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European Technical Assessment

ETA-20/0659
of 17.11.2020

General part

Technical Assessment Body issuing the European Technical Assessment	Österreichisches Institut für Bautechnik (OIB) Austrian Institute of Construction Engineering
Trade name of the construction product	IGLU 2000, IGLU Kombi, POWER-S, KWAD, POLY-LINE, PARTNER STONE, and PARTNER STONE MASSIV
Product family to which the construction product belongs	Non load-bearing permanent shuttering kit based on hollow blocks of thermal insulating material
Manufacturer	HIRSCH Porozell GmbH Glanegg 58 9555 Glanegg Austria
Manufacturing plant	HIRSCH Porozell GmbH Glanegg 58 9555 Glanegg Austria
This European Technical Assessment contains	60 pages including Annexes 1 to 5, 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 (ETAG) 009, “Non load-bearing permanent shuttering kits/systems based on hollow blocks or panels of insulating materials and sometimes concrete”, Edition 2002, used as European Assessment Document (EAD).

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Remarks

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Specific parts

1. Technical description of the product

1.1 General

This European Technical Assessment – ETA – applies to the kits

IGLU 2000, IGLU Kombi, POWER-S, KWAD, POLY-LINE, PARTNER STONE, and PARTNER STONE MASSIV.

IGLU 2000, IGLU Kombi, POWER-S, KWAD, POLY-LINE, PARTNER STONE, and PARTNER STONE MASSIV wall system are non load-bearing permanent shuttering kits consisting of hollow blocks made of expanded polystyrene (EPS) and accessories.

On the building site the hollow blocks are stacked in courses, overlapped on alternate courses, and are used as a permanent shuttering kit for walls. During construction, the permanent shuttering is filled with concrete whereas the hollow blocks resist to the concrete pressure. When the concrete has set and hardened (concrete core), the permanent shuttering no longer has a load bearing function, but provides an essential part of the thermal isolation of the wall and the basis for internal and external finishes.

The thicknesses of the concrete core for wall thickness of 250 mm are:

- 160 mm for IGLU 2000, IGLU Kombi
- 135 mm for KWAD and POWER-S
- 156 mm for POLY-LINE, PARTNER STONE and PARTNER STONE MASSIV

An integral wall finish as well as construction materials for completing the structure, such as concrete, reinforcement, pipes, ducts, wall ties, moisture proofing if required, etc. do not form part of the shuttering kit and, therefore, are not considered in the European Technical Assessment.

1.2 Hollow blocks

Hollow blocks are made of expanded polystyrene (EPS) and produced by expansion method.

Hollow blocks have webs also made of expanded polystyrene (EPS).

Hollow blocks are used to build a wall with a concrete core of grid type.

The shuttering kit includes hollow blocks of the following types, which are available in one wall thickness of 250 mm and in 2 shapes, straight and crooked. Delivered to the construction site, the straight hollow blocks are completely assembled. Crooked hollow blocks are assembled on the construction site with spread cotters.

Table 1: Hollow blocks

Wall thickness	Hollow block with EPS web	Form/Shape	
		Standard	Crooked
250 mm	IGLU 2000	Yes	Yes
	IGLU Kombi	Yes	_
	POWER-S	Yes	Yes
	KWAD	Yes	Yes
	POLY-LINE	Yes	Yes
	PARTNER STONE	Yes	_
	PARTNER STONE MASSIV	Yes	_

The hollow blocks with their most important dimensions are shown in Annex 2.

1.3 Hollow blocks and accessories

The shuttering kit includes the following hollow blocks and accessories.

Table 2: Hollow blocks and accessories

Wall thickness in mm	250						
Concrete core in mm	160		135		156		
Hollow blocks							
Hollow blocks	IGLU 2000	IGLU Kombi	POWER-S	KWAD	POLY-LINE	PARTNER STONE	PARTNER STONE MASSIV
Accessories							
Spread cotter	Yes, see Annex 2, Figure 8	No	Yes, see Annex 2, Figure 21	Yes, see Annex 2, Figure 30	Yes, see Annex 2, Figure 39	No	No
End insert block	Yes, see Annex 2, Figure 9	Yes, see Annex 2, Figure 13	Yes, see Annex 2, Figure 22	Yes, see Annex 2, Figure 31	Yes, see Annex 2, Figure 40	Yes, see Annex 2, Figure 44	Yes, see Annex 2, Figure 48

The accessories are made of the same expanded polystyrene (EPS) as is used for the hollow blocks.

The accessories with their most important dimensions are shown in Annex 2.

2. Specification of the intended use in accordance with the applicable European Assessment Document (hereinafter EAD)

2.1 Intended use

The shuttering kit is intended to be used for the construction of external walls above or below ground and internal walls, which are load bearing or non-load bearing. In the area below ground, care shall be taken that there is appropriate protection for the expanded polystyrene EPS against mechanical damage, taking into consideration the local conditions. The product is not intended to be used for installation with plaster and tiles.

2.2 Assumptions

2.2.1 General

Concerning product packaging, transport, storage, maintenance, replacement, and repair it is the responsibility of the manufacturer to undertake the appropriate measures and to advise his clients on transport, storage, maintenance, replacement, and repair of the product as he considers necessary.

2.2.2 Recommendations on packaging, transport, and storage

The hollow blocks shall be protected against damage during transportation and storage. Depending on weather conditions, the hollow blocks shall be covered if necessary, in particular to avoid deterioration by UV-radiation. The hollow blocks shall be tied down to resist higher wind speeds.

The hollow blocks may only be supplied as non-load-bearing, permanent shuttering components.

2.2.3 Design

The European Technical Assessment only applies to the manufacture and use of the shuttering kit. Verification of stability of the works including application of loads on the products is not subject to the European Technical Assessment.

The hollow blocks are used to contain fresh concrete as a permanent shuttering. During construction, they are subject to pressure of the fresh concrete. After the concrete core has set and hardened, the shuttering kit no longer has a load bearing function. In the works the hollow blocks provide an essential part of the thermal insulation and form the basis for additional finishes.

The shuttering kit is fit for its intended use, provided that the design of the concrete core and reinforcement are in accordance with the EN 1992 series[1] of standards, taking the standards and regulations in force at the place of use into account. In absence of applicable design methods at the place of use for in plane shear loads, the design method according to ETAG 009, Annex B may be used.

The following conditions shall be observed:

- Design of the shuttering kit is carried under the responsibility of an engineer experienced in these elements.
- The shuttering kit is installed correctly.

The data of the European Technical Assessment including Annex 1 to 5 and if necessary the references in additional national regulations are to be considered.

The manufacturer has to ensure that all necessary information concerning planning and installation is made known to those who are responsible for design and execution of structures with the IGLU 2000, IGLU Kombi, POWER-S, KWAD, POLY-LINE, PARTNER STONE, and PARTNER STONE MASSIV.

[1] Standards and other documents reffered to in the European Technical Assessment are listed in Annex 5.

2.2.4 Installation

2.2.4.1 General

It is assumed that IGLU 2000, IGLU Kombi, POWER-S, KWAD, POLY-LINE, PARTNER STONE, and PARTNER STONE MASSIV will be installed according to the manufacturer's instructions or – in absence of such instructions – according to the usual practice of the building professionals. An installation procedure to be applied in absence of standards and regulations in force at the place of use is given in Annex 4.

2.2.4.2 Assembly of the shuttering elements

An assembly plan shall be prepared for each structure. The assembly plan shall indicate the designation of the hollow blocks required to construct each part of the structure. The assembly plan shall be available on the construction site.

Before placing the first course of hollow blocks, any unevenness in the substructure and deviations from the horizontal shall be carefully levelled out. The hollow blocks can thereafter be stacked in courses, overlapped on alternate courses, without any mortar or bonding agent. When stacking the hollow blocks, the next course should overlap the hollow blocks of the previous course. Thereby, webs shall be placed one upon the other to maintain the concrete core and avoid to favour segregation of the concrete.

After assembly, open joints shall be sealed with e.g. PU foam or other suitable means.

The reinforcement shall be installed according to the design, ensuring that there is adequate concrete cover. The instructions given by the manufacturer are to be observed.

2.2.4.3 Concreting

The concrete shall be designed, manufactured, conveyed, and placed in accordance with the standards and regulations in force at the place of use. The weather conditions during concreting shall be considered. The concrete should display a flow class of F4 according to EN 206 and a maximum aggregate size of 8 to 16 mm. The hollow blocks shall be completely filled with concrete in one operation consisting of several stages. Concrete placement shall steadily follow the floor plan. The concrete pressure (see Annex 1, Table 5) and the instructions given by the manufacturer are to be observed. Standard hollow blocks resist a concreting speed of 0.75 m per hour in vertical direction. Crooked hollow blocks require each course to be concreted individually. For construction joints see Annex 4.

2.2.4.4 Ducts and services

Ducts and services shall be located in the shuttering blocks where possible. If ducts and services are in the concrete core, their impact on the mechanical resistance and stability, safety in case of fire, and the wall's building physical characteristics shall be taken into consideration. Cutting horizontal slots in the concrete core is to be avoided where possible. The instructions given by the manufacturer are to be observed.

2.2.4.5 Finishes

The walls of the finished works shall be protected with appropriate internal and external finishes. Cladding or its substructure shall be fixed in the concrete core. The instructions given by the manufacturer are to be observed.

Suitable protection should be provided near radiators or other sources of high temperature where necessary; to prevent the hollow blocks of expanded polystyrene EPS from overheating.

2.2.4.6 Fixing of objects

Fixing of objects in the shuttering leaves is impossible for objects of important seizes and weight. The part of the fixings which is significant for the mechanical resistance shall be anchored in the concrete core. This applies in particular to hand rails, etc. The instructions given by the manufacturer are to be observed.

2.3 Assumed working life

The European Technical Assessment is based on an assumed working life of the shuttering kit of 50 years, provided that the shuttering kit is subject to appropriate installation, use, and maintenance, see Clause 2.2.

The real working life may in normal use conditions be considerably longer without major degradation affecting the basic requirements for construction works[2].

The indications given as to the working life of the shuttering kit cannot be interpreted as a guarantee neither given by the product manufacturer or his representative nor by the Technical Assessment Body, but are regarded only as a means for selecting the appropriate 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 Essential characteristics of the product

The performance of IGLU 2000, IGLU Kombi, POWER-S, KWAD, POLY-LINE, PARTNER STONE, and PARTNER STONE MASSIV for the essential characteristics is given in Table 3.

Table 3: Essential characteristics and performances of the product IGLU 2000, IGLU Kombi, POWER-S, KWAD, POLY-LINE, PARTNER STONE, and PARTNER STONE MASSIV

№	Essential characteristic	Product performance
Basic requirement for construction works[3] 1: Mechanical resistance and stability		
1	Resulting structural pattern	See Clause 3.1.1.1
2	Efficiency of filling	See Clause 3.1.1.2
3	Possibility of steel reinforcement	See Clause 3.1.1.2
Basic requirement for construction works 2: Safety in case of fire		
4	Reaction to fire	See Clause 3.1.2
—	Resistance to fire	Characteristic not assessed.
Basic requirement for construction works 3: Hygiene, health, and the environment		
5	Content, emission, and / or release of dangerous substances	See Clause 3.1.3.
6	Water vapour permeability	See Annex 1.
7	Water absorption	See Annex 1.
—	Water tightness	Characteristic not assessed
Basic requirement for construction works 4: Safety and accessibility in use		
8	Bond strength and resistance to impact loads	See Annex 1.
—	Tensile strength perpendicular to the faces	Characteristic not assessed.

[2] The real working life of a product incorporated in a specific works depends on the environmental conditions to which that works are subject, as well as on the particular conditions of design, execution, use, and maintenance of that works. Therefore, it cannot be excluded that in certain cases the real working life of the product may also be shorter than the working life indicated above.

[3] Basic requirement for construction works as defined in Annex I of Regulation (EU) № 305/2011.

№	Essential characteristic	Product performance
9	Resistance to filling pressure	See Annex 1.
—	Safety against personal injuries by contact[4]	Characteristic not assessed.
Basic requirement for construction works 5: Protection against noise		
—	Airborne sound insulation	Characteristic not assessed.
—	Sound absorption[4]	Characteristic not assessed.
Basic requirement for construction works 6: Energy economy and heat retention		
10	Thermal resistance	See Annex 1.
—	Influence of moisture transfer on insulating capacity of the wall	Characteristic not assessed.
11	Thermal inertia	See Annex 1.
Basic requirement for construction works 7: Sustainable use of natural resources		
—	No characteristic assessed.	—
Aspects of durability and serviceability		
12	Resistance to deterioration	See Clause 3.1.4.1
13	Resistance to normal use damage	See Clause 3.1.4.2

3.1.1 Mechanical resistance and stability

3.1.1.1 Structural pattern of load bearing concrete core

The geometry of the load bearing concrete core of the shuttering kit is depending on the type of web a grid type.

Hollow blocks results in a concrete core of grid type, consisting of concrete columns which are connected by horizontal concrete ribs, see Annex 1, Table 5 and Annex 2. The horizontal concrete ribs are formed by the webs made of expanded polystyrene EPS that do not extend over the entire block height.

3.1.1.2 Efficiency of filling and possibility of steel reinforcement

Under the conditions given in Clause 2.2, the shuttering kit is suitable to infill the concrete core and to position reinforcement at every course.

3.1.2 Safety in case of fire

The classifications of the shuttering kit and the walls constructed with it regarding to their reaction to fire is given in Annex 1, Table 5.

3.1.3 Hygiene, health, and environment

Content, emission, and/or release of dangerous substances is determined according to ETAG 009, Clause 6.3.1. No dangerous substances is the performance of the shuttering kit in this respect. A manufacturer's declaration to this effect has been submitted.

[4] The kit does not incorporate a finish and this characteristic is not relevant.

NOTE In addition to specific clauses relating to dangerous substances in the European Technical Assessment, there may be other requirements applicable to the product falling within their scope, e.g. transposed European legislation and national laws, regulations and administrative provisions. These requirements also need to be complied with, when and where they apply.

3.1.4 Aspects of durability and serviceability

3.1.4.1 Resistance to deterioration

Regarding resistance to the weather of IGLU 2000, IGLU Kombi, POWER-S, KWAD, POLY-LINE, PARTNER STONE, and PARTNER STONE MASSIV, see the conditions given in Clause 2.2.

3.1.4.2 Resistance to normal use damages

Regarding ducts and fixing of objects, see the conditions given in Clause 2.2.

3.2 Assessment methods

The assessment of the essential characteristics in Clause 3.1 of the shuttering kit, for the intended use and in relation to the requirements for mechanical resistance and stability, for safety in case of fire, for hygiene, health, and the environment, for safety and accessibility in use, and for energy economy and heat retention, as well as for durability and serviceability, in the sense of the basic requirements for construction works № 1 to 4 and 6 of Regulation (EU) № 305/2011, has been made in accordance with ETAG 009, Guideline for European technical approval for “Non load-bearing permanent shuttering kits/systems based on hollow blocks or panels of insulating materials and sometimes concrete”, Edition June 2002, used according to Article 66 (3) of Regulation (EU) № 305/2011 as European Assessment Document.

3.3 Identification

The European Technical Assessment for the shuttering kit is issued on the basis of agreed data[5] that identifies the assessed product. Changes to materials, to composition, to characteristics of the product, or to the production process could result in these deposited data being incorrect. Österreichisches Institut für Bautechnik should be notified before the changes are introduced, as an amendment of the European Technical Assessment is possibly necessary.

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

4.1 System of assessment and verification of constancy of performance

According to Commission Decision 98/279/EC, as amended, the system of assessment and verification of constancy of performance to be applied to the shuttering kit is System 2+. System 2+ is detailed in Commission Delegated Regulation (EU) № 568/2014 of 18 February 2014, Annex, point 1.3 and provides for the following items.

(a) The manufacturer shall carry out

(i) an assessment of the performance of the construction product on the basis of testing (including sampling), calculation, tabulated values or descriptive documentation of that product;

(ii) factory production control;

[5] The technical file of the European Technical Assessment is deposited at Österreichisches Institut für Bautechnik.

(iii) testing of samples taken at the manufacturing plant by the manufacturer in accordance with the prescribed test plan[6].

(b) The notified factory production control certification body shall decide on the issuing, restriction, suspension or withdrawal of the certificate of conformity of the factory production control on the basis of the outcome of the following assessments and verifications carried out by that body

(i) initial inspection of the manufacturing plant and of factory production control;

(ii) continuing surveillance, assessment, and evaluation of factory production control.

4.2 AVCP for construction products for which a European Technical Assessment has been issued

Manufacturers undertaking tasks under System 2+ shall consider the European Technical Assessment issued for the construction product in question as the assessment of the performance of that product. Manufacturers shall therefore not undertake the tasks referred to in Clause 4.1, points (a) (i).

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

5.1 Tasks for the manufacturer

5.1.1 Factory production control

In the manufacturing plant the manufacturer establishes and continuously maintains a factory production control. All procedures and specifications adopted by the manufacturer are documented in a systematic manner. Purpose of factory production control is to ensure the constancy of performances of the shuttering kit with regard to the essential characteristics.

The manufacturer only uses raw materials supplied with the relevant inspection documents as laid down in the control plan. The incoming raw materials are subjected to controls by the manufacturer before acceptance. Check of incoming materials includes control of inspection documents presented by the manufacturer of the raw materials.

Testing within factory production control is in accordance with the prescribed test plan. The results of testing are recorded and evaluated. The records are kept at least for ten years after the product has been placed on the market and are presented to the notified factory production control certification body involved in continuous surveillance. On request the records are presented to Österreichisches Institut für Bautechnik. The records shall include at least.

- Designation of the product, the materials and components
- Type of control and testing
- Date of manufacture of the product and the date of the inspection of the product, materials or components
- Results of control and examination and, if applicable, comparison with requirements
- Name and signature of the person responsible for factory production control

If test results are unsatisfactory, the manufacturer immediately implements measures to eliminate the defects. Products or components that are not in conformity with the requirements are removed. After elimination of the defects, the respective test – if verification is required for technical reasons – is repeated immediately.

[6] The prescribed test plan has been deposited with Österreichisches Institut für Bautechnik and is handed over only to the notified factory production control certification body involved in the procedure for the assessment and verification of constancy of performance. The prescribed test plan is also referred to as control plan.

5.1.2 Declaration of performance

The manufacturer is responsible for preparing the declaration of performance. When all the criteria of the assessment and verification of constancy of performance are met, including the certificate of conformity of the factory production control issued by the notified factory production control certification body, the manufacturer draws up the declaration of performance. Essential characteristics to be included in the declaration of performance for the corresponding intended use are given in Clause 3.1, Table 3.

5.2 Tasks for the notified factory production control certification body

5.2.1 Initial inspection of the manufacturing plant and of factory production control

The notified factory production control certification body verifies the ability of the manufacturer for a continuous and orderly manufacturing of IGLU 2000, IGLU Kombi, POWER-S, KWAD, POLY-LINE, PARTNER STONE, and PARTNER STONE MASSIV according to the European Technical Assessment. In particular the following items are appropriately considered.

- Personnel and equipment
- Suitability of the factory production control established by the manufacturer
- Full implementation of the prescribed test plan

5.2.2 Continuing surveillance, assessment, and evaluation of factory production control

The notified factory production control certification body visits the factory at least once a year for routine inspection. In particular the following items are appropriately considered.

- Manufacturing process including personnel and equipment
- Factory production control
- Implementation of the prescribed test plan

The results of continuous surveillance are made available on demand by the notified factory production control certification body to Österreichisches Institut für Bautechnik. When the provisions of the European Technical Assessment and the prescribed test plan are no longer fulfilled, the certificate of conformity of the factory production control is withdrawn by the notified factory production control certification body.

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by Österreichisches Institut für Bautechnik

The original document is signed by

Rainer Mikulits
Managing Director

Member of EOTA

Table 4: Characteristic data of IGLU 2000, IGLU Kombi, POWER-S, KWAD, POLY-LINE, PARTNER STONE, and PARTNER STONE MASSIV

Wall thickness mm	Concrete core thickness mm	Shuttering element	Mass of the hollow blocks[1] kg/m²		Volume of concrete[1] l/m²		Mass of wall (unfinished) [1), 2)] kg/m²	
			Standard	Crooked	Standard	Crooked	Standard	Crooked
250	**160**	IGLU 2000	2.8	3.2	130.8	150.4	316.7	365.0
250	**160**	IGLU Kombi	3.6	–	130.9	–	317.9	–
250	**135**	POWER-S	2.8	3.1	130.0	151.6	314.9	367.0
250	**135**	KWAD	2.9	3.1	132.4	154.3	320.7	374.0
250	**156**	POLY-LINE	3.1	3.1	128.1	155.1	310.6	376.0
250	**156**	PARTNER STONE	3.6	–	129.4	–	314.2	–
250	**156**	PARTNER STONE MASSIV	4.1	–	128.7	–	313.0	–

NOTE

1) The figures indicated are calculated with nominal dimensions.

2) The mean concrete density is assumed to be 2 400 kg/m³

Table 5: Essential characteristics and evaluation of IGLU 2000, IGLU Kombi, POWER-S, KWAD, POLY-LINE, PARTNER STONE, and PARTNER STONE MASSIV according to ETAG 009

BRCW [1)]	Essential characteristic	Assessment method	Level, class, or description
1	**Resulting structural pattern**	ETAG 009, Clause 5.1.1	Grid type with EPS webs, see Annex 2, Figure 3 und Figure 4.
	Efficiency of filling	ETAG 009, Clause 5.1.2	Satisfactory.
	Possibility of steel reinforcement	ETAG 009, Clause 5.1.3	Satisfactory, see Annex 3.
2	**Reaction to fire**		
	Hollow blocks - IGLU Kombi - PARTNER STONE MASSIV	EN 13501-1, Commission delegated regulation (EU) 2016/364	E, d0 for external leaf with EPS layer density ρ = 80 kg/m^3, otherwise F.
	Hollow blocks - IGLU 2000 - POWER-S - KWAD - POLY-LINE - PARTNER STONE	EN 13501-1, Commission delegated regulation (EU) 2016/364	F

[1)] Basic requirement for construction works.

BRCW [1)]	Essential characteristic	Assessment method	Level, class, or description
3	**Content, emission, and/or release of dangerous substances**	No dangerous substances	
	Water vapour permeability		
	Expanded polystyrene (EPS)	EN ISO 10456	μ = 60
	Concrete core, density 2 200 kg/m^3		μ = 120
	Concrete core, density 2 400 kg/m^3 (2% reinforcement)		μ = 130
	Water absorption	ETAG 009, Clause 5.3.3	Satisfactory

[1)] Basic requirement for construction works.

BRCW [1)]	Essential characteristic	Assessment method	Level, class, or description
4	**Bond strength and resistance to impact load**		
	EPS density 25 kg/m^3	ETAG 009, Clause 5.4.1.4	Hard body impact Satisfactory
	EPS layers, densities (25+80) kg/m^3		Hard body impact Satisfactory
	Resistance to filling pressure		
	Under the conditions given below: - the standard hollow blocks resist a concreting speed of 0.75 m per hour in vertical direction - the crooked hollow blocks (hollow blocks with spread cotters) require each course to be concreted individually. For construction joints see Annex 4.		
	Hollow blocks with EPS webs		
	Min. bending tensile strength of external leaf for standard hollow blocks	EN 15498	5 %-fractile = 0.22 N/mm^2
	Min. bending tensile strength of external leaf for crooked hollow blocks	EN 15498	5 %-fractile = 0.27 N/mm^2 (for external leaf 27 mm), 5 %-fractile = 0.20 N/mm^2 (for external leaf 45 mm)
	Min. web tensile strength for standard and crooked hollow blocks	EN 15498	5 %-fractile = 0.14 N/mm^2

[1)] Basic requirement for construction works.

BRCW [1)]	Essential characteristic	Assessment method	Level, class, or description
6	**Thermal resistance**		
	Thermal conductivity:		
	Concrete core (bulk density ρ = 2 200 kg/m^3) Thermal insulation EPS	EN ISO 10456 EN 13163	λ = 1.650 W/(m · K) λ = 0.04 W/(m · K)
	Thermal inertia		
	Wall structure	–	Annex 3
	Area-related wall mass	–	See Annex 1, Table 4
	Density		
	Expanded polystyrene (EPS)	EN 13163	25, 30, 40 kg/m^3 Heavy duty layer 80 kg/m^3
	Concrete core, non-reinforced	EN ISO 10456	2 200 kg/m^3
	Concrete core, reinforced with 2 % reinforcement		2 400 kg/m^3
	Specific heat capacity, c_p		
	Expanded polystyrene (EPS)	EN ISO 10456	c_p = 1 450 J / (kg · K)
	Concrete core		c_p = 1 000 J / (kg · K)

[1)] Basic requirement for construction works.

Standard hollow block IGLU 2000

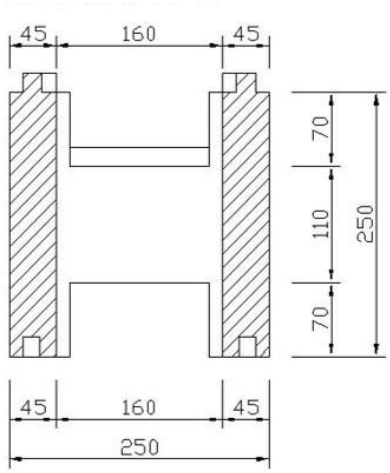


Figure 1: EPS web IGLU 2000 standard, dimensions in mm

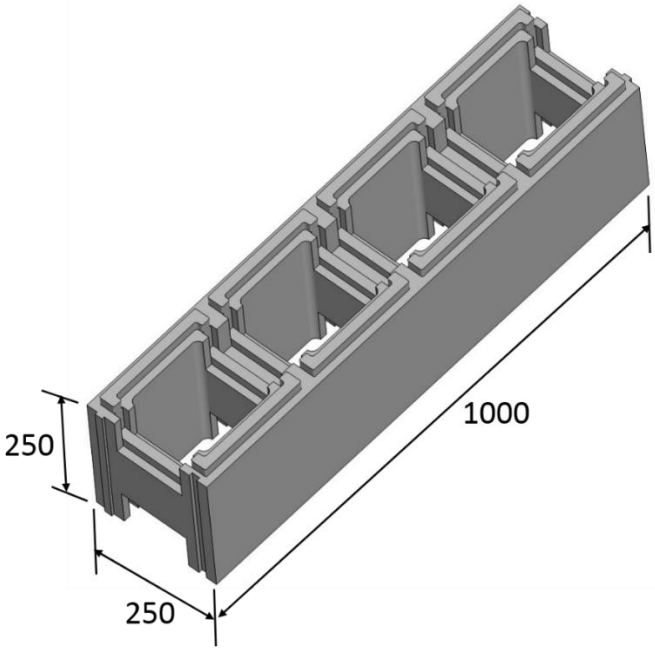


Figure 2: IGLU 2000, standard hollow block
Grid type with EPS webs, dimensions in mm

Hollow block	—	IGLU 2000, standard
Length	mm	1 000
Width	mm	250
Height	mm	250
Insulation (interior / exterior)	mm	45 / 45 [1)]
Concrete core	mm	160
Web	—	EPS
Volume	l	29.81
Density	kg/m^3	25 / 30 / 40
Web width (min.value)	mm	90
[1)] See Figure 3 for thickness of insulation.		

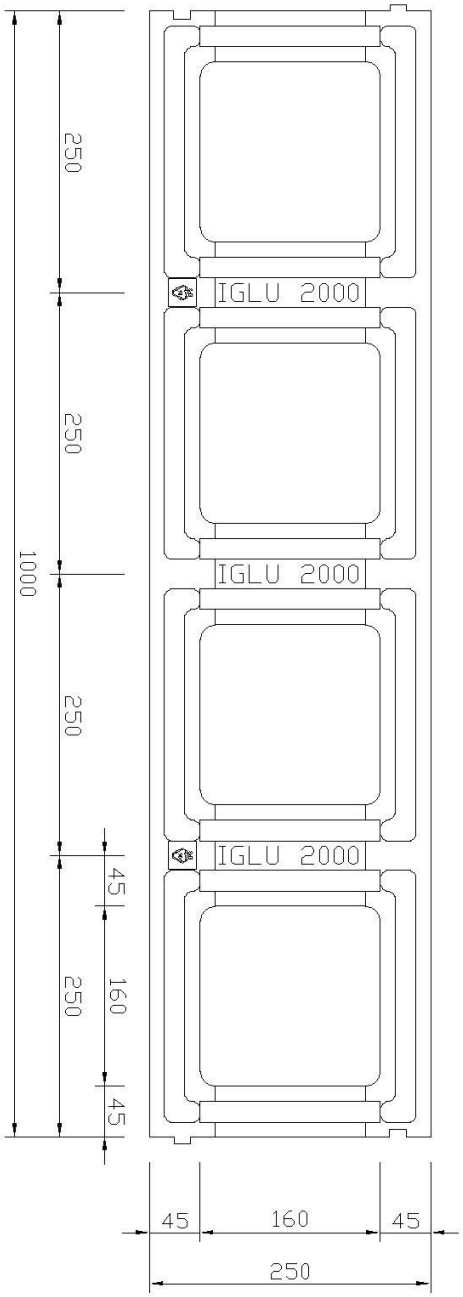


Figure 3: Horizontal connecting surfaces between the hollow block IGLU 2000; standard

Dimensions in mm

Crooked hollow block IGLU 2000

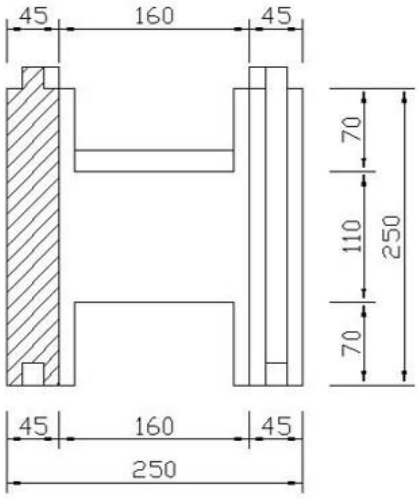


Figure 4: EPS web IGLU 2000 crooked, dimensions in mm

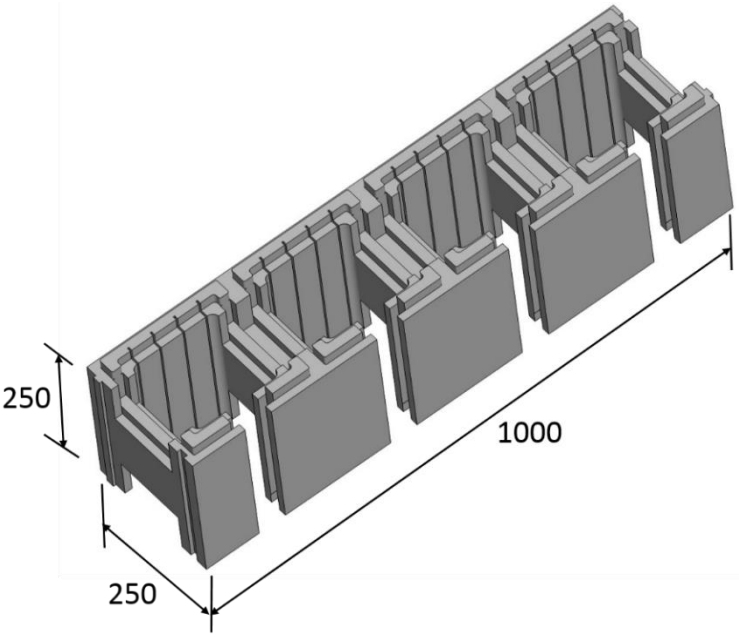


Figure 5: IGLU 2000, crooked hollow block (without spread cotter), grid type of concrete core, dimensions in mm

Hollow block	—	IGLU 2000, crooked
Length	mm	1 000
Width	mm	250
Height	mm	250
Insulation (interior / exterior)	mm	45 / 45 [1)]
Concrete core	mm	160
Web	—	EPS
Volume	l	26.76
Density	kg/m^3	25 / 30
Web width (min.value)	mm	90
[1)] See Figure 6 for thickness of insulation.		

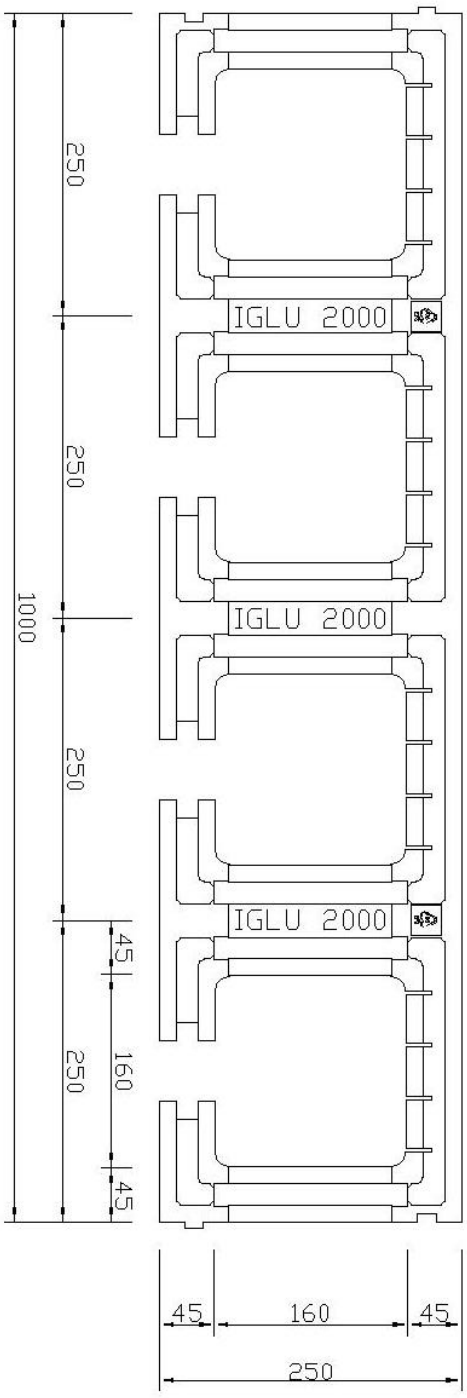


Figure 6: Horizontal connecting surfaces between the crooked hollow block IGLU 2000

Dimensions in mm

Crooked hollow block IGLU 2000 with spread cotters

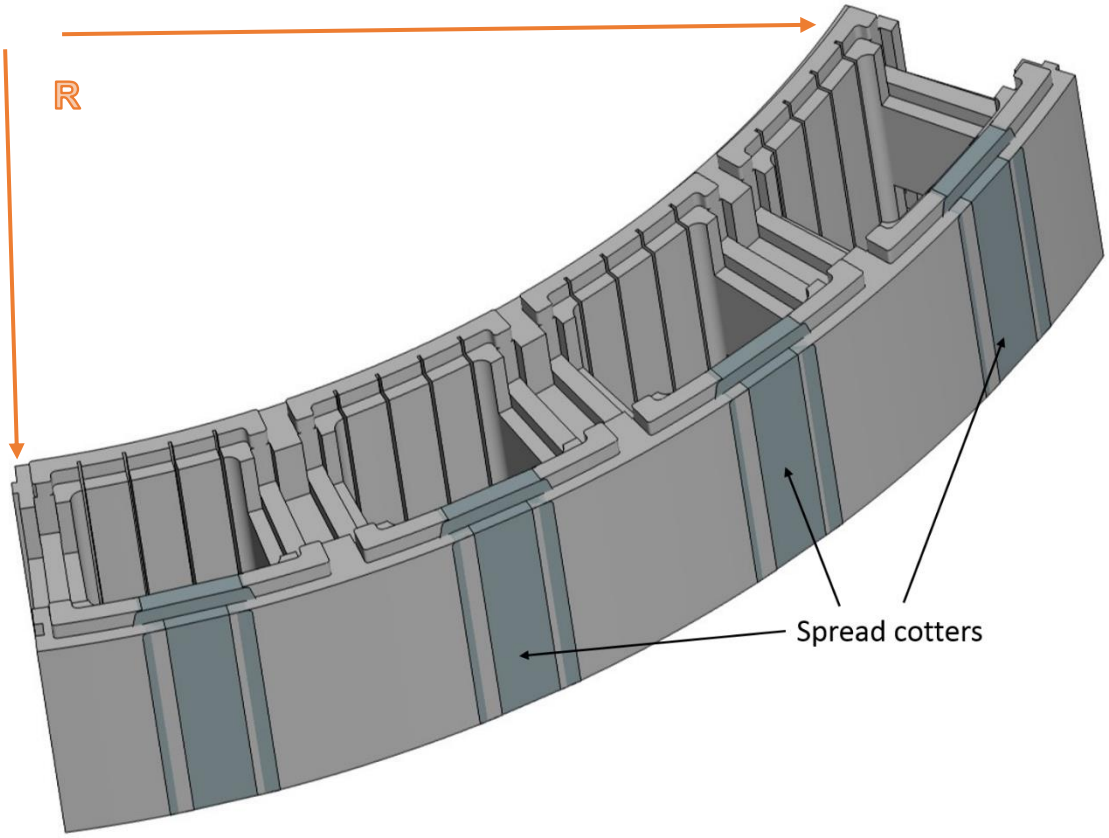
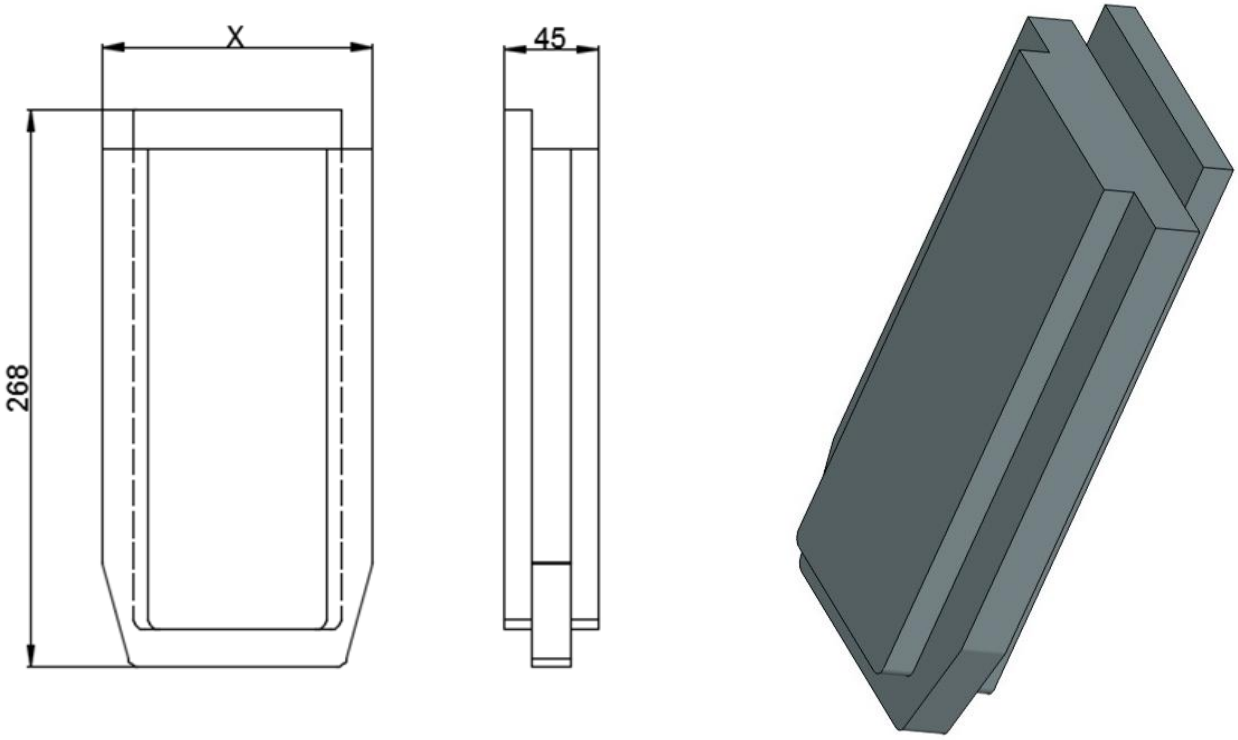


Figure 7: IGLU 2000, crooked hollow block with spread cotters

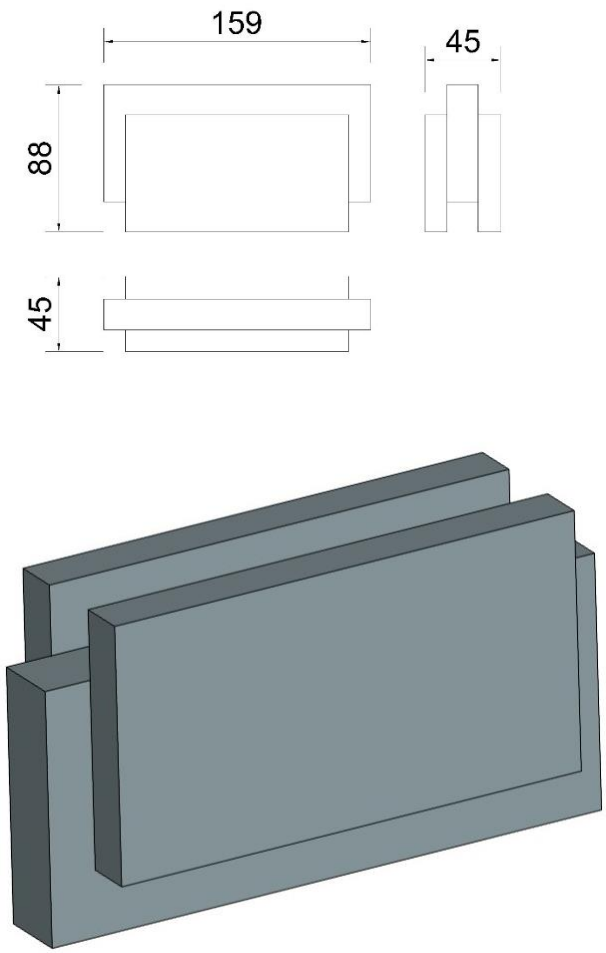
Figure 8: Spread cotter IGLU 2000



Dimensions in mm

Spread cotter IGLU 2000		
Radius in m	—	Dimension X
R0 − straight	mm	87
R1	mm	138
R1.25	mm	131
R1.50	mm	123.5
R2	mm	116
R2.50	mm	110.5
R3	mm	106.5
R3.50	mm	104.5
R5	mm	99
R7	mm	94

Figure 9: End insert block IGLU 2000



Standard hollow block IGLU Kombi

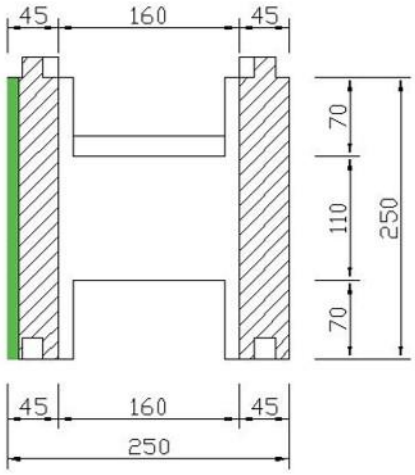


Figure 10:EPS web IGLU Kombi standard, dimensions in mm

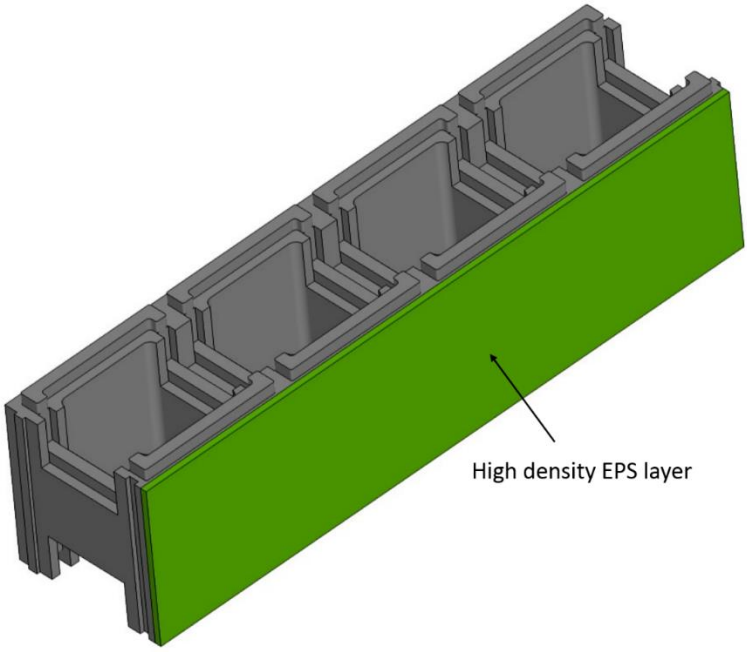


Figure 11: Standard hollow block IGLU Kombi

Hollow block	—	IGLU Kombi, standard
Length	mm	1000
Width	mm	250
Height	mm	250
Insulation (interior / exterior)	mm	45 / (35+10) [1)]
Concrete core	mm	160
Web	—	EPS
Volume	l	29.81
Density	kg/m^3	25+80 30+80 40+80
Web width (min.value)	mm	90
[1)] See Figure 12 for thickness of insulation.		

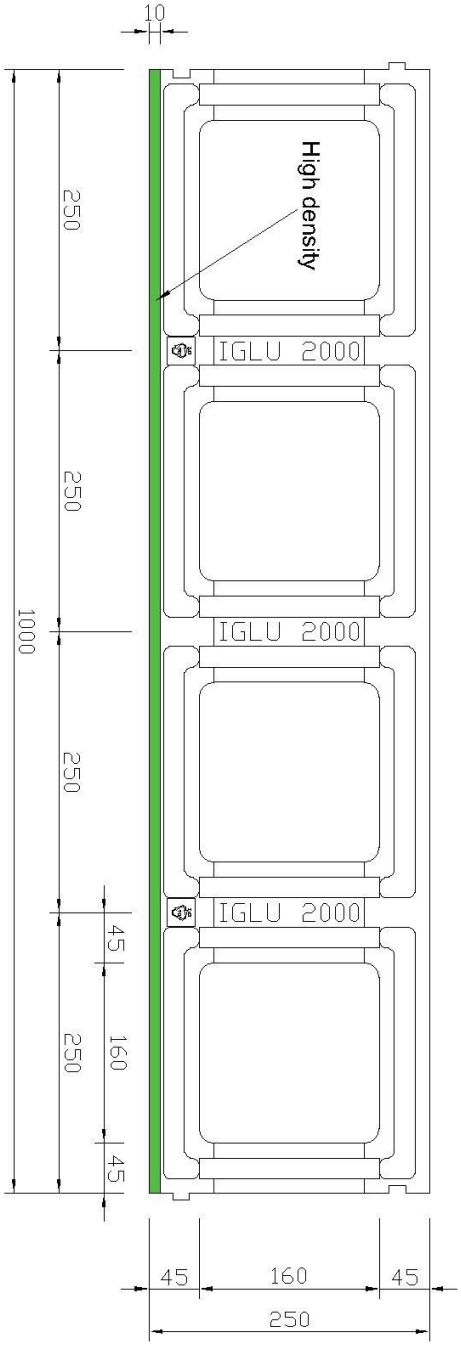
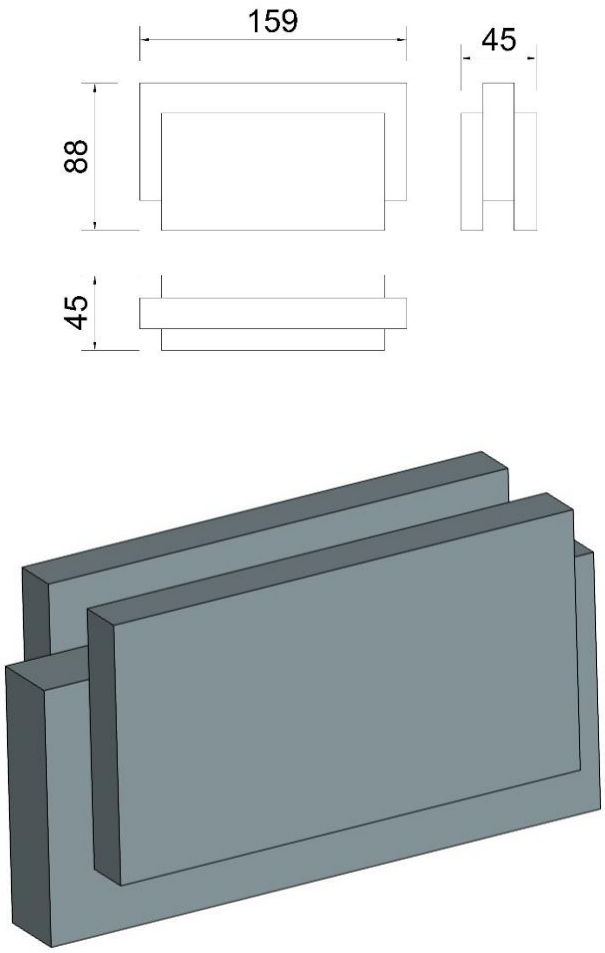


Figure 12: Standard hollow block IGLU Kombi

Dimensions in mm

Figure 13: End insert block IGLU Kombi



Dimensions in mm

Standard hollow block POWER-S

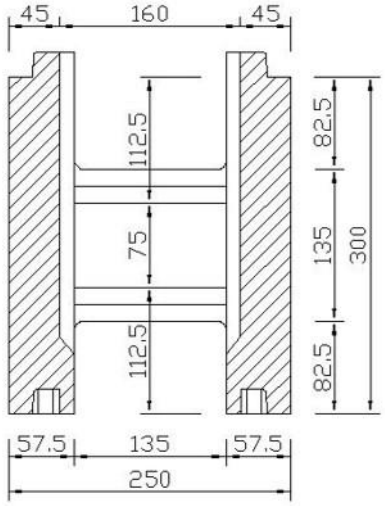


Figure 14: EPS web POWER-S, dimensions in mm

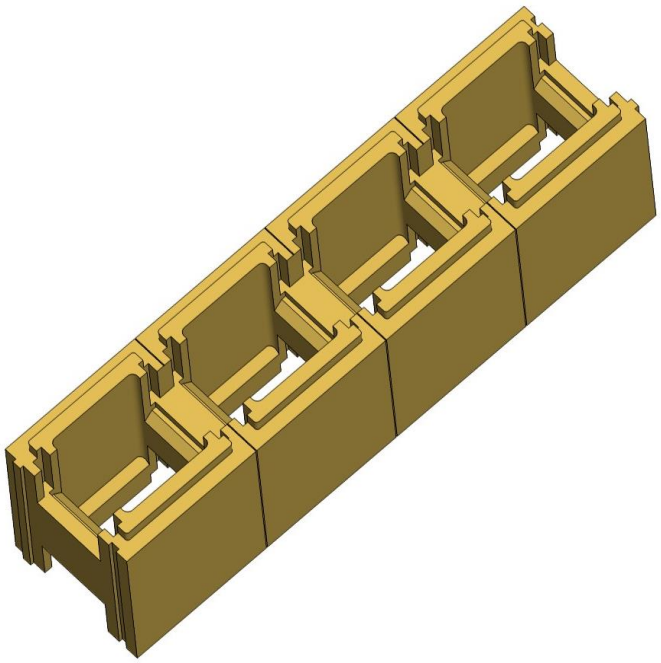


Figure 15: POWER-S, standard hollow block, grid type of concrete core

Hollow block	—	POWER-S, standard
Length	mm	1 000
Width	mm	250
Height	mm	300
Insulation (interior / exterior), max. value	mm	57.5 / 57.5 [1)]
Concrete core (min. value)	mm	135
Web	—	EPS
Volume	l	35.98
Density	kg/m^3	25 / 30 / 40
Web width (min.value)	mm	90
[1)] See Figure 16 for min. value of thickness of insulation.		

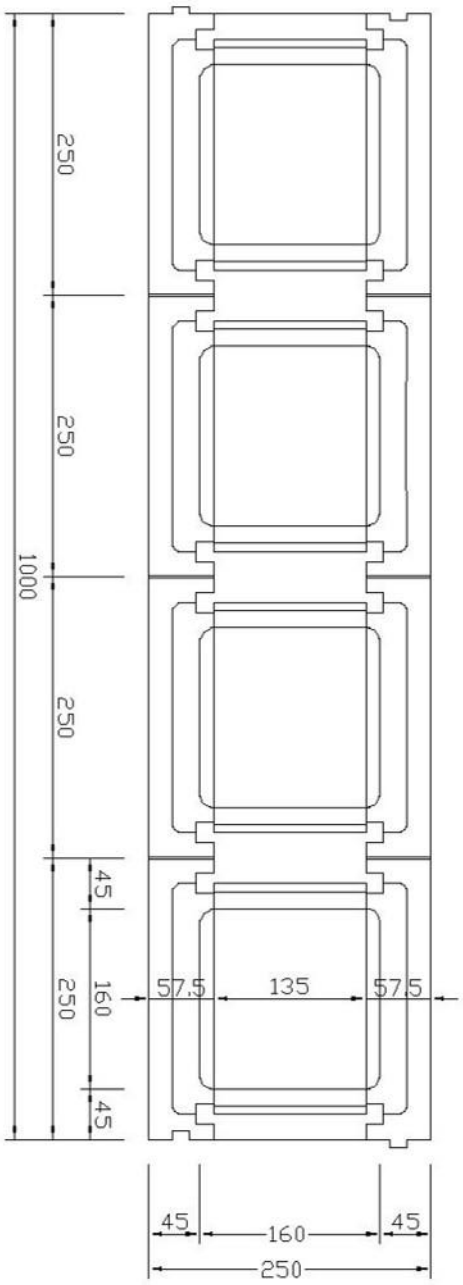


Figure 16: Horizontal connecting surfaces between the standard hollow block POWER-S

Dimensions in mm

Crooked hollow block POWER-S

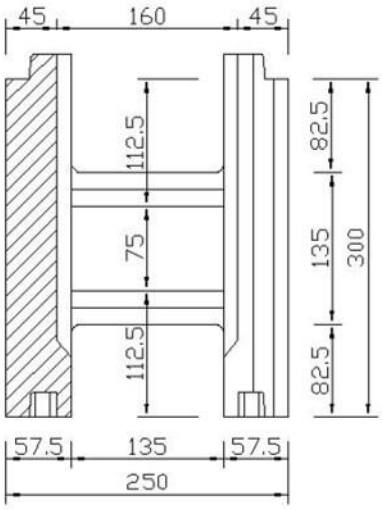


Figure 17: EPS web POWER-S, crooked, dimensions in mm

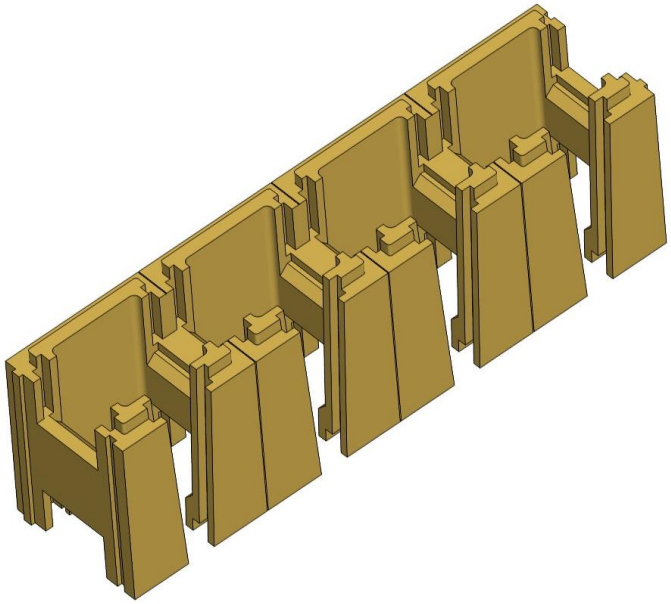


Figure 18: POWER-S, crooked hollow block (without spread cotter), grid type of concrete core

Hollow block	—	POWER-S, crooked
Length	mm	1 000
Width	mm	250
Height	mm	300
Insulation (interior / exterior), max. value	mm	57.5 / 57.5 [1)]
Concrete core (min.value)	mm	135
Web	—	EPS
Volume	l	31.54
Density	kg/m^3	25 / 30
Web width (min.value)	mm	90
[1)] See Figure 19 for min. value of thickness of insulation.		

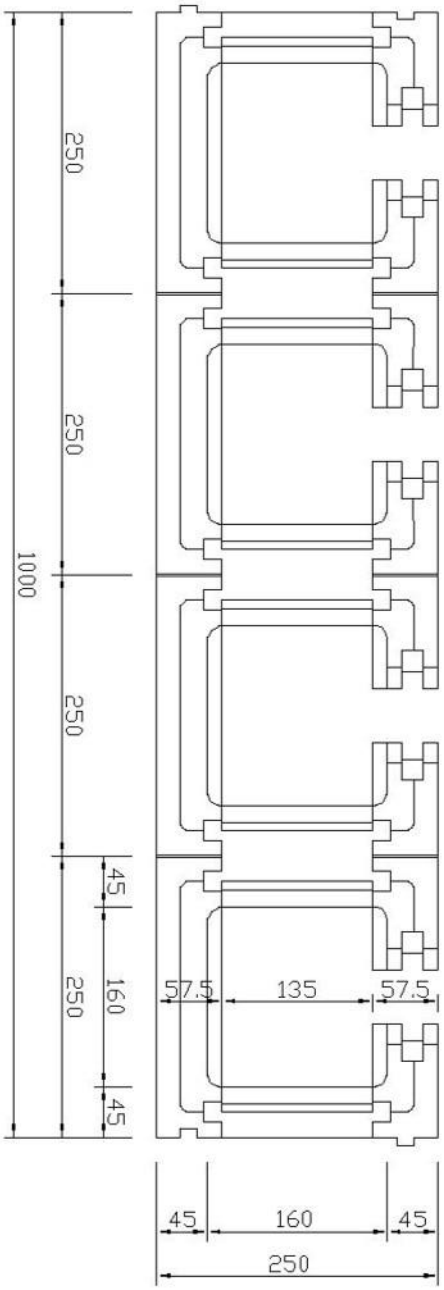


Figure 19: Horizontal connecting surfaces between the crooked hollow block POWER-S

Dimensions in mm

Crooked hollow block POWER-S with spread cotters

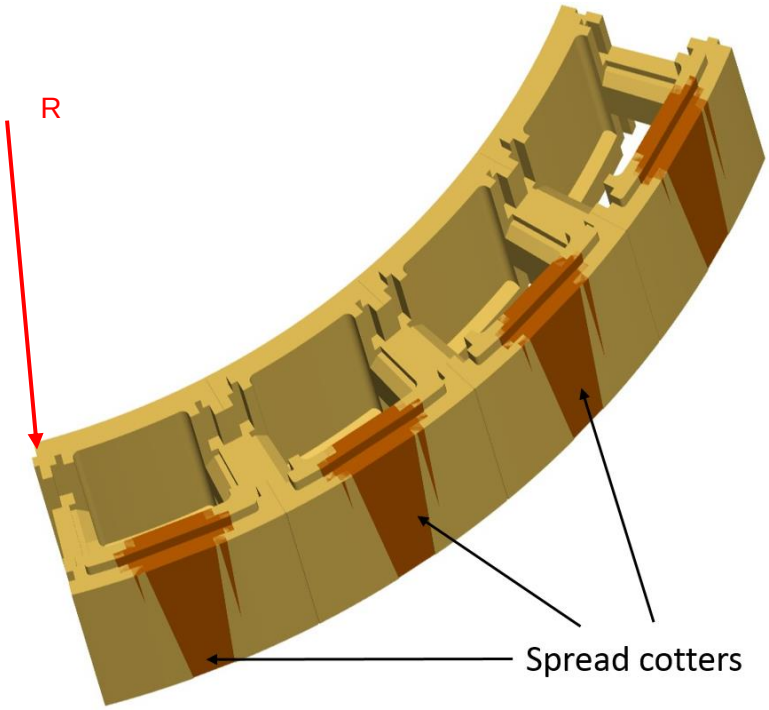
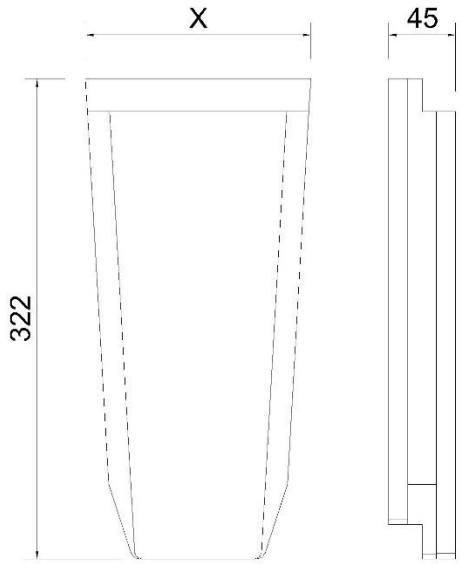
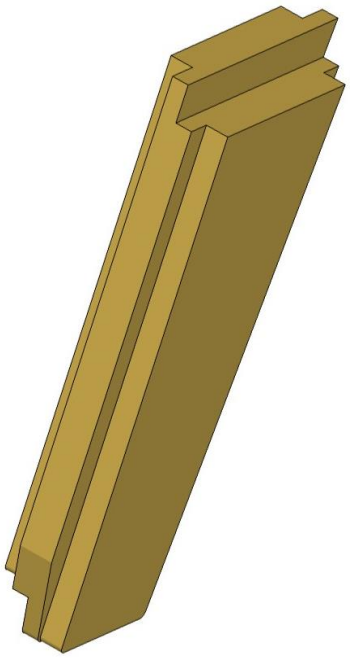


Figure 20: POWER-S, crooked hollow block with spread cotters

Figure 21: Spread cotter POWER-S

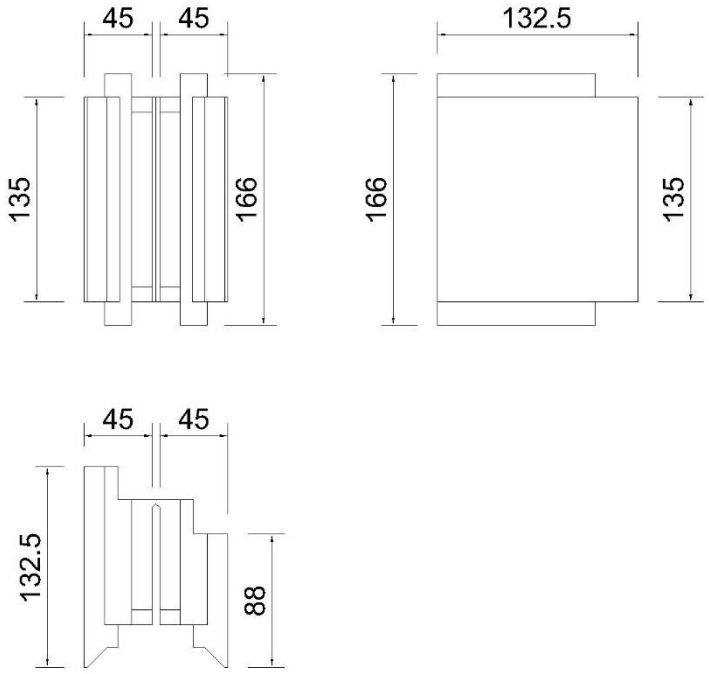




Dimensions in mm

Spread cotter POWER-S		
Radius in m	—	Dimension X
R0 − straight	mm	115
R1	mm	168
R1.25	mm	156
R1.50	mm	147.5
R2	mm	140.5
R2.50	mm	135.0
R3	mm	131.5
R3.50	mm	129.0
R5	mm	124.4
R7	mm	122

Figure 22: End insert block POWER-S (top and bottom)



Dimensions in mm

Standard hollow block KWAD

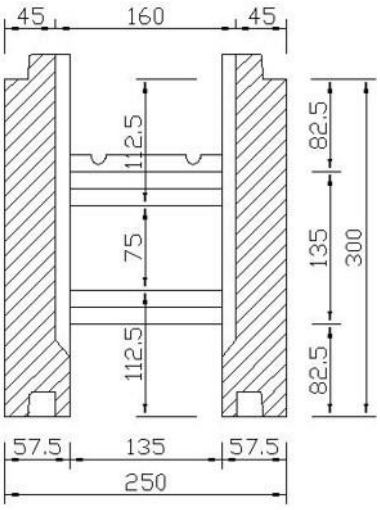


Figure 23: EPS web KWAD, dimensions in mm

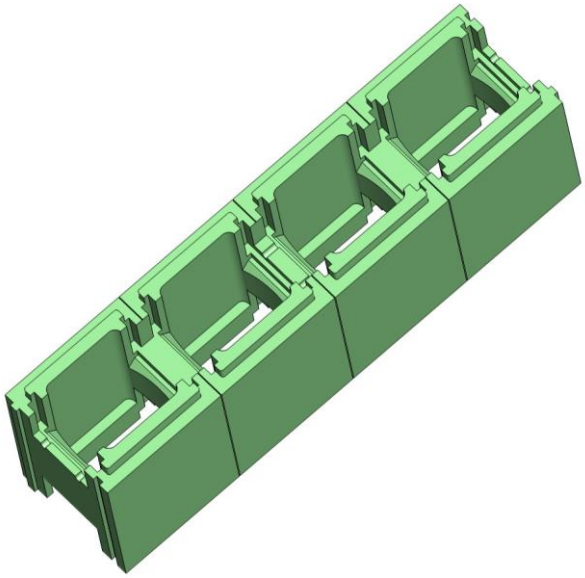


Figure 24: KWAD, standard hollow block, grid type of concrete core

Hollow block	—	KWAD
Length	mm	1 000
Width	mm	250
Height	mm	300
Insulation (interior / exterior), max. value	mm	57.5 / 57.5 [1)]
Concrete core (min. value)	mm	135
Web	—	EPS
Volume	l	35.28
Density	kg/m^3	25 / 30 / 40
Web width (min. value)	mm	75
[1)] See Figure 25 for min. value of thickness of insulation.		

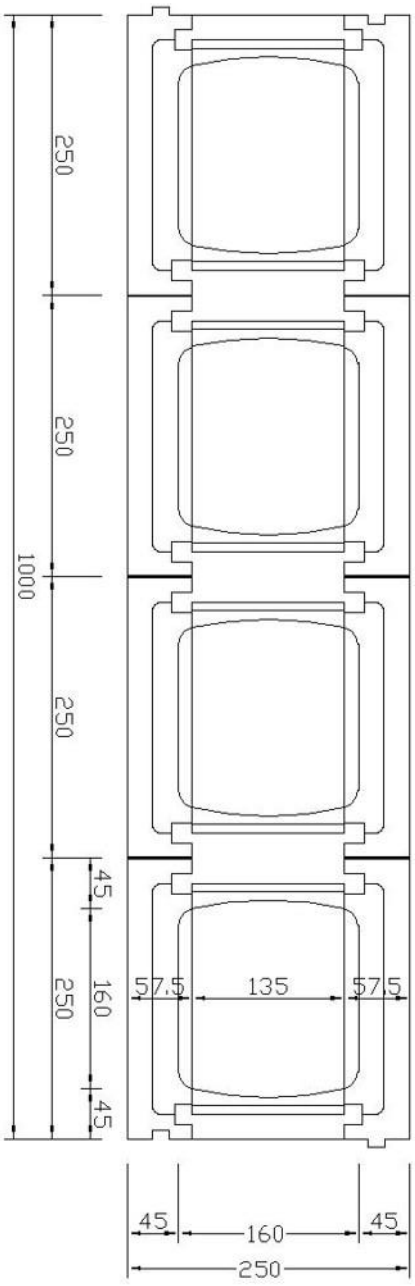


Figure 25: Horizontal connecting surfaces between the standard hollow block KWAD
Dimensions in mm

Crooked hollow block KWAD

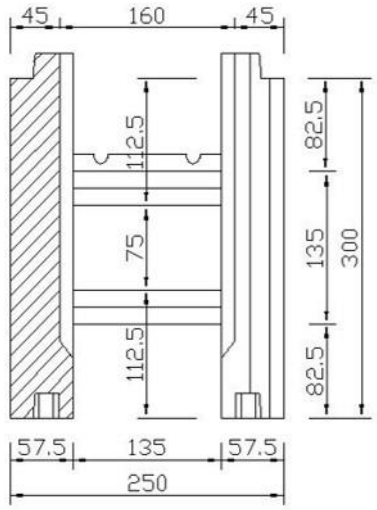


Figure 26: EPS web KWAD, crooked, dimensions in mm

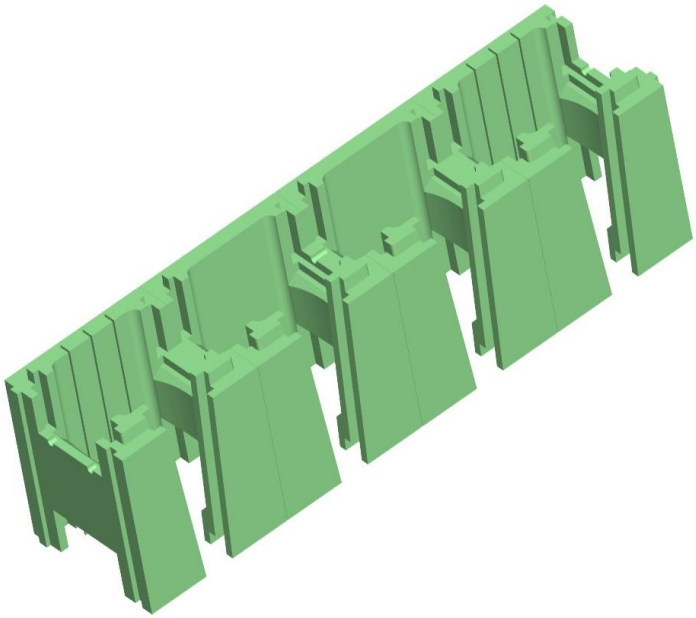


Figure 27: KWAD, crooked hollow block (without spread cotter), grid type of concrete core

Hollow block	—	KWAD, crooked
Length	mm	1 000
Width	mm	250
Height	mm	300
Insulation (interior / exterior), max. value	mm	57.5 / 57.5 [1)]
Concrete core, min. value	mm	135
Web	—	EPS
Volume	l	30.70
Density	kg/m^3	25 / 30
Web width (min. value)	mm	75
[1)] See Figure 28 for min. value of thickness of insulation.		

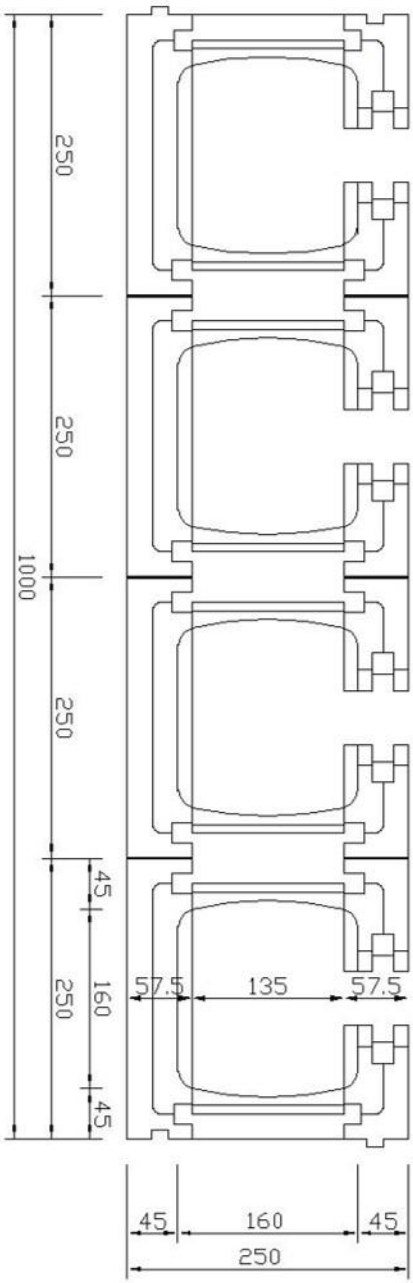


Figure 28: Horizontal connecting surfaces between the crooked hollow block KWAD

Dimensions in mm

Crooked hollow block KWAD with spread cotters

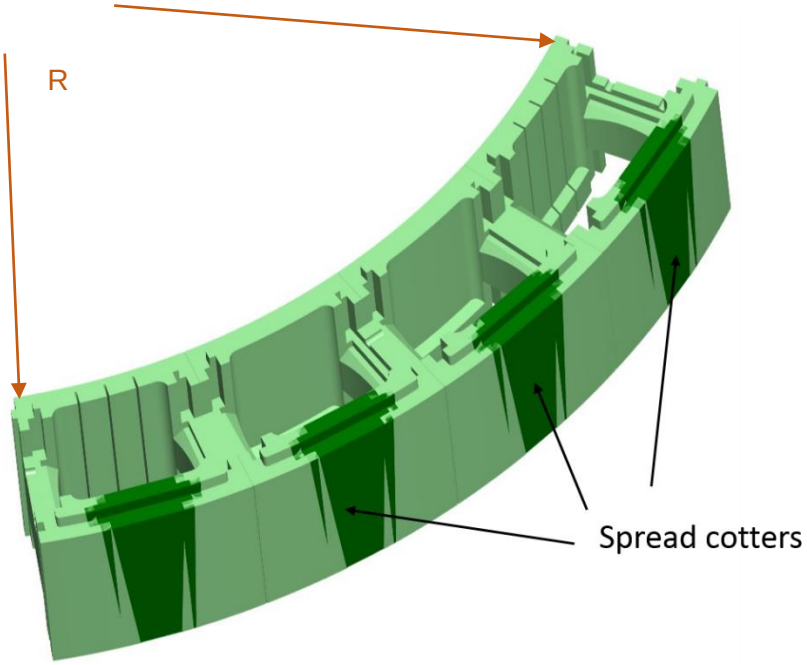
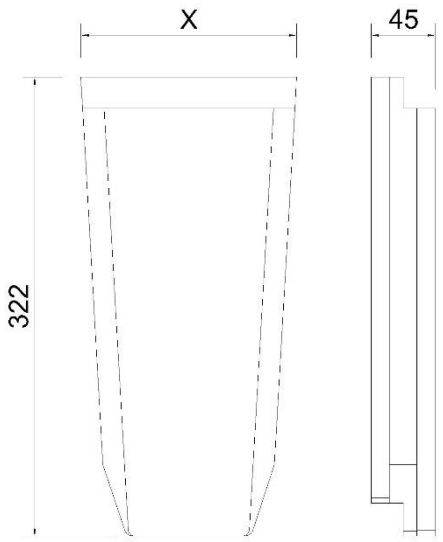
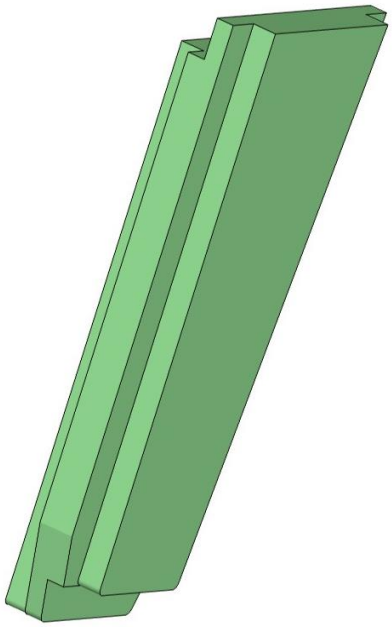


Figure 29: KWAD, crooked hollow block with spread cotters

Figure 30: Spread cotter KWAD

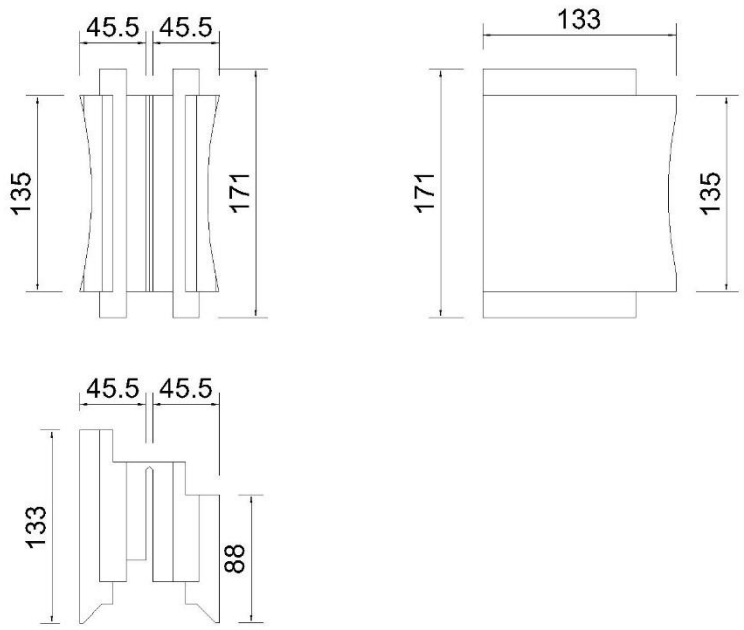




Dimensions in mm

Spread cotter KWAD		
Radius in m	—	Dimension X
R0 − straight	mm	115
R1	mm	168
R1.25	mm	156
R1.50	mm	147.5
R2	mm	140.5
R2.50	mm	135.0
R3	mm	131.5
R3.50	mm	129.0
R5	mm	124.5
R7	mm	122

Figure 31: End insert block KWAD



Dimensions in mm

Standard hollow block POLY-LINE

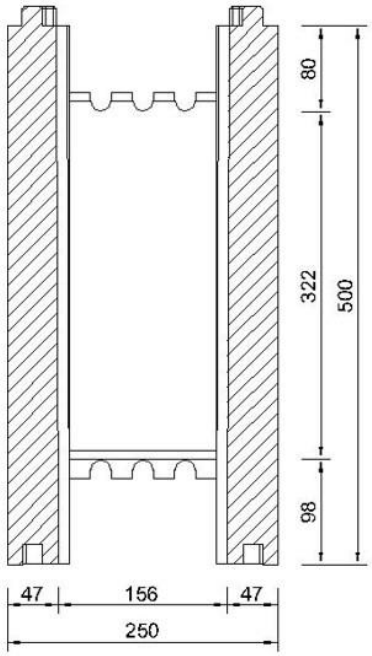


Figure 32: EPS web POLY-LINE, dimensions in mm

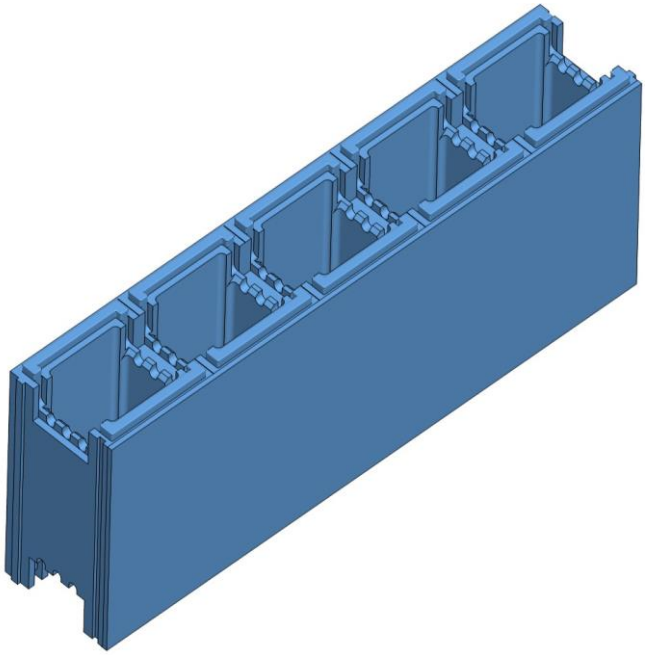


Figure 33: POLY-LINE, standard hollow block, grid type of concrete core

Hollow block	—	POLY-LINE
Length	mm	1 250
Width	mm	250
Height	mm	500
Insulation (interior / exterior), max. value	mm	47 / 47 [1)]
Concrete core, min. value	mm	156
Web	—	EPS
Volume	l	76.11
Density	kg/m^3	25 / 30 / 40
Web width (min. value)	mm	61.5
[1)] See Figure 34 for thickness of insulation.		

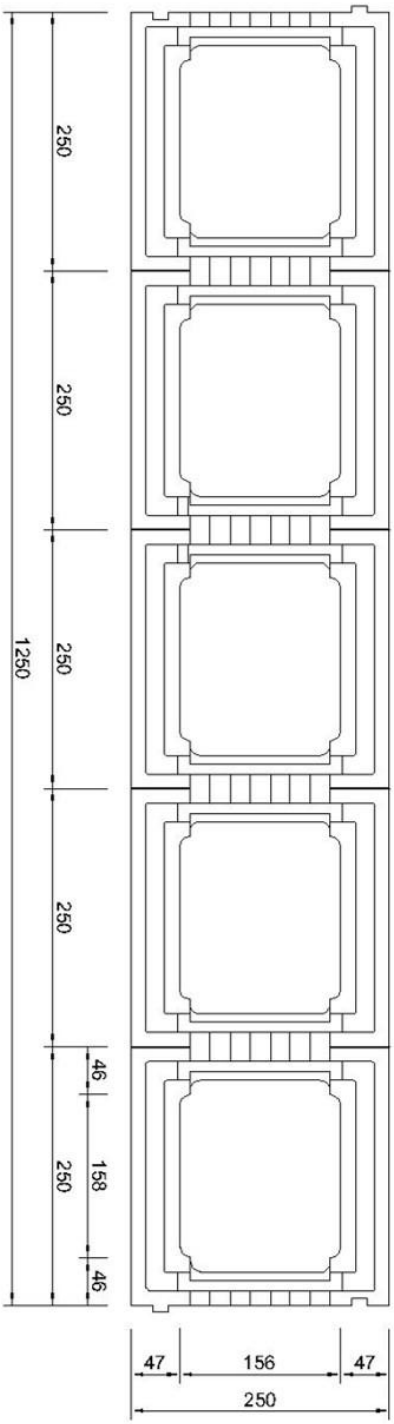


Figure 34: Horizontal connecting surfaces between the standard hollow block POLY-LINE

Dimensions in mm

Crooked hollow block POLY-LINE

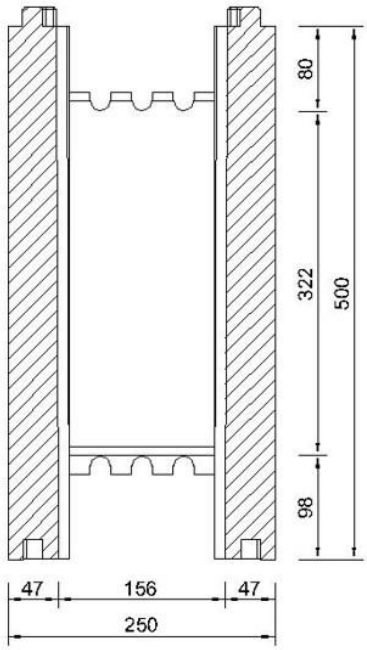


Figure 35: EPS web POLY-LINE, dimensions in mm

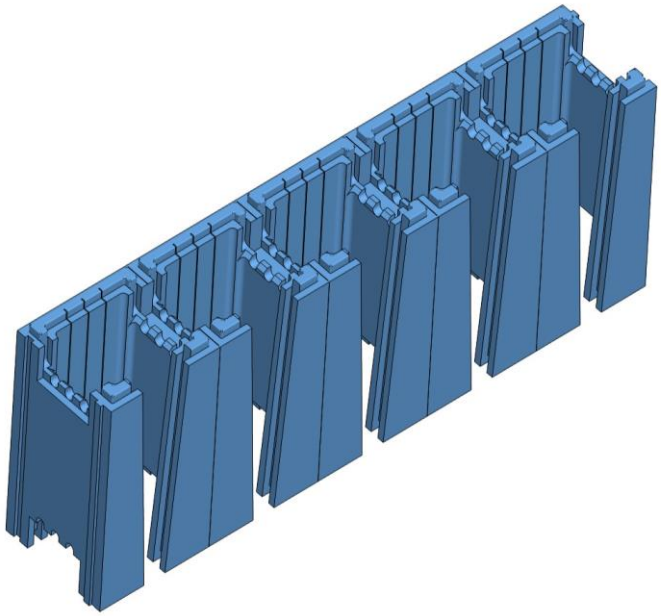


Figure 36: POLY-LINE, crooked hollow block (without spread cotter), grid type of concrete core

Hollow block	—	POLY-LINE, crooked
Length	mm	1 250
Width	mm	250
Height	mm	500
Insulation (interior / exterior), max. value	mm	47 / 47 [1)]
Concrete core, min.value	mm	156
Web	—	EPS
Volume	l	65.52
Density	kg/m^3	25 / 30
Web width (min. value)	mm	61.5
[1)] See Figure 37 for thickness of insulation.		

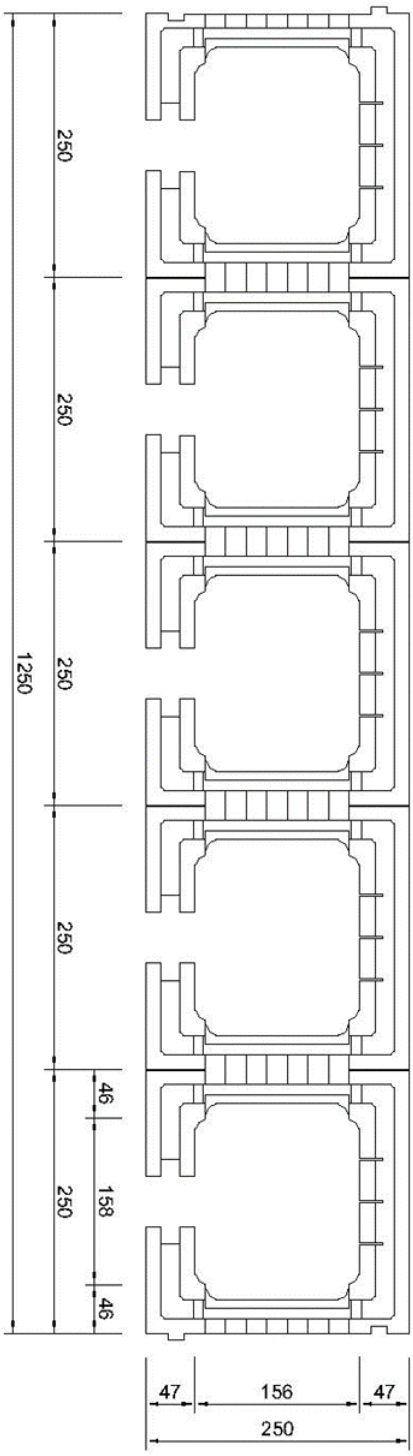


Figure 37: Horizontal connecting surfaces between the crooked hollow block POLY-LINE

Dimensions in mm

Crooked hollow block POLY-LINE with spread cotters

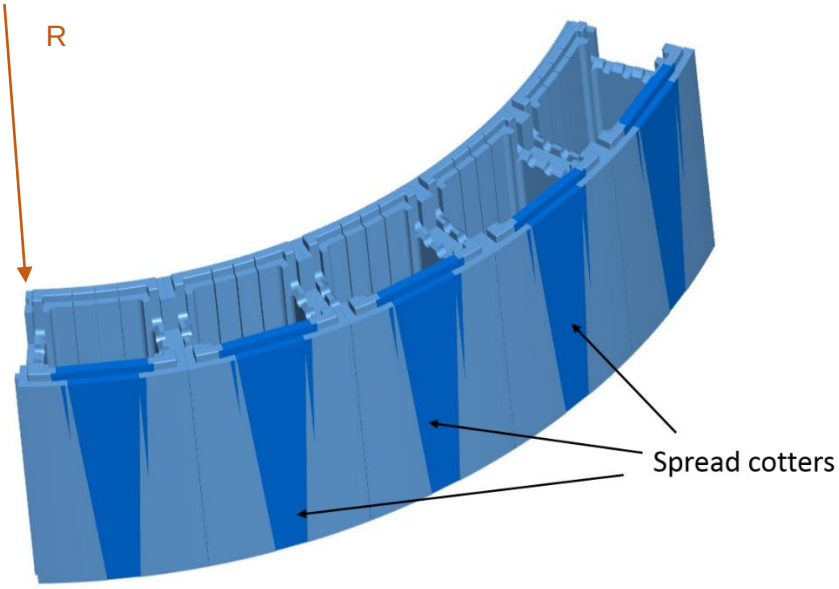
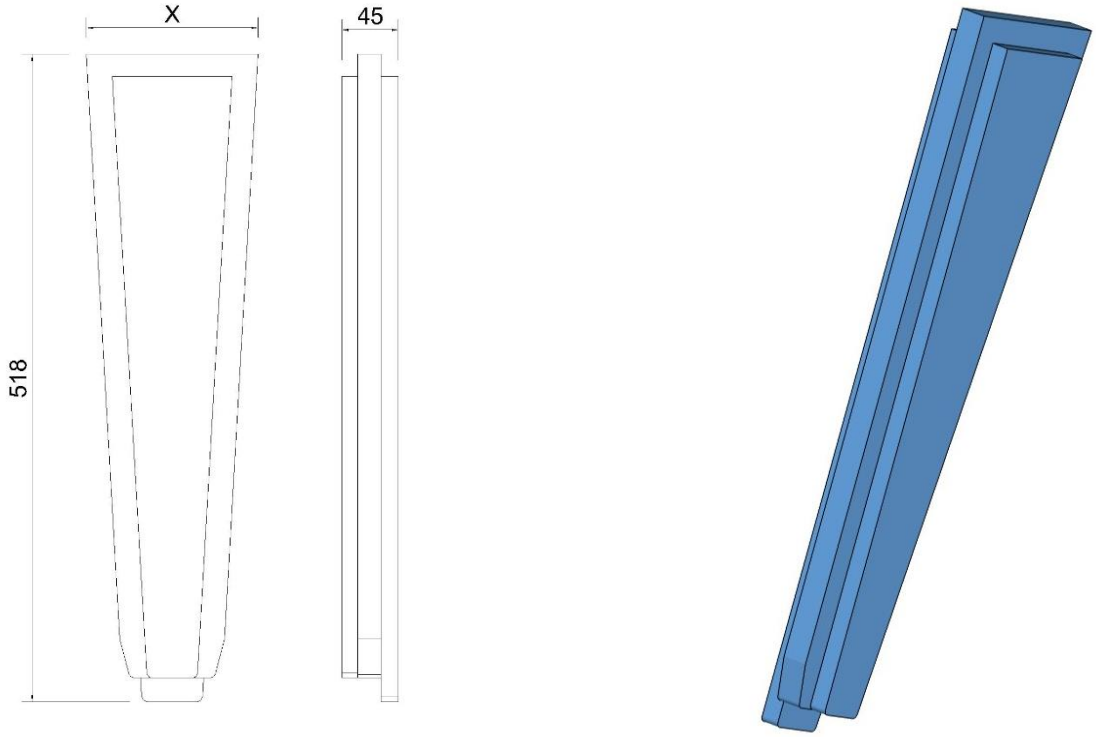


Figure 38: POLY-LINE crooked hollow block with spread cotters

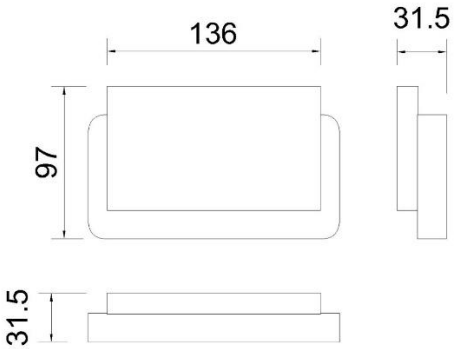
Figure 39: Spread cotter POLY-LINE

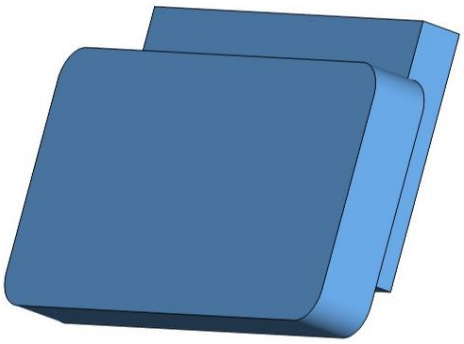


Dimensions in mm

Spread cotter POLY-LINE		
Radius in m	—	Dimension X
R0 − straight	mm	137
R1	mm	186,5
R1.25	mm	178
R1.50	mm	172.0
R2	mm	163
R2.50	mm	157.5
R3	mm	154.4
R3.50	mm	151.4
R5	mm	147
R7	mm	144.5

Figure 40: End insert block POLY-LINE





Dimensions in mm

Standard hollow block PARTNER STONE

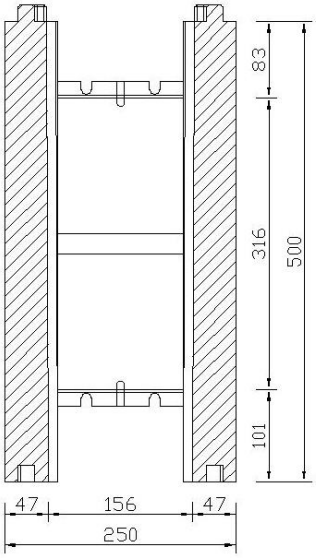


Figure 41: EPS web PARTNER STONE, standard, dimensions in mm

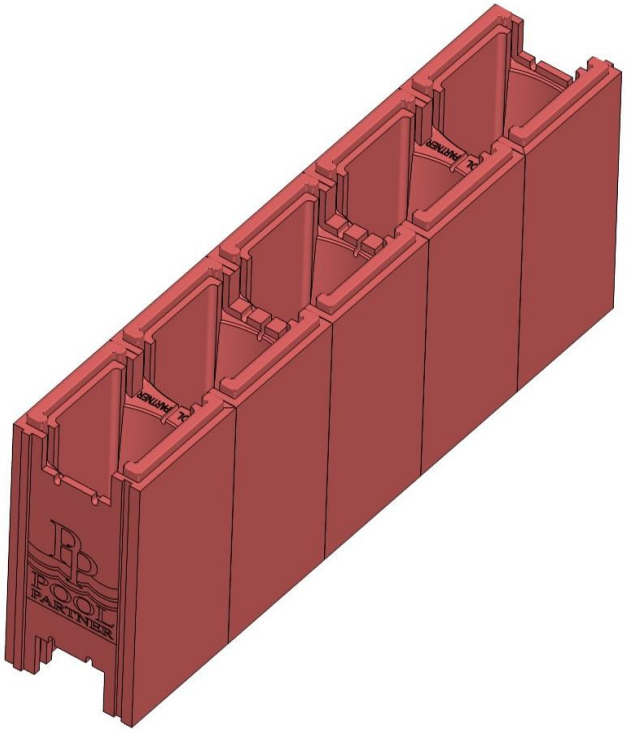


Figure 42: PARTNER STONE, standard hollow block, grid type of concrete core

Hollow block	—	PARTNER STONE
Length	mm	1 250
Width	mm	250
Height	mm	500
Insulation (interior / exterior), max. value	mm	47 / 47 [1)]
Concrete core, min. value	mm	156
Web	—	EPS
Volume	l	75.85
Density	kg/m^3	25 / 30 / 40
Web width (min. value)	mm	44.50
[1)] See Figure 43 for thickness of insulation.		

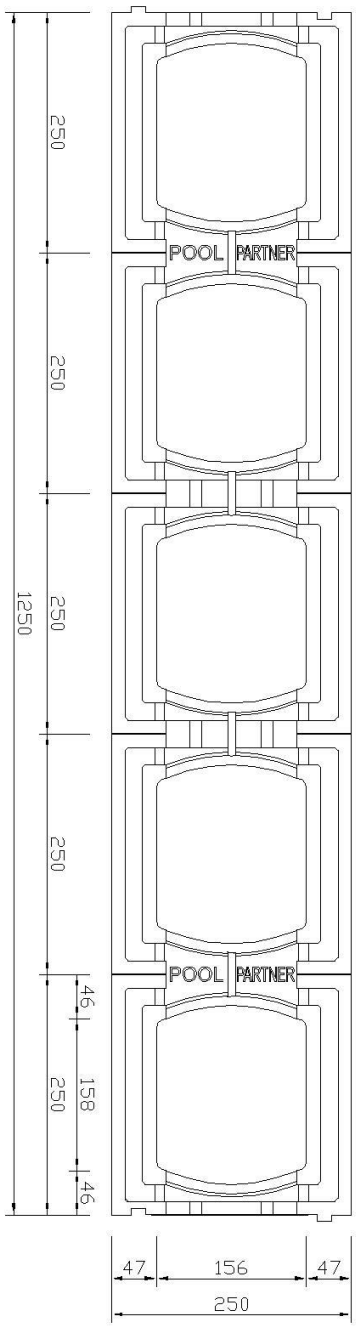
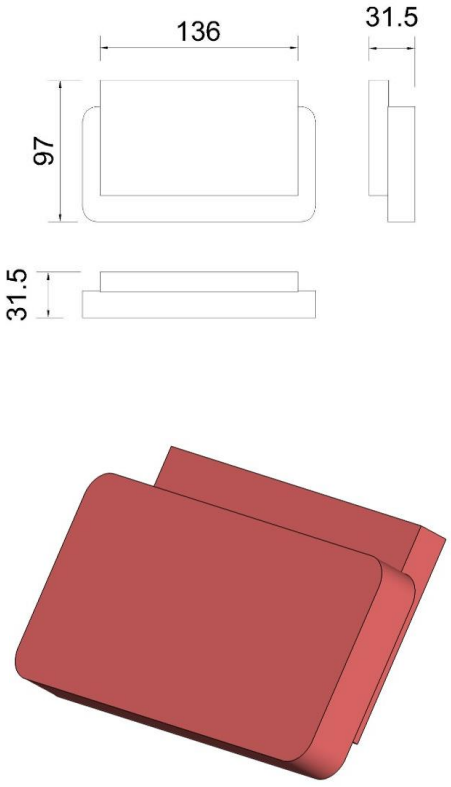


Figure 43: Horizontal connecting surfaces between the standard hollow block PARTNER STONE

Dimensions in mm

Figure 44: End insert block PARTNER STONE



Dimensions in mm

Standard hollow block PARTNER STONE MASSIV

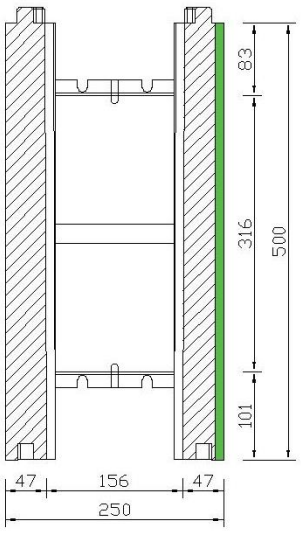


Figure 45: EPS web PARTNER STONE MASSIV, standard, dimensions in mm

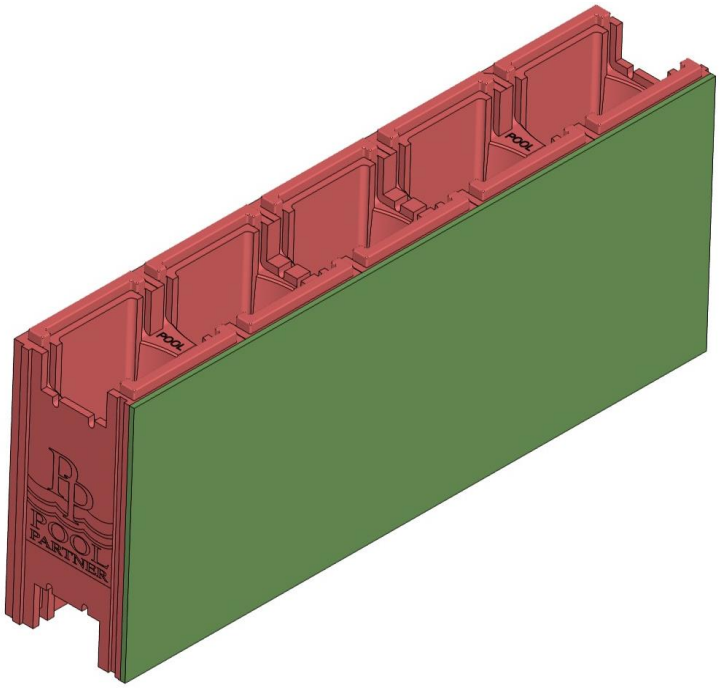


Figure 46: PARTNER STONE MASSIV, standard hollow block, grid type of concrete core

Hollow block	—	PARTNER STONE MASSIV
Length	mm	1250
Width	mm	250
Height	mm	500
Insulation (interior / exterior), max. value	mm	37 + 10 / 47 [1)]
Concrete core, min. value	mm	156
Web	—	EPS
Volume	l	75.85
Density	kg/m^3	25+80 30+80 40+80
Web width (min.value)	mm	44.50
[1)] See Figure 47 for thickness of insulation.		

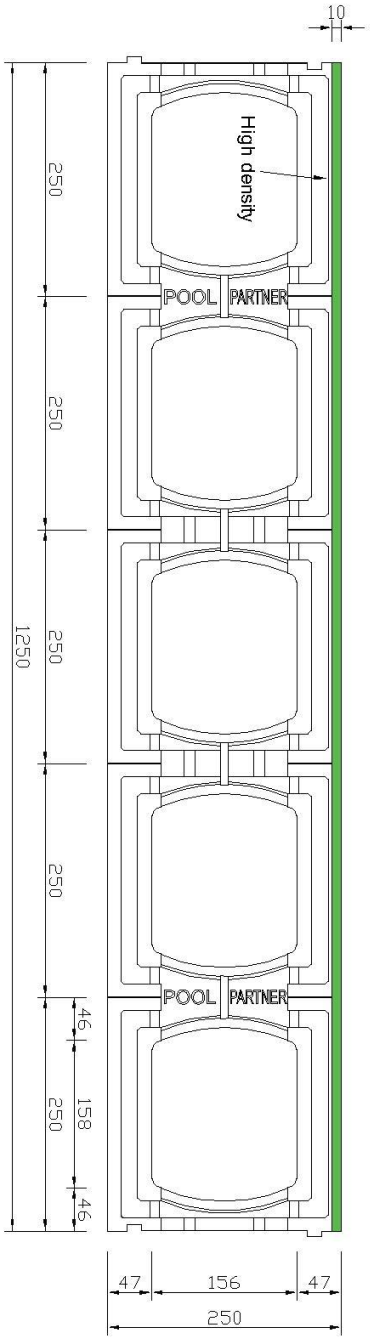
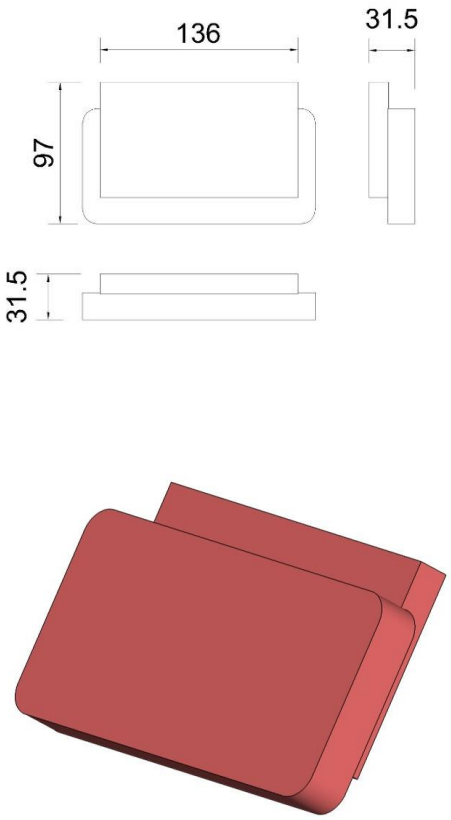


Figure 47: Standard hollow block PARTNER STONE MASSIV

Dimensions in mm

Figure 48**:** End insert block PARTNER STONE MASSIV



Dimensions in mm

Annex 3 - Installation

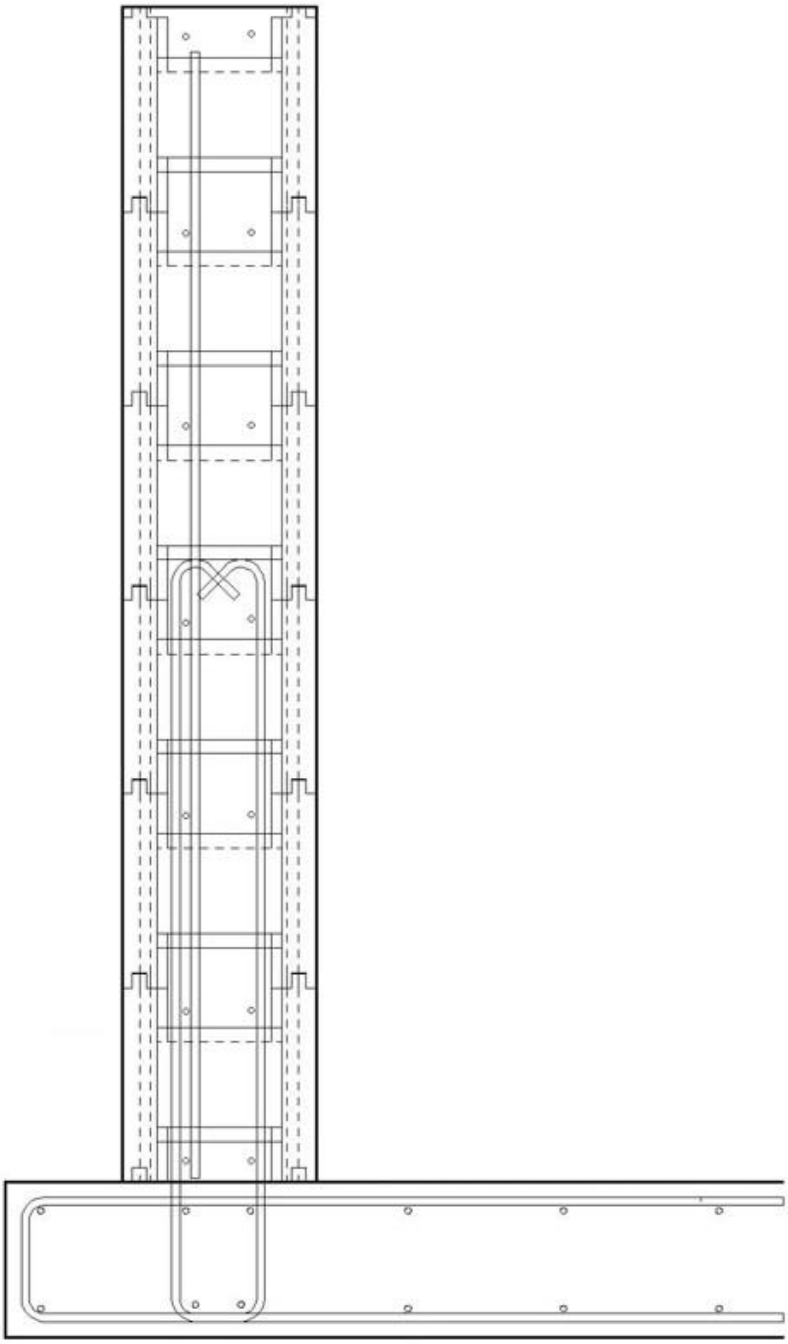


Figure 49: Wall to base plate connection – schematic example

Annex 3 - Installation

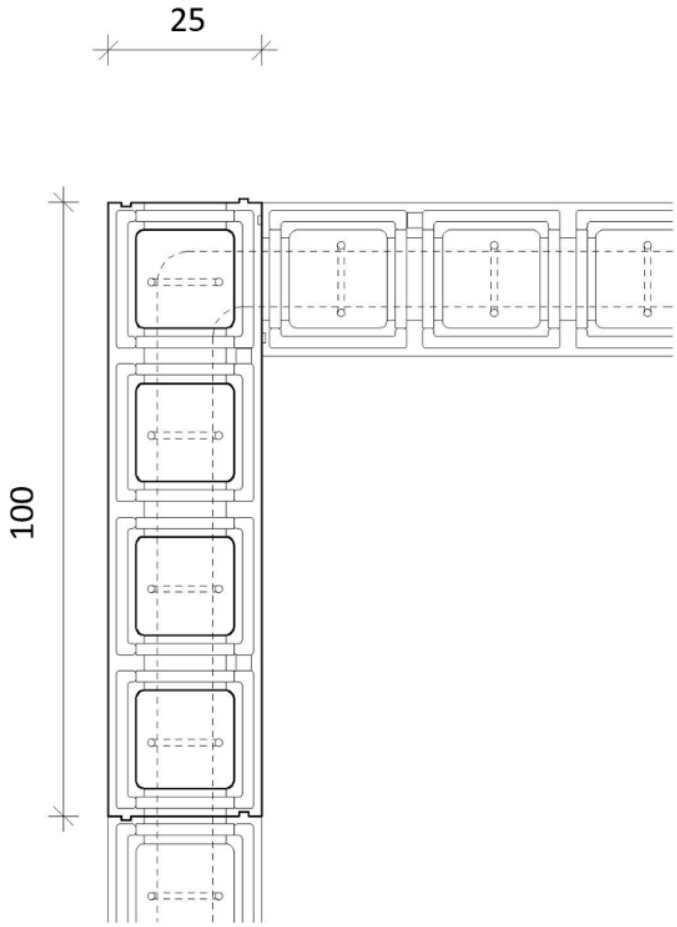


Figure 50: Corner Connection - schematic example

Dimensions in cm

Installation procedure

Procedure to be applied
in absence of standards and regulations in force at the place of use.

1. General

   a) Only skilled personnel who have received appropriate instructions may be employed for installing the IGLU 2000, IGLU Kombi, POWER-S, KWAD, POLY-LINE, PARTNER STONE, and PARTNER STONE MASSIV, and for conveying and placing the concrete.

   The safety-at-work and health protection regulations shall be observed throughout the whole construction process.

   b) An assembly plan shall be prepared for every structure, indicating the individual shuttering block to be used in the various parts of the works. The assembly plan shall be available on the construction site.

   c) In case the manufacturer's installation guide comprises other specifications than the ETA, the specifications of the ETA shall be applied.

   d) The shuttering kit shall be handled and stored with care, protected from accidental damage and dirt. Storage for a long period of time on site needs preventive measures to avoid any damage, e.g.
   - Hollow blocks shall be tied down to resist higher wind speeds.
   - Hollow blocks shall be covered to avoid deterioration by UV-radiation.

2. Preparation of the construction site

   a) The base plate on which the shuttering will be assembled shall be swept clean. Frost resistance, structural requirements and any moisture proofing required shall be taken into consideration in accordance with the applicable standards and regulations.

   b) On the base plate, the location of the walls and openings shall be marked with chalk lines or taut cords and checked by measuring the diagonals as per assembly plan.

   c) The altitude of the base plate in the area of the walls shall be measured. Any deviations from the horizontal shall be carefully levelled out with suitable means (such as wooden shims or PU foam). The first course of hollow blocks can also be embedded in cement mortar or fastened with PU foam to avoid shifts.

3. Installation of the hollow blocks

   a) General

   The hollow blocks of the shuttering kit are designed to result in a load bearing concrete core, a concrete wall that is only penetrated by webs, located at regular intervals.

   b) Hollow blocks

   The weather conditions shall be taken into consideration during assembly and concreting. In particular this applies to higher wind speeds.

   When laying the first course, work shall start at the corner. To stabilize the first course, it is advisable to fix a temporary guide board on the base plate. The hollow blocks of the next course shall overlap the hollow blocks of the previous course, i.e. the vertical joints shall be staggered. However, the webs shall be placed one upon the other to maintain the load bearing concrete core and avoid to favour segregation of the concrete.

After reaching full height, boards shall be fixed vertically to the shuttering with 2 to 3 screws at intervals of 1.2 m to 1.5 m. Diagonal bracing shall be attached to the boards to maintain vertical alignment

After assembly is completed, any open joints between hollows blocks and base plate shall be sealed with e.g. PU foam.

The manufacturer's installation instructions shall be followed.

c) Reinforcement

The reinforcement is installed according to the design of the structure. The detailing of the reinforcement shall be observed.

If more than one reinforcement bar is used for vertical reinforcement, all bars should be connected to a reinforcing cage, e.g. by means of welded-on or tied-on crossbars.

The minimum and maximum distances between reinforcing bars should conform to EN 1992-series and the relevant standards and regulations in force at the place of use.

Spacers with a thickness of at least 2 cm shall be fixed to ensure the required concrete cover of the reinforcements. Standards and regulations on the concrete cover in force at the place of use shall be observed.

Vertical reinforcement shall be installed in the shuttering elements before insertion of the horizontal reinforcements.

Special care is required when inserting the reinforcement steel to avoid damaging the webs of expanded polystyrene EPS.

The reinforcement of the walls shall provide ways for the concrete to be placed, which are free from reinforcing steel and other installations. They shall permit filling devices to be driven down to the bottom layer of the reinforcement.

Before concreting, the shuttering of all walls of the storey is to be checked for vertical and flush alignment before clearance is given.

4. Concreting

a) Concrete

Concrete quality shall be according to the design of the structure.

- The concrete strength class should be at least C20/25 XC2
- Flow class at least F4
- Maximum aggregate size 8 to 16 mm

Wherever possible, concrete shall be purchased under an approved certification scheme where there is continuous inspection and testing according to the standards and regulations in force at the place of use. Ready-mix concrete shall be inspected according to EN 206, Annex C.

Weather conditions shall be considered in selecting the concrete. Until freeze stability, i.e., compressive strength of 5.0 N/mm^2, is reached, concrete temperatures below + 5 °C shall be avoided.

Filling the hollow blocks with self-compacting concrete of consistence exceeding F4 according to EN 206 and maximum aggregate size of 8 using a pump is also possible. The inside diameter of the hose end should be 100 mm maximum.

b) Placing of concrete

The filling of the hollow blocks should be preferably done by hand.
Crooked hollow blocks require each course to be concreted individually.
The walls are to be concreted continuously in several cycles without interruption up to the height of the wall. The maximum filling height corresponds with the maximum filling rate of 0.75 m per hour. Concrete cones are to be avoided by small distances between the filling points.

Segregation of the concrete during placing shall be avoided. In the case of free falling heights in excess of 1.5 m filling pipes or concrete hoses (max. diameter of 100 mm) are to be used, driven down just above the point of placing. Ways for placing the concrete shall be provided for in reinforced walls.

Special care is required to avoid damaging the web, in particular the web of expanded polystyrene EPS during concreting and manually compacting the fresh concrete.

c) Construction joints

Walls should be concreted in layers without longer interruptions that would allow for hardening of the previously placed concrete layer to a degree preventing adequate bonding of the layers. Generally, design of the wall and its reinforcement is based on a standard wall section. In case of a very long wall, temperature changes and shrinkage of concrete can have adverse effects. If the length of the wall exceeds 10 m, thermal stresses in wall and base plate are considered. Temperature difference, e.g. during winter and summer, will cause both contractions and lengthening that can together with shrinkage result in cracking.

It is therefore recommended to construct the works in sections and include joints or to provide horizontal reinforcement. The horizontal reinforcement should be designed considering the climatic conditions at the place of use.

d) Tolerances

The concreted walls shall not deviate from vertical by more than 8 mm over a wall height of 3 m. Tolerances shall be according to relevant standards and regulations in force at the place of use.

5. Finishing

Concrete residues, laitance, and fines of the concrete are to be removed from the surface as soon as possible. Immediately after the concrete has sufficiently hardened, all the surfaces of the shuttering shall be finished with suitable materials or cladding in accordance with standards and regulations in force at the place of use. Cladding or its substructure shall be fixed in the concrete core.

The bracings are removed only after the prescribed stripping times when the wall concrete has sufficiently hardened.

The finish shall be applied shortly after final installation of the walls with IGLU 2000, IGLU Kombi, POWER-S, KWAD, POLY-LINE, PARTNER STONE, and PARTNER STONE MASSIV shuttering kit to avoid detrimental effects in particular by UV-radiation and weather.

6. Demand of further information

For all additional requirements or work that do not relate to the construction of the wall or are not included in this ETA, advice from professionals must be sought.

Reference documents

ETAG 009 (06.2002)	Guideline for European technical approval of non-load-bearing permanent shuttering kits/Systems based on hollow blocks or panels of insulating materials or concrete
EN 1992-series, Eurocode 2	Eurocode 2: Design of concrete structures
EN 206 (11.2013) + A1 (11.2016)	Concrete. Specification, performance, production and conformity
EN 13163 (11.2012) + A2 (11.2016)	Thermal insulation products for buildings - Factory made expanded polystyrene (EPS) products — Specification
EN 13501-1 (12.2018)	Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests
EN 15498 (04.2008)	Precast concrete products - Wood-chip concrete shuttering blocks — Product properties and performance
EN ISO 10456 (12.2007) +AC (12.2009)	Building materials and products - Hygrothermal properties - Tabulated design values and procedures for determining declared and design thermal values
98/279/EC	Commission Decision of 5 December 1997 on the procedure for attesting the conformity of construction products pursuant to Article 20 (2) of Council Directive 89/106/EEC as regards non-load-bearing permanent shuttering kits/systems based on hollow blocks or panels of insulating materials and, sometimes, concrete, Official Journal of the European Communities № L 127 of 29.4.1998, as amended by Commission Decision 2001/596/EC of 8 January 2001, Official Journal L 209, 2.8.2001, p. 33.
305/2011	Regulation (EU) № 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonized conditions for the marketing of construction products and repealing Council Directive 89/106/EEC, Official Journal of the European Communities № L 88 As amended by Commission Delegate Regulation (EU) No 568/2014 of 18 February 2014, Official Journal of the European Communities L 157, 27.05.2014, p. 76 and Delegated Regulation (EU) № 574/2014, as amended by 4.4.2011 Commission of 21 February 2014, Official Journal L 159, 28.05.2014, p. 41.
568/2014	Commission Delegated Regulation (EU) № 568/2014 of 18 February 2014 amending Annex V to Regulation (EU) № 305/2011 of the European Parliament and of the Council as regards the assessment and verification of the performance of construction products, Official Journal of the European Communities № L 157 of 27.5.2014, p. 76.
364/2016	Commission Delegated Regulation (EU) 2016/364 of 1 July 2015 on the classification of the reaction to fire performance of construction products pursuant to Regulation (EU) № 305/2011 of the European Parliament and of the Council, Official Journal of the European Union L 68, 15.3.2016, S. 4–11.