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ETAG 005

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GUIDELINE FOR EUROPEAN TECHNICAL APPROVAL
OF

LIQUID APPLIED ROOF WATERPROOFING KITS

Revision March 2004

Part 5: SPECIFIC STIPULATIONS FOR KITS BASED ON HOT APPLIED POLYMER MODIFIED BITUMEN

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FOREWORD

General

This ETAG has been established by the EOTA WG 4.02/01 dealing with liquid applied roof waterproofing kits (LARWK).

This ETA-Guideline - Part 5 "Specific stipulations for kits based on hot applied polymer modified bitumen" shall be used in conjunction with Part 1 - "General".

This Complementary Part expands and/or modifies the requirements given in Part 1 – “General” taking into account the specific family of products referred to.

Normative references

This ETA-Guideline Part 5 incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references subsequent amendments to, or revisions of these publications, apply to this ETA-Guideline only when incorporated in it by amendment or revision. For undated references the latest dated revision of the publication referred to, applies.

ENV 1991-2-4	Guidelines for the application of ENV 1991-2-4. Eurocode 1:Basis of design and actions on structures – Part 2-4: Actions on structures – Wind actions.
EN ISO 2431 (+ C1 and 2)	Paints and varnishes – Determination of flow time by use of flow cups.
EN ISO 2592	Determination of flash and fire points – Cleveland open cup method.
EN ISO 2719	Determination of flash points – Pensky-Martens closed cup method.
EN ISO 3251	Paints, varnishes and plastics – Determination of non-volatile matter content.
ISO 9073-1	Textiles – Test methods for nonwovens – Part 1:Determination of mass per unit area.
ISO 9073-3	Textiles – Test methods for nonwovens – Part 3:Determination of tensile strength and elongation.
ASTM D 5329 – 96	Standard test method for Sealants and Fillers, hot applied, for Joints and Cracks in Asphaltic and Portland Cement Concrete Pavements.
CAN/CGSB 37.50 – M89	Hot applied Rubberised Asphalt for Roofing and Waterproofing.
ETAG 005 – Part 1	Liquid applied water proofing kits : Part 1 – General.

SECTION ONE:

INTRODUCTION

1. PRELIMINARIES

1.1 **Legal basis**

The legal basis of the ETA-Guidelines is given in clause 1.1 of ETAG 005 – Part 1.

No existing ETA-Guideline is superseded

1.2 **Status of ETA-Guidelines**

The Status of the ETA-Guidelines is given in clause 1.2 0f ETAG 005 – Part 1.

2. SCOPE

This Part 5 shall be used in conjunction with ETAG 005 – Part 1.

This Complementary Part (ETAG 005 – Part 5) - "Specific stipulations for kits based on hot applied polymer modified bitumen" specifies terminology and definitions, the specific methods of verification for the construction products and for the identification of its component characteristics. It also gives guidance for the assessment of the specific installation instructions and for the Attestation of Conformity for such kits for use in roof waterproofing.

It is applicable to roof waterproofing kits based on polymer modified bitumen, supplied in cakes to be melted on site, poured and spread and furnished with a protection layer. The assembled systems may be reinforced or unreinforced and may only be applied to concrete substrates, although other substrates (e.g. metal, brickwork, timber, etc.) are permissible at details.

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The assembled systems are always protected by inverted roof insulation systems, heavy protection, roof gardens or green roofs and therefore may only be used on roofs with slopes up to a maximum of 27%
(15 º).

3. TERMINOLOGY

3.1 **Definitions and abbreviations**

For the purpose of this Complementary Part of the ETA-Guideline the particular definitions and abbreviations as stated in clause 3 of ETAG – Part 1 and the Common Terminology adopted by the Technical Board (see Annex II of ETAG 005 – Part1) applies.

3.2 **Particular definitions**

For the purpose of this ETAG 005 – P art 5, the following definitions apply:

3.2.1 **bitumen**: A viscous semi-solid or solid, consisting essentially of a complex mixture of hydrocarbons and their derivatives, which is soluble in carbon disulphide; it is substantially non-volatile and softens gradually when heated. It is black in colour and possesses waterproofing and adhesive properties. It is obtained by refinery processes from petroleum and is also found as a natural deposit or as a component of naturally occurring asphalt where it is associated with mineral matter.

3.2.2 **bitumen emulsion**: A substantial amount of bitumen, finely dispersed in an aqueous medium by one or more suitable emulsifying agents. The emulsion may also incorporate inert fillers and/or fibres. A liquid or paste of brushing, spraying or spreading consistency that, when dried, provides a film that forms part of the assembled system of a LARWK.

3.2.3 **bitumen primer:** A low viscosity bitumen emulsion or solution for the purpose of improving adhesion, sealing and preparing surfaces prior to the application of the LARWK.

3.2.4 **bitumen solution:** A blend of bitumen dissolved in volatile organic solvent(s) which may contain inert fillers and/or fibres. A viscous liquid or paste of brushing, spraying or spreading consistency that, when dried, provides a film that forms part of the assembled system of a LARWK.

3.2.5 **cake:** A block of polymer modified bitumen, supplied to site, which must be heated to permit the application of the hot applied liquid roof waterproofing layer.

3.2.6 **polymer / copolymer (modifier):** A polymer / copolymer in solid, viscous liquid or liquid emulsion (latex) form, suitable for blending with bitumen to improve properties such as durability, flexibility and elasticity within the dried film.
Examples are:
- atactic polypropylene (APP);
- polychloroprene (CR);
- ethylene vinyl acetate (EVA)
- polyisoprene (IR);
- natural rubber (NR)
- polybutylene (PB)
- styrene butadiene rubber (SBR)
- styrene butadiene styrene (SBS).

3.2.7 **polymer modified bitumen with fillers**: A homogeneous blend of bitumen and suitable polymer / copolymer plus inorganic fillers in such proportions as to obtain a desired level of performance. A solid material softening when heated.

3.2.8 **protection layer:** a layer of material intended to act as a separation sheet (see Part 1 – 3.1.19) to prevent damage to the hot applied roof waterproofing kit, caused by following trades.
Examples are: PE-foil, non-wovens, bitumen sheets or boards, etc..

3.3 Particular abbreviations

For the purpose of this ETA-Guideline - Part 5 no particular abbreviations apply.

SECTION TWO:

GUIDANCE FOR THE ASSESSMENT OF THE FITNESS FOR USE

4. REQUIREMENTS

4.0 **General**

The performance requirements, establishing the fitness for use of LARWK(s) based on **hot applied polymer modified bitumen**, shall be in accordance with chapter 4 of ETAG 005 – Part 1, and with the following specific stipulations for this family of products.

4.1	**ER 1: Mechanical resistance and stability**	No requirements
4.2	**ER 2: Safety in case of fire**	
4.2.1	**External fire performance**	- limited requirements in 6.2.1
4.2.2	**Reaction to fire**	- specific requirements in 6.2.2
4.3	**ER 3: Hygiene, health and the environment** (working life and durability aspects)	The following additional requirements
4.3.1	**Resistance to wind loads**	- specific requirements in 5.3.1
4.3.2	**Resistance to ageing media**	
4.3.2.1	Heat ageing	- specific heat ageing conditions in 5.3.2.1
4.3.2.2	Low temperature flexibility after ageing by heat	- additional requirements in 6.3.1.1
4.3.2.3	UV ageing	- no requirements (see 5.3.2.2)
4.3.2.4	Water ageing	- specific requirements in 5.3.2.3
4.3.2.5	Low temperature flexibilty after ageing by water	- additional requirements in 6.3.2.1
4.4	**ER 4: Safety in use**	Limited requirements in 5.3.1.1 and 5.4.
4.5	**ER 5: Protection against noise**	No requirements
4.6	**ER 6: Energy economy and heat retention**	No requirements
4.7	**Related aspects of serviceability**	Additional requirements

To fall within the scope of this Complementary Part the final product shall meet the additional requirements related to the following aspects.

4.7.1 **Effects of application conditions**

4.7.1.1 Effects of remelting

The polymer modified bitumen may be adversely affected by repeated remelting. Therefore it should be demonstrated that reheating, as permitted by the Applicant, does not adversely affect the assembled system.

4.7.1.2 Effects of prolonged heating

The polymer modified bitumen may be adversely affected by prolonged heating. Therefore it should be demonstrated that the heating regime, as permitted by the Applicant, does not adversely affect the assembled system.

5. SPECIFIC METHODS OF VERIFICATION

5.0 **General**

The methods of verification given in chapter 5 of ETAG 005 shall be applied, except where identified below.

5.1 **ER 1: Mechanical resistance and stability** Not applicable

5.2 **ER2: Safety in case of fire**

5.2.1 **External fire performance** See clause 5.2.1.5 of ETAG 005 – Part 1.

5.2.2 **Reaction to fire** Method of verification according to clause 5.2.2 of ETAG 005 – Part 1.

5.3 **ER 3: Hygiene, health and the environment** Specific methods of verification

The following specific methods of verification apply related to working life and durability aspects

5.3.1 **Resistance to wind loads**

5.3.1.1 with reference to clause 5.3.3.1of ETAG 005 – Part 1.

Although the assembled systems are fully bonded, they are always used under inverted roofs, heavy protection, roof garden or green roofs and therefore may be treated as loose laid and ballasted assembled systems in respect of the resistance to wind uplift. The resistance to wind uplift may be determined by calculation of the weight of the protection. Determination of the delamination strength may be omitted.

5.3.2 **Resistance to ageing media**

5.3.2.1 Heat ageing

{ETAG 005 – Part 1, clause 5.3.3.5.1 (i)}	Depending on the nature of the modification of the bitumen, heat ageing conditions of $(70 \pm 2)^{o}$ C at a doubled exposure period (ETAG 005 – Part 1, Table 10) is permitted.
5.3.2.1.1 Following the heat ageing period	Additional comparative testing of the low temperature flexibility shall be performed on new and aged samples with the method in accordance with CAN/CGSB 37.50-M89.
5.3.2.2 UV ageing (ETAG 005 – Part 1, clause 5.3.3.5.2)	The assembled systems are always protected by inverted roof insulation systems, heavy protection, roof garden or green roofs. Therefore all tests to determine the effects of artificial weathering by UV in the presence of moisture will be omitted.
5.3.2.3 Water ageing (ETAG 005 – Part 1, clause 5.3.3.5.3)	There are no specific conditions for ageing by water for this family of products. Since the assembled systems are used in roof gardens, green roofs and inverted roof application, the most severe conditions of exposure (P4/W3) shall be selected when performing tests to determine the effects of ageing by water (see Table 13 of ETAG 005 – Part 1).
5.3.2.3.1 Following the water ageing period. {ETAG 005 – Part 1, clause 5.3.3.5.3 (ii)}	The determination of the delamination strength is omitted.
5.3.2.3.2 Following the water ageing period	Additional comparative testing of the low temperature flexibility shall be performed on new and aged samples in accordance with method CAN/CGSB 37.50 – M89.
5.4 **ER4: Safety in use**	Although the assembled systems are fully bonded, they are always used under inverted roofs, heavy protection, roof garden or green roofs and therefore may be treated as loose laid and ballasted assembled systems in respect of the resistance to wind uplift. The resistance to wind uplift may be determined by calculation of the weight of the protection. Determination of the delamination strength may be omitted. For the same reasons as above the determination of the friction coefficients need not to be performed.
5.5 **ER 5: Protection against noise**	Not applicable

5.6 **ER 6: Energy economy and heat retention** Not applicable

5.7 **Related aspects of serviceability** Additional methods of verification

5.7.1 **Effects of application conditions**

5.7.1.1 Effects of remelting

The polymer modified bitumen shall be remelted following the procedures and the maximum number of times permitted by the Applicant, and the following properties measured:

i)	Penetration at 50º C	method: CAN/CGSB 37.50 - M89
ii)	Flow at 60º C	method: CAN/CGSB 37.50 - M89

5.7.1.2 Effects of prolonged heating

The polymer modified bitumen shall be held at the maximum temperature for the maximum period permitted by the Applicant, and the following properties measured:

i)	Penetration at 50° C	method CAN/CGSB 37.50 - M89
ii)	Flow at 60º C	method CAN/CGSB 37.50 - M89

5.8 **Identification of components**

5.8.0 **General**

It is necessary to verify that components comply with the specification (including tolerances) of the Applicant. This is achieved by measuring relevant characteristics, preferably by using EN or ISO Standards. In the case where no appropriate EN or ISO Standard is available the use of an approved national standard is permitted.

5.8.1 **Bitumen primer**

5.8.1.1	- nature	by declaration
5.8.1.2	- flash point	method: EN ISO 2719 (Pensky-Martens closed cup) or EN ISO 2592 (Cleveland open cup)
5.8.1.3	- viscosity	method: EN ISO 2431
5.8.1.4	- solids contents	method: EN ISO 3251

5.8.2 **Polymer modified bitumen**

5.8.2.1	- penetration at 25ºC and 50ºC	method: CAN/CGSB 37.50 - M89
5.8.2.2	- flow at 48ºC and 60ºC	method: CAN/CGSB 37.50 - M89
5.8.2.3	- viscosity	method: CAN/CGSB 37.50 - M89
5.8.2.4	- solids content	method: EN ISO 3251
5.8.2.5	- elongation	method: ASTM D 5329
5.8.2.6	- resiliency	method: ASTM D 5329

5.8.3 **Internal layer**

5.8.3.1	- nature	by declaration
5.8.3.2	- mass per unit area	method: ISO 9073-1
5.8.3.3	- tensile strength	method: ISO 9073-3

5.8.3.4	- tensile elongation	method: ISO 9073-3

5.8.4	**Protection layer(s)**	
5.8.4.1	- nature	by declaration
5.8.4.2	- mass per unit area	method: ISO 9073-1
5.8.4.3	- tensile strength	method: ISO 9073-3
5.8.4.4	- tensile elongation	method: ISO 9073-3

6. ASSESSING AND JUDGING THE FITNESS OF PRODUCTS FOR INTENDED USE.

6.0 **General** The requirements given in chapter 6 of ETAG 005 – Part 1 shall be applied, except where identified below, or where the test has been identified as being not required in chapter 5 of this Complementary Part (ETAG 005 – Part 5).

6.1	**ER 1: Mechanical resistance and stability**	Not applicable
6.2	**ER2: Safety in case of fire**	
6.2.1	**External fire performance**	No assessment
6.2.2	**Reaction to fire**	Classification in accordance with the provisions given in clause 6.2.2 of ETAG 005 – Part 1.
6.3	**ER3: Hygiene, health and the environment** (working life and durability aspects)	Additional assessment

In addition or contrary to the requirements given in chapter 6 of ETAG 005 – Part 1, the following specific requirements shall be taken into account for the assessment of the fitness for use.

6.3.1	**Resistance to ageing media**	
6.3.1.1	Heat ageing	- the Approval Body shall satisfy itself that the expected working life, based on the data gathered in accordance with 5.3.2.1.1, is consistent with the defined working life categories.
6.3.2.1	Water ageing	- the Approval Body shall satisfy itself that the expected working life, based on the data gathered in accordance with 5.3.2.3.2, is consistent with the defined working life categories.
6.4	**ER 4: Safety in use**	- no assessment of delamination strength - no assessment of slipperiness
6.5	**ER 5: Protection against noise**	Not applicable
6.6	**ER 6: Energy economy and heat retention**	Not applicable
6.7	**Related aspects of serviceability**	

6.7.1 **Effects of application conditions**

6.7.1.1 Effects of remelting

When tested in accordance with clause 5.7.1.1 of this document (ETAG 005 – Part 5), the properties measured shall fall within the accepted limits declared by the Applicant and shall not affect the kits fitness for the intended use.

6.7.1.2 Effects of prolonged heating

When tested in accordance with clause 5.7.1.2 of this document (ETAG 005 – Part 1), the properties measured shall fall within the accepted limits declared by the Applicant and shall not affect the kits fitness for the intended use.

6.8 **Identification of components**

When verified in accordance with clause 5.8 of this document (ETAG 005 – Part 5), the characteristics of the components shall fall within the limits declared by the applicant

The Approval Body shall assess the possible effects on the performances of the assembled system due to the declared tolerances.

7. PRECONDITIONS CONCERNING THE INCORPORATION OF PRODUCTS IN THE WORKS

7.1 **Application methods and design rules** (installation instructions)

All the information required as indicated in clause 7 of ETAG 005 – Part 1, shall be elaborated in the Manufacturer's Technical Dossier (MTD) taking into account the following specific provisions:

7.1.1 **Transport and storage**

There are no specific requirements.

7.1.2 **Influence of weather conditions**

The kits form a membrane by simple cooling; they are not affected by rain, snow or frost immediately after application, but application must cease during inclement weather conditions.

7.1.3 **Application of components**

Overheating, prolonged storage at high temperature or repeated remelting can affect the properties of the polymer modified bitumen. Therefore the Applicant's installation instructions shall include precise details on the acceptable melting and storage procedures and conditions.

7.1.4 **Details**

There are no specific requirements.

7.1.5 **Auxiliaries**

There are no specific requirements.

7.1.6 **Product waste**

There are no specific requirements.

7.1.7 **Special measures**

The prescribed protection layers, to prevent the waterproofing membrane being damaged as a consequence of installation or maintenance of additional upper layers, shall be embedded into the final coat of the membrane while still hot.

7.1.8 **Safety measures**

Since the systems consist of hot applied materials and the primers are solvent based, the Applicant's instructions shall contain the necessary information to allow safe use and application. This should include a maximum safe temperature for the molten material, details of protective clothing required and actions to be taken in the event of an accident. Specialist heating equipment (eg jacketed heating tanks etc.) is required and precise safety instructions must be given.

7.2 **Maintenance and repair**

There are no specific requirements.

SECTION THREE
ATTESTATION OF CONFORMITY

8. ATTESTATION AND EVALUATION OF CONFORMITY

8.1 EC-decisions

The decision as given in clause 8.1 of ETAG 005 - Part 1.

8.2 AC-procedures

This Complementary Part (ETAG 005 – Part 5) has no procedures contrary to those stated in clauses 8.2 and 8.2 of ETAG 005 – Part 1.

Because incorporation in the works implies the manufacturing of the final product, the installation instructions should also contain one or more practical parameters to verify some aspects which are indicative for **the designed quality of that final product.**
As consequence the installation instructions should not only give guidance on the on-site process control as indicated in clause 7.1.3 "application of components" of this document (ETAG 005 – Part 5), but should also contain instructions on the following, which are to be considered as on-site **quality** control:

- verification of thickness of the applied film and corrective measures, if necessary;
- verification of adhesion to the substrate;
- recommendations for the preparation of free film site samples to enable this on-site verification;
- directions for the registration of results of this on-site verification in a completion report.

8.3 CE-marking and information

This Complementary Part of the ETA-Guideline gives no additional or different information and/or requirements for CE-marking as detailed in clause 8.4 of ETAG 005 – Part1.

SECTION FOUR

9. THE ETA CONTENT

9.1 **Exceptions**

There are no exceptions to the conditions mentioned in clause 9 of ETAG 005 – Part 1.