Deutsches Institut für Bautechnik

Zulassungsstelle für Bauprodukte und Bauarten

Bautechnisches Prüfamt

Eine vom Bund und den Ländern gemeinsam getragene Anstalt des öffentlichen Rechts

Kolonnenstraße 30 B
D-10829 Berlin
Tel.: +49 30 78730-0
Fax: +49 30 78730-320
E-Mail: dibt@dibt.de
www.dibt.de

Authorised and notified according to Article 10 of the Council Directive of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products (89/106/EEC)

Deutsches Institut für Bautechnik

DIBt

Mitglied der EOTA
Member of EOTA

European Technical Approval ETA-07/0105

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung *Trade name*		ARGISOL
Zulassungsinhaber *Holder of approval*		BIOISOTHERM S.r.l. via Roma, n. 14 20045 BESANA IN BRIANZA (MILANO) ITALIEN
Zulassungsgegenstand und Verwendungszweck *Generic type and use of construction product*		Nicht lasttragender verlorener Schalungsbausatz "ARGISOL" aus EPS Schalungselementen *Non load bearing shuttering kit "ARGISOL" based on shuttering elements of EPS*
Geltungsdauer: *Validity:*	vom *from* bis *to*	28 February 2007 15 November 2010
verlängert *extended*	vom *from* bis *to*	16 November 2010 16 November 2015
Herstellwerke *Manufacturing plants*		L´ISOLANTE S.r.l. - II° plant - Strada Statale 249 Nord, n.4 46048 Roverbella (MN) ITALIEN RI.BA SUD S.r.l. via Bosco Fili - Z. I. 84091 Battipaglia (SA) ITALIEN

Diese Zulassung umfasst *This Approval contains*	20 Seiten einschließlich 8 Anhänge *20 pages including 8 annexes*

I LEGAL BASES AND GENERAL CONDITIONS

1 This European technical approval is issued by Deutsches Institut für Bautechnik in accordance with:

- Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products[1], modified by Council Directive 93/68/EEC[2] and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council[3];
- Gesetz über das In-Verkehr-Bringen von und den freien Warenverkehr mit Bauprodukten zur Umsetzung der Richtlinie 89/106/EWG des Rates vom 21. Dezember 1988 zur Angleichung der Rechts- und Verwaltungsvorschriften der Mitgliedstaaten über Bauprodukte und anderer Rechtsakte der Europäischen Gemeinschaften (Bauproduktengesetz - BauPG) vom 28. April 1998[4], as amended by law of 31 October 2006[5];
- Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC[6];
- Guideline for European technical approval of "Nonload-bearing permanent shuttering systems based on hollow blocks or panels of insulating materials and sometimes concrete", ETAG 009.

2 Deutsches Institut für Bautechnik is authorized to check whether the provisions of this European technical approval are met. Checking may take place in the manufacturing plants. Nevertheless, the responsibility for the conformity of the products to the European technical approval and for their fitness for the intended use remains with the holder of the European technical approval.

3 This European technical approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 of this European technical approval.

4 This European technical approval may be withdrawn by Deutsches Institut für Bautechnik, in particular pursuant to information by the Commission according to Article 5(1) of Council Directive 89/106/EEC.

5 Reproduction of this European technical approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of Deutsches Institut für Bautechnik. In this case partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European technical approval.

6 The European technical approval is issued by the approval body in its official language. This version corresponds fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

1 Official Journal of the European Communities L 40, 11 February 1989, p. 12
2 Official Journal of the European Communities L 220, 30 August 1993, p. 1
3 Official Journal of the European Union L 284, 31 October 2003, p. 25
4 *Bundesgesetzblatt Teil I 1998*, p. 812
5 *Bundesgesetzblatt Teil I 2006*, p. 2407, 2416
6 Official Journal of the European Communities L 17, 20 January 1994, p. 34

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of product and intended use

1.1 Definition of the construction product

The shuttering system "ARGISOL" is a non-load-bearing permanent shuttering kit based on shuttering elements and accessory parts (see Annexes 1 to 5) applicable as formwork for plain and reinforced concrete walls cast in-situ. The accessory parts are wedges for horizontal curved walls, floor end plates, single plates, pieces for the equalization of differences in height and end stops.

1.1.1 Shuttering elements

The shuttering elements consist of one-layered expanded polystyrene (EPS) leaves which are prefabricated in connection with spacers of steel. The spacers of steel are 0.63 mm thick and connect the shuttering leaves. The distance between the spacers in longitudinal direction of the elements is 125.0 mm (see Annex 1). The two ends of the spacers are embedded in the EPS (expanded polystyrene) of the shuttering leaves.

The upper and lower surfaces of the shuttering leaves are castellated. The vertical mating surfaces are tongue and groove to form a tight fit when joined together. The outer and inner surfaces have tapered grooves running vertically. In the inner surfaces the grooves ribs serve as mechanical fixing of the shuttering leaves to the concrete. They also form locks for end stops. The length of the elements is 1000.0 mm and the height 250.0 mm.

The thickness of the inner shuttering leaf in all cases is 52.0 mm and the thickness of the outer shuttering leaf 65.0 mm. The minimum thickness of the concrete core is 133.0 mm.

Special elements are also part of the kit as corner elements (see Annex 2), angular elements (Annex 3), T-elements (Annex 4), elements with hinges for horizontal curved walls (Annex 5) and lintel elements (Annex 3) which are produced in the same manner as described above.

1.1.2 Accessory parts

1.1.2.1 Wedges for horizontal curved walls (Annex 5)

Are as high as the shuttering leaves (250.0 mm) and are used to fill the gaps between the vertical joints on the inner side of the horizontal curved walls made with the elements given in Annex 5.

1.1.2.2 Floor end plates (Annex 3)

It is used for the vertical shuttering of the floor plates and to avoid heat bridges in the floor levels in end use conditions. The upper and lower surfaces are castellated in the same way as for the shuttering leaves of the elements. Their vertical mating surfaces are tongue and groove and form a tight fit when they are put together. They are 100.0 mm thick and 200.0 mm high. At the inside of the plates there are pockets which, together with the walls, are filled with concrete and reinforcement. After hardening of the concrete of the wall the floor end plates are sufficiently fixed to resist the concrete pressure when concreting the floors.

1.1.2.3 Single plates, pieces for the equalization of differences in height and end stops (Annex 5)

The upper and lower surfaces of all these parts are castellated in the same way as for the shuttering leaves of the elements. The structure of the inner and outer surface is the same as for the shuttering leaves. Their vertical mating surfaces are tongue and groove and form a tight fit when put together.

Single plates and pieces for equalization are used to fill gaps, which are not possible to fill with shuttering elements (e. g. joints to the roof). Single plates have the same dimensions as the shuttering leaves, pieces for the equalization of differences in height are 50.0 mm thick and high and 500.0 mm long.

End stops are 50.0 mm thick and 133.0 mm long. They are inserted in the gaps between the shuttering leaves at the openings of the wall.

1.2 Intended use

The kit is intended to be used for construction of internal walls as well as external walls above or below ground which are load-bearing (structural) or non-load-bearing (non structural), including those which are subjected to fire regulations.

When using this type of construction below ground a waterproofing according to applicable national rules shall be provided depending on whether water not exerting pressure or water exerting pressure is to be dealt with. The waterproofing shall be protected from mechanical damage by a smash-resistant protective layer.

The provisions made in this ETA are based on an assumed intended working life of the shuttering kit of at least 50 years, provided that the shuttering system in end use conditions is subjected to an appropriate use and maintenance.

The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

2 Characteristics of products and methods of verification

2.1 Characteristics of products

2.1.1 Shuttering elements

The standard and special shuttering elements as well as the accessory parts correspond to the information and drawings given in Annexes 1 to 5. The kit consists of the following shuttering elements, plates and pieces:

- Standard shuttering elements (Annex 1)
- Corner shuttering elements (Annex 2)
- Angular shuttering elements (Annex 3)
- T-elements (Annex 4)
- Elements with hinges for horizontal curved walls (Annex 5)
- Lintel elements (Annex 3)

For the shuttering leaves expanded polystyrene made of polystyrene particle foam EPS-EN 13163-T1-L1-W2-S2-P4-DS(70,-)3-BS250-DS(N)5-TR100 according to EN 13163 is used.

The material characteristics, dimensions and tolerances of the shuttering elements not indicated in Annexes 1 to 5 are given in the technical documentation[7] of the ETA.

2.1.2 Accessory parts

Wedges for horizontal curved walls (Annex 5), floor end plates (Annex 3), single plates, end stops and pieces for the equalization of differences in height (Annex 5) are made of the same EPS material as the shuttering leaves.

[7] The technical documentation of the ETA is deposited with DIBt and, as far as relevant for the tasks of the approved bodies involved in the attestation of conformity procedure, is handed over to the approved bodies.

2.2 Methods of verification

2.2.1 General

The assessment of the fitness of the shuttering system for the intended use has been made in compliance with ETAG 009, Guideline for European Technical Approval of "Non-load-bearing permanent shuttering kits/systems based on shuttering elements or blocks of insulating materials and sometimes concrete", edition June 2002.

The ETA is issued for the shuttering kit "ARGISOL" on the basis of agreed information, deposited with Deutsches Institut für Bautechnik (DIBt), which identifies the shuttering kit that has been assessed and evaluated. Changes to the production process, the kit or the components which could result in this deposited information being incorrect, shall be notified to DIBt before the changes are introduced. DIBt will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA, and, if so, whether further assessment and/or alterations to the ETA shall be necessary.

2.2.2 Essential Requirement 1: Mechanical resistance and stability

2.2.2.1 Resulting structural pattern

In end use conditions walls made with shuttering elements "ARGISOL" are walls of a continuous type according to ETAG 009, paragraph 2.2.

2.2.2.2 Efficiency of filling

Considering the instructions of chapter 4.2 and the installation guide of the ETA applicant the efficient filling without bursting of the shuttering and without voids or any uncovered reinforcement in the concrete core is possible.

The requirements according to ETAG 009, chapter 6.1.2 are met satisfactorily.

2.2.2.3 Possibility of steel reinforcement

The instructions in the installation guide of the ETA applicant are appropriate to install steel reinforcement for walls according to EN 1992-1-1 or corresponding national rules.

The requirements according to ETAG 009, chapter 6.1.3 are met satisfactorily.

2.2.3 Essential Requirement 2: Safety in case of fire

2.2.3.1 Reaction to fire

Euroclass D-s3-d0 according to EN 13501-1[8]

2.2.3.2 Resistance to fire

With the minimum thickness of the continuous concrete core of 133.0 mm the fire resistance class of walls with a minimum concrete strength C16/20 according to Table 1 of Annex C of ETAG 009 is REI 90.

[8] A European reference fire scenario for facades has not been laid down. In some Member States the classification of permanent shuttering systems according to EN 13501-1:2002 might not be sufficient for the use in facades. An additional assessment of permanent shuttering systems according to national provisions (e. g. on the basis of a large scale test) might necessary to comply with Member States regulations, until the existing European classification system has been completed.

2.2.4 Essential Requirement 3: Hygiene, health and the environment

2.2.4.1 Release of dangerous substances

According to the manufacturer's declaration the shuttering elements "ARGISOL" taking account of the EU database[9] do not contain any dangerous substances.[10]

2.2.4.2 Water vapour permeability

The tabulated design value of the water vapour diffusion resistance coefficient of expanded polystyrene (EPS) according to EN ISO 10456[11] is $\mu = 60$.

The values for the water vapour diffusion resistance of concrete depending on density and type are tabulated in EN ISO 10456.

2.2.5 Essential Requirement 4: Safety in use

2.2.5.1 Bond strength between the shuttering leaves and the concrete core

The expanded polystyrene is bonded to the concrete by mechanical interlocking of the dovetail sections running vertically in the inner surfaces of the shuttering leaves over the whole height of the element with a horizontal distance of 2.4 cm (i. e. 41 sections per meter length). Since the minimum width of the dovetail sections is 10.0 mm the effective area for the transmission of tensile forces is 0.01 x 1 x 41 m² = 0.41 m². This is more than 20 % of the whole area of the shuttering leaves and leads to the effective bond strength of 0,041 N/mm² which is sufficient to meet the requirements of ETAG 004, chapter 6.1.4.1.3.

The requirements according to ETAG 009, chapter 6.4.1.3 are met satisfactorily.

2.2.5.2 Resistance to filling pressure

To resist the filling pressure the bending tensile strength of the shuttering leaves shall be more than 280 kPa (see also designation code of EPS in chapter 2.1.1) and the strength to pull out of the spacers more than 900 N.

The requirements according to ETAG 009, chapter 6.4.2 are met satisfactorily.

2.2.5.3 Safety against personal injury by contact

Delivered on site the shuttering elements do not have sharp or cutting edges.

Because of the soft surface of the shuttering leaves there is no risk of abrasion or of cutting people.

The requirements according to ETAG 009, chapter 6.4.3 are met satisfactorily.

2.2.6 Essential Requirement 5: Protection against noise

2.2.6.1 Airborne sound insulation

The "No performance determined" option in ETAG 009, Table 3 is used.

2.2.6.2 Sound absorption

The "No performance determined" option in ETAG 009, Table 3 is used.

[9] Notes are stated in Guidance Paper H: "A harmonized approach relating to dangerous substances under the Construction Products Directive", Brussels, 18 February 2000

[10] In addition to the specific clauses relating to dangerous substances contained in this European Technical Approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EC Construction Products Directive, these requirements need also to be complied with, when and where they apply.

[11] EN ISO 10456:2007 Building materials and products - Hygrothermal properties - Tabulated design values and procedures for determining declared and design thermal values

2.2.7 Essential Requirement 6: Energy economy and heat retention

2.2.7.1 Thermal resistance

The nominal value of the thermal resistance R of the elements in end use conditions (with concrete infill but without rendering) calculated in accordance with EN ISO 6946[12] from the nominal value of the thermal conductivity of the shuttering leaves λ_{DI} = 0.031 W/(m K) according to EN 13163, chapter 4.2.1, and the thermal resistance of the concrete core R_{DC} (can be calculated by using the values of thermal conductivity depending on the density tabulated in EN ISO 10456) and considering the influence of the steel spacers is R_D = 3.3 m²K/W.

2.2.7.2 Thermal inertia

The values for the heat capacity of concrete and expanded polystyrene are tabulated in EN ISO 10456.

2.2.8 Aspects of durability and serviceability

2.2.8.1 Resistance to deterioration

Physical agent

As given in the designation code of the EPS material used (see 2.1.1) the dimensions of the shuttering leaves do not differ more than 3 % after exposing them for 48 h at 70 °C (DS(70,-)3).

The requirements according to ETAG 009, chapter 6.7.1.1 are met satisfactorily.

Chemical agent

The spacers made of steel are only necessary for the resistance to concrete pressure. After hardening of the concrete the bond between concrete and shuttering leaves is given by the dovetail sections running vertically on the inner surfaces of shuttering leaves (see chapter 2.2.5.1).

Therefore the requirement "corrosion protection" according to ETAG 009, chapter 6.7.1.2 is met satisfactorily.

Biological agent

The application of EPS as thermal insulating material for decades has shown that it sufficiently protects against fungi, bacteria, algae and insects.

EPS does not provide a food value and in general it does not contain voids suitable for habitation by vermin.

The requirements according to ETAG 009, chapter 6.7.1.3 are met satisfactorily.

2.2.8.2 Resistance to normal use damage

Incorporation of ducts

The instructions in the installation guide of the ETA applicant are appropriate to install horizontally passing ducts on site.

Fixing of objects

Fixing of objects in the shuttering leaves is not possible, the part of fixings which is significant for the mechanical resistance shall be in the concrete core.

[12] EN ISO 6946:2007 Building components and building elements - Thermal resistance and thermal transmittance - Calculation method

3 Evaluation and attestation of conformity and CE marking

3.1 System of attestation of conformity

According to the decision on the procedure of attestation of conformity 98/279/EC of 5 December 1997[13] amended by the decision 2001/596/EC of the European Commission the system 2+ of attestation of conformity applies.

This system of attestation of conformity is defined as follows:

System 2+: Declaration of conformity of the product by the manufacturer on the basis of:

(a) Tasks for the manufacturer:
  (1) initial type-testing of the product;
  (2) factory production control;
  (3) testing of samples taken at the factory in accordance with a prescribed test plan.

(b) Tasks for the approved body:
  (4) certification of factory production control on the basis of:
    – initial inspection of factory and of factory production control;
    – continuous surveillance, assessment and approval of factory production control.

3.2 Responsibilities

3.2.1 Tasks for the manufacturer

3.2.1.1 Factory production control

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this European Technical Approval.

The manufacturer may only use raw materials stated in the technical documentation of this European Technical Approval.

The factory production control shall be in accordance with the "control plan" of 28 October 2005 which is part of the technical documentation of this European Technical Approval. The "control plan" is laid down in the context of the factory production control system operated by the manufacturer and deposited at Deutsches Institut für Bautechnik.[14]

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the "control plan".

3.2.1.2 Other tasks of manufacturer

The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.1 in the field of non-load bearing shuttering systems in order to undertake the actions laid down in section 3.2.2. For this purpose, the "control plan" referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of this European Technical Approval.

[13] Official Journal of the European Communities L /127 of 24.04.1998

[14] The "control plan" is a confidential part of the documentation of the European Technical Approval, but not published together with the ETA and only handed over to the approved body/bodies involved in the procedure of attestation of conformity. See section 3.2.2.

3.2.2 Tasks for the approved body

The approved body shall perform the

- initial inspection of factory and of factory production control,
- continuous surveillance, assessment and approval of factory production control,

in accordance with the provisions laid down in the control plan of 28 October 2005 relating to this European Technical Approval.

The approved body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

The approved certification body involved by the manufacturer shall issue an EC certificate of conformity of the factory production control stating the conformity with the factory production control of this European Technical Approval.

In cases where the provisions of the European Technical Approval and its "control plan" are no longer fulfilled the certification body shall withdraw the certificate of conformity and inform Deutsches Institut für Bautechnik without delay.

3.3 CE marking

The CE marking shall be affixed on every second shuttering element and/or on the accompanying commercial documents. The letters "CE" shall be followed by the identification number of the approved certification body, where relevant, and be accompanied by the following additional information:

- name and address of producer (legal entity responsible for the manufacturer),
- the last two digits of the year in which the CE marking was affixed,
- the number of the EC certificate for the factory production control,
- the number of the European Technical Approval,
- the number of the guideline ETAG 009,
- Reaction to fire: Euroclass D-s3-d0 according to EN 13501-1,
- Resistance to fire: Class according EN 13501-2,
- protection against noise "no performance determined",
- the nominal value of thermal resistance of the shuttering leaves R_D = 3.3 m²K/W.

4 Assumption under which the fitness of the product for the intended use was favourably assessed

4.1 Manufacturing

The European Technical Approval is issued for the product on the basis of agreed information, deposited with Deutsches Institut für Bautechnik, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited information being incorrect, should be notified to Deutsches Institut für Bautechnik before the changes are introduced. Deutsches Institut für Bautechnik will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment or alterations to the ETA shall be necessary.

4.2 Installation

4.2.1 General

The manufacturer shall ensure that the requirements in accordance with sections 1, 2, and 4 are made known to those involved in planning and execution. The installation guide is deposited with DIBt and shall be present at every construction site. If the manufacturer's instructions contain provisions which differ from those stated here, the specifications of the ETA shall apply.

After installation of the shuttering elements (see chapter 4.2.2) the site-mixed or ready mixed concrete is brought in and compacted.

In end use conditions concrete walls of a continuous type[15] of plain or reinforced concrete will be formed according to EN 1992-1-1 or according to corresponding national rules.

In structural design the thickness of the wall is 133.0 mm and the weight per unit area without rendering 2,87 kN/m² sumed density of concrete 25 kN/m³).

In end use conditions the EPS shuttering leaves are the main part of the thermal insulation of the walls.

4.2.2 Installation of the shuttering elements

The shuttering elements are put together on site in layers without adhesive. To receive stable floor high formworks the vertical joints between two elements of one layer have to be shifted of at least a quarter of the element length to the vertical joints of the previous and next layer (see Annexes 6 and 7).

First of all two layers of the entire floor plan are to be interlocked according to the installation guide of the ETA applicant.

Afterwards leveling to the subsoil is performed (foundation, bottom plate, ceiling). Voids between the shuttering leaves and the uneven subsoil are to be sealed with PU foam before concreting.

Subsequently, according to the installation guide of the ETA applicant, the walls are to be interlocked to floor height, leveled and fastened to the push pull props (see Annex 8).

The push pull props are to be arranged at a maximum distance of 1.20 m to 1.50 m, to be connected over the entire wall height with the shuttering elements and to be fastened to the floor.

The necessary reinforcement according to static calculation shall also be installed according to the instructions of the ETA applicant in the installation guide. Rectangular wall corners are to be formed according to Annex 6 and wall junctions according to Annex 7.

4.2.3 Concreting

For the production of normal concrete EN 206-1:2001-07 shall apply. The consistency of concrete on compacting by shaking shall be within the lower consistency range F3 and on compacting by poking within the upper consistency range F3. The maximum aggregate size shall be at least 8.0 mm and shall not exceed 16.0 mm. The concrete shall have rapid or middle strength development according to EN 206-1:2001-07, Table 12.

Placing the concrete shall be performed only by persons who were instructed in the works and in the proper handling of the shuttering system.

[15] see ETAG 009 chapter 2.2

Placing the concrete shall be performed in layers of 1.0 m at a maximum vertical concreting rate of 3.0 m/h. For horizontal curved walls made with shuttering elements according to Annex 5 the vertical concreting rate shall not exceed 1.0 m/h.

If equivalent national rules are not available the following instructions shall be considered:

Horizontal day joints are to be arranged preferably at the height of the floor. If day joints can not be avoided within the height between the floors vertical composite reinforcement bars shall be installed. The composite reinforcement shall comply the following requirements:

- two adjacent composite reinforcement bars shall not be situated in the same plane parallel to the surface of the wall,
- the distance between two composite reinforcement bars in wall direction shall be at least 10.0 cm and not larger than 50.0 cm,
- the total section area of the composite reinforcement bars shall not be less than 1/2000 of the section area of the concrete,
- anchorage length of the composite reinforcement bars on both sides of the day joint at least shall be 20.0 cm.

Before the further placing of concrete, cement laitance and detached / loose concrete shall be removed and the day joints shall be sufficiently pre-wetted. At the time of concreting the surface of the older concrete shall be slightly moist, so that the cement paste of the newly brought in concrete can combine well with the older concrete.

If no day joint is planned, placing of concrete in layers may only be interrupted until the concrete layer brought in last is not solidified yet so that a good and even bond is still possible between the two concrete layers. When using internal vibrators the vibrating cylinder shall still penetrate into the already compacted lower concrete layer.

The concrete may fall freely only up to a height of 2.0 m, beyond that the concrete shall be cohered by discharge pipes or concreting tubes with a diameter of 100.0 mm at the most and shall be led shortly before the place of installation.

Cones from pouring are to be avoided by short distances of the places of fill in.

Planning shall allow for sufficient spaces in the reinforcement for discharge pipes or concreting tubes.

After concreting the walls may not deviate from the plumb line more than 5.0 mm per running meter wall height.

The ceiling may only be placed on walls made of shuttering elements if a sufficient strength of the concrete core exists.

4.2.4 Ducts crossing and situated inside the wall

Horizontally passing ducts are to be installed according to the installation guide of the ETA applicant and are to be taken into account when designing the wall.

Horizontal ducts situated inside the wall cores are to be avoided. If absolutely necessary, these are to be taken into account when designing the wall.

Also vertical ducts in the concrete core shall be considered, if their diameter exceeds 1/6 of the thickness of the concrete core and the distance of the pipes is less than 2.0 m.

4.2.5 Reworking and finishes

Walls of the type "ARGISOL" are to be protected by finishes. Finishes are not part of the kit and therefore not considered in this ETA. Preferably for external surfaces the rendering systems used should meet the requirement of ETAG 004[16]. The execution of the rendering shall be performed according to applicable national rules.

4.2.6 Fixing of objects

Fixing of objects in the shuttering leaves is not possible, the part of fixings which is significant for the mechanical resistance shall be in the concrete. The influence of the fixing to the reduction of the thermal resistance shall be considered according to EN ISO 6946.

5 Indications on the manufacturer

5.1 Packaging, transport and storage

The shuttering elements shall be protected against damage, soiling and intensive action of water during transport and storage. If necessary the elements shall be covered.

5.2 Use, maintenance, repair

Regular checks should be carried out on render finishes to ensure that any damage is detected and repaired as soon as possible.

The recommendations on use, maintenance and repair in ETAG 009, section 7.5 shall be considered.

Georg Feistel
Head of Department

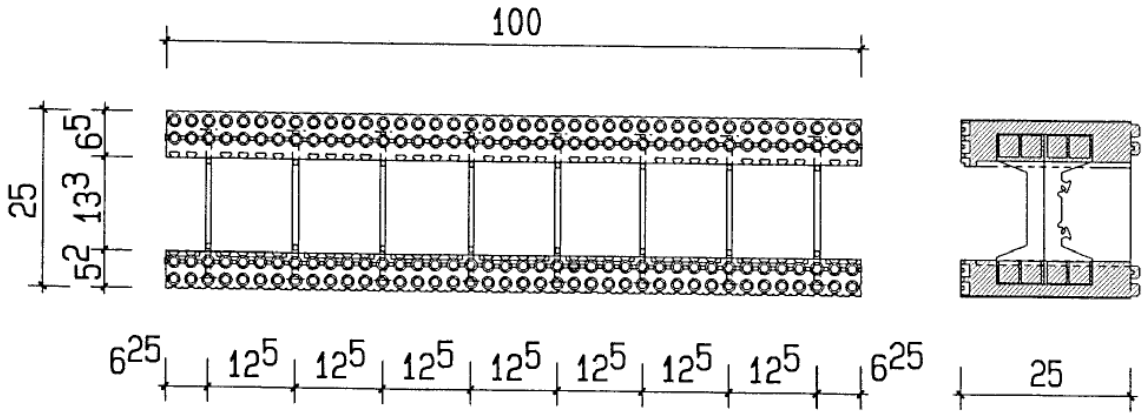
beglaubigt:
Schwab

[16] EOTA Guideline for External Thermal Insulation Composite Systems with rendering.

Deutsches Institut für Bautechnik DIBt

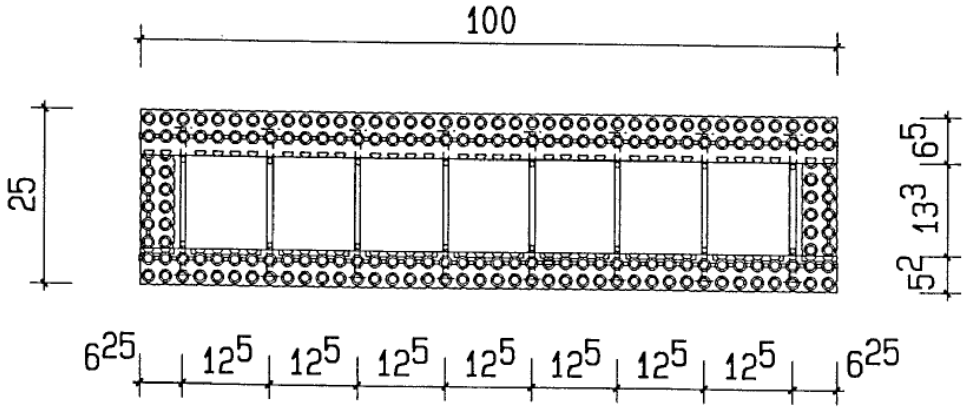
Standard elements

100 x 25 x 25



Standard elements with end stops

100 x 25 x 25



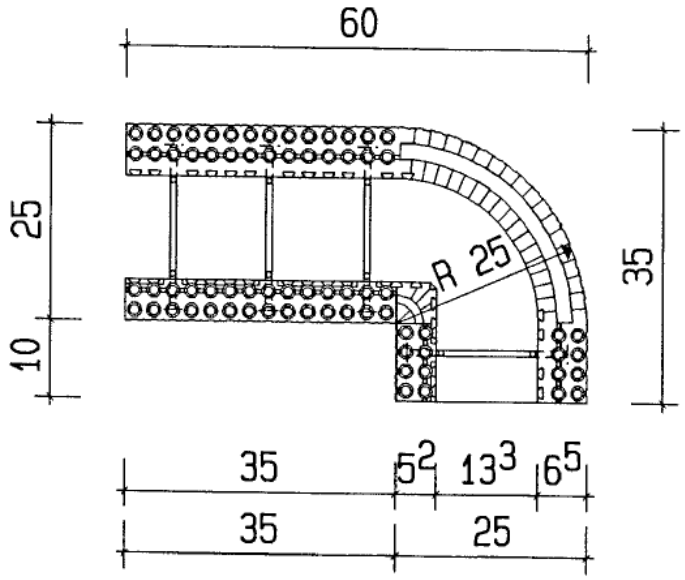
all dimensions in [cm]

ARGISOL	Annex 1
Standard shuttering element	

Deutsches Institut für Bautechnik DIBt

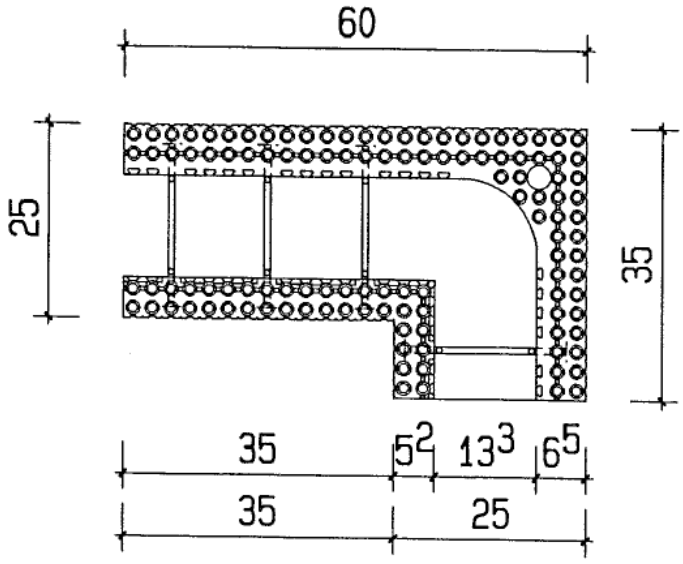
curved corner element left and right

60 x 35 x25



corner element left and right

60 x 35 x25



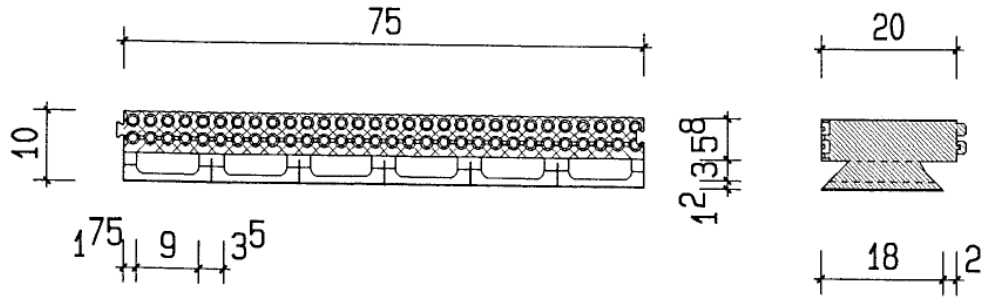
all dimensions in [cm]

ARGISOL	Annex 2
Corner elements	

Deutsches Institut für Bautechnik DIBt

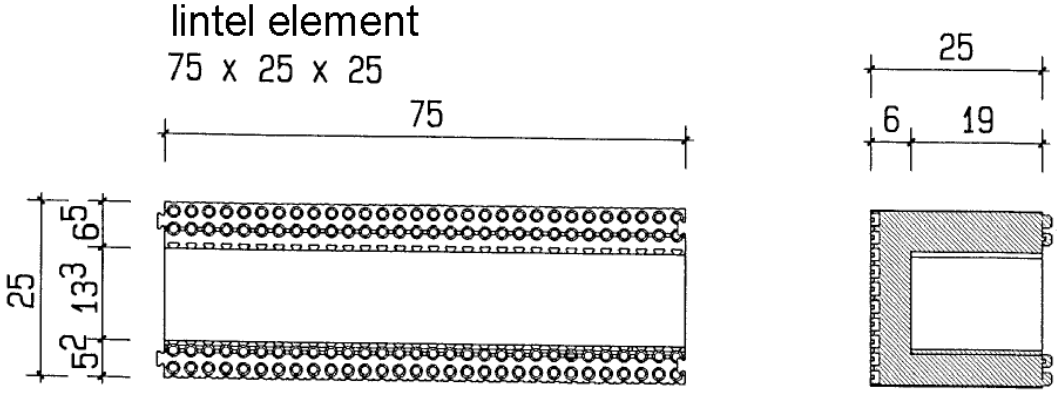
floor end plates

75 x 10 x 20



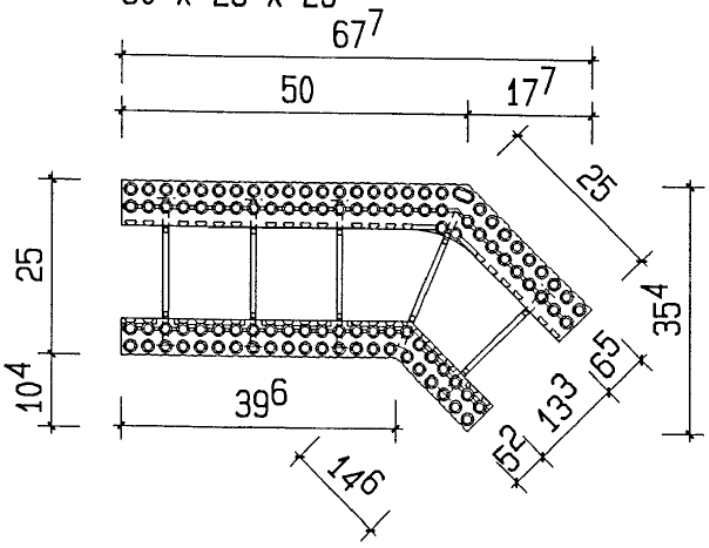
lintel element

75 x 25 x 25



angular element 45°

50 x 25 x 25



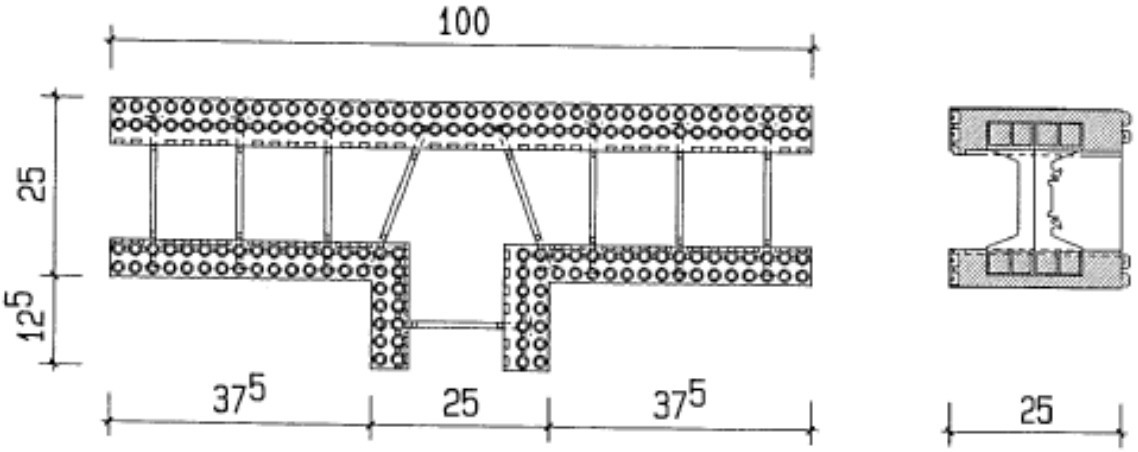
all dimensions in [cm]

ARGISOL	Annex 3
Floor end element Lintel element Angular element	

Deutsches Institut für Bautechnik DIBt

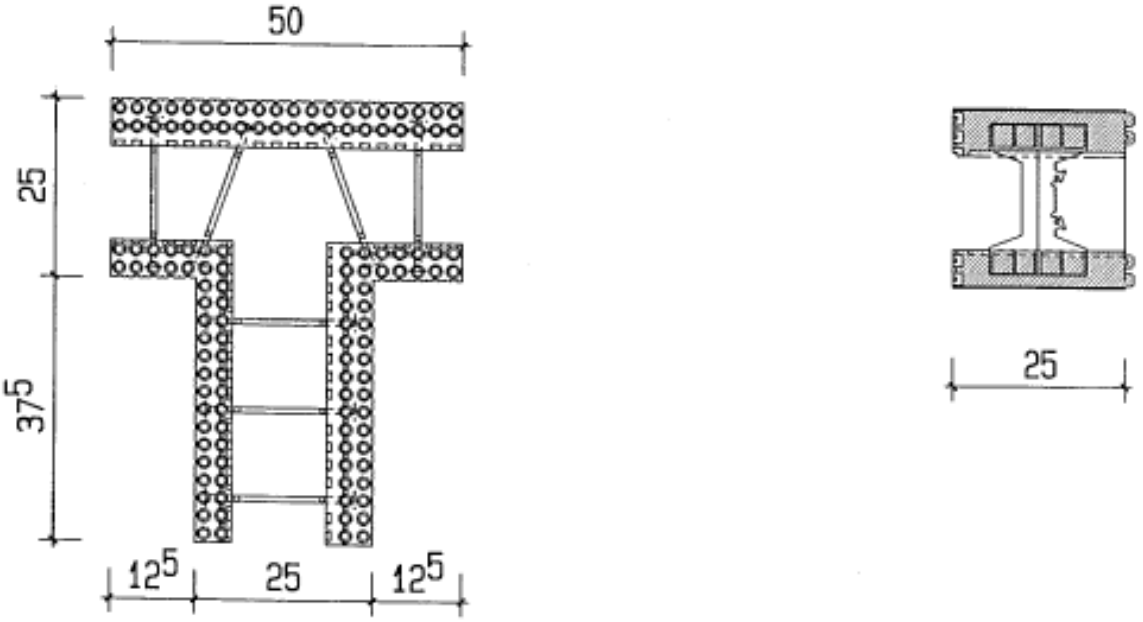
T-element

100 x 25 x 25



T-element

50 x 25 x 25

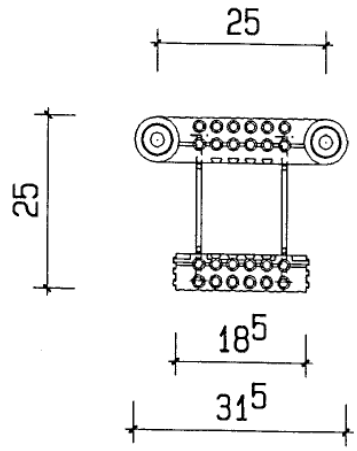


all dimensions in [cm]

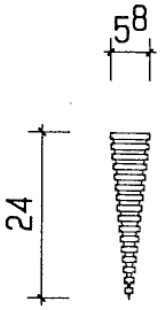
ARGISOL	Annex 4
T-elements	

Deutsches Institut für Bautechnik DIBt

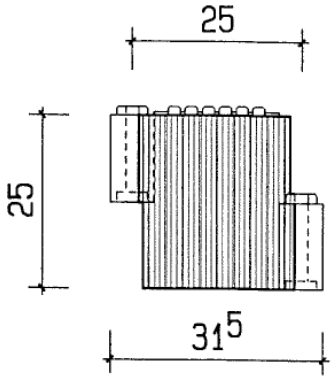
Elements with hinges for horizontal curved walls (top view)



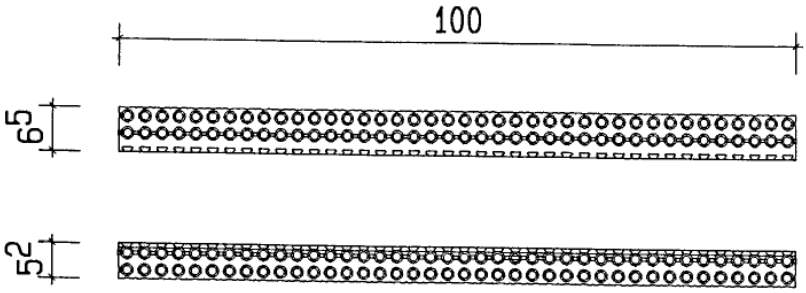
wedges



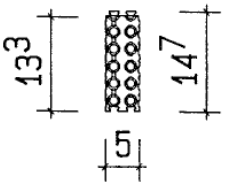
Elements with hinges for horizontal curved walls (elevation)



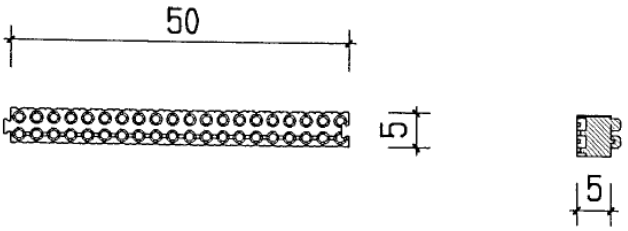
single plates
100 x 25 x 25



end stops
5 x 14 x 25



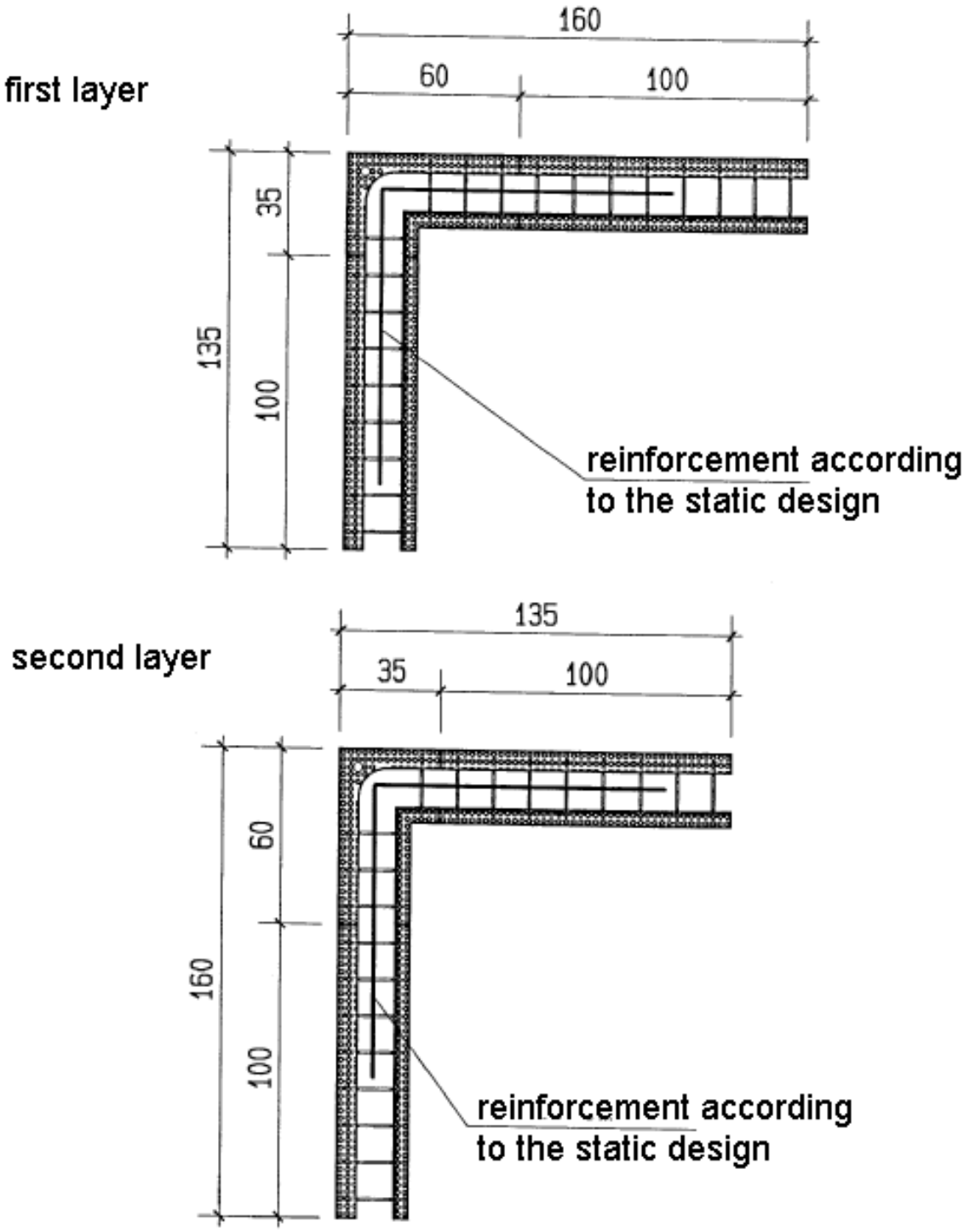
pieces for the equalization of differences in height
50 x 5 x 5



all dimensions in [cm]

ARGISOL	Annex 5
Elements with hinges and wedges for horizontal curved walls Accessory parts (single plates, end stops, pieces for the equalization of differences in height)	

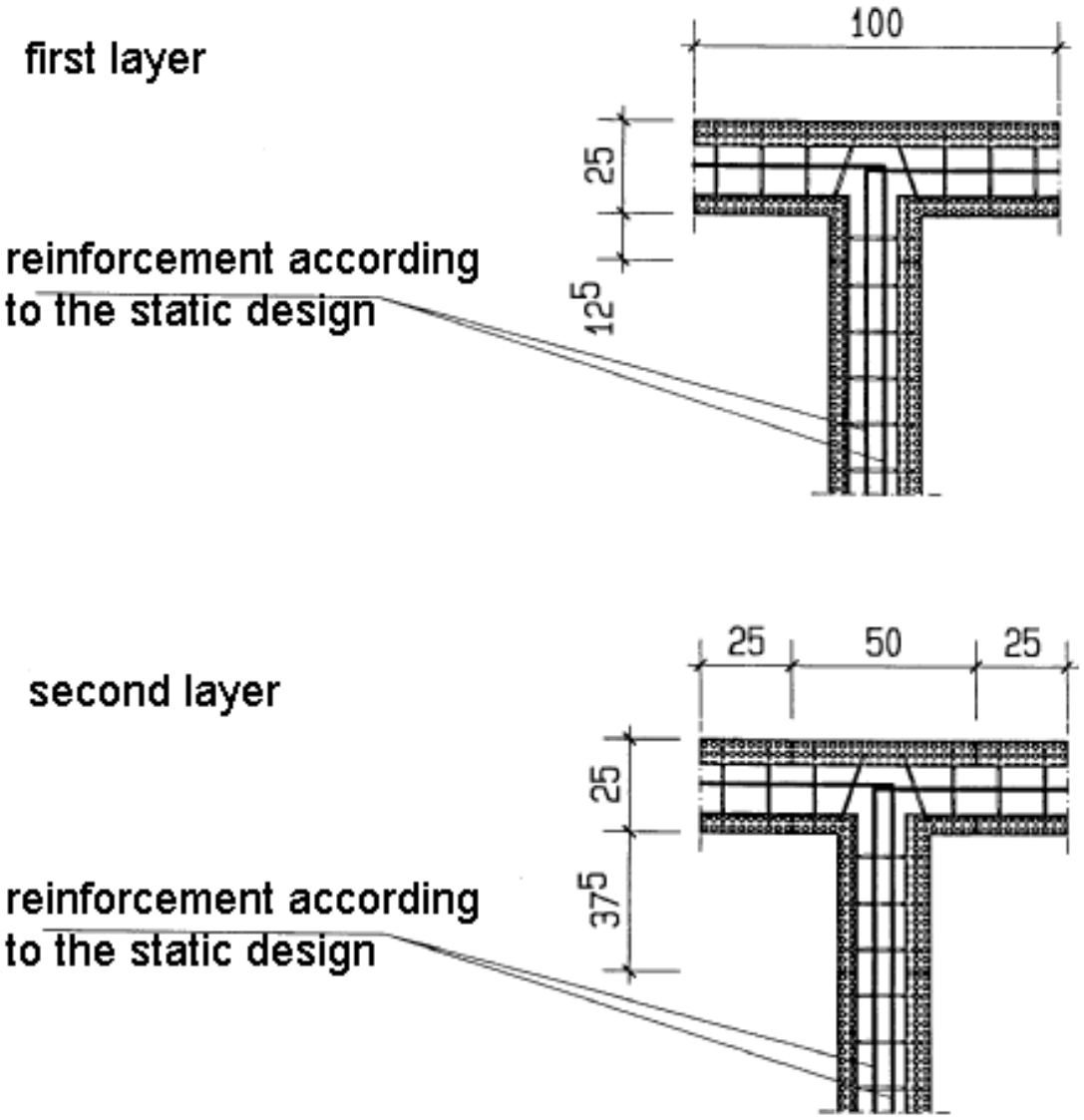
Deutsches Institut für Bautechnik DIBt



all dimensions in [cm]

ARGISOL	Annex 6
Bond of different layers on a corner	

Deutsches Institut für Bautechnik DIBt

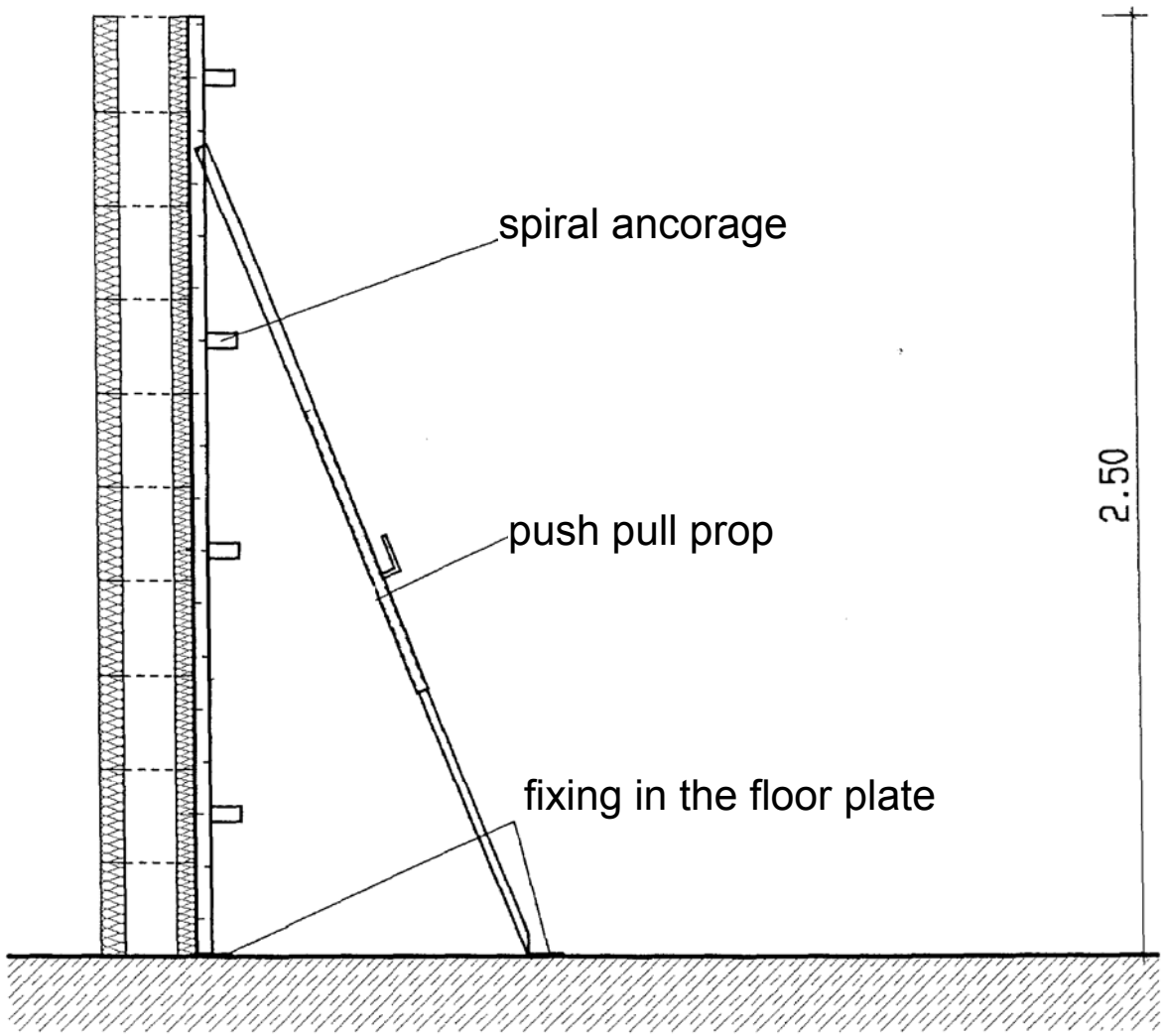


all dimensions in [cm]

ARGISOL	Annex 7
Bond of different layers at a wall junction	

Deutsches Institut für Bautechnik DIBt

push pull prop



ARGISOL	Annex 8
Scaffolding when placing concrete	