



EUROPEAN ASSESSMENT DOCUMENT

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COATED METAL WATER STOP SHEET FOR CONSTRUCTION AND CONTROLLED CRACK JOINTS IN WATERPROOF CONCRETE

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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 No (EU) 305/2011 as a basis for the preparation and issuing of European Technical Assessments (ETA).

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1 SCOPE OF THE EAD

1.1 Description of the construction product

The construction product is a coated metal water stop sheet hereinafter referred as water stop.

The water stop consists of the following components:

- galvanized metal sheet
- coating on the basis of a polymer modified bituminous, a thermoplastic elastomer or a synthetic rubber or cement.

optional:

- holders for fixing the water stop during installation
- clamps for fixing the overlapping joint between the ends of the water stop during installation
- stop end panel
- features for controlled crack joints

The metal sheet is fully or partially coated.

The product will be described by the manufacturer taking into account the following characteristics and methods to derive the relevant definitions:

Number	Product characteristic	Methods relevant for the description of the product
Component: Metal sheet		
1	Thickness	3.4.1
2	Weight per area	weighing
Component: Coating based on bitumen, thermoplastic elastomer or synthetic rubber		
3	Density	EN ISO 2811-1 to 4
4	Viscosity	EN ISO 2555
5	TGA	EN ISO 11358 and 3.4.2
6	IR-Analysis	EN 1767 / DIN 51451 and 3.4.3
7	Softening point	EN 1427
8	Needle penetration	EN 1426
9	Non-volatile compounds	2.2.6
Component: Coating based on cement		
10	Weight	weighing
11	Density	EN ISO 1183-1
12	Determination of ash	EN 3451-1, test method A at 550 °C
13	IR Analysis	EN 1767 / DIN 51451 and 3.4.3
Product		
14	Weight	weighing

The product is not covered by a harmonised European standard (hEN).

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.

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 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.

This is e.g. concerning:

- installation by appropriately trained personnel,
- installation with the required tools and adjuvants,
- precautions during installation,
- inspecting compliance with suitable weather conditions,
- inspections during installation of the product and documentation.

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

1.2.1 Intended use(s)

The water stop is used to seal joints in concrete with high resistance to water (watertight concrete) against the penetration of pressing and un-pressing water (e.g. ground water) and to soil moisture (example see in Annex A).

There are the following scenarios of intended use:

- a) Construction joints
- b) Controlled crack joints for the use in pre-cast elements made of concrete
- c) Controlled crack joints for the use in in-situ concrete

This EAD covers water stops tested with a maximum test water pressure of 500 kPa (5 bar) and a value for the admissible water pressure of 20 m.

Expansion joints are not covered by this EAD.

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 water stop for the intended use of 50 years when installed in the works provided that the water stop is subject to appropriate installation (see 1.2.1). 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 works¹.

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 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 the referred to above.

1.3 Specific terms used in this EAD

1.3.1 Controlled crack joint

A controlled crack joint is a crack at a predetermined breaking point.

2 ESSENTIAL CHARACTERISTICS AND RELEVANT ASSESSMENT METHODS AND CRITERIA

2.1 Essential characteristics of the product

Table 1 shows how the performance of the water stop is assessed in relation to the essential characteristics.

Table 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 <i>(Level, class, description)</i>
Basic Works Requirement 2: Safety in case of fire			
1	Reaction to fire	2.2.1	class
Basic Works Requirement 3: Hygiene, health and the environment			
2	Watertightness in end use condition	2.2.2	level
3	Bond strength at state of delivery	2.2.3	level
4	Bond strength after heat aging	2.2.4	description
5	Durability	2.2.5	description

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

Characterisation of products to be assessed shall be done in accordance with available specifications.

If the ETA contains performance levels in relation to the essential characteristics Content, emission and/or release of dangerous substances in the product, watertightness in end use condition and bond strength at state of delivery, these levels are to be expressed as provide for in paragraph 2.2.2, 2.2.3 and 2.2.4.

2.2.1 Reaction to fire

The water stop shall be tested, using the test method(s) relevant for the corresponding reaction to fire class, in order to be classified according to EN 13501-1.

2.2.2 Watertightness in end use condition

The water tightness shall be tested in the testing device described in Annex B.

The water stop shall be built in with a depth of embedment ≥ 30 mm in the bottom plate.

Two samples of the water stop are cut to length and bent to a square of 680 mm side length. The overlapping joints of the two samples are on the opposite sides. The overlap shall be made with features and dimensions according to the applicant's instructions by e.g. welding / gluing / clamping / screwing.

The water stop has to be installed on the upper reinforcement layer before concreting the bottom plate. A shaking in or impression of the water stop in the concrete is not permitted.

After curing of the concrete of the bottom plate the upper part of the frame can be concreted (maybe with a foil to induce the joint). The setting of the gap between bottom plate and frame (wall) to joint width of testing gap must be done with the help of screws.

The water pressure shall be increased in a period of two weeks to the maximum water pressure. Afterwards the water pressure shall be hold for four weeks.

Test conditions

Water pressure:	The maximum test water pressure is 500 kPa (5 bar). The tests shall be performed taking the safety factor of 2,5 into account (e.g. for a value for the admissible water pressure of 10 m, the test pressure is 2,5 bar).	
Joint width:	Class a) Construction joints:	Opening from 0 to 0,25 mm
	Class b) Controlled crack joints: (in pre-cast elements made of concrete)	Opening from 0 to 0,5 mm
	Class c) Controlled crack joint: (in in-situ concrete)	Opening from 0 to 1,00 mm
	Tests with a larger joint width cover also lower gaps	
Test period:	2 weeks (14 days) for increasing test pressure from 0 to test water pressure, 4 weeks (28 days) holding the test pressure	

The watertightness of the joint between bottom and wall shall be assessed by visual inspection.

The scenario of intended use and the admissible water pressure shall be stated in the ETA.

2.2.3 Bond strength at the state of delivery

The bond strength between the coating and the metal sheet and between the coating and the concrete shall be tested following the EN ISO 4624.

The test shall be done on three samples.

Description for the modified test method:

After remove the protection strip from the water stop a cylinder made of concrete (mortar acc. to EN 196, water cement ratio 0,6, 320 kg cement (CEM I 32,5), consistency F4 acc. to EN 206-1, dimensions: diameter between 50 mm to 80 mm, height 80 mm) shall be concreted on the coated side of the water stop. If both sides are coated, after at least two days a second cylinder concreted on the other side. If only one side is coated, a stamp made of steel with the same diameter shall be glued on the metal sheet.

Then the samples shall be stored 14 days at 23 °C/50 % humidity.

The samples shall be installed in a tensile testing machine for axial tensile strength.

To induce the tensile strength a dowel is incorporated centrally in the concrete or a stamp of steel is glued onto the front surface.

The test speed shall be 500 mm/min. The bond strength shall be recorded.

The bond strength shall be stated in the ETA.

2.2.4 Bond strength after heat aging

For heat aging the metal water stop shall be stored for 7 days at 70 °C. Afterwards the bond strength shall be tested according test procedure described in section 2.2.4.

Based on experience the durability is given, if the measured values of bond strength after heat aging not deviate more than $\pm 20\%$ at the state of delivery. Otherwise the durability cannot be verified on the basis of this EAD. Where relevant, a more exact test method for the durability of the coating would be needed.

2.2.5 Durability

The test shall be done only for bituminous, thermoplastic elastomer and synthetic rubber materials.

The durability is assessed based on the release of non-volatile compounds (lost of weight).

The samples shall be weighed before and after conditioning with a accuracy of 0,01 g.

Preparation of samples: coated water stop with a length of 100 mm without protection foil stored for 24 h at a climate of 23 °C/50 %-2 humidity according to EN ISO 291

Number of samples: 3

Conditioning: 7 days at 70 °C in a dryer with ventilation following the EN 1296; then 24 h at a climate of 23 °C/50 % humidity

The mean value shall be assessed.

Based on experience the durability is given, if the difference between both weights in [%] is smaller than 3 %. Otherwise the durability cannot be verified on the basis of this EAD. Where relevant, a more exact test method for the durability of the coating would be needed.

3 ASSESSMENT OF 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: Decision 1999/90/EC

The system is: 3

In addition, with regard to e.g. reaction to fire/dangerous substances for products covered by this EAD the applicable European legal act is: Decision 2001/586/EC

The systems are: 1, 3 and 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 2.

Table 2 Control plan for the manufacturer; cornerstones

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
Factory production control (FPC)					
1	Geometry of the metal sheet Thickness / Width	3.4.1	± 10 %	1	Each batch resp. each 1000 m
2	Thickness of the coating	3.4.1	Mean value ± x %, depending on thickness	1	Each batch resp. each 1000 m
3	Density of the coating	EN ISO 1183-1	± 3 %	1	Each batch
4	IR-Spectra of the coating		No significant change	1	Each batch
5	Bond strength	2.2.4	± 20 %	1	Each batch resp. each 1000 m
6	Mass per area	weighing	± 3 %	1	Each batch resp. each 1000 m
7	Softening point	EN 1427	± 5 %	1	Each batch
8	Needle penetration	EN 1426	± 5 %	1	Each batch
9	Ash Content / TGA	e.g. DIN 52005 (550°C) / EN ISO 11358 and 3.4.2	± 10 %	1	Once a week / Once a year

3.3 Tasks of the notified body

The cornerstones of the actions to be undertaken by the notified body in the procedure of assessment and verification of constancy of performance for water stops are laid down in Table 3.

Table 3 Control plan for the notified body; cornerstones

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 (for systems 1+, 1 and 2+ only)					
1	Reaction to fire	2.2.1			Once a year
Continuous surveillance, assessment and evaluation of factory production control (for systems 1+, 1 and 2+ only)					
1	Reaction to fire	2.2.1			Once a year

A notified certification body should be involved only if 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).

3.4 Special methods of control and testing used for the verification of constancy of performance

3.4.1 Thickness and width

Thickness and width shall be measured at 10 measuring points on at least 1 m section with a minimum precision of $\pm 0,05$ mm. The mean value and the standard deviation have to be determined.

3.4.2 TGA

Range of temperature: 0 – 1000 °C

Heating rate: 20 K/min

Flushing gas: inert;

Rate of flushing: 100 ml/min, then assessment of ash content

The individual steps of weight loss (determination by tangent method) are recorded in mass [%] with the respective temperature. Thermograms shall be attached to the test report.

3.4.3 IR Analysis

Spectral range: from 4000 cm^{-1} to 500 cm^{-1}

The test results, the device type, the measurement conditions and kind of sample preparation shall be indicated. The IR-spectra shall be accompanied by the test report.

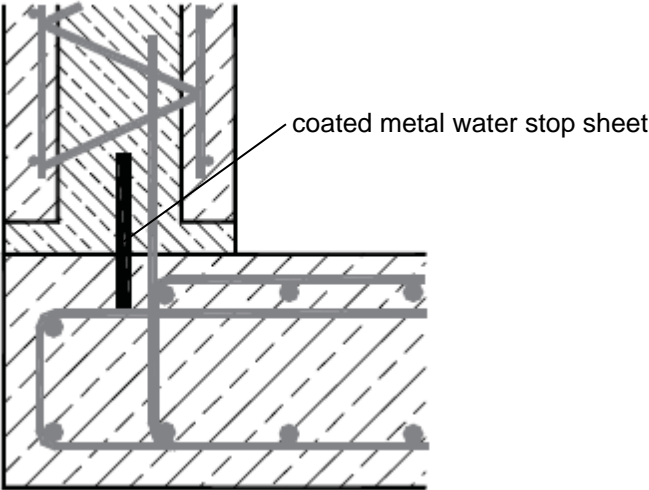
4 REFERENCE DOCUMENTS

As far as no edition date is given in the list of standards thereafter, the standard in its current version at the time of issuing the European Technical Assessment is of relevance.

EN 13501-1	Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests
EN ISO 4624	Paints and varnishes - Pull-off test for adhesion (ISO 4624:2002)
EN 206-1	Concrete - Part 1: Specification, performance, production and conformity
EN ISO 291	Plastics - Standard atmospheres for conditioning and testing
EN 1296	Flexible sheets for waterproofing - Bitumen, plastic and rubber sheets for roof waterproofing - Method for artificial ageing by long term exposure to elevated temperature
EN 1427	Bitumen and bituminous binders - Determination of the softening point - Ring and Ball method
EN 1426	Bitumen and bituminous binders - Determination of needle penetration
DIN 52005	Bitumen and bituminous binders - Determination of ash
EN ISO 2811	Paints and varnishes - Determination of density
ISO 2555	Plastics - Resins in the liquid state or as emulsions or dispersions - Determination of apparent viscosity by the Brookfield test method
EN ISO 11358	Plastics - Thermogravimetry (TG) of polymers - General principles
EN 1767	Products and systems for the protection and repair of concrete structures - Test methods - Infrared analysis
DIN 51451	Testing of petroleum products and related products - Analysis by infrared spectrometry - General working principles
EN ISO 1183-1	Plastics - Methods for determining the density of non-cellular plastics - Part 1: Immersion method, liquid pycnometer method and titration method
EN 3451-1	Plastics - Determination of ash - Part 1: General methods

ANNEX A EXAMPLE

Example: Water stop in a joint between Bottom plate and wall



ANNEX B TEST EQUIPEMENT

