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**GUIDELINE FOR EUROPEAN TECHNICAL
APPROVAL**
of
EXPANSION JOINTS FOR ROAD BRIDGES
PART 2: BURIED EXPANSION JOINTS

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FOREWORD

See Part 1 of this ETAG N° 032.

REFERENCE DOCUMENTS

See Part 1 of this ETAG N° 032.

Additional list of standards referred to in this family Part

Standards	Clause in this part of ETAG	Title
EN 573	Table 8.1	Aluminium and aluminium alloys – Chemical composition and form of wrought products
EN 755-2	Table 5.2	Aluminium and aluminium alloys – Extruded rod/bar, tube and profiles – Part 2: Mechanical properties
EN 1676	Table 8.1	Aluminium and aluminium alloys – Alloyed ingots for remelting – Specifications
EN 1991-1-3	Table 5.2	Eurocode 1: Actions on structures – General actions – Snow loads
EN 1991-2	4.1.1.2	Eurocode 1: Actions on structures – Part 2: Traffic loads on bridges
EN 1999	Table 5.2	Eurocode 9: Design of aluminium structures
	6.1.1.2	
EN 1999-1-3	Table 6.2	Eurocode 9: Design of aluminium structures – Part 1-3: Structures susceptible to fatigue
EN 10025	Tables 5.2 and 8.1	Hot rolled products of structural steel
EN 10088	Tables 5.2 and 8.1	Stainless steels – All parts
EN 10204	Tables 5.2 and 8.1	Metallic products – Types of inspection documents
EN ISO 1461	Table 8.1	Hot dip galvanized coatings on fabricated iron and steel articles – Specifications and test methods
ISO 34-1	Tables 5.2 and 8.1	Rubber, vulcanized or thermoplastic – Determination of tear strength – Part 1: Trouser, angle and crescent test pieces
ISO 37	Tables 5.2 and 8.1	Rubber, vulcanized or thermoplastic – Determination of tensile stress-strain properties
ISO 48	Tables 5.2 and 8.1	Rubber, vulcanized or thermoplastic – Determination of hardness (hardness between 10 IRHD and 100 IRHD)
ISO 812 (2006)	Table 5.2	Rubber, vulcanized or thermoplastic – Determination of low-temperature brittleness
ISO 1817	Table 5.2	Rubber, vulcanized – Determination of the effect of liquids
ISO 2781 (1996)	Tables 5.2 and 8.1	Rubber, vulcanized – Determination of density
ISO 7619-2	Tables 5.2 and 8.1	Rubber, vulcanized or thermoplastic – Determination of indentation hardness – Part 2: IRHD pocket meter method

Note: Some of these standards are also referred to in Part 1.

SECTION ONE: INTRODUCTION

1. PRELIMINARIES

1.1 LEGAL BASIS

See Part 1 of this ETAG N° 032.

1.2 STATUS OF ETAG

See Part 1 of this ETAG N° 032.

2. SCOPE

This document shall be used in conjunction with ETAG N° 032, Expansion joints for road bridges Part 1. If the text in Part 1 applies to this family of products then reference will be made to the appropriate clause in Part 1 ("See Part 1 of this ETAG N° 032").

2.1 SCOPE AND DEFINITION

2.1.1 General

This Part of ETAG N° 032 specifies the product performance characteristics, methods of verification and assessment procedures for Buried Expansion Joints (BEJ) for road bridges to ensure the fitness of the products for their intended use.

Note: The working life of the product and of the surfacing above this type of joint depends very much on the thickness of surfacing. The choice of this thickness should be defined according to the type of product, the movement capacity and the formulation of the surfacing.

The surfacing itself is not within the scope of the expansion joint product or kit (the information concerning the function of surfacing layer according to 7.1 shall be given in the ETA). For further information, see Part 1 of this ETAG N° 032.

2.1.2 Definitions

The following definition details the general definition given in 2.1.2.2 of Part 1. The following sub-categories exist.

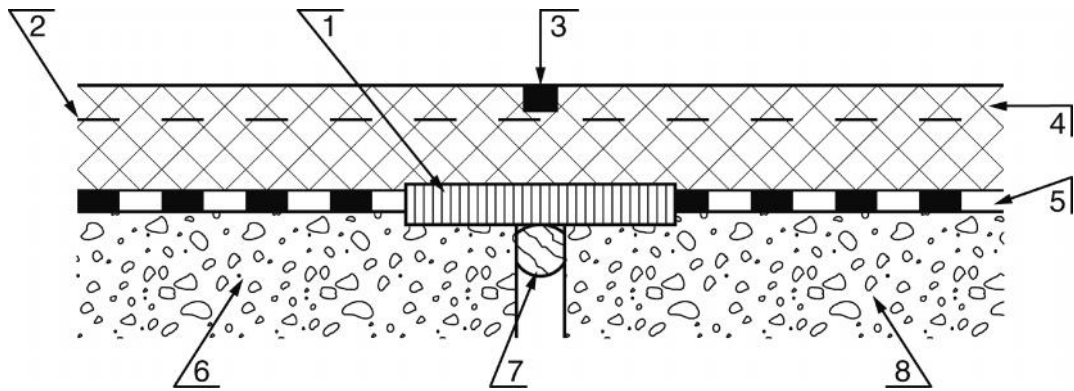
Polymeric Buried Expansion Joints that are attached by bonding or mechanical fixing, defined as:

- Buried flashing: formed in situ using a thin elastomeric strip (bonded or with debonding layer) in combination with the waterproofing layer to bridge the deck joint gap, with all construction above deck level. See Annex 2M Figure type 1.
- Buried pad: formed in a recess at deck level using a preformed elastomeric bridging pad or elastomeric flashing and in combination with the waterproofing. See Annex 2M Figure type 2.
- Buried flexible plug: consists in principle of a flexible plug joint that is formed in a recess at deck level. See Annex 2M Figure type 2.
- Buried Expansion Joints with Mechanical Fixing formed in a recess at deck level attached by anchor loops or bolts incorporating an elastomeric sealing element protected by a plate. See Annex 2M Figure type 3.

Other additional components may be included to accommodate other features or functions (e.g. mesh in the surfacing).

Note: Continuous waterproofing consisting of the waterproofing material only and may be containing local reinforcement by additional layers is not considered as an expansion joint.

A generic example of a Buried Expansion Joint is shown below with other more specific designs shown in Annex 2M.



Key

- 1 Buried expansion joint including waterproofing element (sealant or membrane) (see Annex 2M for more specific designs),
- 2 Reinforcement of the surfacing* (optional**),
- 3 Crack inducer sealant* (optional**),
- 4 Surfacing*,
- 5 Bridge waterproofing*,
- 6 Bridge deck*,
- 7 Caulking,
- 8 Abutment*.

* Not part of the kit.

** Optional item 2 and 3 shall not be used together.

Figure 2.1.2: Section across a generic buried expansion joint

2.2 USE CATEGORY AND KITS

2.2.1 Use categories

See Part 1 of this ETAG N° 032.

2.2.2 Kits

See Part 1 of this ETAG N° 032.

All buried expansion joints include a waterproofing element (sealant or membrane) as part of the kit. This element could be the bridge deck waterproofing which covers also the Expansion Joint (Type 2) or a separate waterproofing element (Type 1 or 3). The continuity to the bridge deck waterproofing has to be maintained.

The manufacturer shall declare which kind of waterproofing element will be used. This element is influenced by the movement and performance of the EJ and shall be assessed as part of the kit. If the element is the bridge deck waterproofing then this may be defined in relation to an existing ETA or harmonised standard.

2.3 ASSUMPTIONS

See Part 1 of this ETAG N° 032.

2.3.1 Main structure

See Part 1 of this ETAG N° 032.

2.3.2 Temperatures

See Part 1 of this ETAG N° 032.

The manufacturer shall declare the operating temperature of the product according to the levels as stated in Part 1 of this ETAG N° 032.

Testing methods described in this part of the ETAG generally cover the operating temperature range -30 °C to +45 °C. For materials used outside this temperature range, it shall be assessed whether the materials show changes of their properties in the concerned range of temperature. If so, these effects shall be considered in the approval procedure.

2.3.3 Installation

See Part 1 of this ETAG N° 032.

In addition, the manufacturer shall declare the limitations of the product in term of bridge surfacing, for example, minimum thickness of surfacing, type, application temperature, etc. This shall be stated in the ETA.

Note: Certain designs of BEJ may cause a reduction of thickness of surfacing above the location of the EJ. These designs may not be permitted in some Member States.

2.3.4 Working life

See Part 1 of this ETAG N° 032.

The working life category for Buried Expansion Joints shall be selected from the table of Working Life in Part 1 of this ETAG 032. It is assumed that a buried expansion joint is suitable for the working life categories 1, 2 or 3 as stated in Part 1 of this ETAG N° 032 when it is tested according to the procedures stated in Chapter 5, as meeting the requirements stated in Chapter 4 of this ETAG Part.

It is important to note that the working life of the expansion joint is influenced by the ability of the surfacing to accommodate the movement of the expansion joint taking into account thickness, mechanical characteristics, optional devices, etc. The appropriate characteristics of the surface layer(s), necessary for the accommodation of the movement of the expansion joint, shall be declared by the joint manufacturer and included in the ETA.

For this family Part, there are no components which are replaceable.

3. TERMINOLOGY

3.1 COMMON TERMINOLOGY AND ABBREVIATIONS

See Part 1 of this ETAG N° 032.

3.2 TERMINOLOGY AND ABBREVIATIONS SPECIFIC TO THIS ETAG

3.2.1 Terminology

See Part 1 of this ETAG N° 032.

For additional terms and definitions specific for this family product: see the following table.

Caulking	A packing material which is placed in the expansion gap to provide support for sealant in an expansion joint
Debonding layer	A lubricant or thin sheet of flexible material installed as a component part of the Buried Expansion Joint to prevent adhesion between selected components
Crack inducer	A saw cut above the joint (e.g. 20 mm width) that is installed to influence and control cracking in the surfacing above the joint, which normally occurs in service (not part of the kit)
Crack inducer sealant	A flexible and durable material (not part of the kit) that is inserted in the crack inducer to prevent the ingress of water through the surfacing to the joint
Flashing	Thin elastomeric strip either bonded or with debonding layer, bridging the gap
Pad	Preformed elastomeric bridging pad

Plate	A thin plate of metal (or other suitable material) over the bridge deck gap and which prevents ingress of aggregate into the bridge deck gap
Sealing element	Elastomeric sealing element preventing ingress of water into bridge gap
Supporting element	Load carrying support for flexible joint components above e.g. metal bridging plate
Tanking	A precoat layer applied to the internal surfaces of the recess formed for the buried flexible plug. The purpose of the tanking is to improve adhesion and seal between the flexible plug and the internal faces of the recess

3.2.2 Abbreviations

See Part 1 of this ETAG N° 032.

SECTION TWO: GUIDANCE FOR THE ASSESSMENT OF THE FITNESS FOR USE

GENERAL NOTES

See Part 1 of this ETAG N° 032.

4. REQUIREMENTS

For works and their relationship to the Road Bridge Expansion Joint characteristics

See Part 1 of this ETAG N° 032.

4.0 TABLE LINKING THE ESSENTIAL REQUIREMENTS TO ROAD BRIDGE EXPANSION JOINT PERFORMANCE

Comprehensive table

See the comprehensive table of Part 1 of this ETAG N° 032 but the clauses in the last column refer to this Part of the ETAG.

4.1 KITS

4.1.1 Mechanical resistance and stability

4.1.1.1 General

See Part 1 of this ETAG N° 032.

ULS criteria for imposed displacements at ULS of the main structure are not relevant for Buried Expansion Joints.

Note: It is a characteristic of Buried Expansion Joints that as the structure expands and contracts tension or compression may be generated in the joint and the surfacing material above the joint. It is considered that the surfacing material shall be able to sustain these loading effects as well as not causing detrimental effects to the joint and the structure. The surfacing is considered to maintain composite action with the waterproofing and Buried Expansion Joint throughout the working life.

For this reason the manufacturer declares the movement capacity of the joint and the recommended overall thickness of surfacing (see 2.3.3 and Chapter 7) that will be required for acceptable performance.

Table 4.1.1: Limit state and assessment criteria definition

Limit State	Limit State requirements	Remark
ULS	No collapse of supporting element (bridging plate, ...).	
SLS	No permanent deformation of supporting element (bridging plate, ...).	Only reversible deformations, displacement or rotation. Allowance of creep or hysteresis effect.

For 4.1.1.2, actions for "Mechanical resistance and stability" derive from Annex G of Part 1. The verification shall be done by calculation.

4.1.1.2 Mechanical resistance

4.1.1.2.1 General

Traffic induced stresses shall only be considered for the verification of the supporting element components (e.g. bridging plate).

The expansion joint shall withstand loading from traffic. The static load model, LM1, TS1 in ETAG N° 032, Part 1, Annex G.2 shall be used.

Load conditions as relevant to the bridging plate of the EJ and its required performance are represented by the following formulas. This clause is not relevant for type 1 BEJ. For this type 1, no verification is required.

Note: The mechanical resistance of this product family is mainly influenced by the behaviour of the supporting element. Its verification is made taking into account the fact that this supporting element is under a surfacing.

Expansion joint parameters (Part 1 Figure G2 and Table G2):

$$L_j(\text{Bej}) \leq 0,5 \text{ m}; W_j(\text{Bej}) \leq 1,2 \text{ m}; Q_{1k} = 300 \text{ kN}$$

4.1.1.2.2 ULS requirement

At ULS, the requirement for BEJ type products is that the bridging plate shall not collapse.

At ULS the design situation is given by:

$$C_{ULS} = \psi_{0T} \gamma_{Q1} Q_{1k} + \psi_{0d} \gamma_{dE} d_{Ek} \quad [\text{EQ. 4.1}]$$

Where:

Q_{1k} = Axle load

γ_{Q1} = Partial factor traffic loads

ψ_{0T} = Combination factor for traffic loads

ψ_{0d} = Combination factor for opening position

d_{Ek} = Maximum manufacturer declared opening position of the joint

Design situation C_{ULS1} :

$$C_{ULS1}: Q_{1d} = 405 \text{ kN with } 60 \% \text{ of manufacturer's declared opening } (d_{Ek})$$

Design situation C_{ULS2} :

$$C_{ULS2}: Q_{1d} = 284 \text{ kN with full manufacturer's declared opening } (d_{Ek})$$

Design contact pressure:

$$p_{\text{contact,ULS}} = \gamma_{Q1} [(Q_{1k} / 2) \times (1 / \text{contact area})] \quad [\text{EQ. 4.2}]$$

$$p_{\text{contact}} (\text{at surface}) = 1,35 \text{ N mm}^{-2}$$

This design contact pressure shall be reduced at the bridging plate with the application of the dispersal effect (D) in accordance with EN 1991-2, 4.3.6.

4.1.1.2.3 SLS requirement

At SLS, the requirement for BEJ type products is that there shall be no permanent deformation of the bridging plate.

At SLS the design situation is given by:

$$C_{SLS} = \psi_{0T} Q_{1k} + \psi_{0d} d_{Ek} \quad [EQ. 4.3]$$

Where:

Q_{1k} = Axle load

ψ_{0T} = Combination factor for traffic loads

ψ_{0d} = Combination factor for opening position

d_{Ek} = Maximum manufacturer declared opening position of the joint

Design situation C_{SLS1} :

$$C_{SLS1}: Q_{1d} = 300 \text{ kN with full manufacturer's declared opening (} d_{Ek} \text{)}$$

Contact pressure (SLS)

$$contact_{SLS} = [(Q_{1k} / 2) \times (1/contact \text{ area})] \quad [EQ. 4.4]$$

$$contact \text{ (at surface)} = 1,00 \text{ N mm}^{-2}$$

Note: The horizontal loads are not taken into account.

4.1.1.3 Fatigue

Fatigue by repeated vertical loading on the expansion joint is not of relevance.

Fatigue caused by repeated horizontal movements of the main structure due to temperature, traffic loads, etc. is covered by material characteristics of the components.

4.1.1.4 Seismic behaviour

See Part 1 of this ETAG N° 032.

Notes:

- It is anticipated that should a buried expansion joint be subject to actions resulting from seismic activity which cause movements to occur outside of the design capability then the joint would need to be repaired or replaced.
- Special attention may be paid to the deformation capability of the surfacing.

4.1.1.5 Movement capacity

The movement capacity stated by the manufacturer shall be demonstrated by test without surfacing and in unloaded conditions. Alternatively, where the relevant components are designed to move freely, the movement capacity may be demonstrated by analysis of the technical file.

The capacity shall be assessed in the directions according to 4.1.1.5 in Part 1 of this ETAG N° 032.

The rate of application of displacement and the temperature of the expansion joint can influence the performance of the joint. The testing of the expansion joints shall take into account movement effects and if relevant depending on material properties temperature effects.

Taking into account the declared movement capacity, the manufacturer shall indicate the minimum property of the surfacing.

4.1.1.6 Cleanability

Not relevant for this family Part.

4.1.1.7 Resistance to wear

Not relevant for this family Part.

4.1.1.8 Watertightness

See Part 1 of this ETAG N° 032.

4.1.2 Safety in case of fire

According to Part 1: Not relevant.

4.1.3 Hygiene, health and environment

See Part 1 of this ETAG N° 032.

4.1.4 Safety in use

4.1.4.1 Ability to bridge gaps and levels in the running surface

Not relevant for this family Part.

4.1.4.2 Skid resistance

Not relevant for this family Part.

4.1.4.3 Drainage capacity

See Part 1 of this ETAG N° 032.

4.1.5 Protection against noise

According to Part 1: Not relevant.

4.1.6 Energy, economy and heat retention

According to Part 1: Not relevant.

4.1.7 Aspects of durability, serviceability and identification of the products

See Part 1 of this ETAG N° 032.

4.1.7.1 Aspects of durability

The durability of the expansion joint depends mainly on the durability of its components, the achieved quality at manufacture and the achieved quality of installation and the proper maintenance.

In general, the durability of the Buried Expansion Joint can be influenced by:

- a) Corrosion. Buried Expansion Joints may contain metal components, for example a bridge or cover plate. All components used in Buried Expansion Joints shall be non-corrodible or corrosion protected.
- b) Chemicals. The materials used in Buried Expansion Joints are not required to demonstrate resistance to solvents and fuels. Materials shall be compatible and shall not deteriorate as a result of chemical or electrochemical interaction.

Buried Expansion Joints are protected by the surfacing and, consequently, they are not exposed to ultra-violet light or ozone and there is no significant historical record that freeze thaw has been a problem with these expansion joints. It is not required to demonstrate resistance to freeze thaw or to ageing for the whole expansion joint. When relevant, ageing is covered by component testing.

4.1.7.2 Aspects of serviceability

See Part 1 of this ETAG N° 032.

Accessibility for inspection is not considered relevant to BEJ.

4.1.7.3 Aspects of identification

See Part 1 of this ETAG N° 032.

4.2 COMPONENTS

See Part 1 of this ETAG N° 032.

Components shall be defined and specified in the Technical Manual according to their function and their role in the product. This shall include their characteristics, method of handling and their source of supply.

The tests determine the material characteristics and performance.

The manufacturer shall present a list of components with the material characteristics (including tolerances) as given in Table 5.2. Testing shall be carried out to demonstrate that the product meets the declared characteristics.

5. METHODS OF VERIFICATION

See Part 1 of this ETAG N° 032.

GENERAL

Comprehensive table

See the comprehensive table of Part 1 of this ETAG N° 032 but the clauses in the last column refer to this part of the ETAG.

5.1 KITS

5.1.1 Mechanical resistance and stability

5.1.1.1 General

See Part 1 of this ETAG N° 032.

5.1.1.2 Mechanical resistance

The verification according to Part 1 of this ETAG N° 032 is not applicable to Buried Expansion Joints, except supporting components (bridging plate, ...). For these supporting components calculation is sufficient.

5.1.1.3 Resistance to fatigue

Resistance to fatigue due to traffic loads is not applicable to Buried Expansion Joints.

Resistance to fatigue due to repeated movement of the bridge structure is assessed by Annex K of Part 1 of this ETAG N° 032 with K.7.2 modified as follow:

- For Working Life Category 1: 1 000 cycles,
- For Working Life Category 2: 1 500 cycles,
- For Working Life Category 3: 2 500 cycles.

One cycle covers the maximum relative displacement (from maximum to minimum opening and back to maximum).

The test is executed with a displacement in one horizontal direction according to K.3.3 in Annex K of Part 1 of this ETAG N° 032.

Deviating from K.7.2 in Annex K of Part 1 of this ETAG N° 032, the cycles are not subdivided into steps.

5.1.1.4 Seismic behaviour

See Part 1 of this ETAG N° 032.

5.1.1.5 Movement capacity

See Part 1 of this ETAG N° 032.

The test method is described in Part 1 of this ETAG N° 032, Annex K, with the following modifications in K.7.2:

“The testing cycle shall be carried out 5 times.

During the 5th cycle, the spectrum of transverse movement capacity is verified for the total range of longitudinal movement and the values of corresponding reaction forces are recorded.”

Concerning the influence of temperature on the behaviour of the product during the movement capacity test, verification of the movement capacity of the component under operating temperature declared by the manufacturer (see 2.3.2 in this family Part) shall be checked by appropriate test on this component.

Note: The test is carried out without surfacing.

5.1.1.6 Cleanability

Not relevant for this family Part.

5.1.1.7 Resistance to wear

Not relevant for this family Part.

5.1.1.8 Watertightness

See Part 1 of this ETAG N° 032.

The test shall be carried out with the joint in the maximum opening position.

Note: Maximum opening position is defined in Part 1 of this ETAG N° 032.

5.1.2 Safety in case of fire

According to Part 1: Not relevant.

5.1.3 Hygiene, health and environment

See Part 1 of this ETAG N° 032.

5.1.4 Safety in use

5.1.4.1 Ability to bridge gaps and levels in the running surface

5.1.4.1.1 Allowable surface gaps and voids

Not relevant for this family Part.

5.1.4.1.2 Level differences in the running surface

Not relevant for this family Part.

5.1.4.2 Skid resistance

Not relevant for this family Part.

5.1.4.3 Drainage capacity

See Part 1 of this ETAG N° 032.

5.1.5 Protection against noise

According to Part 1: Not relevant.

5.1.6 Energy economy and heat retention

According to Part 1: Not relevant.

5.1.7 Aspects of durability, serviceability and identification

See Part 1 of this ETAG N°032.

5.1.7.1 Aspects of durability

See Part 1 of this ETAG N° 032.

5.1.7.2 Aspects of serviceability

See Part 1 of this ETAG N° 032.

5.1.7.3 Aspects of identification of the product

Buried Expansion Joints are supplied to construction sites as a kit of components. The manufacturer shall identify the product and components with manufacturers name and address, product/grade, batch number and date of manufacture. The components and the test certification shall be checked to verify identification of the components.

5.2 COMPONENTS

See Part 1 of this ETAG N° 032.

The manufacturer shall present a list of components with test methods and/or standards.

The table below gives assessment methods which shall be used where they are applicable. Where the methods do not apply or do not assess the correct characteristics for that component/material, alternative assessment methods, based in preference on European or ISO standards, shall be used by agreement between the ETA applicant and the Approval Body. Details shall be given in the Evaluation Report.

Table 5.2: List of components

Material/Component	Characteristics		Test method(s)
Flashing, pad or sealing element	Density		According to ISO 2781 with technical corrections 1996
	Hardness IRDH		According to ISO 48 or ISO 7619-2
	Tensile strength		According to ISO 37
	Elongation at break		According to ISO 37
	Tear resistance		According to ISO 34-1 Method A
	Low brittleness temperature		ISO 812 Requirements according to 7.1.1.4
Heat resistance		According to ISO 1817	
Waterproofing element (e.g. bituminous sheets, liquid applied resins)	According to the EN standard or ETA or technical specifications		According to the EN standard or ETA or technical specifications
Bonding agents/sealants, (chemicals)	Resistance to low temperatures (chemicals)		according to specification
De-bonding layer (waxed paper, silicon spray, grease paint)	De-bonding		According to relevant EN standard or specification
Caulking (e.g. closed cell Polyethylene foam)	Gap filling, heat resistant, not hygroscopic, elastically recoverable		According to relevant EN standard or specification
Supporting element (e.g. bridging plate)	Steel Stainless steel	- Yield point, - Tensile strength, - Elongation at rupture, - Chemical composition (C-eq.)	EN 10025 EN 10088
	Aluminium (covers): Plate material: Grade 5xxx Extruded material: Grade 6xxx excluded: grades given in EN 1999-1-3, cl. 3	- Chemical composition, - Tensile strength, - Yield point, - Stress-strain, - Elongation at rupture, - Ductility, - Charpy-V value	EN 1999 Extruded aluminium: EN 755-2
Bolts, screws, nuts, washer, profiles	Metals		EN 10204

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

This chapter details the performance requirements to be met (Chapter 4) in precise and measurable (as far as possible and proportional to the importance of the risk) or qualitative terms, related to the product and its intended use, using the outcome of the verification methods (Chapter 5).

6.0 TABLE LINKING THE ESSENTIAL REQUIREMENTS TO PRODUCT REQUIREMENTS

ER	Characteristics specified in the mandate	ETAG paragraph on product performance to be assessed	Class, use category, criterion		No performance determined option
1	Mechanical resistance	§ 6.1.1.2	Covered by component assessment		No
			Supported element (e.g. bridging plate, ...)	Pass/fail	
	Resistance to fatigue	§ 6.1.1.3	Not required		
	Seismic behaviour	§ 6.1.1.4	Declaration of selected approach and relevant information (aspects, etc.)		Yes
	Movement capacity	§ 6.1.1.5	Declared value		No
	Cleanability	§ 6.1.1.6	Not relevant		
	Resistance to wear	§ 6.1.1.7	Not relevant		
	Watertightness	§ 6.1.1.8	Pass/fail		No
2	Not relevant				
3	Release of dangerous substances	§ 6.1.3	Indication of dangerous substances incl. concentration, etc. or: "No dangerous substances"		Yes
4	Allowable surface gaps and voids.	§ 6.1.4.1.1	Not relevant		
	Level differences in the running surface	§ 6.1.4.1.2	Not relevant		
	Skid resistance	§ 6.1.4.2	Not relevant		
	Drainage capacity	§ 6.1.4.3	Not relevant		
5	Not relevant				
6	Not relevant				
7	Durability of the characteristics against: Corrosion, ageing, chemicals, temperature, UV-radiation, freeze-thaw, ozone	§ 6.1.7.1	Corrosion	Pass/fail (considering the working life category)	No
			Chemicals	Pass/fail (considering the working life category)	No
			Ageing resulting from		
			- temperature	Not relevant	
			- UV radiation	Not relevant	
			- ozone	Not relevant	
			Resistance against freeze-thaw	Not relevant	

6.1 KITS

6.1.1 Mechanical resistance and stability

6.1.1.1 General

6.1.1.2 Mechanical resistance

For supported element (e.g. bridging plate):

The product will be judged as fit for purpose, for the designated use categories given in 2.2.1, provided that it satisfies the performance requirements in 4.1.1.2 by the verification procedure as described in 5.1.1.2.

ULS condition: At ULS the bridge plate shall be judged as fit for purpose if it satisfies the design criteria as defined in Chapter 4 of this Part.

SLS condition: The Buried expansion Joint up to SLS conditions shall be judged as fit for purpose if it is verified according the methods given in Chapter 5.

6.1.1.3 Resistance to fatigue

The product will be judged as fit for purpose provided that it satisfies the performance requirements in 4.1.1.3 by the verification procedure as described in 5.1.1.3.

6.1.1.4 Seismic behaviour

Not relevant for this family Part.

6.1.1.5 Movement capacity

The results shall be stated in the ETA.

The BEJ product is judged fit for purpose when it meets the requirements of 4.1.1.5, by analysis of the Technical File or by testing, according to 5.1.1.5.

The values achieved in the works may deviate from the tests results because of possible influence of type and bonding of surfacing layer. This information shall be given in the ETA.

Specific information adaptation in the surfacing layer stated by the manufacturer shall be considered, if relevant.

6.1.1.6 Cleanability

Not relevant for this family Part.

6.1.1.7 Resistance to wear

Not relevant for this family Part.

6.1.1.8 Watertightness

After testing in accordance with 5.1.1.8 the product shall remain watertight.

6.1.2 Safety in case of fire

According to Part 1 of this ETAG 032: Not relevant.

6.1.3 Hygiene, health and environment (ER 3)

6.1.3.1 Release of dangerous substances

The expansion joint shall comply with all relevant European and national provisions applicable for the uses for which it is brought to the market. The attention of the applicant shall be drawn on the fact that for other uses or other Member States of destination there may be other requirements which would have to be respected. For dangerous substances contained in the expansion joint, the NPD option (no performance determined) is applicable.

The expansion joint and/or constituents of the expansion joint listed in the EOTA TR 034: "General Checklist for ETAGs/CUAPs/ETAs -Content and/or release of dangerous substances in products/kits", which have to be considered will be verified by the given methods taking into account the installation conditions of the construction product and the release scenarios resulting from there. Regulations related to placing the product on the market may also need to be taken into account.

Regarding the release scenarios referred to in the EOTA TR 034, the use category S/W2 (Product with no direct contact to but possible impact on soil, ground and surface water have to be considered.

6.1.4 Safety in use

6.1.4.1 Ability to bridge gaps and levels in the running surface

Not relevant for this family Part.

6.1.4.2 Skid resistance

Not relevant for this family Part.

6.1.4.3 Drainage capacity

Not relevant for this family Part.

6.1.5 Protection against noise

According to Part 1: Not relevant.

6.1.6 Energy economy and heat retention

According to Part 1: Not relevant.

6.1.7 Aspects of durability, serviceability and identification of the products

6.1.7.1 Aspects of durability

The product shall be judged as fit for purpose when it meets the requirements of 4.1.7.1.

6.1.7.2 Aspects of serviceability

The assessment shall be undertaken according to the verification method given in 5.1.7.2.

6.1.7.3 Aspects of identification of the product

The product is supplied to the construction site as a kit of components. The product shall be judged as fit for purpose when the individual components are identified in accordance with 4.1.7.3.

6.2 COMPONENTS

The Approval Body shall assess the possible effects on the performance of the expansion joint due to the variability of the elements and materials characteristics and, where applicable, declared tolerances.

Table 6.2 below presents assessment criteria for materials for the components, defined in 5.2. For component materials not covered in the table below, appropriate assessment criteria shall be used. The Approval Body shall assess the fitness for purpose of the components based on manufacturer's stated values.

Related tolerances shall be declared by the manufacturer and shall be assessed by the Approval Body in respect to possible effects on the performance of the product/kit.

Table 6.2: Assessment criteria for materials and components

Material/Component	Characteristics		Specification
Flashing, pad or sealing element	Density		MDV
	Hardness		MDV
	Tensile strength		MDV
	Elongation at break		MDV
	Tear resistance		MDV
	Low brittleness temperature		Pass/fail: Requirements according to ISO 812 (2006), 7.1.1.4
	Heat resistance		MDV
Waterproofing element (e.g. bituminous sheets, liquid applied resins)	According to the EN standard or ETA or technical specifications.		MDV
Bonding agents/sealants, (Chemicals)	Resistance to low temperatures (chemicals)		MDV
De-bonding layer (waxed paper, silicon spray, grease paint)	De-bonding		MDV
Caulking (e.g. closed cell Polyethylene foam)	Gap filling, heat resistant, not hygroscopic, elastically recoverable		MDV
Supporting element (e.g. bridging plate)	Steel Stainless steel	- Yield point, - Tensile strength, - Elongation at rupture, - Chemical composition (C-eq.)	MDV
	Aluminium (covers): Plate material: Grade 5xxx Extruded material: Grade 6xxx Excluded: grades given in EN 1999-1-3, cl. 3	- Chemical composition, - Tensile strength, - Yield point, - Stress-strain, - Elongation at rupture, - Ductility, - Charpy-V value	MDV
Bolts, screws, nuts, washer, profiles	Metals		MDV

7. ASSUMPTIONS AND RECOMMENDATIONS UNDER WHICH THE FITNESS FOR USE OF THE PRODUCTS IS ASSESSED

7.0 GENERAL

See Part 1 of this ETAG.

7.1 DESIGN OF WORKS

(Including, if necessary, indications on project testing)

While the surfacing is not part of the kit, the properties and performance of the surfacing can have a major influence on how the buried expansion joint will perform. Therefore it is very important to ensure that the design of the buried expansion joint system is carried out in conjunction with the design of the surfacing system. The factors that should be considered to be most important are the movements (including vertical and rotational) and any bonding or de-bonding layers that are required in the design of the buried expansion joint. The manufacturer may wish to recommend additional specific tests for their product that will demonstrate they can provide the required performance. They may also wish to recommend surfacing specifications that have demonstrated that their buried expansion joint will provide satisfactory service.

7.2 PACKAGING, TRANSPORT AND STORAGE

7.2.1 Packaging

See Part 1 of this ETAG N° 032.

7.2.2 Transport and storage

See Part 1 of this ETAG N° 032.

7.3 EXECUTION OF WORKS

See Part 1 of this ETAG N° 032.

The manufacturer shall show in his Technical Manual how the system will cope with level differences outside the required tolerance. Buried Expansion Joints shall be installed underneath to form continuity of the surfacing across the deck gap.

It is furthermore assumed that the location of installation is absolutely clean and dry before installation of the kit. If the kit requires for specific pre-treatment of the installation surface the manufacturer shall describe this pre-treatment in the Technical Manual.

7.4 MAINTENANCE AND REPAIR

Because Buried Expansion Joints are covered by surfacing it is not normally possible to carry out maintenance and repairs to this family of expansion joints. If there are any guidelines for maintenance and repair, including inspection sequences, these shall be part of the Manufacturer's Technical File.

SECTION THREE: ATTESTATION OF CONFORMITY (AC)

8. ATTESTATION AND EVALUATION OF CONFORMITY

8.1 EC DECISION

See Part 1 of this ETAG N° 032.

8.2 RESPONSIBILITIES

8.2.1 Tasks for the manufacturer

The kit manufacturer shall keep available an updated list of component manufacturers. Copies of this list shall be made available to the CB¹ and may be made available to the Approval Body for information.

At least once a year each component manufacturer shall be audited by the kit manufacturer. Each audit shall be made available to the CB. These audit reports shall typically include:

- Identification of the component manufacturer,
- Date of audit of component manufacturer,
- Summary of the results and records of the Factory Production Control (FPC) since last audit,
- Summary of the complaint records,
- Evaluation of the component manufacturer concerning FPC,
- Specific remarks as relevant,
- Clear and unique statement whether the requirement of the ETA are met,
- Name and position of signatory,
- Date of signature,
- Signature.

The kit manufacturer shall make available all records of relevant results concerning the ETA and the audit reports concerning the component manufacturers.

However, as a derogation from the audit, where the ETA holder can presume that the components have the properties declared of them and have been manufactured according to an appropriate FPC system (e.g. by them bearing the CE marking), the audit is not necessary.

8.2.1.1 Factory production control (FPC)

See Part 1 of this ETAG N° 032.

8.2.1.2 Testing of samples taken at the factory – Prescribed Test Plan

See Part 1 of this ETAG N° 032.

8.2.2 Tasks of the approved body (or in some cases, the manufacturer)

8.2.2.1 General

See Part 1 of this ETAG N° 032.

8.2.2.2 Initial Type Testing and Factory Production Control

See Part 1 of this ETAG N° 032.

As the buried expansion joints are usually assembled at site in general the component tests conducted during type test shall be repeated in the factory production control.

¹ CB: Certification Body

For the initial type test of the kit the relevant clauses in Chapter 4, 5 and 6 apply.

Table 8.1 below shows testing procedures and certificates to be presented for commonly used materials for the components and the kit. For components not covered in the table, equivalent procedures shall apply.

Table 8.1: Characterization tests on the components

Material/component	Characteristics	Test method(s)	Frequency
Elastomer	On sampling:		Each batch, or certificate according to EN 10204, type 3.1 (1)
	- Density	According to ISO 2781 Technical corrections 1 (1996)	
	- Hardness IRHD	According to ISO 48 or ISO 7619-2	
	- Tensile strength	According to ISO 37,	
	- Elongation at break	According to ISO 37	
	- Tear resistance	According to ISO 34-1 Method A	
Steel pieces	On sampling: - Elasticity limit $f_{0,2k}$ at 0,2 % - Tensile strength - Elongation at break - Chemical composition	EN 10025, EN 10088-2	Certificate type 3.1 according to EN 10204 at each delivery (1) For secondary elements, the Certificate type 2.2 according to EN 10204, at each delivery
	Corrosion protection: - Verification of the thickness and the continuity of the layer - Surface characteristics before corrosion protection application (roughness, cleanliness) - Drying time	See Part 1, 5.1.7.1.1	Each batch or every assembled expansion joint
Piece of aluminium alloy	On sampling: - Chemical composition - Elasticity limit at 0,2 % - Tensile strength - Elongation at break	EN 1676 and/or EN 573	Certificate type 3.1 according to EN 10204, at each delivery (1) For secondary elements, the Certificate type 2.2 according to EN 10204, at each delivery
Bolts, nuts and washers	According to the relevant EN standard or specification		CE marking or certificate type 3.1 according to EN 10204 at each delivery or confidence achieved by sufficient samples testing
	Corrosion protection	E.g. EN ISO 1461	Identified at each delivery
Elements of anchorage (anchor bar, grout, resin, ...)	According to the relevant EN standard or specification		CE marking or certificate type 3.1 according to EN 10204 at each delivery or confidence achieved by sufficient samples testing. For secondary elements, the certificate type 2.2 according to EN 10204, at each delivery

8.2.2.3 Assessment of the factory production control system. Initial inspection and continuous surveillance

See Part 1 of this ETAG N° 032.

8.2.2.4 Certification

See Part 1 of this ETAG N° 032.

8.3 DOCUMENTATION

See Part 1 of this ETAG N° 032.

8.4 EC MARKING AND INFORMATION

See Part 1 of this ETAG N° 032.

SECTION FOUR: ETA CONTENT

9. THE ETA CONTENT

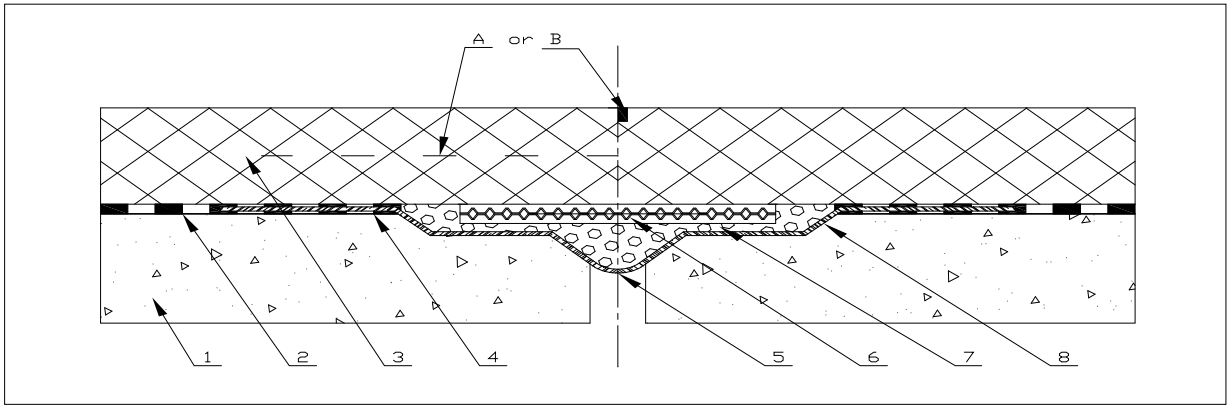
See Part 1 of this ETAG N° 032.

ANNEXES TO THIS ETAG FAMILY PART

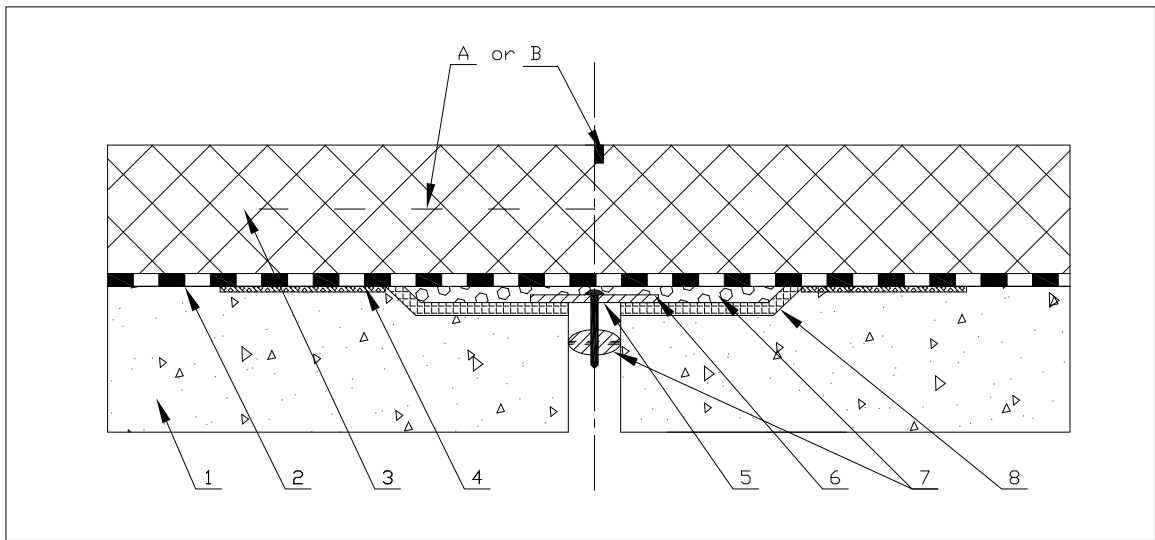
Annexes 2-A to 2-L for this family Part correspond to Annexes A – L in Part 1 of this ETAG N°032, if applicable.

ANNEX 2-M

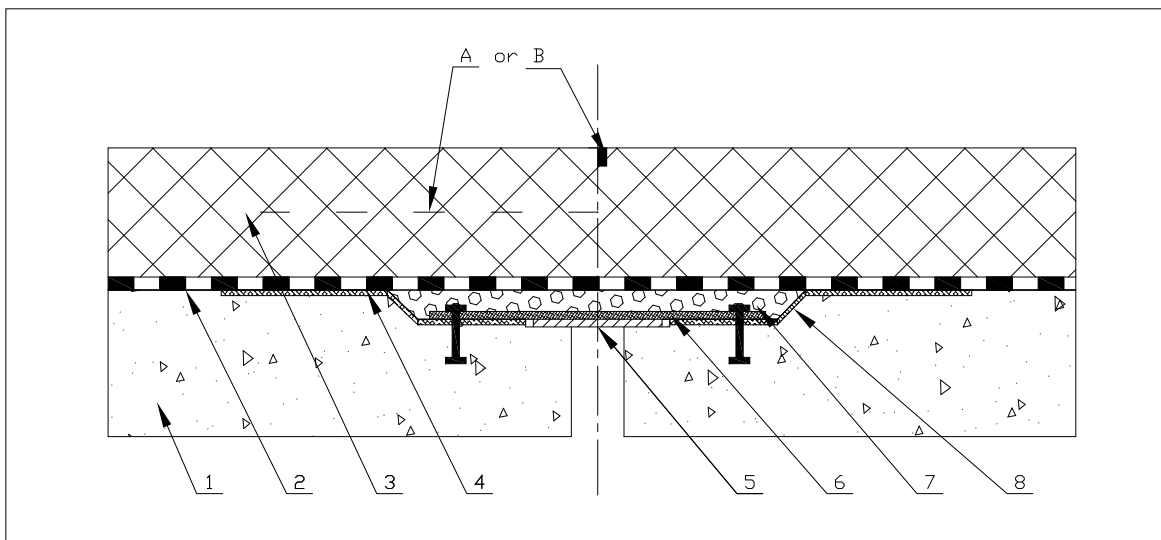
EXAMPLES OF BURIED JOINTS



Type 1



Type 2



Type 3

KEY

1. Bridge deck/abutment *
2. Bridge deck waterproofing *
3. Surfacing *
4. Waterproofing connection element
5. Supporting element (e.g. bridging plate)
6. Free sliding surface, extensible membrane or flexible plug mixture
7. Caulking
8. Waterproofing element

- A. Reinforcement * (optional)
- B. Crack inducer sealant * (optional)

* Not part of the kit