



1<sup>st</sup> DIVISION

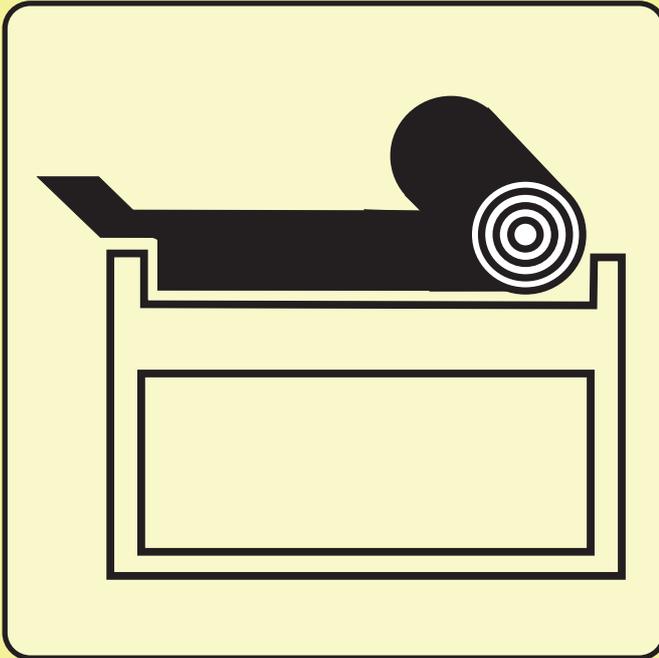


2<sup>nd</sup> DIVISION

# technical specifications

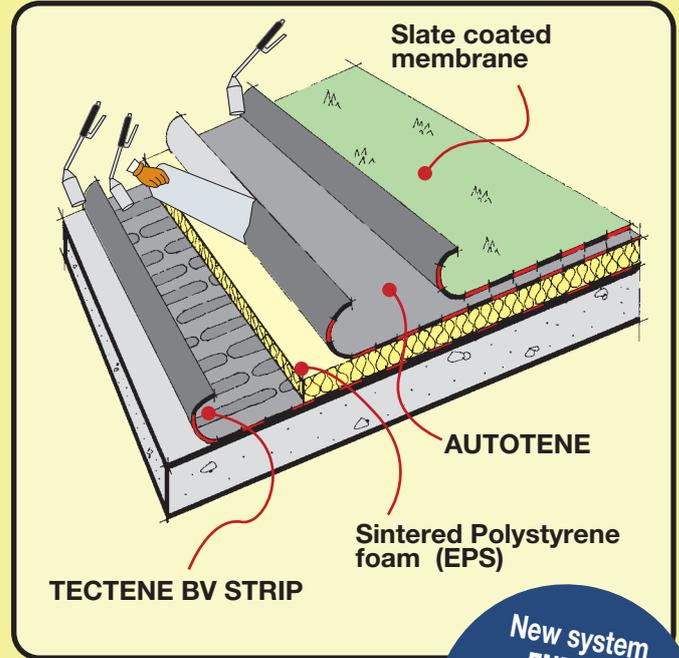
## PROBLEM

Waterproofing with low environmental impact and heat insulation with sintered polystyrene foam panels for use on non-pedestrian flat roofs in cement where mechanical fastening is impossible.



## SOLUTION

Waterproofing and heat insulation for flat non-pedestrian roofs with AUTOTENE BASE/V, the "ENERGY SAVING" system



## Waterproofing and heat insulation of the non-pedestrian roof cement slab with an exposed coat produced with the "Energy-Saving"

New system  
**ENERGY SAVING**  
• environmentally friendly  
• safer work

The "ENERGY-SAVING" system is a stratigraphy for waterproofing and heat insulation of flat non-pedestrian roofs. It is applied with a lower consumption of energy, and has lower environmental impact than that of traditional technologies. It was studied with the aim of using a low-cost, ecological insulation material, such as sintered polystyrene foam, which is, however, heat sensitive and cannot be glued with melted bitumen because it would melt. Moreover, the use of solvent-based adhesives is polluting, produces refuse and a needless waste of resources.

In the "ENERGY-SAVING" system, the insulation panels are glued with the same flame used for gluing the polymer-bitumen membranes. This is thanks to the special heat-adhesive strips located on the top face of the innovative vapour barrier named TECTENE BV STRIP. When these strips are heated by the flame, and the hot-melt film which covers them shrinks, they become adhesive and maintain their melt properties longer and at temperatures lower than the standard mixes. This gives sufficient time to lay the polystyrene panels, which stubbornly anchor themselves without melting. Light laying equipment is used, boilers need not be transported and no time is lost in melting oxidised bitumen. Therefore, there is neither smoke nor smell, and the risk of burns is reduced. Gluing material is not consumed because the glue is already included in the vapour barrier, transport costs are cut down and evaporation of harmful solvents is diminished.

Another special feature of the "ENERGY-SAVING" system is the possibility of flame-gluing the waterproof coat on the polystyrene foam without melting it. This is achieved by using - as the first layer on the polystyrene - the additional sheet named AUTOTENE PRO/V or the AUTOTENE BASE membrane. These are innovative self-heat-adhesive membranes, i.e. there is no need to heat them by flame, because they adhere to the polystyrene through the indirect heat generated by flame-laying of the next layer, which is glued above the membranes.

Furthermore, you save energy, because flame heating is done once only, and the operator does not 'burn' his feet, which is what happens in summer with standard membranes. That is because the first membrane is not heated, and only the second layer is flame heated, which means the operator can walk on a surface that is still cold.

**index**

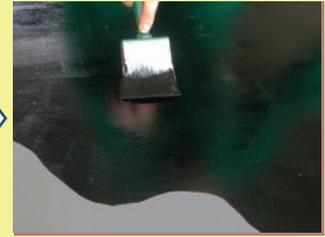
**integrated systems**

# SINGLE-LAYER WATERPROOF COAT

## technical specifications

### Preparation of laying surface

The entire cement surface to be covered will be treated with a coat of ECOVER bituminous adhesion primer. The primer has a water-based bituminous emulsion of distilled bitumen, with solid content of 40% and specific weight of 1.00±0.05 kg/litre.



### Vapour barrier

A 3mm thick TECTENE BV STRIP/V heat adhesive vapour barrier membrane will be flame-glued for full adherence on the entire surface and on the overlaps. The membrane is armed with reinforced glass felt, containing elastoplastomeric polymer bitumen. It is provided with built-in adhesive for gluing insulation panels in sintered polystyrene foam. This adhesive material consists of heat-adhesive strips spread over 40% of the top face of the sheet. The membrane has aqueous vapour permeability of (EN 1931)  $\mu > 100,000$  and flexibility to cold (EN 1109) of -15°C. The overlaps between the sheets of about 6 cm will also be flame sealed.



### Heat insulation

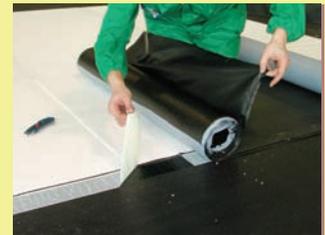
This will consist of self-extinguishing panels in sintered polystyrene foam, with a density of  $\geq 20 \text{ Kg/m}^3$ , and with thickness ensuring thermal resistance sufficient to prevent dew point below the vapour barrier. The panels will be glued and pressed on the adhesive strips spread on the top face of the vapour barrier. The strips will have been pre-warmed with the flame of a propane gas burner.



### Single-layer waterproof coat

A protective additional layer will be applied before the waterproofing element is laid. This layer will be dry-spread on the insulation panels with 6 cm overlaps. It consists of a base self-heat-adhesive waterproofing membrane - AUTOTENE PRO/V - in elastomer-bitumen, weighing 2 kg/m<sup>2</sup>. The lower face is coated with an adhesive mix, which is activated by indirect heat produced by flame-laying of the next layer, and is protected by a silicone coated film, which is removed as the roll is unrolled. The membrane, armed with a reinforced glass felt, will have ultimate tensile strength L/T (EN 12311/1) of 350/200 N/50 and flexibility to cold (EN 1109) of -25°C.

A waterproof elastomeric membrane in polymer-bitumen - MINERAL HELASTA P - will be flame-glued for total adherence between the overlaps of the previous layer. The membrane is armed with a continuous thread non-woven polyester fabric, self-protected by slate scales, with a thickness of 4 mm measured on the edge. The membrane will have been certified by Agreement ITC (formerly ICITE) as conforming to the new UEAtc standard of December 2001. The membrane consists of a mix with the following characteristics: ultimate elongation of 2000%, elastic spring-back of 300%, ultimate tensile strength L/T of 900/700 N/50 mm, ultimate elongation L/T of 50%, resistance to static punching L25, flexibility to cold of -25°C for the product when new and of -10°C after ageing. Flame-sealed overlaps of about 10 cm will be placed between the sheets. The vertical parts will be covered up to at least 20 cm above the maximum expected water level. The heat produced by the sealing of the last layer only will simultaneously ensure that the two layers will adhere to each other and that the coat will adhere to the heat insulation, thus reducing exposure of operators' legs to overheating.



### The products



**TECTENE BV STRIP/V**  
A heat-adhesive vapour barrier in elastoplastomeric polymer bitumen, with built-in adhesive for gluing insulation panels in polystyrene foam. This adhesive material consists of heat adhesive strips spread over the top face of the membrane.



**SINTERED POLYSTYRENE FOAM**  
Sintered polystyrene foam is rigid plastic foam. It is light, self-extinguishing, with low water absorption, and high heat insulation power.



**AUTOTENE PRO/V**  
Waterproof additional base membrane. Self-heat-adhesive, in elastomeric polymer bitumen, with lower face and upper overlap face coated with a self-heat-adhesive mix.



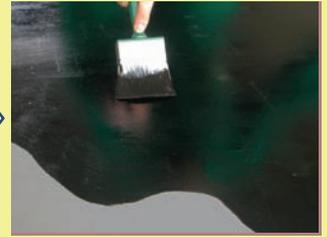
**MINERAL HELASTA/P**  
A waterproof membrane in elastomeric polymer bitumen, armed with a continuous thread non-woven polyester fabric (Non rotting Spunbond). Self-protected by means slate scales.

# DOUBLE-LAYER WATERPROOF COAT

## technical specifications

### Preparation of laying surface

The entire cement surface to be covered will be treated with a coat of ECOVER bituminous adhesion primer. The primer has a water-based bituminous emulsion of distilled bitumen, with solid content of 40% and specific weight of 1.00±0.05 kg/litre.



### Vapour barrier

A 3mm thick TECTENE BV STRIP/V heat adhesive vapour barrier membrane will be flame-glued for full adherence on the entire surface and on the overlaps. The membrane is armed with reinforced glass felt, containing elastoplastomeric polymer bitumen. It is provided with built-in adhesive for gluing insulation panels in sintered polystyrene foam. This adhesive material consists of heat-adhesive strips spread over 40% of the top face of the sheet. The membrane has aqueous vapour permeability of (EN 1931)  $\mu > 100,000$  and flexibility to cold (EN 1109) of -15°C. The overlaps between the sheets of about 6 cm will also be flame sealed.



### Heat insulation

This will consist of self-extinguishing panels in sintered polystyrene foam, with a density of  $\geq 20 \text{ Kg/m}^3$ , and with thickness ensuring thermal resistance sufficient to prevent dew point below the vapour barrier. The panels will be glued and pressed on the adhesive strips spread on the top face of the vapour barrier. The strips will have been pre-warmed with the flame of a propane gas burner.

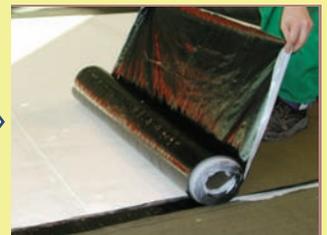


### Double-layer waterproof coat

The first layer of the waterproof coat will be dry-spread on the insulation panels with 6 cm overlaps. It consists of a self-heat-adhesive waterproofing base membrane - AUTOTENE BASE/V - in elastoplastomeric polymer bitumen, with a thickness of 3mm. The membrane is armed with reinforced glass felt. Its lower face and the overlap strip of the top face are coated with an adhesive mix, which is activated by indirect heat produced by flame-laying of the next layer. Both faces are protected by a silicone coated film, which is removed as the roll is unrolled. The membrane, armed with reinforced glass felt, has ultimate tensile strength L/T (EN 12311/1) of 350/200 N/50 mm and flexibility to cold (EN 1109) of -15°C.

A waterproof elastoplastomeric membrane in polymer-bitumen - MINERAL FLEXTER TESTUDO SPUNBOND POLIESTERE - will be flame-glued for total adherence between the overlaps of the previous layer. The membrane is armed with a continuous thread non-woven composite polyester fabric, stabilised with fibre glass, with a thickness of 3 mm measured on the edge. The membrane will have been certified by Agreement ITC (formerly ICITE) as conforming to the new UEAtc standard of December 2001. The membrane will have the following characteristics: ultimate tensile strength L/T of 850/700 N/50 mm, ultimate elongation L/T of 50%, flexibility to cold of -20°C, heat resistance of 140°C, and dimensional stability L/T of  $\pm 0.30/\pm 0.20\%$ . Flame-sealed overlaps of about 10 cm will be placed between the sheets. The vertical parts will be covered for up to at least 20 cm above the maximum expected water level.

The heat produced by the sealing of the last layer only will simultaneously ensure that the two layers will adhere to each other and that the coat will adhere to the heat insulation, thus reducing exposure of operators' legs to overheating.



### The products

#### TECTENE BV STRIP/V

A heat-adhesive vapour barrier in elastoplastomeric polymer bitumen, with built-in adhesive for gluing insulation panels in polystyrene foam. This adhesive material consists of heat adhesive strips spread over the top face of the membrane.



#### SINTERED POLYSTYRENE FOAM

Sintered polystyrene foam is rigid plastic foam. It is light, self-extinguishing, with low water absorption, and high heat insulation power.



#### AUTOTENE BASE/V

Waterproofing membrane with self-heat-adhesive base, in elastoplastomeric polymer-bitumen, with bottom face and top overlap strip treated with a self-heat-adhesive mix. Armature in non-rotting reinforced glass mat.



#### MIN. FLEXTER TESTUDO SPUNBOND POLYESTER

A waterproof membrane in elastoplastomeric polymer bitumen. Composite armature in continuous thread non-woven polyester fabric (Spunbond) stabilised with non rotting glass fibre. Self-protected by means slate scales.



# LAYING METHOD AND DETAILS

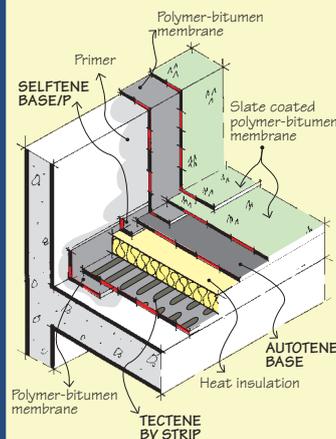
## Preparation of laying surface

In cold, humid seasons and climates, the drying time of Ecover, the water-based primer, may become too long. In this case, it may help to replace Ecover with Indever, the solvent-based bituminous primer.

## DETAILS



### RELIEF



## Vapour barrier

The vapour barrier sheets will be laid, with longitudinal overlaps of about 6 cm between the sheets along the edge. The edge, of reduced thickness, is purposely located on the lower end of the fabric to enable overlapping without any projections and to obtain a sufficiently flat laying surface for the insulation panels. As concerns the end overlaps, of the same size, the excess thickness can be removed with a heated trowel. The sheets will be flame-glued on the laying surface for total adherence. The overlaps will be sealed with the flame of a propane gas burner to likewise ensure total adherence. The vapour barrier will be flame-glued also on the vertical parts to a height of about 5 cm above the specified heat insulation level. As an alternative for roofs of rooms with a relative humidity of over 80% at 20°C, **TECTENE BV STRIP ALU/P**, a heat adhesive membrane, will be applied. The membrane is in elastomeric polymer bitumen, and is provided with built-in adhesive for gluing insulation panels in sintered polystyrene foam. This adhesive material consists of heat-adhesive strips spread over 40% of the top face of the sheet. The membrane is armed with a 12 micron aluminium foil coupled to a non-woven composite polyester fabric, stabilised with fibre glass, with a thickness of 3 mm. The membrane has aqueous vapour permeability of (EN 1931)  $\mu_{\infty}$  (an almost impenetrable barrier), and cold flexibility (EN 1109) of -15°C.

If laying on roofs of rooms with high relative humidity, the sheets of the vapour barrier will be spot flame-glued for at least 40% of the surface, with the exception of perimeter parts long the roof edge, where the sheets will instead be glued for total adherence along a strip with a width of at least 1 m. Laying at semi adherence is possible only in zones with little wind, otherwise the coat will have to be ballasted by heavy protection in gravel or by cement flooring.

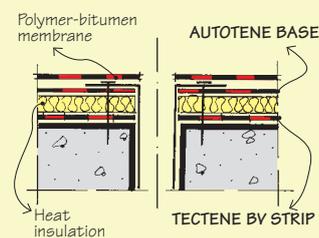
## Heat insulation

Sintered polystyrene foam is a good insulation material which is very cost-effective. It has been used in the building industry for many years, does not contain neither CFC nor HCFC, and is 100% recyclable. It is a stable material, resistant to humidity, mould, bacteria and has a long-life. The insulation panels are flame-glued, by melting the film covering the glue strips on the top face of the vapour barrier. The operator should take care not to point the flame directly at the polystyrene panel, but to heat the vapour barrier from a distance of 50 cm to 1 m ahead of the front of the insulation panels being laid. After the panels have been laid, they should be accurately pressed with the feet.

The operator should periodically check the result of gluing, by trying to lift up an already fixed panel.

(This technology can also be used for gluing polystyrene already coupled in strips to a membrane - see product Thermobase PSE)

### DRAIN OPENING

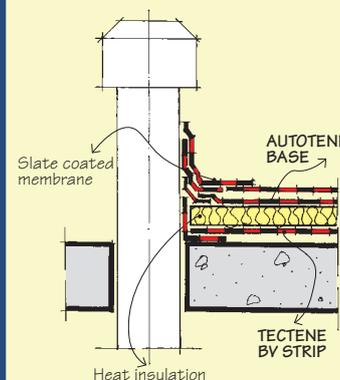


## Waterproofing coat

The "ENERGY-SAVING" system is ideal for laying layers without any heavy protective materials, with an exposed coat. It can be applied on flat roofs and up to an inclination of 15% - beyond this angle, mechanical securing devices are required in addition to gluing. The **AUTOTENE** membrane can be glued by indirect heat gluing on overlaps too. But one must make sure to remove the silicone coated strip which protects the longitudinal edge area, with a width of about 6 cm. For end overlaps of about 12 cm, the residual 8 cm of the remaining upper end zone can be flame-sealed, without melting the polystyrene underneath, providing the zone near to the edge of the lower end is kept well pressed for at least 4 cm.

The sheets must be well aligned before removing the silicone coated film which covers the front face of **AUTOTENE**, otherwise, in summer, the increased adhesion caused by the heat will prevent the sheet being moved, and the sheet will tend to stick to the polystyrene. Vice versa, at low temperatures, the flame heat transmitted through **AUTOTENE** toward the interface with the polystyrene foam, will be lower and, therefore, it would be preferable to use **AUTOTENE PRO**, which is less thick than **AUTOTENE BASE** and transmits more heat. Before laying, the operator is advised to check, on some sample panels, the degree of flame intensity required to seal the system excellently on polystyrene, according to the weather at time of application. This procedure should be maintained during the following laying stages.

### AERATOR



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Via G. Rossini, 22 - 37060 Castel D'Azzano (VR) - Italy - Tel. +39.045.8546201 - Fax +39.045.512444

