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Subject:
Mi Panel 1 Building System

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Certificate holder:

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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*

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Use

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

- place of worship (A4)
- small shop (F2)
- offices, including day-care clinics (G1)
- domestic residence (H3)
- dwelling house and related out-buildings (H4)

This certificate and Agrément South Africa's assessment apply only to the Mi Panel 1 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 Mi Panel 1 Building System is a combination of innovative and conventional construction methods. It is a single storey structure that comprises:

- foundations: cast in-situ concrete surface bed and thickened edge beams which in all cases are designed by a professional engineer or competent person.
- 75 mm thick lightweight interlocking sandwich in-fill panels comprising a polystyrene beaded concrete core with a density of 650 kg m^{-3} , encapsulated in two layers of 4,5 mm thick fibre cement boards.
- light gauge structural steel roof trusses with lightweight roof cladding including.
- ceilings which are always insulated and
- conventional services

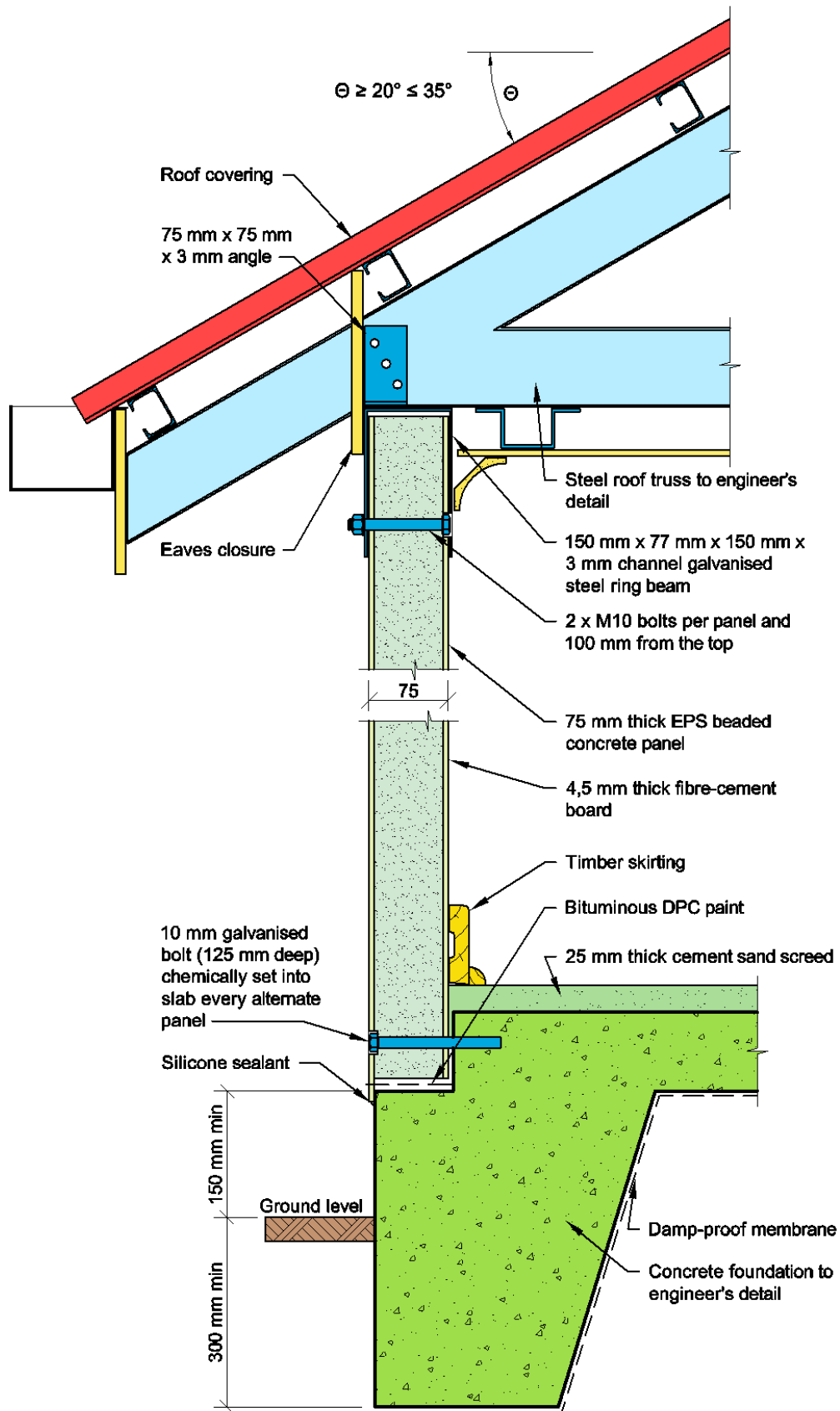


Figure 1: Foundation and eaves wall detail

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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 Mi Panel 1 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 Mi Panel 1 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 Mi Panel 1 Building System in accordance with this certificate and authorised by him/her 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 Mi Panel 1 Building System described in the certificate must:

- be 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

The Mi Panel 1 Building System is constructed under the supervision of a professional engineer or approved competent person who:

- prepares a rational design that :
 - ensures the structural integrity of the entire building
 - adheres to the conditions of certification of this certificate and the certificate holder's specification and quality management documentation.

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

The Mi Panel 1 Building System is a combination of innovative and conventional construction methods. 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 Mi Panel 1 Building System as described and illustrated in this certificate unless such change is approved in writing by Agrément South Africa before it is implemented.

Mi Panel 1 Building System

Tested and approved fit for purpose when constructed as specified in

CERTIFICATE 2010/376



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 Mi Panel 1 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.

Quality monitoring

The certificate holder is required to participate in Agrément South Africa's post-certification quality management scheme, 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 Mi Panel 1 Building System
- the cooperation of the certificate holder in facilitating post-certification quality monitoring by Agrément South Africa or its authorised agents.

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 Mi Panel 1 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

A handwritten signature in black ink, appearing to read 'M. J. ...', is written over a horizontal line.

Chairperson
18 August 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 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 Mi Panel 1 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 use of polystyrene beaded concrete wall panel encapsulated in 4,5 mm thick fibre cement boards
- Method of fixing of wall panels to one another
- Method of fixing wall panels to the concrete surface bed
- Method of fixing the roof structure to the wall panel

The assessment

In the opinion of Agrément South Africa, the Mi Panel 1 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 Mi Panel 1 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.

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

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

Table 1: Health and Safety

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>	Walls are classified non-combustible (type FR) with a fire resistance rating of 30 minutes.	<p><i>K4 Walls</i></p> <p>T1 (1) (b), T1 (1) (c) and T1 (1) (d) are satisfied insofar 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 Mi Panel 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 the technical specifications as described in Part 3 of this certificate are adhered to.	<p><i>K1, K3 and K4 Walls</i></p> <p><i>L1 (a) and (b) Roofs</i></p> <p>Regulations B 1 (1) and (2) are deemed to be satisfied. The structural design of the Mi Panel 1 Building System is the responsibility of a professional engineer or a proved competent person and deemed-to-satisfy rule BB4 of SANS 10400 is applicable.</p> <p>Regulations H1(1) and (2), <i>Foundations</i>, are deemed-to-be satisfied as follows:</p> <p>All foundations are designed by a professional engineer or competent person and deemed to satisfy rule HH1(a) applies.</p>
<i>Water penetration and rising damp</i>	Satisfactory. Mi Panel 1 Building System buildings meet Agrément South Africa's criteria for resistance to rainwater penetration and rising damp throughout South Africa.	<p><i>J1 (4) Floor</i></p> <p><i>K2 Walls</i></p>

Table 2: Habitability

Aspects of performance	Opinion of Agrément South Africa	Explanatory notes
<p>Thermal performance and energy usage</p>	<p>Satisfactory. The thermal performance of the Mi Panel 1 Building System buildings without insulated ceilings will be inferior to that of a Standard Brick House (SBH) and will perform better when insulated ceilings are installed.</p> <p>The energy required to heat a Mi Panel 1 Building System building without insulating ceilings will be up to 2 times that required to heat the SBH and when fitted with insulated ceilings, could drop to about half that required to heat the SBH.</p> <p>Insulated ceilings must always be installed.</p>	<p>Agrément South Africa's opinion is based on the calculated likely maximum indoor air temperature in summer in a 53 m² Mi Panel 1 Building System in Cape Town, Durban and Johannesburg, and the calculated energy required to maintain an indoor temperature of 16 °C in winter in Cape Town and Johannesburg.</p> <p>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 Mi Panel 1 Building System and has:</p> <ul style="list-style-type: none"> • external walls of 230 mm thick 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.
<p>Condensation</p>	<p>Satisfactory: A Mi Panel 1 Building System building fitted with insulated ceilings performs better than the standard brick house.</p>	<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>
<p>Acoustic performance</p>	<p>Satisfactory: Agrément South Africa's performance criteria for sound attenuation between adjacent rooms and dwellings have been met.</p> <div style="border: 1px solid green; padding: 5px; margin-top: 10px;"> <p>SANS 10218: Part 1: Grading criteria for the airborne sound insulation properties of buildings.</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 39 dB.</p> <p>These values meet 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 Supplement to certificates.</p>
<p>Durability</p>	<p>Satisfactory, provided normal use and adequate and regular maintenance are applied.</p>	<p>Agrément South Africa's opinion is based on the inspection of buildings erected using this building system and knowledge of the construction materials used.</p>

Table 3: Quality Management System

Aspects of performance	Opinion of Agrément South Africa	Explanatory notes
<p>Quality management system</p>	<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 Mi Panel 1 Building System will be maintained consistently.</p>	<p>Agrément South Africa's requirements are based on SANS 9001.</p> <div data-bbox="956 432 1297 555" style="border: 1px solid green; padding: 5px; margin: 10px 0;"> <p>SANS 9001: <i>Quality management systems – Requirements</i></p> </div>

PART 3: TECHNICAL SPECIFICATIONS

General description

The Mi Panel 1 Building System is a combination of innovative and conventional construction methods. It is a single storey structure that comprises of:

- foundations: cast in-situ concrete surface bed and thickened edge beams which in all cases are designed by a professional engineer or competent person.
- 75 mm thick lightweight interlocking sandwich in-fill panels comprising a polystyrene beaded concrete core with a density of 650 kg m^{-3} , encapsulated in two layers of 4,5 mm thick fibre cement boards.
- light gauge structural steel roof trusses with lightweight roof cladding
- ceilings which are always insulated and
- conventional services

Materials

A pre-requisite is placed that all materials used in the manufacturing of the Mi Panel 1 Building System are to comply with the latest relevant South African Bureau of Standard's codes and standards. In particular the main constituent materials of the wall panel are to fully comply with **SANS 10100 Part 1 and 2**, **SANS 10161**.

In terms of occupational health and safety legislation it is vital that the equipment and infrastructure used for these activities, fully comply.

SANS 10100: *The structural use of concrete Part 1 and 2*

SANS 10161: *The design of foundations for buildings*

Description of manufacturing process

The wall panels are manufactured in the factory at Jakarta, Indonesia. The Mi Panel wall panels are available in sizes varying between 2400 mm to 3000 high x 600 mm wide and 75 mm thick. Panels are manufactured using jigs that ensure accuracy. They are joined together using a tongued mould slotted into the panels during manufacture.

The panel production process is fully automated. It involves the mixing of sand, cement and expanded polystyrene beads in pan-mixers.

2 x 4,5 mm thick fibre cement boards are fixed at 66 mm apart in a specialised jig/ mould. The mould is then placed into a clamping press and then the polystyrene beaded concrete mix injected in between.

The mould is subsequently removed from the press, de-moulded and resulting in a complete Mi Panel wall panel.

To ensure that all residual reactions are complete, the panels are allowed to cure fully for a period of at least 24 hours before use.

Description of erection process

- Foundations and surface bed (figure 1)

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*

The design of the raft foundation is the responsibility of a professional engineer.

The foundations and surface floor slab are cast within the perimeters of jigs that follow the shape of the building, using concrete with a minimum compressive strength of 20 MPa at 28 days. A 71 mm x 75 mm deep rebate is formed around the perimeter of the slab. The surface is floated to a true and smooth finish.

The foundation slab is cast on a 250 µm damp-proof membrane complying with the requirements of **SANS 952** or one that is covered by a valid Agrément certificate.

SANS 952 – Polyolefin film for Damp-proofing and waterproofing in buildings

- Walls (figures 1, 2, 3 and 4)

External walls are secured to the perimeter of the slab as illustrated in figure 1.

The top of the wall panels are secured with a 150 mm x 77 mm x 150 mm x 3 mm galvanised steel (Z275) channel profile perimeter ring beam which secures the roofs to the walls.

The corner panels are lifted vertically and placed in position and braced temporarily. Holes are drilled horizontally at the bottom to accommodate mechanical anchors to hold down the panels. Holes are drilled at angles (see figure 4) and at ±480 mm centres to the top of the wall panels. The rest of the panels are slotted in accordingly.

A 77 mm x 52 mm x 2 mm galvanised steel (Z275) channel base rail is bolted with 8 mm Ø x 75 x 60 mm expansion bolts at 500 mm centres to the foundation slabs to accommodate internal walls (see figure 2).

The internal walls are then placed in positions and secured to the slab and to the external walls with mechanical anchors.

The surfaces in contact with the foundation slab are liberally coated with a bituminous paint.

- Roof construction

Roofs are light gauge structural steel trusses with lightweight cladding. The trusses are secured to the top of the walls with angle iron brackets which are welded to the tie beams and screwed to the ring beam.

- Ceilings
6,4 mm thick gypsum plasterboard ceilings are always installed and fixed to timber bracing spanning between the rafters. Bracing is secured to rafters by means of self tapping screws. Ceilings are always insulated with 40 mm thick glass-wool insulation or equivalent.
- Windows and doors
Window are Clisco-type and door frames are of galvanised pressed steel (figure 6)
- Attachment of fittings
Light and medium-weight fittings can be fixed with 4 mm and 6 mm self-tapping screws. Heavy weight fittings must be supported off the floor or supported in the roof structure.
- Services
Services are conventional. Where they run in wall, conduits are pre-fabricated or a chase is formed and the service slid into position. All voids must be finished with plaster before finishing the walls.
Alternatively, services are surface mounted.

Finishes

Walls are finished with two coats of exterior acrylic paints with SABS or Agrément South Africa accreditation and applied in accordance with the manufacturer's specifications.

Walls in wet rooms

Walls in rooms such as bathrooms, laundries, kitchens and shower cubicles, where floors are splashed with water, or where vapour is released into the atmosphere, are treated as follows:

SANS 801: Epoxy-tar paints

- seepage into the walling is prevented by a plastic skirting, approximately 100 mm high, fully bonded with a chloroprene-type contact adhesive, or by a standard timber skirting with a strip of bitumen-polyurethane foam (Compriband or equivalent) compressed underneath the skirting;
- the steel components at floor level are coated with epoxy tar complying with the requirements of **SANS 801**, Type 1, or with a good quality bituminous paint applied at a dry film thickness of at least 60 microns;
- wall surfaces, including areas behind baths, shower trays and wash-hand basins, are painted or covered with a coating that is highly impermeable to water, such as two coats of polyurethane paint of the two-part type, or a PVC-type wall cladding attached with a high quality, flexible adhesive as recommended by the manufacturer of the wall cladding;

SANS 580: Chloroprene rubber sheet (for waterproofing)

SANS 1305: Sealing compounds for the building industry, one-component, silicone-rubber-base

- in shower cubicles, the propriety shower trays have a minimum depth of 150 mm and are watertight. Whether the shower tray is preformed or constructed insitu, three sides of the tray are at least 25 mm higher than the threshold at the entrance side, with a watertight membrane to the underside and sides of the tray. (The waterproofing membrane that is used is either butyl rubber sheet complying with **SANS 580**, or an ethylene vinyl acetate copolymer sheet such as Hyperlastic). The membrane is sealed at all joints to ensure water-tightness;
- The joint between wall tiling and the lip of the bath or the edge of the shower tray is completely sealed all round, with a suitable silicone sealant complying with the requirements of **SANS 1305**.

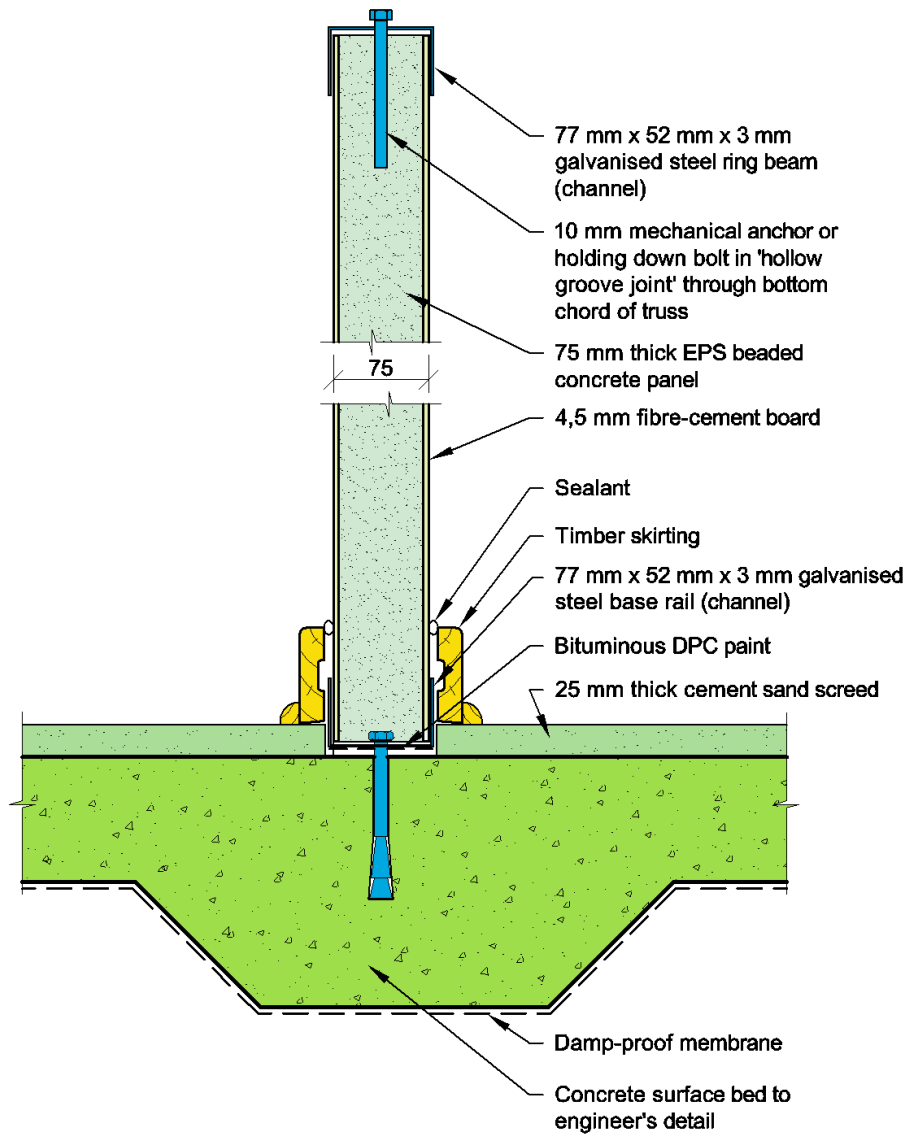


Figure 2: Internal wall and foundation detail

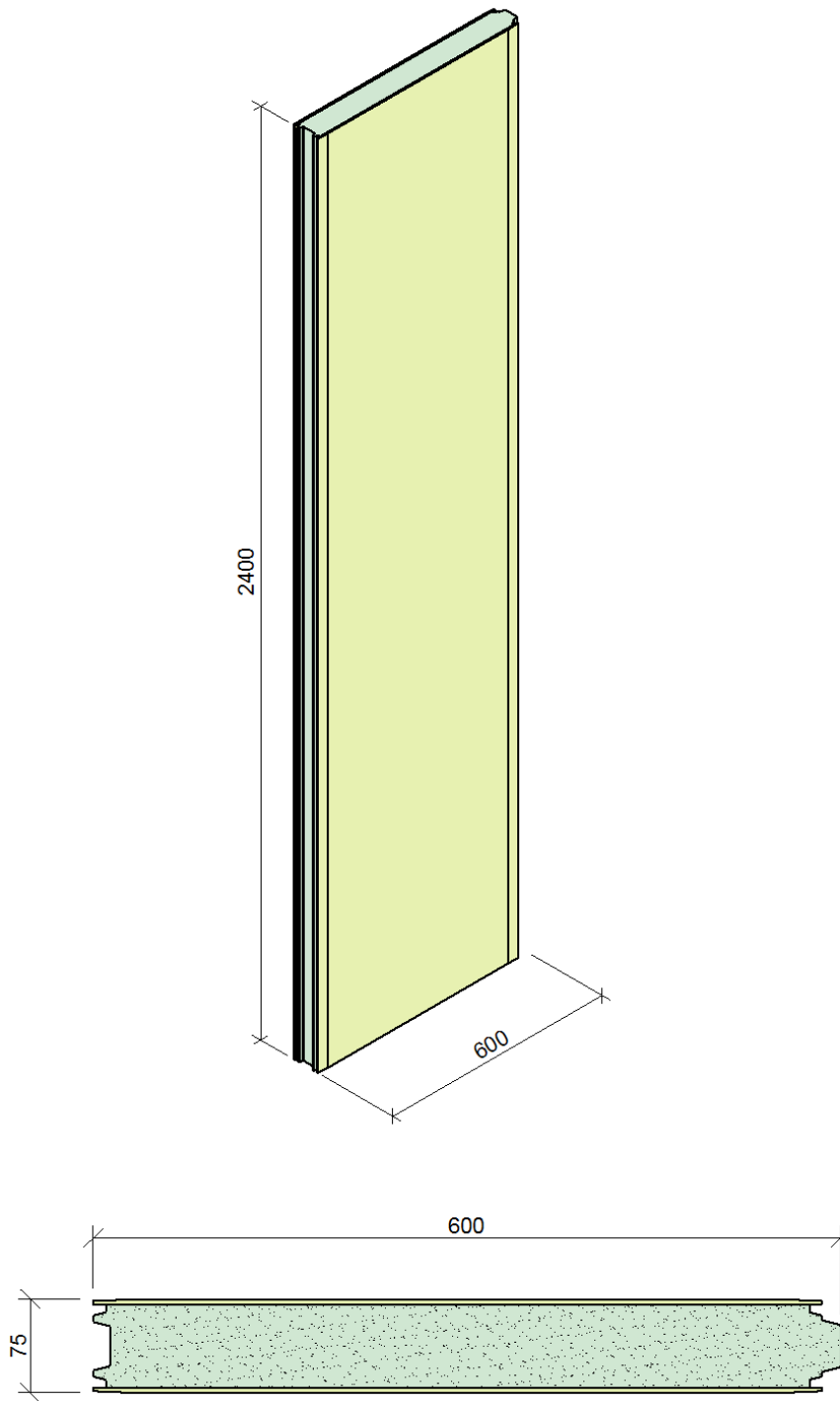


Figure 3: Plan and isometric view of Mi panel

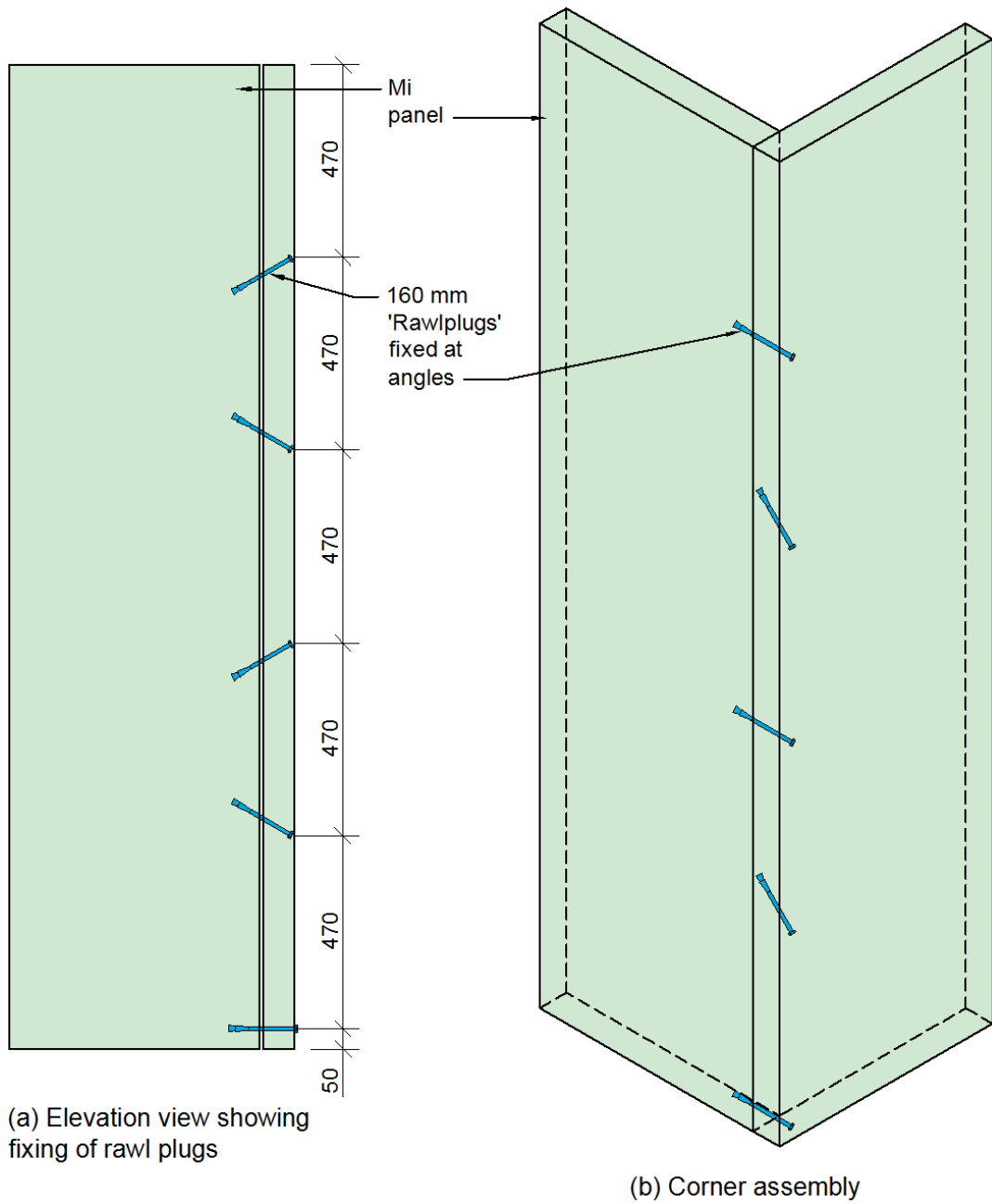
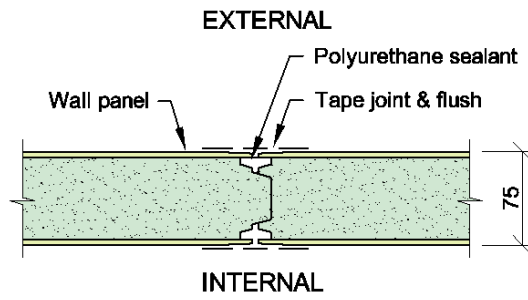
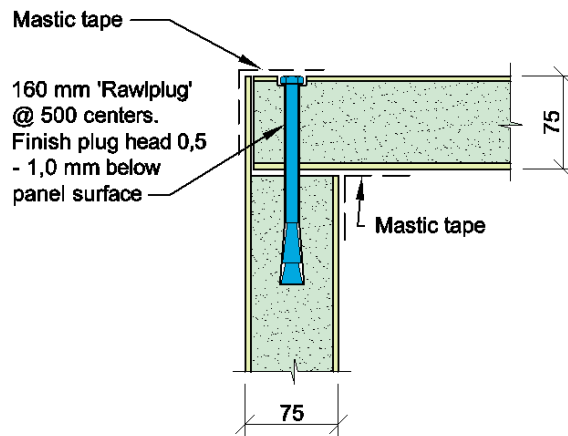


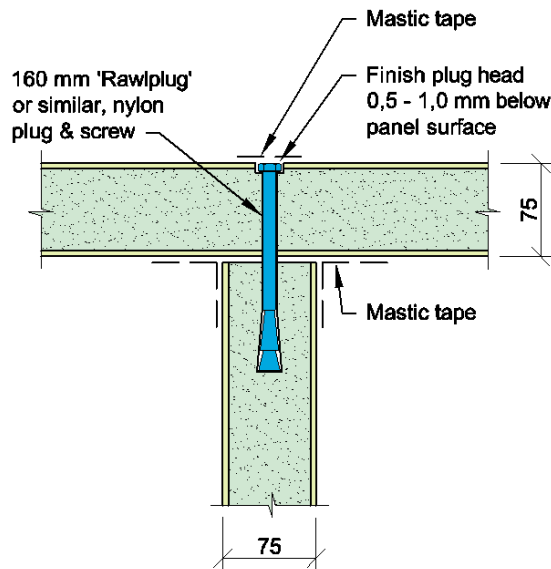
Figure 4: Fixing detail



(a) Straight junction detail (intermediate panels)

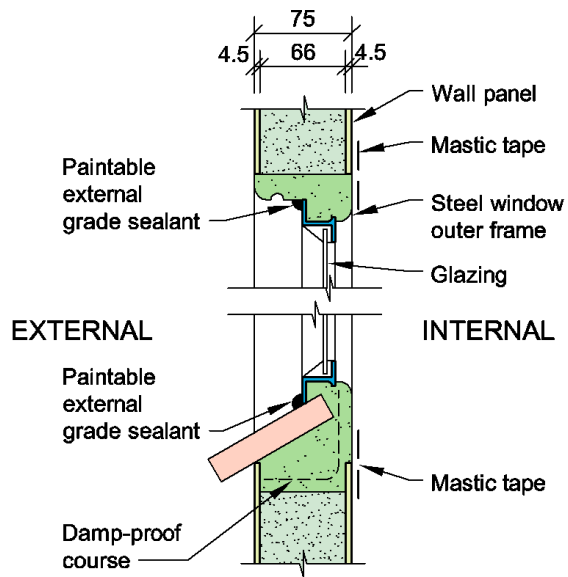


(b) External corner detail

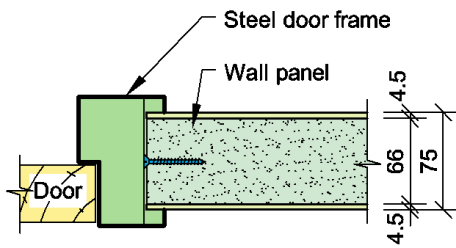


(c) 'T'-Connection detail

Figure 5: Connection details



(a) Vertical section through window



(b) Horizontal section through door frame

Figure 6: Window and door fixing details