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European Technical Assessment

ETA 13/ 0525
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English translation prepared by IETcc. Original version in Spanish language

General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) Nº305/2011:

Instituto de Ciencias de la Construcción Eduardo Torroja (IETcc)

Trade name of the construction product

POLYNUM

Product family to which the construction product belongs

Thermal insulation products for buildings with radiant heat reflective components

Manufacturer

OPTIMER SYSTEM, S.A
C/ Belice, 7
Ctra. Alcalá de Henares-Daganzo km. 2,2
Pol. Ind. La Granja, Nave 7
28806 ALCALÁ DE HENARES (Madrid), Spain

Manufacturing plant(s)

Polynum C.L.P Insulation Ltd
Roma st 4 37600 Industrial Area Sderot
Israel

This European Technical Assessment contains

6 pages. Annex 1. Contain confidential information and is not included in the ETA when that assessment is publicly available

This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of

European Assessment Document (EAD) Nº 040007-00-1201 for "Thermal insulation products for buildings with radiant heat reflective components", November 2015)

This version replace

ETA 13/ 0525 issued on 27/ 05/ 2013

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SPECIFIC PARTS OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of the product

The reflective product POLYNUM is composed by one or two external aluminium films (min. 99% of purity) of low emissivity ($< 0,06$), linked by a thermo-welded to one or several internal layer of polyethylene and/or aluminium. The total thickness of the product goes from 0,15 to 30 mm. The POLYNUM system is constituted by:

Trade name	Composition
POLYNUM ONE	Thermo-reflective isolation constituted by one external aluminium films (16 μm) with one support layer of polyethylene burlles (thickness 4 mm)
POLYNUM SUPER LB NET	Constituted by two external aluminium films (16 μm) with and without auto adhesive band, and one internal film of polyethylene (130 μm) and reinforcement mesh. The total thickness is 150 μm .
POLYNUM SUPER	Constituted by two external aluminium films (16 μm) with and without auto adhesive band, and one internal of polyethylene burlles (4mm)
POLYNUM BIG	Constituted by two external aluminium films (16 μm) and one internal of polyethylene burlles (8mm).
POLYNUM BLH	Constituted by two external layers of high density (300g/m ²) polyethylene burlles (4mm), and one internal aluminium film (12 μm). The total thickness is 8 mm
POLYNUM MULTI	Constituted by two external aluminium films (16 μm) and two internal layers of polyethylene bubbles (3mm) and a core of polyethylene foam (3mm). The total thickness is 9 mm
POLYNUM ULTRA	Constituted by two external aluminium films (16 μm) and two internal layers of polyethylene with big bubbles (8mm). Between these polyethylene layers there are one aluminium films (16 μm), the burlles in contact with the internal aluminium are open, creating small air space with low emissivity. The total thickness is 16 mm
POLYNUM SOUND	Constituted by two external aluminium films (16 μm) and two internal layers of polyethylene (high density 300g/m ²) burlles (8 mm) and a core of high density polyethylene film. The total thickness is 16 mm
POLYNUM 3L, 5L, 7L	Constituted by two external aluminium films (16 μm) and Internal layers of polyester wool (10mm): 1 for 3L, 2 for 5L and 3 for 7L. These polyester layers are separated between them with a polyethylene film ((13 μm)). The total thickness is 10mm for 3L, 20mm for 5L and 30mm for 7L
POLYFIX	Band constituted by polypropylene aluminized and acrylic resin as adhesive
ALU-FIX	Band constituted by aluminium layer of 30 μm without any external protection and acrylic resin as adhesive

The Composition of the components

Trade name	Composition
External and internal aluminium layer	Layers of aluminium with 12 and 16 μm of thickness with a minimum content of 99% of aluminium. These present an external coat of anti-corrosive lacquer (1-2 g/m ²). This aluminium is adhered by an bi-component adhesive ((2-3 g/m ²) to a polyethylene film (50 μm thickness)
Layer of polyethylene burlles	It is made of a polyethylene with a density $\leq 0,94 \text{ g/cm}^3$, fluidity index $\leq 2,5 \text{ dg/min}$. The weigh/surface is 150 or 300 g/m ² (high density) and their thickness varies from 4 to 16 mm, depending to the product. The thermal conductivity is 0,036 (150 g/m ²) y 0.040 (300 g/m ²) W/mK.
Layer of polyethylene foam	Chemical closed cell cross linked LDPE foam density of 25 kg/m ³ . Thermal Conductivity 0.038 W/mK.
Polyester wool	Density of 8.0 kg/m ³ . Thermal Conductivity 0.040 W/mK
Reinforcement mesh	Mesh of glass fiber of 16 g/m ² (aprox) with 5x5 cm weave
Adhesive band	Styrene butadiene rubber (SBR) based

2 Specification of the intended use in accordance with the applicable EAD

POLYNUM is a reflective thermal isolated that increases the thermal resistance of the air spaces existing in roofs, walls and floors (without load on all surface of POLYNUM) o ceilings. The thermal properties of this product are related with the surface low emissivity of the aluminium foil and the space air in contact with them. The thermal resistance of these products is mainly due to the union of **POLYNUM + space air**.

The best thermal resistances are obtained when this product are incorporated into a non-ventilated air space. The minimum thickness recommended for the air space is 2 cm.

POLYNUM BLH contents low emissivity aluminium foil with their own space air in contact with it, so this product does not need to be in contact with other external space air. Its insteded use is to be applied in floors.

The thermal insulation product shall only be installed in structures where it is protected from rain, weathering and moisture, to avoid that the aluminium surface gets dirty and its thermal properties are reduced.

This European Technical Approval does not cover the complete or finished system of insulation. As for the application of all products insulating, the national codes of practice and regulations must be respected for design and implementation of construction systems.

The provisions made in this European Technical Approval are based on an assumed working life of the product of 25 years, provided that the conditions for packaging, transport, storage, installation and use are met. The indication given on the working life cannot be interpreted as a guarantee given by the manufacturer, but are only to be regarded as a means for choosing the right products in relation to the expected economically reasonable working life of the works. "Assumed intended working life" means that, when an

assessment following the ETAG provisions is made, and when this working life has elapsed, the real working life may be, in normal use conditions, considerably longer without major degradation affecting the Essential Requirements.

Installation. The fitness of use of this kit can only be assumed if this is installed according to the manufacturer's instructions, which are part of the MTD to this ETA placed at IETcc. Particularly, it is recommended to consider:

- In all the cases, the user must fulfill the national regulations, in particular in term of fire, wind resistance, risk of condensation and durability of the constructions. The fitness for use of the product is subjected to the following conditions of implementation:
 - o Installation carried out by appropriate installer under the supervision of the project representative.
 - o Installation in accordance with the manufacturer's specifications.
- It can only be used the components of the kit indicated in this ETA,
- The value of thermal resistance or of thermal coefficient of transmission U of the constructive element has to be determined in accordance with the relevant national provisions. The global thermal resistance of a space air + POLYNUM depend of several factor, such as:
 - o Emissivity of each low emissivity layer given in the ETA.
 - o Thickness of each air space.
 - o Ventilation amount of each air space (tight, weakly or highly ventilated),
 - o Orientation of air space: for heat flow up, down or horizontal (see Annex B of EN ISO 6946).
 - o The thermal resistance of a non-ventilated air space when it is in contact with this product, is determined according to the standard EN 6946, annex B. In the calculation of the global thermal transmission coefficient of a constructive element, it is necessary to consider the thermal bridges (EN 10211). Note: when the air space is slightly ventilated, the thermal resistance of the air space is the middle and when this air space is ventilated the thermal resistance of the air space is negligible (EN 6946).
- Constructions integrating the reflective product must be designed and carried out in order to eliminate any condensation risk inside and on the surface from the structural component. The calculation of the condensation risk can carry out according to standard EN 13788.

Before, the installation of POLYNUM, it is recommended to read its security card.

3 Performance of the product and references to the methods used for its assessment

The identification tests and the assessment for the intended use of this product according to the Essential Requirements were carried out in compliance with the European Assessment Document (EAD) N° 040007-00-1201 for "Thermal insulation products for buildings with radiant heat reflective components", November 2016)

Safety in case of fire ((BWR 2)

Reaction to fire. No performance assessed (NPA).

Safety in use (BWR 4)

Corrosion developing capacity. The test is carried out according to ISO EN 9227: "*Corrosion tests in artificial atmospheres – Salt spray tests*", in order to check the behavior of coatings of product with respect to corrosion when it is subjected to an air charged with chloride (for example salt fog) for 168 days.

The test results concerning the measure of loss of mass and the visual check of the state of surface of the product show that there is no sensitive loss of material. Pass

Energy economy and heat retention (BWR 6)

Core thermal resistance. The core thermal resistance is determined according to the EN 12.667 "*Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Products of high and medium thermal resistance*".

The test specimens are measured to determine the fractile value of thermal resistance according to EN ISO 10456 "*Building materials and products-Procedures for determining declared and design thermal values*". The fractile value of thermal resistance is R (10°C, 90/90) representing at least 90 % of the production with a confidence level of 90% and the declared value of thermal resistance are:

Core thermal resistance		
Samples	R (10°C,90/90) M²k/w	Declared Valour
SUPER LB NET	0,00	0,00
ONE	0,11	0,10
SUPER	0,11	0,10
BIG	0,2	0,20
MULTI	0,25	0,25
ULTRA	0,43	0,42
SOUND	0,4	0,4
BLH	0,21	0,20
POLYNUM 3L	0,22	0,22
POLYNUM 5L	0,50	0,50
POLYNUM 7L	0,85	0,85

Emissivity (EN 16012)

Emissivity	
Samples	Values
Initial and the final emissivity after the ageing test (28d)	0,05
The fractile value of emissivity $\epsilon_s = \epsilon_{90/90}$	0,05
The declared value of emissivity for both faces is ϵ_d	0,05
The emissivity of the adhesive band (POLIFIX) before and after the ageing (28d)	0,25 / 0,31
The emissivity of the adhesive band (ALUFIX) before and after the ageing (28d)	0,05 / 0,08

Resistance to water vapour (EN 12086). The test was performed on two layer of POLYNUM stocked between them using the adhesive tape. This system does not permit to go through the water vapor, and it is considered watertight to the water vapor. The μ value obtained was 4.500 (4mm).

Length and width (EN 822), Thickness (EN 823) and Mass per square meter (EN 1602).

Product	Width (m)	Length (m)	Thickness (mm)	Surface roll (m²)	g/m²
SUPER LB NET	1,2	50	0,15	60	160
ONE	1,2	40	4	48	242
SUPER	1,2	40	4	48	205
BIG	1,2	30	8	36	244
MULTI	1,2	30	9	36	450
ULTRA	1,2	20	16	24	376
SOUND	1,2	10	16	12	2292
BLH	1 / 1,2	30	8	30	567
POLYNUM 3L	1,2	40	10 / 3*	48	160
POLYNUM 5L	1,2	30	20 / 5*	36	260
POLYNUM 7L	1,2	24	30 / 6,5*	24	360

*The values of the longitude and width are standard but they could change. The tolerances are kept.

Dimensional Stability (EN 1604). The samples are keep for 48h at 70°C and 50%HR

Dimensional Stability ($\Delta\%$)			
Samples	Width	Length	Thickness
SUPER LB NET	0	-0,1	5
ONE	- 0,3	-0,3	-12
SUPER	-0,3	-0,1	-21
BIG	-0,3	-0,4	-14
MULTI	0,11	-0,3	-10
ULTRA	-0,3	-0,3	-20
SOUND	-0,7	-0,4	-3
BLH	-0,25	-0,25	-1,5
POLYNUM 3L/5L/7L	-0,25	-0,25	-----

Tensile strength perpendicular to face (EN 1607)

Tensile strength perpendicular to face (kPa)			
Samples	Initial	Ageing 28d, 70°C, 95% HR	Ageing 90d, 70°C, 95% HR
POLIFIX / ALU-FIX	0,013	0,014	0,012
SUPER LB	-----	-----	-----
ONE	0,0452	0,0420	0,0474
SUPER	0,0546	0,0521	0,0489
BIG	0,0349	0,0333	0,0318
MULTI	0,0313	0,0289	0,0299
ULTRA	0,0228	0,0214	0,0222
SOUND	0,0692	0,0645	0,0648
BLH	0,0275	0,0266	0,0241
POLYNUM 3L/5L/7L	0,00075	0,00089	0,0005

Peel strength (EN 11339)

Peel strength. R. maximum (N/5cm)			
Samples	Initial	Ageing 28d, 70°C, 95% HR	Ageing 90d, 70°C, 95% HR
Tape ALU-FIX	22	20	17
Tape POLYFIX	13	19	17

Resistance to tearing (EN 12310-1)

Resistance to tearing (N)			
Samples: nail / staple	Initial	Ageing 28d, 70°C, 95% HR	Ageing 90d, 70°C, 95% HR
SUPER LB NET	53 / 37	52 / 32	50 / 31
ONE	50 / 30	49 / 36	85 / 65
SUPER	55 / 28	55 / 32	65 / 55
BIG	80 / 25	80 / ---	60 / ---
MULTI	80 / 25	80 / --	60 / --
ULTRA	118 / --	118 / --	68 / ---
SOUND	86 / --	104 / --	105 / ---
POLYNUM 3L	16 / --	16 / --	21 / ---
POLYNUM 5L	29 / --	30 / --	36 / ---
POLYNUM 7L	46 / ---	47 / ---	53 / ---

Compressive creep for products exposed to compression loads (EN 1606). The test was performed on POLYNUM BLH. The compressive creep, X_{ct} , and the total thickness reduction, X_t , were determined after 120 days of testing at the declared compressive stress 6 kPa.

Compressive load (kPa)	6
X_t (mm) 120d	1,18
X_o (mm)	0,16
X_{ct} (mm) 120d	1
Deformation relative (%) ϵ	14,2

NOTE: Without experience, long term behaviour (at least 5 years) cannot be extrapolated from the results obtained after 4 months.

Behavior under point load for products exposed to compression loads. (EN 12430). 80N for POLYNUM BLH.

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

System of Attestation of Conformity. The European Commission according to the decision 1999/91/CE of January 1991, on the procedure of attestation of conformity (Annex III, clause 2(ii) second possibility of EU Regulation 305/2011) for this insulation products has laid down for this type of material

Product	Intended uses	Level / Classes	System
POLYNUM	Thermal insulation products for buildings with radiant heat reflective components	Any	3

According to this decision, system 3 of Attestation of Conformity also applies with regard to external fire performance. The system 3 provides: Tasks for the manufacturer: Factory production control and Tasks for the approved body: Initial type-testing of the product.

5 Technical details necessary for the implementation of the AVCP system, as provided for the applicable EAD

The ETA is issued for this kit on the basis of agreed data/information, deposited at IETcc, which identifies the product that has been assessed and judged. It is the manufacturer's responsibility to make sure that all those who use the kit are appropriately informed of specific conditions according to sections 1, 2, 4 and 5 including the annexes of this ETA. Changes to the product or the components or their production process, which could result in this deposited data/information being incorrect should be notified to the IETcc before the changes are introduced. IETcc will decide whether or not such changes affect the ETA and if so whether further assessment or alterations to the ETA shall be necessary.

5.1 Tasks of the manufacturer

Factory production control. The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic

manner in the form of written policies and procedures, including records of results performed. This production control system shall ensure that the product is in conformity with this ETA.

The manufacturer may only use components stated in the technical documentation of this ETA including Control Plan. The incoming raw materials are subjected to verifications by the manufacturer before acceptance. The factory production control shall be in accordance with the Control Plan⁽¹⁾ which is part of the Technical Documentation of this ETA. The Control Plan has been agreed between the manufacturer and the IETcc and is laid down in the context of the factory production control system operated by the manufacturer and deposited at the IETcc. The results of factory production control shall be recorded and evaluated in accordance with the provisions of the Control Plan.

Other tasks of the manufacturer. The manufacturer shall, on the basis of a contract, involve a body which is notified for the tasks referred to in section 4 in the field of reflective insulation products in order to undertake the actions laid down in this clause. For this purpose, the control plan shall be handed over by the manufacturer to the notified bodies involved.

For initial type – testing, the results of the tests performed as part of the assessment for the ETA shall be used unless there are changes in the production line or plant. In such cases the necessary initial type- testing has to be agreed with the IETcc.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of this ETA.

5.2 Tasks of notified bodies. The notified body shall perform

Initial type-testing of the product. The initial type-testing have been conducted by the IETcc to issued this ETA in accordance with chapter 2 of the EAD N° 040007-00-1201 for “Thermal insulation products for buildings with radiant heat reflective components”, November 2016. The verifications underlying this ETA have been furnished on samples from the current production; these will replace the initial type-testing carried out by the manufacturer. The IETcc has assessed the results of these tests in accordance with chapter 2 of this EAD, as part of the ETA issuing procedure.



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by
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⁽¹⁾ The control plan is a confidential part of this European Technical Assessment and only handed over to the notified body involved in the procedure of attestation of conformity. See section 3.2.2.