SYSTEM

Certificate holder:

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Use

The certificate covers the use of the UkuZwana Building System in all areas of South Africa for the erection of single storey buildings for occupancy classes set out below (**SANS 10400**: Table 1 of regulation A (20) (1)):

- places of instruction (A3)
- moderate risk commercial services (B2)
- low risk commercial services (B3)
- small shops (F2)
- other institutional (residential)(E3)
- moderate risk storage (J2)
- low risk storage (J3)
- offices (G1)
- hostels, semi-detached, row and detached houses (H2, H3 and H4).

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

General description

The UkuZwana Building System are single storey structures utilizing factory produced or cast *in-situ* wall panels. The external and internal walls are cellular lightweight concrete (CLC) with Neopor as the foaming agent (minimum density 1200 kg/m³). Wall panel are generally manufactured in 14 m long x 2.8 m high x 180 mm (external) and 90 mm (internal) thickness, and incorporates service connections and door and window openings.

Foundations are cast *in-situ* concrete surface bed with thickened edge beams on damp-proof membranes. Foundations are always the responsibility of a registered competent professional engineer. Wall panels are placed in position on the surface bed using a crane or alternatively are cast on site using a shuttering system.

Roof consists of either a pitched timber roof trusses placed in slots formed at the top of the walls or adequately waterproofed precast concrete slab.

Doors and window frames are either fixed into openings on site after erection of the wall panels or are cast in place during manufacturing.

All other aspects of construction are conventional.

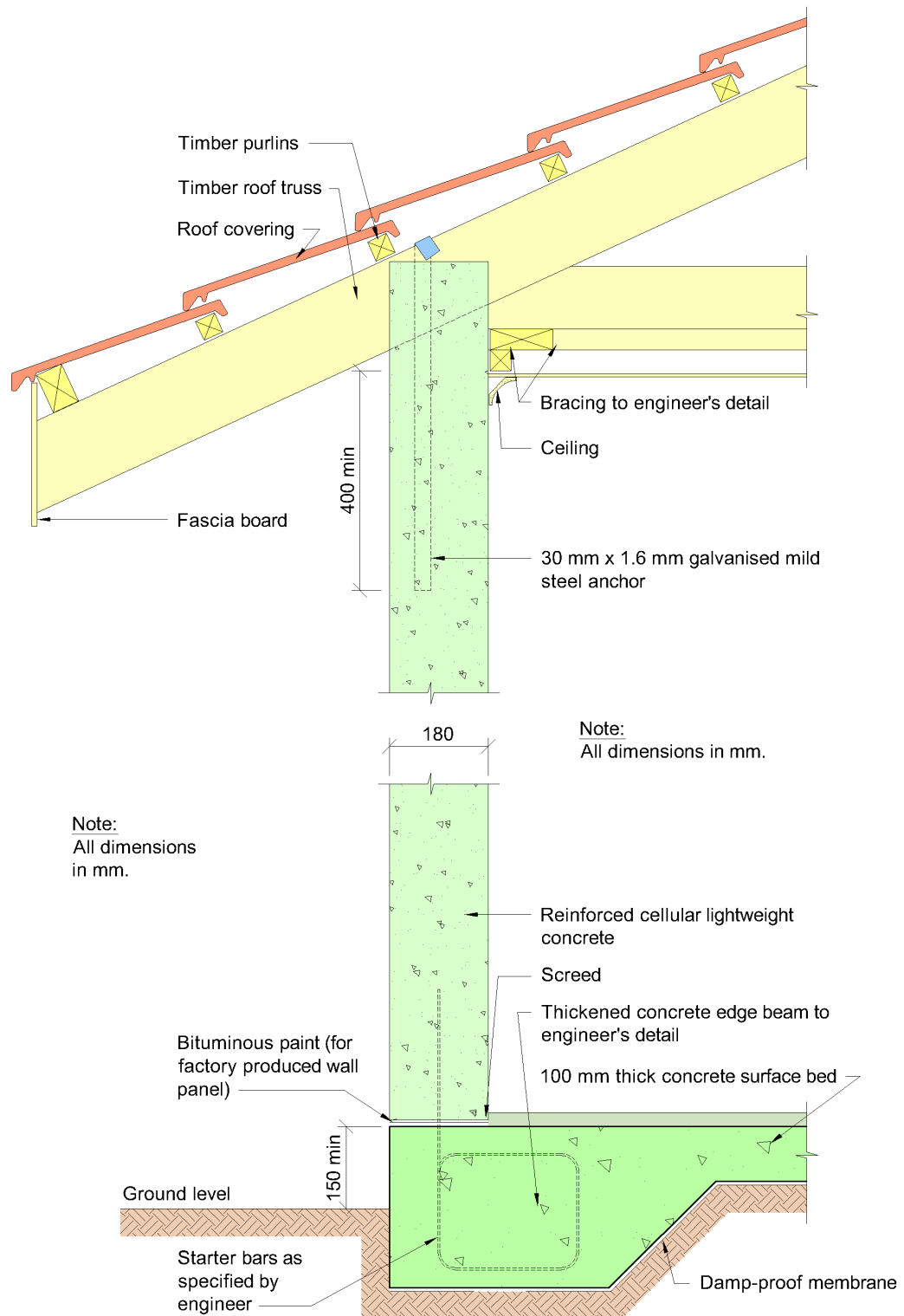


Figure 1: Vertical section through external wall showing foundation and roof anchorage details

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PREAMBLE

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

- has been granted after a technical appraisal of the performance of the UkuZwana Building System 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
- 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 considers that the quality and performance of the UkuZwana Building System will be satisfactory provided the requirements stipulated in the 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 the 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 the certificate.

Building authorities or users who are in any doubt about any details or variation should contact [Agrément South Africa](#).

The validity of the 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 building system is acceptable
- any changes in building legislation, regulations, relevant standards or Agrément performance criteria have not invalidated the technical assessment that 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 the UkuZwana Building System in accordance with this certificate and authorised by UkuZwana Project Management Solutions (Pty) Ltd to claim compliance with the certificate. It is the certificate holder's responsibility to ensure that the licensee carries out the work in compliance with this certificate and in accordance with the approved quality system.

The UkuZwana Building System described in the certificate must:

- be designed by the certificate holder
- be manufactured and constructed by the certificate holder or licensee
- be constructed in accordance with the technical description (see [Part 3](#)) and the certificate holder's detailed specifications and quality management system
- comply with the Conditions of Certification.

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

The UkuZwana 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 UkuZwana Building System as described and illustrated in this certificate unless such change is approved in writing by Agrément South Africa before it is implemented.

UkuZwana Building System

Tested and approved fit for purpose when constructed as specified in

CERTIFICATE 2013/445



General conditions

Marking

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

Reappraisal

- Must be requested by the certificate holder prior to implementing changes to the Building System
- Will be required by Agrément South Africa if there are changes to the National Building Regulations or to Agrément assessment criteria.

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

Validity

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

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

- ### Requirements of *Supplement to certificates* that must be met

On behalf of the Board of Agrément South Africa

[Handwritten signature]

Agrément Certificate 2013/445: *UkuZwana Building System*

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 and 3* issued by the National Home Builders Registration Council), and must comply with the National Building Regulations.

The assessment applies to those innovative aspects of the UkuZwana 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:

- use of cellular light-weight concrete with Neopor as the foaming agent to cast the complete structure incorporating window, door frames and services
- manufacturing of walls using either in-situ casting or manufactured by casting in a factory environment and delivered to site.

This assessment is based on:

- documentation provided by the applicant
- inspections of the applicants factory and completed installations
- known behavior of the materials used in the building system
- the applicant's quality management system.

The assessment

In the opinion of Agrément South Africa, the UkuZwana Building System as described in the certificate is suitable for use for occupancy class [types specified](#) (page 1).

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

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

The 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 National Building Regulations

The innovative aspects of the UkuZwana Building System comply with 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.

For details see Agrément South Africa's [Assessment criteria: building and walling systems](#).

Republic of South Africa. **National Building Regulations**, Government Notice No. R. 711, Government Gazette No 34586, Pretoria, South Africa, 9 September 2011

Table 1: Performance

Aspects of performance	Opinion of Agrément South Africa	National Building Regulations satisfied
<i>Fitness-for-purpose of materials used</i>	The quality and suitability of the materials as described in Part 3 meet the requirements of the regulations.	Regulation A13(1)(a): <i>Materials</i>
<i>Behaviour in fire</i>	Satisfactory. External walls are classified type FR (non-combustible) with fire-resistance ratings of 30 minutes.	<p><i>K4 Walls</i></p> <p>T1 (1) (b), T1 (1) (c) and T1 (1) (d) are satisfied as far as the walls are concerned.</p> <p>Comments made in <u>Supplement to certificates</u> must be taken into account when building plans scrutinised 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).</p> <p>Deemed-to-satisfy rules TT5.1(c) and TT5.2(c) of Section 3 of SANS 10400 have been met.</p> <p>As defined in deemed-to-satisfy rule TT2.1 (a) of Section 3 of SANS 10400, the external walls of UkuZwana Building System buildings are classified as non-combustible with fire-resistance rating of 30 minutes. The building system 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.</p>
<i>Structural strength and stability</i>	Satisfactory, provided all the requirements of this certificate are adhered to.	<p><i>K1, K3, K4 Walls</i></p> <p>Regulations B1 (1) and (2) are deemed to be satisfied when UkuZwana Building System buildings are built in accordance with the technical specifications 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.</p> <p>Regulations H1(1) and H1 (2), <i>Foundations</i>, are deemed to be satisfied as follows:</p> <p>H1 (1) on non-problematic soils;</p> <p>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.</p>
<i>Water penetration and rising damp</i>	Satisfactory. UkuZwana Building System buildings meet Agrément South Africa's criteria for resistance to rainwater penetration and rising damp throughout South Africa.	<p><i>J1 (4) Floors</i></p> <p><i>K2 Walls</i></p>

Table 2: Habitability

Aspects of performance	Opinion of Agrément South Africa	Explanatory notes
Thermal performance	<p>Satisfactory. External walls are assessed as having a total R-value of 0.465 m²K/W.</p> <div> <p>SANS 10400 XA-2011: <i>The application of the National Building Regulations Part X: Environmental sustainability Part XA: Energy usage in buildings</i></p> </div>	<p>The annual energy usage in a 53 m² UkuZwana dwelling has been determined using BSIMAC (version 9) software and is equivalent to that of standard Agrément house meeting the requirements of Clause 4.2.1 (b) of SANS 10400 XA.</p> <p>The energy demand of a 53m² UkuZwana dwelling is also found to be better than that of the standard brick house (SBH).</p> <p>Agrément South Africa recommends that the performance of the UkuZwana Building System be considered equivalent to similarly buildings erected of 'masonry' as referred to in SANS 10 400 XA.</p>
Energy usage	<p>The winter and summer temperatures in a 53 m² UkuZwana dwelling, when neither heated nor cooled are expected to be approximately 1 °C warmer than Agrément house in all climatic zones.</p> <div> <p>SANS 204-2011: <i>Energy efficiency in buildings</i></p> </div>	
Condensation	Satisfactory.	<p>Condensation is generally a problem in the Southern Coastal Condensation Problem Area (SCCP Area). The assessment of this aspect of performance applies only to dwellings in this area. Agrément South Africa requires that the minimum standard of performance be equivalent to that of the standard brick dwelling, which in itself is not immune to condensation problems.</p>
Acoustic performance	<p>Satisfactory: Agrément South Africa's performance criteria for sound attenuation between adjacent rooms and dwellings have been met.</p> <div> <p>SANS 10218-1: 2004: <i>Acoustic properties of buildings Part 1: Grading criteria for the airborne sound insulation properties of buildings</i></p> </div>	<p>Agrément South Africa opinion is based on computer simulation. The <i>in situ</i> airborne sound insulation that is likely to be obtained between adjacent rooms is 47 dB (DnT,w).</p> <p>This value meets Agrément South Africa's criteria and most of the recommended sound insulation values set out in SANS 10218: Part 1</p> <p>A description of the degree of acoustic privacy that can be expected between specific rooms for various degrees of sound insulation is given in Agrément's Supplement to certificates.</p>

Table 2: Habitability (continued)

Durability	<p>Satisfactory, provided normal use and adequate and regular maintenance are applied.</p> <p>SANS 6085-2006: <i>Concrete tests - Initial drying shrinkage and wetting expansion of concrete.</i></p>	<p>Agrément South Africa's opinion is based on knowledge of the construction materials used.</p> <p>The drying shrinkage of the cellular lightweight concrete used for UkuZwana walls should be determined for every mix design and every change of aggregate and should not exceed a nominal value of 0.13 % when measured in accordance with SANS Method 6085.</p> <p>Some minor surface cracks (hair line cracks) may be expected to appear on external wall surfaces, particularly under and above windows and above door frames and at joints. However such cracks have no structural significance and will not result in rain water penetration of the walls. Regular maintenance and painting of the external walls by painting with a good quality, pure acrylic paint or similar approved paints.</p>
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Table 3: Quality Management System

Aspects of performance	Opinion of Agrément South Africa	Explanatory notes
Quality management system	<p>The certificate holder's quality management system complies with Agrément South Africa's quality management system requirements. If properly applied, it will ensure that quality in manufacture and erection of the UkuZwana Building System buildings will be consistently maintained.</p>	<p>Agrément South Africa's requirements are based on SANS 9001:2008.</p> <p>SANS 9001: 2008 <i>Quality management systems – Requirements'</i></p>

PART 3: TECHNICAL DESCRIPTION

General description

The UkuZwana Building System are single storey structures utilizing factory produced or cast *in-situ* wall panels . The external and internal walls are cellular lightweight concrete (CLC) with Neopor as the foaming agent (minimum density 1200 kg/m³). Wall panel are generally manufactured in 14 m long x 2.8 m high x 180 mm (external) and 90 mm (internal) thickness, and incorporates service connections and door and window openings.

Foundations are cast *in-situ* concrete surface bed with thickened edge beams on damp-proof membranes. Foundations are always the responsibility of a registered competent professional engineer. Wall panels are placed in position on the surface bed using crane or alternatively are cast on site using shuttering systems.

Roof consists of either a pitched timber roof trusses placed in slots formed at the top of the walls or adequately waterproofed precast concrete slab.

Doors and window frames are either fixed into openings on site after erection of the wall panels or are cast in place during manufacturing.

All other aspects of construction are conventional.

Manufacturing process

The UkuZwana Building System wall panels are factory produced or cast *in-situ* and are manufactured in South Africa.

SANS 50197-1-2013, Cement
Part 1: Composition,
specifications and conformity
criteria for common cements

SANS 1090-2009: Aggregates
from natural sources – Fine
aggregates for plaster and
mortar

Potable water: The water should be clean and preferably drinkable. Water that may be made drinkable by boiling may be used in its natural state.

Walls panels produced in a factory environment, use either casting tables or vertical battery mild steel moulds. The moulds are cleaned and inspected for any possible flaws and then water-based mould releasing oil applied. Window and door frames and plumbing and electrical services and steel box connection are placed in position before casting the panels. The wall panels are kept in horizontal position before lifting and to ensure adequate curing.

Alternatively, wall panels are cast in-situ using a shuttering system (plastic, wood, steel or aluminium) assembled and secured on site as per manufacturer's recommendations .

The cellular lightweight concrete (CLC) constituents are ordinary Portland cement complying with **SANS 50917-1** , Cem I or Cem IIA, sand complying with **SANS 1090** (or blended by a specialist) potable water,

polypropylene fibres and the chemical foaming additive Neopor and are blended using the mixer. Once blended the mixture is then poured onto moulds and vibrated.

Erection process

Foundations and surface bed

A competent person classifies the site in accordance with the site class designation set out in Table 3 of the SAIEG publication *Guidelines for Urban Engineering Geological Investigations*

SANS 10161-1980: *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 accordingly.

SANS 952-2011: *Polymer film for damp-proofing and waterproofing in buildings*

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

Walls

The surface bed below all wall panels are coated with 60 microns bituminous paint at the bottom to create a waterproofing seal for factory produced wall panels. Special care needs to be taken when transporting and placing of the wall panel to avoid damages. The factory produced wall panels are transported to site and vertically lifted into position on the surface bed using a crane. Stirrups are then tied to the reinforcement steel contained in each wall panel causing a mechanical bond between the steel box connections and the wall panel. The steel box connectors are manufactured with slots which allow three-dimensional flexibility. These enable connection to hold the wall panels together until aligned and correctly positioned. The steel box connectors are then fastened to pre-bend reinforcing steel stirrups (**Figure 4**). Movement joints are formed in the wall using steel formers which are held in position with steel pins fastened and sealed with a polysulphide sealant that remains unpainted and matches the colour of the finishing paint. Alternatively, movement joints are cut into the walls after the shuttering has been stripped (**Figure 2**).

Roof construction

The timber roof trusses or rafters are placed in slots formed at the top of the walls. Roof trusses and rafters are anchored against uplift with 30 mm x 1,6 mm galvanized mild steel anchors cast at least 400 mm into the walls. The anchors are then taken around the appropriate roof members and nailed into the side of the members (**Figure 1**).

Alternatively, two strands of 4 mm diameter galvanized wire are used. The double strands are taken up on either side of the truss or rafter and twisted until taut and spiked to the top of the rafter. The 30 mm x 1,6 mm hoop irons, are cast into side of the gable walls at the same centres

as the runners and are each fastened to the corresponding runner with a nail.

Alternatively, the roof may consist of precast concrete planks designed by a professional competent engineer with suitable screed and waterproofing system.

Conventional ceilings are always installed.

Finishes and services

All finishes such as glazing, tiling, painting, lying of carpets, electrical, gas and services are carried out in the conventional manner. No surface finishing other than painting is required to the wall panels after erection.

Technical drawings

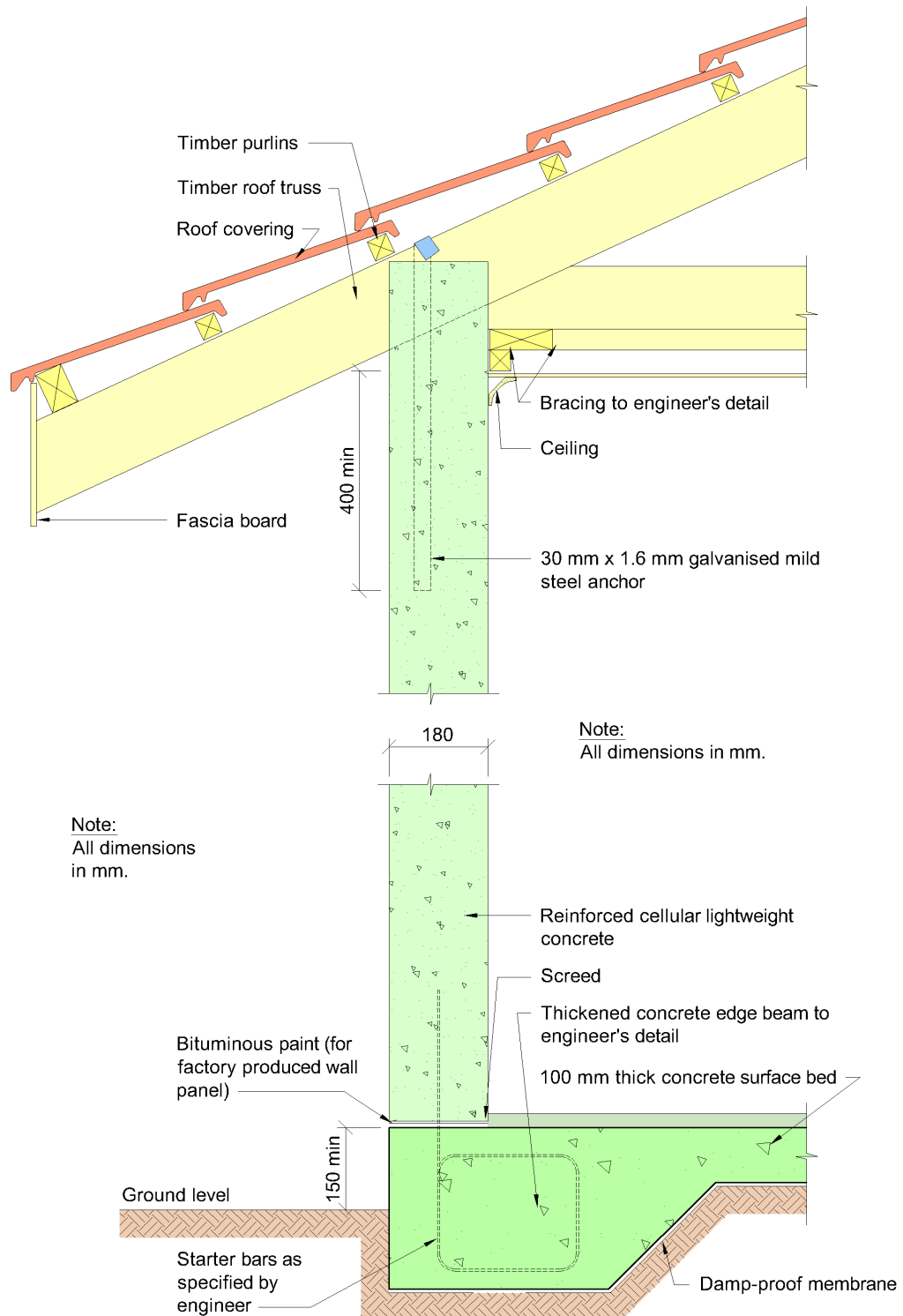
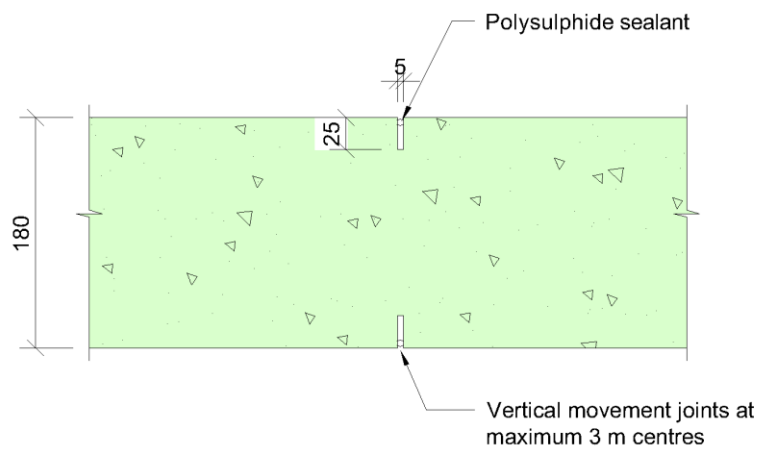


Figure 1: Vertical section through external wall showing foundation and roof anchorage details

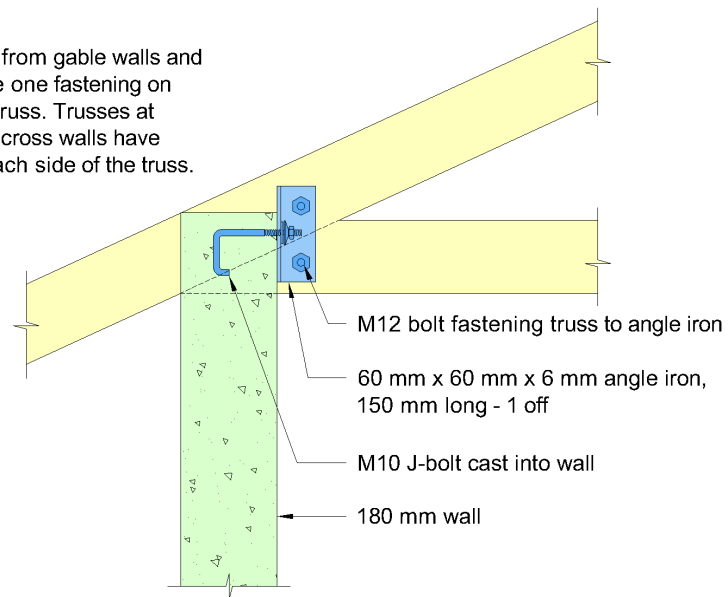


Note:
All dimensions in mm.

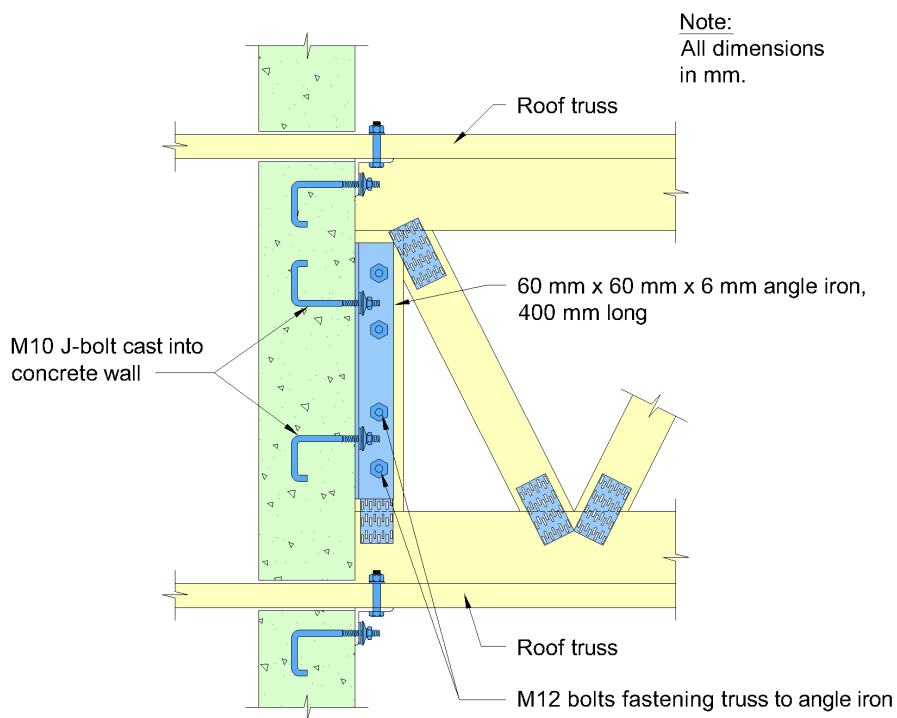
Figure 2: Horizontal section of details
at external walls

Note:

Trusses remote from gable walls and cross walls have one fastening on one side of the truss. Trusses at gable walls and cross walls have fastenings on each side of the truss.



(a) Fastening of main roof trusses to the side walls



(b) Fastening of transverse bracing to the side walls

Figure 3: Anchorage of trusses and braces

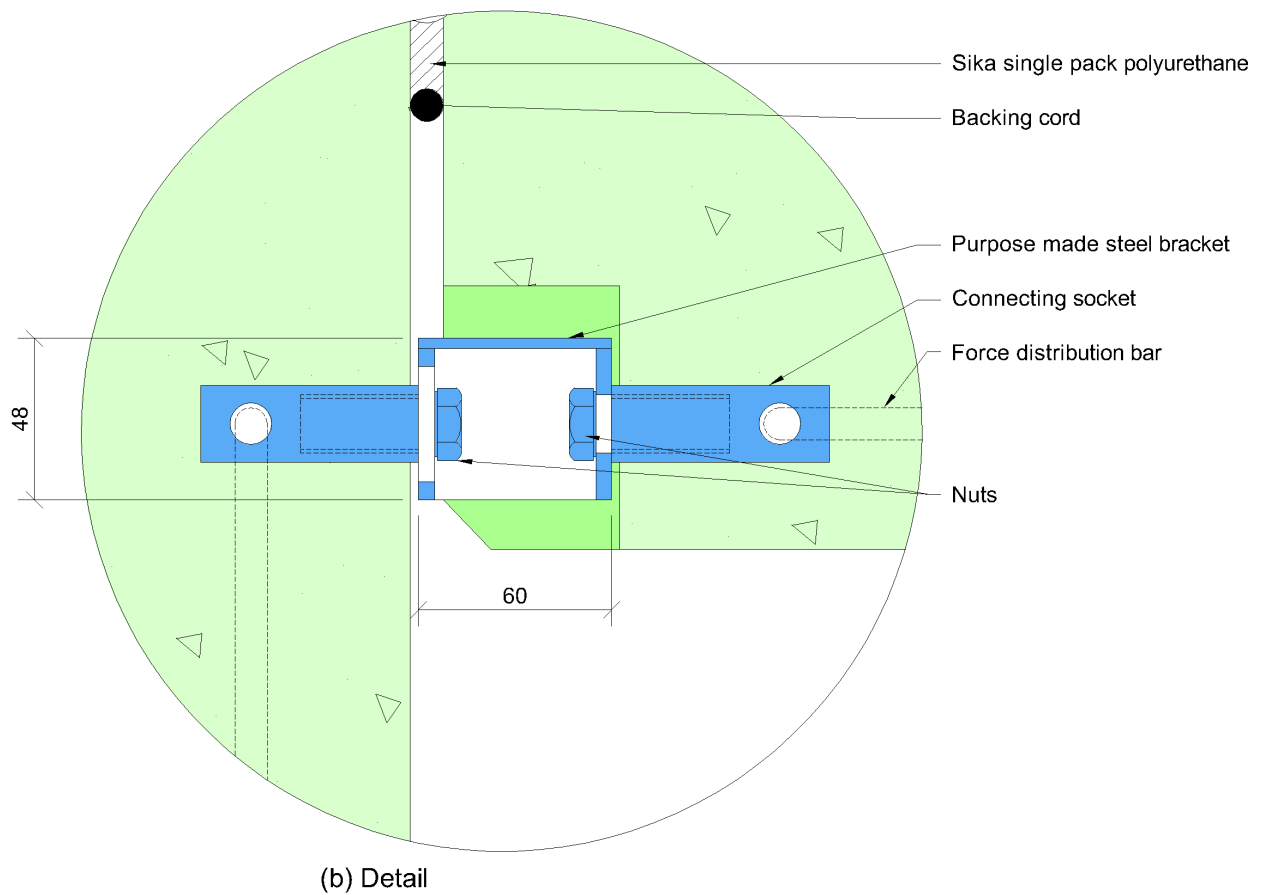
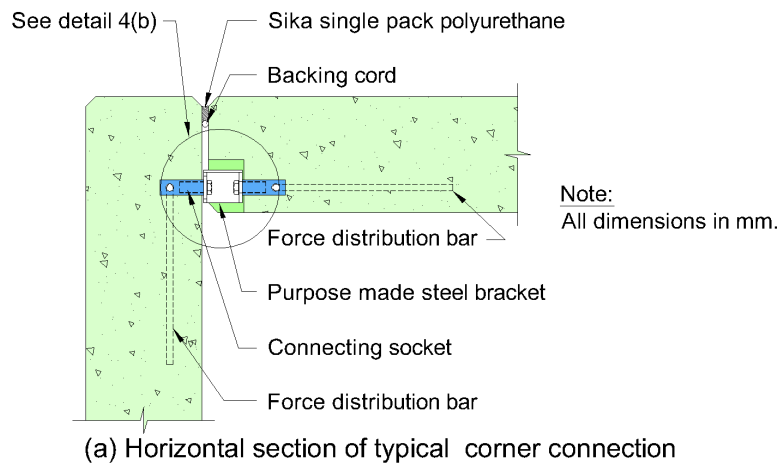


Figure 4: Details of typical corner connection

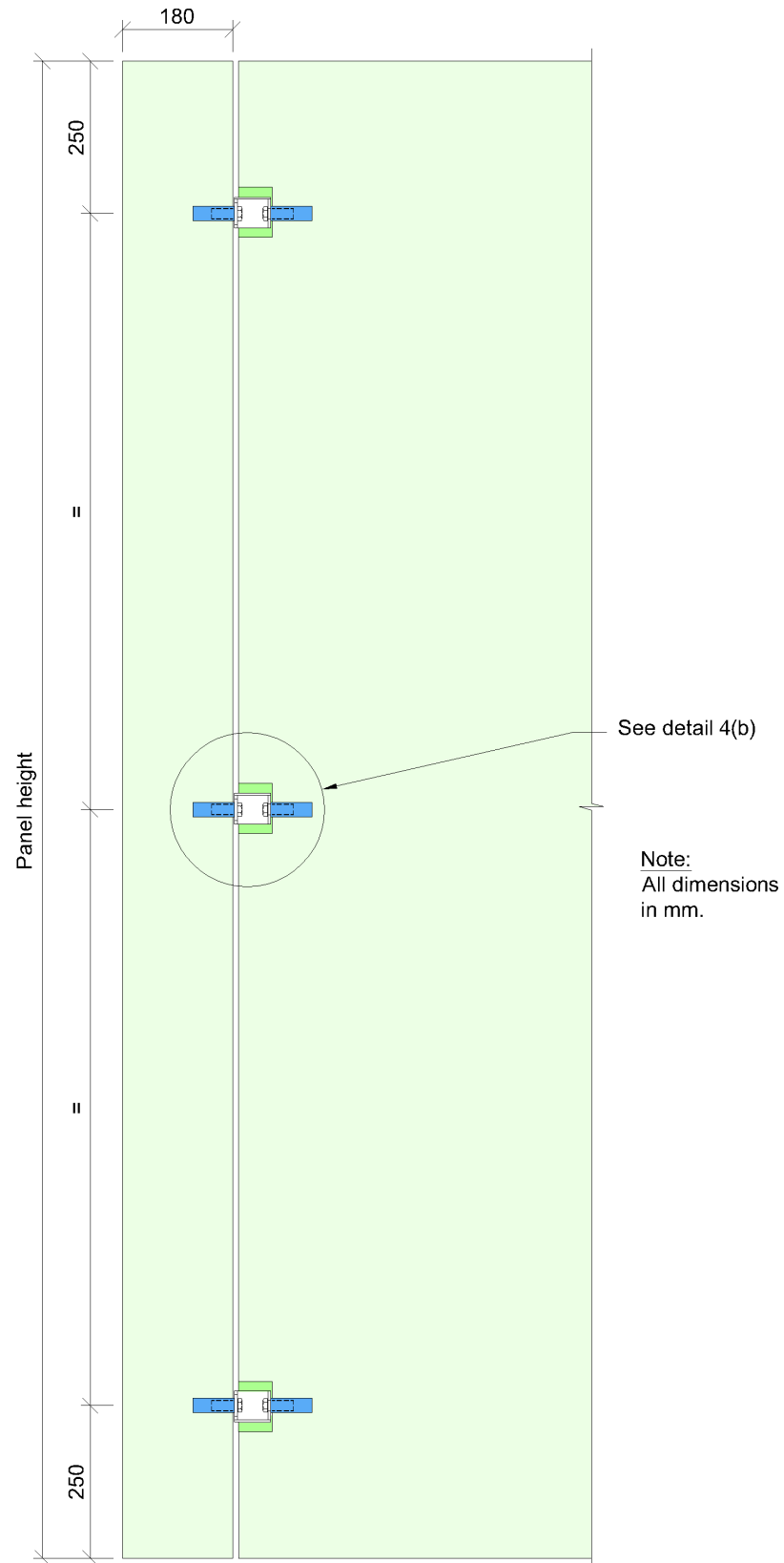
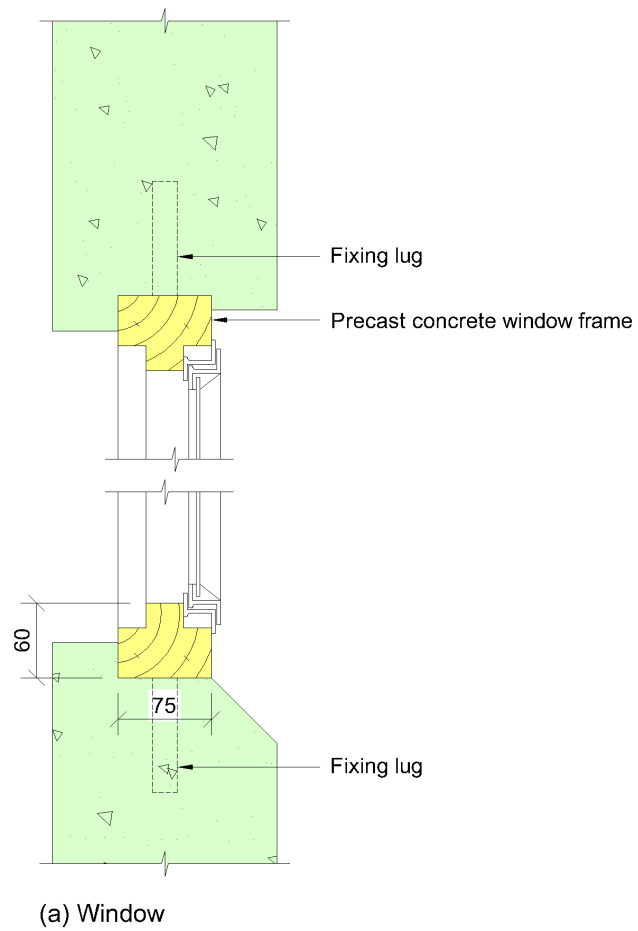


Figure 5: Elevation showing positions of wall junction boxes



Note:
All dimensions in mm.

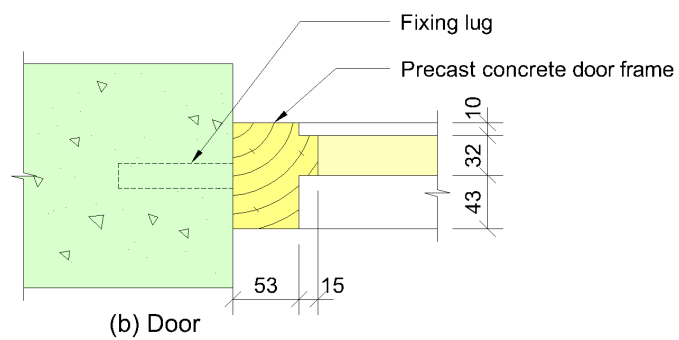
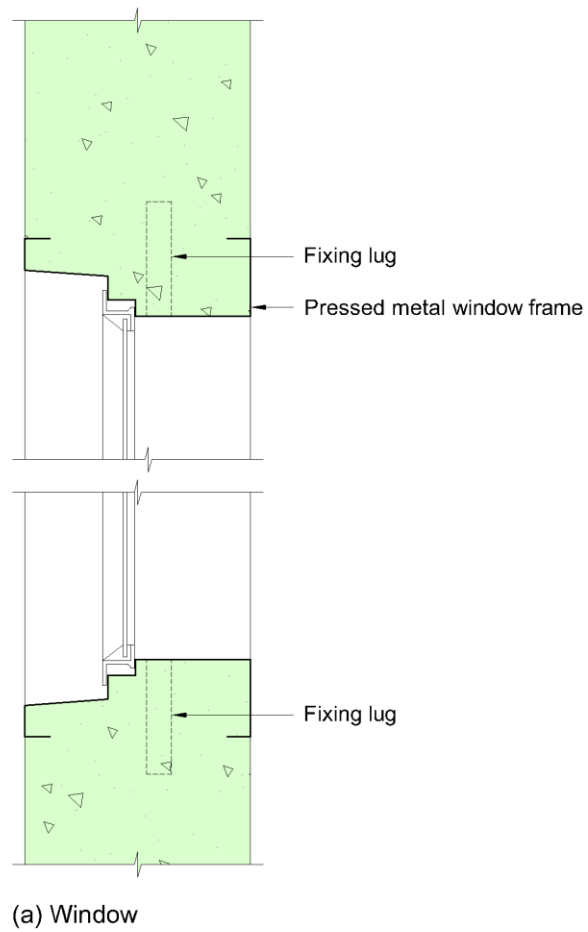


Figure 6: Precast concrete window and door frame details



Note:
All dimensions in mm.

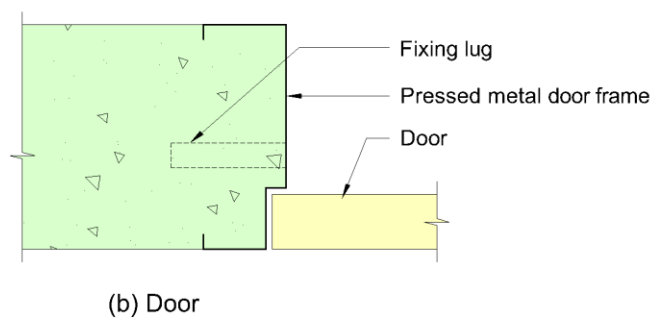


Figure 7: Pressed metal window and door frame details