

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-05/0170
of 30 October 2015

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

ARGISOL

Product family
to which the construction product belongs

Non load bearing shuttering kit "ARGISOL"
based on shuttering elements of EPS

Manufacturer

BEWA GmbH
ARGISOL-Bausysteme
Grünstadter Straße 2
67271 Obersülzen

Manufacturing plant

BEWA GmbH
ARGISOL-Bausysteme
Grünstadter Straße 2a
67271 Obersülzen
DEUTSCHLAND

This European Technical Assessment
contains

27 pages including 20 annexes which form an integral
part of this assessment

This European Technical Assessment is
issued in accordance with Regulation (EU)
No 305/2011, on the basis of

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, June 2002,
used as European Assessment Document (EAD)
according to Article 66 Paragraph 3 of Regulation (EU)
No 305/2011.

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Specific Part

1 Technical description of the product

1.1 Definition of construction product

The shuttering system "ARGISOL" is a non-load-bearing permanent shuttering kit based on shuttering elements and accessory parts (see e. g. Annexes A2 and A3) 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.

1.2 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 mm (see e. g. Annexes A2 and A3). 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 mm respectively 1250 mm and the height is 250 mm, see Annexes A2 and A3.

The thickness of the inner shuttering leaf is for all elements 52 mm and the thickness of the outer shuttering leaf is either 55 mm or 65 mm respectively 155 mm. The minimum thickness of the concrete core is 133 mm respectively 143 mm.

Special elements are also part of the kit as corner elements, angular elements, T-elements, elements with hinges for horizontal curved walls and lintel elements which are produced in the same manner as described above.

1.3 Accessory parts

1.3.1 Wedges for horizontal curved walls

Are as high as the shuttering leaves (250 mm) and are used to fill the gaps between the vertical joints on the inner side of the horizontal curved walls.

1.3.2 Floor end plates

They 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 mm thick and 200 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.

1.3.3 Single plates, pieces for the equalization of differences in height and end stops

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 mm thick and high and 133 mm respectively 143 mm long.

End stops are 50 mm thick and 133 mm respectively 143 mm long. They are inserted in the gaps between the shuttering leaves at the openings of the wall.

2 Specification of the intended use in accordance with the applicable European Assessment Document

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 (nonstructural), 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 performances given in Section 3 are only valid if the shuttering elements are used in compliance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the shuttering kit of at least 50 years. 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.

3 Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

3.1.1 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.

3.1.2 Efficiency of filling

Considering the instructions of Annexes B1 and B2 and the installation guide of the ETA holder 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.

3.1.3 Possibility of steel reinforcement

The instructions in the installation guide of the ETA holder 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.

3.2 Safety in case of fire (BWR 2)

3.2.1 Reaction to fire

Class E according to EN 13501-1.

3.2.2 Resistance to fire

With the minimum thickness of the continuous concrete core of 133 mm the fire resistance class of walls with a minimum concrete strength class C16/20 according to table 1 of Annex C of ETAG 009 is REI 90.

3.3 Hygiene, health and the environment (BWR 3)

3.3.1 Release of dangerous substances

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

3.3.2 Water vapour permeability

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

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

3.4 Safety and accessibility in use (BWR 4)

3.4.1 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 mm the effective area for the transmission of tensile forces is $0.01 \cdot 1 \cdot 41 \text{ m}^2 = 0.41 \text{ m}^2$. This is more than 20 % of the whole area of the shuttering leaves and leads to the effective bond strength of 0.041 N/mm^2 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.

3.4.2 Resistance to filling pressure

To resist the filling pressure the bending tensile strength of the shuttering leaves shall be more than 250 kPa (see also designation code of EPS in Annex A1) and the strength to pull out of the spacers more than 850 N.

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

3.4.3 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.

3.5 Protection against noise (BWR 5)

3.5.1 Airborne sound insulation

The "No performance assessed" option in ETAG 009, table 3 is used.

3.5.2 Sound absorption

The "No performance assessed" option in ETAG 009, table 3 is used.

3.6 Energy economy and heat retention (BWR 6)

3.6.1 Thermal resistance

Assuming a minimal declared (nominal) value of thermal conductivity of $\lambda_D = 0.031 \text{ W}/(\text{m}\cdot\text{K})$ for the expanded polystyrene and a design value for concrete infill of $\lambda = 1.65 \text{ W}/(\text{m}\cdot\text{K})$ (according to EN ISO 10456) the shuttering elements according to table 1 has been determined by numerical calculations taking the influence of the steel spacers into account. Table 1 gives the declared (nominal) values of thermal resistance R and for information the so called "overall reduction factor" to determine the influence of the steel spacers on the thermal resistance R.

Table 1: Declared (nominal) values of thermal resistance R calculated by finite differences according to EN ISO 10211 (with concrete infill without rendering but with influence of steel spacers) depending on the thickness of the outer layer of expanded polystyrene and thickness of concrete core and the "overall reduction factor" for information

Type of shuttering element according to Annex A1, table A1	Thickness of the internal shuttering leaf	Concrete core	Thickness of the external shuttering leaf	Total wall thickness	overall reduction factor	Thermal resistance R (declared (nominal) value)
No	[mm]	[mm]	[mm]	[mm]		$[(\text{m}^2\cdot\text{K})/\text{W}]$
1	52	133	65	250	0.80	3.07
2	52	143	55	250	0.80	2.82
3	52	143	155	350	0.90	6.06

The planner shall consider accessory parts made of steel as thermal bridges, where relevant, for determination of the thermal resistance.

3.6.2 Thermal inertia

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

3.7 General Aspects

3.7.1 Resistance to deterioration

Physical agent

As given in the designation code of the EPS material used (see Annex A1) 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 3.4.1).

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

English translation prepared by DIBt

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.

3.7.2 Resistance to normal use damage

Incorporation of ducts

The instructions in the installation guide of the ETA holder 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.

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with guideline for European technical approval ETAG 009, June 2002, used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011, the applicable European legal act is: [98/279/EC], as amended by European legal act [2001/596/EC]

The system to be applied is: 2+

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 30 October 2015 by Deutsches Institut für Bautechnik

Uwe Bender
Head of Department

beglaubigt:
Dr.-Ing. Hintzen

Characteristics of shuttering elements

The standard and special shuttering elements as well as the accessory parts correspond to the information and drawings given in Annexes A2 to A14. The kit consists of the following shuttering elements, plates and pieces:

- Standard shuttering elements (Annexes A2 to A5)
- Corner shuttering elements (Annexes A6 and A8 to A10)
- Angular shuttering elements (Annexes A7 and A8 to A10)
- T-elements (Annexes A11 and A12)
- Lintel elements (Annexes A7 and A13)
- Elements with hinges and wedges for horizontal curved walls (Annex A14)
- Floor end plates (Annex A7)
- Single plates, pieces for the equalization of differences in height and end stops (Annexes A4, A5, A13, and A14)

Dimensions:

The spacers of steel (see e.g. Annexes A2 to A5) have a minimum overall thickness of 0.60 mm and a minimum height in the middle of spacer of 50 mm.

The shuttering element allows for plain and reinforced concrete wall with a concrete core thickness of 133 mm or 143 mm. Table A1 shows the possible wall thicknesses.

Table A1: Wall thickness

No	Internal leaf of EPS [mm]	External leaf of EPS [mm]	Concrete core (wall cavity core) [mm]	Overall wall width [mm]	according ETA-Annex for standard elements
1	52	65	133	250	A2
2	52	55	143	250	A4
3	52	155	143	350	A5

Materials:

For the shuttering leaves expanded polystyrene

EPS EN 13163-T1-L1-W2-S2-P4-DS(70,-)3-BS250-CS(10)150-DS(N)5-TR100

made of polystyrene particle foam with a apparent density ρ_a of 29 to 31 kg/m³ respectively a thermal conductivity $\lambda_D = 0,031$ W/(m*K) according to EN 13163 is used.

The spacers of steel are galvanized and have a minimum tensile strength of 360 MPa.

Wedges for horizontal curved walls (Annex A14), floor end plates (Annex A7), single plates, end stops and pieces for the equalization of differences in height (Annexes A4, A5, A13, and A14) are made of the same EPS material as the shuttering leaves.

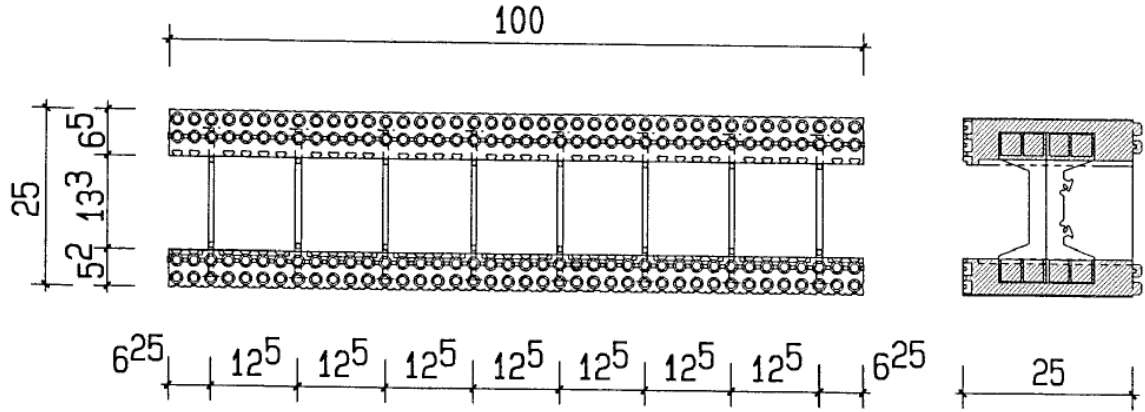
Shuttering system "ARGISOL"

Characteristics of shuttering elements

Annex A1

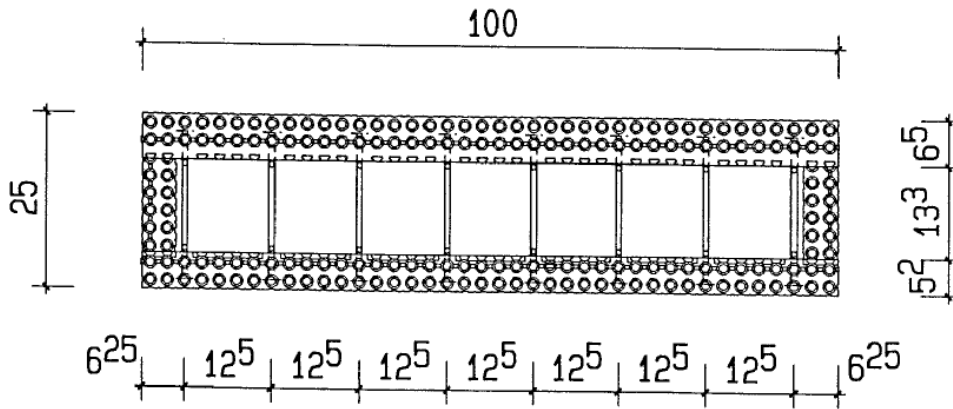
Standard elements

100 x 25 x 25



Standard elements with end stops

100 x 25 x 25



all dimensions in cm

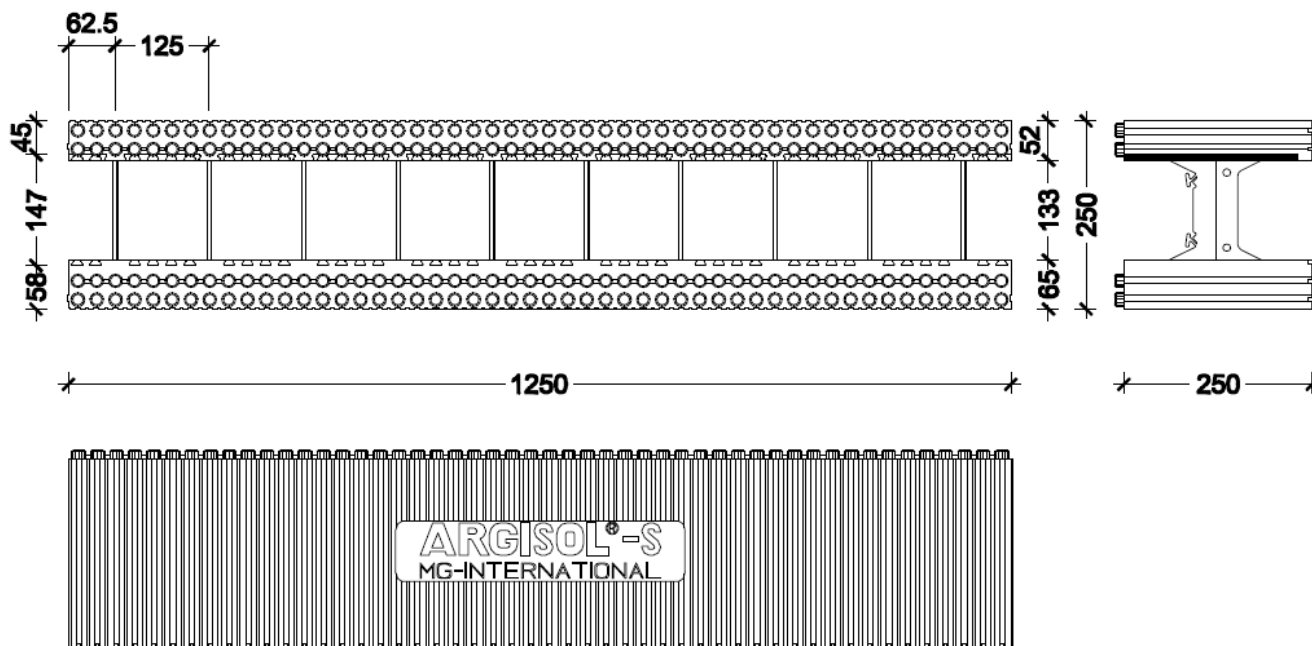
Shuttering system "ARGISOL"

Standard shuttering element

Length of element: 100 cm with concrete core of 13.3 cm
 and overall wall thickness of 25.0 cm

Annex A2

Standard element - S
1250 x 250 x 250

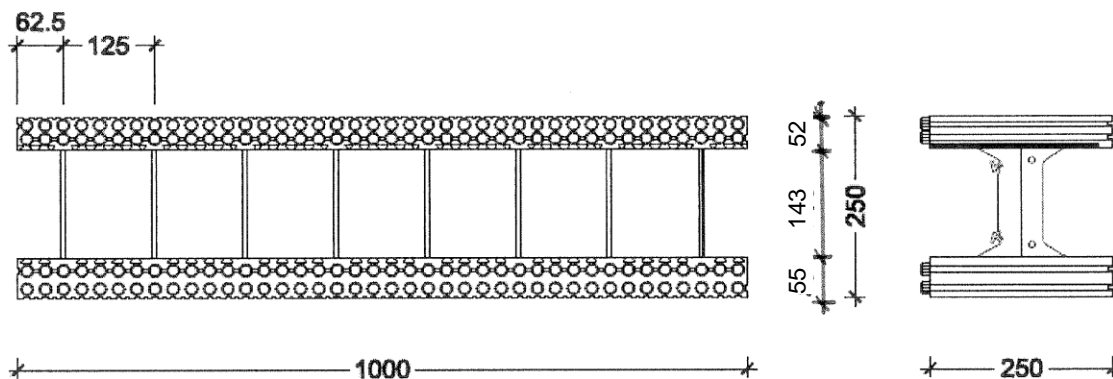


all dimensions in mm

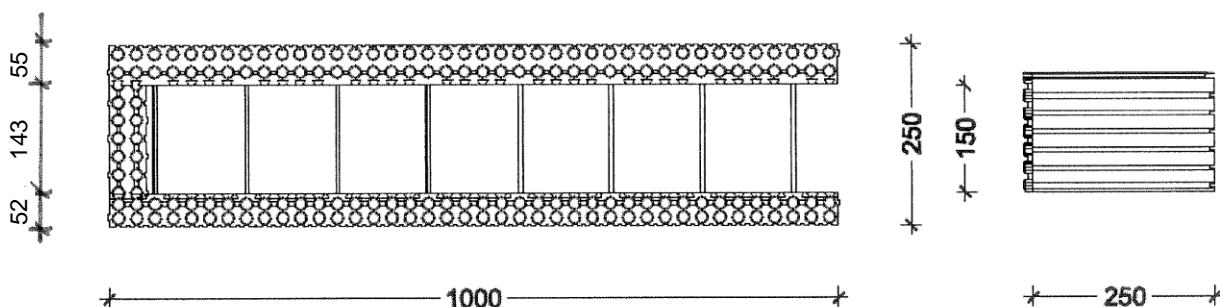
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<p>Shuttering system "ARGISOL"</p>	<p>Annex A3</p>
<p>Standard shuttering element S Length of element: 125 cm with concrete core of 13.3 cm and overall wall thickness of 25.0 cm</p>	

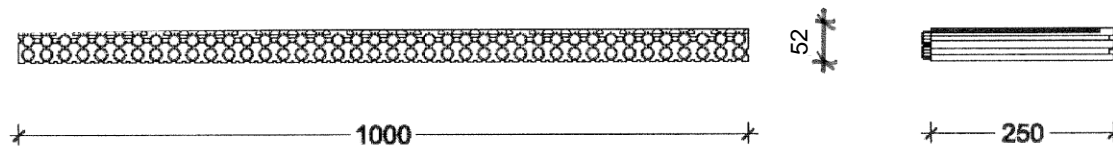
Standard elements
1000 x 250 x 250



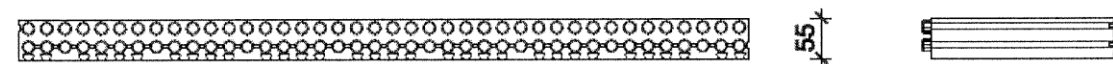
Standard elements with end stop
1000 x 250 x 250



single plates
1000 x 52 x 250



single plates
1000 x 55 x 250



all dimensions in mm

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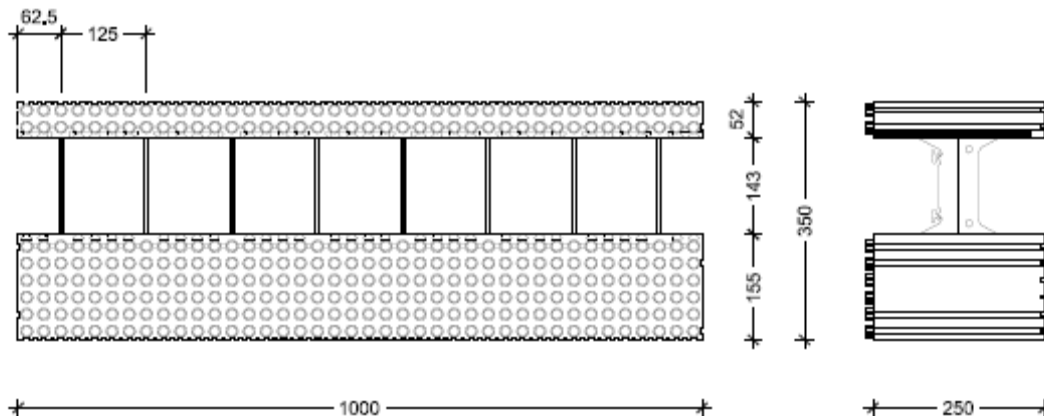
Shuttering system "ARGISOL"

Standard shuttering element
Single plates

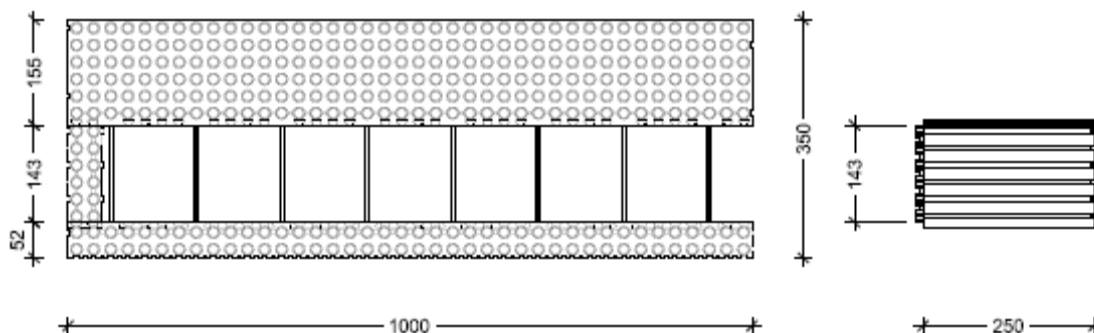
With concrete core of 14.3 cm and overall wall thickness of 25.0 cm

Annex A4

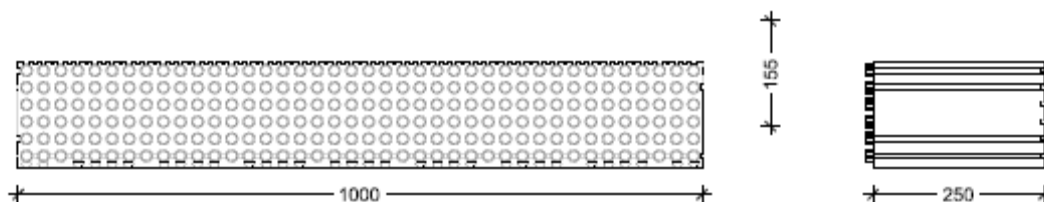
Standard element
1000 x 350 x 250 mm



Standard element with end stop
1000 x 350 x 250 mm



Single board exterior
1000 x 155 x 250 mm



all dimensions in mm

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Shuttering system "ARGISOL"

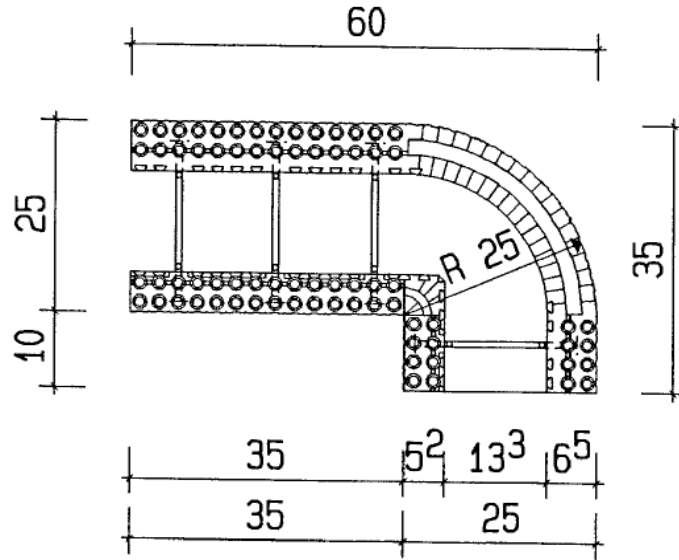
Standard shuttering element
Single plates

With concrete core of 14.3 cm and overall wall thickness of 35.0 cm

Annex A5

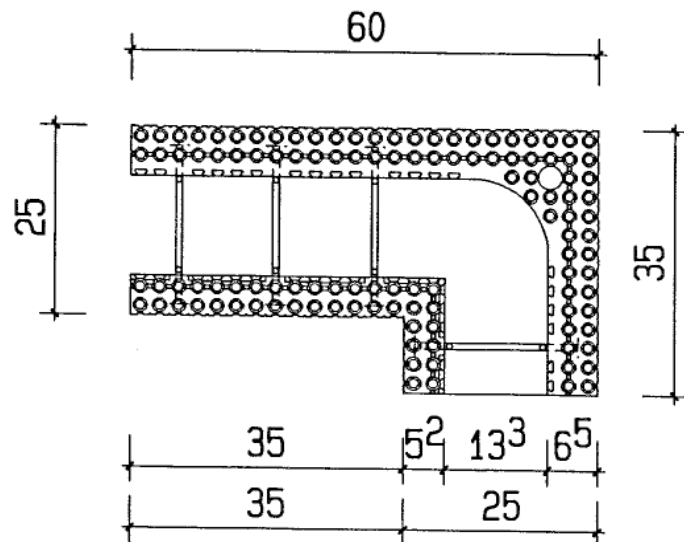
curved corner element
 left and right

60 x 35 x 25



corner element
 left and right

60 x 35 x 25



all dimensions in cm

Shuttering system "ARGISOL"

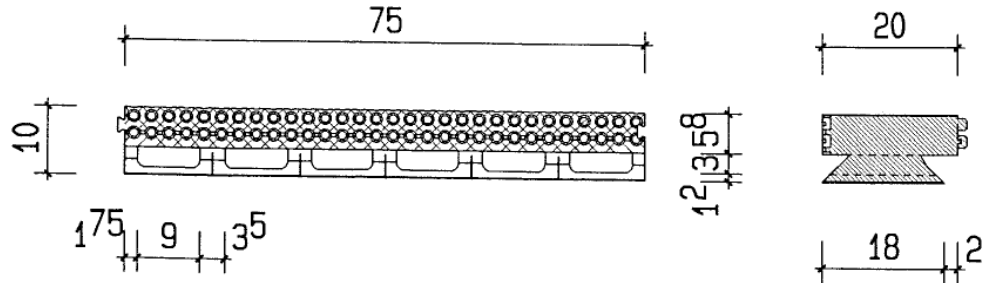
Corner elements

With concrete core of 13.3 cm and overall wall thickness of 25.0 cm

Annex A6

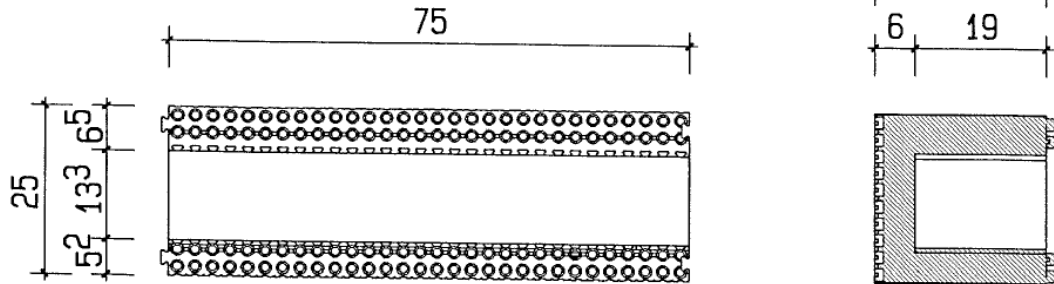
floor end plates

75 x 10 x 20



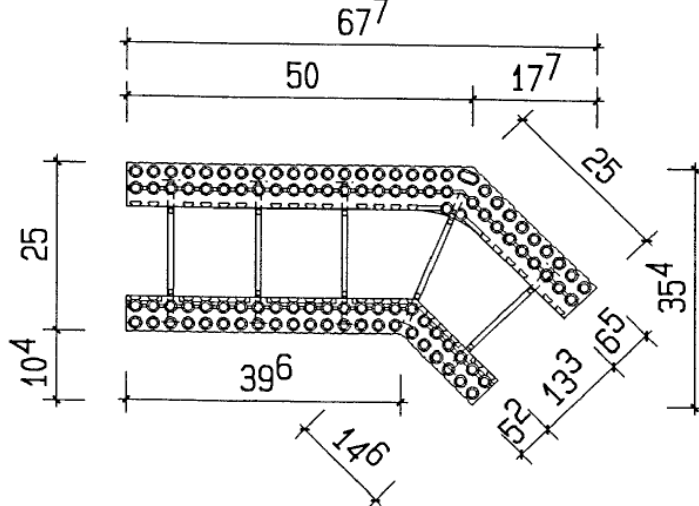
lintel element

75 x 25 x 25



angular element 45°

50 x 25 x 25



all dimensions in cm

Shuttering system "ARGISOL"

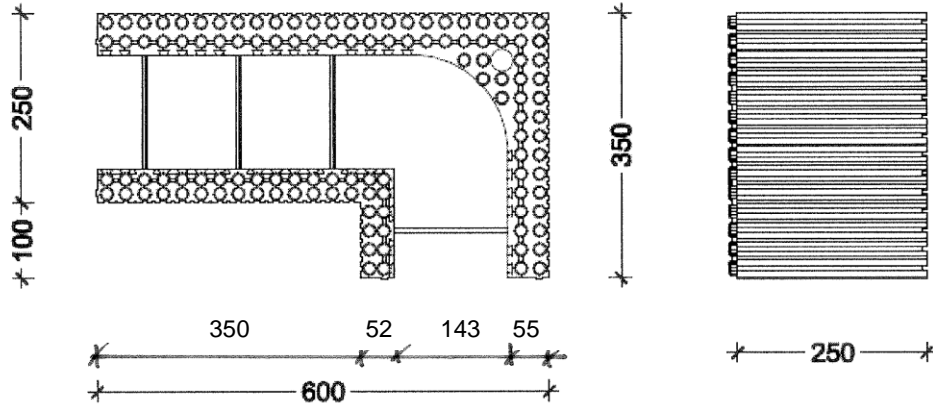
Floor end element, lintel element, angular element

With concrete core of 13.3 cm and overall wall thickness of 25.0 cm

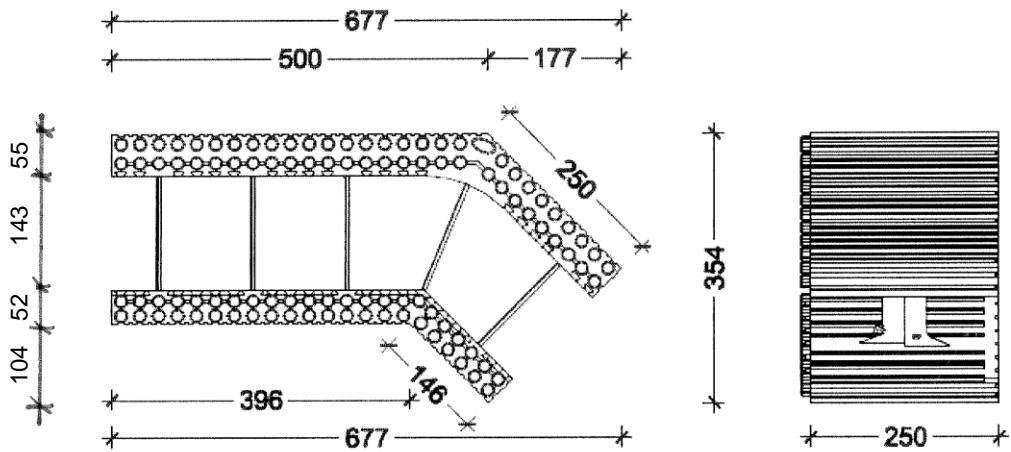
Annex A7

English translation prepared by DIBt

corner element left / right
600 x 350 x 250



angular element 45°
500 x 250 x 250



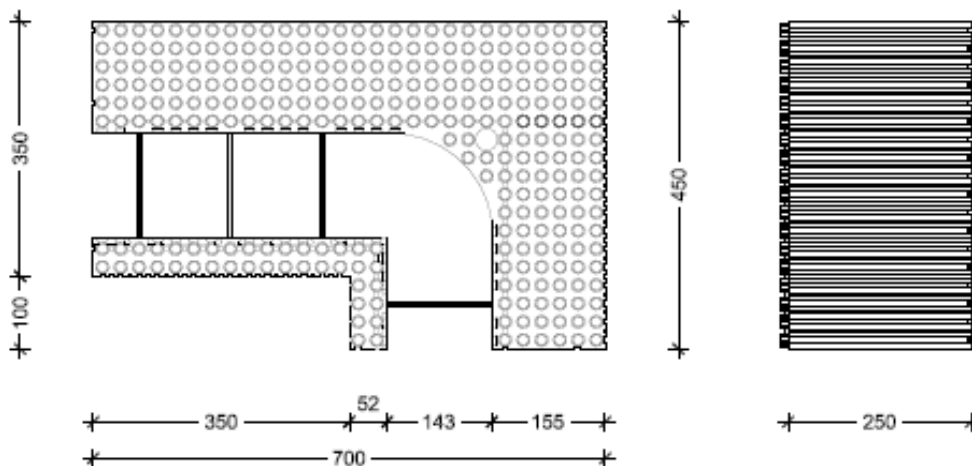
all dimensions in mm

Shuttering system "ARGISOL"

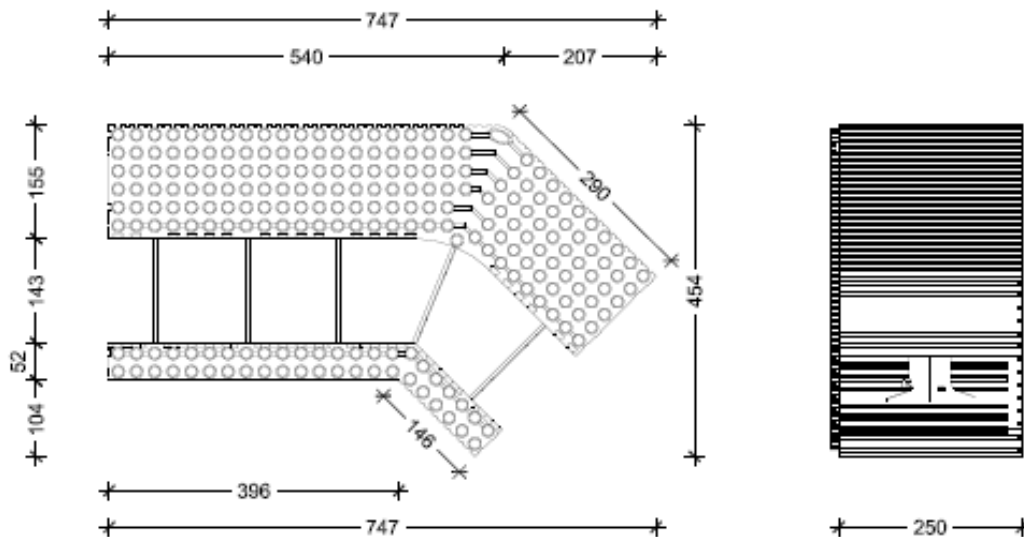
Corner and angular elements
 With concrete core of 14.3 cm and overall wall thickness of 25.0 cm

Annex A8

Corner element right / left
700 x 450 x 250 mm



angular elements 45° right / left
747 x 454 x 250 mm



all dimensions in mm

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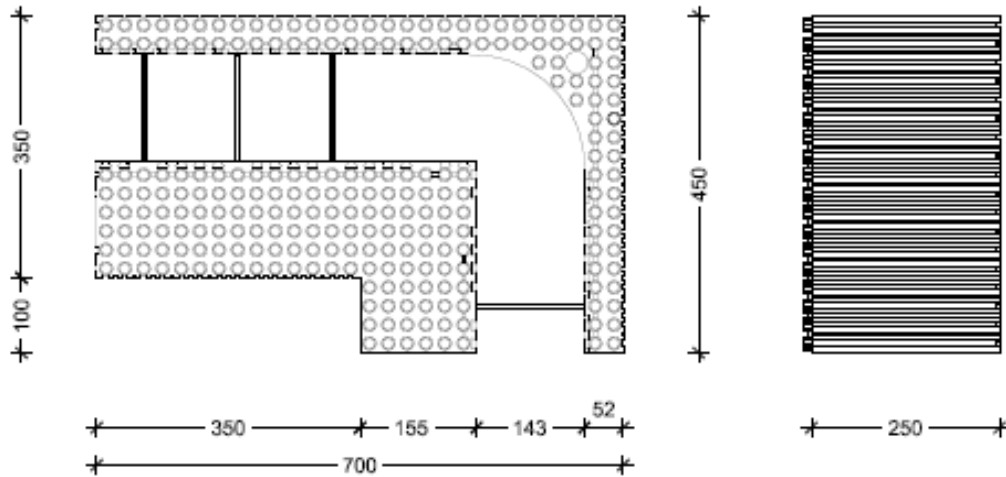
Shuttering system "ARGISOL"

Corner and angular elements

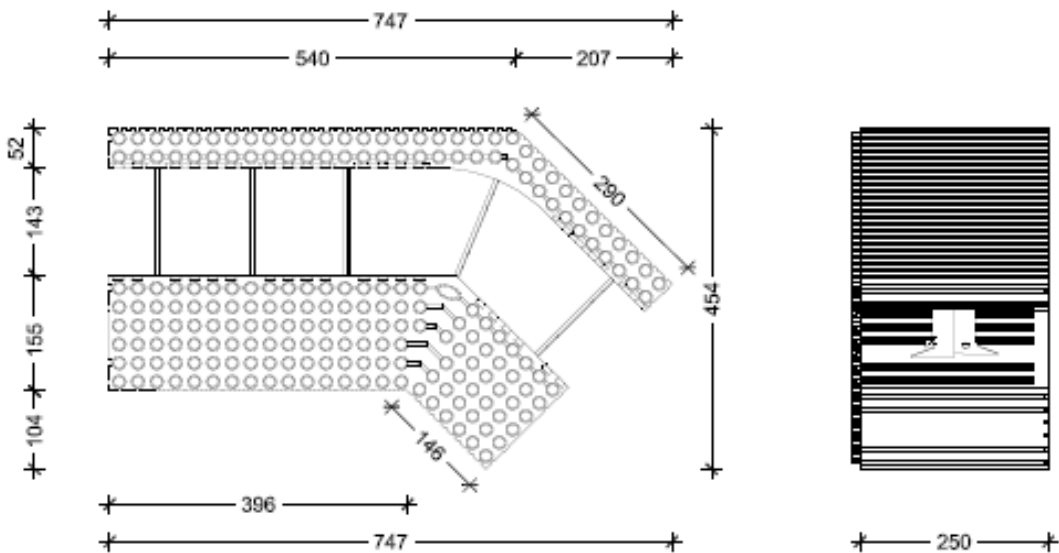
With concrete core of 14.3 cm and overall wall thickness of 35.0 cm

Annex A9

Inside corner elements right / left
 700 x 450 x 250 mm



Inside angular elements 45° right / left
 747 x 454 x 250 mm



all dimensions in mm

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Shuttering system "ARGISOL"

Inside corner and angular elements

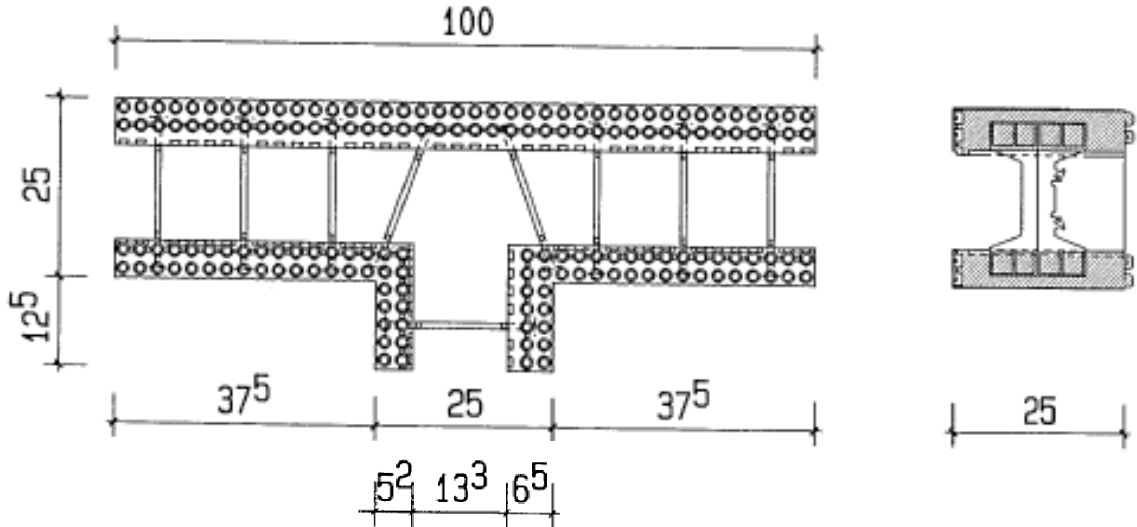
With concrete core of 14.3 cm and overall wall thickness of 35.0 cm

Annex A10

English translation prepared by DIBt

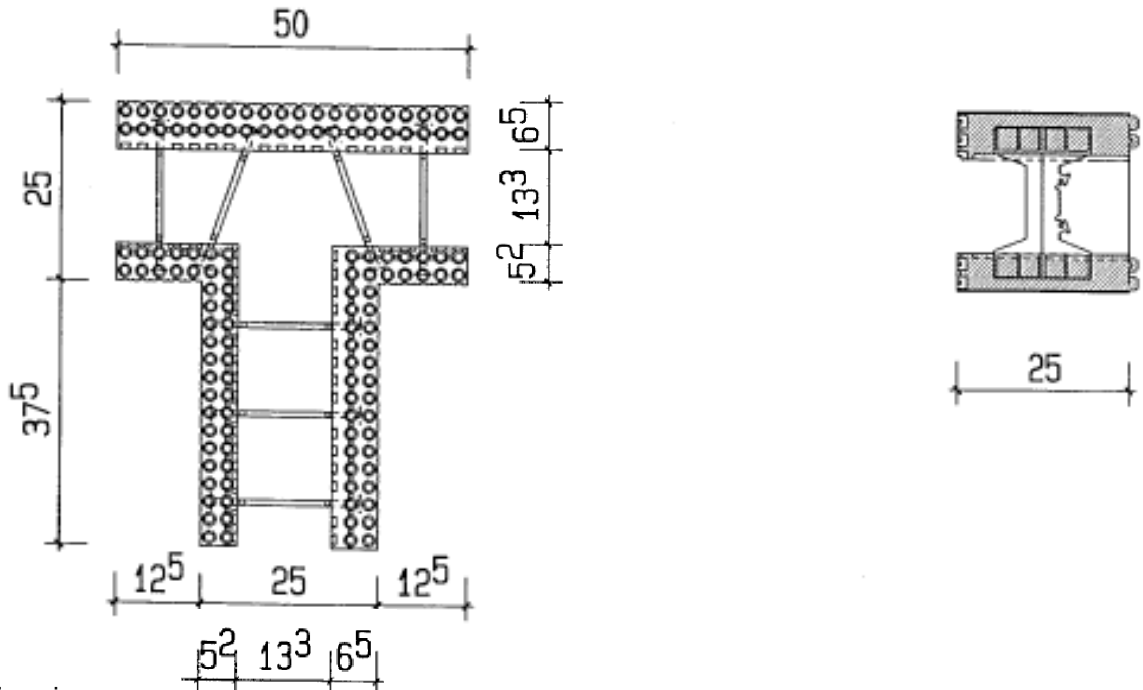
T-element

100 x 25 x 25



T-element

50 x 25 x 25



all dimensions in cm

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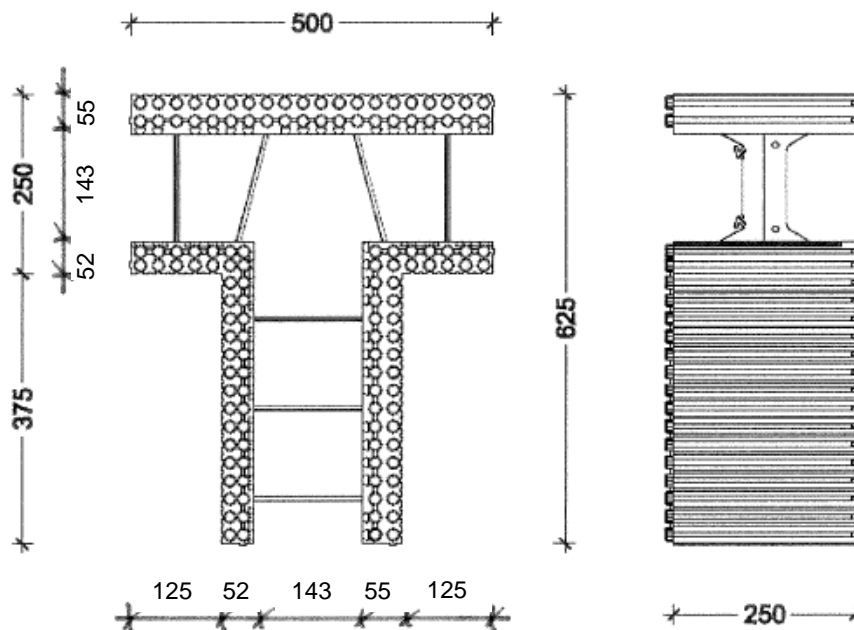
Shuttering system "ARGISOL"

T- elements

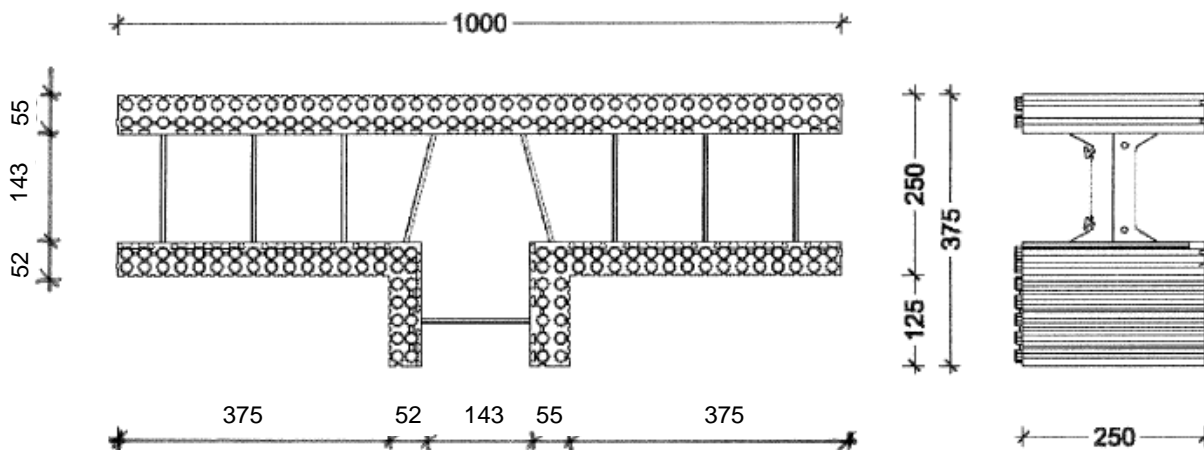
With concrete core of 13.3 cm and overall wall thickness of 25.0 cm

Annex A11

**T - element
500 x 625 x 250**



**T - element
1000 x 375 x 250**



all dimensions in mm

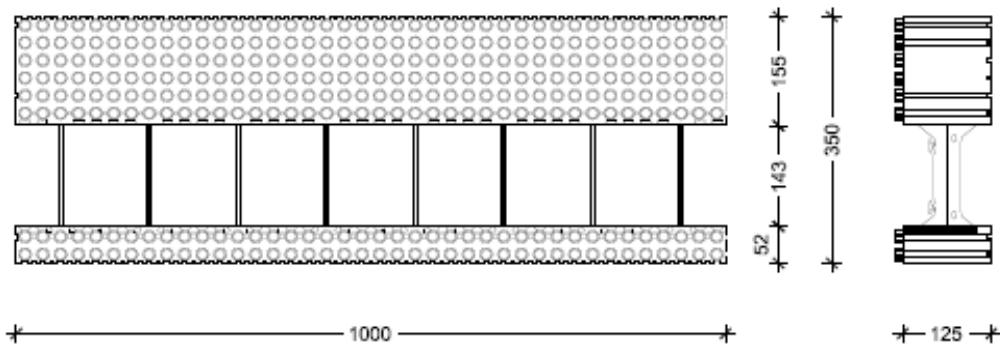
Shuttering system "ARGISOL"

T - elements

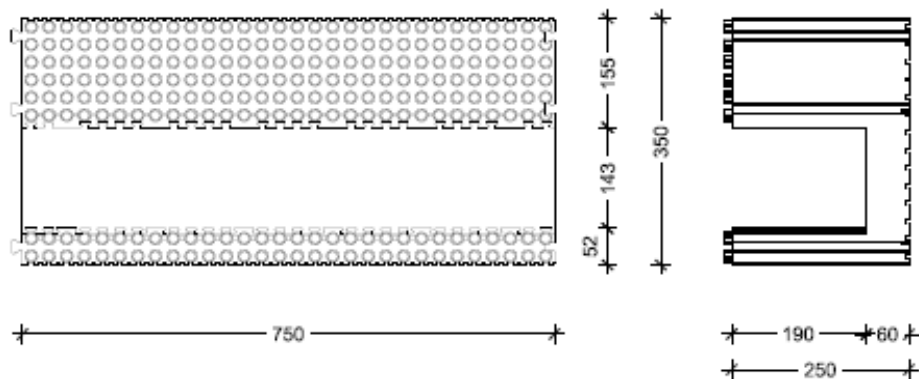
With concrete core of 14.3 cm and overall wall thickness of 25.0 cm

Annex A12

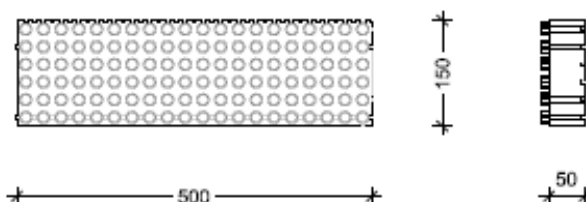
Standard element 1/2 height
1000 x 350 x 125 mm



Lintel element
750 x 350 x 250 mm



Height compensation element
500 x 150 x 50 mm



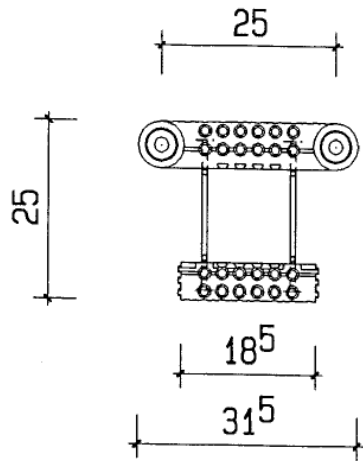
all dimensions in mm

Shuttering system "ARGISOL"

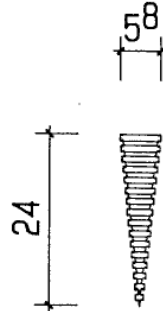
Standard element 1/2 height, lintel element, height compensation element
With concrete core of 14.3 cm and overall wall thickness of 35.0 cm

Annex A13

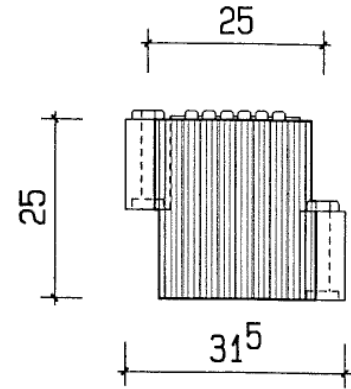
Elements with hinges for horizontal curved walls (top view)



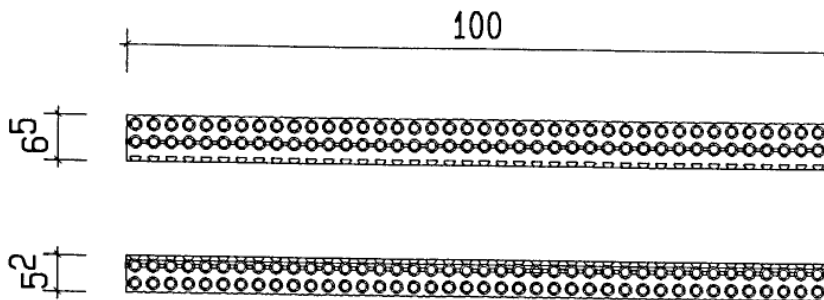
wedges



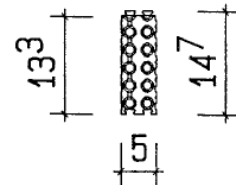
Elements with hinge for horizontal curved walls (elevation)



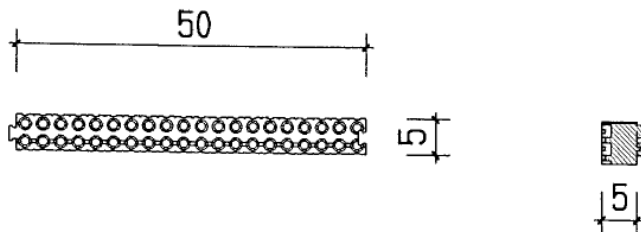
single plates
100 x 25 x 25



end stops
5 x 14 x 25



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



all dimensions in cm

Shuttering system "ARGISOL"

Elements with hinges and wedges for horizontal curved walls accessory parts
(Single plates, end stops, pieces for the equalization of differences in height)

Annex A14

Installation

1 General

The manufacturer shall ensure that the requirements in accordance with sections 1 and 3, Annexes A1, B1 and B2 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 the site-mixed or ready mixed concrete is brought in and compacted.

In end use conditions concrete walls of a continuous type¹ 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 concrete core is 133 mm respectively 143 mm and the weight per unit area without rendering 3.40 kN/m² respectively 3.83 kN/m² (assumed nominal density of concrete of 25 kN/m³ and for EPS-leaves of 0.3 kN/m³).

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

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 B4 and B5).

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

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 holder, the walls are to be interlocked to floor height, leveled and fastened to the push pull props (see Annex B6).

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 (see Annex 8).

The necessary reinforcement according to structural analysis calculation shall also be installed according to the instructions of the ETA holder in the installation guide. Rectangular wall corners are to be formed according to Annex B4 and wall junctions according to Annex B5.

3 Concreting

For the production of normal concrete EN 206-1 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 mm and shall not exceed 16 mm. The concrete shall have rapid or middle strength development according to EN 206-1, 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.

Placing the concrete shall be performed in layers of 1 m at a maximum vertical concreting rate of 3 m/h. For horizontal curved walls made with shuttering elements according to Annex A14 the vertical concreting rate shall not exceed 1 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 cannot be avoided within the height between the floors vertical composite reinforcement bars shall be installed. The composite reinforcement shall the following requirements comply:

¹ see ETAG 009 chapter 2.2

Shuttering system "ARGISOL"	Annex B1
Installation	

- 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 cm and not larger than 50 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 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 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 m, beyond that the concrete shall be cohered by discharge pipes or concreting tubes with a diameter of 100 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 mm per running meter wall height.

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

4 Ducts crossing and situated inside the wall

Horizontally passing ducts are to be installed according to the installation guide of the ETA holder 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 m.

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. The execution of the rendering shall be performed according to applicable national rules.

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.

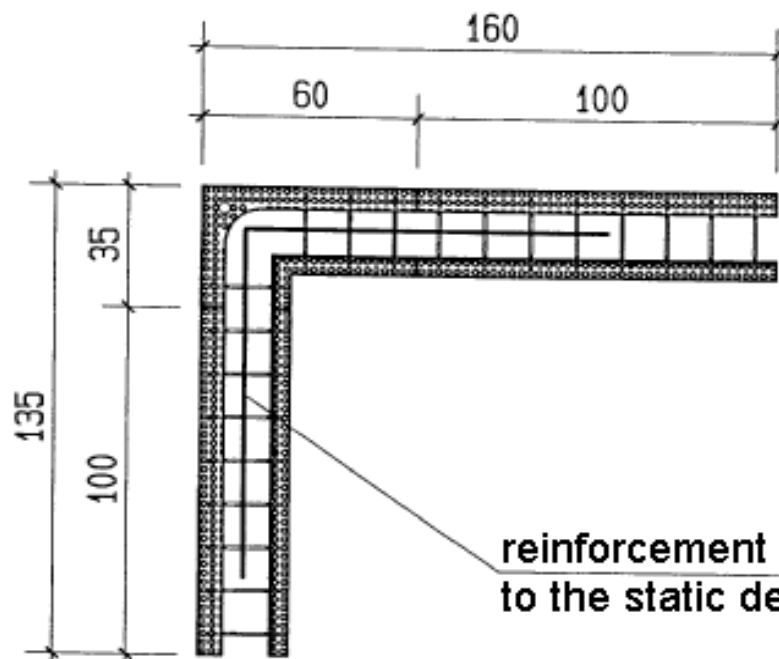
Shuttering system "ARGISOL"

Installation

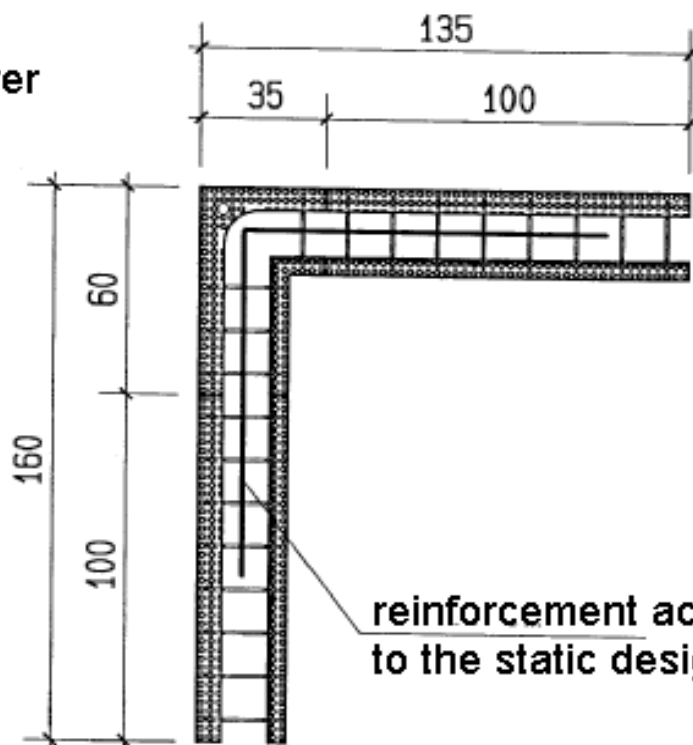
Annex B2

standards and guidelines		title
EN 206-1		Concrete – Part 1: Specification, performance, production and conformity
EN1992-1-1		Eurocode 2: Design of concrete structures. – Part 1-1: General rules and rules for buildings
EN 13163		Thermal insulation products for buildings – Factory made products of expanded polystyrene (EPS) – Specification
EN 13501-1		Fire classification of construction products and building elements – Part 1: Classification using test data from reaction to fire tests
EN ISO 6946		Building components and building elements – Thermal resistance and thermal transmittance – Calculation method
EN ISO 10211		Thermal bridges in building construction – Heat flows and surface temperatures – Detailed calculations
EN ISO 10456		Building materials and products – Hygrothermal properties – Tabulated design values and procedures for determining declared and design thermal values
standards and guidelines	issue	title
ETAG 004	2013-06	Guideline for European technical approval of "External thermal insulation composite systems with rendering"
ETAG 009	2002-06	Guideline for European technical approval of "Non load bearing permanent shuttering kits/systems based on hollow blocks or panels of insulating materials and sometimes concrete"
Shuttering system "ARGISOL"		Annex B3
List of standards and guidelines		

first layer



second layer



all dimensions in cm

Shuttering system "ARGISOL"

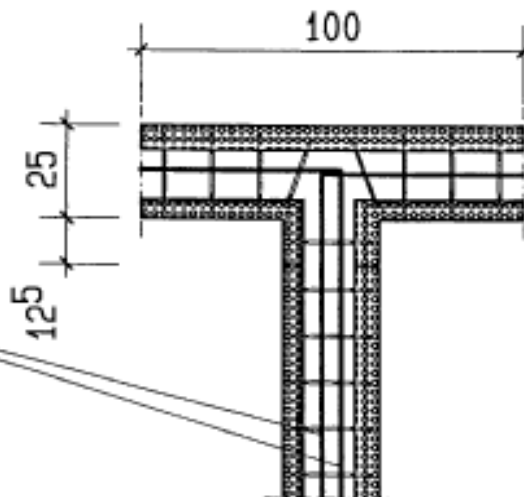
Bond of different layers on a corner

With concrete core of 13.3 cm and an overall wall thickness of 25.0 cm

Annex B4

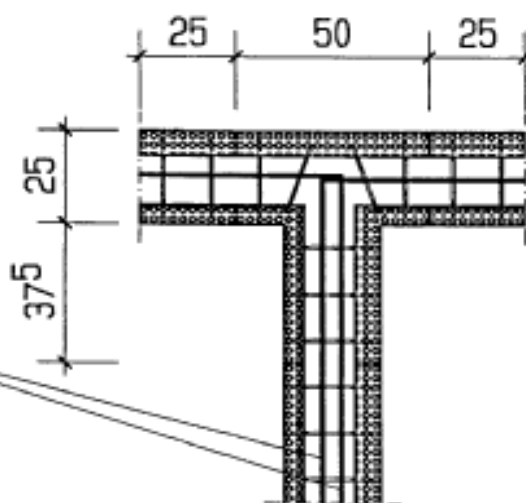
first layer

reinforcement according
to the static design



second layer

reinforcement according
to the static design



all dimensions in cm

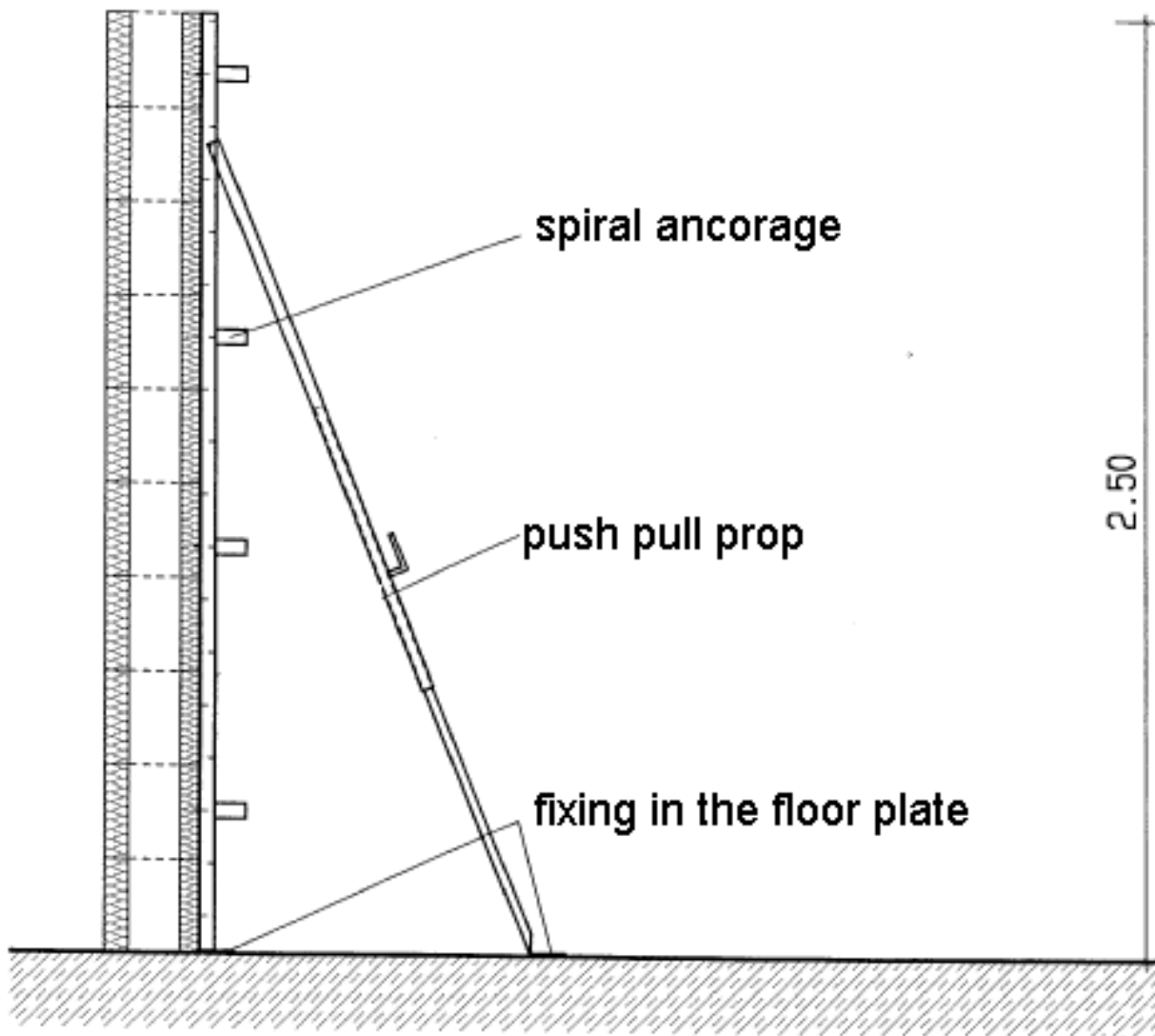
Shuttering system "ARGISOL"

Bond of different layers at a wall junction

With concrete core of 13.3 cm and an overall wall thickness of 25.0 cm

Annex B5

push pull prop



all dimensions in m

electronic copy of the eta by dibt: eta-05/0170

Shuttering system "ARGISOL"

Scaffolding
When placing concrete

Annex B6