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Certificate No C-9432-13
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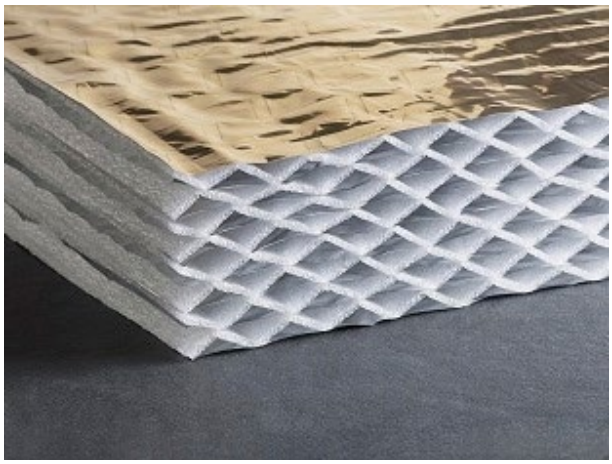
PRODUCT CERTIFICATE

NAME OF PRODUCT

HYBRIS



MANUFACTURER

ACTIS SA
30 Avenue de Catalogne
11300 Limoux
France

PRODUCT DESCRIPTION

HYBRIS is a flexible, non-homogeneous reflective insulation product. The product consists of an inner core of shaped polyethylene foam layers and outer surfaces made of aluminium coated polyethylene foil. The inner foam layer are interspersed with aluminium-coated foils creating triangular shaped air cavities. All layers are assembled by thermo-gluing.

HYBRIS is intended to be used in roofs (pitched roofs between and under rafters, loft/attics insulation, and flat roof insulation) and walls (timber frame, masonry constructions and steel-framed partition walls) and floors.

The low emissivity of the two outer faces of HYBRIS contributes to its thermal performance. Non-ventilated air gaps on the external surfaces will improve the thermal efficiency.

In most configurations, an independent and continuous vapour control layer and a breathable underlay shall be installed together with HYBRIS insulation.

CERTIFICATION PROCEDURE

This certificate has been issued by Eurofins Expert Services Oy, which is a certification body (S017) accredited by FINAS.

This certificate is based on an initial type assessment of the product, an initial inspection of the factory and the factory production control according to the certification criteria SERT R007 and section 2. The general certification procedures are based on the certification system of Eurofins Expert Services Oy.

The conditions of validity of this certificate are described in section 14.

REGULATIONS

1 Regulations

According to the assessment of Eurofins Expert Services Oy, HYBRIS, if used in accordance with the provisions of this certificate, will contribute to meet the relevant requirements of the Finnish building regulations as stated in the following:

782/2017 *Ministry of the Environment, Decree on the moisture performance of buildings*

The requirements given in Finnish national decree 848/2017, *Decree on the fire safety of buildings*, shall be attested case-by-case, taking into account the properties and the use of the building.

Finnish national decree 745/2017, *Decree on the structures and fire safety of small chimneys*, gives requirements for insulation of chimney penetrations. In this certificate, installation details for chimney penetrations are not presented.

Since the regulations are not harmonised, the user is recommended to consider separately the relevant national regulations regarding the intended use.

PRODUCT INFORMATION

2 Product description, marking and quality control

Nominal dimensions and density of HYBRIS insulation is:

	Length and width		Density
HYBRIS insulation - panels	Length x width*)	1200 mm x 1145 mm 2650 mm x 1150 mm	7,2 ± 1 kg/m^3

*) Other dimensions, e.g. 610 mm x 1200 mm, 410 mm x 1200 mm, 2900 mm x 1200 mm are available upon request.

Nominal thickness of HYBRIS insulation is:

Thickness of HYBRIS panels, mm														
50	60	75	90	105	125	140	155	170	185	195	205	220	235	250

Products are marked with product name, name of the manufacturer, dimensions of the product and manufacturing date.

Manufacturer's internal quality control consists of process control and visual inspection of the product as well as control of raw materials, product dimensions, product strength, thermal resistance and emissivity.

External quality control is carried out according to the contract on quality control between the manufacturer and Eurofins Expert Services Oy.

3 Delivery and storage on site

The product is delivered to the site packed in a plastic wrapping.

The product shall be stored in clean, dry conditions in such a way that dirt and dust cannot adhere to the product surfaces and the product is not exposed to sunlight. The product shall be protected from being dropped or crushed. It shall also be protected from direct heat sources, sparks and open flames, and stored away from flammable materials, e.g. solvents.

DESIGN INFORMATION

4 General

The design information given in this certificate is based on the assumption that the structural solutions, fastening methods and other details given in this certificate are followed and the given requirements, instructions and standards are followed. This certificate includes structure examples, which may not be common in every country and shall be verified against national codes and regulations.

5 Installation

HYBRIS insulation product must be carefully installed side by side to ensure the continuity of insulation. For most configurations, HYBRIS should be complemented by an independent and continuous vapour control layer and breathable underlay that ensures the air tightness and good condensation risk management. Underlays and vapour barriers can be installed in direct contact with HYBRIS or there can be a non-ventilated air gap between HYBRIS and underlay/vapour control layer. If a separate vapour control layer is not used, joints between HYBRIS insulation must be sealed with ACTIS adhesive tape in order to provide adequate continuous contact, to prevent thermal bridging and moisture movement.

When HYBRIS panel is installed between rafters/studs, the insulation should be cut to a width equal to the center distance between the rafters/studs plus 5 - 10 mm.

The insulation can be cut with an insulation saw, standard handsaw or an electric saw, insulation knife or InsulKnife.

5.1 Roof/wall underlay installation

To protect the walls, roof structures and insulating materials, a watertight and vapour permeable underlay membrane shall be used when the underlay is installed without ventilated air gap between the insulation and the underlay. Water tightness of the joints of the roof underlay is provided by overlapping the joints by at least 100 mm.

All roofing underlay joints shall have an overlapping of at least 100 mm in roofs with slope 1:3 or more and 200 mm in roofs with slope less than 1:3. The maximum span between supports onto which the underlay shall be fastened is c/c 900 mm.

5.2 Vapour or air barrier installation

In timber-framed constructions, the installation of a vapour barrier or an air barrier layer is required. The water vapour resistance of the vapour or air barrier must correspond to the local regulations. To ensure the performance of the vapour or air barrier foil the overlaps of minimum 100 mm and tightening of joints should be applied.

The water vapour permeability of roof underlay membrane or wall wind barrier, when installed without ventilated air gaps, should be at least 5 times higher than the water vapour permeability of vapour barrier or air barrier. In evaluation also the use of building boards shall be taken into account.

5.3 Timber frame wall installation

The wall to be insulated should be watertight and weatherproof and the surfaces to be covered should be firmly fixed, clean, dry and smooth. The thickness of insulation system depends on thermal performance requirement and once installed, the insulation thickness should be at least half of the depth of the stud measured from the inside face.

An example of HYBRIS insulation product installation in timber-framed wall construction with plasterboard finish is illustrated in Figure 1.

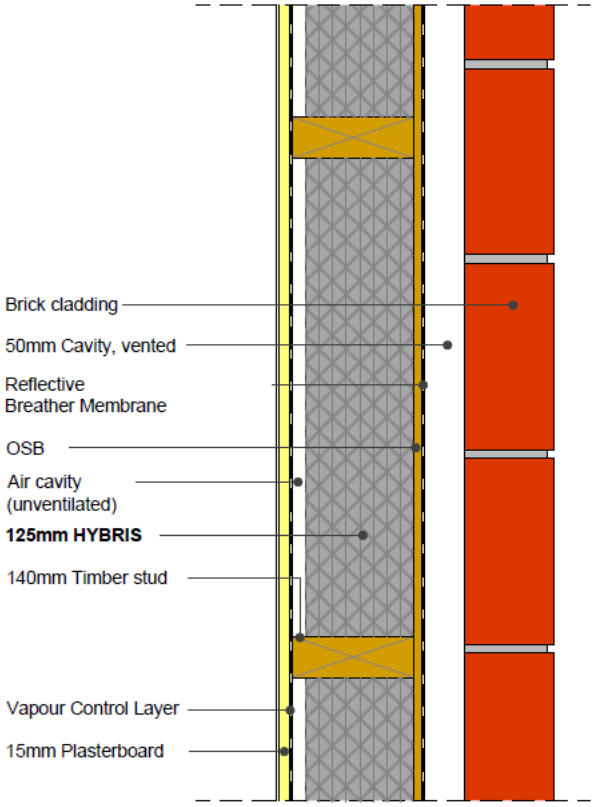


Figure 1. Typical HYBRIS installation in timber-framed wall construction

Installation details:

- HYBRIS panels are placed between the studs. The insulation is installed in one layer fulfilling the space between studs or leaving an air gap between the HYBRIS panel and the adjacent structure.
- HYBRIS is cut to a width equal to the distance between studs plus an additional an additional 5 - 10 mm, and to a length equal to the distance between floor and ceiling plus 10 mm. To ensure the thermal continuity it is recommended that the outer face joints of the HYBRIS panels are sealed with ACTIS adhesive tape prior to installation.
- A vapour barrier layer is stapled on to the studs and overlaps are sealed with adhesive tape. Floor and ceiling joints should be tightly sealed using appropriate sealant.
- Electric wiring, pipes and ducts should be installed in the gap between insulation material and plasterboard (cavity area). Penetrations through the insulation are sealed with ACTIS adhesive tape.
- Plasterboard is fixed to the back of the studs.

The thickness of HYBRIS is chosen according to the thermal performance requirements. In Table 1, as an example, U- and R-values of a wall with 600 mm c/c stud distance are calculated for HYBRIS insulation of 125 mm thickness with an air cavity between HYBRIS panel and vapour barrier layer.

Table 1. U-value and thermal resistance R for 125 mm thick HYBRIS installed between studs and having an air cavity between insulation and vapour barrier.

Timber frame wall - c/c distance of studs 600 mm			
Construction from indoor to outdoor		**R (m^2K/W)**	**Thickness (mm)**
Plasterboard		0,079	15
Vapour barrier		0	1
Stud thickness 140 mm	Non-ventilated cavity / service zone	0,507	15
	HYBRIS (thickness 125 mm)	3,75	125
OSB		0,069	9
Vented air cavity		0,77	50
Outer cladding		0,130	100
Thermal performance - Including thermal bridge of 15 % of stud cross section of 140 mm x 38 mm			
U, W/m^2K		0,22	

The thickness of HYBRIS is chosen according to the thermal performance requirements.

5.4 Pitched roof installation

The roof to be insulated should be watertight and weatherproof and the surfaces to be covered should be firmly fixed, clean, dry and smooth. The thickness of insulation system depends on thermal performance requirement and once installed the thickness of the insulation should be at least half the depth of the rafters when measured from the inside face.

The HYBRIS can be installed in one layer (between rafters) or two layers (between and under rafters). An example of installation of two layers of HYBRIS on pitched roofs is illustrated in Figure 2.

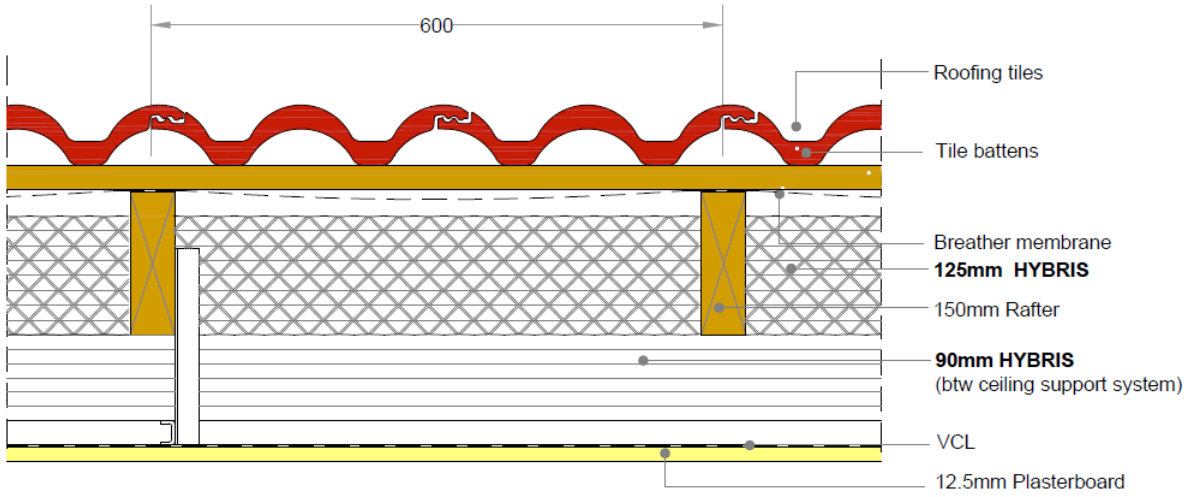


Figure 2. Typical two-layer HYBRIS installation on pitched roofs

Installation details:

- The HYBRIS can be installed in one layer (between rafters) or two layers (between and under rafters), with offset or cross joint.

  First layer:

- HYBRIS is cut to a width equal to the distance between rafters plus an additional 5 - 10 mm. The insulation can be installed up to underside of underlay.
- To ensure that HYBRIS is firmly held between rafters during the installation, a double face adhesive tape can be installed between the breather membrane underlay and HYBRIS either perpendicular to the rafters or parallel in the middle distance between rafters. Alternatively, the external foil of HYBRIS can be stapled to the rafters.

Second layer:

- The thickness of HYBRIS should be at least the same as the width of the rafters. The HYBRIS should not be compressed against the rafters. However, a slight compression may be tolerated.
- To install the second layer, a complementary batten or metallic frame is required. For timber batten support HYBRIS is installed perpendicular to rafters. For metallic frames, HYBRIS can be installed parallel or perpendicular to rafters.
- A vapour barrier layer is stapled on to the batten support or stuck on to the metallic frame. The overlaps of the vapour barrier layers should be sealed with adhesive tape. Ceiling/wall junctions should be adequately sealed using appropriate sealant.

The thickness of HYBRIS is chosen according to the thermal performance requirements. In Table 2, as an example, U- and R-values of a roof with 600 mm c/c rafter distance are calculated for HYBRIS insulation of thickness 125 mm between rafters and 90 mm below rafters.

Table 2. U- and R-values for HYBRIS installed in between rafters in warm roof. The thermal bridge of this configuration is equal to 7,83%

Warm roof - c/c distance of rafters 600 mm			
Construction from indoor to outdoor		**R (m^2K/W)**	**Thickness (mm)**
Plasterboard		0,066	12,5
Vapour barrier		0	1
Frame thickness 110 mm	HYBRIS (thickness 90 mm) - non-ventilated air cavity R=0,44m^2 K/W / 20 mm	2,7	90
Rafter thickness 150 mm	HYBRIS (thickness 125 mm)	3,75	125
Water vapour permeable underlay		0	1
Ventilated air cavity		0	25
Tiles		0	17
Thermal performance - Including thermal bridge of 7,83 % for rafter cross section 47 mm x 150 mm			
U, W/m^2K		0,14	

The thickness of HYBRIS is chosen according to the thermal performance requirements.

5.5 Lofts/attics installation

HYBRIS can be installed on lofts/attics in between and over ceiling joists and floor joists of timber frame structures and on continuous solid floors.

The roof to be insulated should be watertight and weatherproof and the surfaces to be covered should be firmly fixed, clean, dry and smooth. The thickness of insulation system depends on the thermal performance requirement.

The insulation can be installed in one layer laid between or over ceiling joists (see Figure 3) or two layers, with offset of cross-joint.

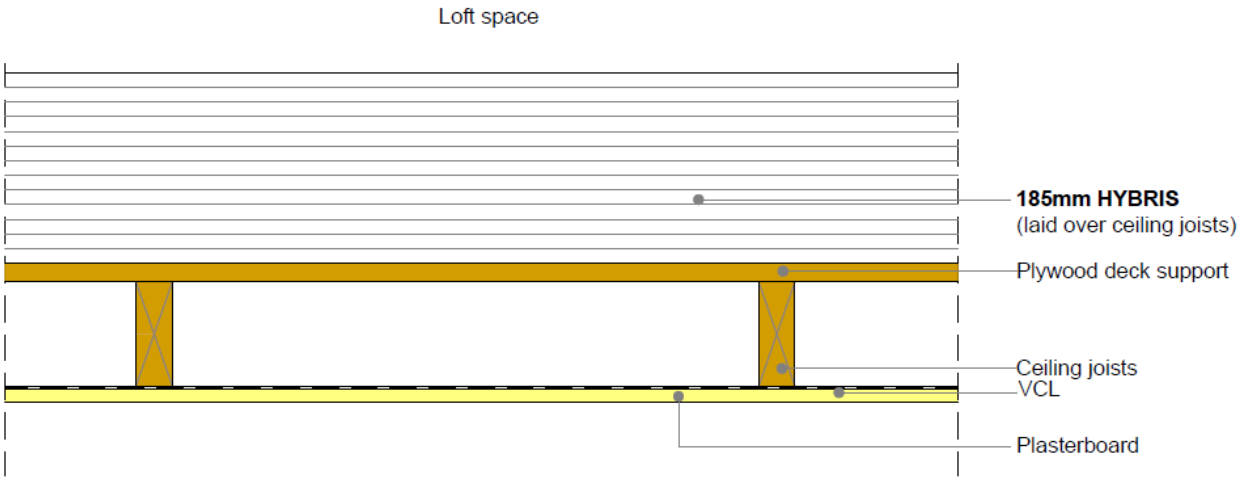


Figure 3. Typical HYBRIS installation in lofts in one layer over ceiling joists.

Installation details:

- An independent and continuous standard vapour control layer is to be installed.

Installation of the first layer:

- When the floor is composed of timber joists, the insulation is cut to a width equal to the distance between joists plus an additional 5 - 10 mm.
- When the floor is continuous, HYBRIS should be laid on the floor without any air cavity and well jointed with adhesive tape.

Installation of the second layer:

- The second layer is laid over the first one with offset or cross joints.
- The thermal insulation and vapour control layer needs to be continuous and particular care is required in sealing around penetrations and at the perimeters where roofs and walls meet.
- It is possible to walk on the HYBRIS.
- Storing loads on HYBRIS is not recommended

The thickness of HYBRIS is chosen according to thermal performance requirements. In Table 3, as an example, U- and R-values are calculated for one layer of a 185 mm thick HYBRIS insulating product installed over joists.

Table 3. U- and R-values for HYBRIS installed in lofts above joists

Loft above joists - single layer		
Construction from the floor to HYBRIS	**R (m^2K/W)**	**Thickness (mm)**
Floor	0,069	9
Unventilated loft cavity	0,444	1000
HYBRIS (thickness 185 mm)	5,60	185
Ceiling joist cavity	0,16	100
Thermal performance		
U, W/m^2K	0,16	

The thickness of HYBRIS is chosen according to thermal performance requirements.

6 Structural performance

HYBRIS is not a structural component. It is a non load-bearing product. It will resist normal loads associated with installation and use.

7 Performance in relation to moisture

Finnish national degree 782/2017, Decree on the moisture performance of buildings, shall be followed in the design of the constructions taking into account the water vapour permeability and air tightness of the structures.

Water vapour permeability of the HYBRIS is presented in Table 6.

The s_d value for the most inner part of the structure shall be at least five times higher than the most outer one. This can be different in other countries related to construction regulations in effect.

8 Performance in case of fire

Finnish national degree 848/2017, Decree on the fire safety of buildings, gives requirements for fire safety of buildings and building products and shall be followed when designing structures incorporating HYBRIS. HYBRIS insulation is classified to reaction to fire class F according to Commission Delegated Regulation (EU) 2016/364.

The installation of HYBRIS must not be carried over junctions between roofs and compartment walls requiring minimum period of fire resistance. A safe distance from a chimney or flue must be made using reaction to fire class A1 material as given in the Finnish national decree 745/2017.

9 Thermal insulation performance

The thermal performance of HYBRIS has been measured according to the standard EN 12667. Results are given in Table 4.

Table 4. Thermal performance of HYBRIS panels

Thickness [mm]	Declared thermal resistance [m²K/W]	Thickness [mm]	Declared thermal resistance [m²K/W]
50	1,50	170	5,15
60	1,80	185	5,65
75	2,25	195	5,95
90	2,75	205	6,25
105	3,20	220	6,70
125	3,80	235	7,15
140	4,25	250	7,60
155	4,70		

The emissivity of HYBRIS outer surfaces has been determined according to EN 16012. The results are given in Table 5.

Table 5. Declared emissivity of HYBRIS

HYBRIS declared emissivity	
Front side (copper coloured)	**Back side (silver coloured)**
0,06	0,10

Thermal resistance of air cavities can be calculated according to EN ISO 6946.

HYBRIS has reflective faces. Applying the non-ventilated air gap is more advantageous for these products. When the metallised face of the product faces a 20 mm cavity, the product will provide additional thermal resistance, which can be incorporated into U-value calculations carried out in accordance with EN ISO 6946.

When applicable, the dimensions of timber battens should be determined carefully in order to achieve the optimum air cavity width of 20 mm.

10 Sound insulation / Acoustical performance

Performance of HYBRIS as sound insulation has not been determined.

11 Durability

Resistance to tearing, tensile strength parallel to faces, shear resistance of joint with ACTIS adhesive tape and peel strength of the tape have been measured before and after ageing at 70 °C and RH 90 % for 28 days. The ageing did not affect the declared values.

INSTRUCTIONS FOR INSTALLATION AND USE

12 Manufacturer's instructions

Installation should be carried out in accordance with the manufacturer's instructions. The instructions shall be carefully followed in order to achieve the intended functional performance of the construction.

TECHNICAL SURVEY

Eurofins Expert Services Oy has performed evaluation based on manufacturer's documentation, test results and calculations. Summary of the product characteristics is presented in Table 6.

Table 6. A summary of product characteristics of HYBRIS insulation

Characteristics	Test method	Unit	Declared value
Thickness	EN 823	mm	50/60/75/90/105/125/140/155/170/ 185/195/205/220/235/250
Density	EN 1602	kg/m^3	7,2 ± 1
Length	EN 822	m	1145 - 2900
Width		mm	1200
Declared thermal resistance, see Table 4			
Declared emissivity	EN 16012	-	0,06/0,10 (front/back side)
Tensile strength parallel to faces			
Longitudinal direction	EN 1608	kPa	> 45
Transversal direction		kPa	> 30
Resistance to tearing, nail shank			
Longitudinal direction	EN 12310-1	N	> 150
Transverse direction		N	> 150
Peel strength of adhesive tape	EN ISO 11339	N/100 mm	28
Water vapour transmission			
Permeance (W)	EN ISO 12572 set C	kg/m^{2}sPa	2,11·10^{-12}
Vapour resistance (Z)		m^{2}sPa/kg	470·10^9
Diffusion eq. air layer thickness (s_d)		m	90
Reaction to fire class	EN ISO 11925-2	class	F
After ageing			
Tensile strength			
Longitudinal direction	EN 1608	kPa	> 45
Transverse direction		kPa	> 30
Resistance to tearing, nail shank			
Longitudinal direction	EN 12310-1	N	> 150
Transverse direction		N	> 150
Peel strength of adhesive tape	EN 11339	N/100 mm	42

VALIDITY OF THE CERTIFICATE

13 Validity period of the certificate

This certificate is valid until July 14, 2028.

The validity of the certificate may be confirmed on the Eurofins Expert Services Oy web pages.

14 Conditions of validity

The certificate is valid assuming that no fundamental changes are made to the product, and that the manufacturer has a valid contract on quality control.

15 Other conditions

The references made in this certificate to standards and instructions are valid in the format used at the time the certificate was signed.

The recommendations in this certificate concerning the safe use of this product are minimum requirements that shall be satisfied when using the product. The certificate does not override current or future requirements imposed by laws and statutes. In addition to the issues presented in this certificate, design, manufacturing and use shall follow appropriate construction methods.

The manufacturer is in charge of the product's quality and factory production control. In awarding this certificate, Eurofins Expert Services Oy does not bind itself to indemnification liability concerning personal injury or other damage that may directly or indirectly result from using the product described in this certificate.

This updated certificate C-9432-13 (issued first on February 12, 2013) has been granted as described above to ACTIS SA.

On behalf of Eurofins Expert Services Oy on July 14, 2023

Katja Vahtikari
Manager, Construction Certification

Tiina Tirkkonen
Senior Expert

This document has been signed electronically