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European Assessment Document for

Permanent insulating shuttering kits for whole buildings

This European Assessment Document (EAD) has been developed taking into account up-to-date technical and scientific knowledge at the time of issue and is published in accordance with the relevant provisions of Regulation (EU) 305/2011 as a basis for the preparation and issuing of European Technical Assessments (ETA).

Contents

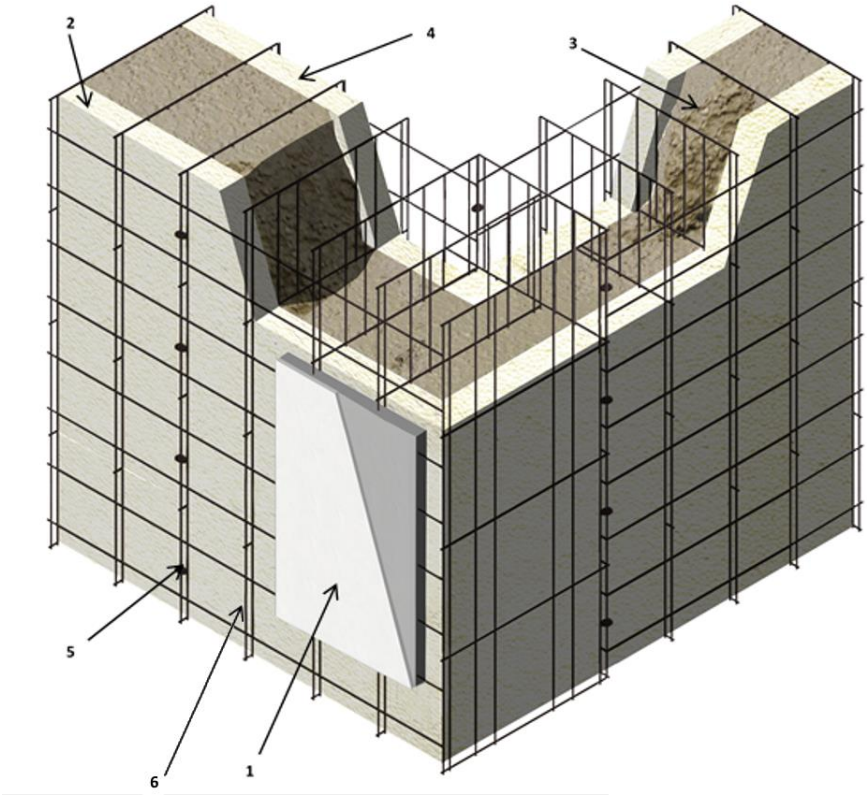
1 SCOPE OF THE EAD

1.1 Description of the construction product

This EAD covers permanent insulating shuttering kits for whole buildings (in the following named "shuttering kits"), composed of the following mandatory kit components:

- Steel wire modules of 3-dimensional network of steel wires, and steel rings to bind the steel wire modules together. The steel shall be uncoated or coated with an inorganic layer containing not more than 1 % by weight or volume (whichever is the lower) of homogeneously distributed organic material;
- Strips of appropriate dimensions, ready to be inserted in the steel wire modules, and resisting to filling pressure (see Table 2.1.1, Row 2). The dimensions, squareness and thermal properties of the strips shall be known.

An example of a shuttering kit, with ancillary external finishing (partially indicated) is given in Figure 1.1.1.



1. External finishings (example with rendering, partially indicated – not a kit component)
2. Strip on the outside
3. Concrete (reinforced or not – not a kit component)
4. Strip on the inside
5. Rings
6. Steel wire module

Figure 1.1.1 – Example of a shuttering kit

The assembled system comprises the following optional components (subject of assessments, if used):

- Additional strips or thermal insulation may be added on floor slabs or on the steel wire modules, e.g., in order to increase the thermal resistance.

The assembled system comprises the following ancillary components (optional components necessary for assessment methods to be included, but not subject of assessment):

- Concrete (reinforced or not);
- Exterior finishings (claddings, rendering systems or finishing walls, roofing systems);
- Interior finishings (rendering systems, floorings, ceilings);
- Ancillaries to fix walls, windows and doors.

1.1.1 The steel wire modules

The steel wire module is the frame of the shuttering, keeps the strips together and defines the dimensions and the composition of the wall, roof or floor. Each steel wire module consists of a 3D frame of wires, with a wire diameter of 1,5 mm to 5 mm, made of galvanised or stainless steel. The wires are welded together in several directions, in order to obtain a succession of wires in vertical and horizontal way, parallel as well as perpendicular to the wall, roof or floor face.

Rings of the same steel wire, with a wire diameter of 1,5 mm to 5 mm, bind the steel wire modules together.

The steel wire module consists of 2D meshes which are affixed to wires in the third dimension, thus creating a 3D frame of which the spacing is compatible with the dimension of the strips and ancillary products. An example of a 2D wire mesh is given in Annex A, Figure A.1 and of a 3D frame in Figure 1.1.1. Examples of its' application as walls, floors and roofs are given in Annex A, Figure A.2 through Figure A.6.

The steel wire modules provide the possibility to use strips of different thickness, and offer voids to be filled with concrete (reinforced or nod) of different thickness.

The steel wire modules are not considered as concrete reinforcement.

1.1.2 Strips

The purpose of the strips is temporary support of the liquid concrete (shuttering), permanent support of the rendering (external and internal) and, possibly, thermal insulation.

The strips can be made of :

- thermal insulating materials such as expanded polystyrene (EPS) according to EN 13163 [1], phenolic foam (PF) according to EN 13166, mineral wool (MW) according to EN 13162, cellular glass (CG) according to EN 13167, rigid polyurethane foam (PU) according to EN 13165 and extruded polystyrene (XPS) according to EN 13164;
- other materials such as fibre cement board (FCB) according to EN 12467 and wood-based panel (HDF) according to EN 13986.

The product is not covered by a harmonised European standard (hEN) and is not covered by EAD 340309-00-0305 because of the discontinuous nature of the shuttering leaf, materials used and spacers traversing the shuttering leaf and as the kit foresees applications for walls, floors and roofs. Nevertheless, some of the assessment methods of EAD 340309-00-0305 can be applied also for the shuttering kits covered by this EAD.

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 the transport, storage, maintenance, replacement and repair of the product as he considers necessary.

[1] All undated references to standards in this EAD are to be understood as references to the dated versions listed in chapter 4.

It is assumed that the product will be installed according to the manufacturer's instructions or (in absence of such instructions) according to the usual practice of the building professionals.

Relevant manufacturer's stipulations, e.g., with regard to the intended end use conditions, having influence on the performance of the product covered by this European Assessment Document shall be considered for the determination of the performance and detailed in the ETA as long as the details of the assessment methods as laid down in this EAD are respected.

1.2 Information on the intended use(s) of the construction product

1.2.1 Intended use(s)

This EAD covers shuttering kits to be used for whole building elements such as walls (including basement walls), floors, roofs and their liaisons.

Shuttering kits are to be filled in on site with concrete (reinforced or not) resulting a continuous monolithic concrete system.

The stability of the building elements (assembled systems) will depend entirely on the concrete structure that is designed using the shuttering kit.

The assembled system on site is intended to be used as internal and external load bearing or non-load bearing walls (straight or curved), floors or roofs (inclined or not), for residential, commercial and industrial buildings and low- and high-rise buildings.

For the overall design a particular building is split up into modules along the width, taking into account all the particularities of the individual project such as doors and windows, concrete reinforcements, etc.

The steel wire modules:

- May be cut to appropriate dimensions;
- Be provided with openings cut within the steel wire modules, adopting any form;
- Curved to form curved planes;
- Assembled under vertical and horizontal angles.

Steel wire modules are put together on site following a sequence adapted to the optimal filling procedure and using liaisons and instruments, and the appropriate temporary scaffolding (Annex A, Figure A.2).

Concrete is poured in, according to the Manufacturer's Product Installation Instructions (MPII), or in the absence of such instructions according to the usual practice of the building professionals, after having included all necessary strips and local or general reinforcements. Outer and inner finishings are applied to the surfaces.

Pipes and ducts may be installed within the steel wire modules before pouring the concrete, or afterwards within the insulating layers.

An example of the construction of a wall, floor and roof is shown in Annex A, Figure A.2 through Figure A.6.

1.2.2 Working life / durability

The assessment methods included or referred to in this EAD have been written based on the manufacturer's request to take into account a working life of the shuttering kit for the intended use of 50 years when installed in the works (provided that the shuttering kit is subject to appropriate installation (see 1.1)). These provisions are based upon the current state of the art and the available knowledge and experience.

When assessing the product, the intended use as foreseen by the manufacturer shall be taken into account. The real working life may be, in normal use conditions, considerably longer without major degradation affecting the basic requirements for works[2].

The indications given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer or his representative nor by EOTA when drafting this EAD nor by the Technical Assessment Body issuing an ETA based on this EAD, but are regarded only as a means for expressing the expected economically reasonable working life of the product.

1.3 Specific terms used in this EAD

1.3.1 Load-bearing (structural) walls

Walls which ensure the stability of a structure by transferring vertical loads (generally applied from a floor or a roof) and/or horizontal loads applied in the wall plane by a floor or a roof, and possibly lateral loads.

1.3.2 Non load-bearing (non-structural) walls

Walls which do not ensure the stability of a structure but which transfer to this structure their own weight (self-bearing wall) and, possibly, wind-loading perpendicular to their plane.

1.3.3 Internal walls

Structural or non-structural walls intended to separate identical or different internal environments; partition walls are internal walls.

1.3.4 External walls

Structural or non-structural walls which are intended to separate an internal environment from a changing external environment; external walls, also known as “façade walls” have to protect the internal environment from weather effects.

2 The real working life of a product incorporated in a specific works depends on the environmental conditions to which that works is subject, as well as on the particular conditions of the 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 referred to above.

2 ESSENTIAL CHARACTERISTICS AND RELEVANT ASSESSMENT METHODS AND CRITERIA

2.1 Essential characteristics of the product

Table 2.1.1 shows how the performance of the shuttering kit is assessed in relation to the essential characteristics.

Table 2.1.1 Essential characteristics of the product and methods and criteria for assessing the performance of the product in relation to those essential characteristics

No	Essential characteristic	Assessment method	Type of expression of product performance
Basic Works Requirement 1: Mechanical resistance and stability			
1	Resulting structural pattern	EAD 340309-00-0305 clause 2.2.1	Description
2	Efficiency of filling	EAD 340309-00-0305 clause 2.2.2	Description
3	Possibility of steel reinforcement	EAD 340309-00-0305 clause 2.2.3	Description
Basic Works Requirement 2: Safety in case of fire			
4	Reaction to fire	2.2.1	Class
5	Influence of the shuttering kit on the fire resistance	EAD 340309-00-0305 clause 2.2.5	Class
Basic Works Requirement 3: Hygiene, health and the environment			
6	Content, emission and/or release of dangerous substances	EAD 340309-00-0305 clause 2.2.6	Description
7	Water vapour permeability	EAD 340309-00-0305 clause 2.2.7	Level
8	Water absorption	EAD 340309-00-0305 clause 2.2.8	Level
9	Water tightness	EAD 340309-00-0305 clause 2.2.9	Description
Basic Works Requirement 4: Safety and accessibility in use			
10	Bond strength	EAD 340309-00-0305 clause 2.2.10	Description
11	Resistance to impact load	EAD 340309-00-0305 clause 2.2.11	Description
12	Resistance to filling pressure	2.2.2	Level and description
13	Safety to personal injuries	EAD 340309-00-0305 clause 2.2.13	Description
Basic Works Requirement 5: Protection against noise			
14	Airborne sound insulation	EAD 340309-00-0305 clause 2.2.14	Level
15	Sound absorption	EAD 340309-00-0305 clause 2.2.15	Level
Basic Works Requirement 6: Energy economy and heat retention			
16	Thermal resistance	EAD 340309-00-0305 clause 2.2.16	Level
17	Thermal inertia	EAD 340309-00-0305 clause 2.2.17	Level
Aspects of durability			
18	Resistance to deterioration	2.2.3	Description

2.2 Methods and criteria for assessing the performance of the product in relation to essential characteristics of the product

This chapter is intended to provide instructions for TABs. Therefore, the use of wordings such as “shall be stated in the ETA” or “it has to be given in the ETA” shall be understood only as such instructions for TABs on how results of assessments shall be presented in the ETA. Such wordings do not impose any obligations for the manufacturer, and the TAB shall not carry out the assessment of the performance in relation to a given essential characteristic when the manufacturer does not wish to declare this performance in the Declaration of Performance.

If for any components covered by harmonised standards or European Technical Assessments the manufacturer of the component has included the performance regarding the relevant essential characteristic in the Declaration of Performance, retesting of that component for issuing the ETA under the current EAD is not required.

2.2.1 Reaction to fire

2.2.1.1 Strips

The strips shall be assessed, using the method(s) relevant for the corresponding reaction to fire class according to EN 13501-1. The strips shall be classified according to the Commission Delegated Regulation (EU) No 2016/364 in connection with EN 13501-1.

The following mounting and fixing rules for testing in accordance with EN 13823 shall be observed:

- For strips of thermal insulating materials such as expanded polystyrene (EPS) according to EN 13163, phenolic foam (PF) according to EN 13166, mineral wool (MW) according to EN 13162, cellular glass (CG) according to EN 13167, rigid polyurethane foam (PU) according to EN 13165 and extruded polystyrene (XPS) according to EN 13164:
    - The test specimen shall be mounted on a calcium silicate (preferred method), fibre-cement or laminated gypsum board;
    - The test specimen shall be mounted in the test apparatus without an air gap between the product and substrate, nor between the substrate and backing board;
    - The mounting and fixing rules given in EN 15715 shall be observed
- For strips of fibre cement board (FCB) according to EN 12467, not containing 1 % or less organic substances by mass and volume:
    - The test specimen shall be mounted on a calcium silicate (preferred method), fibre-cement or laminated gypsum board;
    - The test specimen shall be mounted in the test apparatus without an air gap between the product and substrate, nor between the substrate and backing board;
    - The mounting and fixing rules given in EN 12467 shall be observed
- For wood-based panel (HDF) according to EN 13986:
    - The test specimen shall be mounted on a calcium silicate (preferred method), fibre-cement or laminated gypsum board;
    - The test specimen shall be mounted in the test apparatus without an air gap between the product and substrate, nor between the substrate and backing board;
    - The mounting and fixing rules given in EN 13986 shall be observed

Strips of fibre cement board (FCB) according to EN 12467, containing 1 % or less organic substances by mass or volume, whichever is more onerous, are considered to satisfy the requirements for performance class A1 of the reaction-to-fire performance in accordance with Commission Decision 96/603/EC, amended by Commission Decision 2000/605/EC and Commission Decision 2003/424/EC without the need for testing on the basis of it fulfilling the conditions set out in that Decision and its intended use being covered by that Decision.

Therefore, the performance of the strips of fibre cement board (FCB) according to EN 12467, containing 1 % or less organic substances by mass or volume, whichever is more onerous, is A1.

2.2.1.2 Steel wire modules

The steel wire modules are considered to satisfy the requirements of class A1 of the reaction-to-fire performance in accordance with Commission Decision 96/603/EC, amended by Commission Decision 2000/605/EC and Commission Decision 2003/424/EC without the need for testing on the basis of it fulfilling the conditions set out in that Decision and its intended use being covered by that Decision.

Therefore, the performance of the steel wire modules is A1.

2.2.2 Resistance to filling pressure

Purpose of the assessment:

The objective of this assessment method is to determine the performance of the shuttering walls under extreme concreting conditions.

Both of the following characteristics shall be determined:

- The maximum deformation of the shuttering leaves;
- The maximum concrete pressure before which failure of the shuttering occurs.

Failure of the shuttering may occur due to:

- inadequate tensile strength of steel wire traversing the wall being poured;
- inadequate weld strength of the wire traversing the wall being poured and the wires in the wall face;
- inadequate flexural strength of shuttering leaf;
- pull-through of the wires retaining the shuttering leaf;
- failure of connection between spacers and shuttering leaf.

This failure, when it occurs, is induced by the pressure exerted by the concrete being poured, which is related to the wall height, consistency of concrete and filling rate as defined in the MPII, or in the absence of such instructions according to the usual practice of the building professionals.

Two types of assessment can be used:

- filling test of the complete wall (2.2.2.1);
- calculation assisted by testing (2.2.2.2).

The filling test of the complete wall shall be carried out on a trial structure under the most extreme filling conditions (see clause 2.2.2.1); in addition, the assessment can be repeated for additional structures.

All specimen of the filling test of the complete wall shall be verified through the calculation assisted by testing (see clause 2.2.2.2); in addition, the assessment can be repeated for other steel wire modules and strips, facilitating the extrapolation of results from the filling test of the complete wall for less extreme concreting conditions.

2.2.2.1 Filling test of the complete wall

Assessment method:

This assessment is intended to determine the maximum deformation of the shuttering leaves by pouring of complete shuttering walls with concrete.

Filling test of a trial shuttering wall shall be performed according to the MPII, under the most extreme filling conditions (lowest thickness of shuttering leaves, lowest thickness of concrete core, lowest maximum aggregate site D_{max}, highest fluidity of concrete, highest speed of filling…) under which no failure occurs.

The results can apply for thicker shuttering leaves, thicker concrete core, larger maximum aggregate site D_{max}, less fluid concrete and lower speed of filling. If failure occurs, its' nature shall be recorded and related to the enumeration of failure modes provided in clause 2.2.2 and whereby these results shall not be extrapolated to other filling conditions.

If the manufacturer's installation instructions allow the possibility to use a range of consistency class, the highest end of the range (most fluid concrete) shall be used for the resistance to filling assessment, as it exerts the highest filling pressure.

The following wall dimensions shall be used: overall height shall be 2,8 m ± 0,10 m, overall length shall be 2,4 m ± 0,10 m, overall wall thickness shall be the minimum wall thickness. Additional dimensions can be assessed, taking into account the modularity of height, length and thickness of the kit, the possibility to use rebar, the additional use as ceiling or roof, corner or ridge details, the possibility of use of additional strips and insulation.

Measurement of displacements shall be performed by measuring the distance perpendicular to the shuttering surface to an unaffected reference plane parallel to the shuttering surface, with an accuracy of 1 mm or better, before and after the pour. The unaffected reference plane parallel to the shuttering surface can be materialized by a laser projector.

Expression of results:

The ETA shall state the following information, recorded during and after assessment:

- propping system (if relevant);
- thickness of shuttering leaves;
- thickness of concrete core;
- wall height;
- wall length;
- composition of concrete, according to EN 206 Clause 5.4.2, including compressive strength grade, environmental class, type of cement, water/cement ratio, maximum aggregate site D_{max};
- consistency of concrete, according to EN 206 Clause 5.4.1;
- filling rate, expressed in m/min;
- description of compacting method used;
- maximum deformation of the shuttering wall, by means of detailed drawings (views, horizontal and vertical sections) indicating changes in appearance and displacements before and after pouring. Measuring of displacements shall occur at least:
    - vertically: at the base, half height and top of the wall and, if propping is used, where propping is attached to the shuttering and halfway in-between two adjacent propping attachments;
    - horizontally: at the ends, in the middle of the wall and, if propping is used, where propping is attached to the shuttering and halfway in-between two adjacent propping attachments;
    - on both faces of the shuttering;
    - any point where a loss of fines or damage of the shuttering is observed resulting from the pouring, as related to the enumeration of failure modes provided in clause 2.2.2.

2.2.2.2 Calculation assisted by testing

Assessment method:

To assess the strength of the components of the 3-dimensional steel wire modules, the following assessments apply:

- The tensile strength of the wire traversing the wall being poured shall be assessed according to EN ISO 6892-1 (using to method A1, A2 or B, all giving comparable results, the reference method being method B: testing rate based on stress rate) on 5 specimens. The ETA shall state the arithmetic mean tensile strength R_m.
- The weld shear force of the welded fabric shall be assessed according to EN ISO 15630-2 Clause 7.1 on 5 specimens. The ETA shall state the arithmetic mean weld shear force F_s.

To assess the strength of the strips to be inserted in the 3-dimensional steel wire modules, the following assessments apply:

- The bending strength of strips of expanded polystyrene (EPS), phenolic foam (PF), mineral wool (MW), cellular glass (CG), rigid polyurethane foam (PU) and extruded polystyrene (XPS) shall be assessed according to EN 12089 method B on 3 specimens. The ETA shall state the arithmetic mean bending strength σ_b;

- The bending strength of strips of fibre cement board (FCB) shall be assessed according to EN 12467 Clause 5.4.4 on 10 specimens (5 specimen cut perpendicular and 5 specimens parallel to the manufacturing direction). The ETA shall state the arithmetic mean modulus of rupture MOR.
- The bending strength of strips of wood-based panel (HDF) shall be assessed according to EN 310, on 6 specimens taken according to EN 326-1. The ETA shall state the arithmetic mean bending strength f_m.

Expression of results:

The strength of the components (3-dimensional steel wire modules and the strips to be inserted in the 3-dimensional steel wire modules) shall be related to the filling pressure of concrete, derived from the filling height of concrete as determined according to Annex F of EN 15435. The ETA shall state the filling pressure of concrete.

The ETA shall state the maximum calculated load on the tensile strength of the wire traversing the wall being poured, related to the mean tensile strength $R_{m.}$

The ETA shall state the maximum calculated load on the welds within the 3-dimensional steel wire modules, related to the arithmetic mean weld shear force F_s.

The ETA shall state the maximum calculated deflection of the strips, for each type of strip.

2.2.3 Resistance to deterioration

2.2.3.1 Resistance to deterioration of finishes

Purpose of the assessment

Assessment of the resistance to deterioration of finishes applies to the outside of the strips of the shuttering. This assessment quantifies the visibility of the effects of cleaning, using cleaning and stain removal products.

Assessment method

The strips shall be assessed according to EN ISO 26987.

At least the following cleaning and stain removal products shall be used for the assessment:

- oxalic acid, saturated aqueous solutions
- denaturated alcohol, > 95 % ethanol

In addition, the assessment can be repeated for additional cleaning and stain removal products.

Expression of results

For each chemical agent, the assessment according to table 1 of EN ISO 26987 shall be stated in the ETA.

2.2.3.2 Resistance to deterioration of steel components

The resistance to deterioration of steel components is assessed related to the material and method of protection applied:

- for galvanization: assessment according to EN 10244-1 and EN 10244-2; the ETA shall state the coating mass according to EN 10244-1 and coating class according to EN 10244-2.
- for zinc coating or epoxy coating of the galvanized wires: assessment according to EN ISO 1463; the ETA shall state the arithmetic mean of measured thicknesses.
- for stainless steel: assessment according to EN 10088-1; the ETA shall state the steel designation by name and number.

3 ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE

3.1 System(s) of assessment and verification of constancy of performance to be applied

For the products covered by this EAD the applicable European legal act is Commission Decision 98/279/EC[3], as amended by Commission Decision 2001/596/EC[4] and Commission Delegated Regulation (EU) 2016/364[5]**.**

The applicable AVCP system is 2+ for any use except for uses subject to fire regulations in buildings.

For uses subject to fire regulations in buildings the applicable AVCP systems are 1, or 2+ depending on the conditions defined in the said Decision.

[3] OJ L 127, 29.4.1998, p. 26

[4] OJ L 209, 2.8.2001, p. 33

[5] OJ L 68, 15.3.2016, p. 4

3.2 Tasks of the manufacturer

The cornerstones of the actions to be undertaken by the manufacturer of the product in the procedure of assessment and verification of constancy of performance are laid down in Table 3.2.1.

The manufacturer (regarding the components he buys from the market with DoP) shall take into account the Declaration of Performance issued by the manufacturer of that component. No retesting is necessary.

Table 3.2.1: Control plan for the kit manufacturer; corner stones

N°	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control*
Factory production control (FPC) [including testing of samples taken at the factory in accordance with a prescribed test plan]					
1	Incoming materials	Check of documentation accompanying delivery, supplier certificates / report	As defined in Control Plan	As defined in Control Plan	Each delivery
2	Dimensions of the strips	Check of documentation accompanying delivery, supplier certificates / report	As defined in Control Plan	As defined in Control Plan	Each delivery
3	Density of the strips	Check of documentation accompanying delivery, supplier certificates / report	As defined in Control Plan	As defined in Control Plan	Each delivery
4	Compression behaviour of the strips	Check of documentation accompanying delivery, supplier certificates / report or EN ISO 29469	As defined in Control Plan	As defined in Control Plan	Each delivery
5	Bending behaviour of the strips For expanded polystyrene (EPS), phenolic foam (PF), mineral wool (MW), cellular glass (CG), rigid polyurethane foam (PU) and extruded polystyrene (XPS) strips	Check of documentation accompanying delivery, supplier certificates / report or EN 12089	As defined in Control Plan	As defined in Control Plan	Each delivery

N°	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control*
	For fibre cement strips	Check of documentation accompanying delivery, supplier certificates / report or EN 12467	As defined in Control Plan	As defined in Control Plan	Each delivery
	For wood-based panel strips	Check of documentation accompanying delivery, supplier certificates / report or EN 310	As defined in Control Plan	As defined in Control Plan	Each delivery
6	Thermal conductivity of the strips	Check of documentation accompanying delivery, supplier certificates / report	Check of conformity with purchase order	As defined in Control Plan	Each delivery
7	Welding strength of the steel wire modules	EN ISO 15630-2	As defined in Control Plan	1	After each 25.000 m² production, and at least once a year
8	Tensile strength of the wires	Check of documentation accompanying delivery, supplier certificates / report	Check of conformity with purchase order	-	Each delivery
9	Corrosion resistance of the wires and the welding	Check of documentation accompanying delivery, supplier certificates / report	Check of conformity with purchase order	-	Each delivery
10	Execution of the welding of the steel wire modules	Visual check	As defined in Control Plan	1	Once every delivery and at least once per 8 hours of production
* In case of discontinuous production these minimum frequencies should be adapted.					

3.3 Tasks of the notified body

The cornerstones of the actions to be undertaken by the notified body of the product in the procedure of assessment and verification of constancy of performance are laid down in Table 3.3.1.

Table 3.3.1: Control plan for the notified body; corner stones

No	Subject/type of control *(product, raw/constituent material, component - indicating characteristic concerned)*	Test or control method *(refer to 2.2 or 3.4)*	Criteria, if any	Minimum number of samples	Minimum frequency of control
Initial inspection of the manufacturing plant and of factory production control					
1	Notified Body will ascertain that the factory production control with the staff and equipment are suitable to ensure a continuous and orderly manufacturing of the shuttering kit.	Verification of the complete FPC as described in the control plan agreed between the TAB and the manufacturer	According to Control plan	According to Control plan	When starting the production or a new line
Continuous surveillance, assessment and evaluation of factory production control					
3	The Notified Body will ascertain that the system of factory production control and the specified manufacturing process are maintained taking account of the control plan.	Verification of the controls carried out by the manufacturer as described in the control plan agreed between the TAB and the manufacturer with reference to the raw materials, to the process and to the product as indicated in Table 3.2.1	According to Control plan	According to Control plan	n[number]/year

The intervention of the notified body under AVCP system 1 is only necessary for reaction to fire for products/materials for which a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification (e.g., an addition of fire retardants or a limiting of organic material).

In this case the cornerstones of the actions to be undertaken by the notified body under AVCP system 1 are laid down in Table 3.3.2

Table 3.3.2 Control plan for the notified body; cornerstones

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
Initial inspection of the manufacturing plant and of factory production control carried out by the manufacturer regarding the constancy of performance related to reaction to fire *(for system 1 only)*					
…	Where the intervention of the Notified Body is necessary only because the conditions for the applicability of system 1 are fulfilled for reaction to fire, the notified body will consider especially the clearly identifiable stage in the production process which results in an improvement of the reaction to fire classification (e.g., an addition of fire retardants or a limiting of organic material).	Verification of the complete FPC as described in the control plan agreed between the TAB and the manufacturer	As defined in the control plan agreed between the TAB and the manufacturer	As defined in the control plan agreed between the TAB and the manufacturer	When starting the production or a new line
Continuous surveillance, assessment and evaluation of factory production control carried out by the manufacturer regarding the constancy of performance related to reaction to fire *(for system 1 only)*					
…	Where the intervention of the Notified Body is necessary only because the conditions for the applicability of system 1 in the Decisions regarding reaction to fire are fulfilled, the notified body will consider especially the clearly identifiable stage in the production process which results in an improvement of the reaction to fire classification (e.g., an addition of fire retardants or a limiting of organic material)	Verification of the controls carried out by the manufacturer as described in the control plan agreed between the TAB and the manufacturer with reference to the raw materials, to the process and to the product as indicated in Table 3.2.1	As defined in the control plan agreed between the TAB and the manufacturer	As defined in the control plan agreed between the TAB and the manufacturer	1/year

4 REFERENCE DOCUMENTS

EAD 340309-00-0305	Non load-bearing permanent shuttering kits/systems based on hollow blocks or panels of insulating materials and sometimes concrete (January 2019)
EN 206:2013/A2:2021	Concrete - Specification, performance, production and conformity
EN 310:1993	Wood-based panels - Determination of modulus of elasticity in bending and of bending strength
EN 326-1:1994	Wood-based panels - Sampling, cutting and inspection - Part 1: Sampling and cutting of test pieces and expression of test results
EN 10088-1:2023	Stainless steels - Part 1: List of stainless steels
EN 10244-1:2009/AC:2011	Steel wire and wire products - Non-ferrous metallic coatings on steel wire - Part 1: General principles
EN 10244-2:2023	Steel wire and wire products - Non-ferrous metallic coatings on steel wire - Part 2: Zinc or zinc alloy coatings
EN 12089:2013	Thermal insulating products for building applications - Determination of bending behaviour
EN 12467:2012+A2:2018	Fibre-cement flat sheets - Product specification and test methods
EN 13162:2012+A1:2015	Thermal insulation products for buildings - Factory made mineral wool (MW) products - Specification
EN 13163:2012+A1:2015	Thermal insulation products for buildings - Factory made expanded polystyrene (EPS) products – Specification
EN 13164:2012+A1:2015	Thermal insulation products for buildings - Factory made extruded polystyrene foam (XPS) products - Specification
EN 13165:2012+A2:2016	Thermal insulation products for buildings - Factory made rigid polyurethane foam (PU) products - Specification
EN 13166:2012+A2:2016	Thermal insulation products for buildings – Factory made phenolic foam (PF) products – Specification
EN 13167:2012+A1:2015	Thermal insulation products for buildings - Factory made cellular glass (CG) products – Specification
EN 13823:2020+A1:2022	Reaction to fire tests for building products - Building products excluding floorings exposed to the thermal attack by a single burning item
EN 13986:2004+A1:2015	Wood-based panels for use in construction - Characteristics, evaluation of conformity and marking
EN 13501-1:2018	Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests
EN 13501-5:2016	Fire classification of construction products and building elements - Part 5: Classification using data from external fire exposure to roofs tests
EN 15435:2008	Precast concrete products - Normal weight and lightweight concrete shuttering blocks - Product properties and performance

EN 15715:2009	Thermal insulation products - Instructions for mounting and fixing for reaction to fire testing - Factory made products
EN ISO 1463:2021	Metallic and oxide coatings - Measurement of coating thickness - Microscopical method
EN ISO 6892-1:2019	Metallic materials - Tensile testing - Part 1: Method of test at room temperature
EN ISO 15630-2:2019	Steel for the reinforcement and prestressing of concrete -- Test methods -- Part 2: Welded fabric
EN ISO 26987:2012	Resilient floor coverings - Determination of staining and resistance to chemicals
EN ISO 29469:2022	Thermal insulating products for building applications - Determination of compression behaviour

ANNEX A: FIGURES

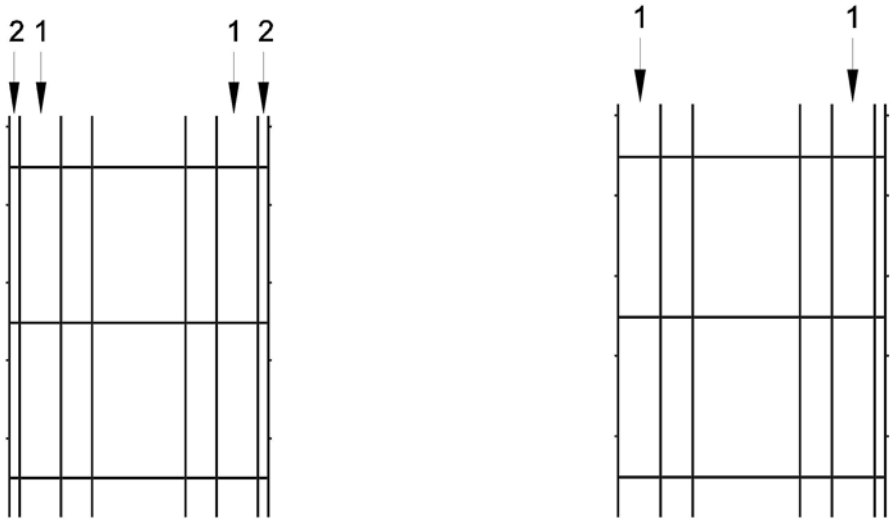


Figure A.1 – Examples of a vertical cross section of the steel wire module.
Key: 1 = position of insulation strips, 2 = position of FCB or HDF strips

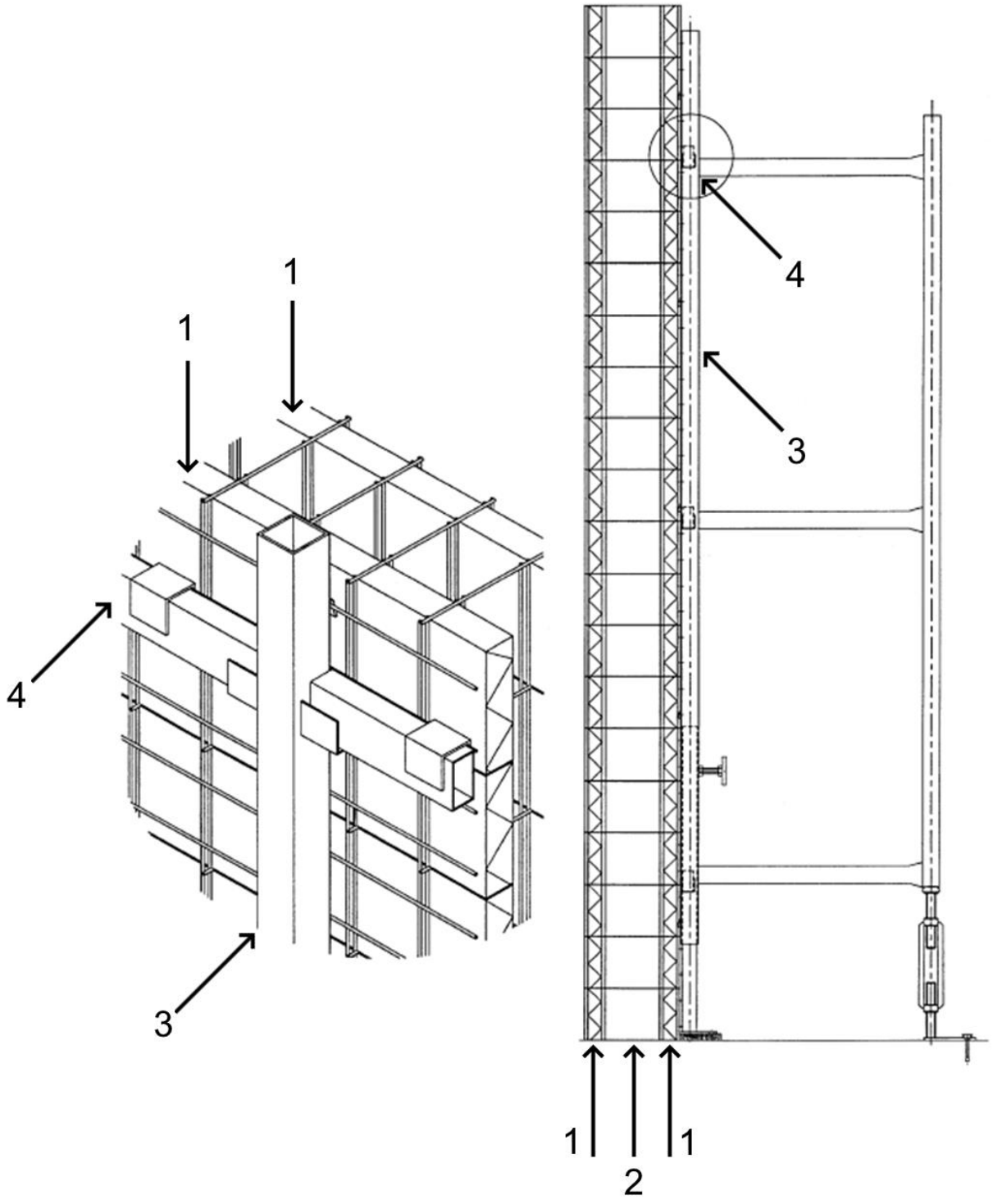


Figure A.2 – Example of a shuttering kit with temporary scaffolding

Key: 1 = insulation strips
2 = void for filling with concrete
3 = vertical propping or scaffolding member (not part of the kit)
4 = horizontal propping or scaffolding member (not part of the kit)

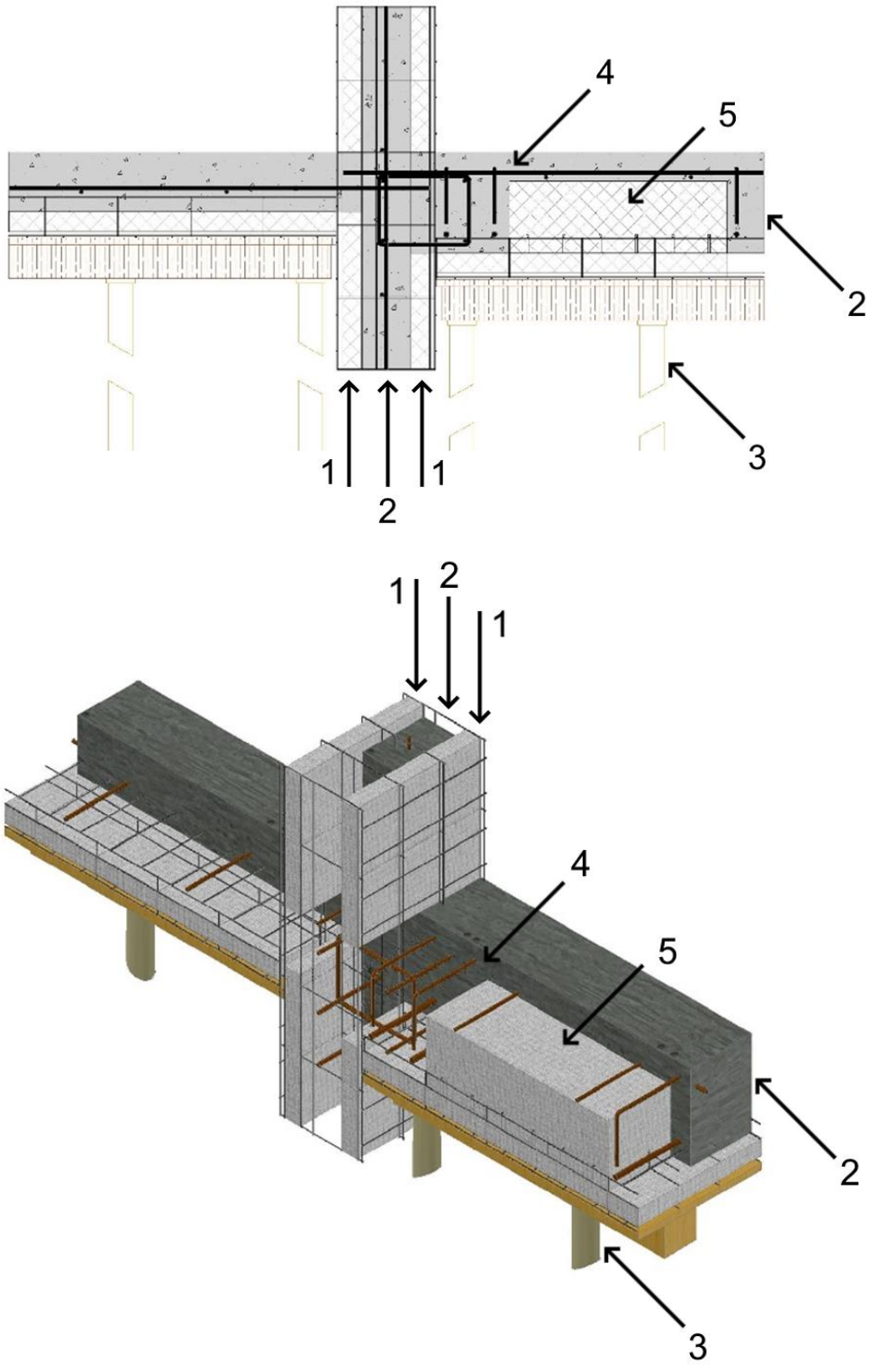


Figure A.3 – Example of a shuttering kit floor, including additional rebar

Key: 1 = insulation strips
2 = concrete (not part of the kit)
3 = scaffolding (not part of the kit)
4 = rebar (not part of the kit)
5 = additional insulation (optional component of the kit)

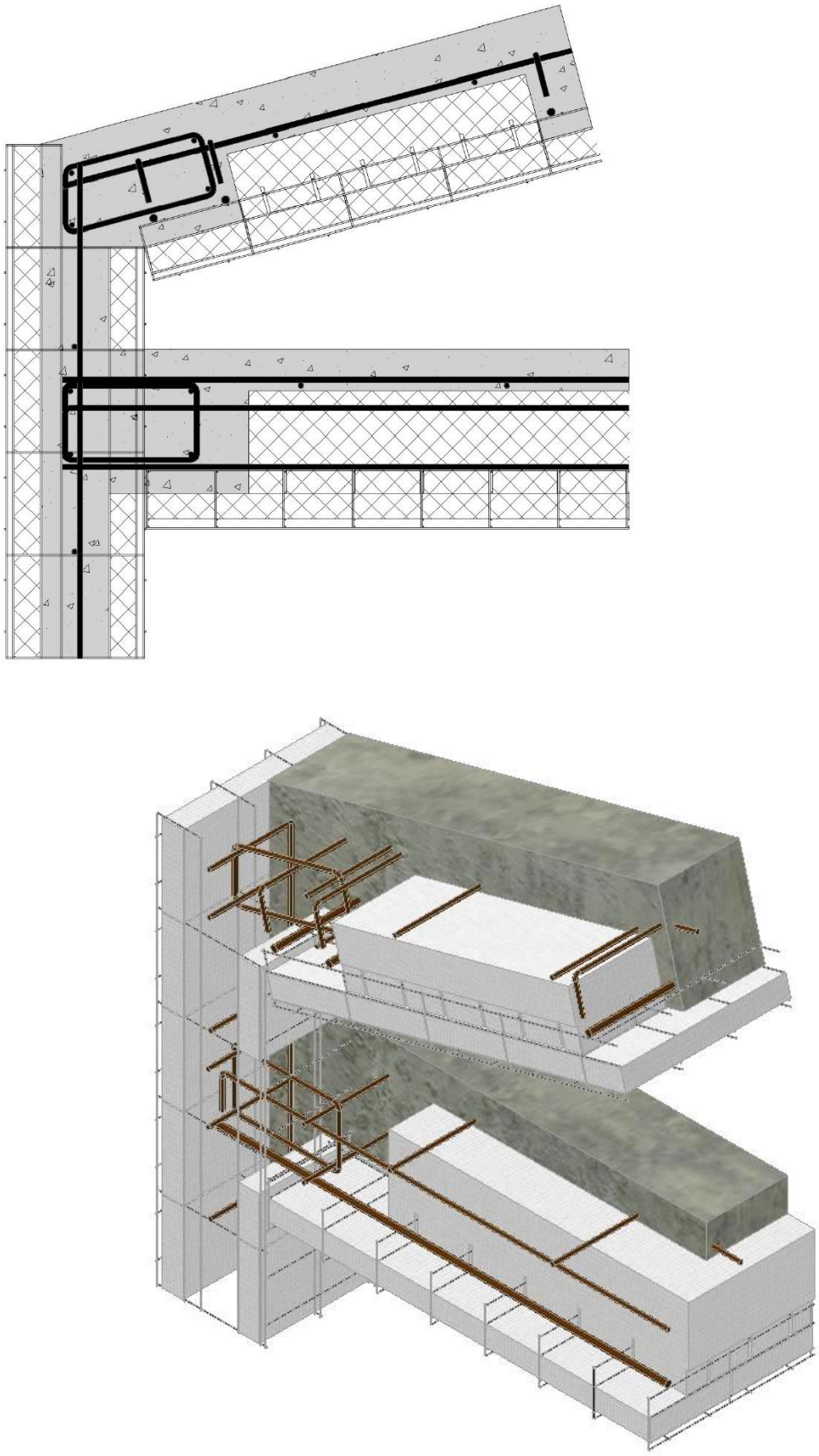


Figure A.4 – Example of a shuttering floor and roof, including additional rebar

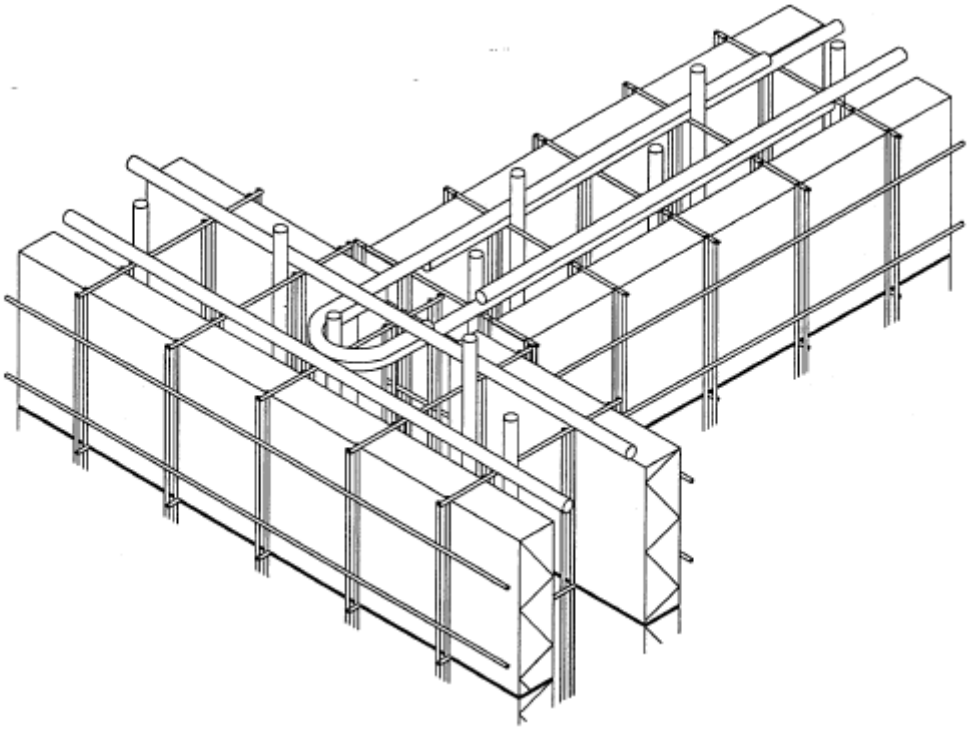


Figure A.5 – Example of a shuttering kit wall junction, with additional rebar

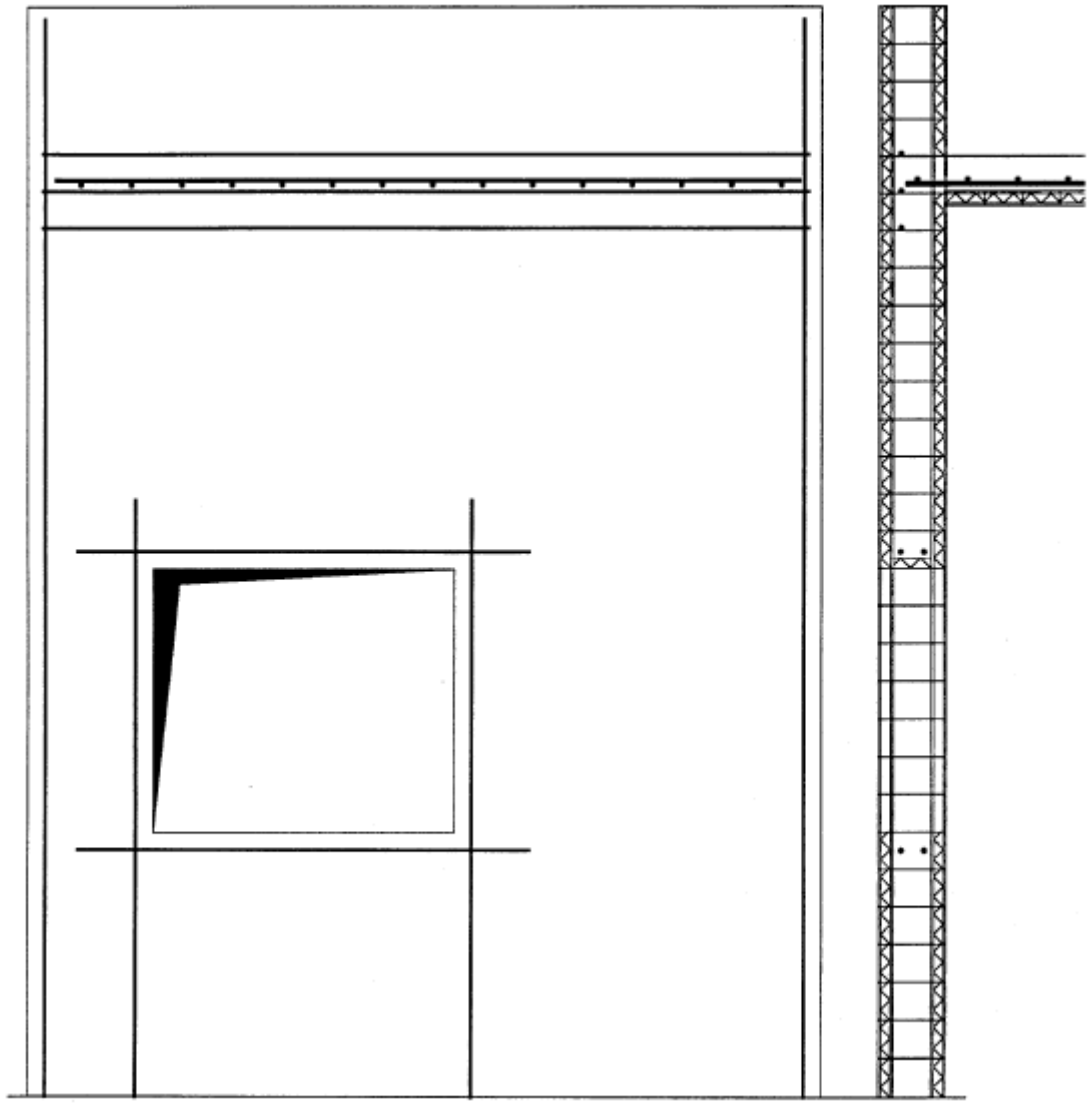


Figure A.6 – Example of a shuttering kit wall construction, with a cut-out for a window