

REPORT No.	050898-001
CUSTOMER	SELENA LABS SP. Z O.O
APPLICANT	IGOR KORCZAIN
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PURPOSE	SRI INDEX IN ACCORDANCE WITH ASTM E1980-11
SAMPLE TESTED	ACRYLIC COATING REF. «MATISOL COOL-R» «AQUA PROTECT COOL-R»
DATE OF RECEIPT	07.04.2015
TEST DATES	05.05.2015
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CHARACTERISTICS OF THE SAMPLES

On 7th April 2015, TECNALIA received from the company SELENA LABS SP. Z O.O, two test specimens of white acrylic coating on a metallic substrate measuring (100 x 100) mm and referred to as:

«MATISOL COOL-R»

«AQUA PROTECT COOL-R»



The annex includes the technical data sheet for the product tested supplied by the customer.

CALCULATION REQUESTED

The calculation requested is the determination of the **SRI index** of the test specimen received in accordance with **ASTM E1980-11** «Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces».

Two tests must be done prior to the determination of the SRI index;

- Determination of the **solar reflectance** in accordance with **ASTM E903-12** «Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres».
- Determination of the **emissivity** in accordance with **ASTM C1371-04a (2010)e1** «Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers».

TESTS CARRIED OUT

SOLAR REFLECTANCE

The determination of the reflectance between 280 and 2,500 nm was carried out using a Perkin-Elmer Spectrometer Lambda 900 UV/VIS/NIR spectrophotometer with an integrating sphere of 150 mm in diameter and white standard.

The test was carried out under laboratory conditions at (23 ± 2) °C and a relative humidity of under 70%. The test specimens were conditioned for 24 hours under the laboratory conditions described above.

The method used has the following characteristics:

- Wavelength interval: 5 nm
- Scan speed: 284.6 nm/min
- Slit UV/VIS:1
- Detector gain NIR:4

Three measurements were taken on one of the test specimen received and the average was calculated.

Based on the reflectance average value of the test specimen, solar reflectance has been calculated using the selected ordinate method set out in Section 8.3.4.. Ordinates have been selected from the values of direct normal solar irradiance specified in Table X2.3 of the ASTM E903-12 «50 Selected Ordinates for G173 Direct Normal Irradiance AM 1.5».

EMISSIVITY

The measuring equipment used was an emissometer model AE manufactured by Device & Services Company for low and high emissivity.

The test was carried out under laboratory conditions at (23 ± 2) °C and a relative humidity of under 70%. The test specimens and test device (Emissometer Model AE) were conditioned for 24 hours under the laboratory conditions described above.

Emissivity values are determined by comparing the minimum standard value estimated at 0.06 using a silver and copper alloy disc and the maximum standard value estimated at 0.88 using a black disc close to perfect black with a value of 1, made of galvanized aluminium and coated with Teflon. The values of these materials of reference are described in technical note 78-2 provided by the Device & Services Company, which explains how these standard emissivity values have been reached.

The values obtained have an estimated deviation of ± 0.02 .

Ten measurements were taken on one of the test specimen received and the average was calculated.

RESULTS

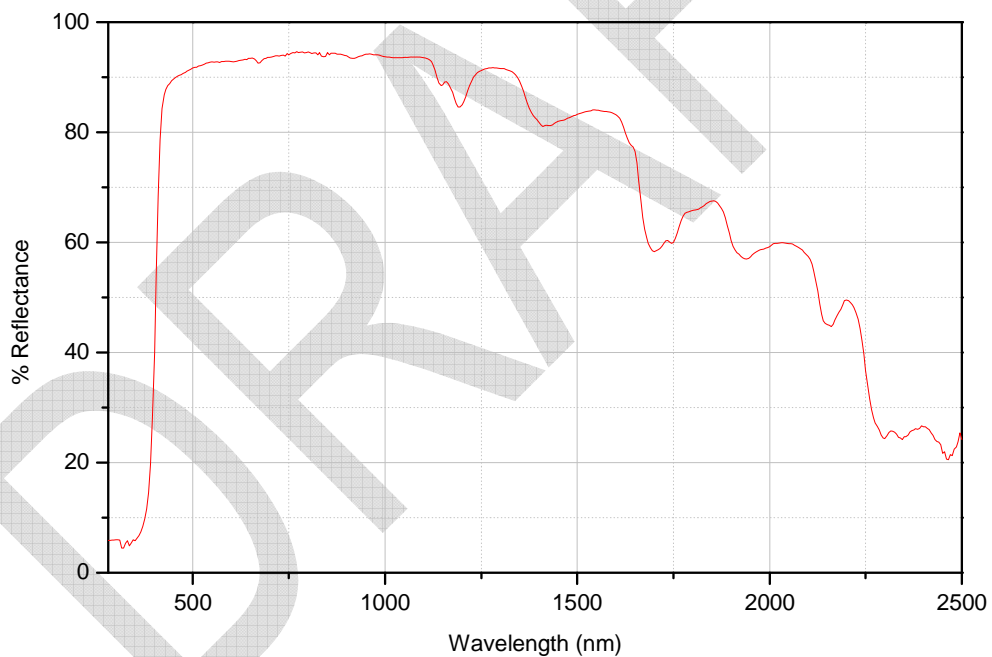
SOLAR REFLECTANCE

The result of solar reflectance of the test specimen referenced as «**MATISOL COOL-R**» and «**AQUA PROTECT COOL-R**» is:

Solar reflectance (%)

85.7 ± 0.2

The following graph shows the data of the spectral reflectance of the test specimen.



EMISSIVITY

The results of emissivity are:

Measurement	1	2	3	4	5	6	7	8	9	10
Emissivity	0.87	0.85	0.86	0.87	0.84	0.85	0.84	0.85	0.84	0.84

Therefore, the mean emissivity value of the test specimen referenced as «**MATISOL COOL-R**» and «**AQUA PROTECT COOL-R**» is:

Emissivity	0.85 ± 0.03
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SRI

Using the solar reflectance and emissivity values obtained, the following SRI index values are obtained, in accordance with the ASTM E1980-11 Standard for different convection coefficients:

Convective coefficient	SRI
Low (0-2 m/s)	106.5 ± 0.2
Medium(2-6 m/s)	106.8 ± 0.2
High (6-10 m/s)	107.1 ± 0.3

ANNEX

DRAFT

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TECHNICAL INFORMATION

For internal use in Selena Group

Matisol Cool-R

Matisol Cool-R for roof renovation is a weather and UV resistant water based, acrylic coating. Suitable for decorative and reflective paint application, on new and old bituminous roofs, bituminous and metal roofing sheets, aluminum, tin, copper, asbestos, concrete, clay and masonry tiles. Due to special pigments the heat build-up of the roof is minimized. A large part of the solar heat will be reflected allowing for lower temperatures of the roof.

APPLICATION

Apply only in dry weather conditions. The surface has to be cleaned thoroughly, free of loose particles and dirt, dust, oil and grease. Do not apply below +5 °C or at temperature higher than +35 °C. **Matisol Cool-R** is applied in 2 crossed coats. Second coat can be applied after about 8-12 hours and in any case only after the complete drying of the first one. The consumption changes according to the nature and the porosity of the support. The average consumption on bituminous membranes with granules is about 0,2 l/m² per coat and on talc or sand membranes it is about 0,1 l/m² per coat. The product after drying is walkable for maintenance and for renovation.

AVAILABLE COLOURS

Color		RAL Nr
White	+	-

TECHNICAL DATA

Liquid product at 23°C and 50% relative humidity	Standard	MIN	MAX
Appearance	-	Liquid paste	
Density [g/ml]	ISO 2811-1	1,46	1,50
Skin formation time [min]	-	40	50
Tack free time [min]	-	50	60
Viscosity (Brookfield at 20 RPM, 25 °C, spindle 6) [mPas]		24000	26000
Viscosity (Brookfield at 100 RPM, 25 °C, spindle 6) [mPas]		7800	8400
Spreading rate [kg/m ² /mm of layer thickness]		1,46	1,50

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Cured layer after 4 weeks at 23°C and 50% relative humidity	Standard	MIN	MAX
Modulus at 100% elongation @ [MPa]	ISO 37	3,1	3,5
Elongation at break [%]	ISO 37	200	350
Tensile strength [MPa]	ISO 37	3,1	3,5
Shore A hardness	ISO 868	25	30

	Standard	MIN	MAX
Application temperature [°C]	-	+ 5	40
Temperature resistance after curing [°C]	-	-30	100
Storage temperature [°C]	-	+ 5	25

SOLAR REFLECTANCE INDEX (ASTM E1980-11)

Convective coefficient [W/m ² K]	SRI
5,0	106,5 ± 0,2
12,0	106,8 ± 0,2
30,0	107,1 ± 0,3

USE RESTRICTIONS

- Matisol Cool-R cannot be used on sensitive metal surfaces (e.g. copper and its alloys) since it could cause discoloration of the substrates.
- Matisol Cool-R is not suitable for food contact and medical applications. The product has not been tested for medical and pharmaceutical applications.

The coating is intended only for roofs that are restricted from pedestrian and automotive traffic. The coating is intended for occasional access for maintenance of the roofing only.

STORAGE

Store up to 24 months in dry conditions. Protect from heat, store at temperatures up to 25°C.

Matisol Cool-R can be transported for the period of up to three weeks at temperatures not lower than -10 °C, thaw for 24 hours at 23 °C. The product can resist up to three freeze-thaw cycles.

ADDITIONAL CONDITIONS

The roof coating has to be inspected at least once every three years for any local damages. Repair works have to be carried out to ensure continuity of the coating layer.

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The information contained herein is offered in good faith based on Selena's research and is believed to be accurate. However, because conditions and methods of use of our products are beyond our control, this information shall not be used in substitution for customer's tests to ensure that Selena's products are fully satisfactory for your specific applications. Selena's sole warranty is that the product will meet its current sales specifications. Your exclusive remedy for breach of such warranty is limited to refund of purchase price or replacement of any product shown to be other than as warranted. Selena FM S.A. specifically disclaims any other expressed or implied warranty of fitness for a particular purpose or merchantability. Selena disclaims liability for any incidental or consequential damages. Suggestions of use shall not be taken as inducements to infringe any patent.

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Aqua Protect Cool-R

Aqua Protect Cool-R for roof renovation is a weather and UV resistant water based, acrylic coating. Suitable for decorative and reflective paint application, on new and old bituminous roofs, bituminous and metal roofing sheets, aluminum, tin, copper, asbestos, concrete, clay and masonry tiles. Due to special pigments the heat build-up of the roof is minimized. A large part of the solar heat will be reflected allowing for lower temperatures of the roof.

APPLICATION

Apply only in dry weather conditions. The surface has to be cleaned thoroughly, free of loose particles and dirt, dust, oil and grease. Do not apply below +5 °C or at temperature higher than +35 °C. **Aqua Protect Cool-R** is applied in 2 crossed coats. Second coat can be applied after about 8-12 hours and in any case only after the complete drying of the first one. The consumption changes according to the nature and the porosity of the support. The average consumption on bituminous membranes with granules is about 0,2 l/m² per coat and on talc or sand membranes it is about 0,1 l/m² per coat. The product after drying is walkable for maintenance and for renovation.

AVAILABLE COLOURS

Color		RAL Nr
White	+	-

TECHNICAL DATA

Liquid product at 23°C and 50% relative humidity	Standard	MIN	MAX
Appearance	-	Liquid paste	
Density [g/ml]	ISO 2811-1	1,46	1,50
Skin formation time [min]	-	40	50
Tack free time [min]	-	50	60
Viscosity (Brookfield at 20 RPM, 25 °C, spindle 6) [mPas]		24000	26000
Viscosity (Brookfield at 100 RPM, 25 °C, spindle 6) [mPas]		7800	8400
Spreading rate [kg/m ² /mm of layer thickness]		1,46	1,50

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Cured layer after 4 weeks at 23°C and 50% relative humidity	Standard	MIN	MAX
Modulus at 100% elongation @ [MPa]	ISO 37	3,1	3,5
Elongation at break [%]	ISO 37	200	350
Tensile strength [MPa]	ISO 37	3,1	3,5
Shore A hardness	ISO 868	25	30

	Standard	MIN	MAX
Application temperature [°C]	-	+ 5	40
Temperature resistance after curing [°C]	-	-30	100
Storage temperature [°C]	-	+ 5	25

SOLAR REFLECTANCE INDEX (ASTM E1980-11)

Convective coefficient [W/m ² K]	SRI
5,0	106,5 ± 0,2
12,0	106,8 ± 0,2
30,0	107,1 ± 0,3

USE RESTRICTIONS

- Aqua Protect Cool-R cannot be used on sensitive metal surfaces (e.g. copper and its alloys) since it could cause discoloration of the substrates.
- Aqua Protect Cool-R is not suitable for food contact and medical applications. The product has not been tested for medical and pharmaceutical applications.

The coating is intended only for roofs that are restricted from pedestrian and automotive traffic. The coating is intended for occasional access for maintenance of the roofing only.

STORAGE

Store up to 24 months in dry conditions. Protect from heat, store at temperatures up to 25°C. Aqua Protect Cool-R can be transported for the period of up to three weeks at temperatures not lower than -10 °C, thaw for 24 hours at 23 °C. The product can resist up to three freeze-thaw cycles.

ADDITIONAL CONDITIONS

The roof coating has to be inspected at least once every three years for any local damages. Repair works have to be carried out to ensure continuity of the coating layer.

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