

**EN 14891:2017**



**NBN EN 14891:2017**



**Liquid applied water impermeable products for use beneath ceramic tiling bonded with adhesives - Requirements, test methods, assessment and verification of constancy of performance, classification and marking**

Valid from 22-03-2017

Replaces NBN EN 14891:2012

Personal use : freddy.coninx@ikof.com  
37494 - bbri286132  
2017-10-10 16:19:35

ICS: 91.100.23, 91.100.25, 91.100.50

Personal use : freddy.coninx@iko.com  
37494 - bbri286132  
2017-10-10 16:19:35

EUROPEAN STANDARD

**EN 14891**

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 2017

ICS 91.100.23; 91.100.25; 91.100.50

Supersedes EN 14891:2012

English Version

**Liquid applied water impermeable products for use  
beneath ceramic tiling bonded with adhesives -  
Requirements, test methods, assessment and verification  
of constancy of performance, classification and marking**

Produits d'imperméabilisation appliqués en phase liquide utilisés sous carrelage collé - Spécifications, méthodes d'essai, évaluation et vérification de la constance de performance, classification et marquage

Flüssig zu verarbeitende wasserundurchlässige Produkte im Verbund mit keramischen Fliesen und Plattenbelägen - Anforderungen, Prüfverfahren, Bewertung und Überprüfung der Leistungsbeständigkeit, Klassifizierung und Bezeichnung

This European Standard was approved by CEN on 7 November 2016.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

## Contents

Page

European foreword.....	4
<b>1</b> <b>Scope</b> .....	<b>5</b>
<b>2</b> <b>Normative references</b> .....	<b>5</b>
<b>3</b> <b>Terms and definitions</b> .....	<b>6</b>
<b>4</b> <b>Product characteristics</b> .....	<b>7</b>
<b>4.1</b> <b>General</b> .....	<b>7</b>
<b>4.2</b> <b>Release of dangerous substances</b> .....	<b>7</b>
<b>5</b> <b>Testing, assessment and sampling methods</b> .....	<b>8</b>
<b>6</b> <b>Assessment and verification of constancy of performance (AVCP)</b> .....	<b>8</b>
<b>6.1</b> <b>General</b> .....	<b>8</b>
<b>6.2</b> <b>Type testing</b> .....	<b>8</b>
<b>6.2.1</b> <b>General</b> .....	<b>8</b>
<b>6.2.2</b> <b>Test samples, testing and compliance criteria</b> .....	<b>9</b>
<b>6.2.3</b> <b>Test reports</b> .....	<b>9</b>
<b>6.2.4</b> <b>Shared other party results</b> .....	<b>9</b>
<b>6.3</b> <b>Factory Production Control (FPC)</b> .....	<b>10</b>
<b>6.3.1</b> <b>General</b> .....	<b>10</b>
<b>6.3.2</b> <b>Requirements</b> .....	<b>10</b>
<b>6.3.3</b> <b>Product specific requirements</b> .....	<b>13</b>
<b>6.3.4</b> <b>Procedure for modifications</b> .....	<b>14</b>
<b>6.3.5</b> <b>One-off products, pre-production products (e.g. prototypes) and products produced in very low quantity</b> .....	<b>14</b>
<b>7</b> <b>Classification and designation</b> .....	<b>15</b>
<b>8</b> <b>Marking and labelling</b> .....	<b>16</b>
<b>Annex A (normative) Testing, assessment and sampling methods</b> .....	<b>18</b>
<b>A.1</b> <b>Sampling</b> .....	<b>18</b>
<b>A.2</b> <b>Test conditions</b> .....	<b>18</b>
<b>A.3</b> <b>Test materials</b> .....	<b>18</b>
<b>A.3.1</b> <b>General</b> .....	<b>18</b>
<b>A.3.2</b> <b>Ceramic tiles</b> .....	<b>18</b>
<b>A.3.3</b> <b>Test substrate</b> .....	<b>18</b>
<b>A.3.3.1</b> <b>Concrete slab</b> .....	<b>18</b>
<b>A.3.3.2</b> <b>Other substrates (optional)</b> .....	<b>18</b>
<b>A.3.4</b> <b>Ceramic tile adhesive</b> .....	<b>19</b>
<b>A.3.5</b> <b>Sodium hypochlorite</b> .....	<b>19</b>
<b>A.4</b> <b>Apparatus</b> .....	<b>19</b>
<b>A.4.1</b> <b>Weight (Mass)</b> .....	<b>19</b>

A.4.2	Pull head plates .....	19
A.4.3	Machine for pull testing.....	19
A.4.4	Air-circulating oven .....	19
A.4.5	Mould .....	19
A.4.6	Jig.....	21
A.4.7	Equipment for permeability test.....	22
A.4.8	Machine for tensile testing.....	23
A.5	Mixing of liquid-applied water impermeable products.....	23
A.6	Tensile adhesion tests.....	23
A.6.1	Preparation of test pieces.....	23
A.6.2	Initial tensile adhesion strength .....	24
A.6.3	Tensile adhesion strength after water contact.....	24
A.6.4	Alternative method for tensile adhesion strength after water contact .....	24
A.6.5	Tensile adhesion strength after heat ageing .....	25
A.6.6	Tensile adhesion strength after freeze-thaw cycle.....	25
A.6.7	Tensile adhesion strength after contact with chlorinated water.....	25
A.6.8	Alternative method for tensile adhesion strength after contact with chlorinated water .....	26
A.6.9	Tensile adhesion strength after contact with lime water .....	26
A.6.10	Evaluation and expression of the results.....	27
A.7	Water impermeability .....	27
A.8	Crack bridging ability.....	29
A.8.1	General.....	29
A.8.2	Crack bridging ability under standard conditions .....	30
A.8.3	Crack bridging ability at low temperature .....	30
A.9	Test report .....	30
<b>Annex ZA (informative) Relationship of this European Standard with Regulation (EU) No.305/2011 .....</b>		<b>32</b>
ZA.1	Scope and relevant characteristics .....	32
ZA.2	System of Assessment and Verification of Constancy of Performance (AVCP) .....	33
ZA.3	Assignment of AVCP tasks .....	33
<b>Bibliography .....</b>		<b>35</b>

**EN 14891:2017 (E)****European foreword**

This document (EN 14891:2017) has been prepared by Technical Committee CEN/TC 67 “Ceramic tiles”, the secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2017, and conflicting national standards shall be withdrawn at the latest by December 2018.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 14891:2012.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports basic requirements for construction works of Regulation No. 305/2011.

For relationship with this Regulation, see informative Annex ZA, which is an integral part of this document.

The significant technical changes between this European Standard and the previous edition are listed herewith:

- Clause 3.7 replacement of the term “Fundamental” with “Basic”;
- Clause 4, Tables 1;
- New Clause 5;
- New Clause 6 in accordance with CEN Guidance documents;
- New Annex ZA (informative) in accordance with the CPR (Regulation (EU) No. 305/2011) and the Commission Delegated Regulations (EU) No. 568/2014 relative to the assessment and verification of constancy of performance.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## 1 Scope

This European Standard applies to all liquid-applied water impermeable products, based on polymer modified cementitious mortars, dispersions and reaction resin coatings, used beneath ceramic tiling, for external tile installations on walls and floors and in swimming pools.

This European Standard gives the terminology concerning the products and specifies the test methods and the values of performance requirements for liquid-applied water impermeable products associated with tile adhesives.

This European Standard specifies the assessment and verification of constancy of performance, and the classification and marking of liquid-applied water impermeable products beneath ceramic tiling.

This European Standard does not contain recommendations for the design and installation of ceramic tiles and grouts in combination with water impermeable products.

NOTE Liquid-applied water impermeable products may also be used beneath other types of tiles (natural and agglomerated stones, etc.), where they do not adversely affect these materials.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 196-1:2016, *Methods of testing cement - Part 1: Determination of strength*

EN 197-1:2011, *Cement - Part 1: Composition, specifications and conformity criteria for common cements*

EN 480-1:2014, *Admixtures for concrete, mortar and grout - Test methods - Part 1: Reference concrete and reference mortar for testing*

EN 1008, *Mixing water for concrete - Specification for sampling, testing and assessing the suitability of water, including water recovered from processes in the concrete industry, as mixing water for concrete*

EN 1067, *Adhesives - Examination and preparation of samples for testing*

prEN 12004-1:2014, *Adhesives for tiles — Part 1: Requirements, evaluation of conformity, classification and designation*

EN 12004-2:2016, *Adhesives for tiles — Part 2: Test methods*

EN 12390-2, *Testing hardened concrete - Part 2: Making and curing specimens for strength tests*

EN 12620:2002+A1:2008, *Aggregates for concrete*

EN 14411:2016, *Ceramic tiles — Definitions, classification, characteristics, evaluation of conformity and marking*

EN ISO 15605, *Adhesives - Sampling (ISO 15605)*

**EN 14891:2017 (E)****3 Terms and definitions**

For the purposes of this document, the following terms and definitions apply.

**3.1****liquid-applied water impermeable product**

single- or multicomponent waterproofing material applied in a uniform layer, beneath ceramic tiling

Note 1 to entry: The water impermeable layer can include a reinforcing cloth or mesh.

**3.2****polymer modified cementitious liquid-applied water impermeable product****CM**

mixture of hydraulic binding agents, aggregates and organic additives that has only to be mixed with water or liquid admixture just before use

**3.3****dispersion liquid-applied water impermeable product****DM**

ready for use mixture of organic binding agent(s) in the form of an aqueous polymer dispersion, organic additives and mineral fillers

**3.4****reaction resin liquid-applied water impermeable product****RM**

one or more component mixture of synthetic resin, mineral fillers and organic additives in which hardening occurs by chemical reaction

**3.5****crack bridging ability**

ability of the hardened waterproofing material to withstand propagation of the cracks without deterioration

**3.6****primer**

liquid coating applied to the surface, prior to the application of a liquid product, to improve adhesion and durability of the bond

**3.7****basic characteristics**

characteristics that a liquid-applied water impermeable product absolutely has to have

**3.8****optional characteristics**

characteristics for specific service conditions where enhanced levels of performance are required or which provide further information about its general performance



## 4 Product characteristics

### 4.1 General

Characteristics of the liquid-applied water impermeable products shall comply with the requirements specified in Table 1, Section 1.a.

When needed for special service condition(s) of liquid-applied water impermeable products, its optional characteristics shall comply with the requirements specified in Table 1, Section 1.b.

The amount of water and/or liquid admixture required for preparing the cementitious liquid-applied water impermeable products shall be the same for all tests.

**Table 1 — Product requirements**

<b>1 a BASIC CHARACTERISTICS (CM - DM - RM)</b>		
<b>Characteristic</b>	<b>Requirement</b>	<b>Test method</b>
Initial tensile adhesion strength	$\geq 0,5 \text{ N/mm}^2$	A.6.2
Tensile adhesion strength after water contact	$\geq 0,5 \text{ N/mm}^2$	A.6.3 or A.6.4
Tensile adhesion strength after heat ageing	$\geq 0,5 \text{ N/mm}^2$	A.6.5
Tensile adhesion strength after freeze-thaw cycles	$\geq 0,5 \text{ N/mm}^2$	A.6.6
Tensile adhesion strength after contact with lime water	$\geq 0,5 \text{ N/mm}^2$	A.6.9
Waterproofing	No penetration and $\leq 20 \text{ g weight gain}$	A.7
Crack bridging ability under standard conditions	$\geq 0,75 \text{ mm}$	A.8.2
<b>1 b OPTIONAL CHARACTERISTICS</b>		
<b>Characteristic</b>	<b>Requirement</b>	<b>Test method</b>
Tensile adhesion strength after contact with chlorinated water (P)	$\geq 0,5 \text{ N/mm}^2$	A.6.7 or A.6.8
Crack bridging ability at low temperature (- 5°C) (O1)	$\geq 0,75 \text{ mm}$	A.8.3
Crack bridging ability at very low temperature (- 20°C) (O2)	$\geq 0,75 \text{ mm}$	A.8.3

### 4.2 Release of dangerous substances

Materials used in products shall not release any dangerous substances in excess of the maximum permitted levels specified in a relevant European Standard for the material or permitted in the national regulations of the member state of destination.

National regulations on dangerous substances may require verification and declaration on release, and sometimes content, when construction products covered by this standard are placed on those markets. In the absence of European harmonized test methods, verification and declaration on release/content should be done taking into account national provisions in the place of use.

NOTE An informative database covering European and national provisions on dangerous substances is available at the Construction website on EUROPA accessed through: <http://ec.europa.eu/growth/tools-databases/cp-ds/>

**EN 14891:2017 (E)****5 Testing, assessment and sampling methods**

Testing and assessment methods and requirements for sampling shall be as set out in Annex A.

**6 Assessment and verification of constancy of performance (AVCP)****6.1 General**

The compliance of liquid-applied water impermeable products with the requirements of this standard and with the performances declared by the manufacturer in the DoP shall be demonstrated by:

- determination of the product type on the base of type testing;
- factory production control by the manufacturer, including product assessment.

The manufacturer shall always retain the overall control and shall have the necessary means to take responsibility for the conformity of the product with its declared performances.

**6.2 Type testing****6.2.1 General**

All performances related to characteristics included in this standard shall be determined when the manufacturer intends to declare the respective performances unless the standard gives provisions for declaring them without performing tests (e.g. use of previously existing data, CWFT and conventionally accepted performance).

Assessment previously performed in accordance with the provisions of this standard, may be taken into account provided that they were made to the same or a more rigorous test method, under the same AVCP system on the same product or products of similar design, construction and functionality, such that the results are applicable to the product in question.

For the purposes of assessment, the liquid applied water impermeable products may be grouped into families, where it is considered that the results for one or more characteristics from any one product within the family are representative for the same characteristics for all products within that same family.

NOTE 1 Products are grouped in different families for different characteristics.

NOTE 2 The assessment method standards are chosen to allow the selection of a suitable representative sample.

In addition, the determination of the product type shall be performed for all characteristics included in the standard for which the manufacturer declares the performance:

- at the beginning of the production of a new liquid applied water impermeable product (unless a member of the same product range), or
- at the beginning of a new or modified method of production (where this may affect the stated properties), or
- they shall be repeated for the appropriate characteristic(s), whenever a change occurs in the product design, in the raw material or in the supplier of the components, or in the method of production (subject to the definition of a family), which would affect significantly one or more of the characteristics.

Where components (e.g. cement) are used whose characteristics have already been determined by the component supplier on the basis of conformity with other product standards, these characteristics need

not be re-assessed to demonstrate compliance with the European Standard. The specifications of these components shall be documented.

Products bearing regulatory marking in accordance with appropriate harmonized European specifications may be presumed to have the performances declared in the DoP, although this does not replace the responsibility on the liquid-applied water impermeable products manufacturer to ensure that liquid-applied water impermeable products as a whole is correctly manufactured and its component products have the declared performance values.

### 6.2.2 Test samples, testing and compliance criteria

The number of samples of liquid-applied water impermeable product and the testing method to be tested/assessed shall be in accordance with Annex A (A.6, A.7 and A.8) and Table 2.

**Table 2 — Number of samples to be tested and compliance criteria**

Characteristic	Requirement	Assessment method	No. of samples	Compliance criteria
Initial tensile adhesion strength	Clause 4	A.6	1	Table 1.a of Clause 4
Tensile adhesion strength after water contact	Clause 4	A.6	1	Table 1.a of Clause 4
Tensile adhesion strength after heat ageing	Clause 4	A.6	1	Table 1.a of Clause 4
Tensile adhesion strength after freeze-thaw cycles	Clause 4	A.6	1	Table 1.a of Clause 4
Tensile adhesion strength after contact with lime water	Clause 4	A.6	1	Table 1.a of Clause 4
Waterproofing	Clause 4	A.7	1	Table 1.a of Clause 4
Crack-bridging ability under standard conditions	Clause 4	A.8	1	Table 1.a of Clause 4
Tensile adhesion strength after contact with chlorinated water	Clause 4	A.6	1	Table 1.b of Clause 4
Crack-bridging ability at low temperature	Clause 4	A.8	1	Table 1.b of Clause 4

### 6.2.3 Test reports

The results of the determination of the product type shall be documented in test reports. All test reports shall be retained by the manufacturer for at least 10 years after the last date of production of the liquid-applied water impermeable product to which they relate.

### 6.2.4 Shared other party results

A manufacturer may use the results of the product type determination obtained by someone else (e.g. by another manufacturer, as a common service to manufacturers, or by a product developer), to justify his own declaration of performance regarding a product that is manufactured according to the same design (e.g. dimensions) and with raw materials, constituents and manufacturing methods of the same kind, provided that:

**EN 14891:2017 (E)**

- the results are known to be valid for products with the same essential characteristics relevant for the product performance;
- in addition to any information essential for confirming that the product has such same performances related to specific essential characteristics, the other party who has carried out the determination of the product type concerned or has had it carried out, has expressly accepted (by licence, contract, or any other type of written consent) to transmit to the manufacturer the results and the test report to be used for the latter's product type determination, as well as information regarding production facilities and the production control process that can be taken into account for FPC;
- the manufacturer using other party results accepts to remain responsible for the product having the declared performances and he also:
  - ensures that the product has the same characteristics relevant for performance as the one that has been subjected to the determination of the product type, and that there are no significant differences with regard to production facilities and the production control process compared to that used for the product that was subjected to the determination of the product type; and
  - keeps available a copy of the determination of the product type report that also contains the information needed for verifying that the product is manufactured according to the same design and with raw materials, constituents and manufacturing methods of the same kind.

**6.3 Factory Production Control (FPC)****6.3.1 General**

The manufacturer shall establish, document and maintain an FPC system to ensure that the products placed on the market comply with the declared performance of the essential characteristics.

The FPC system shall consist of procedures, regular inspections and tests and/or assessments and the use of the results to control raw and other incoming materials or components, equipment, the production process and the product.

All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures.

This factory production control system documentation shall ensure a common understanding of the evaluation of the constancy of performance and enable the achievement of the required product performances and the effective operation of the production control system to be checked. Factory production control therefore brings together operational techniques and all measures allowing maintenance and control of the compliance of the product with the declared performances of the essential characteristics.

In case the manufacturer has used shared or cascading product type results, the FPC shall also include the appropriate documentation as foreseen in 6.2.4.

**6.3.2 Requirements****6.3.2.1 General**

The manufacturer is responsible for organizing the effective implementation of the FPC system in line with the content of this product standard. Tasks and responsibilities in the production control organization shall be documented and this documentation shall be kept up-to-date.

The responsibility, authority and the relationship between personnel that manages, performs or verifies work affecting product constancy, shall be defined. This applies in particular to personnel that need to

Personal use : freddy.galinx@bbri.com  
37494 - bbri2017-10-10 16:19:35

initiate actions preventing product non-constancies from occurring, actions in case of non-constancies and to identify and register product constancy problems.

Personnel performing work affecting the constancy of performance of the product shall be competent on the basis of appropriate education, training, skills and experience for which records shall be maintained.

In each factory the manufacturer may delegate the action to a person having the necessary authority to:

- identify procedures to demonstrate constancy of performance of the product at appropriate stages;
- identify and record any instance of non-constancy;
- identify procedures to correct instances of non-constancy.

The manufacturer shall draw up and keep up-to-date documents defining the factory production control. The manufacturer's documentation and procedures should be appropriate to the product and manufacturing process. The FPC system should achieve an appropriate level of confidence in the constancy of performance of the product. This involves:

- a) the preparation of documented procedures and instructions relating to factory production control operations, in accordance with the requirements of the technical specification to which reference is made;
- b) the effective implementation of these procedures and instructions;
- c) the recording of these operations and their results;
- d) the use of these results to correct any deviations, repair the effects of such deviations, treat any resulting instances of non-conformity and, if necessary, revise the FPC to rectify the cause of non-constancy of performance.

Where subcontracting takes place, the manufacturer shall retain the overall control of the product and ensure that he receives all the information that is necessary to fulfil his responsibilities according to this European Standard.

If the manufacturer has part of the product designed, manufactured, assembled, packed, processed and/or labelled by subcontracting, the FPC of the subcontractor may be taken into account, where appropriate for the product in question.

The manufacturer who subcontracts all of his activities may in no circumstances pass the above responsibilities on to a subcontractor.

NOTE Manufacturers having an FPC system, which complies with EN ISO 9001 standard and which addresses the provisions of the present European Standard are considered as satisfying the FPC requirements of the Regulation (EU) No 305/2011.

### 6.3.2.2 Equipment

#### 6.3.2.2.1 Testing

All weighing, measuring and testing equipment shall be calibrated and regularly inspected according to documented procedures, frequencies and criteria.

**EN 14891:2017 (E)****6.3.2.2.2 Manufacturing**

All equipment used in the manufacturing process shall be regularly inspected and maintained to ensure use, wear or failure does not cause inconsistency in the manufacturing process. Inspections and maintenance shall be carried out and recorded in accordance with the manufacturer's written procedures and the records retained for the period defined in the manufacturer's FPC procedures.

**6.3.2.3 Raw materials and components**

The specifications of all incoming raw materials and components shall be documented, as shall the inspection scheme for ensuring their compliance. In case supplied kit components are used, the constancy of performance system of the component shall be that given in the appropriate harmonized technical specification for that component.

**6.3.2.4 Traceability and marking**

Individual product batches shall be identifiable and traceable with regard to their production origin. The manufacturer shall have written procedures ensuring that processes related to affixing traceability codes and/or markings are inspected regularly.

**6.3.2.5 Controls during manufacturing process**

The manufacturer shall plan and carry out production under controlled conditions.

**6.3.2.6 Product testing and evaluation**

The manufacturer shall establish procedures to ensure that the stated values of the characteristics he declares are maintained. The characteristics, the test methods and the minimum frequency of control shall be as specified in Table 3.

**Table 3 — Production control: test methods and minimum FPC frequency**

Characteristic	Test method	Minimum FPC frequency
Initial tensile adhesion strength	A.6.2	B
Tensile adhesion strength after water contact	A.6.3 or A.6.4	B
Tensile adhesion strength after heat ageing	A.6.5	B
Tensile adhesion strength after freeze-thaw cycles	A.6.6	B
Tensile adhesion strength after contact with lime water	A.6.9	B
Waterproofing	A.7	A
Crack-bridging ability (under standard conditions or at low temperature)	A.8.2 or A.8.3	B
Tensile adhesion strength after contact with chlorinated water	A.6.7 or A.6.8	B
A: means at six month interval B: means one test per year for production below 500 tonnes/y and two tests per year for production over 500 tonnes/y		

### 6.3.2.7 Non-complying products

The manufacturer shall have written procedures which specify how non-complying products shall be dealt with. Any such events shall be recorded as they occur and these records shall be kept for the period defined in the manufacturer's written procedures.

Where the product fails to satisfy the acceptance criteria, the provisions for non-complying products shall apply, the necessary corrective action(s) shall immediately be taken and the products or batches not complying shall be isolated and properly identified.

Once the fault has been corrected, the test or verification in question shall be repeated.

The results of controls and tests shall be properly recorded. The product description, date of manufacture, test method adopted, test results and acceptance criteria shall be entered in the records under the signature of the person responsible for the control/test.

With regard to any control result not meeting the requirements of this European Standard, the corrective measures taken to rectify the situation (e.g. a further test carried out, modification of manufacturing process, throwing away or putting right of product) shall be indicated in the records.

### 6.3.2.8 Corrective action

The manufacturer shall have documented procedures that instigate action to eliminate the cause of non-conformities in order to prevent recurrence.

### 6.3.2.9 Handling, storage and packaging

The manufacturer shall have procedures providing methods of product handling and shall provide suitable storage areas preventing damage or deterioration.

## 6.3.3 Product specific requirements

The FPC system shall address this European Standard and ensure that the products placed on the market comply with the declaration of performance.

The FPC system shall include a product specific FPC, which identifies procedures to demonstrate compliance of the product at appropriate stages, i.e.:

- a) the controls and tests to be carried out prior to and/or during manufacture according to a frequency laid down in the FPC test plan,

and/or

- b) the verifications and tests to be carried out on finished products according to a frequency laid down in the FPC test plan.

If the manufacturer uses only finished products, the operations under b) shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

If the manufacturer carries out parts of the production himself, the operations under b) may be reduced and partly replaced by operations under a). Generally, the more parts of the production that are carried out by the manufacturer, the more operations under b) may be replaced by operations under a).

In any case the operation shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

NOTE Depending on the specific case, it can be necessary to carry out the operations referred to under a) and b), only the operations under a) or only those under b).

The operations under a) refer to the intermediate states of the product as on manufacturing machines and their adjustment, and measuring equipment etc. These controls and tests and their frequency shall

**EN 14891:2017 (E)**

be chosen based on product type and composition, the manufacturing process and its complexity, the sensitivity of product features to variations in manufacturing parameters etc.

The manufacturer shall establish and maintain records that provide evidence that the production has been sampled and tested. These records shall show clearly whether the production has satisfied the defined acceptance criteria and shall be available for at least ten years.

**6.3.4 Procedure for modifications**

If modifications are made to the product, production process or FPC system that could affect any of the product characteristics declared according to this standard, then all the characteristics for which the manufacturer declares performance, which may be affected by the modification, shall be subject to the determination of the product type, as described in 6.2.1.

Where relevant, a re-assessment of the factory and of the FPC system shall be performed for those aspects, which may be affected by the modification.

All assessments and their results shall be documented in a report.

**6.3.5 One-off products, pre-production products (e.g. prototypes) and products produced in very low quantity**

The liquid applied water impermeable product produced as a one-off, prototypes assessed before full production is established, and products produced in very low quantities shall be assessed as follows.

For type assessment, the provisions of 6.2.1, 3rd paragraph apply, together with the following additional provisions:

- in case of prototypes, the test samples shall be representative of the intended future production and shall be selected by the manufacturer;
- on request of the manufacturer, the results of the assessment of prototype samples may be included in a certificate or in test reports issued by the involved third party.

The FPC system of one-off products and products produced in very low quantities shall ensure that raw materials and/or components are sufficient for production of the product. The provisions on raw materials and/or components shall apply only where appropriate. The manufacturer shall maintain records allowing traceability of the product.

In the initial assessment of the factory and FPC it shall be verified:

- a) that all resources necessary for the achievement of the product characteristics included in this European standard will be available, and
- b) that the FPC-procedures in accordance with the FPC-documentation will be implemented and followed in practice, and
- c) that procedures are in place to demonstrate that the factory production processes can produce a product complying with the requirements of this European standard and that the product will be the same as the samples used for the determination of the product type, for which compliance with this European standard has been verified.

Once series production is fully established, the provisions of 6.3 shall apply.



## 7 Classification and designation

The liquid-applied water impermeable products are classified into one of the three types, according to the definitions given in Clause 3:

- **CM** cementitious liquid-applied water impermeable products;
- **DM** dispersion liquid-applied water impermeable products;
- **RM** reaction resin liquid-applied water impermeable products.

For each type it is possible to have different classes, related to the different optional characteristics given in Table 1, section 1b. These classes are designated by the following abbreviations:

- **01** with improved crack bridging ability at low temperature ( $-5^{\circ}\text{C}$ );
- **02** with improved crack bridging ability at very low temperature ( $-20^{\circ}\text{C}$ );
- **P** resistant to contact with chlorinated water (i.e. for use in swimming pools).

The product is designated by the symbol for the type (CM, DM or RM), followed by the abbreviation of the class or classes it belongs to. Table 4 describes the designation of the products types and classes which shall be used.

**Table 4 — Classification and designation of liquid-applied water impermeable products**

SYMBOL		DESCRIPTION
TYPE	CLASS	
CM		Normal cementitious liquid-applied water impermeable product
DM		Normal dispersion liquid-applied water impermeable product
RM		Normal reaction resin liquid-applied water impermeable product
CM	01	Cementitious liquid-applied water impermeable product with improved crack bridging ability at low temperature ( $-5^{\circ}\text{C}$ )
CM	02	Cementitious liquid-applied water impermeable product with improved crack bridging ability at very low temperature ( $-20^{\circ}\text{C}$ )
DM	01	Dispersion liquid-applied water impermeable product with improved crack bridging ability at low temperature ( $-5^{\circ}\text{C}$ )
DM	02	Dispersion liquid-applied water impermeable product with improved crack bridging ability at low temperature ( $-20^{\circ}\text{C}$ )
RM	01	Reaction resin liquid-applied water impermeable product with improved crack bridging ability at low temperature ( $-5^{\circ}\text{C}$ )
RM	02	Reaction resin liquid-applied water impermeable product with improved crack bridging ability at very low temperature ( $-20^{\circ}\text{C}$ )
CM	P	Cementitious liquid-applied water impermeable product resistant to contact with chlorinated water
DM	P	Dispersion liquid-applied water impermeable product resistant to contact with chlorinated water
RM	P	Reaction resin liquid-applied water impermeable product resistant to contact with chlorinated water

**EN 14891:2017 (E)**

SYMBOL		DESCRIPTION
TYPE	CLASS	
CM	O1P	Cementitious liquid-applied water impermeable product with improved crack bridging ability at low temperature (-5°C) and resistant to contact with chlorinated water
CM	O2P	Cementitious liquid-applied water impermeable product with improved crack bridging ability at very low temperature (-20°C) and resistant to contact with chlorinated water
DM	O1P	Dispersion liquid-applied water impermeable product with improved crack bridging ability at low temperature (-5°C) and resistant to contact with chlorinated water
DM	O2P	Dispersion liquid-applied water impermeable product with improved crack bridging ability at very low temperature (-20°C) and resistant to contact with chlorinated water
RM	O1P	Reaction resin liquid-applied water impermeable product with improved crack bridging ability at low temperature (-5°C) and resistant to contact with chlorinated water
RM	O2P	Reaction resin liquid-applied water impermeable product with improved crack bridging ability at very low temperature (-20°C) and resistant to contact with chlorinated water

**8 Marking and labelling**

Products complying with the requirements of this European Standard shall be clearly marked with the following information:

- a) name of the product;
- b) manufacturer's mark and place of origin;
- c) date or code of production, shelf life and conditions of storage;
- d) number of this European Standard, i.e. EN 14891 and date of issue;
- e) type of product according to Clause 7 (using symbols given in Table 4);
- f) instructions for use:
  - 1) mix proportions (where applicable);
  - 2) maturing time (where applicable);
  - 3) pot life;
  - 4) mode of application (including recommended primer and/or reinforcement mesh);
  - 5) minimum quantity or thickness of the product;
  - 6) delay for installing ceramic tiles;

- 7) specified adhesive, type and class in accordance with prEN 12004-1:2014;
- 8) field of application (external, wall, floor, swimming pool).

NOTE 1 In the designation of a liquid-applied water impermeable product, information about special properties may be included when the product is intended for use in specific applications.

This information shall be marked on the packaging and/or on the product's technical data sheet.

NOTE 2 Where regulatory marking provisions require information on some or all items listed in this clause, the provisions of this clause concerning those common items are deemed to be met and the information needs not be repeated for the purpose of this clause.

Personal use : freddy.coninx@iko.com  
37494 - bbri286132  
2017-10-10 16:19:35

## Annex A (normative)

### Testing, assessment and sampling methods

#### A.1 Sampling

Take a sample of at least 2 kg of the product to be tested in accordance with EN ISO 15605 and EN 1067.

#### A.2 Test conditions

Standard conditions shall be  $(23 \pm 2)$  °C and  $(50 \pm 5)$  % Relative Humidity and the speed of air in the working area less than 0,2 m/s.

When the test specimens have to be conditioned according to the test method, the tolerances in the time of conditioning for all test specimens shall be as follows:

Conditioning	Tolerance
24 h	$\pm 0,5$ h
7 days	$\pm 3$ h
14 days	$\pm 6$ h
21 days	$\pm 9$ h
28 days	$\pm 12$ h

#### A.3 Test materials

##### A.3.1 General

Condition all test materials for at least 24 h under standard conditions. The materials to be tested shall be within their shelf life.

##### A.3.2 Ceramic tiles

The tiles shall be clean and dry.

The tiles used for this method shall be of:

**type V1:** fully vitrified tile complying with EN 14411:2016, with a water absorption  $\leq 0,5$  % by mass, unglazed and with a plain adhering surface, with facial dimensions of  $(50 \pm 1)$  mm  $\times$   $(50 \pm 1)$  mm.

##### A.3.3 Test substrate

###### A.3.3.1 Concrete slab

The concrete slab shall comply with EN 12004-2:2016.

###### A.3.3.2 Other substrates (optional)

Other substrates may be used upon agreement if the substrate is recommended for the ceramic tile application by the manufacturer. To demonstrate compatibility with other optional substrates, the product shall be applied to the selected substrate in accordance with the initial adhesion test method

(A.6.2). When a result of more or equal to  $0,5 \text{ N/mm}^2$  is achieved or cohesive failure occurs in the substrate, the requirement is considered satisfied.

### **A.3.4 Ceramic tile adhesive**

The ceramic tile adhesive shall comply with prEN 12004-1:2014.

### **A.3.5 Sodium hypochlorite**

Analytical grade sodium hypochlorite.

## **A.4 Apparatus**

### **A.4.1 Weight (Mass)**

A mass capable of exerting a force of  $(20 \pm 0,05) \text{ N}$ , with a cross-sectional area of less than  $50 \text{ mm} \times 50 \text{ mm}$ .

### **A.4.2 Pull head plates**

Square metallic plates, with dimensions of  $50 \text{ mm} \times 50 \text{ mm}$  and a thickness of minimum 10 mm with a suitable fitting for connection to the test machine.

### **A.4.3 Machine for pull testing**

A test machine for direct pull tensile force test and with suitable capacity and sensitivity for the test. The machine shall be capable of applying the load to the pull-head plate at the rate of  $(250 \pm 50) \text{ N/s}$  through a suitable fitting that does not exert any bending force.

### **A.4.4 Air-circulating oven**

An air-circulating oven capable of controlling the temperature to within  $\pm 3 \text{ }^\circ\text{C}$ .

### **A.4.5 Mould**

The mould shall consist of six horizontal compartments so that six prismatic specimens  $(12 \pm 0,1) \text{ mm} \times (40 \pm 1) \text{ mm} \times (160 \pm 1) \text{ mm}$ , with a square hole, with  $(4 \pm 0,1) \text{ mm}$  side, in the middle of the narrowest face, can be prepared simultaneously. In order to avoid the sliding of the sample in the dynamometer, the ends of the specimen shall be greater than the middle (see Figure A.1) and a clamp as shown in Figure A.2 shall be used.

Dimensions in millimetres

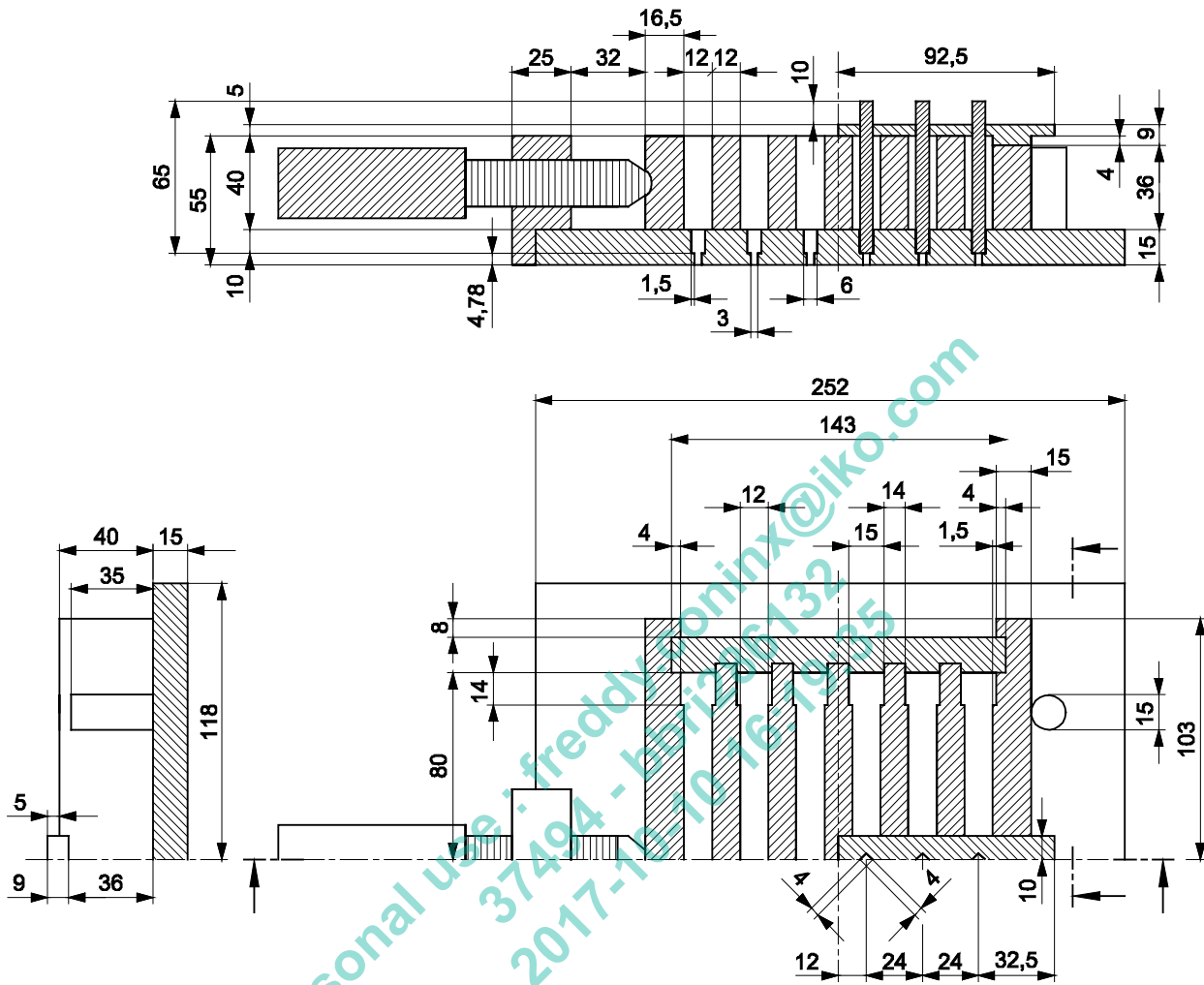


Figure A.1 — Mould

Dit document is auteursrechtelijk beschermd en door NBN onder licentie verstrekt aan CSTC-WTCB. Idev@bbri.be verbindt er zich toe dit document, in zijn geheel of gedeeltelijk, noch tijdelijk, noch permanent aan derden ter beschikking te stellen.

Dimensions in millimetres

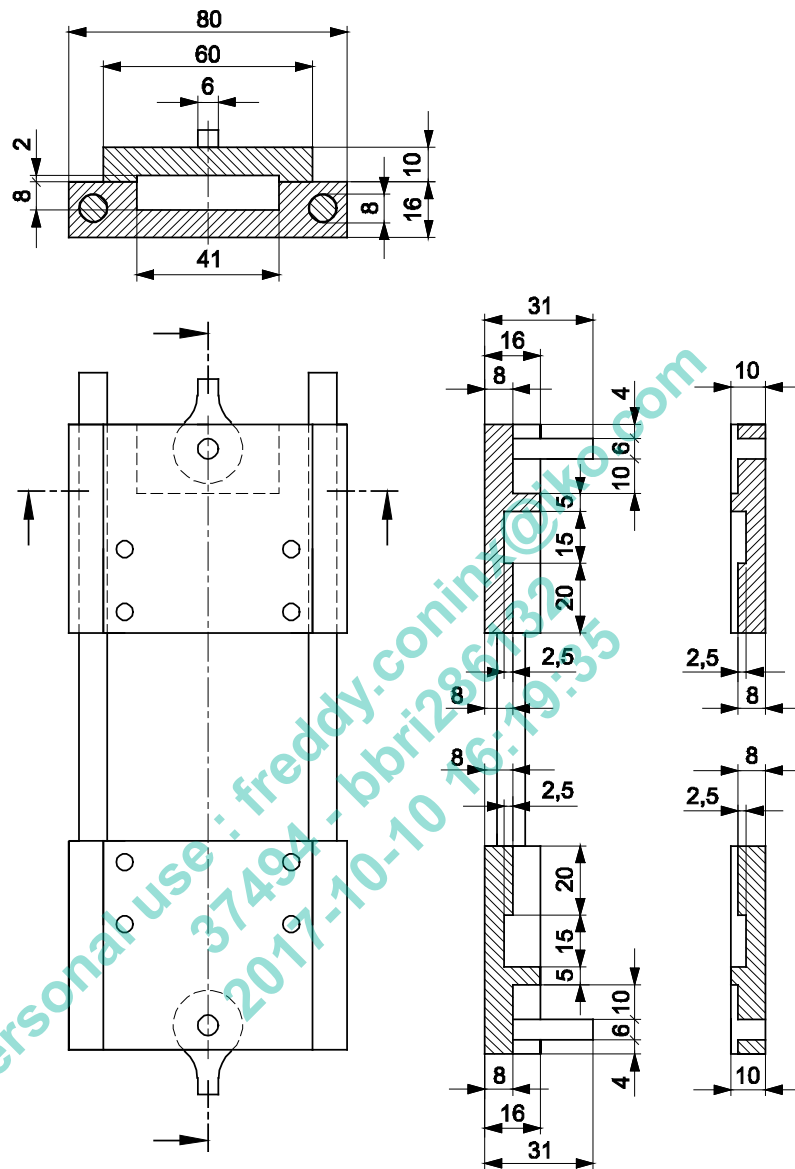


Figure A.2 — Clamp

#### A.4.6 Jig

Any jig capable of cracking the specimen in a position corresponding to the hole, without damaging the applied water impermeable product (see Figure A.3).

Dimensions in millimetres

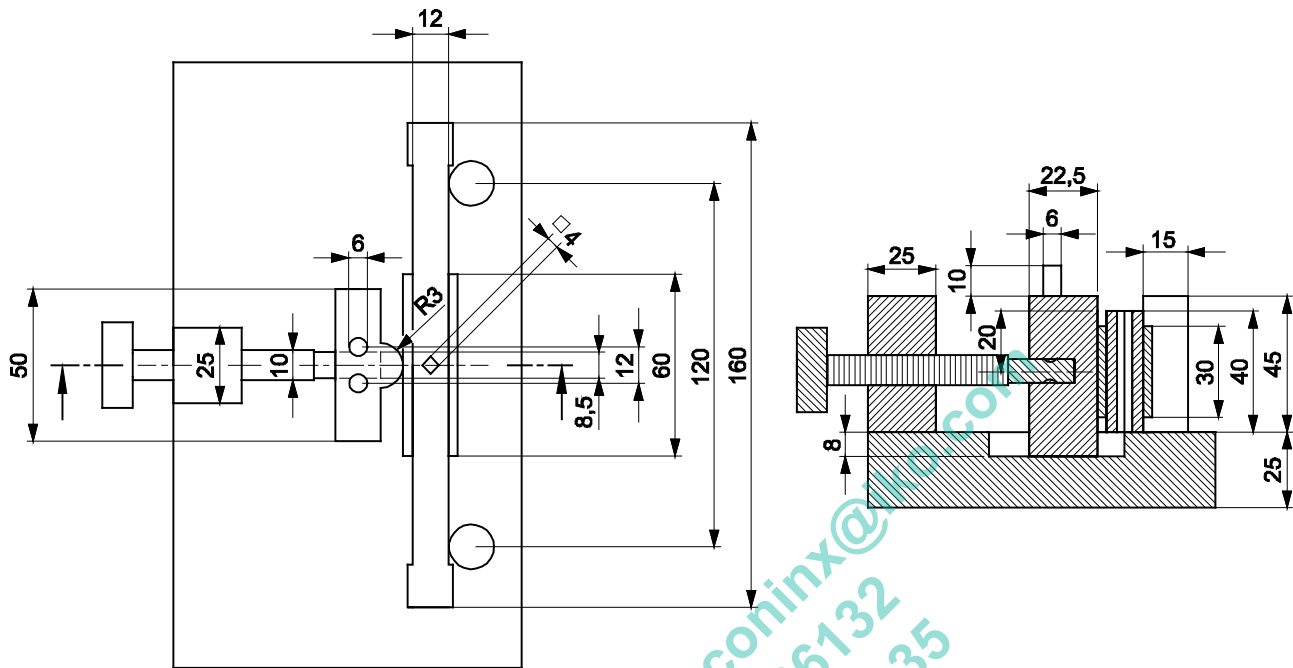


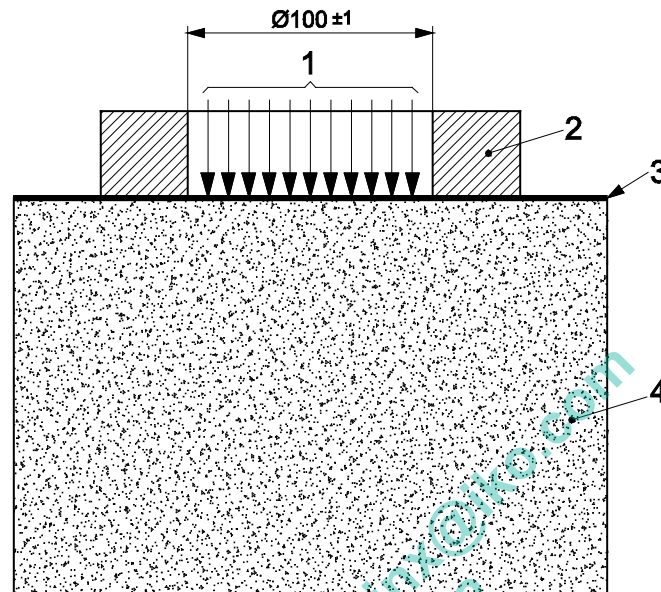
Figure A.3 — Jig

#### A.4.7 Equipment for permeability test

Any equipment which permits the test sample, as defined in A.7, to be placed in such a way that the water pressure acts from above the specimen. The machine shall permit the unexposed faces to be observed to detect any possible sign of water permeation (see Figure A.4). The internal diameter of the sealing ring shall be  $(100 \pm 1)$  mm.



Dimensions in millimetres

**Key**

- 1 water pressure
- 2 sealing ring
- 3 water impermeable product
- 4 concrete slab

**Figure A.4 — Typical arrangement for determining the waterproofing**

**A.4.8 Machine for tensile testing**

A machine for tensile testing, capable of measuring the elongation with a precision of 0,01 mm and the load with a precision of 1 N.

**A.5 Mixing of liquid-applied water impermeable products**

To prepare the cementitious, dispersion or reaction resin liquid water impermeable materials follow the manufacturer's instructions.

The amount of water and/or liquid admixture required for preparing the cementitious water impermeable product shall be as stated by the manufacturer in parts by mass, i.e. liquid to dry powder (if a range of values is given, the arithmetic mean shall be used).

The amount of water and/or liquid admixture required for preparing the product shall be the same for all tests.

**A.6 Tensile adhesion tests****A.6.1 Preparation of test pieces**

Apply the liquid water impermeable product to the surface of the substrate (A.3.3) in accordance with the manufacturer's instructions, including a primer if required. Where recommended, the water impermeable material should be applied in two or more layers, inserting if requested a reinforcing cloth or mesh. With some products, a sprinkling of silica sand into the top layer is required to improve adhesion to the surface.

**EN 14891:2017 (E)**

Before applying the adhesive, allow the coated concrete slabs to dry under standard conditions for at least 24 h, unless the manufacturer gives different instructions.

Apply a thin layer of the adhesive to the water impermeable product with a straight edge trowel. Then apply a thicker layer and comb with a notched trowel having 6 mm × 6 mm notches at 12 mm centres.

After 5 min place nine type V1 tiles on the adhesive at a distance apart of 50 mm and load each tile with  $(20 \pm 0,05)$  N for 30 s.

The trowel shall be held at an angle of approximately 60° to the substrate at a right angle to one edge of the slab and drawn across the slab parallel to that edge, in a straight line. The adhesive between the tiles shall not be removed.

**A.6.2 Initial tensile adhesion strength**

Prepare the test pieces in accordance with A.6.1.

After 27 days bond the pull head plates to the tiles with a suitable high strength adhesive (e.g. epoxide).

After a total of 28 days storage under standard conditions determine the tensile adhesion strength by applying a force at a constant rate of  $(250 \pm 50)$  N/s. Before the bond strength is determined, the sample surface shall be cut through to the surface of the concrete slab, around the perimeter of each tile.

Report the results in Newton (N).

**A.6.3 Tensile adhesion strength after water contact**

Prepare the test pieces in accordance with A.6.1. Then, form an upstand, approximately 10 mm high, around the perimeter of the upper surface of the coated slab by applying, for example, a bead of silicone sealant. Condition the test pieces under standard conditions for 7 days.

Fill the reservoir formed by the sealant upstand to about 6 mm depth of water at the standard temperature. After 20 days, during which time the water level should be maintained at about 6 mm, pour away the water and wipe the surface of the test piece tiles dry with a cloth, before bonding the pull head plates to the tiles. After a further 7 h, fill the reservoir with a 6 mm depth of water at the standard temperature once again.

The following day pour away the water and immediately carry out the tensile adhesion test in accordance with A.6.2.

Report the results in Newton (N).

**A.6.4 Alternative method for tensile adhesion strength after water contact**

Prepare the surface of the test pieces in accordance with A.6.1.

All remaining faces of the slab, including the underside, shall then be sealed with an impervious, waterproof coating material, such as an epoxide or polyester based product, ensuring complete integrity of the coating on all the edges and at the junction with the liquid-applied water impermeable product on the upper face.

Condition the test pieces under standard conditions for 7 days and immerse them in water at the standard temperature.

After 20 days remove the test pieces from the water, wipe with a cloth and bond the pull head plates to the tiles. After a further 7 h immerse the test pieces in water at the standard temperature.

The following day remove the test pieces from water and immediately carry out the tensile adhesion test in accordance with A.6.2.

### A.6.5 Tensile adhesion strength after heat ageing

Prepare the test pieces in accordance with A.6.1.

Condition the test pieces under standard conditions for 14 days and then place them in an air-circulating oven at  $(70 \pm 3)$  °C for a further 14 days. Remove from the oven and bond the pull head plates to the tiles with a suitable high strength adhesive (e.g. epoxide).

Condition the test pieces for a further 24 h under standard conditions.

Determine the tensile adhesion strength in accordance with A.6.2.

Report the results in Newton (N).

### A.6.6 Tensile adhesion strength after freeze-thaw cycle

Prepare the surface of the test pieces in accordance with A.6.1. In addition, a layer of the adhesive approximately 1 mm thick, shall be applied with a straight edge trowel to the back face of the type V1 tile before placing.

All remaining faces of the slab, including the underside, shall then be sealed with an impervious, waterproof coating material, such as an epoxide or polyester based product, ensuring complete integrity of the coating on all the edges and at the junction with the liquid-applied water impermeable product on the upper face.

Condition the test pieces for 7 days under standard conditions, followed by immersing in water for 21 days before carrying out 25 freeze-thaw cycles.

For each freeze-thaw cycle:

- 1) remove the test pieces from the water and lower the temperature to  $(-15 \pm 3)$  °C within  $2 \text{ h} \pm 20 \text{ min}$ ;
- 2) maintain the test pieces at  $(-15 \pm 3)$  °C for  $2 \text{ h} \pm 20 \text{ min}$ ;
- 3) immerse in water at  $20 \text{ °C} \pm 3 \text{ °C}$  and raise the temperature to  $(15 \pm 3)$  °C and maintain this temperature for  $2 \text{ h} \pm 20 \text{ min}$ .

Repeat the cycle 25 times. After the last cycle wipe the surface of the tiles with a cloth and bond the pull head plates to the tiles. Allow the test pieces to reach standard conditions for at least 7 h and then determine the tensile strength in accordance with A.6.2.

Report the results in Newton (N).

### A.6.7 Tensile adhesion strength after contact with chlorinated water

Prepare the test pieces in accordance with A.6.1 and form the reservoir in accordance with A.6.3.

Condition for 28 days before pouring an approximate 6 mm depth of chlorinated water into the reservoir. After seven days pour away the chlorine water, rinse with clean tap water, wipe with a cloth and bond the pull head plates to the tiles. After a further 24 h under standard conditions, carry out the tensile adhesion test in accordance with A.6.2.

Report the results in Newton (N).

The testing solution, with a chloride and sulphate content of 200 mg/l each, shall be prepared with the addition of sodium chloride and sodium sulphate to fresh water.

The water shall be chlorinated by addition of technically pure sodium hypochlorite (A.3.5).

The chlorinated water concentration shall be kept constant within the range 0,3 mg/l to 0,6 mg/l checking the active chlorine content in water by titration.

**EN 14891:2017 (E)**

The pH value shall be determined daily and shall be kept in the range 6,5 to 7,8; any correction required should be carried out by increasing pH with the addition of sodium hydroxide, or by decreasing it with the addition of hydrochloric acid, daily.

The immersion time of the test pieces shall be extended for the time the active chlorine content was below the limit value of 0,3 mg/l (for example on Sundays and holidays).

**A.6.8 Alternative method for tensile adhesion strength after contact with chlorinated water**

Prepare the surface of the test pieces in accordance with A.6.1.

All remaining faces of the slab, including the underside, shall then be sealed with an impervious, waterproof coating material, such as an epoxide or polyester based product, ensuring complete integrity of the coating on all the edges and at the junction with the liquid-applied water impermeable product on the upper face.

Condition the test pieces under standard conditions for 28 days, and immerse them in chlorinated water at the standard temperature.

After 7 days remove the test pieces from the chlorinated water, wipe with a cloth and bond the pull head plates to the tiles.

After a further 24 h under standard conditions, carry out the tensile adhesion test in accordance with A.6.2.

The testing solution, with a chloride and sulphate content of 200 mg/l each, shall be prepared with the addition of sodium chloride and sodium sulphate to fresh water.

The water shall be chlorinated by addition of sodium hypochlorite (A.3.5).

The chlorinated water concentration shall be kept constant within the range 0,3 mg/l to 0,6 mg/l checking the active chlorine content in water by titration.

The pH value shall be determined daily and shall be kept in the range 6,5 to 7,8; any correction required should be carried out by increasing pH with the addition of sodium hydroxide, or by decreasing it with the addition of hydrochloric acid, daily.

The immersion time of the test pieces shall be extended for the time the active chlorine content was below the limit value of 0,3 mg/l (for example on Sundays and holidays).

**A.6.9 Tensile adhesion strength after contact with lime water**

Prepare the test pieces in accordance with A.6.1. All remaining faces of the slab, including the underside, shall then be sealed with an impervious, waterproof coating material, such as an epoxide or polyester based product, ensuring complete integrity of the coating on all the edges and at the junction with the liquid-applied water impermeable product on the upper face.

Condition the test piece under standard conditions for 28 days and then immerse them in saturated lime water (pH  $\geq$  12) at 40 °C.

After 7 days remove the test pieces from the lime water, rinse with clean water, wipe with a cloth and bond the pull head plates to the tiles. After a further 24 h under standard conditions, carry out the tensile adhesion test in accordance with A.6.2.

Report the results in Newton (N).

### A.6.10 Evaluation and expression of the results

The individual tensile adhesion strength is determined to an accuracy of  $\pm 0,1$  N/ mm<sup>2</sup> using the following formula:

$$S = L/A \quad (\text{A.1})$$

where

$S$  is the individual tensile adhesion strength in N/mm<sup>2</sup>

$L$  is the total load in N;

$A$  is the bonding area in square millimetre (2 500 mm<sup>2</sup>).

The tensile adhesion strength for each set of conditions is determined as follows:

- determine the mean of the nine values;
- discard the values falling out of the range of  $\pm 20$  % from the mean value;
- if five or more than five values remain, determine the new mean value;
- if less than five values remain, repeat the test;
- determine the mode of failure of the test pieces.

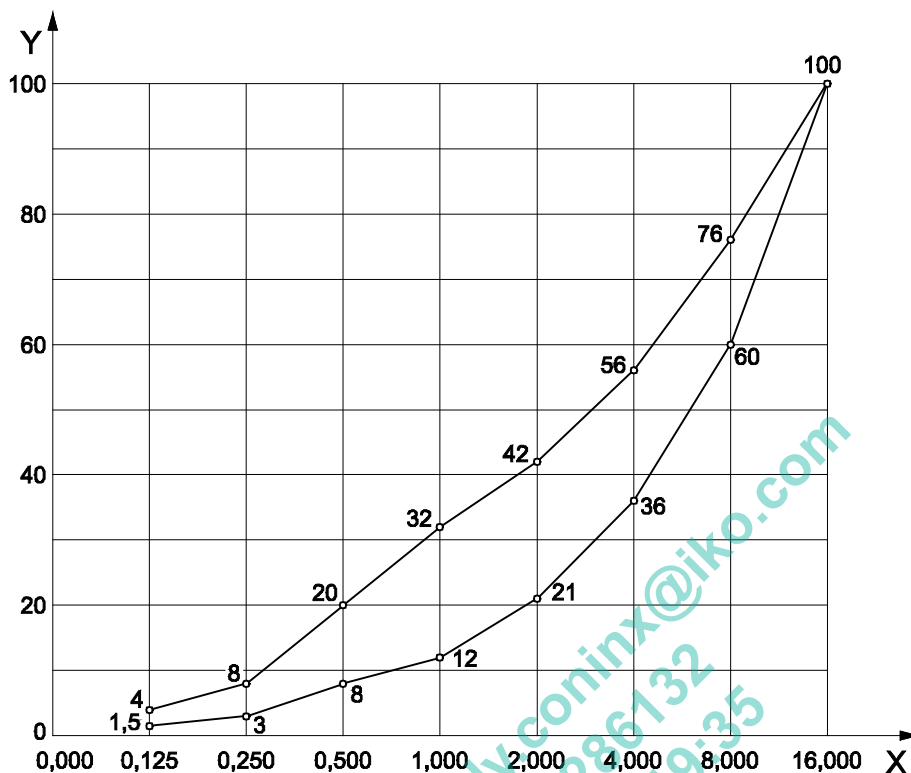
### A.7 Water impermeability

The test sample is based on a permeable concrete substrate sealed in all faces apart from the test area, covered with the liquid water impermeable product, where a water pressure shall be applied.

The substrate is a slab with minimum dimension 150 mm  $\times$  150 mm  $\times$  100 mm prepared using a water permeable concrete and with a plane surface (Figure A.4). In order to have a permeable concrete it is necessary to use a water/cement ratio  $\geq 1$ . The concrete shall be manufactured according to the following mix-design:

- CEM 32,5 R or 42,5 R type I, II, III and IV according to EN 197-1:2011 250 kg/m<sup>3</sup>;
- aggregate with particle size range 0 mm to 16 mm according to EN 12620:2002+A1:2008 1750 kg/m<sup>3</sup>;
- mixing water according to EN 1008 250 kg/m<sup>3</sup>;

NOTE In case of bleeding, the addition of WRA (water retention admixture, according to EN 934-2 [1]) can be used. The particle size distribution of the aggregate is in compliance with the continuous grading curve in Figure A.5.

**Key**

X nominal aperture size (mm)

Y passing, as a percentage by mass

**Figure A.5 — Particle size distribution of the aggregate**

The concrete shall be prepared according to EN 480-1:2014, 6.2. The concrete specimens shall be manufactured according to EN 12390-2 and cured at  $(23 \pm 2)$  °C, 50 % R. H., for at least 28 days.

The control test blocks, prepared as test sample without liquid water impermeable product, shall have a water absorption weight gain of  $400 \text{ g} \pm 100 \text{ g}$  after 7 d at 150 kPa, measured by using this test method. The concrete mix-design shall be adjusted according to the specification if the weight gain is outside this range.

Before applying the liquid water-impermeable product, one face of the concrete specimen shall be abraded and cleaned, in order to remove any laitance and traces of release agent.

The liquid water impermeable product shall be applied to the surface of this face of the concrete slab in accordance with the manufacturer's instructions, using a primer if required. When recommended the waterproofing material shall be applied in two or more layers, inserting if requested a reinforcing cloth or mesh.

Prepare three pieces for the test.

Condition the three coated concrete slabs under standard conditions for the period required by the manufacturer's instructions.

24 h before the waterproofing test all remaining faces of the slab, including the underside, shall be sealed with an impervious, waterproof coating material, such as an epoxide or polyester based product, ensuring complete integrity of the coating on all the edges and at the junction with the liquid-applied water impermeable product on the upper face.

Before starting the waterproofing test the specimens shall be weighed and then placed in the equipment described in A.4.7 and subjected to a water pressure of 150 kPa for seven days. The pressure shall be kept constant throughout the test.

If water penetrates through to the underside of the specimen or if the unexposed faces show signs of water penetration, the test may be terminated.

At the end of the test, the water pressure is released, then the specimen shall be removed blotted dry and weighed for weight gain. Immediately upon completion of the weighing, the test block is broken, in the middle, in the direction of the water penetration using a compressive test machine, in order to evaluate if any water penetration has occurred. The difference of weight between the final and initial waterproofing test is the weight gain.

The test shall be repeated if the test results among the three samples are contradictory.

## A.8 Crack bridging ability

### A.8.1 General

The test pieces are mortar prisms, with dimensions  $(160 \pm 1)$  mm  $\times$   $(40 \pm 1)$  mm  $\times$   $(12 \pm 0,1)$  mm, with a square hole, with  $(4 \pm 0,1)$  mm side, in the middle of the narrow face as per Figure A.6.

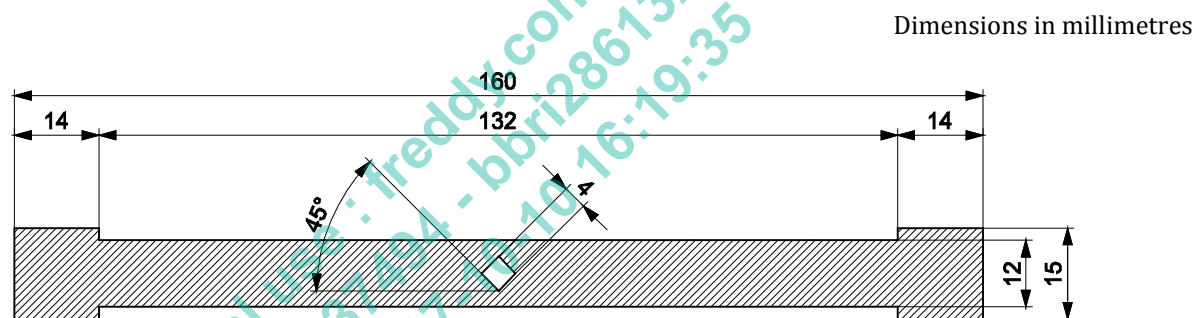


Figure A.6 — Crack-bridging ability test sample

The specimens shall be manufactured using the following mortar:

- |   |  |
|---|--|
| — CEM I 52,5 R according to EN 197-1:2011   | 675 g;   |
| — silica sand according to EN 196-1:2016    | 1 350 g;   |
| — HRWR (high-range water-reduction)         | 0,5 % to 1,5 % of the cement mass (added to the mixing water); |
| — mixing water (according to EN 196-1:2016) | 303 g;   |

The dosage of the superplasticizer should be adjusted to get a mortar with high fluidity, without segregation. A fluidity in the range 270 mm to 300 mm according to EN 1015-3 is advisable.

The surface of the mould (A.4.5) shall be treated with a thin layer of an emulsion-based release agent which can be easily removed.

The mortar shall be mixed and conditioned according to EN 196-1:2016. After being prepared, the mortar is poured into the mould and compacted manually, if it is necessary.

After de-moulding the specimens shall be abraded (in the zone where the product shall be applied) to remove all traces of the release agent and then are cured for at least 28 days in water at 20 °C.

Remove the test pieces from the water and condition for a further 24 h under standard conditions.

**EN 14891:2017 (E)**

By means of a suitable template with 60 mm × 30 mm internal dimensions apply the waterproofing material to the opposing faces of the specimen (Figure A.6) in accordance with the manufacturer's instructions, using a primer if required. When recommended, the waterproofing material should be applied in two or more layers, inserting if requested a reinforcing cloth or mesh.

Prepare three pieces for the test.

The applied product is cured under standard conditions for 28 days.

At the end of conditioning the prism is cracked, using a suitable jig (A.4.6), without damaging the water-impermeable product. Put the specimen in the jig, as shown in Figure A.3, and slowly turn the screw on, until a crack appears near the square hole. Remove the specimen in order to test according to A.8.2 or A.8.3.

**A.8.2 Crack bridging ability under standard conditions**

The crack-bridging at the first failure of the product is evaluated by using a machine for testing (A.4.8) at a speed of 0,15 mm/min.

The specimen prepared according to A.8 is held by a suitable clamp (see Figure A.2). A 20 N pre-tensile load shall be applied, the elongation is set to zero, then the test can be started at 0,15 mm/min rate, without any torsion or flexion of the test specimen.

The test ends when the first failure on the surface of the product is visible.

Report the result in millimetres to the nearest 0,01 mm.

**A.8.3 Crack bridging ability at low temperature**

The test described in A.8.2 shall be carried out with a device to maintain the temperature at  $(-20 \pm 2) ^\circ\text{C}$  and  $(-5 \pm 1) ^\circ\text{C}$ .

The specimen prepared according to A.8 is held by a suitable clamp (see Figure A.2) and is conditioned for at least 2 h before testing. A 20 N pre-tensile load shall be applied, the elongation is set to zero, then the test can be started at 0,15 mm/min rate, without any torsion or flexion of the test specimen.

The test ends when the first failure on the surface of the product is visible.

Report the result in millimetres to the nearest 0,01 mm.

**A.9 Test report**

The test report shall include the following information:

- a) number and date of this European Standard, i.e. EN 14891, and date of issue;
- b) place, date and time of sampling;
- c) type of liquid-applied waterproofing material, commercial designation and manufacturer;
- d) identification of the test sample;
- e) handling and storage of samples before testing;
- f) date of testing;
- g) test conditions;
- h) amount of water and/or liquid admixture required for preparing the cementitious water impermeable product;



- i) description of the primer and of the reinforcing cloth or mesh used;
- j) coverage of primer and product (gram per square meter);
- k) type and commercial designation of the adhesive used;
- l) tests results (adhesion, water impermeability, crack bridging ability);
- m) any other factor that could have influenced the result.

Personal use : freddy.coninx@iko.com  
37494 - bbri286132  
2017-10-10 16:19:35

## Annex ZA (informative)

### Relationship of this European Standard with Regulation (EU) No.305/2011

(When applying this standard as a harmonized standard under Regulation (EU) No. 305/2011, manufacturers and Member States are obliged by this regulation to use this Annex)

#### ZA.1 Scope and relevant characteristics

This European Standard has been prepared under standardization request M/102 “Floor beds (including suspended ground floors) roads and other trafficked areas” given to CEN and CENELEC by the European Commission (EC) and the European Free Trade Association (EFTA).

When this European Standard is cited in the Official Journal of the European Union (OJEU), under Regulation (EU) No 305/2011, it shall be possible to use it as a basis for the establishment of the Declaration of Performance (DoP) and the CE marking, from the date of the beginning of the co-existence period as specified in the OJEU.

Regulation (EU) No 305/2011, as amended, contains provisions for the DoP and the CE marking.

**Table ZA.1 — Relevant clauses**

<b>Product:</b> liquid-applied water impermeable products a,			
<b>Intended uses:</b> all external installations and swimming pools beneath ceramic tiling.			
Essential characteristics	Clauses of this European Standard related to essential characteristics	Classes and/or threshold levels	Notes
Initial tensile adhesion strength	Clause 4, Table 1, section 1.a	$\geq 0,5 \text{ N/mm}^2$	A.6.2
Water tightness	Waterproofing Clause 4, Table 1, section 1.a	no penetration	A.7
Crack bridging ability	Clause 4, Table 1, section 1.a and Table 1, section 1.b	$\geq 0,75 \text{ mm}$	A.8 and declared conditions
Durability of initial tensile adhesion against climate/heat ageing action	Tensile adhesion strength after heat ageing: Clause 4, Table 1, section 1.a	$\geq 0,5 \text{ N/mm}^2$	A.6.5
Durability of initial tensile adhesion against water/humidity action	Tensile adhesion strength after water contact: Clause 4, Table 1, section 1.a	$\geq 0,5 \text{ N/mm}^2$	A.6.3 or A.6.4

Durability of initial tensile adhesion against contact with lime water	Tensile adhesion strength after contact with lime water: Clause 4, Table 1, section 1.b	$\geq 0,5 \text{ N/mm}^2$	A.6.9
Durability of initial tensile adhesion against freeze and freeze-thaw cycles	Tensile adhesion strength after freeze-thaw cycles: Clause 4, Table 1, section 1.b	$\geq 0,5 \text{ N/mm}^2$	A.6.6
Release of dangerous substances	Subclause 4.2		
<sup>a</sup> These water impermeable products are based on polymer modified cementitious mortars (CM), on dispersions (DM) or on reaction resin (RM) coatings			

## ZA.2 System of Assessment and Verification of Constancy of Performance (AVCP)

The AVCP system of liquid-applied water impermeable products indicated in Table ZA.1, can be found in the EC legal act(s) established by EC Decisions 1999/90/EC (see OJEU L29 of 1999-02-03), as amended by 2001/596/EC (see OJEU L209 of 2001-08-02) and corrected (see OJEU L83 of 1999-03-27).

Micro-enterprises are allowed to treat products under AVCP system 3 covered by this standard in accordance with AVCP system 4, applying this simplified procedure with its conditions, as foreseen in Article 37 of Regulation (EU) No.305/2011.

## ZA.3 Assignment of AVCP tasks

The AVCP system of liquid-applied water impermeable products in Table ZA.1 is defined in Table ZA.3 resulting from application of the clauses of this or other European Standards indicated therein. The content of the tasks assigned to the notified body shall be limited to those essential characteristics, if any, as provided for in Annex III of the relevant standardization request and to those that the manufacturer intends to declare.

Taking into account the AVCP systems defined for the products and the intended uses the following tasks are to be undertaken by the manufacturer and the notified body respectively for the assessment and verification of the constancy of performance of the product.

**Table ZA.3 — Assignment of AVCP tasks for liquid applied water impermeable products under system 3 (for water tightness) and system 4**

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use which are declared	6.3
	An assessment of the performance of the construction product on the basis of testing, calculation, tabulated values or descriptive documentation of that product	Essential characteristics of Table ZA.1 other than 'water tightness' relevant for the intended use which are declared	6.2
Tasks for a notified laboratory	The notified laboratory shall assess the performance on the basis of testing (based on sampling carried out by the manufacturer), calculation, tabulated values or descriptive documentation of the construction product.	Water tightness	6.2

Personal use only  
 37494 - bbri286132  
 2017-10-10 16:19:35  
 fredy.coninx@iko.com

## Bibliography

- [1] EN 934-2, *Admixtures for concrete, mortar and grout - Part 2: Concrete admixtures - Definitions, requirements, conformity, marking and labelling*
- [2] EN ISO 9001, *Quality management systems - Requirements (ISO 9001)*
- [3] EN 1015-3, *Methods of test for mortar for masonry - Part 3: Determination of consistence of fresh mortar (by flow table)*

Personal use : freddy.coninx@iko.com  
37494 - bbri286132  
2017-10-10 16:19:35