

# MINERAL REFLEX WHITE FLEXTER TESTUDO SPUNBOND POLIESTERE MINERAL REFLEX WHITE FLEXTER TESTUDO FR TRIARMATO

ELASTOPLASTOMERIC POLYMER-BITUMEN WATERPROOFING MEMBRANE, WITH A DISTILLED BITUMEN, PLASTOMER AND ELASTOMER BASE, SPECIAL HIGH SATURATION AND LUMINOSITY WHITE MINERAL SELF-PROTECTION FOR ENERGY SAVING AND THE REDUCTION OF "URBAN HEAT ISLANDS" HAVING HIGH SOLAR REFLECTANCE AND VERY HIGH THERMAL EMISSIVITY

GRANTS **LEED** CREDITS

CATEGORY	CHARACTERISTICS			ENVIRONMENTAL						METHOD OF USE				
<b>EP S</b>														
SPECIAL ELASTOPLASTOMERIC FOR SPECIFIC USES	WATERPROOF	REACTION TO FIRE	FIRE RESISTANT (FR TRIARMATO)	ECO GREEN	ASBESTOS FREE	TAR FREE	CHLORINE FREE	RECYCLABLE	NON DANGEROUS WASTE	EXHAUSTED OIL FREE	TORCH APPLICATION	HOT AIR APPLICATION	NAILING	APPLICATION WITH MOLTEN BLOWN BITUMEN

\* For waterproofing membranes with TEXLAMINA underface finish only

## 1 PROBLEM

**ROOF**  Flat  Slop

**SUBSTRATE**  Concrete  Wood

Previous membrane  Thermal insulation

## HOW TO IMPROVE THERMAL INSULATION AND INCREASE THE PERFORMANCE OF PHOTOVOLTAIC SYSTEMS ON ROOFS

More than 90% of roofs are dark in colour and the roof surface reaches temperatures of around 80°C through solar radiation, which also negatively affects the photovoltaic panels installed on them, whose performance decreases as the temperature rises. Two advantages are obtained by increasing the solar reflectance of the roof surface using specific surface treatments of the waterproof covering; firstly, you reduce the temperature and consequently save energy for air conditioning in summer of the rooms below, plus you increase the albedo, being the incident radiation fraction reflected from the roof surface, which produces the benefit of increasing the performance of the photovoltaic system also during dimmer daylight hours. The choice of the colour of the waterproof covering's upper layer (which should be the self-protected mineral type (MINERAL) with slate flakes, as durable as possible and unaffected by the problems of membranes with metal self-protection) is the first way to increase solar radiation reflection and it also makes the rooms under the roof cooler.

The table that follows indicates the temperatures recorded in North Italy in the month of July 2007 under bituminous surfaces with different methods of protection.

MAXIMUM TEMPERATURE	
Black bituminous membrane	78°C
Grey slate membrane	74°C
White slate membrane	70°C
Painted aluminium membrane	67°C
<b>Bituminous membrane:</b>	
• MINERAL REFLEX WHITE	<b>65°C</b>

## 2 SOLUTION

**MINERAL REFLEX WHITE FLEXTER TESTUDO** belongs to the family of FLEXTER TESTUDO membranes, namely INDEX polymer bitumen waterproofing membranes, whose quality is certified and constantly monitored by the ITC Institute, a member of the C.N.R. (former IC-ITE), for which it has issued the DVT technical Agrément. The FLEXTER TESTUDO membranes are the first to be certified in compliance with the most recent UEAtc Directives of December 2001 (UEAtc Technical Guide for the assessment of Roof Waterproofing System, made of Reinforced APP or SBS Polymer Modified Bitu-

men Sheets) whose test methods have been updated with the new EN European legislation. The characteristics of the membranes are highly superior with respect to the limits envisaged by the old and new legislation.

FLEXTER TESTUDO was the first membrane to be certified by the ICITE in compliance with the UEAtc common European Directives, drawn up for the first time in 1984, and has obtained numerous recognitions from other prestigious European institutions, such as the CSTB in France, the UBAtc in Belgium and the BBA in Great Britain. Now, after more than 20 years of controlled and periodically certified production with three-yearly renewals, the production

(See following)

**CE** INTENDED USE OF "CE" MARKING SPECIFIED ACCORDING TO THE AISPEC-MBP GUIDELINES

**EN 13707 - REINFORCED BITUMEN SHEETS FOR ROOF WATERPROOFING**

- Upper layer in multi-layer systems without permanent heavy surface protection
  - MIN. REFLEX WHITE FLEXTER TEST. SP. POL.
  - MIN. REFLEX WHITE FLEXTER TEST. FR TRIARMATO
- Exposed single-layer
  - MIN. REFLEX WHITE FLEXTER TEST. SP. POL. - 4 mm
  - MIN. REFLEX WHITE FLEXTER TEST. FR TRIARMATO

## CERTIFICATIONS

**Documento di Valutazione Tecnica all'impiego DVT-0010** for MINERAL REFLEX WHITE FLEXTER TESTUDO SPUNBOND POLYESTER

**Technical Approved**



**AGREMENT "UBAtc"**  
Union belge pour l'Agrément technique dans la construction



Department of Mechanical and Civil Engineering  
University of Modena and Reggio Emilia



**CSTB AGREEMENT**  
Centre scientifique et technique du bâtiment for MINERAL REFLEX WHITE FLEXTER TESTUDO SPUNBOND POLYESTER



**AGREMENT "BBA"**  
British Board of Agreement for MINERAL REFLEX WHITE FLEXTER TESTUDO SPUNBOND POLYESTER



Certification "Warrington fire research"  
Exceeds external fire resistance test according to ENV 1187 and it is classified according to EN 13501-5: Broof-t1, t3, t4 for MINERAL REFLEX WHITE FLEXTER TESTUDO FR TRIARMATO

Certification "Warrington fire research"  
Exceeds reaction to fire test according to EN-ISO 11925-2 and it is classified according to EN 13501-1: Euroclass E for MINERAL REFLEX WHITE FLEXTER TESTUDO FR TRIARMATO



(See previous)

range has been further improved with the introduction of the new high reflectance mineral surface called: **MINERAL REFLEX WHITE**. **MINERAL REFLEX WHITE FLEXTER TESTUDO** in the **SPUNBOND POLIESTERE** version is reinforced with a composite non-woven polyester fabric whereas the **FR TRIARMATO** (Fire Resistance) version has triple reinforcement with a fibreglass mat between two non-woven polyester fabrics, both resistant and elastic and with high dimensional stability.

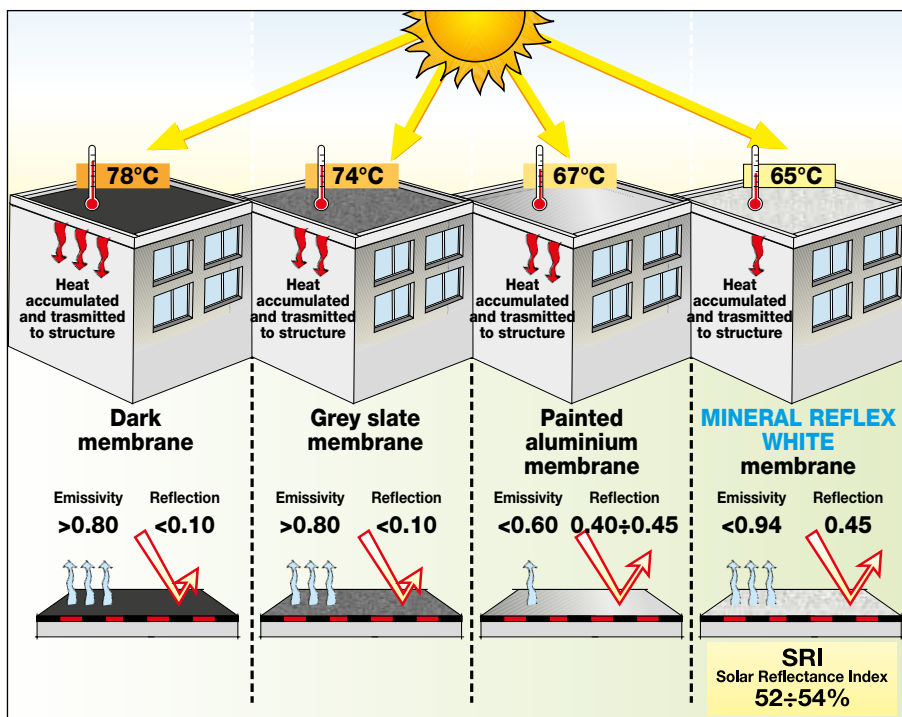
The fire resistance from the external part of the **FR TRIARMATO** version, produced only in the 4 mm version, is certified in compliance with EN 13501- 5 in classes: B<sub>roof</sub> (t1), B<sub>roof</sub> (t3) e B<sub>roof</sub> (t4). The special reinforcement contributes to the membrane's fire resistance, in synergy with the special additive added to the polymer-bitumen mixture of this version. The flame retardant additive in the FR version is harmless, of mineral nature, does not contain chlorine and does not release toxic gases during combustion.

The mixture, tested over thirty years of application and more than twenty years of certification, has a distilled polymer-bitumen base, selected for industrial use, with a high elastomeric and plastomeric polymer and metallocene copolymer content so as to obtain a "phase inversion" alloy, whose continuous phase is made up of a polymeric matrix in which the bitumen is finely dispersed. This configuration determines the characteristics of the product, which are more similar to those of the polymeric material to which the bitumen adds superior adhesion and water resistance.

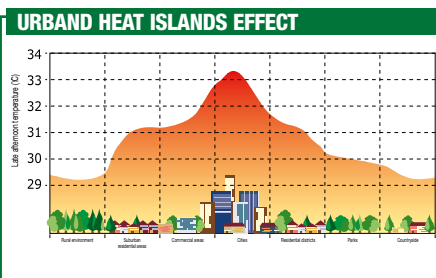
**MINERAL REFLEX WHITE FLEXTER TESTUDO** is intended to be left on view and the special white mineral finish of the compact and adherent upper face has a high capacity to reflect the solar rays which, along with the very high infrared emissivity, in the summer season on the roofs to which it is applied, allows less heat to be absorbed during the daytime and to dispose of the heat absorbed during the night more quickly, hence obtaining energy saving on the air conditioning system of the rooms below.

The high reflectance of the membrane lowers the temperature of the waterproof covering and consequently provides a benefit for the rooms below the roof, as well as the covering itself being exposed to a lower thermal regime, which increases its lifetime.

The temperature reduction of the covering along with the high reflectance (albedo) increases the performance of the photovoltaic solar panels to be installed on the roof, both because at low temperatures they perform better and because increasing the luminosity around them increases the performance of the panel during the evening.



**MINERAL REFLEX WHITE FLEXTER TESTUDO** contributes to the reduction of overheating in cities due to Urban Heat Islands.



The membrane's reflectance properties are certified by the EELab (Energy Efficiency Laboratory of the Department of Mechanical and Civil Engineering at the University of Modena and Reggio Emilia).

The increase in the reflectance and emissivity provided by the WHITE REFLEX paint applied to the waterproof covering		
Surface	Reflection	Emissivity
Dark membrane	<10% (<0,1)	>80% (>0,8)
Painted aluminium membrane	40÷45% (0,40÷0,45)	<60% (<0,6)
<b>Self-protected membrane MINERAL REFLEX WHITE</b>	<b>45% (0,45)</b>	<b>&lt;94% (&lt;0,94)</b>



The lower face of the membrane is coated with Flamina hot-melt film, which retracts greatly in contact with the application torch whereas the upper face is protected by special, compact white mineral granules, stuck at a high temperature, except for a lateral strip of about 8 cm to allow the overlaps to be bonded.

The following types are produced:

Membrane	Thickness	Type of possible system	Access	Maximum pitch
MINERAL REFLEX WHITE FLEXTER TESTUDO SPUNBOND POLYESTER	4 mm	Single or multiple layers	Limited to maintenance, except for application of suitable heavy roof	Class I
MINERAL REFLEX WHITE FLEXTER TESTUDO FR TRIARMATO	3 mm	Multiple layers		
	4 mm	Single or multiple layers		

## APPLICATION FIELDS

The long-lasting mechanical resistance and elasticity characteristics and stability at high and low temperatures of the **MINERAL REFLEX WHITE FLEXTER TESTUDO** membranes allow them to be used as sealing elements in visible single or multiple layers, both for new jobs and for refurbishments on various types of roofs:

- On all inclined surfaces: flat, upright and curved (class I).
- On different types of laying surfaces: cement laying surfaces, site-cast or prefabricated on metal or wooden roofing, on the most widely used thermal insulation systems for the building industry.

### Solar Reflectance Index

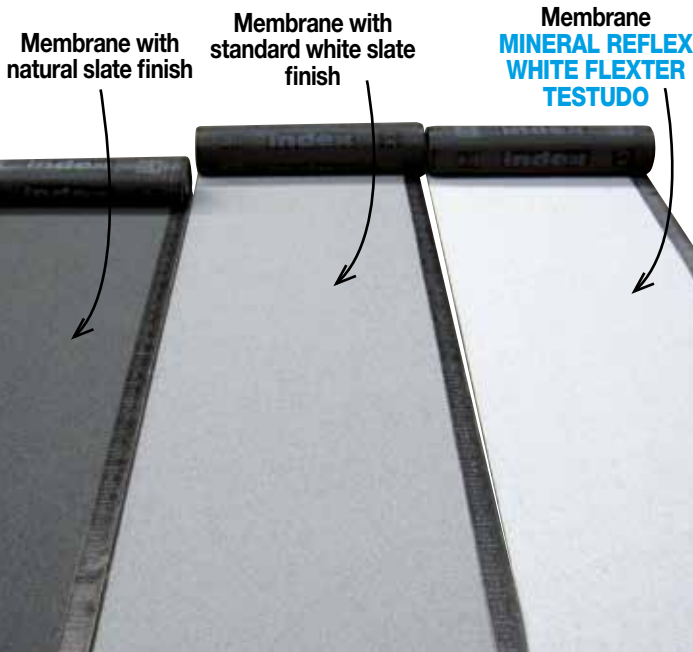
**MINERAL REFLEX WHITE**  
**SRI\* = 52÷54**

\* SRI according to wind speed:  
low wind=52%, medium wind=53% and high wind=54%.

## REROOFING WITH MINERAL REFLEX WHITE



## REFERENCES



## GBC ITALIA (Green Building Council) and LEED-CERTIFICATION



GBC Italia, which INDEX belongs to, has the task of using the common guidelines to everyone in the **LEED** international community to develop the characteristics of the **LEED** Italia system, which must take into consideration the specific climatic, building and legislative conditions in Italy.

**LEED** (Leadership in Energy and Environmental Design) opts for a view of sustainability by making the most of all possibilities to reduce the various

kinds of environmental impacts and harmful emissions of the buildings being built.

The **LEED** standards are parameters for *sustainable building* developed in the USA and applied in 40 countries throughout the world. They indicate the requirements for eco-compatible buildings, able to "work" sustainably and self-sufficiently energy-wise. It is essentially a rating system for the development of "green" buildings.

**LEED** is a certification, which may be obtained on a voluntary basis, where the actual designer deals with collecting the data for the assessment. The system is based on the award of credits for each of the requirements that characterise the sustainability of the building.

The certification level obtained comes from the sum of the credits.

The assessment criteria used by **LEED** (2009 version) are grouped into six categories (+1 only valid in the USA), which envisage one or more compulsory prerequisites and a number of environmental performances that attribute the building's final score:

- Sustainable sites (1 prerequisite, 26 points)
- Efficient water consumption (1 prerequisite, 10 points)
- Energy and atmosphere (3 prerequisites, 35 points)
- Materials and resources (1 prerequisite, 14 points)
- Indoor environmental quality (2 prerequisites, 15 points)
- Innovation and design process (6 points)
- Regional priority (4 points) only applicable in the USA

There are 4 rating levels:

- Certified: between 40 and 49 points
- Silver: between 50 and 59 points
- Gold: between 60 and 79 points
- Platinum: more than 80 points

Therefore, in compliance with the Green Building Council criteria, the **MINERAL REFLEX WHITE FLEXTER TESTUDO** membrane is more than able to fulfil the SRI>29 requirement, relative to the **LEED** credits:

### • SS Credito 7.1: Heat Island Effect: Non roof

**Option 2.** Place a minimum of 70% of parking spaces under cover (defined as under ground, under deck, under roof or under a building). Any roof used to shade or cover parking, if it is not made of support structures covered in vegetation, **must have an SRI of at least 29.**

### • SS Credito 7.2: Heat Island Effect: Roof

**Option 1.** Use roofing materials with a Solar Reflectance Index (SRI) equal to or greater than the values indicated in the table below for a minimum of 75% of the roof surface.

Roof type	Slope	SRI
Low sloped roof	≤2:12 (9.5°-16.7%)	78
High sloped roof	>2:12 (9.5°-16.7%)	29

**Option 3.** Install high-albedo and vegetated roof surfaces that, in combination, meet the following criteria:

(Area roof meeting minimum SRI/0.75) + (Area of vegetated roof/0.5) ≥ Total roof area

## TECHNICAL CHARACTERISTICS

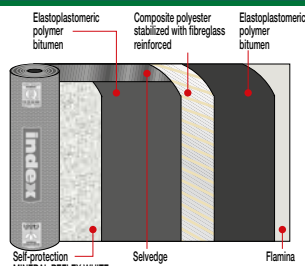
	Standard	T	MINERAL REFLEX WHITE FLEXTER TESTUDO SPUNBOND POLYESTER <sup>(1)</sup>		MINERAL REFLEX WHITE FLEXTER TESTUDO FR TRIARMATO <sup>(2)</sup>
Reinforcement			Stabilised composite Spunbond non-woven polyester fabric		Composite spunbond non-woven polyester fabric with triple reinforcement stabilised with fibreglass mat
Thickness	EN 1849-1	±0,2	3 mm	4 mm	4 mm
Roll size	EN 1848-1	≥	1×10 m	1×10 m	1×10 m
Watertightness	EN 1928 - B	≥	60 kPa	60 kPa	60 kPa
Shear resistance L/T	EN 12317-1	-20%	750/600 N/50 mm	750/600 N/50 mm	650/600 N/50 mm
Maximum tensile force L/T	EN 12311-1	-20%	850/700 N/50 mm	850/700 N/50 mm	750/600 N/50 mm
Elongation L/T	EN 12311-1	-15% V.A.	50/50%	50/50%	50/50%
Resistance to impact	EN 12691 - A		1 250 mm	1 250 mm	1 000 mm
Resistance to static loading	EN 12730 - A		20 kg	20 kg	15 kg
Resistance to tearing (nail shank) L/T	EN 12310-1	-30%	200/200 N	200/200 N	250/250 N
Dimensional stability L/T	EN 1107-1	≤	-0.30/+0.30%	-0.30/+0.30%	-0.25/+0.10%
Flexibility to low temp. • after ageing	EN 1109 EN 1296-1109	≤ +15°C	-20°C -20°C	-20°C -20°C	-15°C -5°C
Flow resist. at high temp. • after ageing	EN 1110 EN 1296-1110	≥ -10°C	140°C 140°C	140°C 140°C	140°C 120°C
UV ageing	EN 1297		-	Supera la prova	-
Reaction to fire Euroclass	EN 13501-1		E	E	E
External fire performance	EN 13501-5		F roof	F roof	B roof (t1, t3, t4)
Solar Reflectance Index (SRI)					
• SRI per h <sub>c</sub> =5 W/(m²K) (low wind)			52%	52%	52%
• SRI per h <sub>c</sub> =12 W/(m²K) (medium wind)			53%	53%	53%
• SRI per h <sub>c</sub> =30 W/(m²K) (high wind)			54%	54%	54%
Thermal specifications					
Thermal conductivity			0.2 W/mK	0.2 W/mK	0.2 W/mK
Heat capacity			3.60 KJ/K	4.80 KJ/K	4.80 KJ/K

(<sup>1</sup>) Agrément ITC-CNR (former ICITE) no. 589/03 (<sup>2</sup>) Agrément UBatc ATG1616.

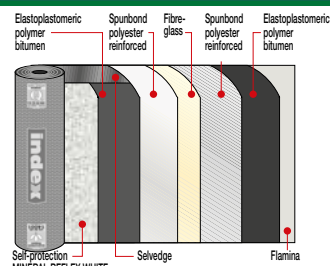
Compliant with EN 13707 in terms of the resistance factor to steam penetration for reinforced polymer-bitumen membranes, the value of  $\mu = 20\ 000$  may be considered, unless declared otherwise.

## COMPOSITION OF THE MEMBRANE

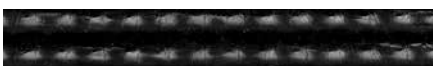
### MINERAL REFLEX WHITE FLEXTER TESTUDO SPUNBOND POLYESTER



### MINERAL REFLEX WHITE FLEXTER TESTUDO FR TRIARMATO



## PRODUCT FINISHING



**EMBOSSING FLAMINA.** The embossing on the lower surfaces of the membranes finished with Flamina film makes it possible to lay the product precisely and quickly, forming a smooth surface when melted with the torch. It indicates the correct melting temperature and lets the film retract faster. The embossing also enables optimal vapour diffusion; in spot bonded and loose laid installation, in the points where it remains intact, preventing blisters and swelling.



**MINERAL REFLEX WHITE SELF-PROTECTION.** A special high saturation and luminosity white mineral self-protection is applied to the face of the membrane to remain visible, which protects it from ageing due to UV rays, with high solar reflectance and very high heat emissivity.

• FOR ANY FURTHER INFORMATION OR ADVICE ON PARTICULAR APPLICATIONS, CONTACT OUR TECHNICAL OFFICE • IN ORDER TO CORRECTLY USE OUR PRODUCTS, REFER TO INDEX TECHNICAL SPECIFICATIONS •

**index**  
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The numerous possible uses and the possible interference of conditions or elements beyond our control, we assume no responsibility regarding the results which are obtained. The purchasers, of their own accord and under their own responsibility, must establish the suitability of the product for the envisaged use.

The figures shown are average indicative figures relevant to current production and may be changed or updated by INDEX at any time without previous warning. The advice and technical information provided, is what results from our best knowledge regarding the properties and the use of the product. Considering