

## European Technical Report

**ETA 20/ 0263**  
**of 11/ 06/ 2021**

**Technical Assessment Body issuing the European Technical Assessment:**  
Instituto de Ciencias de la Construcción Eduardo Torroja (IETcc)

**Trade name of the construction product**

**TECNOCOAT H-2049 SYSTEM**

**Product family to which the construction product belongs**

Liquid Applied Roof Waterproofing Kit, based on polyurea

**Manufacturer**

**TECNOPOL SISTEMAS S.L.U.**  
Carrer Finlàndia, 33, 08520 LES FRANQUESES DEL VALLÈS. Barcelona (Spain)

**Manufacturing plant(s)**

Carrer Finlàndia, 33, 08520 LES FRANQUESES DEL VALLÈS. Barcelona (Spain)

**This European Technical Report contains**

9 pages

**This European Technical report is issued in accordance with**

EAD 030350-00-0402  
Liquid applied roof waterproofing kits

## 1. GENERAL

The performed tests were performed on the liquid applied roof waterproofing kit, based on hybrid polyurea two-component as “TECNOCOAT H-2049 SYSTEM”, manufactured by the company TECNOPOL SISTEMAS, S.L.U.

The tests were carried out at the laboratories of the Instituto Ciencias de la Construcción Eduardo Torroja. The assessment of the fitness for use of the liquid waterproofing kit TECNOCOAT H-2049 SYSTEM according to the basic works requirements nº 2, 3 and 4 was carried out in compliance with “Guideline for European Technical Assessment EAD 030350-00-0402. Liquid applied roof waterproofing kits.

## 2. DESCRIPTION OF PRODUCT

The liquid applied roof waterproofing kit, based on hybrid polyurea “TECNOCOAT H-2049 SYSTEM” consists of hybrid polyurea, two-component, elastomeric without internal protection layer; which once polymerized conforms an elastic lining, in form of a layer completely bonded to the support (concrete, mortar, ceramic, XPS, etc). TECNOCOAT H-2049 SYSTEM is constituted for:

Components	Trade name	Consume
Primer over concrete	PRIMER PU-1050:polyurethane based	≥ 0.200 kg/m <sup>2</sup>
Primer over concrete and thermal insulation	PRIMER EPw-1070:epoxy water based	≥ 0.200 kg/m <sup>2</sup>
Primer on metal	PRIMER EP-1040, epoxy 100% solids	≥ 0.150 kg/m <sup>2</sup>
Waterproofing membrane	TECNOCOAT H-2049	≥ 1.5 kg/m <sup>2</sup> .
Finish layer: Protection UV	TECNOTOP 2C	≥ 0.250 kg/m <sup>2</sup>
	TECNOTOP 1C	≥ 0.100 kg/m <sup>2</sup>
Film Slipperiness	TECNOPLASTIC F	8 % weight mixed TECNOTOP 2C or 1C
	TECNOPLASTIC C	8 % weight mixed TECNOTOP 2C or C1

The raw materials constituents of this kit are enclosed in the MTD placed in the IETcc.

## 3. PREPARATION OF SAMPLES

The test specimens were made according to EAD 030350-00-0402 with respect to size and number. The manufacturer performed the roof waterproofing on the substrates in presence of the testing laboratory (IETcc).

The amount of material used to performance the sample was of 1,6 kg/m<sup>2</sup>. The final layer is obtained by applying one coat. The layer thickness obtained was between 1,4 - 2,2 mm, and the average thickness was of 1,5 mm. The application was carried out:

- Support: Polystyrene extruded (XPS), Concrete and steel.
- Application of:
  - PRIMER XPS-1050 on concrete
  - PRIMER EPw-1070 with consume of 200 g/m<sup>2</sup>, on XPS
  - . PRIMER EP-1040 with consume of 150 g/m<sup>2</sup>, on steel
- Mechanical application of the TECNOCOAT H-2049 polyurea membrane, using a specific machine, which mixes the two components at 70°C temperature approximately. The material became dry very fast (4-5 seconds) TECNOCOAT H-2049.
- The next day, the TECNOTOP 2C and 1C is applied (200 g/m<sup>2</sup> and 100 g/m<sup>2</sup>) on the necessary samples.
- TECNOPLASTIC F. Applied mixed with the TECNOTOP 2C to the 8% in weight.
- TECNOPLASTIC C. Applied mixed with the TECNOTOP 1C to the 8% in weight.

To perform specific test and verifications it was necessary to prepare free film samples of system. The most appropriated method to performance free samples; it was applying the product over a plastic sheet without creases and wrinkles.

The product was cured for 7 days (prescribed by the manufacture) at temperature of 23°C (±2) and 50%(±5) relative humidity. The tests were carried out at curing conditions indicated above, except in those indicated cases. The working life is for 25 years.

**4. RESULTS AND ASSESMENT OF PERFORMED TEST**

**4.1 BWR.2 Safety in case of fire**

**4.1.1 External fire performance (2.2.1).** NPA

**4.1.2 Fire reaction (2.2.2).** The classification of this LARWK with respect to reaction fire is undertaken in accordance with EN 13501-1 and it is E (AFITI LICOF 4005T20-2).

**4.2 BWR.3 Hygiene, health and environment**

**4.2.1 Resistance to water vapour (2.2.4) (EN 1931).** The value of the water vapour diffusion coefficient  $\mu > 1.000$  declared by the manufacturer was confirmed. The examination was conducted on 5 test specimens without any top coat at 22°C and 90-95 % relative air humidity. The amount of water vapour passed through the waterproof kit was:

Samples	g/(m <sup>2</sup> /d)
1	0.046
2	0.048
3	0.043
4	0.046
5	0.044
<b>Average</b>	<b>0.045</b>

The value of the water vapour resistance factor obtained was  $\mu = 1700$  (thickness 2,3 mm).

**4.2.2 Watertightness (2.2.5).** The test was performed according to EAD 030350-00-0402 “*Determination of the Watertightness*”. The examination was conducted on 3 test specimens at a hydrostatic pressure of 1 m water column during 24 hours. **The roof waterproofing remained watertight after test.**

**4.2.3 Resistance to delamination (2.2.6).** The test was performed according to EAD 030350-00-0402 “*Determination of the resistance to delamination*”. The examination was conducted on 5 test specimens.

Support	Adherence (kPa)	
	Values	Values
Concrete	3130	3000 (Ahdesive)
	2160	
	2340	
	3977	
	3330	
Steel	5057	3600 (Adhecive)
	4206	
	2635	
	2740	
	3370	
XPS	123	86 (Cohesive)
	63	
	74	
	87	
	80	

The delamination strength of the assembled system shall exceed 50 kPa according to EOTA.

**4.2.4 Resistance to dynamic indentation (2.2.7.1).** The examination was performed in accordance with EAD 030350-00-0402 “*Determination of the resistance to dynamic indentation*” 2.2.7.1, on 3 test specimens each fully bonded to the substrate. The type of indenter used did not perforate the specimens and remained watertight. The minimum thickness was 1,4 mm and the average was 2.0 mm.

Support	Indenter (mm)	Resistance Level
Steel	6	I4
XPS	6	I4

**4.2.5 Resistance to static indentation (2.2.7.2).** The examination was performed in accordance with EAD 030350-00-0402 “*Determination of the resistance to static indentation*” on 3 test specimens each fully bonded to the substrate. The minimum thickness was 1,4 mm and the average was 2.0 mm.

Support	Load (N)	Resistance Level
Steel	250	L4
XPS	250	L4

**4.2.6 Resistance to fatigue movement (2.2.8).** The examination was performed in accordance with EAD 030350-00-0402) “*Determination of the resistance to fatigue movement*” on 3 test specimens of fibre cement on which the roof waterproofing was applied. The samples were kept at least 16h at  $-10^{\circ}\text{C}$  before the test. The number of cycles applied was 1000 (W3), after the cycles the specimens did not show cracks, loss of adhesion or split. The test was performed at  $-10^{\circ}\text{C}$  temperature.

**4.2.7 Resistance to low temperatures (2.2.9.1).** The examination was performed in accordance with EAD 030350-00-0402 “*Determination of the resistance to dynamic indentation*” at a temperature of  $-20^{\circ} \pm 2^{\circ}\text{C}$  according to TL3 categorisation, on 3 test specimens each fully bonded to the substrate. The type of indenter used did not perforate the specimens and remained watertight.

Support	Indenter (mm)	Resistance Level
Steel	6	I4
XPS	6	I4

**4.2.8 Resistance to high temperatures (2.2.9.3).** The examination was performed in accordance with EAD 030350-00-0402 “*Determination of the resistance to static*” at a temperature of  $90^{\circ}$  and  $60^{\circ} \pm 2^{\circ}\text{C}$  according to TH4 and TH2 categorisation, on 3 test specimens each fully bonded to the substrate. The load applied on the specimens did not perforate the specimens. The minimum thickness was 1,4 mm and the average was 2.2 mm

Temperature $^{\circ}\text{C}$	Support	Load (N)	Resistance Level
90°	Steel	250	L4
	XPS	200	L3

**4.2.9 Resistance to heat ageing (2.2.10.1).** The specimens were exposed to  $80^{\circ}\text{C}$  during 200 days. The period time is defined by the categorisation according to the climatic zone (severe) and the categorisation according to expected working life (W3). Following the heat ageing period, the next tests were performed:

Dynamic indentation, the test was performed at  $-20^{\circ}\text{C}$  according to the TL3 categorisation on three samples. The tests were carried out on specimen fully bonded to the substrate. The type of indenter used did not perforate the specimen and remained watertight.

Age	Support	Indenter (mm)	Resistance Level
200 d	Steel	6	I4
	XPS	6	I4

Resistance to fatigue movement, the test was performed at  $-10^{\circ}\text{C}$  on 3 test specimens of fibre-cement on which the System was applied. The number of cycles was 50. After the cycles the specimens did not show cracks, loss of adhesion, or split.

Tensile properties. The test was performed in accordance with EN ISO 527-3/1B/200 (type 1B, speed 200mm/m) on 5 samples and 5 after be exposed to heat ageing. The values was calculated according to EN ISO 527-1.

Samples	Tensile strength (MPa) $\sigma_y$		Tensile elongation (%) in the maximum tensile strength $\epsilon$		Tensile elongation (%) in the maximum tensile strength $\epsilon_t$	
	Individual values	Mean value	Individual values	Mean value	values	Mean value
No heat ageing Without top coat	22	22	657	624	420	403
	22		625		400	
	22		633		405	
	22		622		398	
	22		614		393	
Ageing 25 years (W3) Without top coat	14	14	640	590	410	380
	10		490		314	
	15		640		410	
	15		690		442	
	12		500		320	
With TECNOTOP 2C Initial	20	21	634	613	406	390
	21		626		401	
	20		625		400	
	19		628		402	
	22		551		353	
With TECNOTOP 2C Ageing 25 years (W3))	21	19	605	603	387	386
	20		587		376	
	19		599		383	
	18		621		397	
	18		605		387	
With TECNOTOP 1C Initial	20	21	658	646	421	411
	21		644		412	
	22		629		403	
	19		661		423	
	21		620		397	
With TECNOTOP 1C Ageing 25 years (W3))	20	18	620	610	397	391
	18		600		384	
	18		615		394	
	19		610		390	
	18		608		389	

**4.2.10 Resistance UV-radiation in the presence of moisture (2.2.10.2).** The specimens were exposed to UV radiation during 5.000 hours, according to EAD 030350-00-0402. This time period is defined by the categorisation according to the climatic zone (severe) and the categorisation according to expected working life (W3). Following the UV radiation the next tests were performed:

Tensile properties. The test was performed in accordance with EN-ISO 527-3 on 5 samples and 5 (type 1B) at 200 mm/min after be exposed to UV-radiation.

Samples	Tensile strength (MPa) $\sigma_y$		Tensile elongation (%) in the maximum tensile strength $\epsilon$		Tensile elongation (%) in the maximum tensile strength $\epsilon_t$	
	Individual values	Mean value	Individual values	Mean value	values	Mean value
No UV ageing Without top coat	21	22	465	500	298	309
	20		450		288	
	25		500		320	
	21		500		320	
	22		500		320	
Ageing 25 years (W3) Without top coat	19	19	400	400	256	260
	19		400		256	
	17		400		256	
	20		400		256	
	20		430		275	
With TECNOTOP 2C initial	22	22	657	624	420	403
	22		625		400	
	22		633		405	
	22		622		398	
	22		614		393	
With TECNOTOP 2C Ageing 25 years (W3))	19	20	520	512	333	327
	20		535		342	
	20		489		313	
	22		512		328	
	19		503		322	
With TECNOTOP 1C Initial	20	21	658	646	421	411
	21		644		412	
	22		629		403	
	19		661		423	
	21		620		397	
With TECNOTOP 1C Ageing 25 years (W3))	22	20	540	520	346	332
	21		510		326	
	20		500		320	
	20		512		328	
	19		531		340	

**Dynamic indentation**, the test was carried out on three specimens adhered on the substrate -10°C. The type of indenter used did not perforate the specimen and remain watertight. Thickness average 2.0 mm.

Product	Time	Support	Indenter (mm)	Resistance Level
Without top coat	5000 h	Steel	6	I4
		XPS	6	I4
With TECNOTOP 2C		Steel	6	I4
		XPS	6	I4
With TECNOTOP 1C		Steel	6	I4
		XPS	6	I4

**Resistance to water ageing (2.2.10.3).** The upper weathering surface of the test specimens was exposed to hot water at 60°C during 60 (P3) and 180 (P4) days. The period time of exposition is defined by the categorisation according to the expected working life (W3). Following the hot water exposition, the following tests are performed:

**Static indentation.** The test was performed at 60° and 30°C according to the TH2 y TH1 categorisation. The tests were carried out on specimen fully bonded to the substrate. The load applied on the specimens did not perforate the membrane.

Temperature °C	Support	60 d		180 d	
		Load (N)	R. Level	Load (N)	R. Level
90°	Steel	250	L4	250	L4
	XPS	200	L3	-----	----
60°	Steel	250	L4	250	L4
	XPS	200	L3	150	L2
30°	Steel	250	L4	250	L4
	XPS	200	L3	200	L3

**Resistance to delamination.** The test was performed on 5 test specimens made of concrete on which the roof waterproofing was applied (60 and 180d at 60 °C).

Adherence (kPa)				
Support	60 days		180 days	
	Values	Mean value	Values	Mean value
Concrete	3200	3300 (Adhesive)	3400	2700 (Adhesive)
	3800		2600	
	3100		3300	
	2300		2000	
	3800		2000	
XPS	75	95 (cohesive)	63	90 (Cohesive)
	87		90	
	110		120	
	100		90	
	100		100	

4.2.12 **Resistance to plant roots (EN 13948) (2.2.11)**. NPA, the test is doing in the IETcc. The test started in January of 2021, after four months the roofs don't pass through the product

4.3 **ER.4 Safety in use**

4.3.1 **Slipperiness (2.2.14)**. The resistance of slipperiness was tested in accordance with EN 12633 at TECNALIA LABORATORIES:

- test report 13.02482 on the kit with TECNOTOP 2C + TECNOPLASTIC F (8%). The result Rd= 50.
- test report 079501 on the kit with TECNOTOP 2C + TECNOPLASTIC C (8%). The result Rd= 67,5.

4.4. **Related aspects of serviceability**

4.4.1 **Effect of weather conditions (2.2.12)**. The test results determined did not indicate any significant effects on the properties of the system. The results were within the given range of tolerances when the kits were assembled and cured at 5 °C and 40 °C.

Tensile properties. The test was performed in accordance with EN-ISO 527-3 (1B) on 5 samples.

Samples	Tensile strength (MPa) (EN-ISO 527-3)		Tensile elongation (%) in the maximum tensile strength $\epsilon$		Tensile elongation (%) in the maximum tensile strength $\epsilon_t$	
	Individual values	Mean value	Individual values	Mean value		
5 °C	24	24	604	610	387	390
	25		621		397	
	24		610		390	
	22		570		365	
	27		640		410	
40 °C	21	20	565	540	362	345
	21		541		346	
	21		570		365	
	19		513		328	
	18		510		326	

Static indentation,. Average thickness of 2.0 mm

T°C	Support	Load (N)	Resistance Level
5 °C	Steel	250	L4
40 °C	Steel	250	L4

Dynamic indentation,. Average thickness of 2.0 mm

T°C	Support	Indenter (mm)	Resistance Level
5 °C	Steel	6	I4
40 °C	Steel	6	I4

**4.4.2 Overlapping of day joints (2.2.13).** The delamination strength test performed on a layer assembled over other one show a good delamination strength, being upper to required value of 50 kPa. The number of samples tested was 5.

Substrate	Adherence (kPa)	
	Values	Values
Concrete	4200	3800 (Adhesive to support)
	3800	
	3700	
	3300	
	3500	

The table 1 shows the test results of the “TECNOCOAT H-2049.

#### 4.5 Identification of components

The results comply with the specifications of the manufacturer.

##### TECNOCOAT H-2049. Hybrid Polyurea membrane

Properties	Standard	Component
Density (g/cm <sup>3</sup> )	ISO 1675.	1,4. ± 5%
Dry extract (105 °C) (% weight)	ISO 1768	≥ 85
Ash content (450 °C) (% weight)	EN 1879	42 - 47
Viscosity (cps), (S63, 30 rpm, 25°C)	UNE-EN ISO 2555	2650 ± 200

##### PRIMER-PU 1050. Polyurethane based primer (100% solids).

Properties	Standard	Component A	Tolerance	Component B	Tolerance
Density (g/cm <sup>3</sup> )	ISO 1675.	1,01	1,19 ± 5%	1,03	1,03 ± 5%
Dry extract 105 °C	ISO 1768	99	≥ 99	99,91	≥ 99
Ash 450 °C, (% weight)	EN 1879	50,14	50 ± 5%	20.9	20.0 ± 5%
Viscosity (cps), (S63, 30 rpm, 25 °C)	UNE-EN ISO 2555	49	450 ± 50	925	900 ± 50

##### PRIMER EPw-1070. Epoxy water based primer.

Properties	Standard	Component A	Component B
Density (g/cm <sup>3</sup> )	ISO 1675.	1,00 ± 5%	1,10 ± 5%
Dry extract (105°C) (% weigh)	ISO 1768	60	75
Ash content (450°C) (% weight)	EN 1879	45 ± 5	25 ± 5
Viscosity (cps), (S63, 30 rpm, 25°C)	UNE-EN ISO 2555	1000 ± 50	200 ± 50

##### PRIMER EP-1040. Epoxy based primer.

Properties	Standard	Component A	Tolerance	Component B	Tolerance
Density (g/cm <sup>3</sup> )	ISO 1675.	1,31	1,34 ± 5%	1,32	1,34 ± 5%
Dry extract 105°C	ISO 1768	60	60	74	>90
Ash 450°C, (% weight)	EN 1879	50	45 ± 5	28	25 ± 5
Viscosity (cps), (S63, 30 rpm, 25°C)	EN ISO 2555	605	600 ± 50	95	80 ± 50

**UV Top Coat TECNOTOP 2C.** Aliphatic Polyurethane resin.

Properties	Standard	Component A	Tolerance	Component B	Tolerance
Density (g/cm <sup>3</sup> )	ISO 1675.	1,34	1,34 ± 5%	1,25	1,25 ± 5%
Dry extract 105°C	ISO 1768	60	≥ 60	75	≥ 75
Ash 450°C, (% weight)	EN 1879	36	37 ± 3 %	0	<1
Viscosity (cps), (S63, 30 rpm, 25°C)	UNE-EN ISO 2555	500	500 ± 10	600	600 ± 100

**UV Top Coat TECNOTOP 1C.**

Properties	Standard	Component
Density (g/cm <sup>3</sup> )	ISO 1675.	1,4. ± 5%
Dry extract (105°C) (% weight)	ISO 1768	≥ 45
Ash content (450°C) (% weight)	EN 1879	10-20
Viscosity (cps), (S63, 30 rpm, 25°C)	UNE-EN ISO 2555	2650 ± 200

**TECNOPLASTIC F and C (8%)**

Properties	TECNOPLASTIC F	TECNOPLASTIC C
Nature	Polyamide	Polyamide
Form	Micronized particles	Micronized particles
Weight (g/l)	± 640	± 640
Density (g/cm <sup>3</sup> )	± 1,22	± 1,28
Melting range (°C)	150 ~ 160	150 ~ 160
Particle size	150 ~ 280 µm	290 ~ 500 µm

**5. CLASSIFICATION OF THE TEST RESULTS**

The results of the tests according to EAD 030350-00-0402 lead to the classification of the roof waterproofing "TECNOCOAT H-2049 SYSTEM in the following performance levels:

Performance	Classification
External fire performance	NPA
Fire reaction	E
Expected working life	W3
Climatic zone of use	S (Severe)
User loads	Concrete: P4: TH4-TH1 XPS: P3: TH4-TH1
Roofs slopes	S1 – S4
Minimum surface temperatures	TL3 (- 20 °C)
Maximum surface temperatures	TH4 -TH1