WHITE REFLEX
WHITE REFLEX Ultra
WHITE REFLEX Fire Resistant

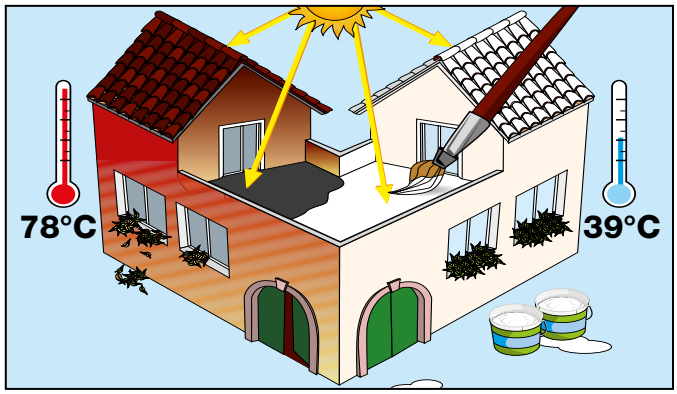
HIGH REFLECTANCE AND HIGH EMISSIVITY WATER-BASED WHITE PAINTS, FOR BITUMINOUS WATERPROOFING MEMBRANES, CONCRETE, SHEET METAL, PLAIN AND HALF-ROUND TILES, WHICH IMPROVE THE THERMAL INSULATION OF BUILDINGS

GRANTS *LEED* CREDITS

CHARACTERISTICS		ENVIRONMENTAL	METHOD OF USE				PRECAUTIONS
A	H_2O						
ONE-COMPONENT	WATER BASED	ECO GREEN	MIX MECHANICALLY	SPRAY APPLICATION	APPLY BY BRUSH	APPLY BY ROLLER	STORAGE: KEEP AWAY FROM FROST

PROBLEM

- INCREASE THE SUMMER TIME THERMAL COMFORT OF INHABITED INTERIORS
- REDUCE AIR CONDITIONING COSTS IN THE SUMMER
- REDUCE THE URBAN HEAT ISLAND EFFECT
- EXTEND THE LIFE OF BITUMINOUS COVERINGS



More than 90% of roofs are dark in colour and the covering surface reaches temperatures of around 80°C under the heat of the sun, which also negatively affects the life of the waterproof coating. The table that follows indicates the temperatures recorded in Northern Italy in the month of July 2007 under bituminous surfaces with different methods of protection:

MAXIMUM TEMPERATURE	
Dark membrane	78°C
Grey slate membrane	74°C
White slate membrane	70°C
Painted aluminium membrane	67°C
Self-protected membrane with copper foil	60°C
Self-protected membrane with aluminium foil	55°C
Bituminous membrane with WHITE REFLEX coating or WHITE REFLEX Fire Resistant	**42°C**
Bituminous membrane with WHITE REFLEX Ultra coating	**39°C**

REFLECTANCE	
Dark membrane	<0.10
Membrane with aluminium paint	0.40-0.46
Bituminous membrane with WHITE REFLEX coating	**>0.80**
Bituminous membrane with WHITE REFLEX ULTRA coating	**>0.80**

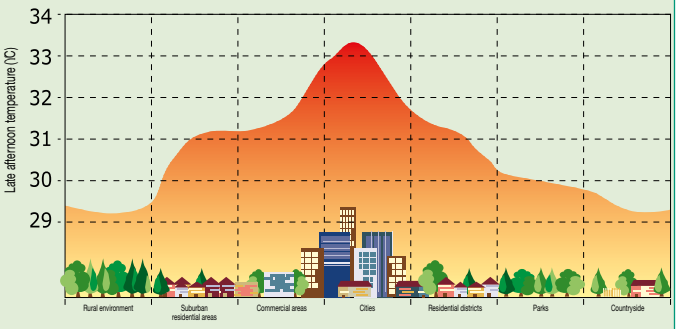
EMISSIVITY	
Dark membrane	>0.80
Membrane with aluminium paint	0.90
Bituminous membrane with WHITE REFLEX coating	**>0.90**
Bituminous membrane with WHITE REFLEX ULTRA coating	**>0.90**

In summer, the interior under the roof overheats, compromising the thermal comfort of the occupants and increasing air conditioning costs.

Roofs and the heat island effect

The American EPA (Environmental Protection Agency) has for some time being working to combat the Heat Island Effect, the phenomenon of higher temperatures in urban areas than in the countryside, which may have serious consequences in the summer.

These heat islands over cities may have a temperature difference relative to the surrounding areas of 1 to 6°C, which results in peak electrical power consumption and the attendant risk of black out, increased air conditioning costs, increased pollution, illness and death.



The EPA has drawn up the following strategies to combat the urban heat island effect:
- Increasing green areas, including roofs (Green Roofs)
- Cooling roofs with reflective paint or membranes (Cool Roofs)
- Cooling urban pavement surfaces, including terraces (Cool Pavements)

SOLAR REFLECTANCE INDEX

WHITE REFLEX and WHITE REFLEX Fire Resistant
Solar Reflectance Index
SRI 104

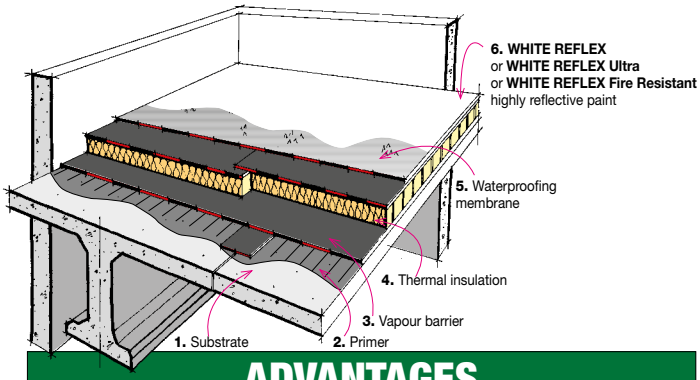
WHITE REFLEX Ultra
Solar Reflectance Index
SRI 110

SOLUTION

The cool roof technique, in which roofs are cooled by increasing their reflectance, has proved to be a highly successful approach.
Using white coatings based on titanium dioxide has proved to be more effective than using reflective metal surfaces.
WHITE REFLEX coatings are single-component coatings pigmented with titanium dioxide, consisting of a water-based polymer emulsion with special additives.
It dries to form an elastic film which is resistant to atmospheric agents and UV.
WHITE REFLEX is used to protect polymer-bitumen membranes: its white finish and the special additives not only extend the life of the roof coverings but also reduce the temperature, both outside and inside the building. The high reflectance of **WHITE REFLEX** (0.82) and **WHITE REFLEX Fire Resistant** (0.83) and **WHITE REFLEX Ultra** (0.86) significantly reduces heat absorption in comparison with a dark roof, increases occupant comfort in the summer and satisfies the limits for cool roofs set out in Annex 1 of Italian Inter-ministerial Legislative Decree 26/06/2015 for both flat and pitched roofs; the results are a considerable reduction in temperature and greatly reduced costs for air conditioning both residential buildings and livestock sheds in the summer. The high level of infrared emissivity (0.91, for WHITE REFLEX Fire Resistant 0.94) also promotes the dissipation of heat accumulated overnight.
In urban areas, roofs coated with **WHITE REFLEX** do not overheat in the sun and contribute to the reduction of the urban heat island effect. The temperature reduction and the light diffused by the reflective coating increase the efficiency of solar panels installed on the roof.
The performance of the panels does indeed decrease by approximately 5% for every 0.5°C deviation from the temperature of 25°C (temperature at which best performance is obtained).
Painting roofs with **WHITE REFLEX** and **WHITE REFLEX Fire Resistant** yields an **SRI** (Solar Reflectance Index) of **104** and **WHITE REFLEX Ultra** a value of **SRI 110**, which amply satisfies the various environmental protocols (CAM PANGPP, ITACA, *LEED*) for *sustainable construction*.

APPLICATION FIELDS

• RESIDENTIAL AND INDUSTRIAL CONSTRUCTION
WHITE REFLEX coating can be used not just on bituminous coverings but also on plaster, concrete, metal panelling, roof tiles and corrugated bitumen panels. It is used to protect the exposed bituminous coverings of residential and industrial buildings, with the benefits discussed above.



ADVANTAGES

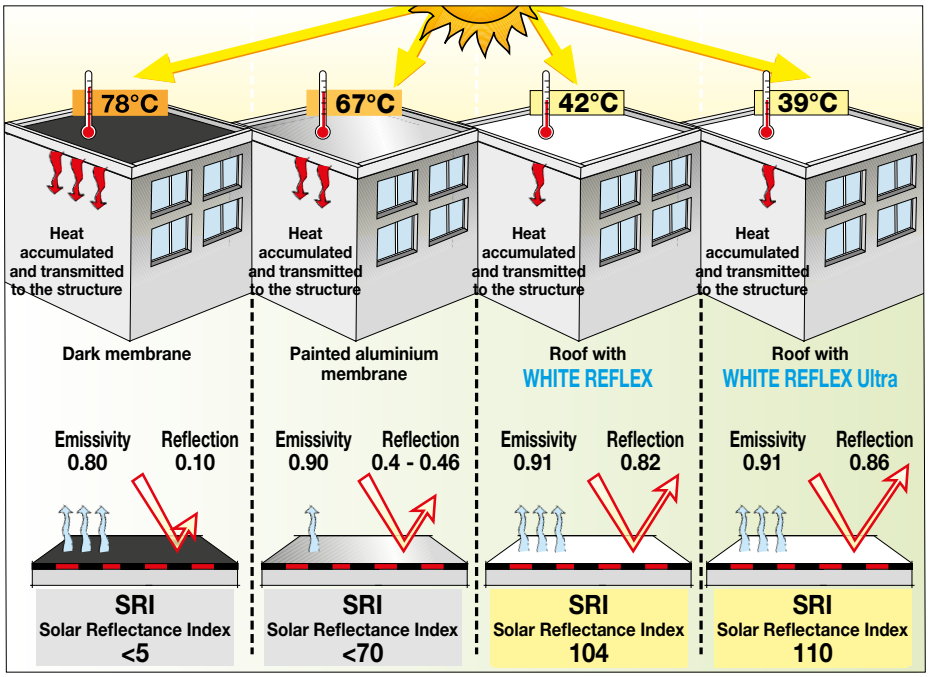
- **Reduces the surface temperature of roofs exposed to the sun.**
- **Improves thermal insulation reduces the cost of air conditioning in the summer.**
- **Increases the efficiency of photovoltaic panels.**
- **Reduces the urban heat island effect**
- **Extends the life of the bituminous waterproof covering.**
- **Water-based, solvent free, easy to apply.**
- **Satisfies the requirements of Annex 1 of Italian Inter-ministerial Legislative Decree 26/06/2015 the criteria of environmental protocols for sustainable construction (CAM PANGPP, ITACA, LEED).**

ACCORDING TO EUROPEAN NORMS
EN 1504-2
CONCRETE SURFACES PROTECTION

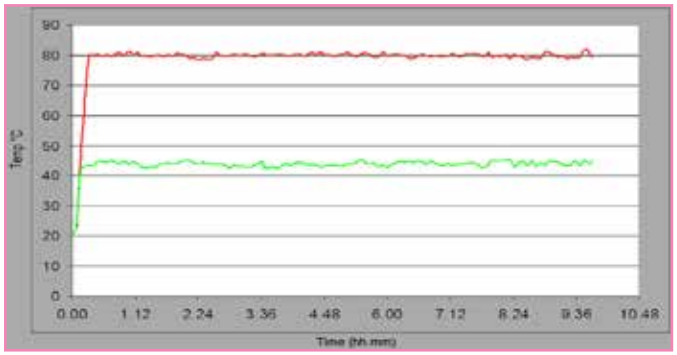
C
PI-MC-IR
PROTECTIVE COATING

TEST REPORT

Solar reflectance test report
Department of Mechanical and Civil Engineering
University of Modena and Reggio Emilia



GRAPH COMPARING THE TEMPERATURE OF BITUMEN POLYMER MEMBRANES COATED WITH WHITE REFLEX AND UNCOATED MEMBRANES



Black bitumen polymer membrane
Roof protected with WHITE REFLEX

• LIVESTOCK SHEDS

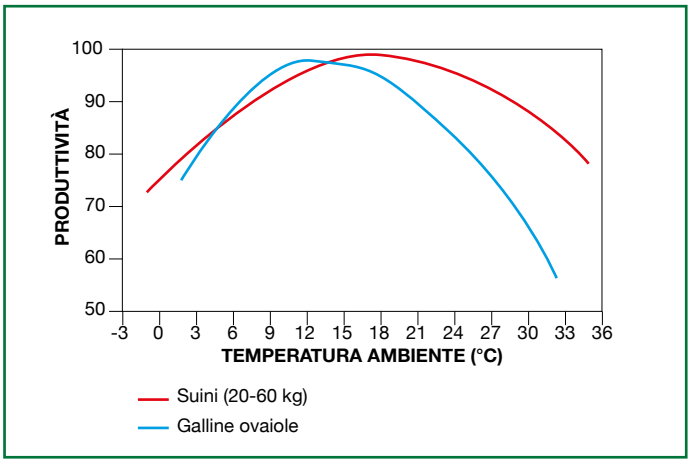
The materials and system offered by Index contribute not only to the wellbeing of human users but also to that of livestock in intensive farming applications, which generally use lightweight shed roofs which transmit heat due to sunshine directly into the interior.

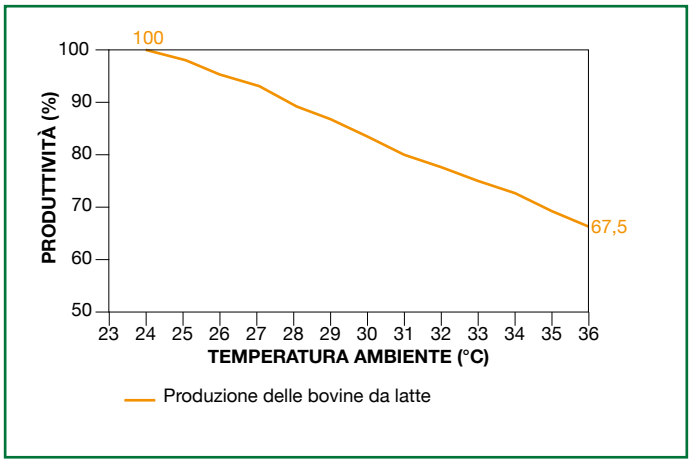
Metal roofs are very common, and corrugated fibre cement roofs are even more so; the latter are often made of asbestos cement which can be remediated with INDEX systems (see “Specification 12 – Rehabilitating asbestos cement roofs"). The roofs often also provide poor quality thermal insulation and combining reflective coatings with insulation increase the roof's performance even in the winter, by reducing its thermal dispersion.

In upgrading livestock shed roofs the benefits of a cool roof are experienced by the livestock itself, which is affected by heat stress in the summer, since it is very difficult to control the micro-climate in the shed due to the metabolic heat generated by the animals themselves.

This is an application of considerable economic importance, since heat stress in the summer can be injurious to the animals, degrading both their health and fertility, the quality and productivity of hens and the milk production of cows, as well as reducing the growth of rabbits, cattle and swine.

For an example, see the following graphs, which show how the productivity of swine (20 - 90 kg), laying hens and milk cows varies with the ambient temperature.

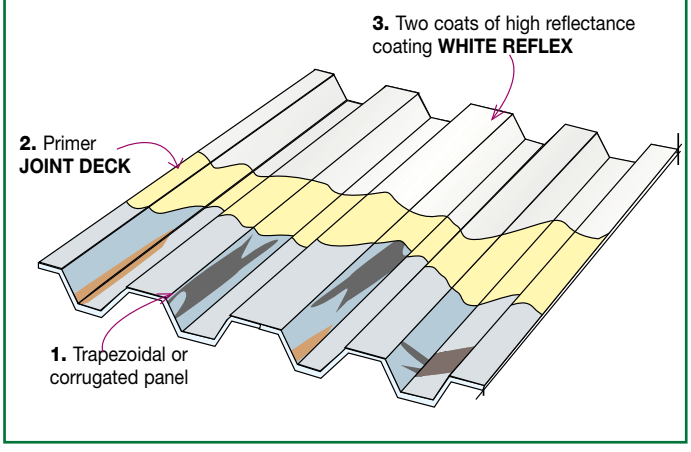




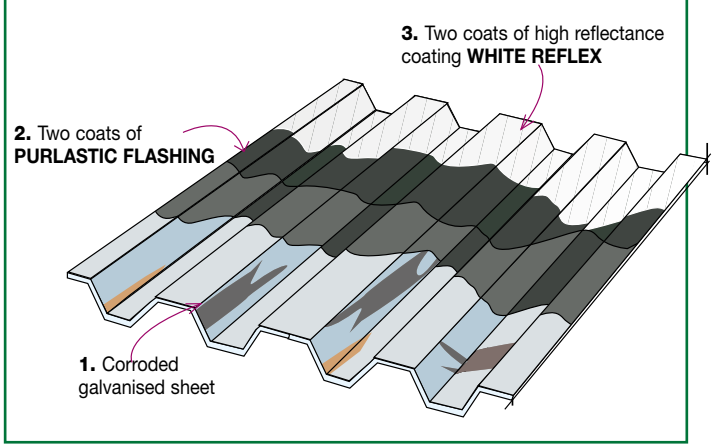
Examples of livestock shed cool roofs

For painting roofs which do not require REMEDIATION (in contrast with asbestos cement roofs): corrugated or trapezoidal metal panels, corrugated fibre cement panels or corrugated bituminous fibre panels, use **WHITE REFLEX, WHITE REFLEX Fire Resistant** or **WHITE REFLEX ULTRA.**

TRAPEZOIDAL OR CORRUGATED PANELS IN GOOD CONDITION

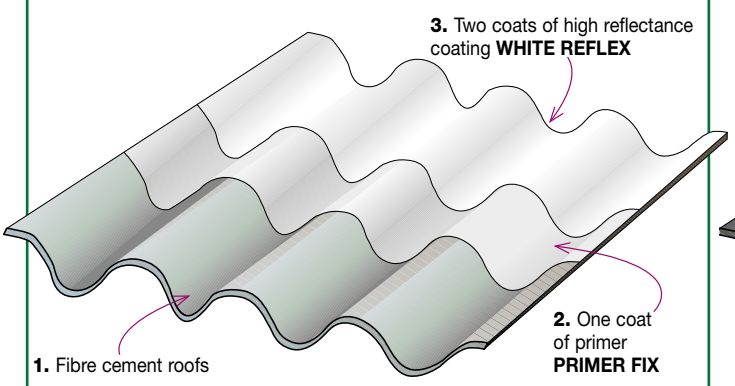


CORRODED GALVANISED SHEET

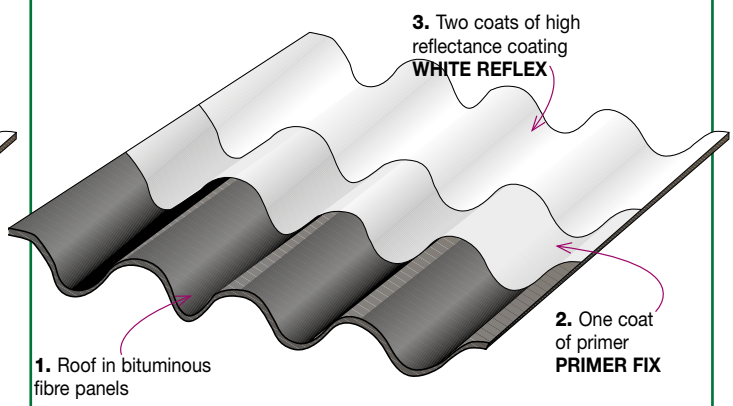


METAL ROOF COATED WITH PURLASTIC FLASHING AND WHITE REFLEX

FIBRE CEMENT PANELS

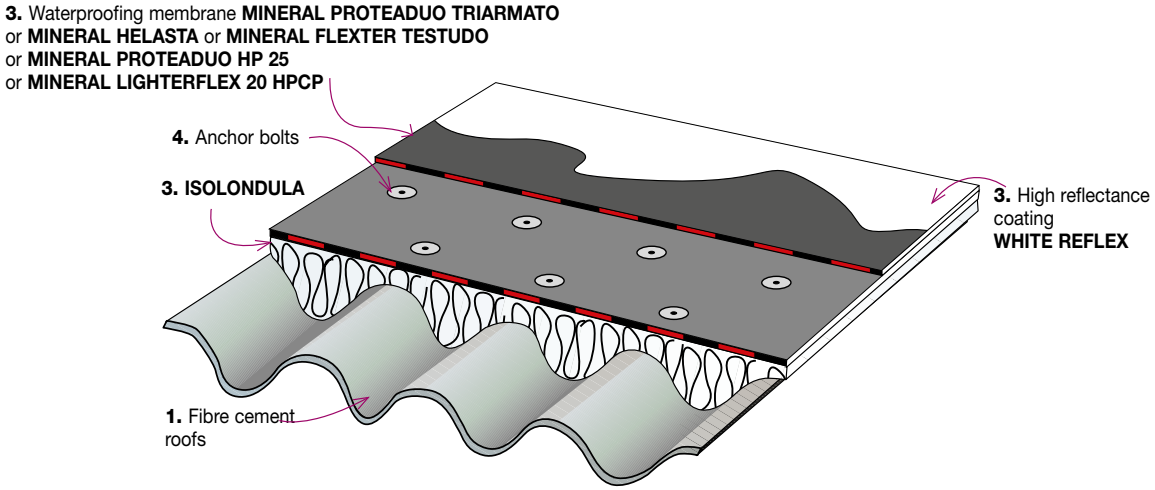


BITUMINOUS FIBRE PANELS



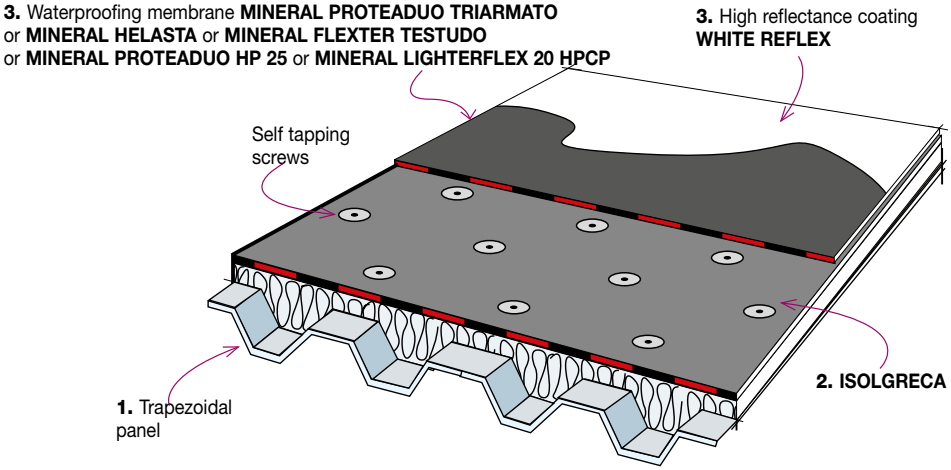
Energy requalification of livestock shed roofs

The "Stability Law" 2016 (law n. 208, 28 December 2015) extended the tax deduction of 65% for energy requalification of buildings to 31 December 2016. From 1 January 2017, the incentive will be replaced by the tax deduction of 36% for restoration projects.
For thermally insulating corrugated fibre cement roofs, use ISOLONDULA thermal insulation panels, themselves protected by a slated waterproofing layer to which **WHITE REFLEX**, **WHITE REFLEX Fire Resistant** or **WHITE REFLEX Ultra ultrareflective coating may be applied.**



Energy requalification

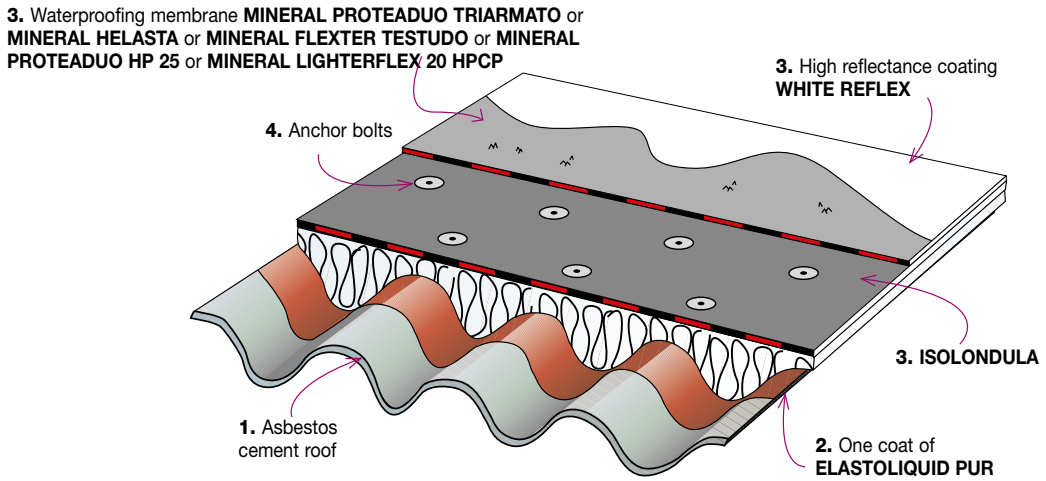
For thermally insulating trapezoidal or corrugated metal sheet roofs, use ISOLGRECA or ISOLONDULA thermal insulation panels, themselves protected by a slated waterproofing layer to which **WHITE REFLEX**, **WHITE REFLEX Fire Resistant** or **WHITE REFLEX Ultra ultrareflective coatings may be applied.**



Energy requalification

Remediation of asbestos cement and energy requalification with cool roofs

For REMEDIATING corrugated asbestos cement roofs (pursuant to UNI 10686, March 1998, Annex 2, enacted by Decree on 20 August 1999, extension of the Law of 27 March 1992, n. 257.): Following encapsulation of the asbestos cement fibres with ELASTOLIQUID PUR, ISOLONDULA may be used for the OVERCOATING – TYPE C, itself protected by a slated waterproofing layer to which **WHITE REFLEX** or **WHITE REFLEX ULTRA** o **WHITE REFLEX Fire Resistant ultrareflective coating may be applied.**



Energy requalification

CERTIFICATION OF SUSTAINABLE CONSTRUCTION PROJECTS

The attestation of the environmental quality of a building in relation to a specific protocol is a tool for assessing the environmental impact of the building in a holistic manner. *LEED* certification, which was devised in the USA, is a voluntary initiative which has become widespread all over the world. It is promoted in our country by the GBC Italia, whose main aim is to encourage sustainable building on the Italian market through the *LEED* system, developed over more than 10 years' experience by USGBC. In this sense GBC Italia is aiming to make use of the result of the work carried out by USGBC in the USA and adapt the various aspects tackled by it to the Italian situation.
The American experience has led to the development of environmental protocols for sustainable public buildings in Italy as well, for instance:

• The **ITACA protocol** (iiSBE Italia, SB Tool, Associazione delle Regioni Italiane) approved 15 January 2004 by the Conferenza delle Regioni e delle Province Autonome (Conference of Regions and Autonomous Provinces), now enacted as UNI/PdR 13.1:2015

• The **CAM** (minimum environmental criteria) of PAN-GPP (National Action Plan for Green Public Procurement), Legislative Decree 12-4-2006 n. 163 Public contract code for works, services and supplies, enacting European Directives 2004/17/EC and 2004/18/EC, Law n. 221/15 enacted 02.02.2016 provides for mandatory Green Public Procurement – Ministerial Decree 24 December 2015 containing the CAM for public construction activities.

Limit environmental protocol values for COOL ROOFS

WHITE REFLEX and **WHITE REFLEX ULTRA** satisfy both:
• Reflectance on bituminous surfaces of 0.82 for **WHITE REFLEX,** 0.83 for **WHITE REFLEX Fire Resistant** and 0.86 for **WHITE REFLEX Ultra**, certified by the EELab of the University of Modena and Reggio Emilia, creates a cool roof which satisfies the solar reflectance criteria for both flat and pitched roofs as demanded by Annex 1 of Italian Inter-ministerial Legislative Decree 26/06/2015 enacted on 01/10/2015, solar reflectance no less than:
- 0.65 for flat roofs
- 0.30 for pitched roofs.

• The Solar Reflectance Index (SRI) on bituminous surfaces of 104 for **WHITE REFLEX** and **WHITE REFLEX Fire Resistant** and 110 for **WHITE REFLEX Ultra**, certified by the EELab of the University of Modena and Reggio Emilia, creates a cool roof which satisfies the following limits:
- of the **CAM** of the National Action Plan for Green Public Procurement (PAN-GPP) of Ministerial Decree 24 December 2015 enacted on 2 February 2016, point 2.2.3 Reduction of impact on the micro-climate and of atmospheric pollution - Waterproof surfaces: of which requires that high Solar Reflectance Index materials must be used, as follows:
Roofs must have an SRI of at least 29, for slopes of more than 15%, and at least 75 for slopes of no more than 15%.
- The requisites of **the ITACA protocol - UNI/PdR** 13.1:2015, point C. 6.8, Heat Island Effect, of which demands an SRI of at least:
- 78 for flat surfaces or surfaces sloping by no more than 8.5°;
- 29 for sloping surfaces with slope greater than 8.5°.

• The requisites of the ***LEED*** protocol - GBC ITALY "To design, build and renovate institutional and commercial buildings" of 2009 updated on 9 February 2016 under the item SS CREDIT 7.2 - Heat island effect: roofs

TYPE OF ROOF	SLOPE	SRI
Shallow pitched roof	≤15%	78
Steeply pitched roof	>15%	29

• The requisites of the ***LEED*** protocol – GBC ITALY, HOME RESIDENTIAL BUILDINGS short 2015 under item SS CREDIT 5 – HEAT ISLAND EFFECT, GREEN ROOFS OR HIGH REFLECTANCE ROOFS. Create an extensive green roof covering or use roofing materials with a Solar Reflectance Index (SRI), measured 3 years after installation, equal to or greater than the values indicated in the table below over a minimum of 75% of the roof surface. If information about the SRI 3 years after installation is not available, materials with an initial SRI may be used.

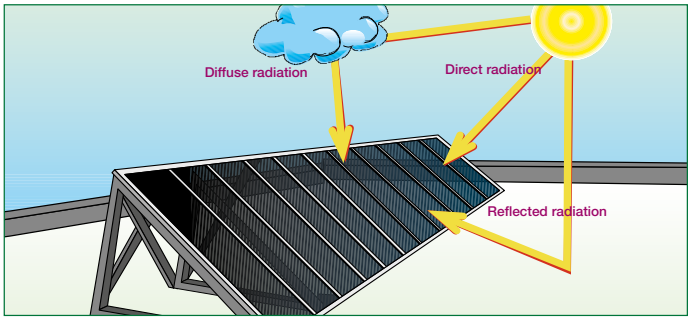
TYPE OF ROOF	SLOPE	SRI	SRI 3 years after installation
Shallow pitched roof	≤15%	82	82
Steeply pitched roof	>15%	39	39

FLAT ROOFS AND RENEWABLE ENERGY

The trend of architecture for *sustainable building* is not limited to the design of a "conservative" envelope from an energy point of view, but current design research intends to make the building envelope perform an "active" energy role. Flat roofs allow substantial freedom in the orientation of the installations for solar collection both for solar thermal power and photovoltaic solar power. **WHITE REFLEX, WHITE REFLEX Fire Resisant** and **WHITE REFLEX Ultra** coatings, with a double effect, also provide a significant increase in the energy performance of the photovoltaic solar panels to be installed on the flat roof, both because they reduce the temperature of the covering and therefore increase the performance of the panels which are more efficient if they work at a lower heat regime, and because they increase the diffused and reflected light which is added to that collected by direct radiation.

Sunlight

The total sunlight incident on the photovoltaic module has three components: direct, diffuse and reflected. The **direct sunlight** is that part of the light that strikes the module directly, for instance during cloudless days.
The **diffused sunlight** is that portion of the direct radiation which is diffused as it passes through clouds and airborne particles, so that the module generates energy even on cloudy days, although to a lesser extent.
The **reflected sunlight** is that portion of the sunlight which is reflected towards the module by its surroundings, for instance when the roof is covered with snow. The reflected radiation thus depends on the material surrounding the module, so that the output of the panel can be increased by taking suitable action.



Using a **WHITE REFLEX** coating, which keeps the waterproof covering at around 40°C, reduces the temperature of the rigid crystalline silica module by 10 - 20°C, thus increasing its output by 3 - 8%. The output of photovoltaic panels increases with the brightness of the environment. **WHITE REFLEX** reflective coating increases the albedo and thus improves the output of photovoltaic panels. The combination of the two effects results in an estimated increase in the output of conventional photovoltaic panels (made of crystalline or polycrystalline cells) of 4 - 10%. To demonstrate and validate the above assertion, INDEX initiated, in July 2007, a series of on-site trials and laboratory tests in collaboration with the University of Modena and Reggio Emilia. In addition to adhesion tests on the most various surfaces, specific tests were run to determine the increase in power generation due to the presence of a reflective surface treated with **WHITE REFLEX**. From April (when the **WHITE REFLEX** was applied), the power generation of a photovoltaic system with crystalline silica cells on a 700 m² roof was monitored to compare the results before and after the cooling and reflective treatment with **WHITE REFLEX**.

ANNO 2009	ENERGIA PRODOTTA [watt]	SOLE [gg]	PIOGGIA [gg]	ENERGIA / gg SOLE [watt / gg SOLE]
MAGGIO	15341,5	24,5	6,5	789,45
GIUGNO	18709,7	22	8	850,44
LUGLIO	20294,7	28,5	2,5	867,53
AGOSTO	21496,3	27,5	3,5	781,68
SETTEMBRE	15953,1	26	4	613,58
Totale	150795,3	128,5	24,5	784,40

ANNO 2010	ENERGIA PRODOTTA [watt]	SOLE [gg]	PIOGGIA [gg]	ENERGIA / gg SOLE [watt / gg SOLE]
MAGGIO	17655,6	16,5	14,5	1070,04
GIUGNO	22727,5	25,5	4,5	891,27
LUGLIO	25065,8	28,5	2,5	879,50
AGOSTO	20814,4	25,5	5,5	816,25
SETTEMBRE	14076,8	22	8	639,85
Totale	100349,1	118	35	850,34

The comparison was run for 5 months (May to September) in 2009 (untreated roof with exposed black bituminous covering), and 2010 (after treatment). To obtain an approximate evaluation, the data were compared in consideration of the actual sunlight during the period as recorded in the weather logs of San Giovanni in Marignano (RN). The calculations, once days of heavy rain were excluded and days with bad weather events calculated at half generation capacity, made it immediately clear that despite a considerable increase in precipitation (in May 2010), the system maintained constant power generation throughout the 5 month period. The last column gives the data of greatest significance for the study; **the power production (as power generated per days of sunshine) increased by approximately 8%**. In conclusion, one could also run a commercial assessment, by quantifying the economic benefits due to the presence of **WHITE REFLEX** ultrareflective coating. Given the approximate nature of the data (the period and intensity of radiation are not precisely known) and having assessed the deterioration and loss of output of the system itself (the manufacturers indicate that performance drops primarily in the very early period of operation), if we consider the power produced as the sum of potentially commercial energy and that not demanded from the grid, **the system would have generated around 8,400 Watts more**, which is almost sufficient to cover the costs of supplying and installing the coating. We can therefore conclude by saying that the coating pays for itself within a year and runs at a profit thereafter.

WHITE REFLEX Fire Resistant

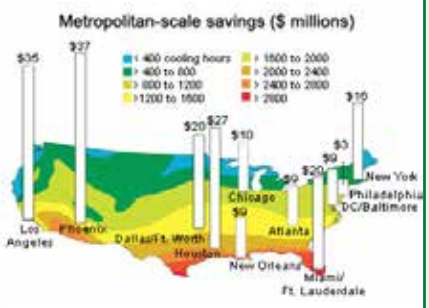
On the roofs of buildings in which activities subject to fire prevention control are being run, the requirements of the enclosed Guide for the installation of photovoltaic systems, those of the bulletin regarding the fire requisites for photovoltaic systems installed on the roofs of buildings in which activities subject to fire prevention control are run must be observed, as issued by the Fire Department of the Ministry of the Interior on 7/2/2012 and the subsequent explanatory bulletin dated 4/5/2012 – Annex B case 3a.

In such case, conforming to case 3a, as upper layer of the waterproof covering, it is better to lay a membrane resistant to external fire, classified as B_{roof} according to UNI EN 13501-5:2009 based on the results of the exposure tests of the roofs to an external fire, pursuant to UNI ENV 1187:2007. This type of membrane, while it has a reflective finish, is not able to match the solar reflectance of WHITE REFLEX and WHITE REFLEX ULTRA coatings, but the latter may not be used on fire certified membranes, since they would have to be tested and certified for reaction to fire together with the membrane and included in the same certificate to be accepted by the Fire Department. For these reasons, we have developed **WHITE REFLEX Fire Resistant** which has the same solar reflectance prerogatives as WHITE REFLEX and is also fire resistant.
- **WHITE REFLEX Fire Resistant** coating has been certified $B_{roof}(t2)$ per UNI EN 13501-5:2016 by the Istituto Giordano: applied to an EPS 50 mm non-fire resistant panel of density 20 kg/m³, with non-reinforced Velo Vetro (45 g/m²) for asphalt installers between the two layers. With this classification, the product is suited to use on any kind of surface, combustible or incombustible, so long as its density is greater than 15 kg/m³. - It has also been certified fire resistant $B_{roof}(t2)$ per UNI EN 13501-5:2016 at the "LAPI" fire prevention laboratory: applied to MINERAL LIGHTERFLEX HPCP 20 P 4.5 mm membrane. This is a high quality membrane which creates a covering whose service life is adequate to a roof with a photovoltaic system.

WHITE REFLEX Fire Resistant has been certified in an system of layers consisting of application of 500 g/m² of **WHITE REFLEX Fire Resistant** to MINERAL LIGHTERFLEX HPCP 20 P 4.5 mm waterproof membrane, which may be applied to an existing roof to renovate the old bituminous waterproofing layer prior to installation of the photovoltaic panels are installed, or on ISOLONDULA or ISOLGRECA in case of energy requalification of the roof of a livestock shed equipped with a photovoltaic system. The system composed of membrane and coating has been tested on expanded polystyrene; the resulting $B_{roof}(t2)$

MONITORING ON ENERGY SAVING CARRIED OUT IN THE USA

Monitoring carried out on 10 buildings in California and Florida has shown a reduction from 20% to 70% in the energy consumed due to air conditioning. The saving is most noticeable for roofs with little or no thermal insulation and in climatic zones characterized by hot and sunny summers.
Even though painting the roofs of non-air-conditioned buildings does not generate energy saving, it does increase the internal comfort in summer. Research has demonstrated that in the majority of climatic zones in the USA, the energy saving on summer air conditioning obtained by painting is significantly larger than the winter energy penalty due to the lower absorption of solar heat in the cold season.
The estimate of the cost of the energy which could potentially be saved by painting the roofs of residential and commercial buildings, calculated for 11 American cities representing various climates (Los Angeles, Phoenix, Dallas, Houston, Chicago, New Orleans, Atlanta, Miami, Baltimore, Philadelphia, New York), amounts to 195 million dollars per year.



The graph shows the potential urban energy saving in some large US cities if the roofs of the residential and commercial buildings were painted with paints such as WHITE REFLEX

classification makes it suited to installation on flat and pitched roofs, whether on a combustible or an incombustible surface, so long as its density is ≥16 kg/m³, so that it can be applied: to old and new bituminous coverings, on any kind of thermal insulation of density ≥16 kg/m³; on wooden substrates; on concrete substrates; on metal substrates; on bituminous substrates; etc.

CERTIFICATIONS

Istituto Giordano certification
FIRE REACTION CLASSIFICATION REPORT
(EU): $B_{roof}(t2)$

Certification "LAPI"
Fire prevention laboratory
FIRE REACTION CLASSIFICATION REPORT
(EU): $B_{roof}(t2)$

METHOD OF USE

• SURFACE PREPARATION
Surfaces must be clean, dry and free from impurities or old paint. They must also be washed with water to remove the water-soluble reddish dust and any loose talc residues (**1**). For new, talced and sanded membranes, it is essential to prime the surface with PREPAINT, as indicated in its technical data sheet. PREPAINT is a fixer and insulator which allows unseasoned bitumen polymer membranes to be coated.

• APPLICATION
Apply the first coat after diluting it with water (around 10%); apply the second coat to the completely dry surface (at least 6 hours). The amount of dilution depends on the type of surface and the environmental conditions. Always apply two coats, preferably in a crosswise pattern. The product can be applied with a brush, roller, large brush or spray gun. **The surfaces must be pitched sufficiently to drain rainwater. WHITE REFLEX, WHITE REFLEX Fire Resistant and WHITE REFLEX Ultra are not suited to flat surfaces with lengthy stagnation of water. Over time, as well as reducing the adhesion of the paint, stagnant water leads to the accumulation of dirt and hence a reduction in the reflectance and performance of the photovoltaic panels.** To keep the reflectance and therefore the efficiency high, periodic maintenance of the surfaces is recommended, with a visual inspection and removal of the dirt by washing with a water jet cleaner.
For application on metal sheet roofs, apply a coat of JOINT DECK gripping primer first, according to the methods indicated in the relative technical data sheet.
When applying on concrete, any holes, cavities or cracks must be evened up using RESISTO UNIFIX mortar.
Apply a first coat insulating sealant, diluting the product with 30% of water. If the surfaces are particularly porous and powdery, apply PRIMER FIX or BETON PRIMER S acrylic primer, as detailed in the respective technical data sheets.
The application on curved or other roof tiles will follow the same procedures as for concrete, and in this case a spray application is recommended (**2**).

• CONSUMPTION
The product's consumption depends on the nature and porosity of the underlying surface.
The consumption per coat, on aged smooth membranes is about 200÷300 g/m², whereas on slated membranes, it is about 350-450 g/m².

1

1

2

2

• PRECAUTIONS
Apply only to surfaces with proper run-off, do not use on surfaces on which water collects and stagnates.
- Do not apply on wet or damp surfaces.
- Do not use for tanks, cellars or drains subject to high water counterthrust or to water under pressure.
- Do not use the product for surfaces or containers in contact with liquids for human consumption, drinking water or which may come into contact with solvents or mineral oils.
- Mix the product well before applying.
- Keep the containers sealed before use.
- Apply at temperatures between +5°C and +35°C. Extreme conditions of heat and cold must be avoided during application. Do not apply if the temperature is likely to drop below +5°C while the paint film is drying. Do not apply on very hot substrates because the paint filming process would be unduly accelerated with negative consequences on the cohesion and adhesion of the product to the substrate.
- Do not apply in very humid conditions or if it threatens to rain while the film is still drying.
- Apply the second coat only when the first coat is perfectly dry.
- The product cannot be walked on except for routine maintenance.
- New, freshly applied bituminous surfaces usually have superficial 'outcrops' of hydrocarbons, which prevent the coating from adhering perfectly. You are recommended to apply the product to the surface no earlier than 6 months after they have been laid, which should be long enough to eliminate such "outcrops". Sometimes 6 months waiting is not always sufficient and we therefore advise you to assess the surface before applying the product by carrying out experimental tests using sticky tape in order to evaluate the amount of dirt present and feasibly the level of adhesion (the tests are described in the booklet entitled "Waterproofing Guide"). If the surface is dirty, clean by brushing and washing with water. For new, talced and sanded membranes, if you cannot wait for the membrane to season or if there is talc residue or surface outcrops, it is essential to prime the surface with PREPAINT, as indicated in its technical data sheet. - Slated membranes may be coated immediately after installation even without using the fixer, once the surface has been thoroughly cleaned. - Membranes with fabric finish (texflamina) must be coated immediately after installation.
- The product applied onto polymer-bitumen membranes placed on insulation packs, may over time form surface micro-cracking. This, however, will not affect the waterproofing in any way.
- After use, clean tools with water and, if the product has already dried, we advise you to use white spirit or hot water to remove it.
- The product is subject to freezing; store at temperatures >+5°C.

TECHNICAL CHARACTERISTICS

	Standard	WHITE REFLEX	WHITE REFLEX Ultra	WHITE REFLEX Fire Resistant
Appearance		Pasty liquid	Pasty liquid	Pasty liquid
Colour		White	White	White
Density	**EN 2811-1**	1.35 ± 0.10 kg/L	1.35 ± 0.10 kg/L	1.55 ± 0.10 kg/L
Dry residue - at 130°C	**UNI EN ISO 3251**	62 ± 3%	62 ± 3%	70 ± 3%
Brookfield Viscosity	**Internal method**	15 000 ± 5 000 cps	15 000 ± 5 000 cps	20 000 ± 5 000 cps
Storage in original packaging in a dry place		12 months	12 months	12 months
Workability characteristics				
Application thickness		0.2 ÷ 0.4 mm (in two coats)	0.2 ÷ 0.4 mm (in two coats)	0.2 ÷ 0.4 mm (in two coats)
Waiting time - for dust-free drying (*)		approx 1 ÷ 2 hours	approx 1 ÷ 2 hours	approx 1 ÷ 2 hours
Waiting time - till tack-free drying (*)		approx 2 ÷ 4 hours	approx 2 ÷ 4 hours	approx 2 ÷ 4 hours
Waiting time - for applying each coat over the previous one (*)		minimum 6 hours	minimum 6 hours	minimum 6 hours
Waiting time - for total dry (*)		approx. 12 - 24 hours	approx. 12 - 24 hours	approx. 12 - 24 hours
Application temperature		+5°C to +35°C	+5°C to +35°C	+5°C to +35°C
Application		manual or spray	manual or spray	manual or spray
Performance characteristics	**Standard**	**Product performance**	**Product performance**	**Product performance**
Class and type	**EN 1504-2**	**C PI-MC-IR**	**C PI-MC-IR**	**C PI-MC-IR**
Permeability to water vapour	**EN 7783**	Sd <5 m - class **I**	Sd <5 m - class **I**	Sd <5 m - class **I**
Adhesion test	**EN 1542**	≥1.0 MPa	≥1.0 MPa	≥1.0 MPa
Water absorption through capillarity	**EN 1062-3**	$w < 0.1\ kg/m^2 \cdot h^{0.5}$	$w < 0.1\ kg/m^2 \cdot h^{0.5}$	$w < 0.1\ kg/m^2 \cdot h^{0.5}$
Permeability to CO_2	**EN 1062-6**	Sd >50 m	Sd >50 m	Sd >50 m
Solar reflectance	**ASTM E-903**	0.82 (**)	0.86 (**)	0.83 (**)
Solar reflectance - after ageing for 2 years		0.75 (**)	–	–
Emissivity in the infrared	**ASTM C-1371**	0.91 (**)	0.91 (**)	0.94 (**)
SRI (Solar Reflectance Index)		**104** (**)	**110** (**)	**104** (**)
Reduction in temperature - over black membrane (75° to 80°C)	**Internal method**	35 ÷ 40°C	40 ÷ 45°C	35 ÷ 40°C
Exposure to artificial weathering - QUV Test	**EOTA TR 010**	No change evident	No change evident	No change evident
Fire resistant		–	–	B_{roof} (t2) (1)
Thermal resistance - Working temperature		-30°C to +90°C	-30°C to +90°C	-30°C to +90°C
Hazardous substances	**EN 1504-2**	According note in ZA.1	According note in ZA.1	According note in ZA.1

Test conditions: temperature 23±2°C, 50±5% R.H. and air velocity in test area <0.2 m/s. **These parameters may vary based on the specific conditions of the worksite: temperature, humidity, ventilation, porosity of the substrate.** (*) The stated times may be longer or shorter as the temperature decreases or increases.
(**) Test report Department of Mechanical and Civil Engineering - University of Modena and Reggio Emilia
(1) Istituto Giordano certification: Certified resistance to fire when applied to EPS 50 mm non-fire resistant panel of density 20 kg/m³, by applying non-reinforced Velo Vetro (45 g/m²) for asphalt installers between the two layers. (2) LAPI certification: Fire resistance certified on MINERAL LIGHTERFLEX HPCP 20 P 4.5 mm membrane.
Compliant with the general principles defined in **EN 1504-2** - Principles for evaluation of the use of products and systems.

Duration over time

Solar reflectance tends to diminish over time due to the deposition of dust and dirt onto the white surface. Measurements taken at laboratories of research institutes indicate a fall in the solar reflectance of **WHITE REFLEX** of about 10% after two years of exposure to the open air. These results are in line with studies conducted at authoritative research institutes:

- The Florida State Energy Center has estimated a maximum reduction of 11% after two years without any cleaning or maintenance.
- Studies conducted by LBNL (Lawrence Berkeley National Laboratory) indicate that there is a larger percentage reduction in the first year and it slows considerably in subsequent years.

We therefore recommend periodic cleaning of the roof to keep solar reflectance high. The studies mentioned above advise repainting roofs roughly every ten years.

PACKAGING

20-kg Bucket

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