

EMIRATESGBC TECHNICAL WORKSHOP

# REFLECTIVE TPO MEMBRANE ROOFING

Facilitator

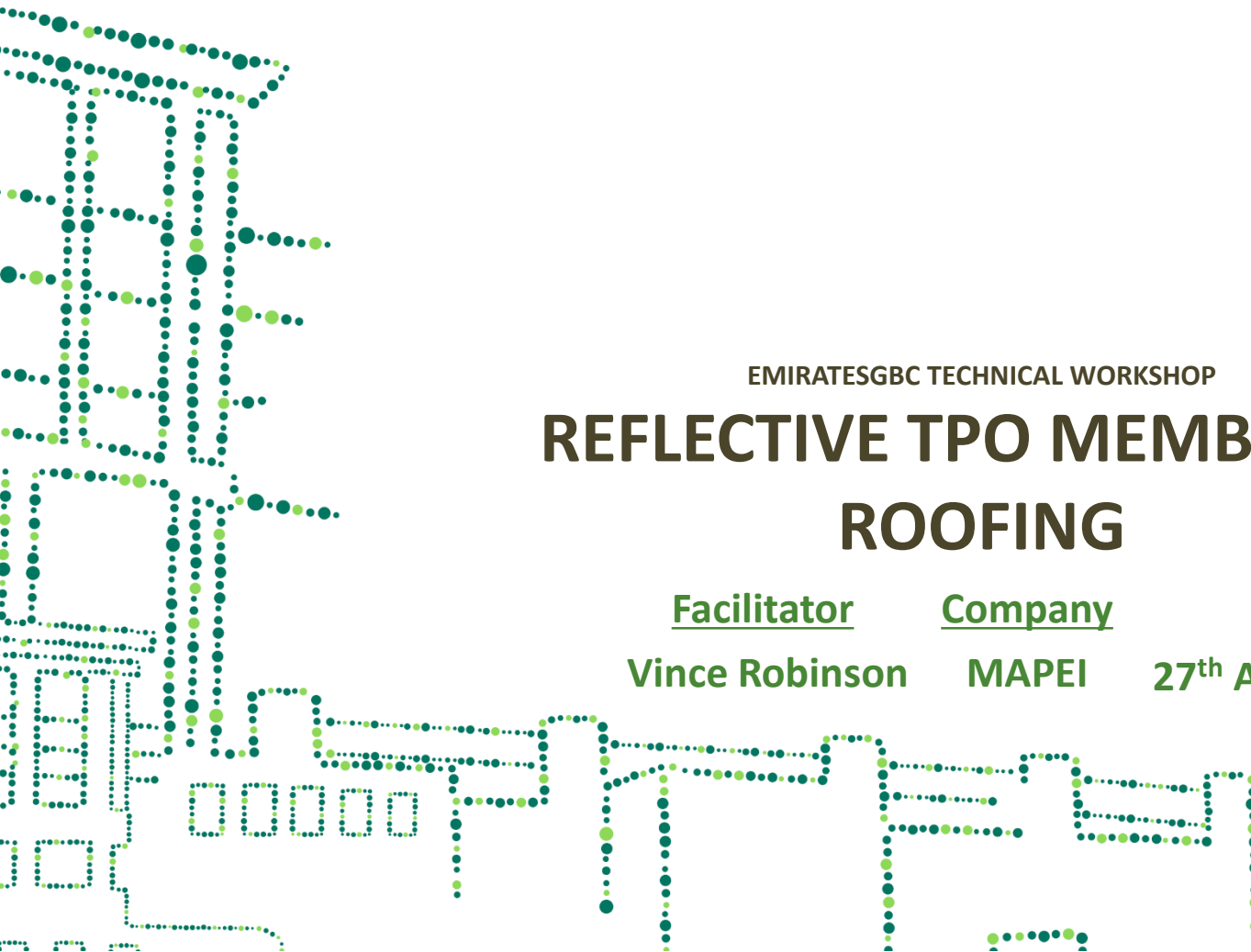
Company

Date

Vince Robinson

MAPEI

27<sup>th</sup> August 2019





# Thermoplastic PolyOlephine – TPO

## What are they....

‘TPOs – are relatively "new generation" roof membranes that combine the attributes of two of today's popular flexible single-ply membranes EPDM and PVC’

# Thermoplastic PolyOlephine - TPO

Reinforced TPO membranes can be produced by:

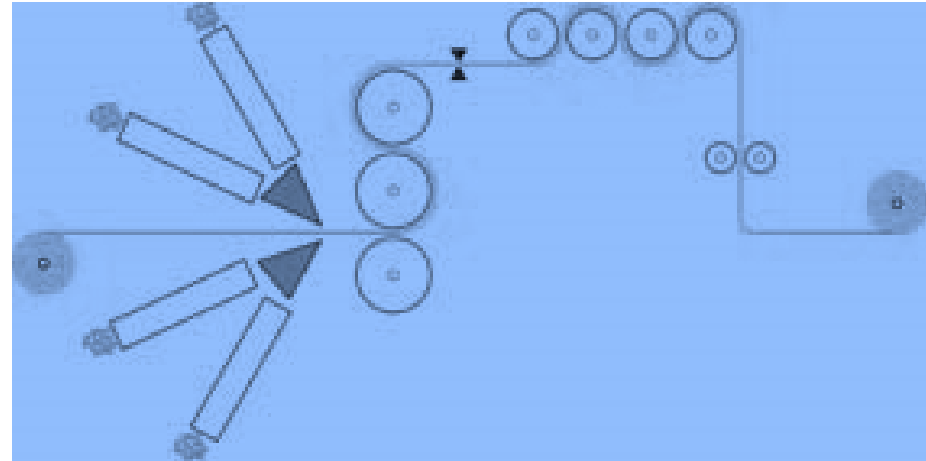
- 1) Calendering with lamination  
(Compresses, Sheet Forming, Layering)
- 1) Extrusion with lamination The production of multi-layer reinforced membranes in one-step process which means laminated reinforcing elements to enhance mechanical resistance of the finished product.
- 2) Extrusion-coating techniques.

Most TPO membranes are reinforced with polyester, fiberglass or a combination of both. Unreinforced TPO membranes are also available.



# Thermoplastic PolyOlephine - TPO

Coextrusion TPO reinforced  
single ply roofing membranes



# SYNTHETIC MEMBRANES



- Synthetic waterproofing in **Europe** constitutes 20% of the market size (75% PVC and 20% TPO). This is a growing market sector
- Synthetic waterproofing market in the **USA** represents two million m<sup>2</sup>, TPO constitutes 45%, PVC 10%
- Synthetic membrane use in the **Middle-East** represents 10% of the market, increasing year on year. This is a growing market sector with designers and specifiers slowly moving away from problematic older technology membranes.

# Thermoplastic Poly Olephine - TPO

TPO membranes are installed in the same manner as other thermoplastic, hot-air welded membranes.

TPOs can be:

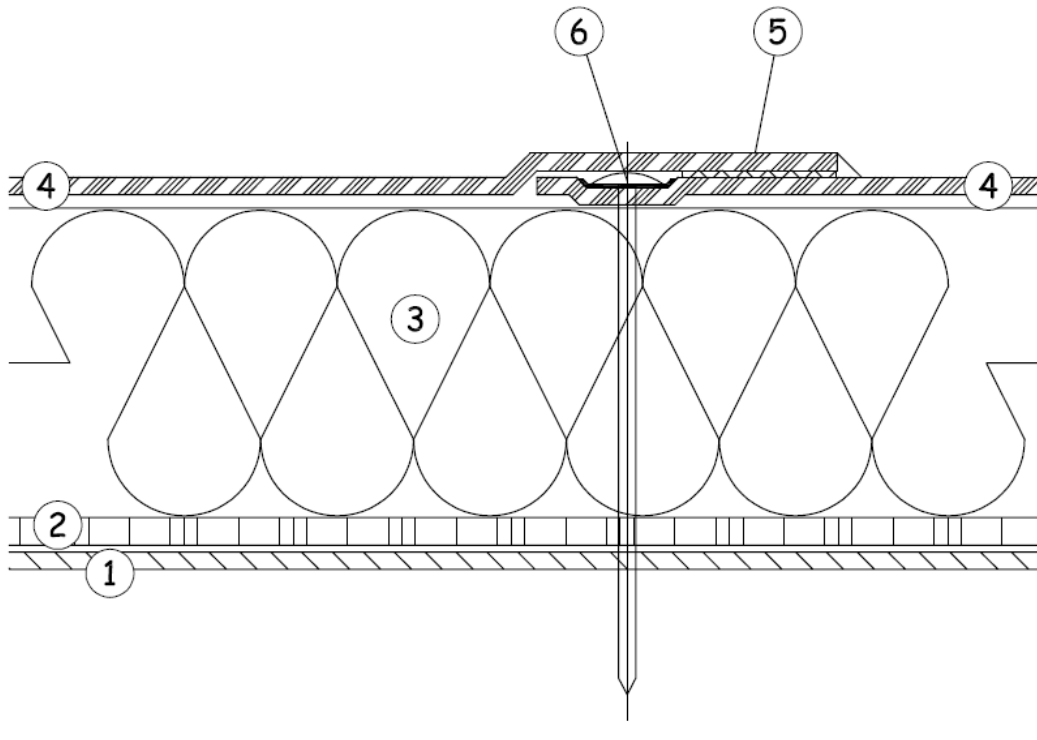
- 1) Mechanically-attached
- 2) Fully adhered
- 3) Stone or paver ballasted
- 4) Or installed as a vented roofing system. Commercial wind-vented systems pull the air from under the roof membrane through equalizer valves, typically located along the roof's perimeter. The process is similar to sucking the air out of a balloon.

# LOGISTICS CENTER

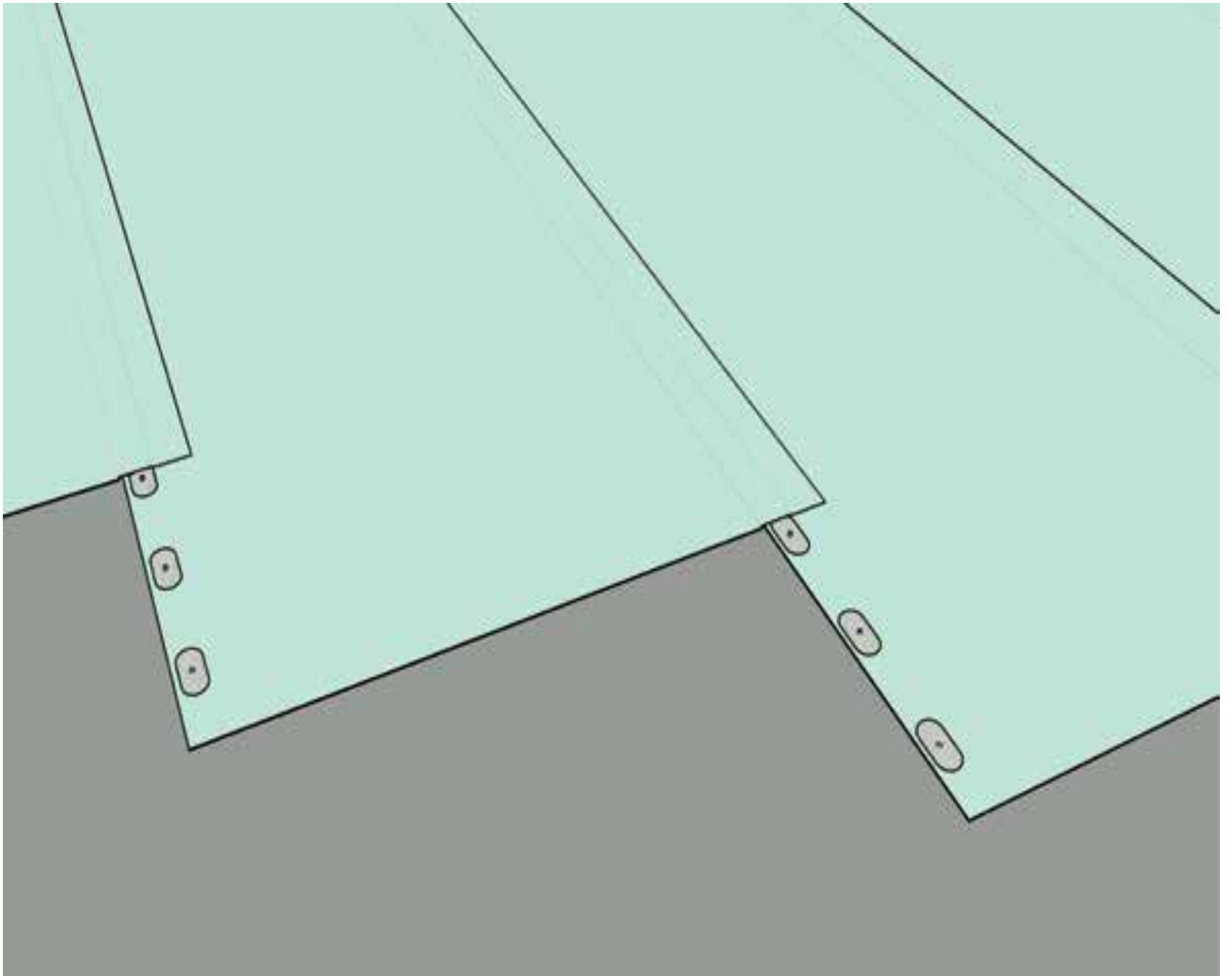


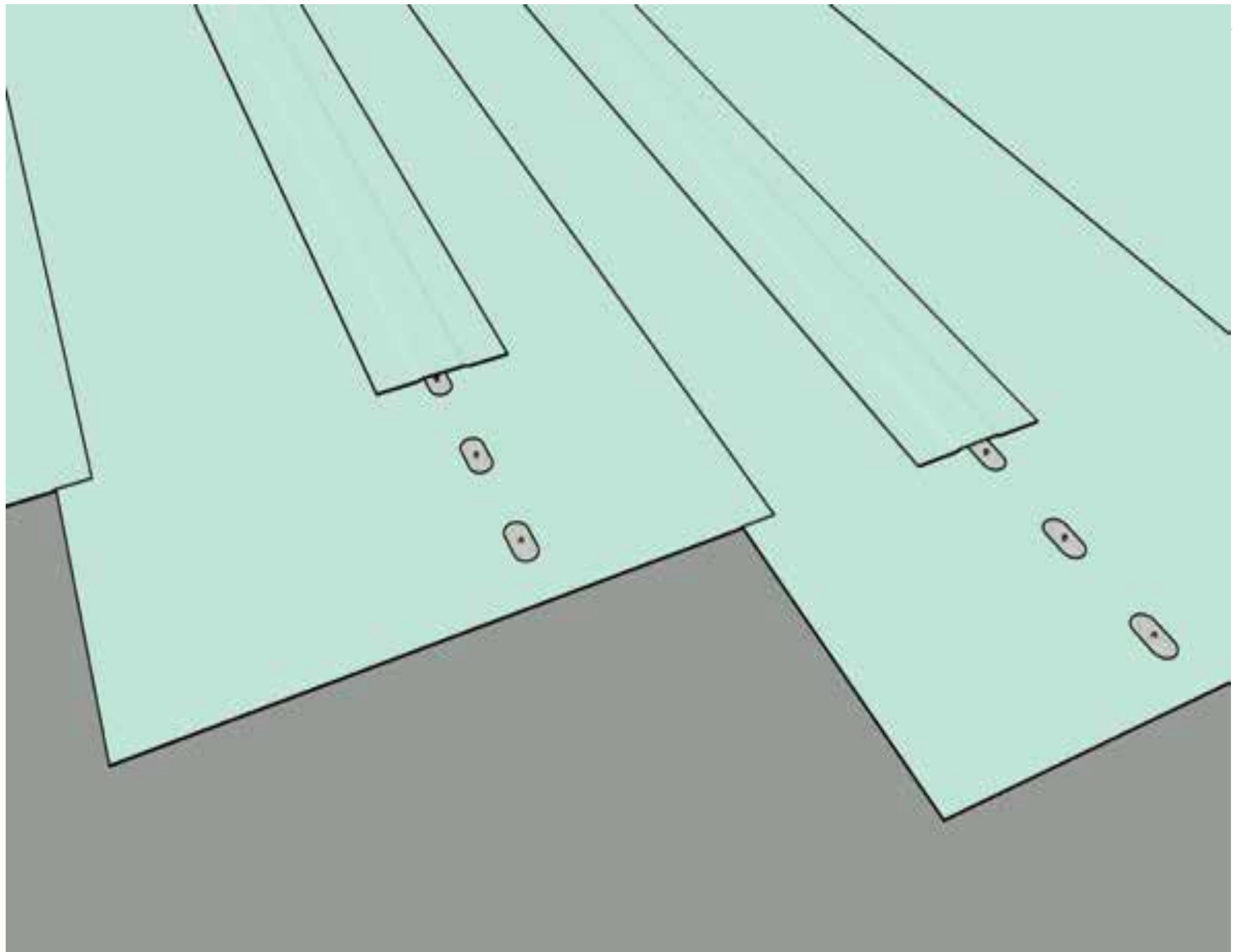


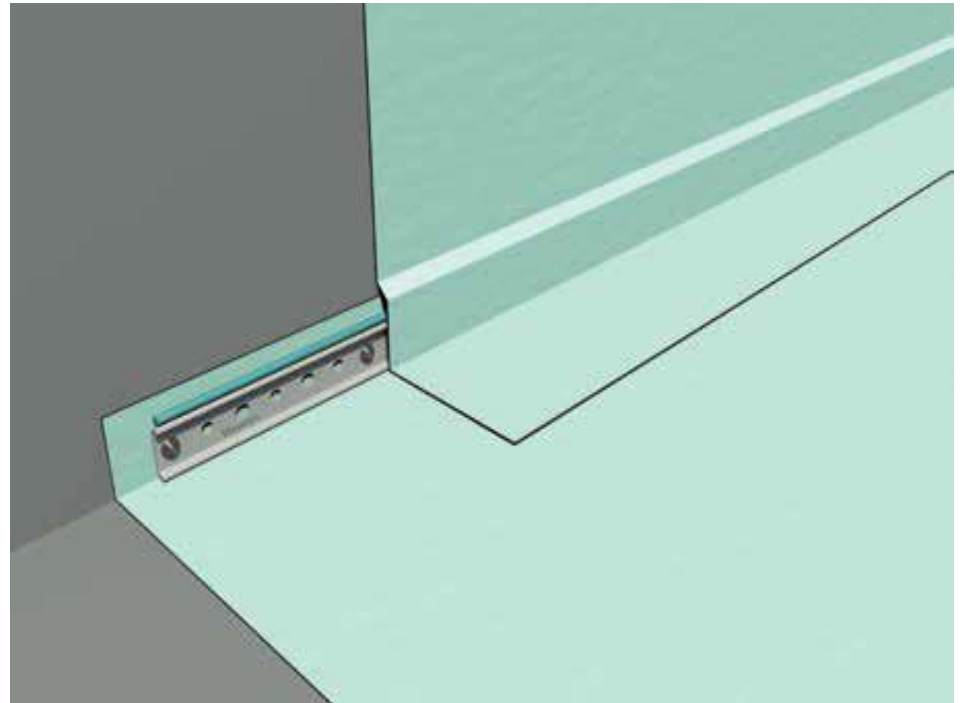
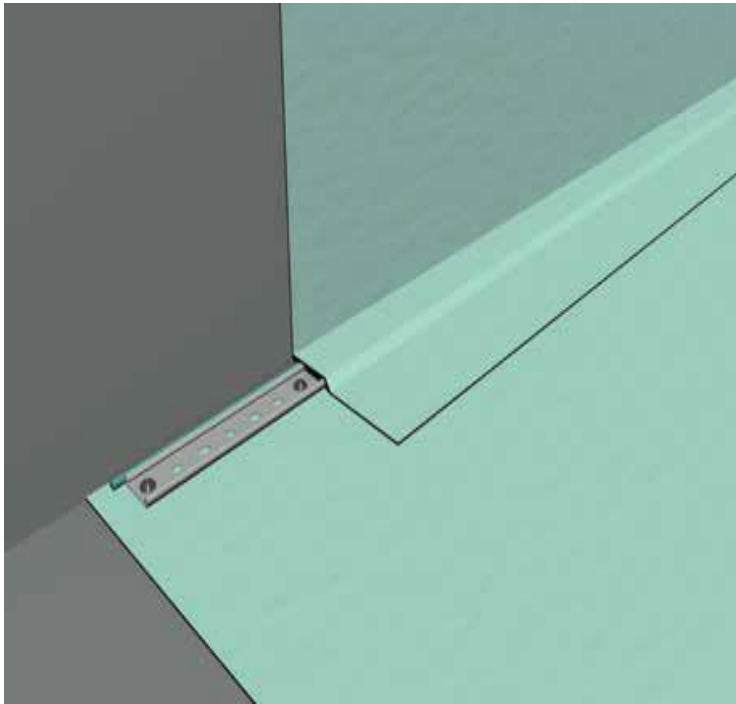
# MECHANICALLY FIXED SYSTEM



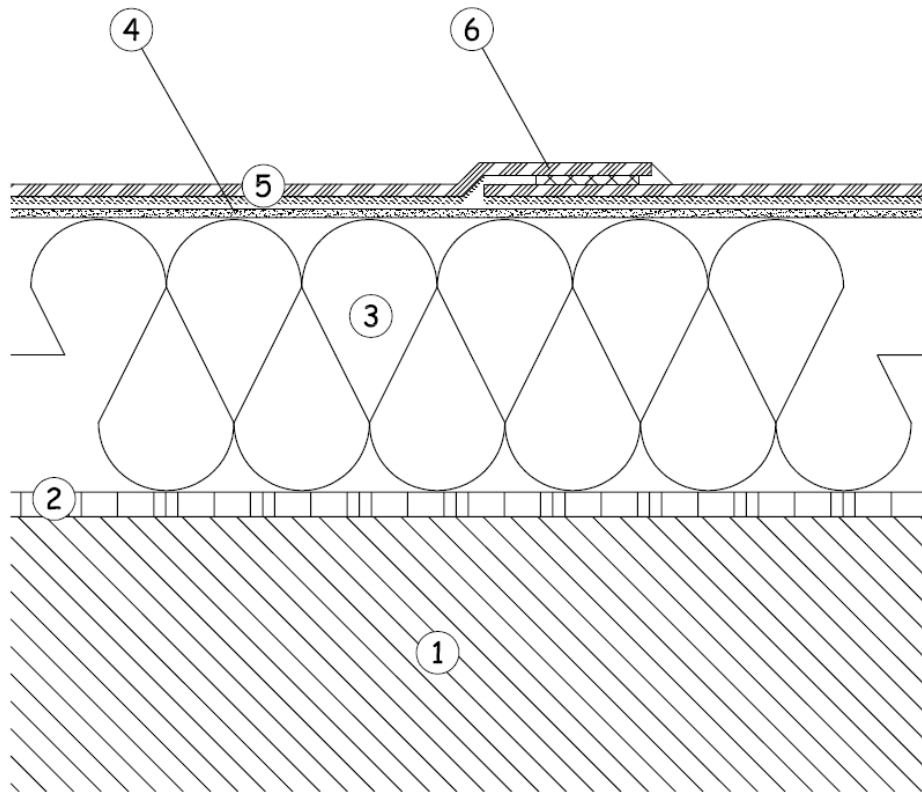
1. Structural slab
2. Vapour control layer
3. Thermal insulation
4. TPO roofing membrane
5. Hot air welding
6. Mechanical fixing system







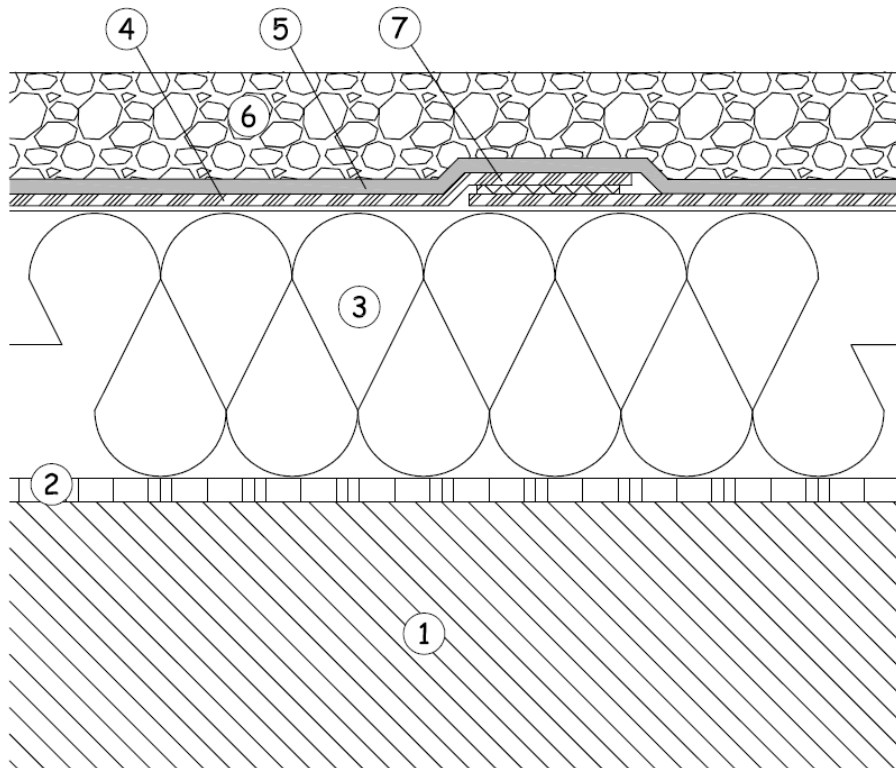
# ADHERED SYSTEMS



1. Structural slab
2. Fully bonded vapour control layer
3. Fully bonded thermal insulation
4. Adhesive
5. Fleece backed TPO roofing membrane
6. Hot air welding



# BALLASTED SYSTEMS



1. Structural slab
2. Vapour control layer
3. Thermal insulation \*
4. TPO roofing membrane
5. Protection layer
6. Ballast
7. Hot air welding

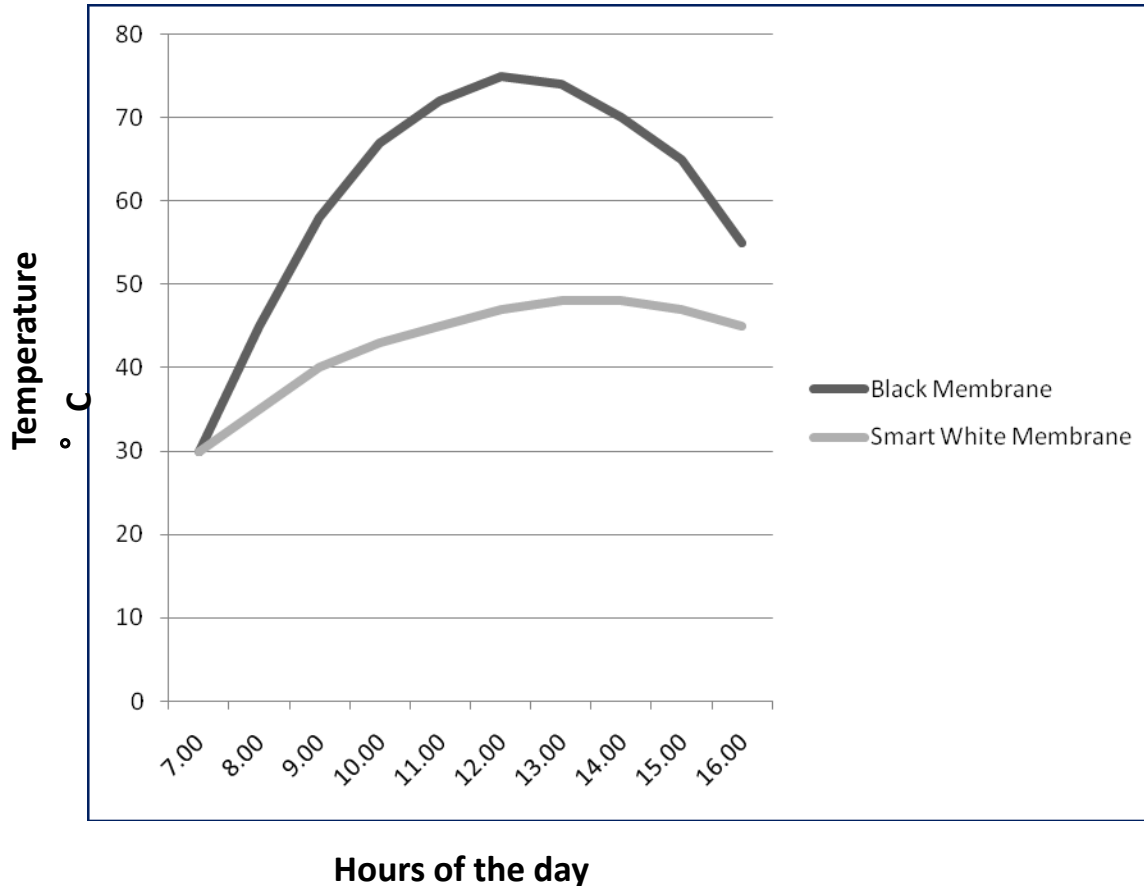
- Install a separation layer, if required

SHOULD WE SEE MORE USE OF WHITE TPO  
MEMBRANES AS PART OF THE BUILDING  
ENVELOPE.....

## WHY TPO....

- White membrane - Sustainable – Eco Friendly
- No Plasticisers
- Long life expectancy
- 100% Recyclable
- Light and easy installation
- Heat welded seams
- Chemical stability and compatibility
- Commercial & technical benefits
- Dimensionally stable
- Can withstand extreme heat & UV exposure
- SRI 102 - Energy savings
- No gas emissions during heat welding

## Smart White Colour Means Energy Savings



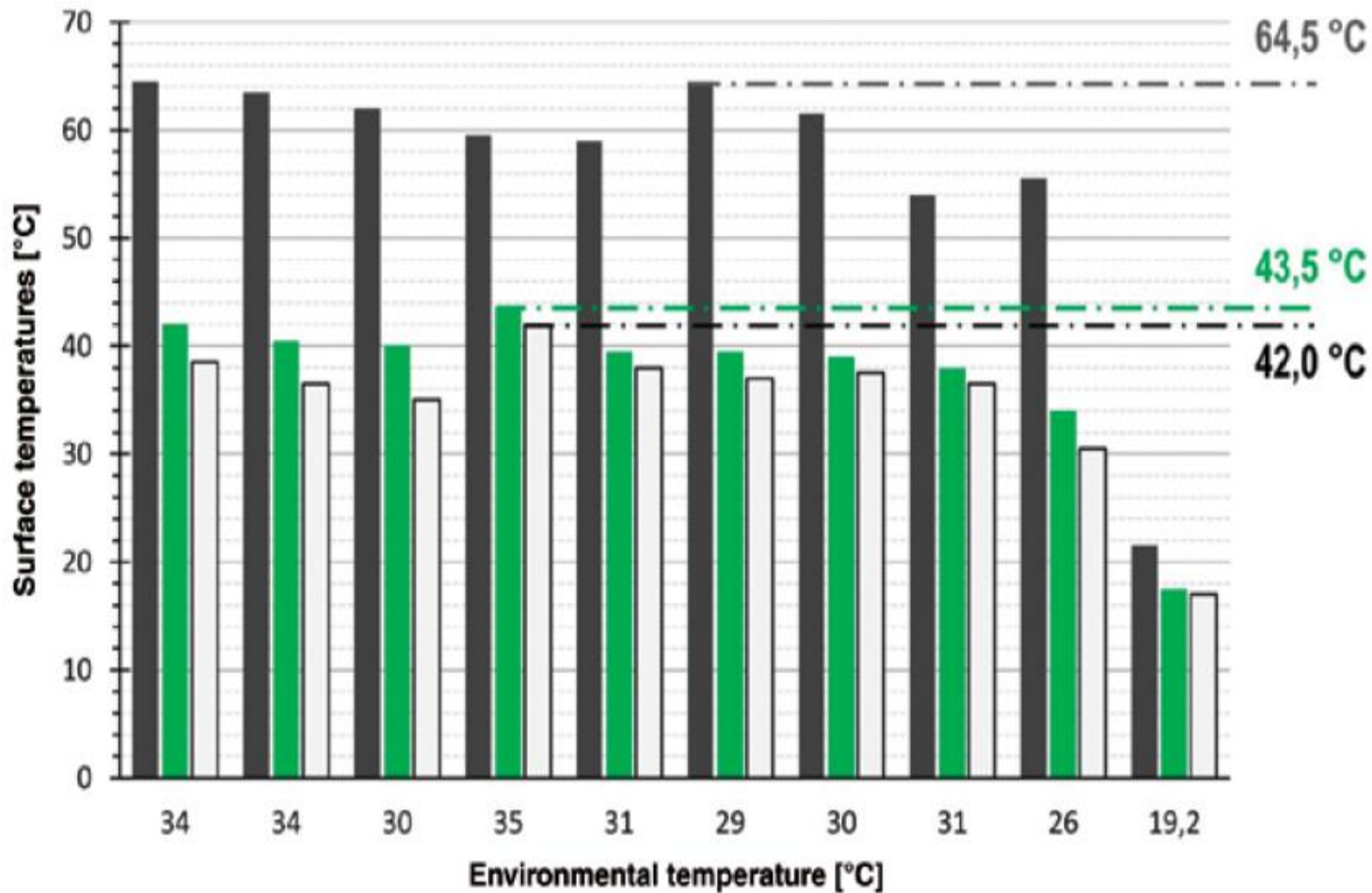
A white, sun reflecting surface provides the **building owner with substantial energy savings.**

On a hot summer day the difference could be as high as 30 ° C

TPO MEMBRANES ARE A PROVEN ENERGY SAVING  
MATERIAL, SHOULD THEIR USE BE A MANDATORY  
GOVERNMENTAL REQUIREMENT



### Temperatures measured in the period June / September 2015





LEED, internationally recognized green building certification system is the International reference for design, building and management of environmental friendly, high-performance buildings.

White TPO Membrane roofing contributes to satisfy the requirement for obtaining LEED certification points.

More specifically:

### Sustainability of the site

Credit 7.1. Heating isle effect: external surfaces

### Materials and resources

Credit 2 Management of building waste

# Smart White Means Energy Savings

Example of approximate cooling / energy savings:

- \$45,000 (Dhs165k) over a 15 year span (versus a black roof) installed on a 50,000ft<sup>2</sup> (4645m<sup>2</sup>) building in Beijing.
- Significant portion of installed cost “paid back” over time.

Third party links for energy saving calculation:

<http://iwitness.weather.com/Cool-roofs-mean-cooler-earth/video/1562404/148597.html>

Dept of Energy's Oak Ridge National Labs site:

[www.ornl.gov/sci/roofs+walls/facts/CoolCalcEnergy.htm](http://www.ornl.gov/sci/roofs+walls/facts/CoolCalcEnergy.htm)

Cool Roof Rating Council site:

[www.coolroofs.org](http://www.coolroofs.org)

Energy Star site:

[www.roofcalc.com](http://www.roofcalc.com)

# LONGEVITY OF TPO MEMBRANES COMPARED TO TRADITIONAL WATERPROOFING



**ISO 14001** Plant certified to ISO 14001

**30%** 30% of energy used in our manufacturing plant is produced by the cogeneration process

**100%** 100% recycling of water in the production process

**100%** 100% recycling of production wastage

**EPD** EPD certification

LEED certification \*



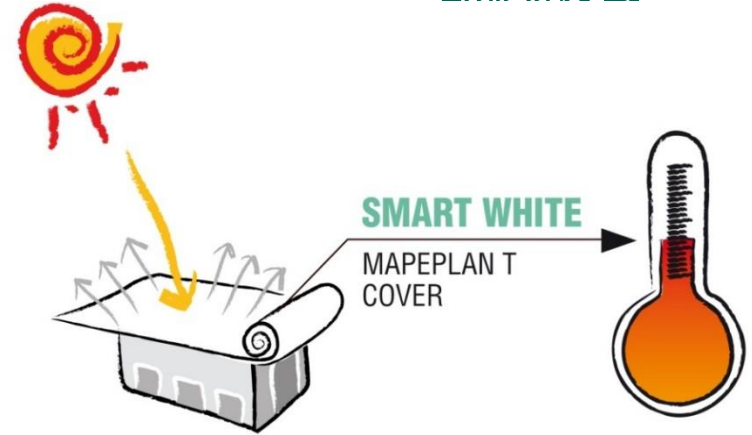
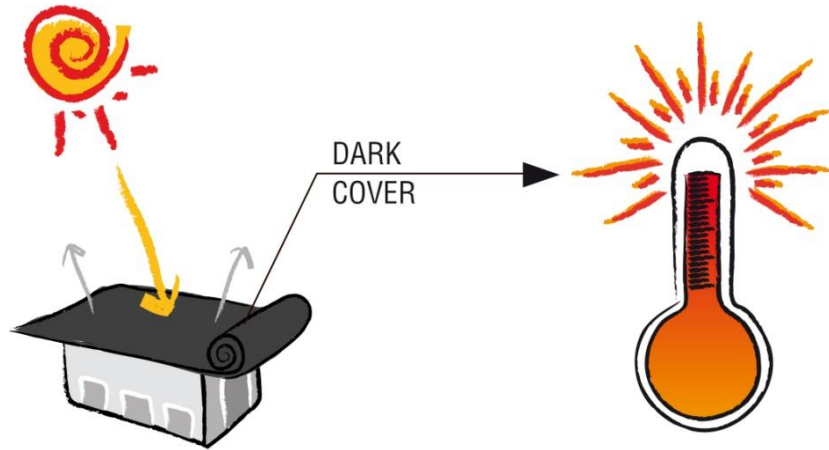
Reduction by 70% of packaging materials

**ENVIRONMENTAL FRIENDLY** Production system

**CO<sub>2</sub>** Reduced emission CO<sub>2</sub>

\* LEED (Leadership in Energy and Environmental Design) is an internationally recognized green building certification system. It is the International reference for design, building and management of environmental friendly, high-performance buildings.





# SMART WHITE REFLECTANCE CONCEPT

# TPO – PVC



	PVC	TPO
Expected life	>15 years	> 30 years
High chem. compatibility	YES	YES
Hot air welding	YES	YES
Signal Layer	YES	YES
Elongation	>300%	>500%
Tensile strength	>11 Mpa	>15 Mpa
Puncture resistance	HIGH	HIGH
Density	1.3 Kg/m <sup>2</sup>	0.92 Kg/m <sup>2</sup>
Colour	Any	Any

# COST OF TPO MEMBRANE WATERPROOFING COMPARED TO TRADITIONAL WATERPROOFING SYSTEMS

# TPO – EPDM

	EPDM	TPO
Expected life	> 30 years	> 30 years
High chem. compatibility	YES	YES
Hot air welding	NO	YES
Signal Layer	NO	YES
Elongation	>500%	>500%
Tensile strenght	>11 Mpa	>15 Mpa
Puncture resistance	LOW	HIGH
Density	1.2 Kg/m <sup>2</sup>	0.92 Kg/m <sup>2</sup>
Colour	Black	White

EPDM LAPS ARE GLUED USING SOLVENTED ADHESIVES

# TPO – ENVIRONMENTAL IMPACT

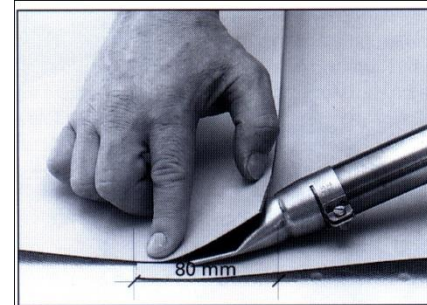


- Chloride free
- 100% recyclable
- Uses recycled content
- 35% lighter than PVC
- TPO density: 0.92 Kg/m<sup>2</sup>
- PVC density: 1.30 Kg/m<sup>2</sup>
- On a 100,000 m<sup>2</sup> roof with a 1.5 mm thick membrane:
  - PVC – 195 Tons (9 containers)
  - TPO – 138 Tons (6 containers)
- TPO doesn't release any harmful gas or smoke during welding.
- SRI 102 – Energy saving

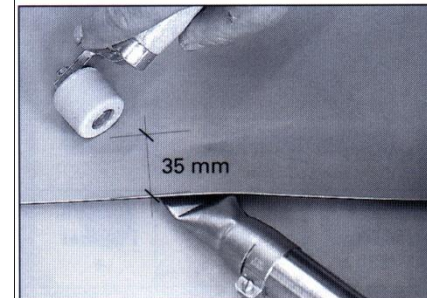
# TPO benefits in hot climates

- Durability and increased life expectancy, even in fully exposed applications (Mech Fix or Fully bonded)
- Longevity is not dependent on extra thickness
- Lighter color results in heat reflection  
SRI 102
- Easier and faster application in extreme temperatures
- No shrinkage when laid loose
- No degradation under UV
- Recycled material used
- Heat welded seams

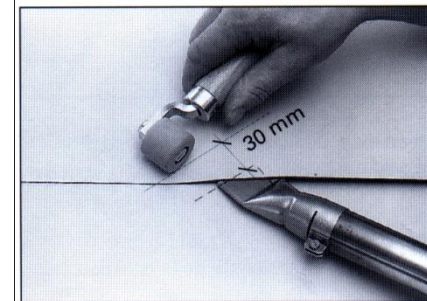
# Hot air Manual Welding



1.  
Spot welding



2.  
Pre-welding



3.  
Welding

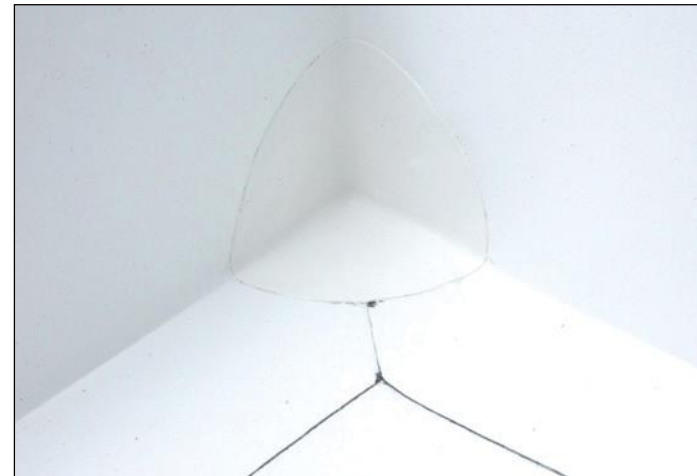
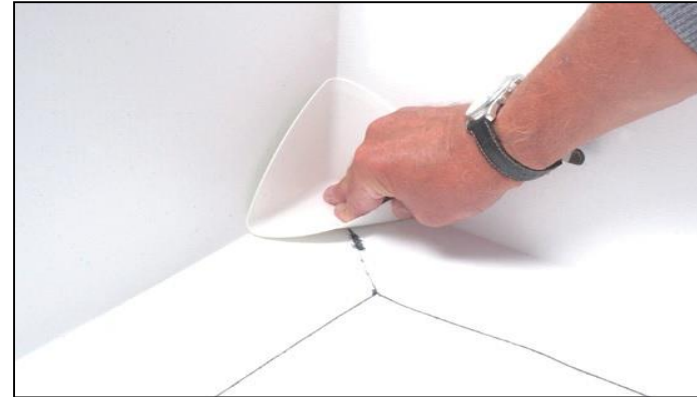
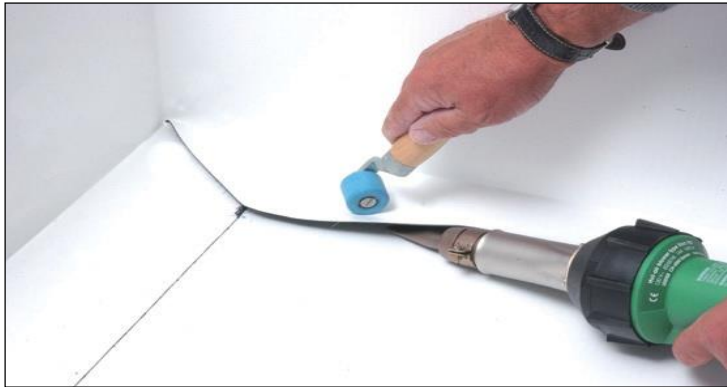
# Hot air manual welding





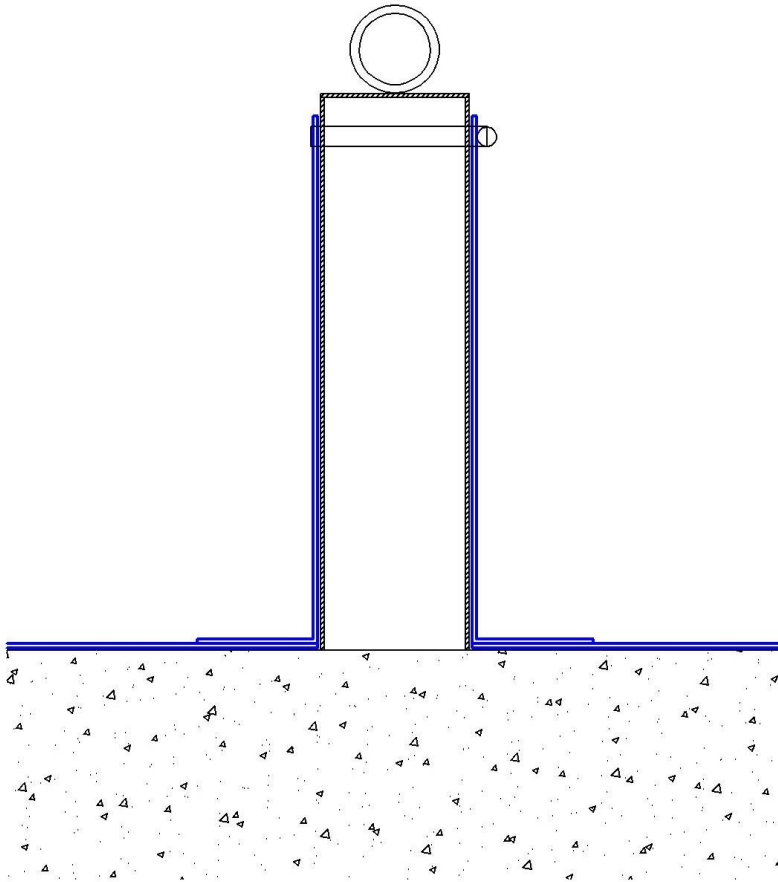
# HOT AIR MANUAL WELDING

## Internal corner



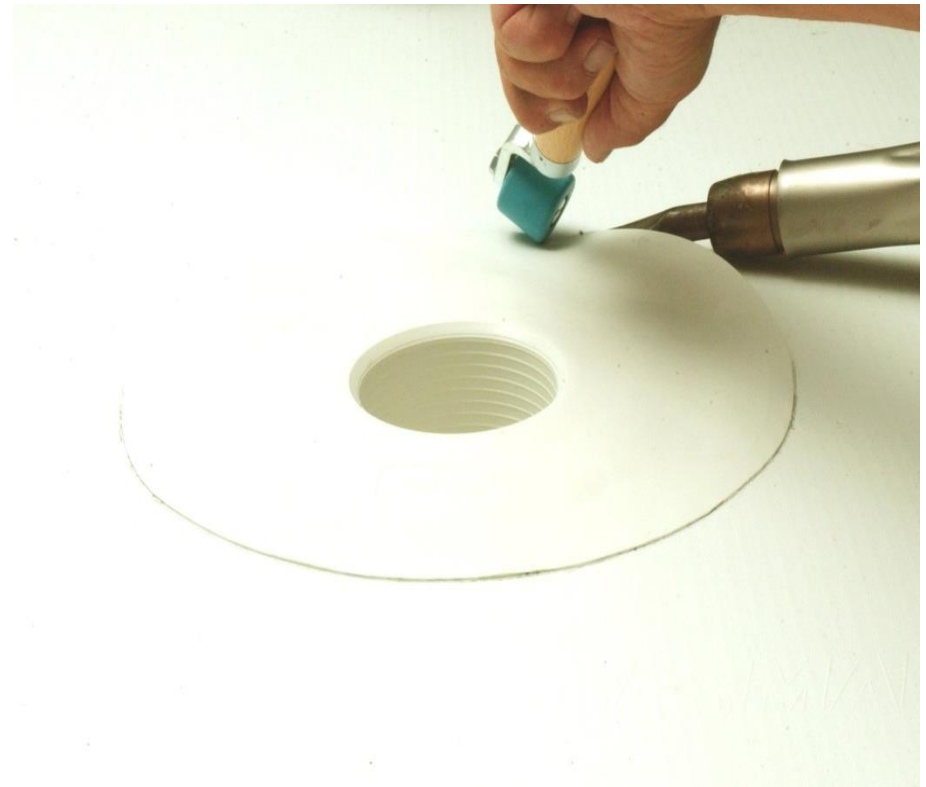
# WORKING DETAILS

## VENT COVERING



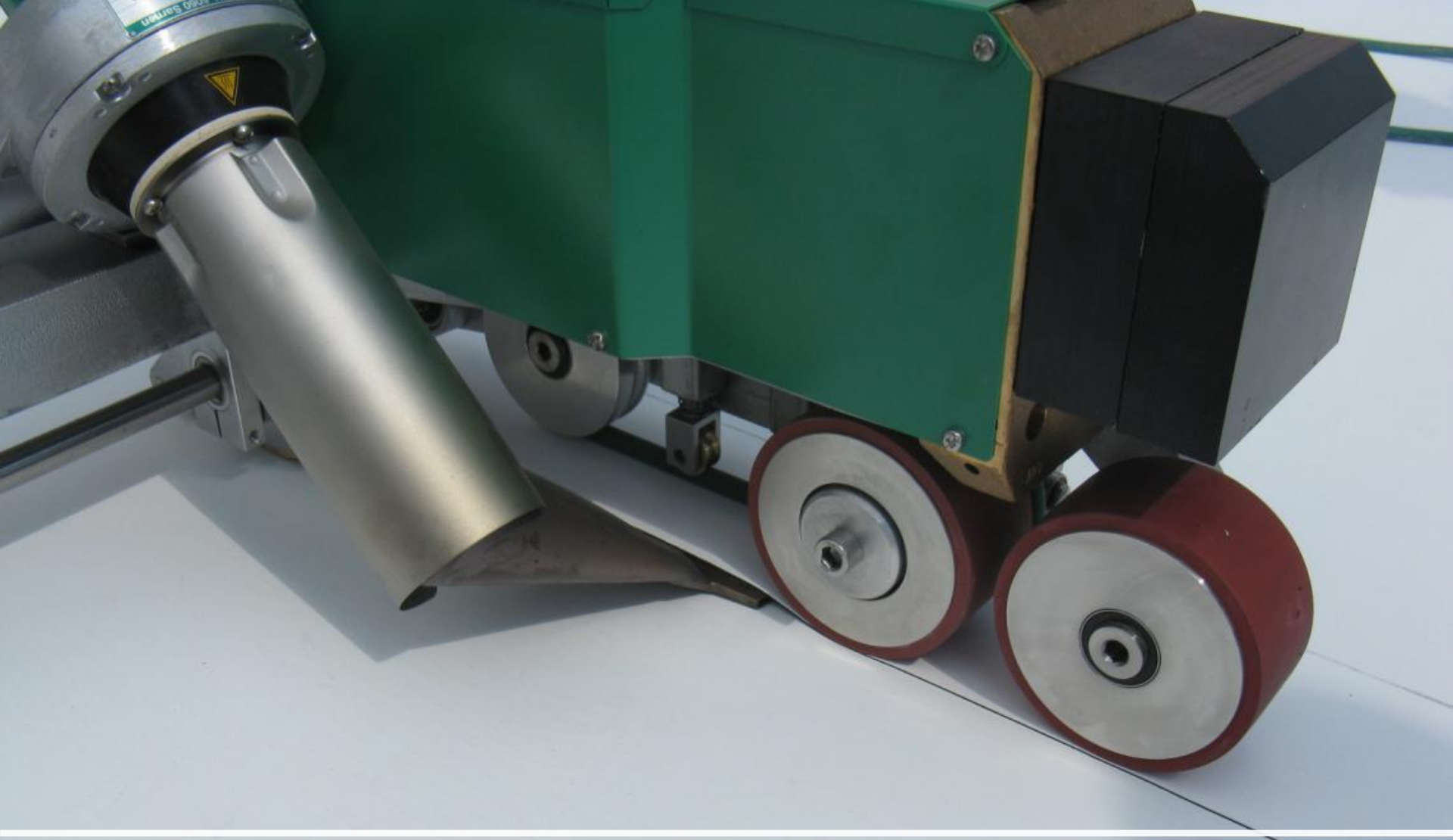
# WORKING DETAILS

## DRAINPIPE OUTLET



# AUTOMATIC WELDING





AUTOMATIC WELDING



# Application by qualified Contractors

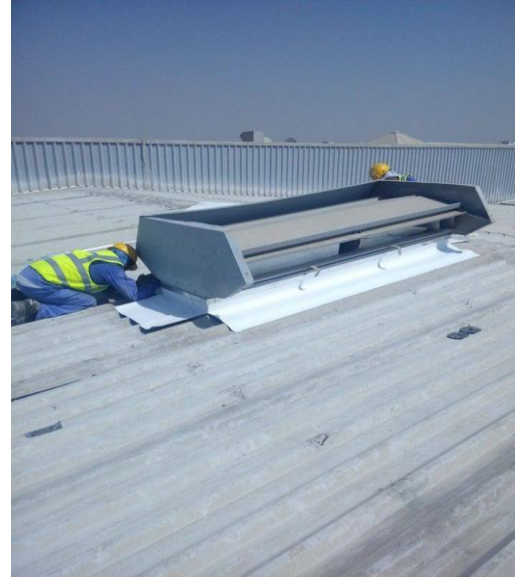
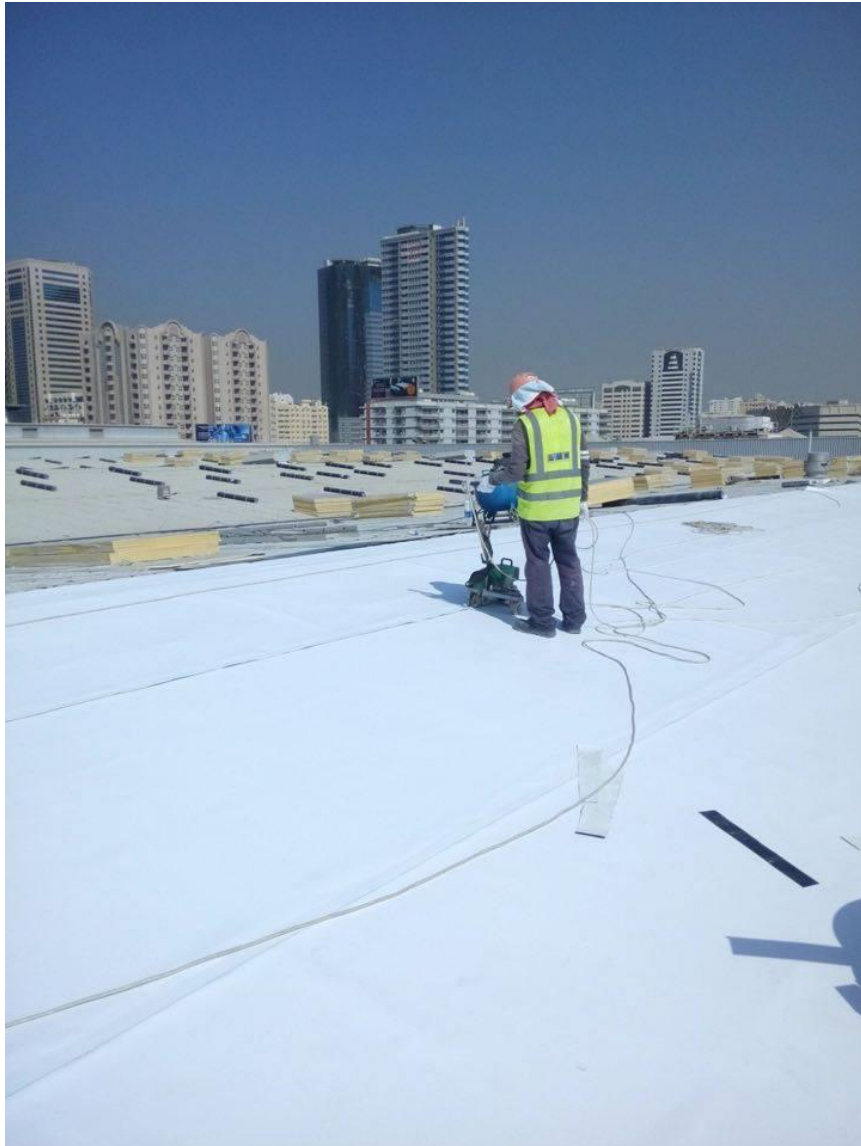
Training



Approved contractor



# SHARJAH CITY CENTER













# METRO, BRATISLAVA (SLOVAKIA)





# AJMAN CITY CENTER

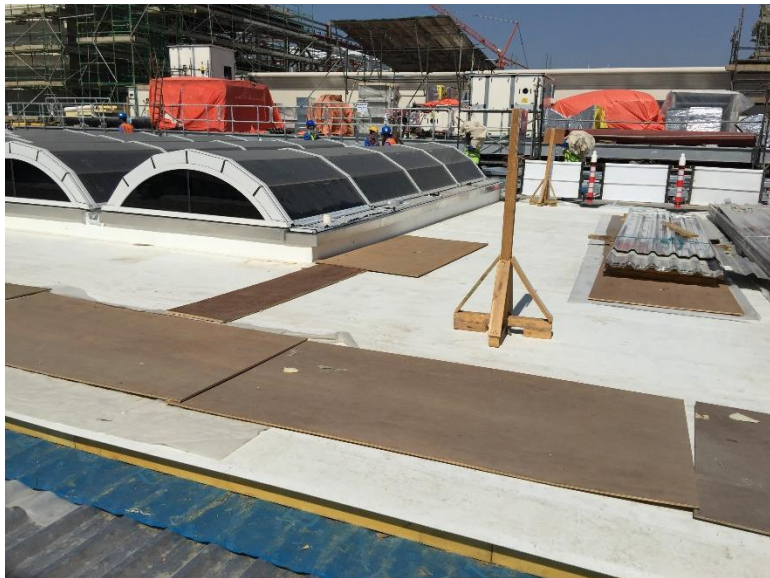


# LAING'S CARPENTRY SHOP





# MALL OF THE EMIRATES







# ENERGY EFFICIENT SOLAR PANEL ROOF





# LOGISTICS CENTER



# AUCHAN PALERMO



Thank You