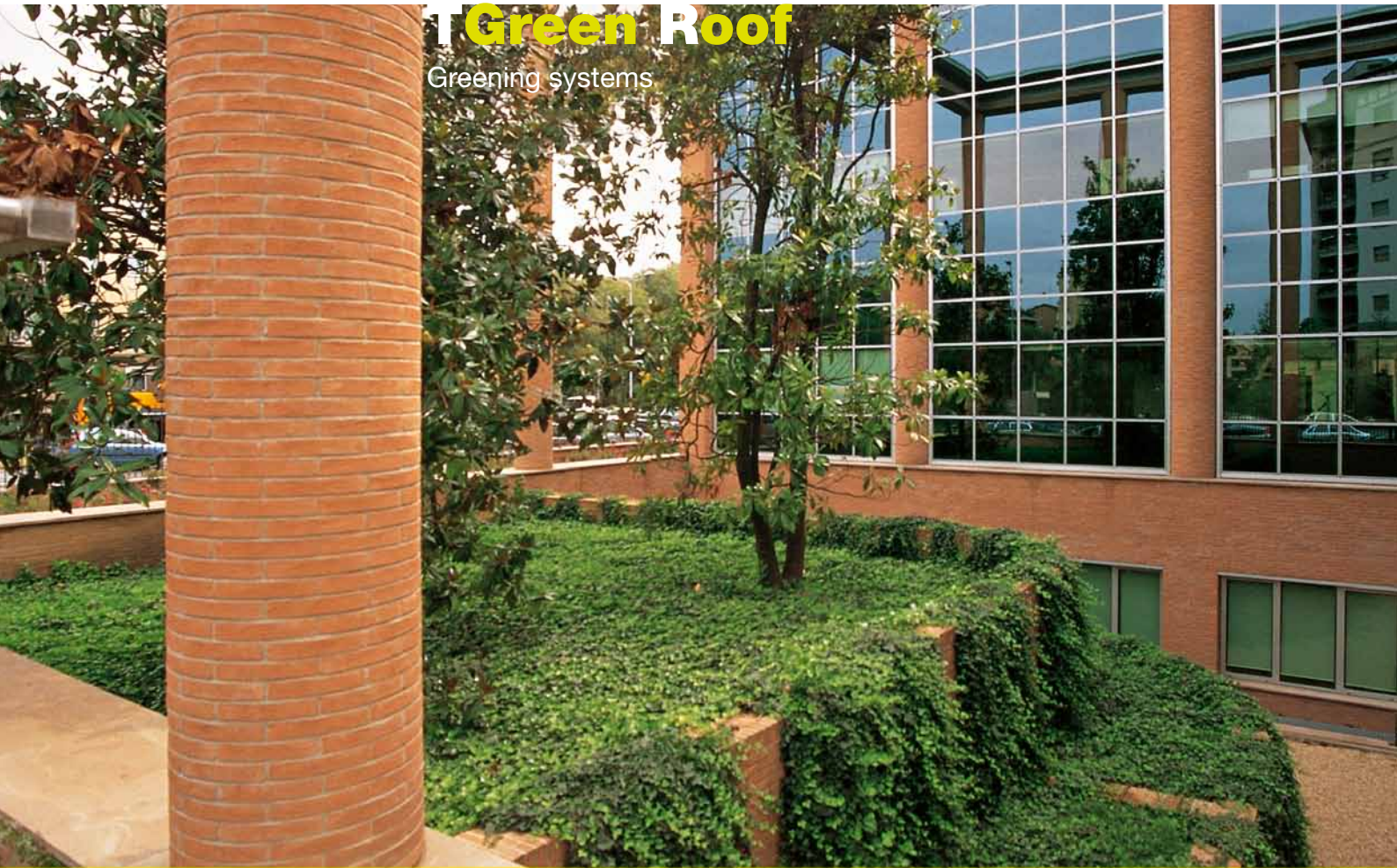


# Green Roof

Greening systems



## GREEN ROOFS

Greening systems



photo: garden of the L'Oreal offices in Milan

# Green roofs

Plants and grass on roofs go back a long way. Just think of the legendary hanging gardens of Babylonia that decorated the top parts of buildings with trees and flowers. Today this attractive practice has strong environmental value and for this reason TeMa adds to the fascination of rooftop gardens wellbeing, safe maintenance, and the waterproofing qualities guaranteed by the most up to date technologies available on the market. Special attention is paid to drainage and water accumulation in order to keep vegetation light, reducing weight, costs and maintenance.



photo: Roof garden, Veneto Banca Holding Executive Offices, Montebelluna

photo: garden of the L'Oreal offices in Milan



## Why choose a green roof?

- 1** High water retention
- 2** Reduced levels of smog and dust
- 3** Reduced noise
- 4** Thermal insulation
- 5** Efficient protection of waterproofing from UV rays
- 6** Protection of waterproofing from night-day, summer-winter heat excursion.
- 7** Protection of waterproofing from mechanical strain
- 8** Improved quality of life
- 9** A home friendly to nature
- 10** Increased value of building



photo: green roof – private dwelling



photo: green roof – private dwelling

# The many advantages of a green roof



# Solutions for all types of pitch





TeMa has developed a particularly flexible green roof system, studied down to the last detail to adapt to the most complex surfaces regarding structure, composition and pitch.

One example is steeply pitched gardens, where TeMa solutions and materials guarantee constant smooth green.

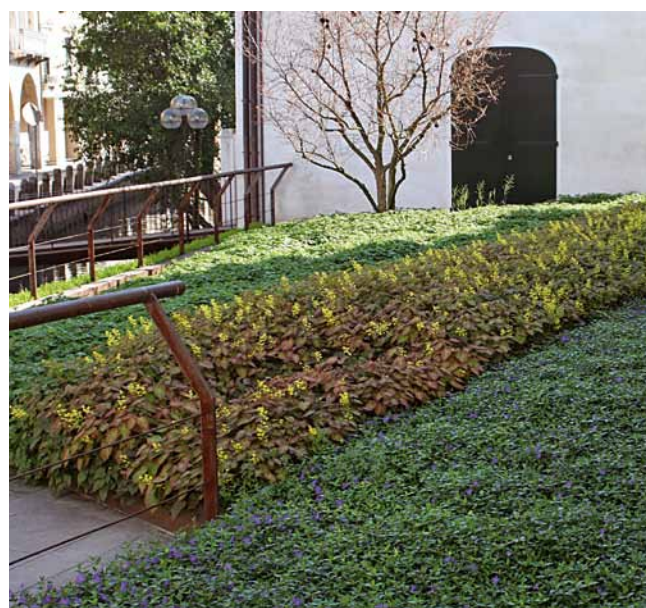


photo: green roof of Palazzo Bomben, Treviso

# Plan your green roof

**LOW SURFACE PITCH < 5% (2,9°)**

**EXTENSIVE**



sedum



perennials



mix

**SEMI**



lawn

**5% (2,9°) < AVERAGE SURFACE PITCH < 15% (8,5°)**

**EXTENSIVE**



sedum



perennials



mix

**SEMI**



lawn

**15% (8,5°) < STEEP SURFACE PITCH < 45% (24,2°)**

**EXTENSIVE**



sedum

**SEMI  
INTENSIVE**



mix

1-Check pitch >> 2-Decide the degree of maintenance >> 3-Decide how you wish to use the green roof >> 4-Decide the vegetation\*

- A** Accessible to maintenance personnel only
- B** Accessible to users
- C** Suitable for motor vehicles

## INTENSIVE



flowery lawn

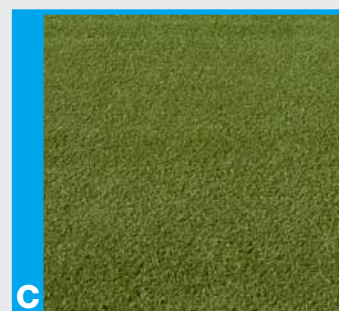


garden

## INTENSIVE

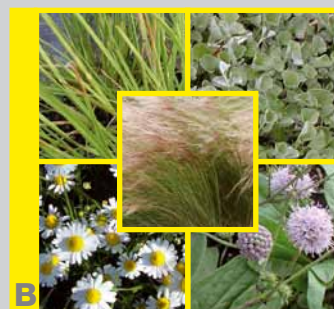


robust



suitable for vehicles

## INTENSIVE



flowery lawn

## MAINTAINING THE GREEN SYSTEM

**Green roofs have three different classes of maintenance:**

- **Class 1:** low maintenance (extensive)
- **Class 2:** average maintenance (semi intensive)
- **Class 3:** high maintenance (intensive)

Maintenance of a green roof is strictly linked to the economic and environmental sustainability of the system and is necessarily established at the planning stage, as it determines running costs.

The three maintenance levels are defined as follows:

**low maintenance:** (extensive system) maintenance is limited to checking the elements of the system.

In particular, checking the layer of vegetation means monitoring the physiological state and health of the plants, the existence of parasites and weeds which may prejudice the functionality of the system. Irrigation can be carried out occasionally to keep the plants alive in extraordinarily dry conditions. For your information, we wish to specify that green roofs with low maintenance have planned maintenance of approximately three days a year for an area of 1,000 m<sup>2</sup>.

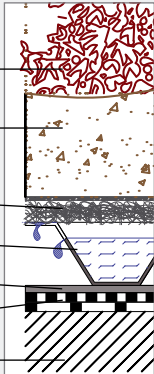
**Average and high maintenance:** (intensive systems) maintenance includes checking the elements of the system and the layer of vegetation established for the extensive system, as well as all activities required to manage the green areas well. Do not use equipment not suitable for the situation (pointed tools, earth-working instruments, etc.). When it is needed to keep the roof green, irrigation shall be specially planned.

# Composition of T-Green Roof systems

SLIGHT SURFACE PITCH < 5% (2,9°)

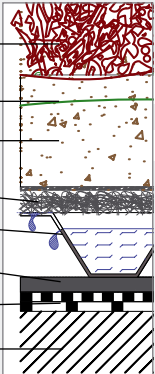
## EXTENSIVE

Vegetation		sedum	perennials/mix
	Total thickness [cm]	12	14
<b>TeMa extensive soil</b>	weight* [Kg/m²]	122	148
QDrain TG			
<b>Maxistud F</b>			
Tematex NW			
<b>Waterproofing and root barrier</b>			
Roof structure			



## SEMI INTENSIVE

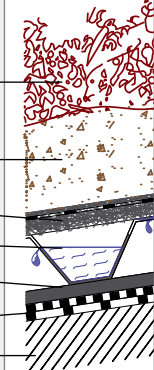
Vegetation		lawn/flowery lawn
	Total thickness [cm]	19
<b>TeMa intensive soil</b>	weight* [Kg/m²]	231
QDrain TG		
<b>Maxistud F</b>		
Tematex NW		
<b>Waterproofing and root barrier</b>		
Roof structure		



5% (2,9°) < AVERAGE SURFACE PITCH < 15% (8,5°)

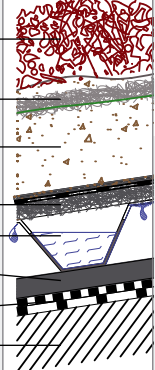
## EXTENSIVE

Vegetation		sedum	perennials/mix
	Total thickness [cm]	12	14
<b>TeMa extensive soil</b>	weight* [Kg/m²]	121	147
QDrain RF TG			
<b>Maxistud F</b>			
Tematex NW			
<b>Waterproofing and root barrier</b>			
Roof structure			



## SEMI INTENSIVE

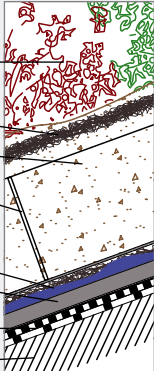
Vegetation		lawn/flowery lawn
	Total thickness [cm]	19
<b>TeMa intensive soil</b>	weight* [Kg/m²]	230
Kmat mini L sedum		
QDrain RF TG		
<b>Maxistud F</b>		
Tematex NW		
<b>Waterproofing and root barrier</b>		
Roof structure		



15% (8,5°) < STEEP SURFACE PITCH < 45% (24,2°)


## EXTENSIVE

Vegetation		sedum
	Total thickness [cm]	12
Kmat L	weight* [Kg/m²]	151
<b>TeMa extensive soil</b>		
Withholding system		
<b>QDrain</b>		
Tematex NW		
<b>Waterproofing and root barrier</b>		
Roof structure		



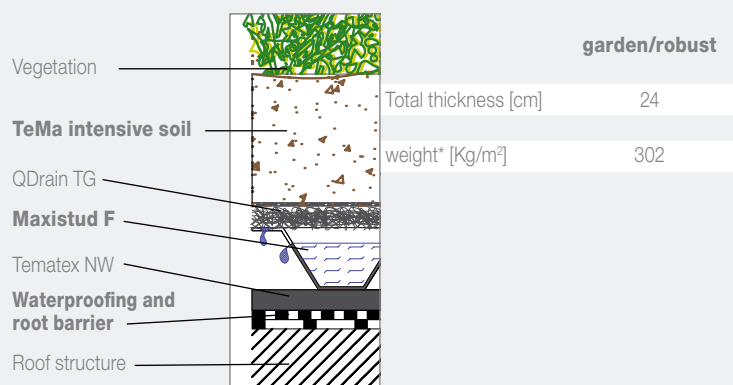
## SEMI INTENSIVE

Vegetation		mix
	Total thickness [cm]	17
Kmat L	weight* [Kg/m²]	216
<b>TeMa intensive soil</b>		
Withholding system		
<b>QDrain</b>		
Tematex NW		
<b>Waterproofing and root barrier</b>		
Roof structure		

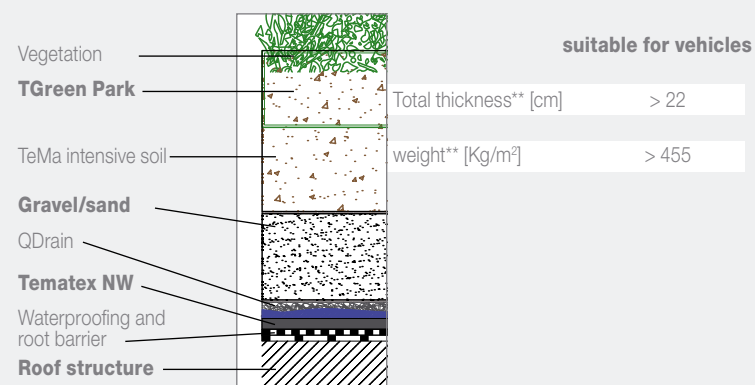


\* weight of system with maximum retention.

## INTENSIVE



## INTENSIVE

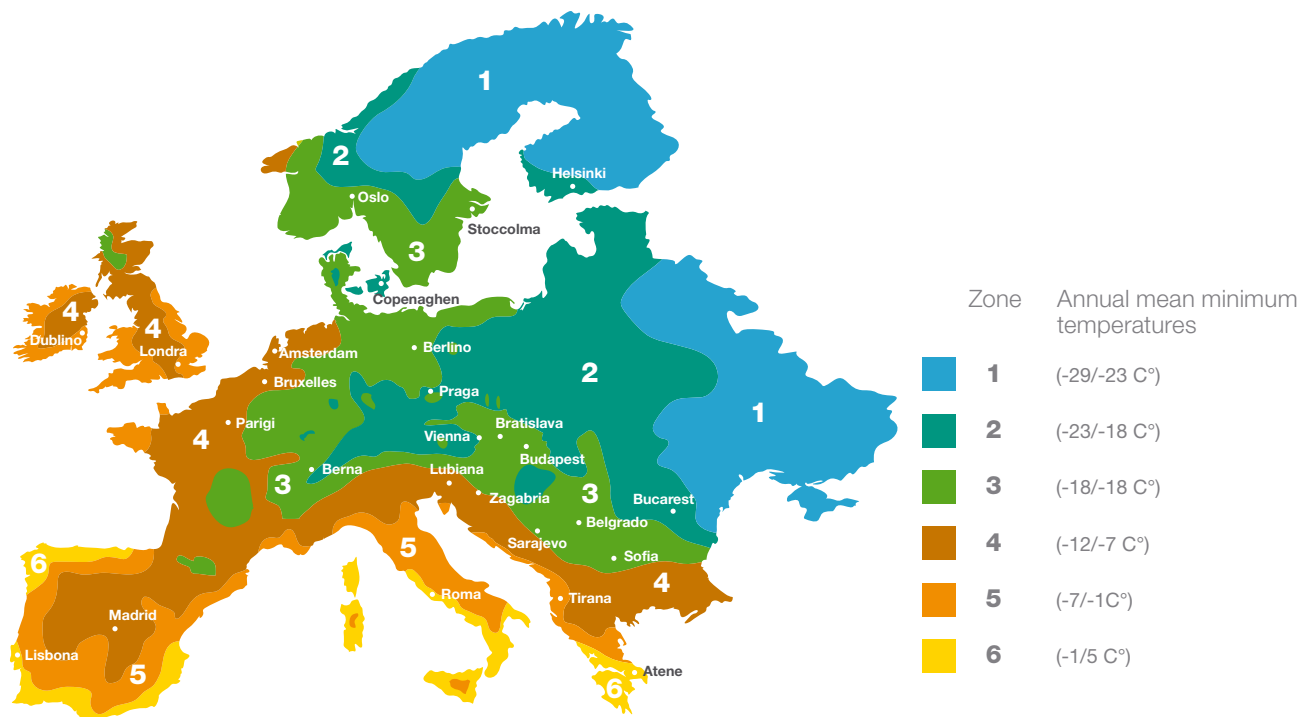


\*\* For vehicles with full load of no more than 3 tonnes, with two axles and two wheels per axle.

## DIMENSIONS OF YOUR GREEN ROOF SYSTEM

- 1 Total weight of H<sub>2</sub>O saturated system [Kg/m<sup>2</sup>]
- 2 Total thickness of system [cm]
- 3 Compatibility with climate zone (for information contact the Tema engineering office).

## ADAPTABILITY TO CLIMATE ZONES



# Italian standards: UNI 11235

## Instructions for planning, implementing, checking and maintaining green roofs

The Italian standards referring to green roofs are UNI 11235. The standards define the criteria for planning, implementing, checking and maintaining continuous green roofs according to the special climatic context, type of building and type of use. Current technical culture in the building trade has led producers of layers or systems of rooftop green to require that these standards be drawn up to regulate relationships between designers, producers and customers.

The main scope is to provide guarantees of work well done, thereby assisting the market in receiving a new injection of professional behaviour. The UNI standards also prepare the way for any incentives relating to the use of green roofs in architecture. Our research into the use of TeMa products in the field of natural surfaces stems from interpretation of the notions presented by UNI standards.



## Elements, layers and equipment comprising the sub-system

A building sub-system comprises the grouping together of the basic elements (primary elements) and secondary layers and equipment that may be introduced according to the conditions of use, climate and utilities sector.

### 1) The elements, or primary layers, of a green roof are:

- load-bearing element
- withholding element
- root barrier element (integrated or not)
- element of mechanical protection
- drainage element
- water accumulation element
- filter element
- soil layer
- vegetation layer

### 2) The secondary layers and complementary equipment making up a green roof are:

- steam barrier layer
- steam shield layer
- thermal insulation layer
- pitch layer
- priming layer

- continuity layer
- steam pressure diffusion and/or balance layer
- rigidity or load division layer
- separation layer
- protective layer
- ballasting layer
- erosion barrier layer
- irrigation equipment

### 3) Green roof accessory elements are:

- withholding elements for the soil layer
- withholding elements for the drainage elements
- vegetation anchorage elements
- fire barrier elements

It is clear that the single elements with different functions are subject to different standards according to their specific fields of application.

## Some of the standards in the field of roofing are:

ELEMENT	FUNCTION	APPLICATION	STANDARDS REQUIRING “CE” MARKING ON PRODUCTS
Withholding elements	Barrier	Roof covering	EN 13956
Root barrier element (integrated or not)	Root barrier	Roof covering	UNI EN 13948 + manufacturer's declaration of suitability of the membrane for green roof application
Drainage element	Drainage	Roof covering	EN 13252

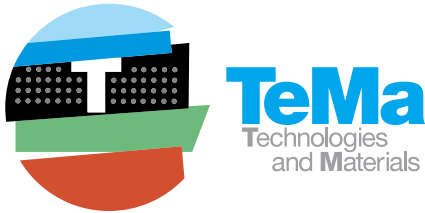
Failure to use “CE” marking violates the law regarding building materials. “CE” marking to standards different from those regulating the specific “function” for the particular “application” violates the law regarding building materials.

# T-Green Roof and photovoltaic panels

**Successful solutions for energy efficiency**







## Tema: technologies and materials for the building trade and environment.



There are basically two main aspects of building jobs and environmental engineering projects: what is visible, mainly aesthetic, and what is not visible, involving structural, protection, maintenance and safety elements. **Tema** has been dealing with the latter aspect for over 10 years and has distinguished itself for original application solutions (in many cases, strongly competitive), technological innovation and use of new materials.

**Tema** benefits from a modern production system based in Italy, Spain, Turkey, Romania and Russia. It operates daily in over 60 countries, where it is a protagonist on the market with solutions and products for drainage and insulation in the civil and residential building trade.

Just as important are the innovative solutions specially designed for big environmental projects: **Tema** offers the broadest and fullest range of draining geocomposites and three-dimensional erosion control geomats.

**Tema** is also distinguished for its research into new products, active involvement of designers and businesses, and assistance to customers at the planning and realization stages.

Cover: L'Oreal offices in Milan

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