TeMa
Technologies and Materials

HIGH BUILDING PROTECTION

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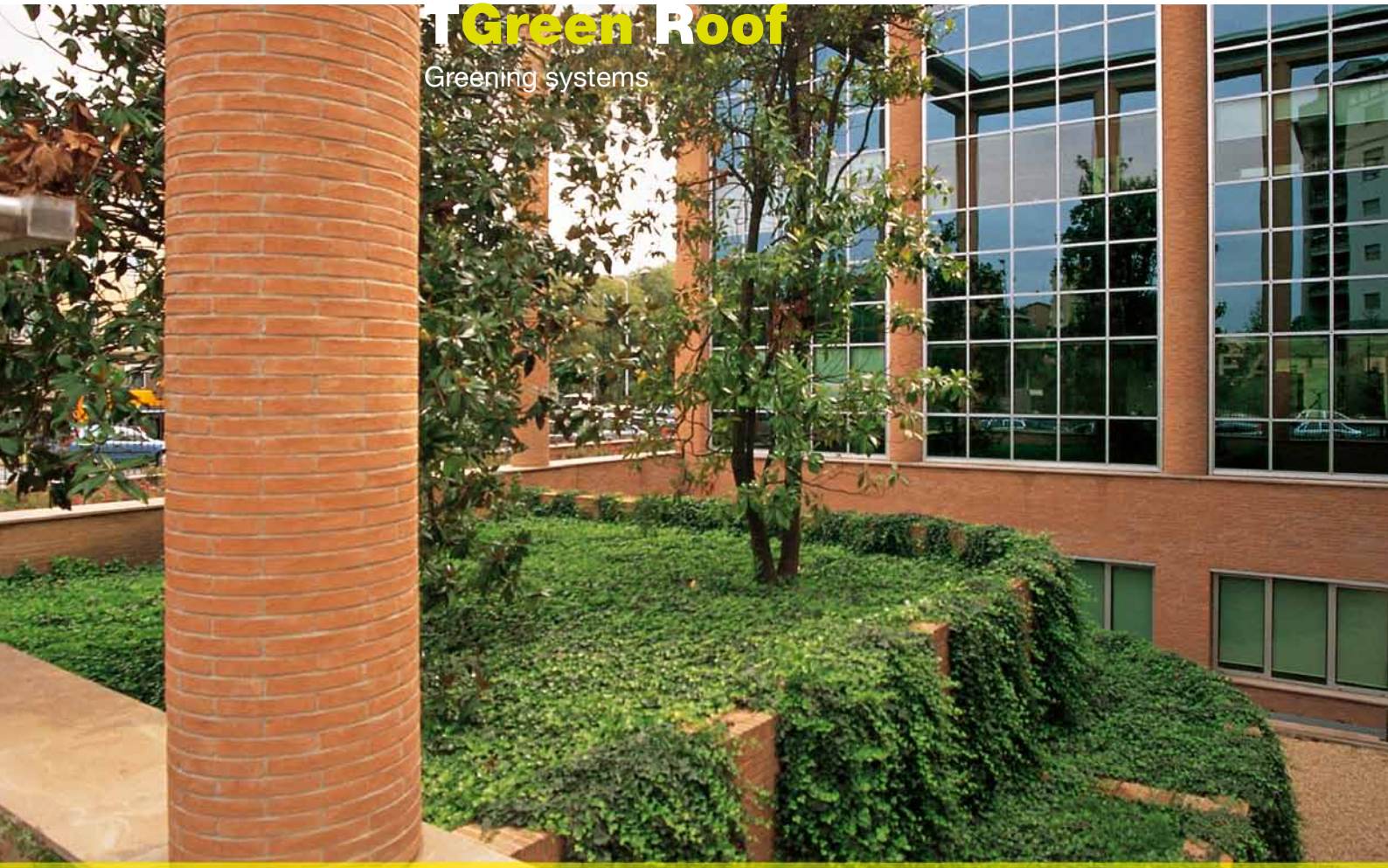
HBP
HIGH BUILDING PROTECTION



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

TGreen Roof
Greening systems

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

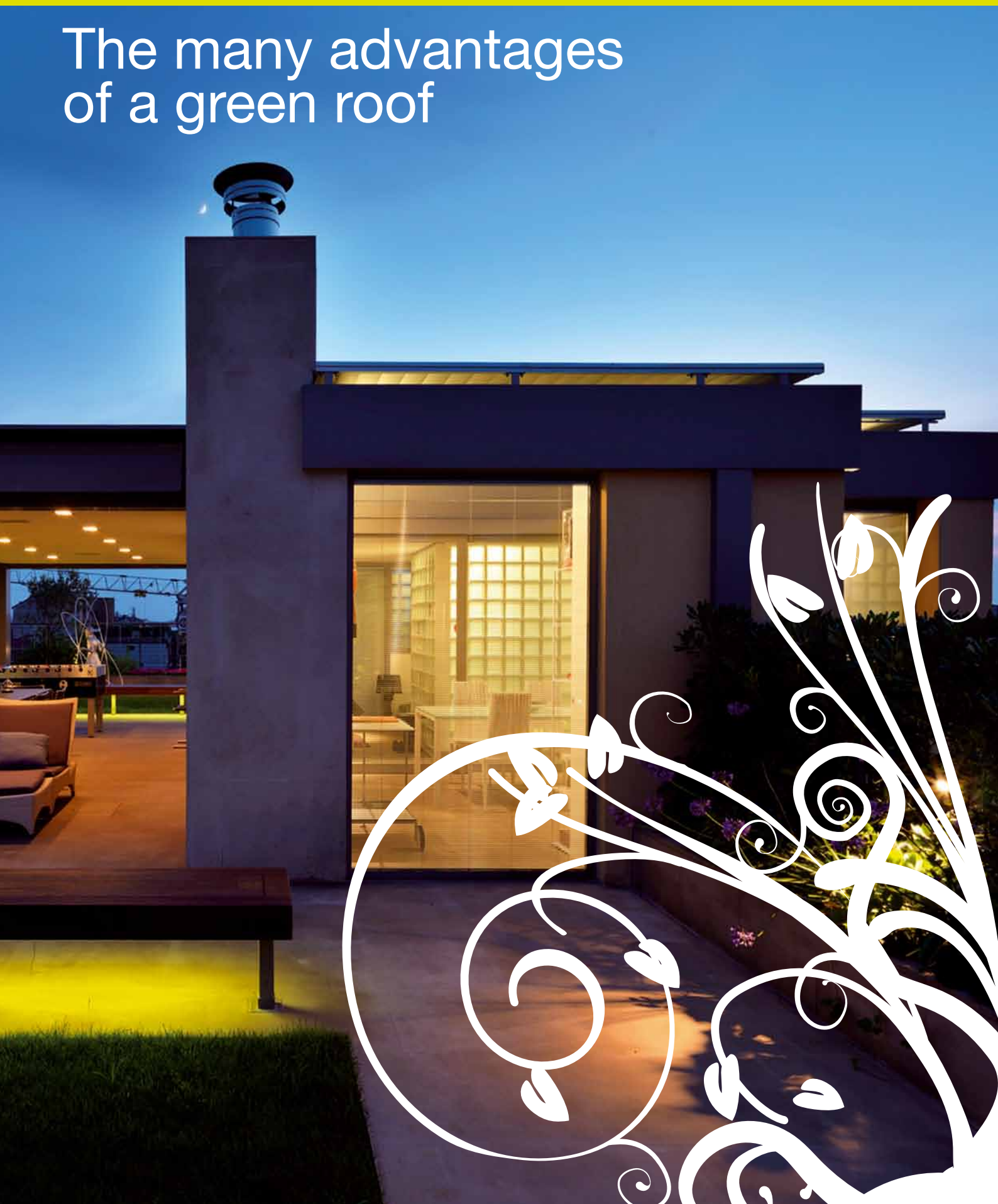
10 Increased value of building

photo: green roof – private dwelling

photo: green roof – private dwelling

TGreen Roof
Greening systems

The many advantages of a green roof



TGreen Roof
Greening systems

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.

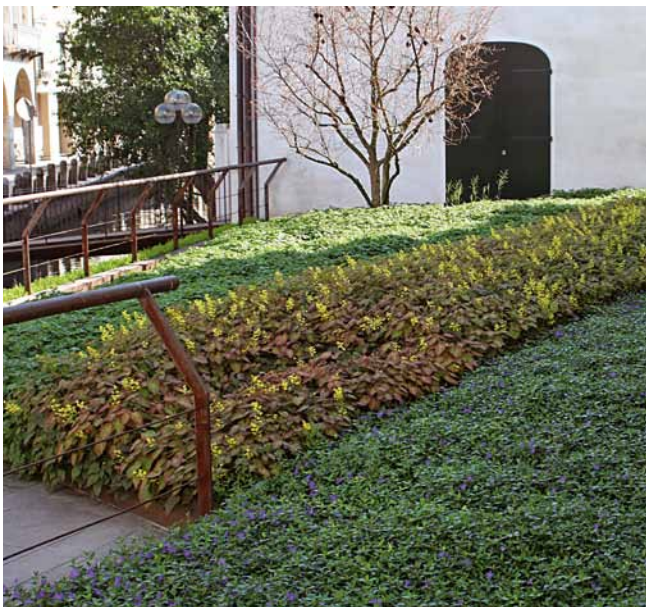


photo: green roof of Palazzo Bomben, Treviso

TGreen Roof
Greening systems

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

*The plants shown in the illustrations are indicative of possible combinations.

TGreen Roof
Greening systems

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

INTENSIVE

garden

robust

suitable for vehicles

INTENSIVE

flowery lawn

MAINTAINING THE GREEN SYSTEM

Green roofs have three different classes of maintenance:

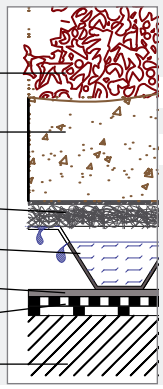
- **Class 1:** low maintenance (extensive)
- **Class 2:** average maintenance (semi intensive)
- **Class 3:** high maintenance (intensive)

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 m2.
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

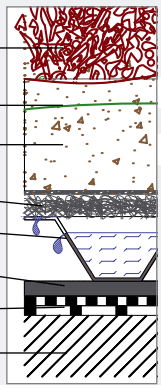
SLIGHT SURFACE PITCH < 5% (2,9°)

EXTENSIVE



	sedum	perennials/mix
Total thickness [cm]	12	14
weight* [Kg/m²]	122	148

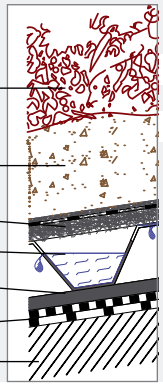
SEMI INTENSIVE



	lawn/flowery lawn
Total thickness [cm]	19
weight* [Kg/m²]	231

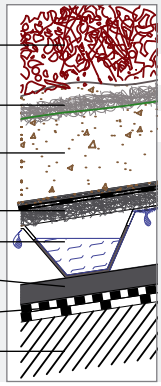
5% (2,9°) < AVERAGE SURFACE PITCH < 15% (8,5°)

EXTENSIVE



	sedum	perennials/mix
Total thickness [cm]	12	14
weight* [Kg/m²]	121	147

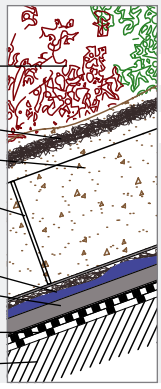
SEMI INTENSIVE



	lawn/flowery lawn
Total thickness [cm]	19
weight* [Kg/m²]	230

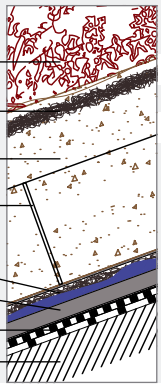
15% (8,5°) < STEEP SURFACE PITCH < 45% (24,2°)

EXTENSIVE



	sedum
Total thickness [cm]	12
weight* [Kg/m²]	151

SEMI INTENSIVE

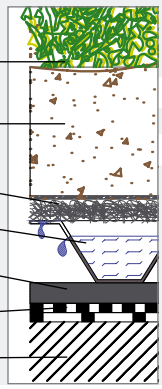


	mix
Total thickness [cm]	17
weight* [Kg/m²]	216

* weight of system with maximum retention.

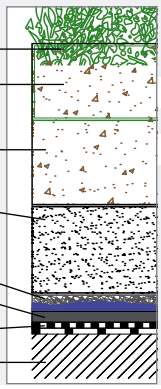
TGreen Roof
Greening systems

INTENSIVE



	garden/robust
Total thickness [cm]	24
weight* [Kg/m²]	302

INTENSIVE



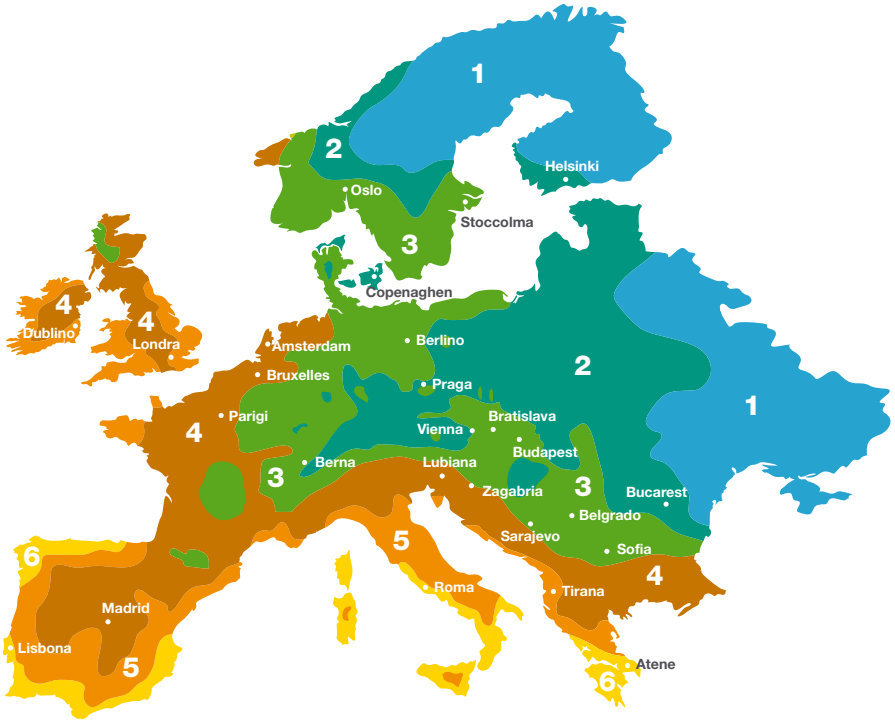
	suitable for vehicles
Total thickness** [cm]	> 22
weight** [Kg/m²]	> 455

** 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_2O saturated system [Kg/m²]
2. Total thickness of system [cm]
3. Compatibility with climate zone (for information contact the Tema engineering office).

ADAPTABILITY TO CLIMATE ZONES



Zone	Annual mean minimum temperatures
1	(-29/-23 C°)
2	(-23/-18 C°)
3	(-18/-18 C°)
4	(-12/-7 C°)
5	(-7/-1C°)
6	(-1/5 C°)

TGreen Roof
Greening systems

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.

photo: Green roof, Savno offices, Conegliano

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.

TGreen Roof
Greening systems

T-Green Roof and photovoltaic panels

Successful solutions for energy efficiency

TGreen Roof
Greening systems

TeMa
Technologies
and Materials

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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