

ECORK

TEST REPORT

WATER VAPOR TRANSMISSION PROPERTIES

ASTM E96/E96M-16 "Standard Test Methods for Water Vapor Transmission of Materials":

Test Result Summary	Metric units	Imperial Units
Water Vapor Transmission	15.66 g/hr. m ²	22.39 grns/hr.ft ²
	380.00 g/day.m ²	537.36 grns/hr.ft ²
Water Vapor Permeance	3046.29 ng/Pa.s.m ²	53.26 perms
	0.20 per mm.	840.20 per in.
Water Vapor Permeability	4.90 ng/Pa.s.m	840.20 Perm inch

EN ISO 7783:2012 "Determination of water-vapour transmission properties":

Water vapour transmission rate V (37 g/m² x day)

Equivalent air layer thickness S_D = 0.70 m.

Class I: S_D < 5 m. (water vapour permeable)

RESISTANCE TO MOLD / FUNGI/ALGAE

ASTM D3273 - 2016 "Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coating in an Environmental Chamber":

Samples received a rating of 10 meaning there was zero defacement on the test specimens at the completion of the mold resistance evaluation.

ASTM G21 - 2015 "Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi":

Samples received an average growth rating of 0 meaning there were No

Growth (0%) on the test specimens at the completion of the fungal resistance evaluation.

Dry film fungal/algal resistance test (Thor Method 800.2/850.2)

The results of the test indicate that the samples have adequate protection against moulds and algae after a pretreatment in QUV during 250 hours.

LIQUID WATER PERMEABILITY

EN 1062-3:2008 "Determination of liquid water permeability":

Transmission index of liquid water W: 0.12 ± 0.01 kg/(m².h^{0.5})

RESISTANCE TO SALT

ASTM B117-18 "Standard Practice for Operating Salt Spray (Fog) Apparatus":

Slight color change observed as samples were darker shade of red when compared to control.

Average mass loss was 0.5% and no other signs of damage were observed.

FIRE SAFETY

CAN/ULC S102-18 "Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies":

- Flame Spread Rating: **0**
- Smoke Developed Classification: **10**

EN 13501-5:2005 "Fire classification of construction products and building elements. Part 5: Classification using data from external fire exposure to roofs tests": **B_{ROOF(t1)}**

EN 13501:2007 "Fire classification of construction products and building elements. Part 1: Classification using data from reaction to fire tests: **B-s2, d0**

Test Method	Parameter	Result
EN 13823:2002	FIGRA _{0.2 MJ}	110.71 W/s
	FIGRA _{0.4 MJ}	78.44 W/s
	LFS<edge	YES
	THR _{600S}	1.72 MJ
	SMOGRA	30.69 m ² /s ²
	THR _{600S}	153.47 m ²
	Flaming droplets/particles	NO
EN ISO 11925-2:2002	Fs < 150 mm. (in 60 sec.)	YES
	Ignition of filter paper	NO

THERMAL CONDUCTIVITY

ASTM C518-17 "Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus":

Average thermal resistance values at 1"		
Mean Temperature [°C]	Avg. Thermal Resistance at 1" (25 mm)	
	°F·ft ² ·h/Btu at 1"	K · m ² /W at 25 mm
23	1.600	0.277

Variability of thermal resistance values at 1"			
Mean Temperature [°C]	Standard Deviation [°F·ft ² ·h/Btu at 1"]	Standard Deviation [K · m ² /W at 25 mm]	Coefficient of Variation
23	0.058	0.010	4%

EN 12667:2002 "Thermal performance of building materials and products. Products of high and medium thermal resistance":

Thermal conductivity (W/mK): 0.031

Measurement of Surface Temperatures and Heat Flow Under Radiation as indicated in UNE-EN ISO 12543-4:1998:

Sample	% of heat flow through the sample in relation to the flow through the fibre cement	Difference between sample with coating and sample without coating
Fibre cement without coating	100%	-
Fibre cement with 6 mm. natural ECORK coating	50.1%	49.2%
Fibre cement with 6 mm. white ECORK coating	52.1%	47.9%
Fibre cement with 3 mm. natural ECORK coating	79.8%	20.2%

SOUND ABSORPTION

ISO 10354-2 "Standard Incidence Sound Absorption Coefficient Test":
 $\alpha = 0.24$ (250 Hz); 0.20 (500 Hz); 0.32 (630 Hz); 0.23 (1000 Hz); 0.30 (2000 Hz)

DIMENSIONAL STABILITY

EN 1604:2013 "Determination of dimensional stability under temperature and humidity conditions (60°C / 50% h.r.):

Dimensional change: Length (-0.1%), Width (-0.1%), Thickness (+0.4%)

COLOUR AGEING

UNE 48073-2:1994 "Difference in colour after ageing in accordance with UNE-EN ISO 4892-3:2006:

ΔE^* (red): 1.80; ΔE^* (green): 3.75

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MATERIAL CERTIFICATE RESUME

SUBJECT	STANDARD		RESULTS			
Classification in Accordance with UNE-EN 13501-5:2005	UNE-EN 13501-5:2005		BROOF (t1)			
Thermal Conductivity	-		0.031 ± 0.004 W/mK (a 27 °C)			
Classification in Accordance with UNE-EN 13501-1:2007	UNE-EN 13501-1:2007		B-s2, d0			
Difference in color after agaig in accordance with UNE-EN ISO 4892-3:2006 (250 hours) Determination of liquid water permeability	UNE-EN ISO 4892-3:2006	Color	ΔE			
		Red	1.80			
		Green	3.75			
		Orange	5.40			
Determination of liquid water permeability	UNE-EN 1062-2:2008	0.1 Kg/ (m/h0.5)				
Determination of water vapor transmission properties	UNE-EN 1 2086:1998	0.01 rr.				
Laboratory measurement of sound absorption (in a reverberation room)	NP EN ISO 354	0.10 (500 Hz)		0.14 (620 a 300 Hz)		
Pull-Off Test for Adhesion	NP EN ISO 4624:2004	1 Mpa, 10% A/B, 90% B				
Determination of the mechanical resistance of different materials coated with Ecork after conditioning at -2 °C	NP EN ISO 4624:2004	Support	Pull-off Test before cycles - MPa	Pull-off Test after cycles - MPa	Variation	
		Concrete slab	0.50	0.90	86.00%	
		EPS	0.27	0.50	109.00%	
Determination of the mechanical resistance variation of concrete coated with Ecork after conditioning at -4 °C	NP EN ISO 4624:2004	Pull-off Strength (Room Temp.) - MPa	Pull-off Test (after conditioning and curing at -2°C - MPa	Pull-off Test (after conditioning and curing at -4°C - MPa		
		0.54	0.84	0.78		
		Support	Pull-off Test before cycles - MPa	Pull-off Test after cycles - MPa	Variation	
Determination of the mechanical resistance of different materials coated with Ecork after salt spray test	NP EN ISO 9227:2011 and NP EN ISO 624:2004	Concrete slab	0.50	0.90	86.00%	
		EPS	0.27	0.50	109.00%	
		Support	Pull-off Test before cycles - MPa	Pull-off Test after cycles - MPa	Variation	
Determination of the mechanical resistance of different materials coated with Ecork exosure to filtered xenon-arc radiation	EN ISO 11341:2004 and NP EN ISO 4624:2004	PVC	1.30	1.45	10.00%	
		Concrete slab	0.50	1.01	162.00%	
		Determination of the specific heat of Ecork coating material	-	1.979 J/(g.K)		
Determination of slip resistance by means of the pendulum test	NPEN 14231:2006	Support	Slip resistance value in wet conditions	Slip resistance value in dryconditions	Decrease	
		Concrete	84	55	34%	
		EPS	89	55	39%	
		Asbestos Cement	67	58	13%	
		Wood	86	56	34%	
		Zinc	85	55	35%	
Determination of the mechanical resistance of different materials coated with Ecork submitted to hydrothermal cycles (heat-cold)	NPEN ISO 4624:2004	Support	Pull-off Test before cycles - MPa	Pull-off Test after cycles - MPa	Variation	
		EPS	0.25	0.32	29.10%	
		Concrete slab	0.45	0.78	71.60%	
		PVC	1.27	1.51	18.90%	
Analysis of the evolution of heat tranfer through systems with and without coating with Ecork		Specimen		Heat Transfer Resistance		
		EPS + Zinc (With and without Ecork) + EPS		Higher with Ecork		
		EPS + MDF (With and without Ecork) + EPS		Higher with Ecork		
Determination of the mechanical resistance of different materials coated with Ecork exposed to condensation - water atmosphere	NPEN ISO 4624:2004	Support	Pull-off Test before cycles - MPa	Pull-off Test after cycles - MPa	Variation	
		EPS	0.25	0.4	61.00%	
		Concrete slab	0.45	0.49	7.90%	
Test for external fire exposure in roofs. Test 1: Burning torch method, in accordance with UNE-ENV 1187:2003	UNE-ENV 1187:2003	External fire spread		Fire penetration		
		No		No		
Reaction to fire test in accordance with UNE EN 13823:2002 and UNE EN ISO 11925-2:2002	UNE EN ISO 11925-2:2002	THP 600 (Mj)	Figra 0.2 Mj (W/s)	FIGRA 0.4 Mj (W/s)	TSP 600S	Smogra
		1.72	110.71	78.44	(m²)	(m²/s²)
		LFS	DROP T<10s	DROP T>10s	153.47	30.69
		< to the edge	No	No		
Measurement of surface temperature and heat flow under radiation	UNE EN ISO 12543-4:1998		Fibre cement without coating	White Cork	White Cork	Natural Cork
		Exposed surface temperature CC	36.7	35.3	32.9	36.7
		Unexposed surface temperature °C	35.2	30.7	27.8	28.6
		Heat flow (W/m*)	237.4	123.3	99.0	166.2
Measurement of surface temperature and heat flow under radiation	UNE EN ISO 12543-4:1998		Fibre cement without coating	White Cork	White Cork	Natural Cork
		Exposed surface temperature CC	42.9	41.6	41.3	43.0
		Unexposed surface temperature °C	37.3	35.5	35.0	37.1
		Heat flow (W/m*)	122.2	64.4	65.8	100.1