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European Technical Assessment

ETA 17/0389 of 02/05/2017

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General Part

Technical Assessment Body issuing the ETA: ITeCons - Instituto de Investigação e Desenvolvimento Tecnológico para a Construção, Energia, Ambiente e Sustentabilidade	
Trade name of the construction product	Granulado de Cortiça Expandida
Product family to which the construction product belongs	Thermal Insulation Products Product area code:4
Manufacturer	Amorim Isolamentos, S.A. Rua de Meladas, 105 4535-186 Mozelos PORTUGAL www.amorimisolamentos.com
Manufacturing plant(s)	Unidade/Linha Industrial de Vendas Novas Estrada de Lavre, Km 6 7084-909 Vendas Novas PORTUGAL
	Unidade/Linha de Silves Vale da Lama 8300-999 Silves PORTUGAL
This European Technical Assessment contains	10 pages
This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of	European Assessment Document EAD 040369-00-1201 – Insulation made of loose-fill or compound granulated expanded cork

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Specific parts

1. Technical description of the product

This European Technical Assessment (ETA) applies to insulation material composed by granulated expanded cork, with trade name Granulado de Cortiça Expandida. The manufacturer is ultimately responsible for the product specified in this ETA.

The granulated expanded cork is obtained by grinding and/or milling manufactured insulation cork boards and is considered such when the cork fragments have granulometry superior to 0.25mm and inferior to 22.4 mm. The particle size distribution of the expanded cork granules is 3/15 mm.

The product can be delivered as a loose-fill granulated expanded cork and can be applied for wall and roof insulation, and for floor insulation inside cavities.

The product will be installed according to the manufacturer's instructions or (in absence of such instructions) according to the usual practice of the building professionals.

The European Technical Assessment is issued for the product on the basis of agreed data/information, deposited with ITeCons - Instituto de Investigação e Desenvolvimento Tecnológico para a Construção, Energia, Ambiente e Sustentabilidade, which identifies the product that has been assessed and judged. The European Technical Assessment applies only to products satisfying the requirements of this agreed data/information.

2. Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)

The insulation layer formed by the product serves the following intended use:

- Thermal and/or acoustic insulation of walls, roofs and floors.

The assessment of insulation product only applies to the product protected from precipitation, wetting or weathering in built-in state and during transport, storage and installation and if it will not be used for construction elements with contact to water and soil or in constructions with a risk that the critical moisture content will be exceed.

Concerning the application of the insulation product, the respective national regulations shall be observed.

This European Technical Assessment, based on the provisions, test and assessment methods in the EAD 040369-00-1201, have been written based upon the assumed intended working life of the loose-fill granulated expanded cork for the intended use of 50 year. This assumes that the loose-fill granulated expanded cork is subject to appropriate installation.

The indications given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer, but are regarded only as a means for expressing the expected economically reasonable working life of the product.

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

The assessment for the intended use of the loose-fill granulated expanded cork, according to the Essential Requirements, was carried out in compliance with EAD 040369-00-1201 – *Insulation made of loose-fill or compound granulated expanded cork*.

3.1 Essential characteristics of the product

3.1.1 Safety in case of fire (BWR 2)

3.1.1.1 Reaction to fire

The insulation product was tested according to ISO 11925-2:2010, ISO 11925-2:2010/Cor1:2011 and Annex A of EAD 040369-00-1201 and classified according to EN 13501-1:2007+A1:2009. Table 1 presents the final classification of Reaction to Fire of the loose-fill granulated expanded cork.

Table 1: Reaction to fire

Product	Class
Loose-fill granulated expanded cork (Granulado de Cortiça Expandida)	E Thickness ≥ 40 mm Density: 90 kg/m^3

3.1.1.2 Continuous smouldering

No performance determined.

3.1.2 Hygiene, health and environment (BWR 3)

3.1.2.1 Content emission and/or release of dangerous substances

The content emission and/or release of dangerous substances was assessed according to information provided by the applicant, the release scenarios (in accordance with EOTA TR 034) taking into account the intended use of the product.

3.1.2.1.1 VOC and SVOC

Tests were carried out according to ISO 16000-9:2006, ISO 16000-9:2006 TC 1, ISO 16000-6:2011. Table 2 presents the results of the assessment of the VOCs in 3/15mm expanded cork granulated.

Table 2: VOC and SVOC (observed compounds for the material at 28 days of exposure)

Compound	CAS	Concentration (µg/m^3)
Toluene	108-88-3	< 300
Tetrachloroethylene	127-18-4	< 250
Xylene	1330-20-7	< 200
1,2,4-trimethylbenzene	95-63-6	< 1000
1,4-dichlorobenzene	106-46-7	< 60
Ethylbenzene	100-41-4	< 750
2-butoxyethanol	111-76-2	< 1000
Styrene	100-42-5	< 250
Trichloroethylene	79-01-6	< 1
Benzene	71-43-2	< 1
Bis(2-ethylhexyl) phthalate (DEHP)	117-81-7	< 1
Dibutyl phthalate (DBP)	84-74-2	< 1
TVOCs	---	8.41

3.1.2.1.2 Biocides (others than wood preservatives): active substances

A written declaration was submitted by the manufacturer stating that its industrial process is free of any aditives.

3.1.2.1.3 Formaldehyde

The formaldehyde was tested according to EN ISO 16000-3:2006. Table 3 presents the result of the assessment of formaldehyde.

Table 3: Formaldehyde (observed compounds for the material at 28 days of exposure)

Compound	CAS	Concentration - 28 days of exposure ($\mu g/m^3$)
Formaldehyde	50-00-0	< 10

3.1.2.2 Biological resistance

The biological resistance was assessed by the determination of the growth of mould fungus according to Annex B of EAD 040369-00-1201. The test results for biological resistance of the loose-fill granulated expanded cork were evaluated according to Table 4 of ISO 846:1997 and are expressed in Table 4 of this ETA.

Table 4: Biological resistance

Product	Intensity of growth
Loose-fill granulated expanded cork (Granulado de Cortiça Expandida)	1

3.1.2.3 Water vapour transmission

The water vapour transmission was assessed in accordance with EN 12086:2013, test condition A, dry state. Table 5 presents the water vapour diffusion resistance factor of the loose-fill granulated expanded cork.

Table 5: Equivalent air thickness

Product	Water vapour diffusion resistance factor	Water vapour diffusion equivalent air layer thickness (m)
Loose-fill granulated expanded cork (Granulado de Cortiça Expandida)	μ = 2.89 (test thickness: 50mm)	S_d = 0.14

3.1.3 Safety and accessibility in use (BWR 4)

3.1.3.1 Corrosion developing capacity

The corrosion developing capacity was assessed according to Annex C of EAD 040369-00-1201. Table 6 presents the test results obtained for the loose-fill granulated expanded cork.

Table 6: Corrosion developing capacity

Product	Coupon	Existence of notches or perforations
Loose-fill granulated expanded cork (Granulado de Cortiça Expandida)	Copper foil	Notches and perforations
	Zinc foil	Notches and perforations

3.1.4 Protection against noise (BWR 5)

3.1.4.1 Impact sound reduction

The impact sound reduction was assessed in floor application according to ISO 10140-1:2010, ISO 10140-3:2010, ISO 10140-3:2010/Amd.1:2015, ISO 10140-4:2010 and ISO 10140-5:2010.

Floor covering constituted by: wooden joists, with cross section of 40mm x 40mm and spaced 400mm apart and 200mm in relation to the ends, resting on medium density ICB resilient supports (40mm x 25mm cross section); wood flooring surface coating with 20mm of thickness, nailed to wooden joists, and oriented transversely to them; air gap fully filled with expanded cork granules with 3/15mm of granulometry. The specimen was laid over a reinforced concrete slab of thickness 140mm (heavyweight standard floor). The total area of the test specimen is 3,56m x 3,56m, with a 20cm width of its perimeter supported on the test rim. The test opening is 3,16m x 3,16m, which corresponds to an area of approximately 10m^2.

Table 7 presents the results obtained for the impact sound reduction of the mentioned test build-up.

Table 7: Impact sound reduction

Product	Impact sound reduction
Loose-fill granulated expanded cork (Granulado de Cortiça Expandida)	$\Delta L_w(C_{I,\Delta})$ = 20 (-12) dB

3.1.4.2 Airborne sound insulation

The airborne sound insulation was assessed according to ISO 10140-1:2010, ISO 10140-2:2010, ISO 10140-4:2010 and ISO 10140-5:2010. The product was assessed for multiple build-ups. The test results are expressed in accordance with EN ISO 717-1:2013.

3.1.4.2.1 Double masonry wall using 11cm and 15cm ceramic bricks

The tested specimen was composed by a double brick masonry wall composed of 15cm thick ceramic bricks, with individual nominal dimensions of 300mm x 200mm x 150mm (length x height x width), an air gap with nominal thickness of 6cm, filled with expanded cork granules with a granulometry of 3/15mm, and 11cm thick ceramic bricks, with individual nominal dimensions of 300mm x 200mm x 110mm (length x height x width), with 20mm thick plastering mortar on both sides. The bricks were laid with vertical joints and continuous horizontal joints, applying traditional cement mortar with a thickness of 15mm. The test opening between acoustic chambers, where the test specimen was installed, has dimensions of 3.16m x 3.16m, which corresponds to an area of approximately 10m^2.

Table 8 presents the results obtained for airborne sound insulation of double ceramic brick wall with a panel of 11cm and 15cm.

Table 8: Airborne sound insulation

Assessed build-up	Airborne sound insulation
Double masonry wall using 11cm and 15cm ceramic bricks and empty air gap	R_W (C; C_{tr}; $C_{100\text{-}5000}$; $C_{tr100\text{-}500}$)= 50 (-1; -5; 0; -5) dB
Double masonry wall using 11cm and 15cm ceramic bricks and air gap filled with 3/15mm granulated expanded cork	R_W (C; C_{tr}; $C_{100\text{-}5000}$; $C_{tr100\text{-}500}$)= 54 (-1; -4; -1; -4) dB

3.1.4.2.2 Simple laminate gypsum wall with one layer of boards on each face

The tested specimen was composed by: a layer of gypsum plasterboard 12.5mm thick; a metallic structure with 70mm thick profiles, with the air gap filled with expanded cork granules with a granulometry of 3/15mm; and a final layer of gypsum plasterboard 12.5mm thick. The joints between adjoining gypsum plasterboards and the bolts were fully filled. The test opening between the acoustic chambers, where the test specimen was installed, has dimensions 3.16m x 3.16m, which corresponds to an area of approximately $10m^2$. Table 9 presents the results for airborne sound insulation of a simple laminate gypsum wall with one layer of boards on each face.

Table 9: Airborne sound insulation

Assessed build-up	Airborne sound insulation
Simple laminate gypsum wall with one layer of boards on each face	R_W (C; C_{tr}; $C_{100\text{-}5000}$; $C_{tr100\text{-}500}$)= 38 (-3; -8; -2; -8) dB

3.1.4.2.3 Simple laminate gypsum wall with two layers of boards on each face

The tested specimen was composed by: two layers of gypsum plasterboard 12.5mm thick each; a metallic structure with 70mm thick profiles, with the air gap filled with expanded cork granules with a granulometry of 3/15mm; and two layers of gypsum plasterboard 12.5mm thick each. The joints between adjoining gypsum plasterboards and the bolts were fully filled. The test opening between the acoustic chambers, where the test specimen was installed, has dimensions 3.16m x 3.16m, which corresponds to an area of approximately $10m^2$. Table 10 presents the results for airborne sound insulation of a simple laminate gypsum wall with two layers of boards on each face.

Table 10: Airborne sound insulation

Assessed build-up	Airborne sound insulation
Simple laminate gypsum wall with two layers of boards on each face	R_W (C; C_{tr}; $C_{100\text{-}5000}$; $C_{tr100\text{-}500}$)= 43 (-4; -9; -3; -9) dB

3.1.4.2.4 Floor coating

Floor coating was made out of: wooden joists, with cross section of 40mm x 40mm and spaced 400mm apart and 200mm in relation to the ends, resting on medium density ICB resilient supports (40mm x 25mm cross section); a 20mm thick wood flooring surface coating, nailed to wooden joists, and oriented transversely to them; air gap fully filled with expanded cork granules with a granulometry of 3/15mm. The specimen was laid over a 140mm thick reinforced concrete slab (ITeCons heavyweight standard floor). The total area of the test specimen was 3,56m x 3,56m, with a width of 20cm off its perimeter, supported on the test rim. The test opening is 3,16m x 3,16m, which corresponds to an area of approximately $10m^2$. Table 11 presents the assessment of airborne sound insulation for floor coating.

Table 11: Airborne sound insulation

Assessed build-up	Airborne sound insulation
Floor coating	$R_{W,\text{ without reinforcement}}$ ($C_{100\text{-}3150}$; $C_{tr\ 100\text{-}3150}$; $C_{100\text{-}5000}$; $C_{tr\ 100\text{-}5000}$) = 51 (-1; -5; 0; -5) dB $R_{W,\text{ with reinforcement}}$ ($C_{100\text{-}3150}$; $C_{tr\ 100\text{-}3150}$; $C_{100\text{-}5000}$; $C_{tr\ 100\text{-}5000}$) = 56 (-3; -8; -2; -8) dB

3.1.4.3 Sound absorption

The sound absorption was assessed according to EN ISO 354:2003 and the absorption coefficient and the weighted sound absorption coefficient calculated according to EN ISO 11654:1997. Table 12 and table 13 present the test results for the sound absorption of the loose-fill granulated expanded cork with 5 cm and 10 cm of thickness.

Table 12: Sound absorption of granulated expanded cork with 5 cm of thickness

Product	Loose-fill granulated expanded cork (Granulado de Cortiça Expandida)					
Freq. (Hz)	125	250	500	1000	2000	4000
α_{pi}	0.10	0.10	0.25	0.45	0.65	0.70
α_w	0.3 (H) Class D					

Table 13: Sound absorption of granulated expanded cork with 10 cm of thickness

Product	Loose-fill granulated expanded cork (Granulado de Cortiça Expandida)					
Freq. (Hz)	125	250	500	1000	2000	4000
α_{pi}	0.15	0.35	0.65	0.70	0.80	0.95
α_w	0.6 (H) Class C					

3.1.4.4 Airflow resistance

The airflow resistance was assessed according to ISO 9053:1991, method A. Table 14 presents the results obtained for airflow resistance.

Table 14: Airflow resistance

Product	**Specific airflow resistance, R_s**	
	Test thickness = 100mm	**Test thickness = 150mm**
Loose-fill granulated expanded cork (Granulado de Cortiça Expandida)	0.109 kPa.s/m	0.169 kPa.s/m

3.1.5 Energy economy and heat retention (BWR 6)

3.1.5.1 Thermal conductivity / resistance

The thermal conductivity of the product was assessed according to clause 2.2.16 of EAD 040369-00-1201 and EN 12667:2001. Table 15 presents the results for thermal conductivity of the loose-fill granulated expanded cork.

Table 15: Thermal conductivity

Product	**Thermal conductivity [W/(m.°K)]**
Loose-fill granulated expanded cork (Granulado de Cortiça Expandida)	$\lambda_{10,dry,90/90}$ = 0.0391 $\lambda_{D,10,(23,50)}$ = 0.041 $Fm_{(dry-23,50)}$ = 1.05 $Fm_{(23,50-23,80)}$ = 1.03

3.1.5.2 Moisture absorption

The moisture absorption was assessed according EN ISO 12571. The table 16 presents the results for moisture absorption.

Table 16: Moisture absorption

Product	Moisture absorption (kg/kg)	
Loose-fill granulated expanded cork (Granulado de Cortiça Expandida)	$u_{23,50}$ = 0.029 23°C, 50% HR	$u_{23,80}$= 0.040 23°C, 80% HR

3.1.5.3 Loose bulk density

The loose bulk density was assessed according EN 1097-3. Table 17 presents the results for loose bulk density of 3/15mm granulated expanded cork.

Table 17: Loose bulk density

Product	Loose bulk density (Mg/m^3)
Loose-fill granulated expanded cork (Granulado de Cortiça Expandida)	0.07

3.1.5.4 Settlement

The settlement was tested according clause 2.2.19 of EAD and EN 15101-1 (Annex B, method B.2) for walls application.

Table 18 presents the assessment of settlement for 3/15mm granulated expanded cork.

Table 18: Settlement

Product	Tested depth	Settlement, S_d (%)	Density, ρ (kg/m^3)
Loose-fill granulated expanded cork (Granulado de Cortiça Expandida)	100mm	1 (Class SC O)	71
	240mm	1 (Class SC O)	66

3.1.5.5 Water absorption

The assessment of water absorption was carried out according to EN 1609 (method A) by partial immersion. Table 19 show the results of assessment of 3/15mm granulated expanded cork. The product was assessed for a test thickness of 50mm.

Table 19: Water absorption (partial immersion)

Product	Water absorption (Kg/m^2)
Loose-fill granulated expanded cork (Granulado de Cortiça Expandida)	0.68 Test thickness = 50mm

3.1.5.6 Particle size distribution

The particle size distribution was assessed according to EN 933-1. Figure 1 presents the particle size distribution graphic for 3/15mm granulated expanded cork.

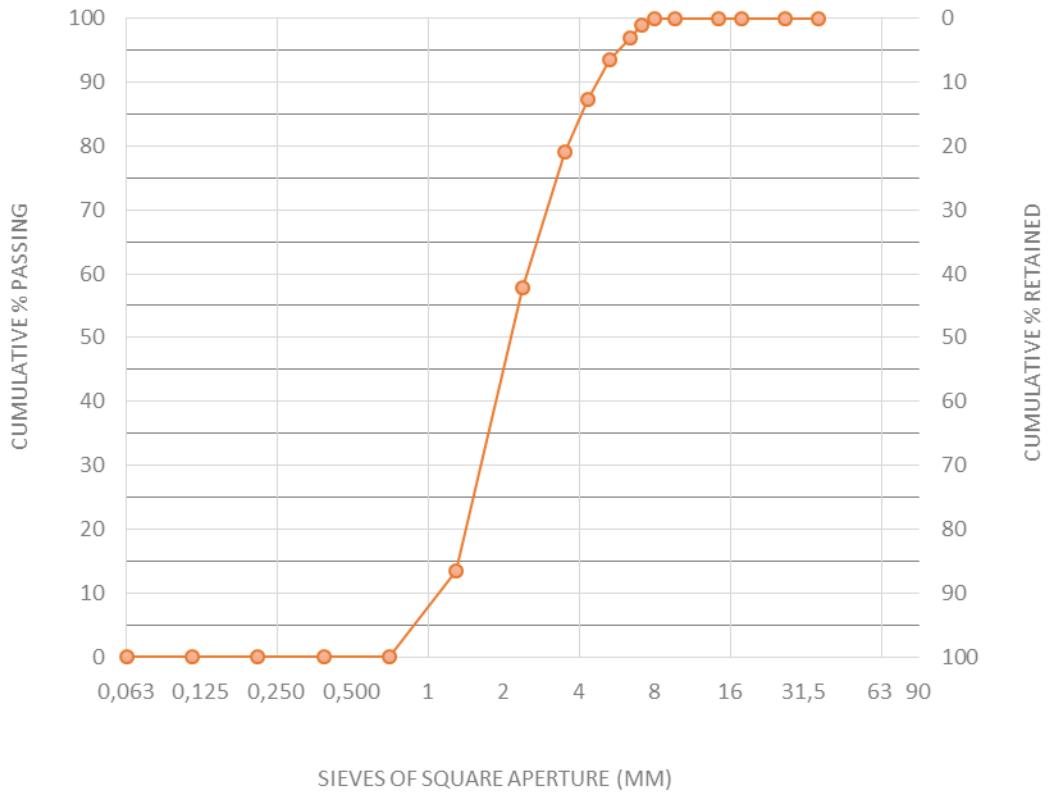

Figure 1: Particle size distribution graphic for 3/15mm granulated expanded cork

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

According to decision 1999/91/EC as amended by 2001/596/EC of the European Commission the system of assessment and verification of constancy of performance applied is system 3.

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

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ITeCons - Instituto de Investigação e Desenvolvimento Tecnológico para a Construção, Energia, Ambiente e Sustentabilidade

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By

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