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Evaluation Report of

ETA 20/0261 of 24/03/2020

GENERAL PART

Trade name of the construction product

Product family to which the construction product belongs

Manufacturer

Manufacturing plant

This European Report contains:

ISOLAREFLEX

**PAC 09: CURTAIN WALLING/ CLADDING/
STRUCTURAL SEALANT GLAZING.**
Kits for external wall cladding of mineral boards with renderings applied in situ

FAVIMA S.r.l.

**Via San Leonardo, traversa Migliaro 120 –
84131 Salerno (SA) - Italy**

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INTRODUCTION

This Evaluation Report describes the results of the tests that have been carried out to assess the characteristics and performances of the product ISOLAREFLEX introduced by FAVIMA S.r.l. - Via San Leonardo, traversa Migliaro 120 – 84131 Salerno (SA) - Italy.

The tests were performed in accordance with the CPR Basic requirements for construction works (BWR) and with the methods specified in EAD (European Assessment Document) No. 090119-00-0404, ed. July 2018, related to “KITS FOR EXTERNAL WALL CLADDING OF MINERAL BOARDS WITH RENDERINGS APPLIED IN SITU” (EAD hereinafter).

A. DESCRIPTION OF THE PRODUCT AND INTENDED USE

See Section 1 and 2 and Annexes from A1 to A7 of the related ETA.

B. ASSESSMENT PROCEDURE

1.1 SAFETY IN CASE OF FIRE (BWR 2)

1.1.1 Reaction to fire

The reaction to fire of the kit has been assessed according to section 2.2.1 of EAD 090119-00-0404; tests according to EN 13823:2010+A1:2014 (SBI-test) and EN ISO 11925-2:2010 have been carried out.

The classification of reaction to fire of the product ISOLAREFLEX according to EN 13501-1:2007+A1:2009 and Commission Delegated Regulation (EU) 2016/364, is **B – s1, d0** for kits 0-1 [1]. Kits 2-3-4-5 have not been assessed.

1.1.2 Façade fire performance

This performance *has not been assessed*.

1.1.3 Propensity to undergo continuous smouldering

This performance *has not been assessed*.

1.2 HYGIENE, HEALTH AND THE ENVIRONMENT (BWR3)

1.2.1 Watertightness (protection against driving rain)

The assessment of watertightness has been positively carried out considering the kit water absorption results (see § 1.2.2) [7] and design details (see Annexes A6-A7 in the ETA).

The assessment intended to determine two requirements of the cladding kit:

- water running down the outside face of the cladding kit not reaching the inside face of the substrate,
- materials likely to be adversely affected by water (i.e. fixings subjected to corrosion) not becoming damp.

1.2.2 Water absorption

This performance has been assessed by means of the assessment of the water absorption to capillarity. Water absorption by capillarity has been determined according to EAD 090119-00-0404 ed. July 2018 Section 2.2.5 and Annex E [7].

Tests have been carried out on kit with and without finishing coat.

KITS WITH FINISHING COAT				
Kit (no.)	Thickness (mm)	Water absorption by capillarity		
		after 3 minutes (kg/m ²)	after 1 hour (kg/m ²)	after 24 hours (kg/m ²)
0-1	3.4	0.019	0.048	0.228
KITS WITHOUT FINISHING COAT				
Kit (no.)	Thickness (mm)	Water absorption by capillarity		
		after 3 minutes (kg/m ²)	after 1 hour (kg/m ²)	after 24 hours (kg/m ²)
0-1*	3.0	0.132	0.308	0.764
(*) Note: these results are valid also for kits 2-3-4-5.				

Table 1: Water absorption by capillarity – Test results summary

1.2.3 Water vapour permeability

This performance *has not been assessed*.

1.2.4 Drainability

The assessment of drainability has been carried out by means of the analysis of the relevant design details provided by the manufacturer, regarding the connections of the cladding kit with the base edge and openings to detected potential accumulation of water behind cladding system. No water accumulation or moisture damage or leakage. These design details are included in the ETA, see Annexes A6-A7.

1.2.5 Content, emission and/or release of dangerous substances

This performance *has not been assessed*.

1.3 SAFETY AND ACCESSIBILITY IN USE (BWR4)

1.3.1 Wind load resistance

The wind load resistance has been determined according to EAD 090119-00-0404 ed. July 2018 Section 2.2.9 and Annex F [4]. The mechanically weakest case of the assembled kit has been tested, on kits 0-1; this result is valid also for kits 2-3-4-5.

Wind suction test has been stopped at -16,85 KPa due to machine limitation: at the end of the test, the specimen remained intact and no deterioration or breakage was observed.

Dimensions (mm) (width x height)	Transom span (mm)	Mullions span (mm)	Maximum wind load Q (KPa)	Type of failure
3420 x 3900	400	700	Q _{suction} = 16.85	No failure or detachment of the kit subframe

Table 2: Wind load resistance – Test results summary

1.3.2 Impact resistance

This performance *has not been assessed*.

1.3.3 Resistance to horizontal point loads

This performance *has not been assessed*.

1.3.4 Mechanical resistances

1.3.4.1 Bond strength (adhesion between the rendering system and the board)

The bond strength has been determined according to EAD 090119-00-0404 ed. July 2018 Section 2.2.12.1 and Annex I [7]. Tests have been carried out on kit both without ageing (with and without finishing coat, see Table 3) and after hygrothermal cycles (with and without finishing coat, see Table 4).

WITHOUT AGEING					
KITS WITH FINISHING COAT					
Kit (no.)	Condition	F _{load} (kN)	R _{mean} (MPa)	R _{min} (MPa)	Rupture
0-1*	Dry conditions	0.554	0.28	0.27	100% adhesive
	2d H ₂ O and 2h drying (23°C-50%U.R)	0.347	0.18	0.16	100% adhesive
	2d H ₂ O and 7d drying (23°C-50%U.R)	0.594	0.30	0.29	100% cohesive
KITS WITHOUT FINISHING COAT					
Kit (no.)	Condition	F _{load} (kN)	R _{mean} (MPa)	R _{min} (MPa)	Rupture
0-1**	Dry conditions	0.617	0.31	0.29	100% adhesive
	2d H ₂ O and 2h drying (23°C-50%U.R)	0.329	0.17	0.13	100% adhesive
	2d H ₂ O and 7d drying (23°C-50%U.R)	0.687	0.35	0.34	100% cohesive
(*) Note: these results are valid also for kits 2-3-4, not for kit 5.					
(**) Note: these results are valid also for kits 2-3-4-5.					

Table 3: Bond strength, samples without ageing – Test results summary

AFTER HYGROTHERMAL CYCLES				
KITS WITH FINISHING COAT				
Kit (no.)	F _{load} (kN)	R _{mean} (MPa)	R _{min} (MPa)	Rupture
0-1*	0.433	0.22	0.20	100% adhesive
KITS WITHOUT FINISHING COAT				
Kit (no.)	F _{load} (kN)	R _{mean} (MPa)	R _{min} (MPa)	Rupture
0-1**	0.558	0.28	0.26	100% adhesive
(*) Note: these results are valid also for kits 2-3-4, not for kit 5.				
(**) Note: these results are valid also for kits 2-3-4-5.				

Table 4: Bond strength after hygrothermal cycles – Test results summary

The ratio values in percentage between the bond strength mean value after hygrothermal cycles and the mean value in the bond strength tests without ageing cycles are 79% for kits with finishing coats and 90% for kits without finishing coats.

1.3.4.2 Bending strength of the board

This performance **has not been assessed**.

1.3.4.3 Connection (board-fixing-subframe)

1.3.4.3.1 Embedding/Shear strength

The shear strength has been determined according to EAD 090119-00-0404 ed. July 2018 Section 2.2.12.3 and Annex J.1 [7].

Kit (no.)	Fixing	F _{mean} (N)	F _c (N)
0-1*	Corner	221.8	181.7
	Border	281.6	169.0

(* Note: these results are valid also for kits 2-3-4-5.

Table 5: Embedding/Shear strength – Test results summary

1.3.4.3.2 Pull-through/ Pull-out resistance

The pull-out resistance has been determined according to EAD 090119-00-0404 ed. July 2018 Section 2.2.12.4 and Annex J.2 [7].

Kit (no.)	Fixing	F _{mean} (N)	F _c (N)
0-1*	Corner	457.5	419.6
	Border	422.0	375.0
	Centre	496.8	435.2

(* Note: these results are valid also for kits 2-3-4-5.

Table 6: Pull-out resistance – Test results summary

1.3.4.4 Resistance of profiles

This performance **has not been assessed**.

1.3.4.5 Subframe-fixings

1.3.4.5.1 Tension/Pull-out resistance

The tension resistance (mullion/transom) has been determined according to EAD 090119-00-0404 ed. July 2018 Section 2.2.12.6 and Annex K.1 [7].

Kit (no.)	F _{mean} (N)	F _c (N)
0-1*	2037	1906

(* Note: these results are valid also for kits 2-3-4-5.

Table 7: Tension resistance (mullion/transom) – Test results summary

1.3.4.5.2 Shear load resistance

The shear load resistance (mullion/transom) has been determined according to EAD 090119-00-0404 ed. July 2018 Section 2.2.12.7 and Annex K.2 [7].

Kit (no.)	F _{mean} (N)	F _c (N)
0-1*	1790	1431

(* Note: these results are valid also for kits 2-3-4-5.

Table 8: Shear load resistance (mullion/transom) – Test results summary

1.3.4.6 Bracket resistance (horizontal and vertical load)

This performance **has not been assessed**.

1.4 PROTECTION AGAINST NOISE (BWR5)

1.4.1 Airborne sound insulation

This performance *has not been assessed*.

1.5 ENERGY ECONOMY AND HEAT RETENTION (BWR6)

1.5.1 Thermal resistance

The thermal resistance has been determined according to EAD 090119-00-0404 ed. July 2018 Section 2.2.14, EN ISO 8990:1996 and EN ISO 12567-1:2010: $U_{st} = 0.351 \text{ W/m}^2\text{K}$ on kits 0-1 [5]; this result is valid also for kits 2-3-4-5.

1.6 DURABILITY

1.6.1 Accelerated ageing behaviour

The accelerated ageing behaviour has been determined according to EAD 090119-00-0404 ed. July 2018 Section 2.2.15.1 by means of bond strength test (see § 1.3.4.1) of specimen taken from the assembled kit submitted to the hygrothermal cycles given in section M.1 of Annex M. At the end of the heat-rain and heat-cold cycles, **no cracks nor visible alterations has been detected [6]**. The test has been carried out on kits 0-1; these results are not valid for kits 2-3-4-5. Kits 2-3-4-5 have not been assessed.

1.6.2 Cracking strength due to board deformation

The cracking strength due to board deformation has been determined according to EAD 090119-00-0404 ed. July 2018 Section 2.2.15.2 by means of water absorption by capillarity tests (see § 1.2.2) of specimen taken from the assembled kit submitted to movement cycles given in section M.4 of Annex M [7]. The maximum load has been 100 N.

The ratio values in percentage between the water absorption by capillarity mean value after cycles and the mean value in the water absorption by capillarity tests without ageing cycles, for kits with finishing coats, are: 95% after 3 minutes, 83% after 1 hour and 107% after 24 hours. The water absorption by capillarity test has been carried out on kits 0-1; these results are not valid for kits 2-3-4-5. Kits 2-3-4-5 have not been assessed.

AFTER MOVEMENT CYCLES					
Kit (no.)	Maximum load applied in the cyclic test (N)	Thickness (mm)	Water absorption by capillarity		
			after 3 minutes (kg/m ²)	after 1 hour (kg/m ²)	after 24 hours (kg/m ²)
0-1	100	3.0	0.018	0.040	0.245

Table 9: Water absorption by capillarity after movement cycles – Test results summary

1.6.3 Dimensional stability by humidity/by temperature

The dimensional stability has been determined according to EAD 090119-00-0404 ed. July 2018 Section 2.2.15.3 on the fiber cement panels [7]. The dimensional variations calculated

by means of the formula $L_m = \frac{(L_{T0} - L_{T1}) \times 100}{L_{T0}}$ are: $L_m = 0\%$ (T1, T2, L1, L2).

1.6.4 Moisture content

This performance *has not been assessed*.

1.6.5 Corrosion

This performance *has not been assessed*.

1.6.6 UV radiation resistance

This performance *has not been assessed*.

C. AVAILABLE TEST REPORTS

- [1]** Test Report No. 6368/RC/19, issuing date: 17/06/2019, Fire Reaction Classification Report according to EN 13501-1:2007+A1:2009 and Commission Delegated Regulation (EU) 2016/364, ITC-CNR, Italy.
- [2]** Test report No. 6369/RP/19, issuing date: 17/06/2019, Ignitability of products subjected to direct impingement of flame - Single-flame source test according to EN ISO 11925-2:2010 and EN 13238:2010, ITC-CNR, Italy.
- [3]** Test report No. 6370/RP/19, issuing date: 17/06/2019, Single Burning Item (SBI) according to EN 13823:2010+A1:2014 and EN 13238:2010, ITC-CNR, Italy.
- [4]** Test report No. 6371/RP/19, issuing date: 28/06/2019, Wind load resistance according to EAD 090119-00-0404, ITC-CNR, Italy.
- [5]** Test report No. 6374/RP/19, issuing date: 25/07/2019, Thermal transmittance according to EAD 090119-00-0404 Section 2.2.14, EN ISO 8990:1996 and EN ISO 12567-1:2010, ITC-CNR, Italy.
- [6]** Test report No. 6373/RP/19, issuing date: 25/07/2019, Hygrothermal behaviour test according to EAD 090119-00-0404 Annex M.1 (heat-rain cycles and heat-cold cycles), ITC-CNR, Italy.
- [7]** Test report No. 6433/RP/19, issuing date: 26/11/2019, Water absorption by capillarity without ageing and after hygrothermal cycles, bond strength without ageing and after hygrothermal cycles, embedding/shear strength, pull-trough/pull-out resistance, tension/pull-out resistance and shear load resistance, dimensional stability, according to EAD 090119-00-0404, ITC-CNR, Italy.