EUROPEAN ASSESSMENT DOCUMENT

EAD 030352-00-0503

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LIQUID APPLIED WATERTIGHT COVERING KITS FOR WET ROOM FLOORS AND/OR WALLS

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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 (EU) No 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 an assessment of a liquid applied covering kit for wet room floors and or walls, with or without wearing surface.

This EAD covers kits, which can be supplied as single- or multi component liquid waterproofing membranes with possible associated adhesives, primers, collars for pipe penetrations and floor gullies etc

The kits can be with or without a wearing surface.

This EAD covers watertight covering kits for interior wet room floors and/or walls. The watertight covering is placed on the inner surface of the wet room floor or wall or beneath the floor screed or wall render, e.g. underneath ceramic tiles, which serve as wearing surface.

The kits include any associated components which are specified by the manufacturer such as reinforcement nets, mats or fibres used in the whole kit or partially in the corners and penetrations, and welding bands and sealants for the joints and possible reinforcements for penetrations, gullies etc. If a wearing surface of tiles is foreseen the tile adhesive(s) shall be specified and subject to relevant tests. The associated components shall be considered as part of the kit and included in the assessment.

Pipes and floor gullies themselves are not part of the kit.

Ceramic tiles and their jointing material, e.g. grouts are not part of the kit.

Sealing of penetrations can be executed with the actual watertight covering product, separate sealants, sealing strips or collars acting together with the waterproofing product.

This EAD further covers paint kits. Where the assessment for paint kits is special – due to the shorter estimated working life and different intended use – this is indicated in the specific sections of the EAD.

The paint kits include possible fabric of glass fibre or polyester fabric, primer, adhesive, paint etc. see figure 1.1.1

Painted kits are meant to be used without a wearing surface.

The kits include any associated components specified by the manufacturer such as reinforcement nets, mats or fibres used in the whole kit in the corners, penetrations etc.

Pipes themselves are not part of the kit.

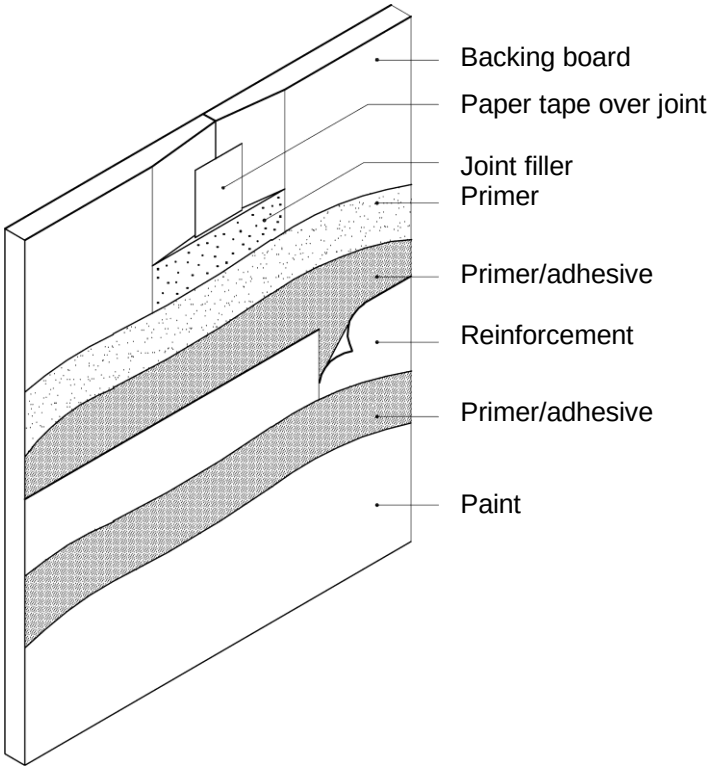
Sealing of penetrations can be executed with the actual watertight covering product, separate sealants, sealing strips or collars acting together with the waterproofing product.

This EAD does not cover swimming pools, outdoor applications – these are covered by EN 14981[1] - and industrial processes.

This EAD covers liquid applied covering kit for wet room floors and or walls, with or without wearing surface, whereas EAD 030436-00-05035 is for watertight covering kits based on flexible sheets for wet room floors and or walls and EAD 030437-00-0503 is for watertight covering kits based on inherently watertight boards for wet room floors and or walls

1 All undated references to standards or to EAD's in this document are to be understood as references to the dated versions listed in clause 4

Figure 1.1.1 Example of the build-up of a paint kit



The liquid applied covering kit for wet room floors and or walls is not covered by a harmonized European standard, since EN 14891 only covers the membrane and only for use in swimming pools and outdoor applications, whereas this EAD covers wet rooms in buildings.

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

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

1.2.1 Intended use(s)

The intended uses of the coverings kits are:

Indoor applications, where the liquid applied kit is not exposed to temperatures (i.e. temperature of structure) below 5 ºC and above 40 ºC, in the following uses:

Floor and/or wall surfaces with only occasional direct exposure to water, e.g. at a good distance from shower or bathtub.

Floors and/or walls in shower areas or around bathtubs used for a few showers daily, e.g. in ordinary dwellings, multifamily houses and hotels.

Floor and/or wall surfaces with exposure to water more frequent or of longer duration than normally anticipated in dwellings, e.g. public wet rooms, schools and sport facilities.

The various intended uses indicated above do not lead to different assessment criteria and the ETA will cover all intended uses.

Paint kits are placed on the inner surface of the wet room wall. The covering serves as both watertight layer and wearing surface.

The actions on the assembled watertight covering kit, which influence a durable watertight function, depend also on the function and type of substrate. The following table is not an exhaustive list of tests but only indicate the tests related to the type of substrate.

In general, the substrates fall in different types:

	Substrates (usually "rigid"), homogenous but susceptible to cracking	**Substrates (usually "flexible") not susceptible to cracking but with jointing[2]**	**Substrates (usually "rigid") susceptible to cracking and with jointing[1]**
Moisture sensitive substrates	**Examples:** Gypsum blocks **Tests:** 2.2.5; Assessment Category 1,2,3 2.2.9; Assessment Category 1 or 2 with annex G 2.2.10; Assessment Category 1 or 2	**Examples:** Gypsum boards, Wood based materials **Tests:** 2.2.8; Assessment Category 1 or 2 2.2.9; Assessment Category 1 or 2 with annex A and F, or E 2.2.10; Assessment Category 1 or 2	None known
Non moisture sensitive substrates	**Examples:** In-situ concrete, masonry **Tests:** 2.2.5; Assessment Category 1,2,3 2.2.9; Assessment Category 1 or 2 with annex G 2.2.10; Assessment Category 1 or 2	**Examples:** Calcium silicate boards, fibre cement boards **Tests:** 2.2.8; Assessment Category 1 or 2 2.2.9; Assessment Category 1 or 2 with annex A and F, or E 2.2.10; Assessment Category 1 or 2	**Examples:** Concrete or aerated concrete elements **Tests:** 2.2.5; Assessment Category 1,2,3 2.2.8; Assessment Category 1 or 2 2.2.9; Assessment Category 1 or 2 with annex G 2.2.10; Assessment Category 1 or 2

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 consider a working life of the watertight covering kits in general for the intended use of 25 years and of paint kits for the intended use of 10 years when installed in the works (provided that the watertight covering kit for wet room floors and or walls 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 by 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[3].

2 For substrates with un-reinforced filled jointing, the crack bridging ability test must be performed according to 2.2.5

3 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.

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.

The decision on whether to apply assessment category 1, 2 or 3 in 2.2.5 or assessment category 1 or 2 in 2.2.8, 2.2.9 and 2.2.10 depends on the national requirements. These can apply to the strength and stability of the substrate and to the security for the waterproofing kit dependent on the nature of the substrate (moisture sensitive/not moisture sensitive).

2 ESSENTIAL CHARACTERISTICS AND RELEVANT ASSESSMENT METHODS AND CRITERIA

2.1 Essential characteristics of the product

Table 1 shows how the performance of the liquid applied watertight covering kits for wet room floors and/or walls, with or without wearing surface, are established 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
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	Content, emission and/or release of dangerous substances	2.2.2	Description
3	Vapour permeability	2.2.3	Level
4	Water tightness	2.2.4	Level
5	Crack bridging ability*)	2.2.5	Description
6	Bond strength	2.2.6	Description
7	Scratching resistance	2.2.7	Level
8	Joint bridging ability	2.2.8	Level
9	Water tightness around penetrations	2.2.9	Level
10	Resistance to temperature	2.2.10	Description
11	Resistance to water	2.2.11	Description
12	Resistance to alkalinity	2.2.12	Description
13	Resistance to mechanical wear	2.2.13	Level
Basic Works Requirement 4: Safety in use			
14	Slipperiness	2.2.14	Level
15	Reparability	2.2.15	Description
16	Thickness	2.2.16	Level
17	Durability of paint kits	2.2.17	Description

*) *The relevance of this test depends on the substrate covered by the intended use see paragraph 1.2.1*

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

Testing will be limited only to the essential characteristics of the kit which the manufacturer intends to declare. In addition, if for any component covered by a harmonised standard or a European Technical Assessment the manufacturer of that component has included the performance regarding the relevant characteristics in the Declaration of Performance retesting that component for issuing a ETA under the current EAD is not required.

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.

The following assessment methods apply to watertight covering kits in general as well as paint kits, unless a different method is specified for the paint kits.

2.2.1 Reaction to fire

The watertight covering kit for wet room floors and or walls shall be tested according to EN 13501-1 and classified according to Delegated Regulation (EU) 2016/364

The classification shall be stated in the ETA.

2.2.2 Content, emission and/or release of dangerous substances

The performance of the product related to the emissions and/or release and, where appropriate, the content of dangerous substances will be assessed on the basis of the information provided by the manufacturer[4] after identifying the release scenarios taking into account the intended use of the product and the Member States where the manufacturer intends his product to be made available on the market.

The identified intended release scenarios for this product and intended use with respect to dangerous substances are:

IA1: Product with direct contact to indoor air

IA2: Product with indirect contact to indoor air (e.g. covered products) but possible impact on indoor air

SVOC and VOC

For the intended use covered by the release scenario IA1 and/or IA2 semi-volatile organic compounds (SVOC) and volatile organic compounds (VOC) shall be determined in accordance with EN 16516.

The following loading factors are applicable:

Table 2 Loading factor L, depending on the product type (in accordance with EN 16516)

Intended use	Loading factor [m^2/m^3]
Walls	1,0
Floor, ceiling	0,4

4 The manufacturer may be asked to provide to the TAB the REACH related information which he must accompany the DoP with (cf. Article 6(5) of Regulation (EU) No 305/2011).

The manufacturer is **not** obliged:
-to provide the chemical constitution and composition of the product (or of constituents of the product) to the TAB, or
-to provide a written declaration to the TAB stating whether the product (or constituents of the product) contain(s) substances which are classified as dangerous according to Directive 67/548/EEC and Regulation (EC) No 1272/2008 and listed in the "Indicative list on dangerous substances" of the SGDS.

Any information provided by the manufacturer regarding the chemical composition of the products may not be distributed to EOTA or to TABs.

The preparation of the test specimen is performed by using a sample of the product - installed in accordance with the manufacturer's product installation instructions or in absence of such instructions the usual practice of the product installation - on an inert substrate (e.g. glass or stainless steel). For the test specimen all parts of the product including associated components which are specified by the manufacturer such as reinforcement nets, mats or fibres used in the whole kit or partially in the corners and penetrations, and welding bands and sealants for the joints and possible reinforcements for penetrations, gullies etc.- have to be considered proportional. Only products which are used in accommodation areas have to be tested.

Tile adhesives covered by EN 12004 or other adhesives already covered by a harmonized specification are not included in the test specimens.

Once the test specimen has been produced, as described above, it should immediately be placed in the emission test chamber. This time is considered the starting time of the emission test.

The test results have to be reported for the relevant parameters (e.g. chamber size, temperature and relative humidity, air exchange rate, loading factor, size of test specimen, conditioning, production date, arrival date, test period, test result) after 3 and/or 28 days testing.

The product performance shall be expressed in [µg/m³ or mg/m³] and stated in the ETA.

2.2.3 Vapour permeability

The test is carried out in accordance with EN/ISO 12572 on a sample made of gypsum plasterboard with approximately 12,5 mm thickness and a density of approximately 720 kg/m^3. The test shall be performed as described in annex E of EN 12572 and the substrate shall be tested in accordance with annex A of EN 12572. The tests shall be carried out with climatic conditions as described for option C in chapter 7 of EN 12572 or with other climatic conditions, which shall be stated in the ETA.

The application of the watertight covering kit shall be in accordance with the manufacturer’s instructions – including primer etc. if so required. If a primer is intended to have a significant additional function in limiting the water vapour permeability, testing shall be performed on the kit including the primer. Otherwise the test of the water vapour permeability shall be carried out without the primer.

The level shall be stated in the ETA together with the climatic conditions at which the performance was determined.

2.2.4 Water tightness

The water tightness of the watertight covering kit is assessed in accordance with Paragraph A.7 in EN 14891.

The test applies for kits with or without a wearing surface, such as ceramic tiles etc. The test applies for both floor and wall applications.

It shall be stated in the ETA if the watertight covering kit for wet room floors and or walls is watertight.

Paint kit are applied to a sample made of gypsum plasterboard with 13 ± 1 mm thickness and a density of approximately 720 kg/m3. The backside of the specimen is covered with a 0,2-mm polyethylene foil. The test specimen is mounted in the rig without the wooden frame. The specimen is tested according to Annex F with the amendment that the test is performed on 2 test specimens without pipe penetrations and only the first 1500 cycles are carried out.

An additional sample is made on a sheet of non-absorbent material, e.g. aluminium, in order to determine the water absorption in the paint kit

The samples are weighed twice. Before water exposure and again directly after the water exposure. Free water on the surface is wiped off before the weighing.

The weight increase in the samples are measured and the weight increase of the specimens with gypsum substrate, $W_{kit,}$ are corrected with the weight of water retained in the paint kit itself, W_{paint}. i.e. ($W_{substrate} = W_{kit} – W_{paint}$).

The calculated weight increase $W_{substrate}$ shall be stated in the ETA.

2.2.5 Crack bridging ability

The test is only carried out, when the intended use covers substrates susceptible to cracking, see footnote of table 1.

For substrates where a filled joint can be foreseen the test also apply.

The test is carried out in accordance with the method described below:

Testing is to be carried out following the method C.2 of EN 1062-7 with the following precisions; The substrates are reinforced concrete slabs, which are manufactured as described in chapter C.2.2 of the abovementioned standard. The watertight covering is only to be applied onto three of these substrates.

Application of the waterproofing membrane
The application of the watertight covering must take place in a strip of 150 mm over the entire length of the slab so that at the longitudinal edges 25 mm wide strips remain uncovered for observing the cracks in the substrate (surface length × width = 300 mm x 200 mm).

Storage of the prepared test specimen
28 days dry at standard atmosphere 23 ± 2 °C /50 ± 5 % RH.

Testing
After storage the test specimen must be loaded in a bending test apparatus with way/distance control with the load arrangement as shown in figure 2.2.5.1.

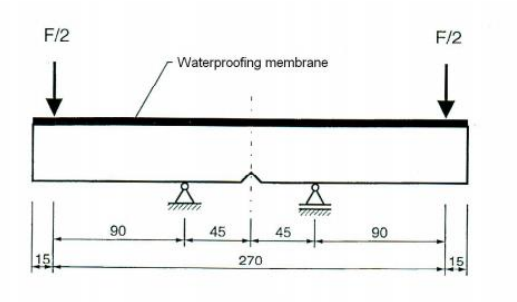


Figure 2.2.5.1. Test set-up for generating cracks by bending of test specimen. Measurements in mm

Bending the test specimen is to be increased constantly by applying a force F until a crack appears on the uncovered sides of the concrete surface. The crack must appear on both sides of the concrete, close to the edge of the watertight material. The velocity of the crack opening is to be 0.02 mm/min. from the point of time a crack is recognizable in the concrete (possible appearance of a light zone in the watertight material) until a crack width of 0,4 mm, 0,75 mm or 1,5 mm respectively (depending on the assessment category) is reached. The crack must be measured – for example using a graduated magnifying glass. The crack width shall be maintained. Each type of change during the following 24 h (incipient crack, tear or through crack) is to be stated in the test report.

It shall be stated in the ETA if 24 h after fixing the crack in the substrate no perforation or through crack (damage) has occurred in the watertight covering

Assessment category 1: Crack width in test: 0,4 mm
Assessment category 2: Crack width in test: 0,75 mm
Assessment category 3: Crack width in test: 1,5 mm

The Assessment Category shall be stated in the ETA, together with the crack width. In addition it shall be stated if 24 h after fixing the crack in the substrate no perforation or through crack (damage) has occurred in the watertight covering

2.2.6 Bond strength

The bond strength of the watertight covering kit to the substrate is assessed in accordance with Paragraph A.6.2 in EN 14891

For kits without a ceramic tile wearing surface the test is carried out without the tile and the tile adhesive, i.e. a square metal plate (50 × 50 mm) is glued with a suitable high strength adhesive, e.g. solvent free epoxy directly to the watertight covering kit. The test is performed according to EN 14891 concerning the speed.

Other substrates may be used upon agreement if the manufacturer recommends the substrate for the watertight covering kit. To demonstrate compatibility with other optional substrates, the membrane shall be applied to the selected substrate in accordance with the initial adhesion test method (A 6.2) in EN 14891. When a result of more or equal the threshold values according to the assessment method is achieved or cohesive failure occurs in the substrate, the requirement is considered satisfied.

If several tile adhesives are envisaged, then a bond strength test is carried out for each adhesive on a concrete substrate with the watertight covering. If more than one substrate is covered by the intended use, then bond strength tests are carried out on every substrate, but only with one adhesive.

The bond strength is to be assessed according to:

Assessment category 1: The bond strength on concrete is ≥ to 0.3 MPa < 0.5 MPa

Assessment category 2: The bond strength on concrete is ≥ to 0.5 MPa

Note. The above-mentioned assessment categories are carried from ETAG 022 part 1

The Assessment category shall be stated in the ETA.

The bond strength of paint kits to the substrate is determined in accordance with EN ISO 4624, method B, with a Ø 50 mm dolly on a substrate of concrete and a force rate of 250 N/s.

Other substrates may be used upon agreement if the manufacturer recommends the substrate for paint kit. To demonstrate compatibility with other optional substrates, the membrane shall be applied to the selected substrate in accordance with the initial adhesion test method in EN ISO 4624.

The bond strength shall be stated in the ETA.

2.2.7 Scratching resistance

The scratching resistance of the watertight covering kit is assessed in accordance with annex C.

The test is only carried out on kits without an envisaged wearing surface.

The test applies for both floor and wall applications.

It shall be stated in the ETA if the watertight covering kit is scratching resistant.

2.2.8 Joint bridging ability

The test is only carried out when the intended use covers substrates susceptible to joint movements, see section 1.2.1, i.e. joints in substrates that are not filled, such as between boards.

The joint bridging ability of watertight covering kit with and without wearing surface at joints subjected to movement of the substrate is tested in accordance with annex B with a 2-mm gap.

For paint kits, the test is performed in accordance with annex B with a 1 mm gap in tension and a 2-mm gap in shear.

The joint bridging ability of the kit is stated in the ETA.

2.2.9 Water tightness around penetrations

The water tightness of the watertight covering kit with and without wearing surface around penetrations, such as floor gullies; pipes and corners etc. is tested for flexible substrates with joints in accordance with annex A and annex F in combination or for rigid substrates without joints in accordance with Annex G. See section 1.2.1.

Products tested according to annexes A and F for flexible substrates do not need to be further tested according to annex G for rigid substrates without joints.

For kits only for use on floors, the assessment shall be carried out based on test according to annex A or G depending on the substrate.

For kits only for use on walls, the assessment shall be carried out based on test according to annex E without applying the loading on the fixtures or G. depending on the substrate.

It shall be stated in the ETA if the kit is watertight.

For paint kits, the water tightness of the paint kit around penetrations, such as pipes and corners etc. shall be assessed on the basis of test according to annex G or E depending on the substrate.

It shall be stated in the ETA if the paint kit is watertight.

2.2.10 Resistance to temperature

The resistance to temperature of the watertight covering kits with or without a wearing surface may be assessed in one of two categories of assessment.

Assessment category 1: According to paragraph A.6.5 in EN 14891

After the test the bond strength shall correspond to the relevant assessment category in 2.2.6.

Assessment category 2: (Applied for substrates susceptible to cracking): In addition to category 1, samples are conditioned according to paragraph A.6.5 in EN 14891 and subsequently tested for crack bridging resistance according to paragraph 2.2.6 of this EAD or for joint bridging ability according to paragraph 2.2.8 of this EAD as relevant.

In addition to assessment category 1, above, the crack bridging ability in 2.2.5 or joint bridging ability in 2.2.8 shall correspond to the relevant assessment category.

The test is carried out for all intended uses.

For kits without a ceramic tile wearing surface the test is carried out without the tile and the tile adhesive, i.e. the metal plate is glued with a suitable high strength adhesive, e.g. solvent free epoxy directly to the watertight covering kit.

The assessment category shall be stated in the ETA.

The resistance to temperature of the paint kit is considered to be done with the exposure to a temperature of 60 ºC used for testing the water tightness, cf. 2.2.4 and 2.2.9

2.2.11 Resistance to water

The resistance to water of watertight covering kits with or without a wearing surface is assessed in accordance with Paragraph A.6.3 in EN 14891.

The test is carried out for all intended uses.

For kits without a ceramic tile wearing surface the test is carried out without the tile and the tile adhesive, i.e. the metal plate is glued with a suitable high strength adhesive, e.g. solvent free epoxy directly to the watertight covering kit.

The bond strength class, after testing the assessment category shall be stated in the ETA.

Bond strength categories are mentioned in 2.2.6.

The resistance to water of the paint kit is considered to be done in testing the water tightness, cf. 2.2.4 and 2.2.9.

2.2.12 Resistance to alkalinity

The resistance to alkalinity of the watertight covering kit is assessed in accordance with Paragraph A.6.9 in EN 14891.

The test is carried out for all intended uses. For kits without a ceramic tile wearing surface the test is carried out without the tile and the tile adhesive, i.e. the metal plate is glued with a suitable high strength adhesive, e.g. solvent free epoxy directly to the watertight covering kit.

The bond strength class, after testing the assessment category shall be stated in the ETA.

Bond strength categories are mentioned in 2.2.6.

2.2.13 Resistance to mechanical wear

The assessment of this characteristic is only relevant for watertight covering kits without a wearing surface.

The assessment of the resistance to mechanical wear of the possible wearing surface of the watertight covering kit shall be undertaken in accordance with the relevant EN-standards for the specified products, e.g. EN 13813 and EN 660-2 applied to the dried liquid watertight covering kit. EN 13813 applies to cement-based watertight coverings and EN 660-2 applies to polymeric watertight coverings.

The test is carried out for all intended uses.

The resistance to mechanical wear shall be stated in the ETA, according to the relevant standard for the specific flooring product e.g. EN 13813 and EN 660-2 depending on the composition of the wearing surface.

The resistance to mechanical wear of the paint kit is considered to be in testing the scratching resistance, cf. 2.2.7.

2.2.14 Slipperiness

This characteristic is only relevant for the wearing surface. Assessment of slip resistance of flooring materials shall be undertaken in accordance with the relevant EN-standards prepared by CEN/TC 339 depending on the composition of the wearing surface. For tile wearing surfaces the test is performed in accordance with EN 14231.

When this performance is assessed the slip resistance of finished floorings in the ETA shall be assessed according to the relevant standard for the specified flooring product. For tile wearing surfaces the performance is stated in the ETA as the SRV “dry” and SRV “wet” values in accordance with EN 14231.

2.2.15 Reparability

A sample of the liquid applied watertight covering kit is prepared according to the bond strength, section 2.2.6.

The sample is conditioned according to EN 14891, section A.6.2.A second layer of the liquid applied watertight covering kit is applied to the first layer according to the manufacturer’s recommendations.

The bond strength test according to 2.2.6 is carried out on the sample.

It is stated in the ETA if it is possible to repair the kit.

2.2.16 Thickness

The thickness of the watertight covering kit is assessed in accordance with annex D, and the level shall be stated in the ETA.

2.2.17 Durability of paint kits

The durability of the paint kits is assessed on the basis of the grey scale of the surface after exposure to different actions.

The test shall be carried out in accordance with the following procedure:

The test is carried out on two samples. The samples are prepared on two wood fibre boards with dimensions 430 mm long, 165 mm wide and 5 mm thick. For the paint kit, the brightest colour shall be chosen, and where available, white shall be used.

The samples are conditioned for 30 days at standard atmosphere 23 ± 2 °C /50 ± 5 % RH.

To simulate the soil a solution made from 9 g of (mild hand) soap, 1 g of carbon black and 600 g of tab water is mixed.

1 ml of the soil solution is applied to the samples with a pipette to form a spot of approx. 35 mm in diameter. The soil spot shall air dry at ambient temperature for three days.

One of the samples is not cleaned and left for reference. The other is leaned according to the following procedure.

The sample is cleaned with a brush made with 20.000 – 25.000 evenly cut pigs hairs with a free length of 18 – 20 mm and a diameter of 0,10 – 0,15 mm. The brush size shall be 80 mm × 30 mm and the weight shall be 450 g ± 10 g.

The brush is fixed in an apparatus so that it is moved over the sample 330 mm back and forth at a speed equal to 33 – 45 cycles per minute. One cycle is 660 mm. The number of cycles shall be recorded.

The cleaning is performed in three steps:

Step 1: The samples is washed down for 1 minute with lukewarm tab water 30 – 35 °C with a water amount of 6 -7 l/m at a distance from the tab of approx. 50 mm and at an angle of 45°. The soil spot shall not be touched and left to dry for 15 minutes. The soil spot is assessed against the grey scale. Any change compared to the reference sample is recorded.

Step 2: The sample is fixed in the cleaning apparatus with the paint kit facing up and in a manner so that the brush can travel in the longitudinal direction of the sample. The brush is dipped in water and placed in the apparatus and set in motion over the sample.

After 20 cycles the cleaning is stopped and the sample is cleaned according to step 1. After 15 minutes drying the remaining soil spot is assessed against the grey scale.

Step 3. The sample is cleaned according to step 2, but the water is replaced with a cleaning agent made from 10 % cat ion active surfactant with 4 % metasilicate/water 1:10., or the cleaning agent specified by the manufacturer.

After 15 minutes drying the remaining soil spot is assessed against the grey scale.

The grey scale category is stated in the ETA for each step of cleaning according to the below grey scale:

Category	Category according to NCS colour code system (grey scale)	Cleaning degree
100/70 %	6500	0
100/60 %	5750	1
100/50 %	5000	2
100/40 %	4500	3
100/30 %	3000	4
100/20 %	2500	5
100/10 %	1500	6
100/0 %		7

3 ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE

3.1 Systems 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 2003/655/EC.

The applicable AVCP system is **2+** except for uses subject to regulations on reaction to fire.

For uses subject to regulations on reaction to fire the applicable AVCP systems regarding reaction to fire are 1, or 3, or 4 depending on the conditions defined in the said Decision.

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.

Table 3 Control plan for the manufacturer; cornerstones

Subject/type of control	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)				
Reaction to fire	EN ISO 11925-2	As defined in the control plan	As defined in the control plan	As defined in control plan
Membrane (liquid components)				
Viscosity	As defined in the control plan	As defined in the control plan	As defined in the control plan	Every batch
Density	As defined in the control plan	As defined in the control plan	As defined in the control plan	Every batch
Mixing sequence/time	As defined in the control plan	As defined in the control plan	As defined in the control plan	Every batch
Curing time	As defined in the control plan	As defined in the control plan	As defined in the control plan	Every batch
Dry content	The analysis shall be carried out at air atmosphere, temperature increase rate 5 °C/min, maximum temperature 1000 °C.	As defined in the control plan	As defined in the control plan	Every batch
Ash content	The analysis shall be carried out at air atmosphere, temperature increase rate 5 °C/min, maximum temperature 1000 °C.	As defined in the control plan	As defined in the control plan	Annual

Subject/type of control	Test or control method *(refer to 2.2 or 3.4)*	Criteria, if any	Minimum number of samples	Minimum frequency of control
Infrared Spectrometry	The infrared spectrometry is carried out at a resolution of 4 cm^{-1} with a measuring range of 4000 - 400. 32 scans are made.	As defined in the control plan	As defined in the control plan	Annual
Primer				
Viscosity	As defined in the control plan	As defined in the control plan	As defined in the control plan	Every batch
Density	As defined in the control plan	As defined in the control plan	As defined in the control plan	Every batch
pH-value	As defined in the control plan	As defined in the control plan	As defined in the control plan	Every batch
Infrared spectrometry	The infrared spectrometry is carried out at a resolution of 4 cm-1 with a measuring range of 4000 - 400. 32 scans are made.	As defined in the control plan	As defined in the control plan	Annual
Adhesive	EN 12004	As defined in the control plan	As defined in the control plan	As defined in EN 12004
Reinforcement				
Colour, thickness, weight build-up	As defined in the control plan	As defined in the control plan	As defined in the control plan	Every delivery

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 the liquid applied watertight covering kits for wet room floors and/or walls are laid down in Table 4.

In this case of AVCP system 2+ applies the cornerstones of the tasks to be undertaken by the notified body are laid down in Table 4.

Table 4 Control plan for the notified body under AVCP system 2+; corner stones

Subject/type of control *(product, raw/constituent material, component - indicating characteristic concerned)*	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				
Initial inspection of the manufacturing plant and of factory production control carried out by the manufacturer regarding the constancy of performance of the liquid applied watertight covering kits for wet room floors and/or walls defined in the control plan (except reaction to fire).	As defined in control plan	As defined in control plan	As defined in control plan	Once a year
Continuous surveillance, assessment and evaluation of factory production control				
Continuous surveillance, assessment and evaluation of the factory production control carried out by the manufacturer regarding the constancy of performance of the liquid applied watertight covering kits for wet room floors and/or walls defined in the control plan (except reaction to fire).	As defined in control plan	As defined in control plan	As defined in control plan	Once a year

Regarding reaction to fire the involvement of the notified body is required only under the conditions defined in 99/90/EC amended by 2001/596/EC – in case of reaction to fire class A1, A2, B, C of the product for which a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification (e.g. an additional of fire retardants or a limiting of organic material).

In this case the cornerstones of the tasks to be undertaken by the notified body under AVCP system 1 are laid down in table 5.

Table 5 Control plan for the notified body under AVCP system 1; corner stones

Subject/type of control *(product, raw/constituent material, component - indicating characteristic concerned)*	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				
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 and taking into account a limiting of organic material and/or the addition of fire retardants.	As defined in control plan	As defined in control plan	As defined in control plan	Once a year
Continuous surveillance, assessment and evaluation of factory production control				
Continuous surveillance, assessment and evaluation of the factory production control carried out by the manufacturer regarding the constancy of performance related to reaction to fire and taking into account a limiting of organic material and/or the addition of fire retardants.	As defined in control plan	As defined in control plan	As defined in control plan	Once a year

4 REFERENCE DOCUMENTS

EN 13501-1:2018 Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests.

EN ISO 11925-2:2020 Reaction to fire tests – Ignitability of products subjected to direct impingement of flame – Part 2: Single-flame source test

EN 16516:2017 Construction products: Assessment of release of dangerous substances – Determination of emissions into indoor air

EN ISO 12572: 2016 Hygrothermal performance of building materials and products – Determination of water vapour transmission properties – Cup method.

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.

EN 1062-7:2004 Paints and varnishes – Coating materials and coating systems for exterior masonry and concrete – Part 7: Determination of crack bridging properties.

EN ISO 4624:2016 Paints and varnishes – Pull-off test for adhesion

EN 13813:2003 Screed material and floor screeds – Screed material – Properties and requirements

EN 660-2/A1:2003 Resilient floor coverings – Determination of wear resistance – Part 2: Frick-Taber Test

EN 12004-1:2017 Adhesives for ceramic tiles – Part 1: Requirements, assessment and verification of constancy of performance classification and marking

EN 14231:2003 Natural stone test methods – Determination of the slip resistance by means of the pendulum tester

ANNEX A – WATER TIGHTNESS AROUND PENETRATIONS AND OTHER DETAILS IN WET ROOM FLOORS WITH FLEXIBLE SUBSTRATE

Scope

The aim of this method is to evaluate the ability of normally used details - such as floor gully, pipe penetrations and in- and outgoing corners – of watertight floors or floor coverings when exposed to water and mechanical stresses.

The test procedure is intended to simulate the mechanical loads and exposure to hot and cold water that can be expected during long-term use in order to assess the performance.

Field of application

The method is applicable to all floors intended for use as watertight floors in wet rooms. The method is intended for floors with a flexible substrate, i.e. plywood, chipboard, gypsum, anhydrite and similar material vulnerable to water, but is not restricted to those.

References

ASTM E-72: Strength Test of Panels for Building Construction.

Definitions

Water tightness in this test refers to penetration of water acting on the surface of the floor and adjoining walls according to the test conditions.

Sampling

One sample is used for the test. The sample is made as a floor with adjoining walls. It shall measure approximately 1200 mm x 1500 mm x 500 mm.

The test specimen shall be made on and fastened to a rack which supports the floor and which creates a space of approximately 0.5 m in height beneath the floor. The supporting rack might for instance be made from timber simulating a wooden subfloor.

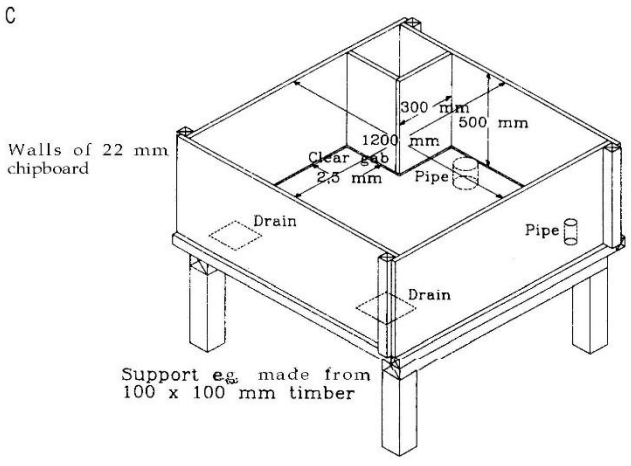


Figure A.1 Dimensions of the test floor

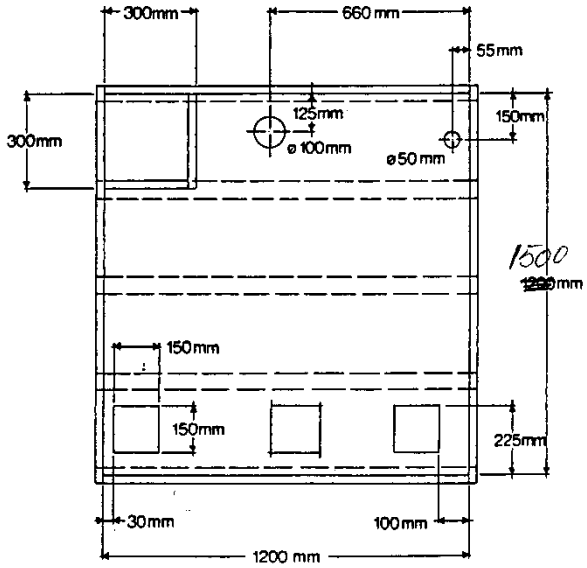


Figure A.2 Plane view of the test floor

The floor and walls of the specimen shall be made from 22 mm chipboard or 19 mm plywood fastened to wooden joists per 300 mm. The joist shall be with dimensions 38 mm x 57 mm. The floor shall form a rectangle approximately1200 mm x 1500 mm with a cut of ca. 300 mm x 300 mm in one corner and a joint in the middle. Walls are simulated with 500 mm high pieces of chipboard with an additionally outgoing corner 300 mm x 300 mm as shown in figure A.1. The walls are screwed together by means of joists in the corners. The walls are placed on the rack so the outgoing corner fits in the cut in the floor. The walls are supported along the perimeter of the floor and are fastened to the floor with screws.

The floor shall be supplied with gullies suitable for use with the floor in question. At least one representative sample of each type of gully intended to be used with the floor i.e. gullies:

- of stainless steel with flange for attaching of collar/membrane figure (typical example shown in figure A.3A
- of plastics – type PE or PP – for attaching of collar/membrane (typical example shown in figure A.3B
- with clamping ring (and collar) (typical examples shown in figure A.4 A and B

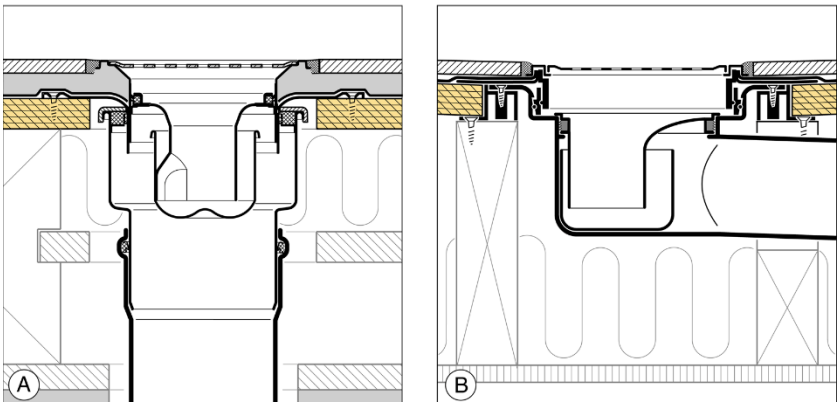


Figure A.3

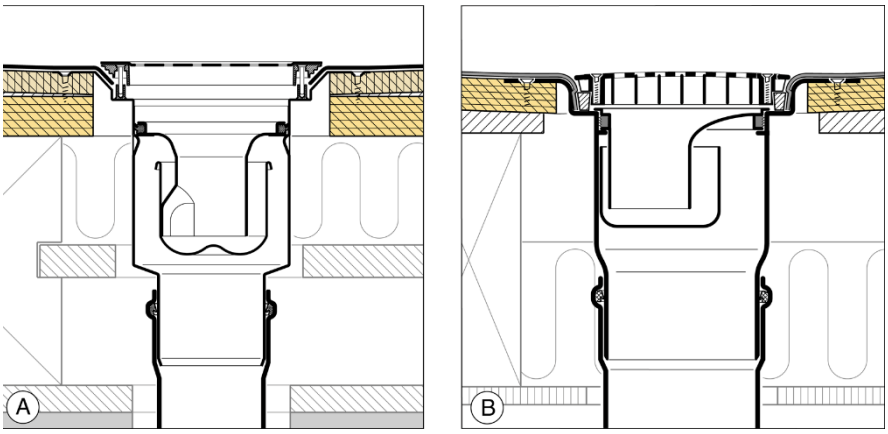


Figure A.4

Further the floor is supplied with at least two PP plastic pipes with different diameter - e.g. 50 and 110 mm - penetrating the floor. The watertight floor covering shall protect subfloor as well as walls. The watertight layer shall be carefully applied including all details – e.g. joints around gullies and between floor and walls (including in- and outgoing corners) and skirtings to pipe penetrations - as recommended by the manufacturer. The waterproof layer on the floor shall for testing purposes continue at least 200 mm up the wall - to form a basin - and be connected to the watertight layer of the wall if this is a different kit. If the same kit is used for floor and wall the watertight covering is continued so the entire floor and wall surfaces are covered.

Waterproofing membranes that are normally used with protective layers, e.g. tiles, are tested without this protection unless something different has been agreed, for example due to the protective layer being an integrated part of the watertight kit.

Method of test

Principle

The water tightness of all details, e.g. penetrations in the floor and in- and outgoing corners, is tested by exposing the floor to a head of water. Afterwards the surface is exposed to a series of dynamic loads and alternating influences from hot and cold water. Finally, the floor is again tested with a head of water.

Apparatus

A sand bag made of leather (according to ASTM E-72). The sand bag shall have a diameter of 250 mm and a mass of 30 kg. The sand shall be placed in a cloth bag, which shall be securely tied and placed inside the leather bag. The sand used shall be dry beach sand with a maximum grain size of 4 mm, 30-60 % able to pass through a sieve of mesh size 0.125 mm.

9 nozzles mounted on water pipes at a distance of about 300 mm from the surface of the floor. The spray of water from the nozzles shall form a cone of about 60°, and shall be evenly distributed. Nozzles shall each give approximately 0.05 l/sec.

Procedure

The floor gullies are blocked in the trap (at the outlet) and the basin formed by the floor is filled with (tap) water to a height of 100 mm above the gullies. After 24 hours it is controlled visually and/or with a moisture meter if water has penetrated.

The test specimen is left to dry in accordance with the Manufacturer’s Instructions, otherwise the test is performed after 24 hours.

The floor is - in 5 different places - exposed to a dynamic load by the bag falling 3 times from 0.45 m. A protection of e.g. 18 mm plywood 200 x 200 mm with rounded edges is placed on points where the dynamic loads are applied.

At least 1 of the impacts shall be so close to the edge of a gully that the edge of the bag just touches the gully.

After the mechanical exposure the test sample is again filled with water to create a head of water of 100 mm above the gullies. After 24 hours the floor is again controlled from beneath for any signs of water penetration.

If the floor still proves to be watertight, the following exposure to hot and cold water is carried out.

1) Hot and cold water is alternately led into the floor gullies in such a way that the water is applied on the edge/flange of the gullies (at the joint between the gully and the floor). The water can be applied successively to one gully at a time or to all three gullies at the same time depending on the test equipment. The water supply shall be in accordance with the following cycle:

Hot water (90 $\pm$ 3 °C) 0.3 litre/sec for 60 sec,

Pause for 60 sec,

Cold water (10 $\pm$ 3 °C) 0.3 litre/sec for 60 sec,

Pause for 60 sec.

The temperature is measured at the nozzle.

The cycle is repeated 100 times.

2) From the nozzles, hot and cold water is alternately sprayed over the details, see figure A.2 of the floor construction, e.g. gullies, pipes and corners. The nozzles are mounted at least 300 mm from the floor and/or wall surfaces. The water is applied with the following cycle:

Hot water (60 $\pm$ 3 °C) for 60 sec,

Pause for 60 sec.

Cold water (10 $\pm$ 3 °C) for 60 sec,

Pause for 60 sec.

The temperature is measured at the nozzle.

In the gullies an arrangement for simulating blocked floor drains shall be mounted, so that the water level rises 20 mm above the gully during each spraying period.

The cycle is repeated 1500 times.

After the exposure the specimen is controlled for any signs of damage or leakage.

After the hot and cold-water exposure, the test sample is again filled with water to create a head of water of 100 mm above the gullies. After 7 days the test is terminated and the details are controlled for any signs of water penetration from beneath.

Supplementary humidification of material/substrate around details considered vulnerable may be recorded with a moisture meter preferably after opening the construction.

Expression of results

As result of the test is stated whether the product is assessed to be watertight. There shall be no signs of water penetration after the test e.g. after visual inspection and possible measurement of humidity level around sensitive details or by opening the membrane for visual inspection of humidity in the substrate under the membrane.

Test report

The test report should include the following information:

a) Name and address of the testing laboratory

b) Identification number of the test report

c) Name and address of the organization or the person who ordered the test

d) Purpose of the test

e) Method of sampling and other circumstances (date and person responsible for sampling)

f) Name and address of manufacturer of the tested material or kit.

g) Name or identification marks of the tested product or products

h) Description of the tested object

i) Date of supply of the tested object

j) Date of test

k) Test method

l) Conditioning of the test specimens, environmental data during the test (temperature, relative humidity etc.)

m) Identification of the test equipment and instruments used

n) Any deviations from the test method

o) Test results and an indication on which way the water penetration was observed, re. Expression of results

j) Date and signature

ANNEX B - IMPERMEABILITY WHEN SUBJECTED TO MOVEMENT OF THE UNDERLYING MATERIAL - TENSILE AND SHEAR LOADING

Scope

The aim of this method is to test watertight layers intended for use in wet rooms. This method is used to assess the ability of the watertight layer to maintain its impermeability when tensile or shear movements occur at joints in the material and/or at borders between materials in the substrate.

Application

The method is applicable for liquid applied waterproofing membranes including any sealing strips, plastic wall cladding and paint-based kits intended for use in wet room areas.

Sampling

Tensile testing

Make two rectangular test pieces of a shape as described below.

Liquid applied watertight covering kits

Apply the liquid applied waterproofing membrane including any sealings strips to a substrate consisting of 2 hard fibreboard sheets about 165 x 125 mm in size. Place the 2 fibreboard sheets close together and apply the test material to an area of 150 x 250 mm in accordance with the manufacturer's instructions. A thin piece of polyethene film may be placed in the gap between the fibreboard sheets in order to prevent them from being adhesively bonded together, see Figure B.1.

Flexible sheet watertight covering kits

Cut the plastic wall cladding to a size of 150 x 250 mm, with the long side across the direction of the material. Using the adhesive recommended by the manufacturer, bond the material to a substrate of 2 hard fibreboard sheets about 165 x 125 mm in size. Place the 2 fibreboard sheets close together, and apply the test material in accordance with the manufacturer's instructions A thin piece of polyethene film may be placed in the gap between the fibreboard sheets in order to prevent them from being adhesively bonded together, see Figure B.1.

Paint-based kits for wet room areas

For paint-based kits containing glass fibre fabric or similar materials, a size of 150 x 250 mm, with the long side across the direction of the material. Using the adhesive/paint recommended by the manufacturer, apply the test material to a substrate of 2 hard fibreboard sheets about 165 x 125 mm in size. Place the 2 fibreboard sheets close together, and apply the glass fibre or similar material in accordance with the manufacturer's instructions. Then apply the paint kit in accordance with the manufacturer's instructions. A thin piece of polyethene film may be placed in the gap between the fibreboard sheets in order to prevent them from being adhesively bonded together, see Figure B.1.

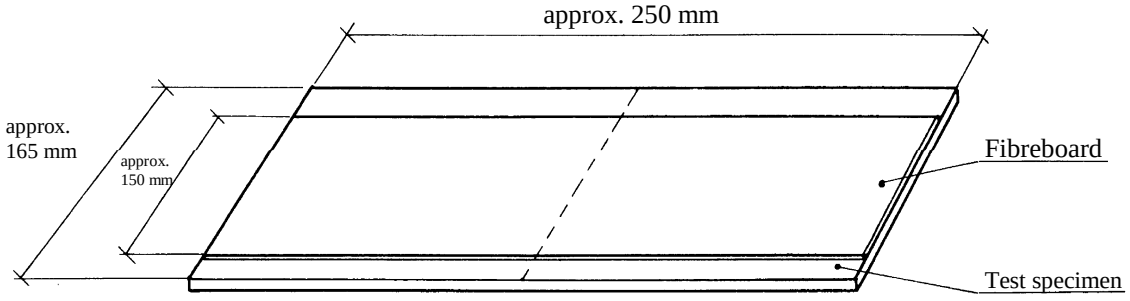


Figure B.1.

Shear loading

Make two rectangular test pieces of a shape as described below:

Liquid applied watertight covering kits

Apply the liquid applied waterproofing membranes ceramic wet room kit, with its sealings strips to a substrate of 2 hard, angled fibreboard sheets. Place the 2 angled sheets close together and apply the test material in accordance with the manufacturer's instructions. A thin piece of polyethene film may be placed in the gap between the fibreboard sheets in order to prevent them from being adhesively bonded together, see Figure B.2.

Flexible sheet watertight covering kits

Cut the material to be tested to a size of 160 x 180 mm, with the long side in the direction of the material. Place the 2 angled sheets close together and apply the test material in accordance with the manufacturer's instructions. A thin piece of polyethene film may be placed in the gap between the fibreboard sheets in order to prevent them from being adhesively bonded together, see Figure B.2.

Paint-based kits for wet room areas

For paint-based kit containing glass fibre fabric or similar materials, cut the material to a size of 160 x 180 mm, with the long side in the direction of the material. Using the adhesive/paint recommended by the manufacturer, apply the test material to a substrate of 2 hard, angled fibreboard sheets. Place the 2 fibreboard sheets close together, and apply the glass fibre or similar material in accordance with the manufacturer's instructions. Then apply the paint kit in accordance with the manufacturer's instructions. A thin piece of polyethene film may be placed in the gap between the fibreboard sheets in order to prevent them from being adhesively bonded together, see Figure B.2.

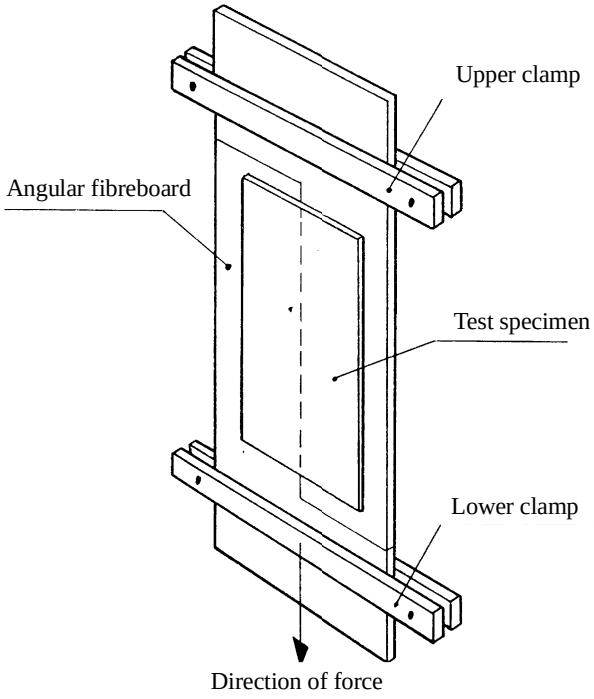


Figure B.2.

Method of test

Principle

The watertight layer is exposed to tension and/or shear and afterwards it is controlled with a vacuum chamber whether the water tightness of the layer is maintained.

Equipment

- Tensile testing machine, capable of providing a load application rate of 0,5 ± 0,1 mm/min and having a clamping device that distributes the clamping force evenly across the width of the test piece.
- 10 mm thick hard fibreboard sheet 165 x 125 mm for application of the test material for tensile testing.
- 10 mm thick hard fibreboard sheet, sawn into shaped pieces as shown in Figure B.2 for application of the test material for shear load testing.

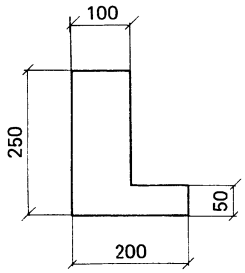


Figure B.3.

- Two spacers 1 mm thick and 2, 2 mm thick, for making and maintaining the gap between the 2 fibreboard sheets of the test piece.
- A conditioning room 23 ± 2 °C and 50 ± 5 % RH.
- Vacuum chamber for checking the impermeability of the material after tensile or shear loading. The equipment to be in the form of a transparent bottomless box which forms a vacuum chamber when applied to the test surface.

  The size of the box shall be sufficient to cover most of the joint that has been subjected to tensile or shear loading. The size of the box shall be so big that it covers the entire sealing otherwise - if the box is too small to cover the entire sealing - the test has to be repeated.

  The lower edges of the sides of the box shall be in the same plane, and shall be covered by soft sealing strips.

- Vacuum pump or other means by which a negative pressure of at least 20 kPa can be established and maintained in the vacuum chamber described above.
- Leak tracing liquid that can be sprayed, brushed or poured on to the surface to be tested. A suitable liquid is water mixed with dishwashing detergent, or water alone.

Procedure

After applying the test material, place the test pieces horizontally on a level base and allow them to dry in the conditioning climate in accordance with the Manufacturer's Instructions, otherwise the test is performed after one week.

Perform the tests in the conditioning climate.

Attach the ends of the test piece in the tensile testing machine, ensuring that the 2 sheets are not moved relative to each other.

Apply a tensile or shear load to the test piece at a deformation rate of 0,5 ± 0,1 mm per minute until the gap width (1 or 2 mm) as given in the requirements is reached. When the desired gap width has been reached, place the spacers in the gap to maintain the tensile or shear load. The test piece can then be removed from the tensile testing machine and placed on a flat base.

When the test piece has been subjected to tensile or shear loading from the spacers for about five minutes, apply the leak-indicating liquid to the material and place the vacuum chamber over the joint to which the load is applied. Reduce the pressure in the vacuum chamber to about 20 kPa, and inspect the area under test through the transparent top of the vacuum chamber. Any leaks will be revealed by the formation of air bubbles in the film of liquid. Maintain the prescribed negative pressure for at least 30 seconds.

Remark: Air can be trapped, and briefly produce bubbles, in pores in the material that do not pass right through the material. In such cases, bubble formation usually declines significantly with time as the leak-indicating liquid is sucked out of the pores. Inspect areas where bubbles have formed and then stopped in order to make a final assessment of the impermeability.

Expression of results

The test result is given as an information on whether leaks occurred or not, i.e. whether the watertight layer passed or failed the test.

Test report

Give details of the following in the test report:

a) Name and address of the testing laboratory
b) Identification number of the test report
c) Name and address of the organization or the person who ordered the test
d) Purpose of the test
e) Method of sampling and other circumstances (date and person responsible for sampling)
f) Name and address of manufacturer of the tested material or kit.
g) Name or identification marks of the tested product or products
h) Description of the tested object
i) Date of supply of the tested object
j) Date of test
k) Test method
l) Conditioning of the test specimens, environmental data during the test (temperature, relative humidity etc.)
m) Identification of the test equipment and instruments used
n) Any deviations from the test method
o) Test results
p) Date and signature

ANNEX C - TEST FOR SCRATCHING RESISTANCE

Scope

The purpose of the test is to assess the resistance of building surfaces to scratching. For testing purposes such scratchings are simulated by means of an impact body having a hard and rough surface.

Field of application

The method is used for wet room coverings without wearing surface, such as paints and thin resilient coverings. The coverings can be tested only when applied to a base, e.g. a board. The test is for use in a laboratory using small test specimens. The method is used to assess whether a watertight covering will be perforated when exposed to mechanical loads.

Definitions

The resistance of a surface to scratching is given as the depth of the mark produced by a blow from an impact body having a hard and rough surface.

For a waterproof covering the resistance is supplementary given as its ability to resist perforation due to a blow from the impact body.

Sampling

The waterproofing covering shall be applied on a board material commonly used for walls in wet rooms, e.g. gypsum boards, in accordance with the manufacturer's instructions. The components used shall be stated.

Method of test

Principle

The test specimen is fixed to a steel frame and supported in a well-defined manner by a suspended concrete slab, the mass of which is large compared to that of the test specimen. An impact body at the end of a pendulum is caused to strike against the test specimen at an angle of 20° relative to the surface.

Apparatus

The impact body used is a steel disc, 20 mm thick and with a diameter of 94 mm. The edge of the disc is of a roughness, defined as a thread with the designation M6 × 0,5. It is made of UHB Arne Steel, diameter 6 mm. When the thread has been cut and the steel bent to fit the shape of the disc, it is hardened and tempered according to specifications.

The final diameter of the disc, measured to the edge of the round steel, should be 100 ± 1 mm. The total weight of the disc and round steel should be 10 N ± 0,1 N.

The steel disc is suspended from a 12-mm steel rod fastened to the centre of the disc and at right angles to its surface. The length of the rod being 600 mm ± 5 mm measured from the point of suspension to the centre of gravity of the disc, see figure C.1.

At the top the pendulum is attached to a universal joint allowing the bob to swing freely in two planes, but not to revolve around the axis of the rod. This means that the bob after having touched the surface of the test specimen will continue its movement until it is intercepted, either by the operator, or by a mechanical device. The total energy released by bob and pendulum is approx. 7,5 Nm.

The pendulum is suspended in a frame in which the test specimen is also fixed. The arrangement of the frame should be such that the same test specimen may be subjected to several blows.

To establish a well-defined rigidity during the test, the specimen is supported by a concrete slab, which weighs 300 N ± 50 N. The concrete slab is suspended by means of two steel wires, 3 mm in diameter. To ensure that the test specimen is well supported, a steel plate of the dimensions 80 × 150 × 20 mm is secured by an adhesive to the concrete slab.

Before the test is carried out, the pendulum is raised to a horizontal position, which results in a drop of 600 mm. In this position the pendulum is held by a release mechanism, which ensures that the impact against the test specimen is guided accurately and the angle of 20° relative to the surface is maintained.

The reference surface used is a steel plate not less than 5 mm thick (d = 100 mm) with a hole (d = 25 mm) at the centre through which the contact point of the watch dial may pass. The contact point is a ball with a diameter of 3 mm.

Preparation of test samples

Minimum dimensions of a test specimen are 100 mm × 150 mm. Ten tests should be carried out on each test specimen, and 300 mm × 600 mm is consequently a suitable size. The apparatus should be flexible enough to allow test specimens up to 100 mm in thickness to be tested. Test specimens should be conditioned in air at a temperature of 23 ± 2°C and a relative humidity of 50 ± 5 %. The coverings should be applied to a substrate specified by the manufacturer.

Procedure

Secure the test specimen in the frame so that the concrete slab with the steel plate rests lightly on the back of the test specimen. Next ensure that the bob, when at rest in a vertical position, just touches the point, which is intended to be the point of impact. Raise the pendulum to its horizontal position and activate the release mechanism. When the pendulum swings it impinges on the test specimen with an energy of approximately 7,5 Nm. Afterwards change the position of the test specimen on the frame and repeat the impact on other points of the test specimen and, if required, on other specimens, until altogether ten individual tests have been carried out.

A visual inspection is made to ascertain whether the surface covering is perforated. If no visible perforation is observed a supplementary test using the method described in Annex F is performed to assess the water tightness of the wall covering.

Before each test any residues of material left in the rough edge of the impact body shall be removed. On each test specimen the distance between points of impact should be not less than 50 mm and between the point of application and the edge not less than 50 mm.

Expression of results

A visual inspection is made to determine if the covering has been penetrated.

Accuracy

The method provides reproducible results within a wide field ranging from soft to hard coverings.

Test report

The test report should give the following information:

a) Name and address of the testing laboratory
b) Identification number of the test report
c) Name and address of the organisation or the person who ordered the test
d) Purpose of the test
e) Method of sampling and other circumstances (date and person responsible for sampling)
f) Name and address of manufacturer of the tested material or kit.
g) Name or identification marks of the tested product or products
h) Description of the tested object
i) Date of supply of the tested object
j) Date of test
k) Test method

l) Conditioning of the test specimens, environmental data during the test (temperature, relative humidity etc.)

m) Identification of the test equipment and instruments used

n) Any deviations from the test method

o) Test results

p) Date and signature

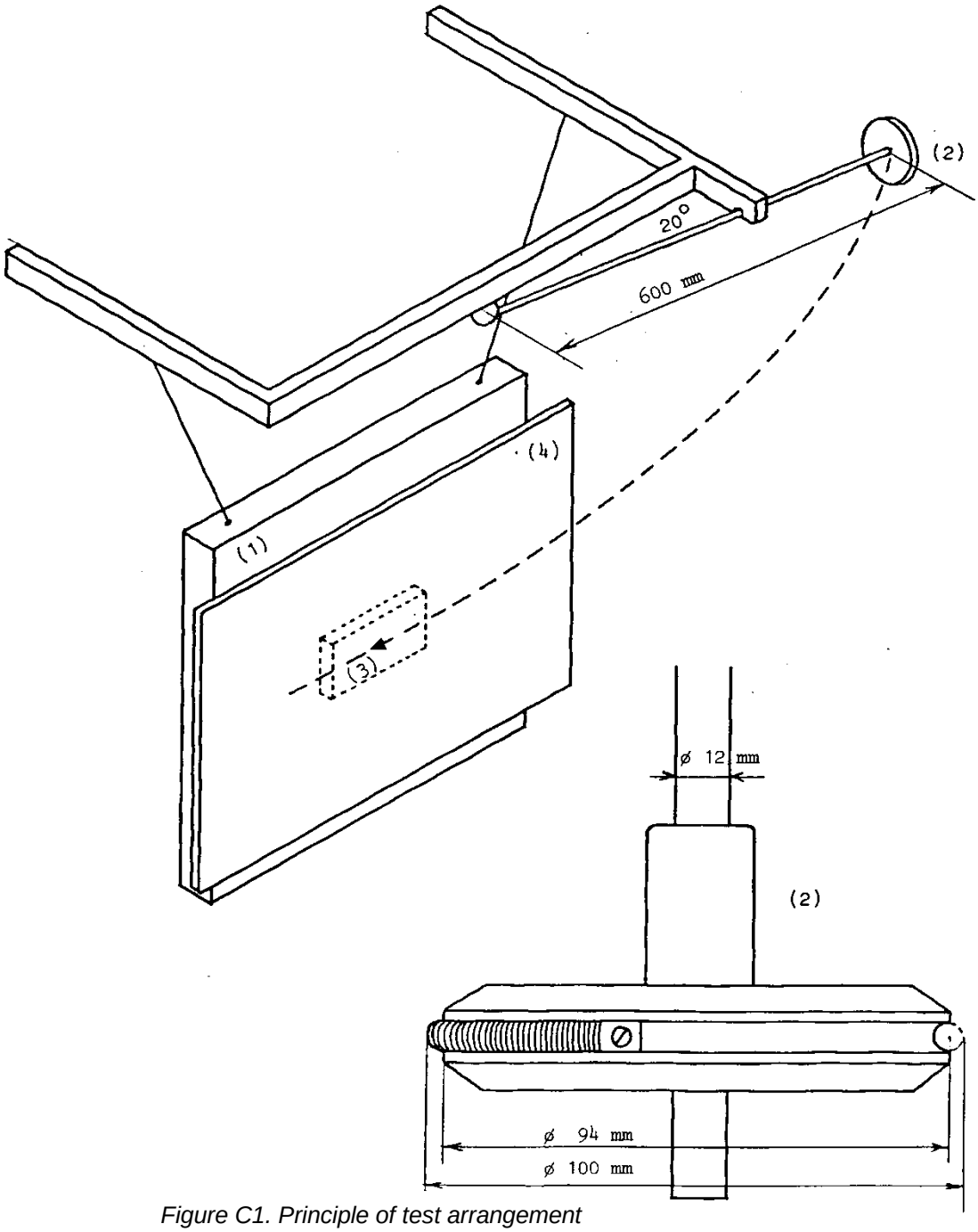


Figure C1. Principle of test arrangement

1) Concrete slab
2) Impact body
3) Steel plate
4) Test specimen

ANNEX D –THICKNESS OF MEMBRANE

Scope

The scope of this method is to determine the thickness of waterproofing membranes applied in liquid form. The test for thickness is meant for the finished membrane, i.e. after drying/hardening.

Field of application

The method is applicable to all waterproofing membranes intended for use on walls or floors in wet rooms.

Preparation of test samples

Only one sample is used for the test. The sample is made in the laboratory as a board material on which the waterproofing membrane is applied as described by the manufacturer. A commonly used board type should be selected as substrate in collaboration with the manufacturer, for example gypsum boards. The membrane is applied on a vertical test specimen.

Method of test

Principle

The waterproofing membrane is applied to a board material. The weight of the applied material and the thickness of the finished and hardened membrane are determined.

On basis of the measured thickness and the amount of material used the thickness in mm/kg may be determined *or* alternatively kg/mm, i.e. the amount of fluid membrane required to obtain 1 mm thickness of the finished membrane.

Apparatus

A scale with an accuracy of 1 g**.**

A magnifying glass with built in rule.

A conditioning chamber with 23°C ± 2°C and 50 ± 5 % RH.

Procedure

The waterproofing membrane is applied to a board material that should be at least 1 m^2. The application is performed in accordance with the manufacturer's description, and should include primer, reinforcement mesh etc. – if so required – the correct number of coats and the required drying/hardening time in between each coat.

The amount of membrane applied is determined by weighing the pot -including the application tool – before and after application.

When the application is finished the test specimen is conditioned at 23 °C and 50 % RH in accordance with the Manufacturer's Instructions, otherwise the test is performed after one week to allow drying/hardening of the membrane.

After hardening the board is cut in two halves and the cut edge is trimmed with a sharp knife in order to get a clean cut through the finished membrane.

Ten points along the cut are chosen randomly. In each of the 10 points the thickness of the finished membrane is measured by means of a magnifying glass with a rule/measure.

The average thickness and the standard deviation are calculated on basis of the individual results.

On basis of the measured thickness and the amount of material used the thickness in mm/kg may be determined *or* alternatively kg/mm, i.e. the amount of fluid membrane required to obtain 1 mm thickness of the finished membrane.

Expression of results

The result of the test is given either as kg/(mm x m^2) or in (m^2 x mm)/kg.

The result of the assessment of the applicability of the membrane is reported.

Test report

The test report should give the following information:

a) Name and address of the testing laboratory
b) Identification number of the test report
c) Name and address of the organisation or the person who ordered the test
d) Purpose of the test
e) Method of sampling and other circumstances (date and person responsible for sampling)
f) Name and address of manufacturer of the tested material or kit.
g) Name or identification marks of the tested product or products
h) Description of the tested object
i) Date of supply of the tested object
j) Date of test
k) Test method
l) Conditioning of the test specimens, environmental data during the test (temperature, relative humidity etc.)
m) Identification of the test equipment and instruments used
n) Any deviations from the test method
o) Test results
p) Inaccuracy or uncertainty of the test results
q) Date and signature

ANNEX E - WATER TIGHTNESS AND RESISTANCE TO WATER AND MOISTURE OF WALLS WITH FLEXIBLE SUBSTRATE

Scope

The scope of this method is to evaluate the suitability of walls and/or wall coverings in wet rooms, i.e. bathrooms or other rooms with a similar exposure to water. The test is intended to simulate the effect of long-term use.

Field of application

The method is applicable to all walls and/or wall coverings intended for use as watertight coverings on walls in wet rooms with flexible substrate.

Definitions

Water tightness in this connection refers to the resistance to water penetrating through the wall during the test.

Sampling

Only one sample is used for the test. The sample is constructed in the laboratory as a test wall between adjoining floor and ceiling (which is normally permanent and not part of the kit).

For the test of watertight membranes a commonly used wall type should be selected as substrate in collaboration with the manufacturer, for example gypsum boards on a steel framed partition, the gypsum boards shall be ordinary boards (gypsum board for indoor uses without any waterproofing or fire retardant surface treatments. Preferably the type of test wall selected shall be the one assessed to be most critical for the membrane to be tested. If relevant the test may be performed on the watertight membrane without the final cladding, e.g. ceramic tiles.

The test wall shall be made in accordance with the manufacturer's instructions and shall be made in the same way as intended to be used in practice. The wall shall be at least 2,3 m high and shall be specified by number and type of studs, fastenings, reinforcement for wash basin, toilet etc. For membranes or other watertight layers the application shall be in accordance with the instructions/directions of the manufacturer.

The test wall shall have at least one salient corner (facing into the room) and one window situated approximately 1.2 m above floor level and 0.3 m from adjoining walls. Four water pipes and one drainpipe shall penetrate the wall. Two of the water pipes shall be perpendicular to the surface of the wall and the penetration shall be made and fixed to the wall in the same way as specified by the manufacturer. Two of the water pipes shall be PEX pipes connected via 2 junction boxes mounted according to the manufacturer's description. The ends of the pipes shall be plugged.

Two supports for a wash basin are mounted approximately 0.8 m above floor level.

When relevant the test specimen might include other details than described above, e.g. support railings for disabled persons.

In order to facilitate the assessment of whether water is penetrating into or through the wall during the test, a moisture indicator might be applied to parts of the wall and/or the moisture content in wood, gypsum boards etc. might be recorded during the test by means of a moisture meter.

Method of testing

Principle

The wall is exposed to alternating influences from hot and cold water. The pipe penetrations and the support for the wash basin are exposed to short term mechanical loads.

Apparatus

A test rig consisting of a watertight floor with a floor gully, a ceiling and two walls. In the walls of the test rig there shall be a door and an inlet for air near the floor, e.g. under the door and an outlet for air near the ceiling. The test rig shall allow test walls to be made with realistic details.

7 nozzles mounted about 1 m above floor level and at a distance of about 300 mm from the surface of the wall. The nozzles shall be connected to water pipes or tubes. The spray of water from the nozzles shall form a cone of about 60° and shall be evenly distributed. The nozzles shall each give approximately 0.05 l/sec.

Facilities to provide the test rig with hot and cold water and to control the relative humidity according to the following schedule:

- Hot water (60±3°C) for 60 sec
- Pause for 60 sec
- Cold water for (10±3°C) for 60 sec
- Pause for 60 sec

The temperature is measured at the nozzle

The cycle is repeated 1500 times

A device to test the resistance to dynamic forces of the pipes penetrating the walls simulating the use – including repair – of the installation. The device consists of a small electric motor, e.g. a wiper motor, equipped with a rotating arm with a weight at the end. The length of the rotating arm is 250 mm and the mass of the deadweight is 0.3 kg. The arm shall rotate at 45 revolutions per minute. The motor shall be provided with means for connecting it to the pipe penetrating the wall. The mass of the entire device is 2.3 kg. The rotating arm shall be at a distance of approximately 200 mm from the wall surface

Moisture indicator, e.g. 1 part methylene blue and 200 parts talcum by weight, and/or moisture sensors or moisture meters.

Preparation of test samples

The test sample is constructed as described above (Section 5). If necessary, for example to allow curing of membranes or adhesives, the entire construction is left in the test laboratory for sufficient time to allow hardening, drying out etc. There are no specific requirements to the temperature and humidity in the laboratory during the conditioning. For finished wall surfaces the surface is washed with water with an admixture of neutral detergent immediately before the testing.

To facilitate the assessment of the water tightness of the bushing for the water pipes it is recommended to record the moisture content around the bushing during the test, e.g. by mounting moisture sensors in the wall.

Procedure

A static load of 1500 N facing vertical down is applied via a crossbar in the centre between the wash basin supports at a distance of 300 mm from the wall (simulating a load on the front of a wash basin) or alternatively the load is applied with 750 N on each support. The load is removed after 5 minutes. The deflections of the supports are measured at a distance of 300 mm from the wall prior to the loading and 10 minutes after the load has been removed. Any signs of damage are recorded.

The nozzles are placed so the spray points towards the most critical parts of the wall, e.g. joints, corners and pipe penetrations.

The walls are exposed to hot water and cold water, according to the schedule in section 6.2. The exposure is repeated 1500 times.

After 1500 cycles the device for mechanical testing is in turn mounted on one penetration for water pipes of each type (at a distance of 200 mm from the wall surface). The motor shall run for 24 hours.

The exposure to hot and cold water according to the schedule in section 6.2 for 1500 cycles is repeated.

Any penetrations of water, change in appearance, change in moisture content etc., shall be recorded.

Finally, the wall is dismounted and any water penetrations, dimensional changes or other factors, which may have influence on the durability, are noted.

Expression of results

The wall is said to be watertight if there is no sign of water penetrating the wall e.g. after visual inspection and possible measurement of humidity level around sensitive details or by opening the membrane for visual inspection of humidity in the substrate under the membrane.

If no damage, e.g. dimensional changes, has occurred the wall is said to be water-resistant.

The loads applied on wash basin etc. should not result in major residual deflections.

Test report
The test report should give the following information:

a) Name and address of the testing laboratory
b) Identification number of the test report
c) Name and address of the organisation or the person who ordered the test
d) Purpose of the test
e) Method of sampling and other circumstances (date and person responsible for sampling)
f) Name and address of manufacturer of the tested material or kit.
g) Name or identification marks of the tested product or products
h) Description of the tested object
i) Date of supply of the tested object
j) Date of test
k) Test method
l) Conditioning of the test specimens, environmental data during the test (temperature, relative humidity etc.)
m) Identification of the test equipment and instruments used
n) Any deviations from the test method
o) Test results and an indication on which way the water penetration was observed, re. Expression of results
p) Date and signature

ANNEX F - WATER TIGHTNESS AROUND PENETRATIONS AND OTHER DETAILS IN WET ROOM WALLS WITH FLEXIBLE SUB-STRATE

Scope

The aim of this method is to evaluate the water tightness of normally used details, e.g. joints and bushings for water pipes and taps of watertight walls or wall coverings for wet rooms. The test procedure is intended to simulate the mechanical loads and exposure to hot and cold water that can be expected during long-term use in order to verify satisfactory performance.

Field of application

The method is applicable to all walls intended for use as watertight walls in wet rooms. The method is intended for walls with flexible substrate, i.e. plywood, chipboard, gypsum, anhydrite and similar material vulnerable to water, but is not restricted to those.

Definitions

The water tightness of a membrane including its attachment to bushings of water pipes and taps etc. is defined as its ability to prevent penetration of water during the test.

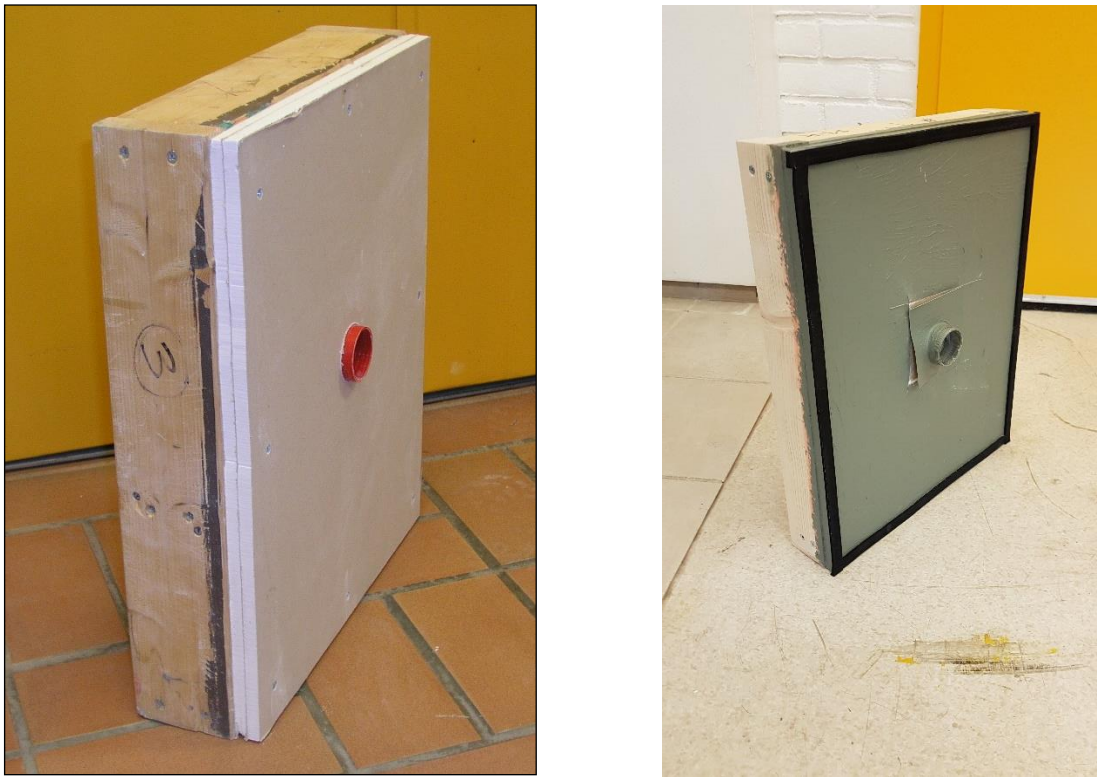


Figure F.1. Test piece of 2 layers of 13 mm gypsum fixed to a frame of steel or wood before and after application of membrane.

Preparation of test pieces

At least 2 test pieces for each detail to be assessed e.g. :

- 2 test pieces for wall boxes belonging to pipe in tube system
- 2 test pieces for water pipes

are used. The test piece is made from 13 ± 1 mm ordinary gypsum board (gypsum board for indoor uses without any waterproofing or fire retardant surface treatments) measuring approximately 535 mm x 435 mm and fixed to a frame made from steel or wood.

The test pieces are made with normally used details, e.g. including bushings, mounting boxes etc. The mounting of bushings etc. shall be in accordance with the manufacturer's instructions. A suitable tap/piece of pipe - closed at the end - is mounted in the bushing and/or mounting box.

The waterproofing layer is attached to the front and on all four edges. Besides it shall preferably cover the outermost 10 mm of the backside in order to prevent water from entering this way.

For some bushings etc. application of ceramic tiles may be necessary in order to get a proper mounting/functioning of the bushing.

Test method

Principle

The test specimens are exposed to cycles of hot water spraying, cold water spraying, drying, and mechanical forces. The accumulation of moisture in the test specimens is recorded.

Apparatus

The following is used for the test:

– Frames for mounting the test pieces. The frames shall have an opening of 400 x 500 mm and shall form a watertight joint with the watertight layer or the wall surface depending on the type of specimen. A seal with a soft, hollow rubber profile is suitable, see Fig. 2 and 3.

– A chamber for mounting the test pieces and exposing to alternating hot and cold water

– Nozzles giving 0.05 l/sec water. The nozzles shall distribute the water evenly over the surface of the specimen, see Fig. F.4.

– Facilities to provide the test pieces with hot (60±3°C) and cold (10±3°C) water

– Mounting steel frame for the test pieces under exposure to dynamic load, see Fig. F.5.

– A device to test the resistance of the water pipes to mechanical forces simulating the use – including repair – of the installation. The device consists of a small electric motor, e.g. a wiper motor, equipped with a rotating arm with a dead-weight at the end. The length of the rotating arm is 250 mm and the dead weight has a mass of 0.3 kg. The arm shall rotate at 45 revolutions per minute. The motor is provided with e.g. a piece of pipe on the back so that it can be connected to the pipe penetrating the wall. The mass of the entire device is 2,3 kg. The rotating arm shall be placed at a distance of approx. 200 mm from the wall surface, see Fig. 5.

– A moisture meter (resistance) used for measurement of moisture content in wood. A moisture meter is also applicable for detecting of changes in the humidity of gypsum boards during the test.

- A climate chamber with 23 ±2 °C and 50 ± 5 % RH.

Figure F.2. Sealing with a soft (hollow) rubber profile.

Figure F.3. Close up of rubber profile

Figure F.4. Nozzles for water spraying – close up and overview.

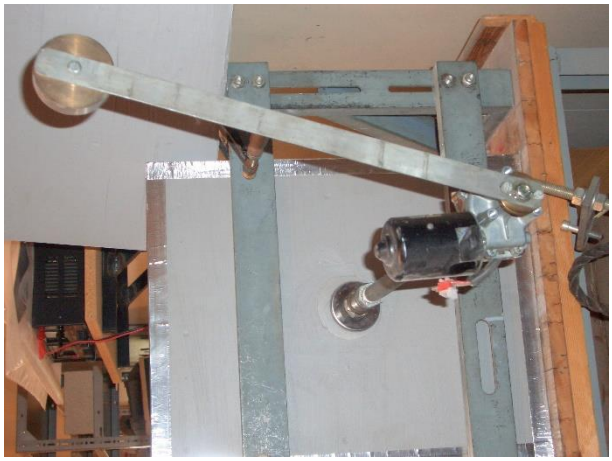


Figure F.5. Device for testing of bushings to dynamic load Note: the photo is of an earlier device giving a more harsh load.

Figure F.6. Overview of test rig

Preparation of test pieces

The test specimens are conditioned in accordance with the Manufacturer's Instructions, otherwise the test is performed after a week in a climate of 23 ±2 °C and 50 ± 5 % RH.

Procedure

After conditioning the test pieces are mounted in the frames and the test pieces are exposed to the following cycles:

Hot water (60±3°C) for 60 sec

Pause for 60 sec

Cold water for (10±3°C) for 60 sec

Pause for 60 sec

The temperature is measured at the nozzle

The cycle is repeated 1500 times

After 1500 cycles the test pieces are demounted and exposed to a dynamic load.

The device for dynamic loading is mounted on one of the water pipes at a distance of 0,2 m from the wall surface. The motor shall run for 24 hours.

Hereafter the test pieces are remounted in the frames and exposed to further 1500 cycles of hot and cold water as described above.

After the 1500 cycles the test pieces are demounted.

Expression of results

The results of the tests are given as the difference between the moisture content near the water pipe bushings and the rest of the board or as changes in moisture content of the gypsum board near the details, e.g. around penetrations or joints during the test.

Any detection of moisture penetration or changes in appearance are registered. Opening of the test pieces around the details investigated is recommended to get the best basis for evaluation.

Test report

The test report shall include the following information, if relevant:

a) Name and address of the testing laboratory
b) Identification number of the test report
c) Name and address of the organization or the person who ordered the test
d) Purpose of the test
e) Method of sampling and other circumstances, detail drawings and photos (date and person responsible for sampling)
f) Name and address of manufacturer of the tested object
g) Name and other identification marks of the tested object
h) Description of the tested object
i) Date of supply of the sample
j) Date of the test
k) Test method
l) Conditioning of the test specimens (temperature, RH, etc.)
m) Identification of the test equipment and instruments used
n) Any deviations from the test method
o) Test result and an indication on which way the water penetration was observed, re. Expression of results
p) Date and signature

ANNEX G - WATER TIGHTNESS AROUND PENETRATIONS AND OTHER DETAILS IN WET ROOM WALLS AND FLOORS WITH RIGID SUBSTRATES

Scope

The aim of this method is to evaluate the ability of normally used details - such as floor gully, pipe penetrations and in- and outgoing corners – of watertight walls and floors or wall and floor coverings when exposed to water.

The test procedure is intended to simulate the exposure to hot and cold water that can be expected during long-term use in order to verify satisfactory performance. This test method is foreseen to evaluate the water tightness of kits intended to be installed on moisture insensitive substrates, e.g. concrete or render.

Field of application

The method is applicable for installations intended to serve as watertight covering kits for walls and floors in wet rooms.

Definitions

Water tightness in this test refers to the resistance to penetration of water acting on the surface of the floor and adjoining walls according to the test conditions.

Preparation of test pieces

One sample is used for the test. The box-shaped sample is made as a floor with adjoining walls. The inner dimensions are approximately 1200 mm x 1500 mm x 500 mm. The sample is constructed in a laboratory.

The test specimen shall be made on a suitable rack which supports the floor and which creates a space of approximately 0.5 m in height beneath the floor for inspection. The supporting rack might for instance be made from timber.

The floor and walls of the specimen shall be made from aerated concrete blocks (thickness 75 mm) laid by using a suitable adhesive/mortar. The floor slab is made through horizontally laying of the blocks. The floor slab shall form a rectangle of ca. 1350 mm x 1650 mm. The walls are simulated with 500 mm high pieces of aerated concrete blocks placed vertically at the edge of the slab including an additionally outgoing corner 300 mm x 300 mm as shown in figure G.3.

The floor shall be supplied with gullies suitable for use with the floor in question. At least one representative sample of each type of gully intended to be used with the floor i.e. gullies:

- of stainless steel with flange for attaching of collar/membrane figure (typical example shown in figure G.1A
- of plastics – type PE or PP – for attaching of collar/membrane (typical example shown in figure G.1B
- with clamping ring (and collar) (typical examples shown in figure G.2 A and B

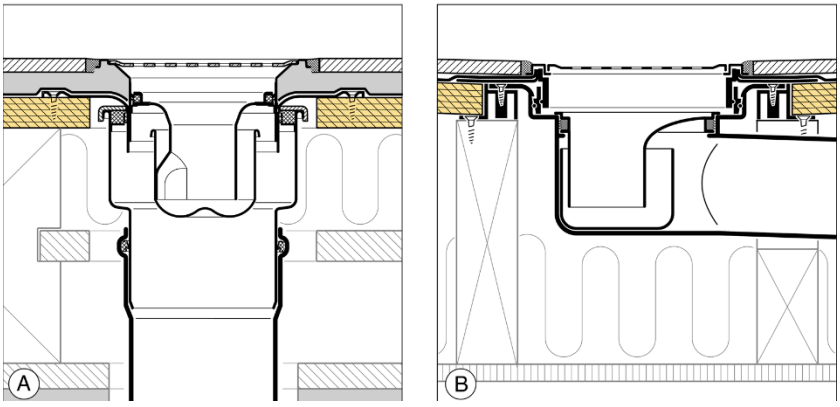


Figure G.1

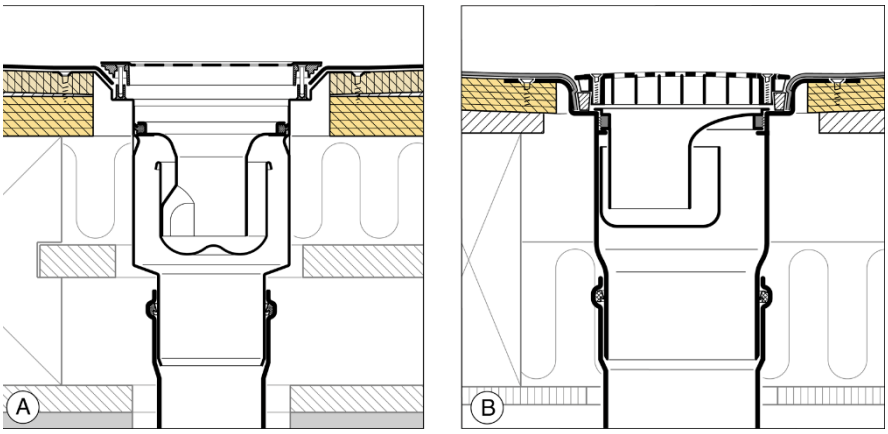


Figure G.2

Further the floor is supplied with at least two water pipes (polypropylene pipes diameter 50 and 110 mm) penetrating the floor. The watertight covering shall protect as well sub-floor as walls. The watertight layer shall be carefully applied including all details – e.g. joints around gullies and between floor and walls (including in- and outgoing corners) and skirtings to pipe penetrations - as recommended by the manufacturer. The waterproof layer on the floor shall continue as watertight layer up the wall - to form a basin - or can be connected to another watertight layer on the walls if this is a different kit. If the watertight layers floor/wall are not identical additional penetrations of the above mentioned water pipes in one of the walls are required.

Waterproofing membranes which in normal use are covered by protective layers, e.g. tiles, are to be tested without this protection unless something different has been agreed.

Testing

Principle

The water tightness of all details, e.g. penetrations and in- and outgoing corners, is tested by exposing the specimen to a head of water and alternating influences from hot and cold water. Finally the specimen is again tested with a head of water.

Apparatus

9 nozzles mounted on water pipes at a distance of about 300 mm from the surface of the floor. The spray of water from the nozzles shall form a cone of about 60°, and shall be evenly distributed. The pressure of water shall be about 0.1 MPa before the nozzles.

Preparation of test samples

Before the test the test specimen shall be allowed to dry/harden sufficiently according to the manufacturer's instructions.

Procedure

The floor gullies are blocked in the trap (at the outlet) and the basin formed by the floor is filled with (tap) water to a height of 100 mm above the gullies. After 48 hours it is controlled visually and/or with a moisture meter if water has penetrated.

If the specimen still proves to be watertight, the following exposure to hot and cold water is carried out:

Hot and cold water is alternately carried directly into the floor gullies in such a way that the water runs along the joint between the drain and the floor. The water can be applied successively to one gully at a time or to all three gullies at the same time depending on the test equipment. The water supply shall be in accordance with the following cycle:

Hot water (90 $\pm$ 3 °C) 0.3 litre/sec for 60 sec,

Pause for 60 sec,

Cold water (10 $\pm$ 3 °C) 0.3 litre/sec for 60 sec,

Pause for 60 sec.

The temperature is measured at the nozzle.

The cycle is repeated 100 times.

From the nozzles, hot and cold water is alternately sprayed over the details, see figure G.3, of the floor and wall construction, e.g. gullies, pipes and corners. The nozzles are mounted at least 300 mm from the floor and/or wall surfaces. The water is supplied with the following cycle:

Hot water (60 ± 3 °C) for 60 sec,

Pause for 60 sec.

Cold water (10 ± 3 °C) for 60 sec,

Pause for 60 sec.

The temperature is measured at the nozzle.

In the gullies an arrangement for simulating blocked floor drains shall be mounted, so that the water level rises 20 mm above the gully during each spraying period.

The cycle is repeated 1500 times.

After the hot and cold water exposure the test sample is again filled with water to create a head of water of 100 mm above the gullies. The floor is controlled from beneath for any signs of water penetration after 7 days. Supplementary humidification of the substrate for the waterproofing membrane around details considered vulnerable can be controlled by means of a moisture meter.

Expression of results

There shall be no signs of water penetration after the test e.g. after visual inspection or measurement of humidity level around sensitive details or by opening the membrane for visual inspection of humidity in the substrate under the membrane.

Test report

The test report should include the following information:

a) Name and address of the testing laboratory
b) Identification number of the test report
c) Name and address of the organization or the person who ordered the test
d) Purpose of the test
e) Method of sampling and other circumstances (date and person responsible for sampling)
f) Name and address of manufacturer of the tested material or kit.
g) Name or identification marks of the tested product or products
h) Description of the tested object
i) Date of supply of the tested object
j) Date of test
k) Test method
l) Conditioning of the test specimens, environmental data during the test (temperature, relative humidity etc.)
m) Identification of the test equipment and instruments used
n) Any deviations from the test method
o) Test results and an indication on which way the water penetration was observed, re. Expression of results
p) Date and signature

Figure G.3 Plane view

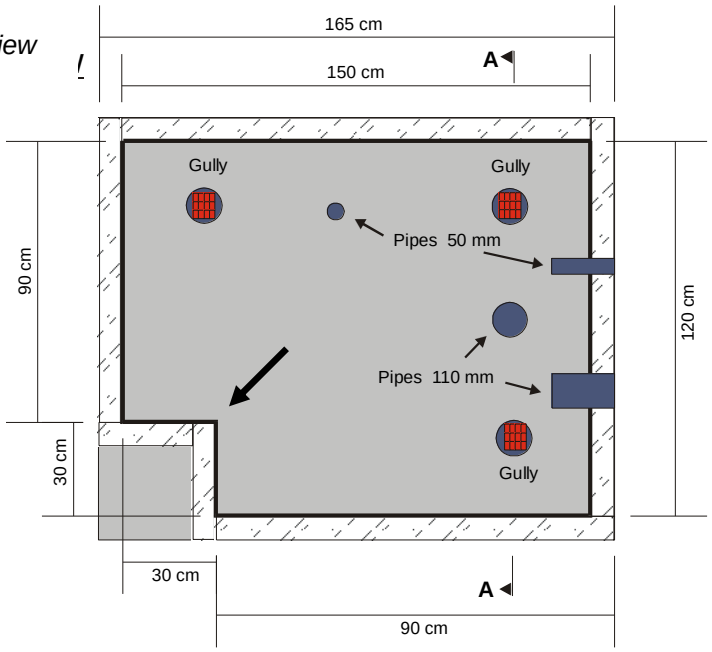


Figure G.4 View A-A