Agrément Certificate 2015/484

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
Fax 012 841 2539
e-mail agrement@csir.co.za
http://www.agrement.co.za/

Subject:
GeoPanel Formwork System

Certificate holder:
GeoPlast South Africa (Pty) Ltd

PO Box 60964 Flamingo Square Table View
Western Cape 7439
Telephone: 021 556 8488 Fax: 021 556 3064
E-mail: office@geoplast.co.za

Uses

The certificate covers the use of GeoPanel Formwork System as a temporary shuttering system for the construction of concrete structures in all regions of South Africa for all occupancy classes as set out in Table 1 – Occupancy or Building Classification of **SANS 10400**: Table 1 of Regulations A (20) (1).

This certificate and Agrément South Africa's assessment apply only to GeoPanel Formwork 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

GeoPanel Formwork System is a temporary shuttering system for the construction of concrete walls, columns and beams. It consists of a series of various sized panels joined together by the Geoplast fast-lock nylon handle. The formwork system is made of acrylonitrile-butadiene-styrene (ABS) polymer and other additives (pigments, polymer additives, antioxidants, and colourants).

The GeoPanel Formwork System range includes the following products:

- Geopanel: for reinforced cast-in-situ concrete walls and solid reinforced concrete slabs
- Geopanel star: special formwork for reinforced concrete columns in rectangular panels. This formwork is interlockable and adjustable, resulting in different sizes of square and rectangular columns using the same panels
- Geotub: for round reinforced cast-in-situ concrete columns
- Geotub panel: for square and rectangular reinforced cast-in-situ concrete columns, panels in predetermined sizes with chamfered corners

NB. Assembly and dismantling of GeoPanel Formwork System is always the responsibility of a registered competent engineer.

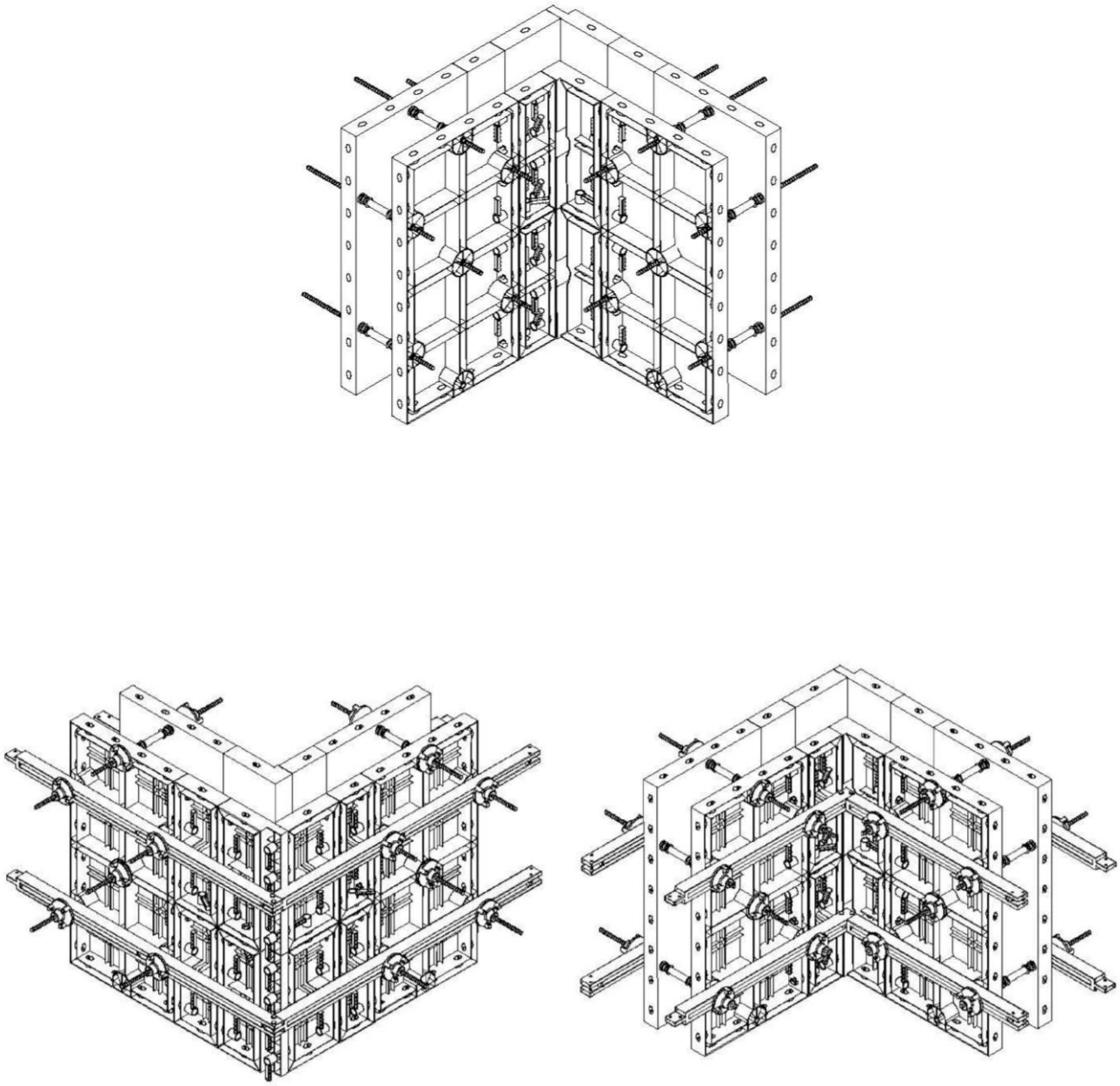


Figure 1: Typical internal corner construction

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 GeoPanel Formwork 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 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 considers that the quality and performance of GeoPanel Formwork 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 complete concrete structures 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 GeoPanel Formwork System in accordance with this certificate and authorized 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.

GeoPanel Formwork System described in this certificate must be:

- designed and erected by the certificate holder or a licensee under the control of a professional engineer or approved competent person
- constructed in accordance with design sheets made available to the professional person responsible for the concrete work
- constructed in accordance with the technical description (see Part 3) and the certificate holder's detailed specifications and quality management documentation and
- comply with the Conditions of Certification.

NB. ABS based formwork products may weather quicker in the RSA than in Europe (higher temperatures and UV levels) and a warning in this regard must be issued.

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

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

SANS 17050-1: Conformity assessment-Supplier's declaration of conformity Part 1: General requirements.

SANS 17050-2: Conformity assessment-Supplier's declaration of conformity Part 2: Supporting documentation.

GeoPlast South Africa (Pty) Ltd shall be responsible for the accuracy of the information contained within the Material Data Sheets, Technical Data Sheets and Material Performance Specifications, and all other information pertaining to the supply and application of GeoPanel Formwork System. GeoPlast South Africa (Pty) Ltd shall submit a COA (Certificate of Analysis) and COC (Certificate of Compliance) in terms of the requirements stipulated in **SANS 17050-1** Suppliers declaration of conformity when requested by Agrément South Africa in accordance with the documentation requirements of **SANS 17050-2.** Should GeoPlast South Africa (Pty) Ltd change or substitute any ingredient in the formulation of the product in question, then a notification shall be addressed to Agrément South Africa immediately.

General conditions

Marking

Where possible and appropriate, marketing brochures and packaging must be suitably marked with Agrément South Africa's identification logo together with the number as illustrated in this certificate.

GeoPanel Formwork System

Tested and approved fit for purpose when constructed as specified in

CERTIFICATE 2015/484

Validity

The continued validity of this certificate is subject to the construction of concrete structures using GeoPanel Formwork System in South Africa and 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 GeoPanel Formwork 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 before making changes to the building system
- will be required by Agrément South Africa if there are changes to the National Building Regulations or to Agrément criteria.

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

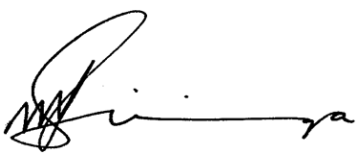
The conventional aspects of the construction are subject to the rules of good building practice (typically as described and illustrated in Agrément South Africa's *Supplement to certificates* and in the *Home building manual Parts 1, 2 & 3* issued by the National Home Builders Registration Council),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

Requirements of Supplement to certificates that must be met

The *Supplement to certificates: good building practice* (revised 2001) applies to those conventional aspects of GeoPanel Formwork 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
July 2015

PART 2: ASSESSMENT

Scope of assessment

This assessment applies to those innovative aspects of GeoPanel Formwork 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 GeoPanel Formwork system as temporary shuttering to cure concrete structures
- the materials used in the manufacturing of the products
- the method of assembly

The assessment was based on:

- documentation provided by the applicant
- known behavior of the materials used in the shuttering system
- the applicant's proposed quality management system.

Assessment

In the opinion of Agrément South Africa, GeoPlast Formwork System as described in the certificate is suitable for the construction of buildings of the types specified (page 1).

The performance in use of concrete structures constructed using 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 No. R. 711, Government Gazette No 34586, Pretoria, South Africa, 09 September 2011.

The innovative aspects of GeoPanel Formwork System must 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.

Table 1: Performance

Aspects of performance	Opinion of Agrément South Africa	National Building Regulations satisfied
Fitness-for-purpose of materials used	The materials described in Part 3 meet the requirements of the regulations.	A13(1)(a) *Materials*
Structural performance	Satisfactory, provided the requirements of this certificate are complied with.	J1(1) *Floors* K1, K3, K4 *Walls* L1 (b) and (c) *Roofs* Regulations B1 (1) and (2) are deemed to be satisfied as GeoPanel Formwork System buildings that are built in accordance with the technical specification 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 approved competent person (deemed-to-satisfy rule BB4 of **SANS 10400**). 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.

Table 2: Habitability

Aspects of performance	Opinion of Agrément South Africa	Explanatory notes
Durability	The durability of Geopanel Formwork System will be satisfactory provided the requirements given in this certificate are adhered to. **NB**. There is no warranty on the life expectancy of the formwork.	Agrément South Africa's opinion is based on knowledge of the materials used, an analysis of the construction details specified in the design and inspection of GeoPanel Formwork System.

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 quality management system requirements. Properly applied, it will ensure that quality in design, manufacturing and erection of GeoPanel Formwork System will be consistently maintained and implemented.	Agrément South Africa's requirements are based on **SANS/ISO 9001.** **SANS/ISO 9001:** *Quality management systems – Requirements.*

PART 3: TECHNICAL DESCRIPTION

General description

GeoPanel Formwork System is a temporary shuttering system for the construction of concrete walls, columns and beams. It consists of a series of various sized panels joined together by the Geoplast fast-lock nylon handle. The formwork system is made of acrylonitrile-butadiene-styrene (ABS) polymer and other additives (pigments, polymer additives, antioxidants, and colourants).

The GeoPanel Formwork System range includes the following products:

- Geopanel: for reinforced cast-in-situ concrete walls and solid reinforced concrete slabs
- Geopanel star: special formwork for reinforced concrete columns in rectangular panels. This formwork is interlockable and adjustable, resulting in different sizes of square and rectangular columns using the same panels
- Geotub: for round reinforced cast-in-situ concrete columns
- Geotub panel: for square and rectangular reinforced cast-in-situ concrete columns, panels in predetermined sizes with chamfered corners

NB. Assembly and dismantling of GeoPanel Formwork System is always the responsibility of a registered competent engineer.

Materials and components

Items	Actual size	Materials	Weight (kg)	No. of pieces/pallet	No. of handles
Geopanel 120x60x8	1210 x 605 x 80	ABS	11	38	12
Geopanel 20x60x8	202 x 605 x 80	ABS	2.38	204	5
Geopanel 25x60x8	252 x 605 x 80	ABS	2.62	166	5
Geopanel 30x60x8	303 x 605 x 80	ABS	2.94	140	5
Geopanel *35x60x8	353 x 605 x 80	ABS	3.36	118	6
Geopanel 40x60x8	404 x 605 x 80	ABS	3.70	104	6
Geopanel Inner Corner	303 x 605 x 80	ABS	4.03	128	5
Geopanel Outer Corner	252 x 605 x 80	ABS	3.12	130	5
Geopanel WP 18-21-27	100 x 605 x 80	ABS	1.5	450	4
Geopanel CL 20-25-30	460 x 605 x 80	ABS	5.25	91	6
Geopanel CL 35-40-45	610 x 605 x 80	ABS	6.28	76	7
Handle	-	Nylon	0.1	5000	-

Manufacturing process

The GeoPanel Formwork System is manufactured and assembled by GeoPlast SpA in Grantorto, Italy.

GeoPanel formwork is made through an injection process. The production process and the verifications are certified in accordance to ISO 9001.

The raw material exists in the form of acrylonitrile butadiene styrene (ABS) granules packaged in 1000 mm x 1000 mm x 1000 mm bags. The raw material is stored in silos and conveyed via a vacuum system to the injection machine.

The injection machine consists of a heating system which heats the granules up thereby turning them into liquid form. The liquid is then injected into the specific formwork moulds using high pressure nozzles.

Once the liquid has set in the mould, the mould releases the formwork without the use of a releasing agent. The rate at which this happens depends on the size and shape of the formwork in use.

Handling, transportation and storage

Handling

A lifting clamp is used to transport the formwork with a crane. Before lifting, the load must be symmetrical and the leg lengths must be equal.

Storage

In order to facilitate the handling and lifting of the formwork and all accessories, they should be stored on wooden pallets or battens in order to keep them off the ground. The formwork must be stacked carefully and not stored in heaps

Although the product is not affected by weathering, for longevity, it is preferable to store the panels away from direct sunlight.

Erection

Foundations and surface beds

Foundation and surface bed designs are the responsibility of a registered professional competent engineer who classifies the site in accordance with the site class designation set out in Table 3 of the South African Institute for Engineering and Environmental Geologists (**SAIEG)**

publication titled *Guidelines for Urban Engineering 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 requirements of **SANS 10161** and constructed accordingly.

SANS 952*: 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. Concrete used shall be in accordance with the relevant provisions of **SANS 10100-1 and SANS 10100-2** (reinforced concrete).

SANS 10100-1: *The structural use of concrete Part 1: Design*

The foundation and ground-floor slab for single-storey GeoPanel Formwork Systems are conventional concrete surface beds with thickened edge beams and with starter bars for anchoring the wall to the footing. In multi-storey structures foundations are designed by a professional engineer.

The GeoPanel Formwork System can also be constructed on GeoPlast Modulo Foundation System foundations as per Agrément certificate: GeoPlast Modulo Foundation System.

Placing of formwork

The GeoPanel Formwork for Concrete Construction is placed on a flat and levelled surface bed, following the lines marked on the surface and in accordance with the layout drawings supplied. The panels are linked to each other using GeoPlast handles which firmly lock panels of different sizes into each other with a 90° turn.

The formwork is arranged with 1200 mm x 600 mm x 80 mm thick ABS plastic panels, nylon handles, lock-nut for the rolled steel bars, vertical wooden closing panels at the ends of the formwork, four internal and external metal tubes of 1210 mm in length and with a square section of 50 mm x 50 mm x 1.5 mm both for the lower stringer at the base (these tubes are used to fix the structure to the floor, using steel blocks, and prevent movement of the walls) and for the upper stringer installed at a height of ±300 mm. It also consists of 8 tubes with a length of 1250 mm and a rectangular section of 50 mm x 60 mm x 3 mm for the external corners, and another 8 tubes of the same length and section for the internal corners. Four inclined metal buttresses (two on the outer side of the wall and two on the inner side) of circular metal tubes with a diameter of 55 mm are installed to guarantee the stability of the structure.

The assembly and dismantling of GeoPanel Formwork System is conventional.

Steel reinforcement

All details (size, fixing and spacing) to reinforcement steel bars (vertical and horizontal) and around junctions and openings are the responsibilities of a professional competent engineer.

Steel reinforcement necessary to the structure under construction is placed in position on the inside of the outer panels. The reinforcement is fixed to the starter bars taking into account that areas where windows and doors will be installed are left without reinforcement.

Window and door openings

Upon installation of the full Geopanel Formwork System, the window and door voids are framed with wooden shutters that are cut to size in accordance with the thickness of the walls of the structure as per the architectural design.

Panels are placed on opposite sides of the openings (doors and windows) and held into position by L-shaped steel channels or wooden boards. Props are placed in position and either a GeoPanel panel or a traditional wooden board is used as a lintel.

Pouring of concrete

A normal concrete mix specified by a professional engineer is pumped into the formwork. Proper bracing is provided through the installation of alignment bars and a steady propping of the full GeoPanel Formwork System structure.

Vibration of the concrete mix takes place in stages during the pouring of the concrete.

NB. Only immersion concrete vibrators are allowed.

Maintenance

The operations of positioning, assembling, dismantling, plumbing, handling and cleaning of GeoPanel products, as well as the pouring of the concrete, must be carried out by competent and properly trained personal or under supervision of the site manager or a technician of GeoPlast (Pty) Ltd, who must ensure that:

- all panels and the supplied accessories are checked before use, discarding those which do not meet the minimum standard of reliability and safety because of the presence of any breakage and/or deformation.

NB. There is no warranty on the life expectancy of the formwork.

Cleaning

After each use the formwork is cleaned with potable water, preferably with a pressure washer. Any residual concrete should be removed with the aid of a brush or wooden scraper.

As long as the contact surface of the formwork does not show signs of wear, no releasing agent is necessary.

Drawings

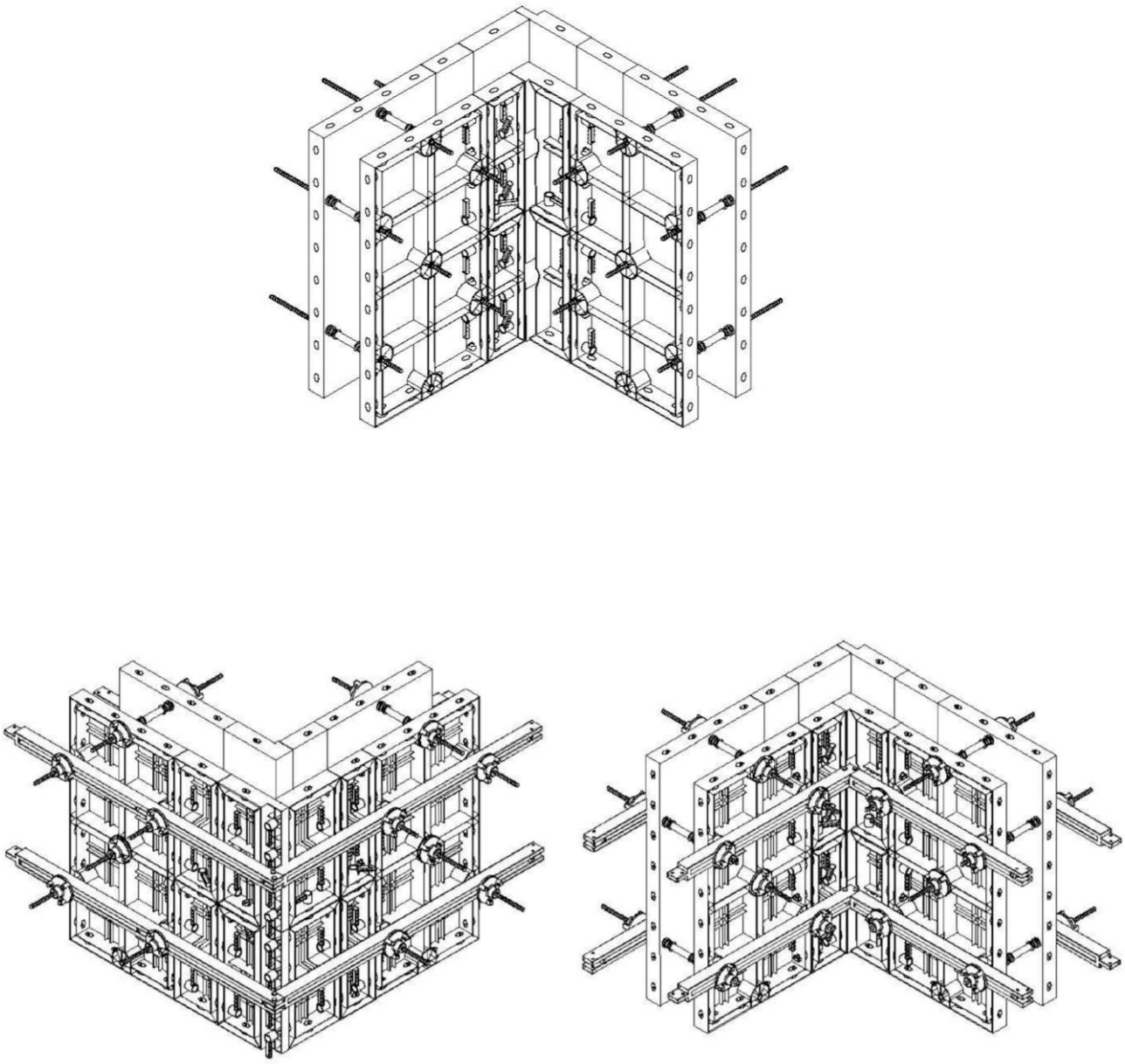


Figure 1: Typical internal corner construction

Figure 2: GeoPanel Formwork System

Figure 3: Geopanel Formwork System

Figure 4: GeoPanel Formwork System in use