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GUIDELINE FOR EUROPEAN TECHNICAL APPROVAL
OF
LIQUID APPLIED ROOF WATERPROOFING KITS

Revision March 2004

**Part 4: SPECIFIC STIPULATIONS
FOR KITS BASED ON FLEXIBLE
UNSATURATED POLYESTER**

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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 4 "Specific stipulations for kits based on flexible unsaturated polyester" 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 4 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.

EN 933-1	Tests for geometrical properties of aggregates – Part 1:Determination of particle size distribution – Sieving method.
EN ISO 527-1 (+ C1)	Plastics – Determination of tensile properties – Part1:General Principles.
EN ISO 527-3	Plastics – Determination of tensile properties – Part 3:Test conditions for films and sheets.
EN ISO 527-4	Plastics – Determination of tensile properties – Part 4:Test conditions for isotropic and orthotropic plastic fibre-reinforced composites.
EN ISO 1675	Plastics – Liquid resins – Determination of density by the pyknometer method.
EN ISO 2535	Plastics – Unsaturated polyester resins – Measurement of gel time at ambient temperature.
EN ISO 2555	Plastics – resins in the liquid state or as emulsions or dispersions – Determination of apparent viscosity by the Brookfield Test method.
EN ISO 3451-1	Plastics – Determination of ash – Part 1:General methods.
ISO 3342	Textile glass – Mats – Determination of tensile breaking force.
ISO 3374	Reinforcement products – Mats and Fabrics – Determination of mass per unit area.

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.
ETAG 005 – Part 1	Liquid applied water proofing kits : Part 1 – General.
EOTA TR – 004	Determination of the resistance to delamination.

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 of ETAG 005 – Part 1.

2. SCOPE

This Part 4 shall be used in conjunction with ETAG 005 – Part 1.

This Complementary Part (ETAG 005 – Part 4) - "Specific stipulations for kits based on flexible unsaturated polyester" - 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 flexible unsaturated polyester, in-situ applied by brushing, spraying or spreading, with or without a supporting layer, an internal layer and/or a protection layer.

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 005 – Part 1 and the Common Terminology adopted by the Technical Board (see Annex II of ETAG 005 – Part 1) applies.

3.2 Particular definitions

For the purpose of this ETAG 005 – Part 4, the following definitions apply:

3.2.1 **additives (accelerator / inhibitor):** a chemical compound which, when added to a polyester resin, controls the reaction and facilitates curing without the application of heat. Accelerators/ inhibitors may be added during mixing, or may be supplied ready mixed with the polyester resin (pre-accelerated resin).

3.2.2 **anti-skid additives:** a mineral aggregate or polymeric granules, applied to or mixed with the finish layer to impart non-skid properties to the assembled system.

- 3.2.3 **catalyst:** a chemical compound, added to a polyester resin in order to initiate the curing process. Catalysts may be supplied as paste, liquid dispersion in a plasticiser or powder in an inert filler.
- 3.2.4 **day joint:** a joint necessitated by a temporary termination in the liquid applied roof waterproofing layer, due to a suspensions of work (e.g. end of the working day).
- 3.2.5 **flexible unsaturated polyester:** flexible unsaturated polyesters are liquid or solid resins with high molecular weight and low unsaturation, to improve flexibility dissolved in a reactive monomer, e.g. styren
- 3.2.6 **primer:** primers are one- or two-component solvent or water borne or solventless penetrating first coat based on materials such as polyurethane, polyacrylate, polyester or polyepoxide, to improve adhesion and to seal the substrate.

3.3 **Particular abbreviations**

For the purpose of this ETA-Guideline - Part 4 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 **flexible unsaturated polyester**, 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 | <u>ER 1: Mechanical resistance and stability</u> | No requirements |
| 4.2 | <u>ER 2: Safety in case of fire</u> | |
| 4.2.1 | External fire performance | Specific requirements in 6.2.1 |
| 4.2.2 | Reaction to fire | Specific requirements in 6.2.2 |
| 4.3 | <u>ER 3: Hygiene, health and the environment</u>
(Working life and durability aspects) | The following additional requirements |
| 4.3.1 | Resistance to wind loads
Delamination strength | - additional requirements in 6.3.1 |
| 4.3.2 | Effects of low and high surface temperatures | |
| 4.3.2.1 | Effects of low surface temperatures | - no specific requirements |
| 4.3.2.2 | Effects of high surface temperatures | - limited requirements in 5.3.2.2 |
| 4.3.3 | Resistance to ageing media | |
| 4.3.3.1 | Heat ageing | - specific heat ageing conditions in 5.3.3.1 |
| 4.3.3.2 | Tensile properties
after heat ageing | - additional requirements in 6.3.3.1 |
| 4.3.3.3 | Tensile properties
after UV ageing | - additional requirements in 6.3.3.2 |
| 4.3.3.4 | Delamination strength
after water ageing | - additional requirements in 6.3.3.3 |
| 4.4 | <u>ER 4: Safety in use</u> | No specific requirements |
| 4.5 | <u>ER 5: Protection against noise</u> | No requirements |
| 4.6 | <u>ER 6: Energy economy and heat retention</u> | No requirements |
| 4.7 | <u>Related aspects of serviceability</u> | The following 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 weather conditions**
Tensile strength and elongation at break - additional requirements in 6.7.1
- 4.7.2 **Effects of day joints**
Delamination strength - additional requirements in 6.7.2

5. SPECIFIC METHODS OF VERIFICATION

- 5.0 **General**
The methods of verification given in Part 1 - chapter 5 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** Method of verification according to clause 5.2.1 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 and relate to working life and durability aspects.
- 5.3.1 **Resistance to wind loads**
Delamination strength No specific methods of verification.
- 5.3.2 **Effects of low and high surface temperatures**
- 5.3.2.1 Effects of low surface temperatures
{ETAG – Part 1, clause 5.3.3.4.1 (ii)} No additional testing of low surface temperature flexibility required.
- 5.3.2.2 Effects of high surface temperatures
{ETAG 005 – Part 1, clause 5.3.3.4.3 (i, ii, iii)} Flexible unsaturated polyester resin is unlikely to be affected by elevated surface temperatures. It will not flow or soften at the high temperatures envisaged in service. Consequently the determination of the effects of elevated temperatures defined in ETAG 005 – Part 1 will be omitted.
- 5.3.3 **Resistance to ageing media**
- 5.3.3.1 Heat ageing
{ETAG 005 – Part 1, clause 5.3.3.5.1 (i)} Specific heat ageing conditions of (70 ± 2) °C at doubled exposure period (ETAG 005 – Part 1 – Table 10) for testing this family of products are permitted.

5.3.3.1.1 Following the heat ageing period {ETAG 005 – Part 1, clause 5.3.3.5.1 (iii)}	Additional comparative testing of tensile properties shall be performed on new and aged samples at 23 °C in accordance with EN ISO 527-1 and -3 (unreinforced), or -4 (reinforced); test piece shape 1B; testing speed 200 mm/min.
5.3.3.2 UV ageing {ETAG 005 – Part 1, clause 5.3.3.5.2 (ii)}	
5.3.3.2.1 Following the UV ageing period	Additional comparative testing of tensile properties shall be performed on new and aged samples at 23 °C in accordance with EN ISO 527-1 and -3 (unreinforced), or –4 (reinforced); test piece shape 1B; testing speed 200 mm/min.
5.3.3.3 Water ageing (ETAG 005 – Part 1, clause 5.3.3.5.3)	No specific conditions for ageing by water.
5.3.3.3.1 Following the water ageing period {ETAG 005 – Part 1, clause 5.3.3.5.3 (ii)}	Additional determination of the resistance to delamination in accordance with EOTA TR-004 is required.
5.4 <u>ER4: Safety in use</u>	No specific method of verification.
5.5 <u>ER 5: Protection against noise</u>	Not applicable.
5.6 <u>ER 6: Energy economy and heat retention</u>	Not applicable.
5.7 <u>Related aspects of serviceability</u>	Additional methods of verification.
5.7.1 <u>Effects of variations in kit components and site practices</u> To check that a satisfactory assembled system can be achieved over the whole range of permitted weather conditions and variations in proportions of constituent parts quoted by the Applicant, the following tests shall be performed comparatively on free films prepared from the same batch under the conditions defined by the Applicant:	
5.7.1.1 Comparative testing of: Tensile strength and elongation at break	According to EN ISO 527-3 or EN ISO 527-4.
5.7.2 <u>Effects of day joints</u> To check the compatibility of the assembled system, freshly applied to the dried assembled system:	
Delamination strength	The delamination test shall be performed according to EOTA TR-004. - The substrate is the assembled

system bonded on the most suitable substrate for adherence (generally concrete) and dried for the period given by the Applicant at normal conditions.
- The test specimen is the fresh kit applied on that substrate.

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. Where no appropriate EN or ISO Standard is available the use of an approved national standard is permitted.

5.8.1 **Primer**

5.8.1.1 - nature by declaration

5.8.1.2 - relevant characteristics such as curing time, density, viscosity and the relevant methods of verification shall be declared by the Applicant, depending on the nature of the primer.

5.8.2 **Unsaturated polyester resin**

5.8.2.1 - nature method: infrared analysis must be taken for the base resin

5.8.2.2 - viscosity method: EN ISO 2555

5.8.2.3 - density method: EN ISO 1675

5.8.2.4 - gel time method: EN ISO 2535

5.8.2.5 - ash content method: EN ISO 3451-1

5.8.3 **Internal layer**

5.8.3.1 - nature by declaration

5.8.3.2 - mass per unit area method: ISO 9073-1 or ISO 3374

5.8.3.3 - tensile strength method: ISO 9073-3 or ISO 3342

5.8.3.4 - tensile elongation method: ISO 9073-3 or ISO 3342

5.8.4 **Finish layer**

5.8.4.1 - nature by declaration

5.8.4.2 - relevant characteristics such as: curing time, non-volatile contents, viscosity and the relevant methods of verification shall be declared by the Applicant, depending on the nature of the finish layer.

- 5.8.5 **Anti-skid additives**
- 5.8.5.1 - nature by declaration
- 5.8.5.2 - particle size method: EN 933-1

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 4).

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

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

6.2.1 **External fire performance**

Classification in accordance with the provisions given in clause 6.2.1 of ETAG 005 – Part 1.

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** Additional assessment (working life and durability aspects)

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 wind loads**

Delamination strength
{ETAG 005 – Part 1, clause 6.3.3.2 (ii)}

The delamination strength of bonded assembled systems determined in accordance with clause 5.3.3.1 (ii) of ETAG 005 – Part 1 shall be equal or exceed the values declared by the Applicant for the proposed substrate(s), but shall be not less than 50 kPa.

6.3.2 **Effects of low and high surface temperatures**

6.3.2.1 Effects of high surface temperatures

No assessment

6.3.3 **Resistance to ageing media**

6.3.3.1 Heat ageing

When aged by heat and tested

The Approval Body shall satisfy itself that the expected working life, based on the data gathered in accordance with 5.3.3.1.1, is consistent with the defined working life categories.

- 6.3.3.2 **UV ageing**
When aged by UV and tested
- The Approval Body shall satisfy itself that the expected working life, based on the data gathered in accordance with 5.3.3.2.1, is consistent with the defined working life categories.
- 6.3.3.3 **Water ageing**
When aged by water and tested
value in accordance with clause 5.3.3.3.1
- The Approval Body shall satisfy itself that the shall fall within the range declared by the Applicant and shall be not less than 50 kPa.
- 6.4 **ER 4: Safety in use**
- No specific assessment
- 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 weather conditions**
As a result of comparative testing in accordance with clause 5.7.1.1 of this document (ETAG 005 – Part 4), the properties measured shall fall within the accepted limits declared by the Applicant and shall not affect the kits fitness for the intended use.
- 6.7.2 **Effects of day joints**
The delamination strength shall contain a minimum value of at least 0,2 N/mm²
- 6.8 **Identification of components**
When verified in accordance with clause 5.8 of this document (ETAG 005 – Part 4) 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 tolerancies.

7. **SPECIFIC PROVISIONS RELATED TO THE INCORPORATION 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**
There are no specific requirements.

- 7.1.3 **Application of components**
There are no specific requirements.
- 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**
There are no specific requirements.
- 7.1.8 **Safety measures**
There are no specific requirements.

- 7.2 **Maintenance and repair**
There are no specific requirements.

SECTION THREE

ATTESTATION OF CONFORMITY

8. ATTESTATION AND EVALUATION OF CONFORMITY

8.1 EC-decision

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

8.2 AC-procedures

This Complementary Part (ETAG 005 – Part 4) has no procedures contrary to those stated in clauses 8.1 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**.

Consequently 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 ETAG 005 – Part 1 , 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 – Part 1.

SECTION FOUR

THE ETA CONTENT

9. THE ETA CONTENT

9.1 Exceptions

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