

waterproofing systems

WATERPROOFING SYSTEMS WITH SYNTHETIC GEOMEMBRANES



BUILDING AND CIVIL ENGINEERING


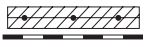






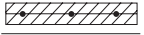

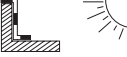














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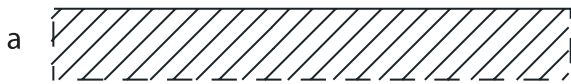
APPLICATIONS MAP

FLEXINE

| | ZM | ZF | VF | VI | GP | CC |
|---|---|---|---|--|---|---|
|  Foundations | |  | | | | |
|  No pedestrian traffic |  | | | | | |
|  Roof gardens | | | | |  | |
|  Vehicle traffic |  | | | | |  |
|  Pedestrian traffic |  |  | | | | |
|  Industrial |  | |  |  | | |
|  Replacement |  | |  |  | | |
|  Inclined | | |  |  | | |
|  Architectural | | | |  | | |



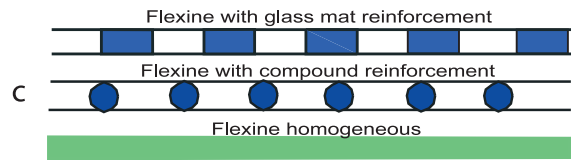
LEGEND – THE LAYER SYSTEMS



a - **Supporting structure** (concrete, wood, metal structure, cement clay mix).



b - **Protection and finishing layer:** protects the next layer from mechanical damage caused by irregularity and/or roughness of the laying surface (Geotextile).



c - **Waterproofing element:** applied as a single or double layer to make the covering system waterproof. The membrane is laid loose dry (and later ballasted), nailed or glued to the laying surface.



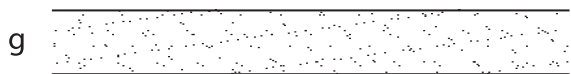
d - **Filtering layer:** in the case of a mobile ballast the filtering layer withholds sand, mud, stones and debris that may come into contact with the waterproofing membrane and flow into the drain (Geotextile).



e - **Mobile ballast:** consists of loose round washed gravel (the quantity used must provide adequate resistance to the wind).



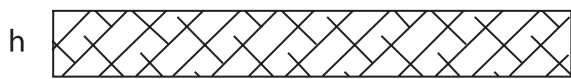
f - **Anti-penetration layer:** prevents adherence of the cement screed and/or the flooring bed to the protection layer, improving differentiated creep between the rigid ballast and the rest of the waterproofing system (LDPE, paraffin paper etc.).



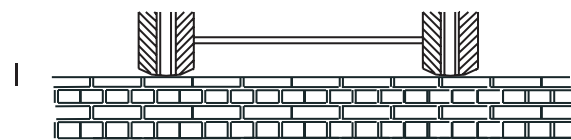
g - **Fixed ballast:** consists of a cement screed and/or flooring.



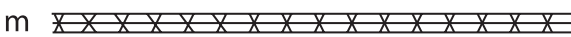
h - **Protective screen** and load division in suitably reinforced concrete.



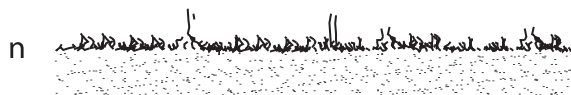
h - **Protective ballast:** in cement with or without reinforcement.



l - **State of vehicle traffic wear:** (road asphalt, cement screed etc.)



m - **Draining layer:** permits drainage of water preventing dangerous build-up of water for crops (geocompound tnt + geonet + tnt).



n - **Planting earth.**



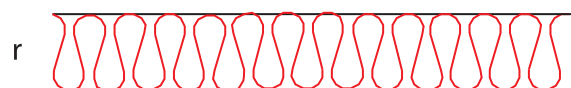
o - **Linear Mechanical fixing:** (with pre-drilled bars and fixing elements) or in points with fixing elements and plates to subdivide tear strain, designed to fix the membrane to the laying surface; this must be applied according to a specific calculation that determines the quantity and distribution on the laying surface.



p - **Gluing element:** consists of a specific glue selected according to the layer system as a whole and operating conditions of the covering to ensure complete and lasting adhesion to the laying surface and resistance to wind.



q - **Screening layer or vapour barrier:** reduces according to its permeability the quantity of vapour that migrates from the interior of the building to the dew point position of the floor triggering the risk of condensate in an undesirable point (as per the thermal-moisture balance calculation which can be carried out by our Technical Office on request).



r - **Insulating layer:** with different densities and thicknesses as per the calculation of the thermal, mechanical resistance etc. for the covering plate in accordance with the thermal-technical project.



BUILDING AND CIVIL ENGINEERING

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WHY CHOOSE



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Modified polyolefin alloys which undergo a special production process to make them flexible, are the main raw material used for FLEXINE membranes together with a varying percentage of stabilizing and pigments.

This composition does away with the need for plasticizing substances making the product more durable and decidedly not aggressive to health and the environment.

In the life cycle of the membrane from production to its disposal, no plasticizing substances of any kind or dangerous fumes during incineration are released not even when the sheets are hot laid. Production scraps are easy to recycle and the chemical compatibility of the product with many materials in which it comes into contact reduces the number of extra layers required and consequently the quantity of other substances required.

FLEXINE contains no:

- Halogens: which produce toxic, irritating and corrosive gases in the case of fire or high temperatures
- Biocides: used in other products to reduce aggression by micro-organisms and roots
- Heavy metals
- Chlorine
- Zinc
- Plasticizing agents in general

Choosing FLEXINE means opting for a product with the advantages of a synthetic covering that is also environmentally friendly and durable.

THE RANGE

The FLEXINE line of membranes for the civil and industrial building trade includes specific products for all water protection requirements; each and every membrane is designed as a fast, safe waterproofing membrane at an excellent quality/price ratio.

FLEXINE ZM (Mobile Ballast):

for flat or slightly inclined coverings with mobile gravel ballast, floating floors etc.: these coverings are subject to weather conditions of all kinds and must therefore be resistant to UV rays, mechanical stress, perforation and also have high dimensional stability.

FLEXINE ZF (Fixed Ballast):

for flat or slightly inclined coverings with fixed ballast such as cement screed, flooring keyed on mortar etc. The membrane is not exposed to weather but should have excellent mechanical and anti perforation properties and be thick enough to offer protection against accidental abrasion, cuts etc.

FLEXINE VF (Visible, Fixed Version):

for flat (or non flat) coverings or those with low-medium inclination with visible membrane fixed to the laying surface by spot or seamless linear mechanical fixing means. The exposed membrane must be resistant to UV rays and wind and have excellent mechanical and dimensional stability properties to ensure a good finish. The range of colours make this an attractive waterproofing membrane.

FLEXINE VI (Visible, Glued):

for flat (and non flat) coverings or those with low-medium inclination with visible membrane glued to the laying surface. These membranes offer excellent resistance to UV rays and dimensional stability and a very attractive finish; the membrane is fully glued to the laying surface and available in different colours to ensure that the waterproofing membrane blends with the architecture of the building.

FLEXINE GP (Roof garden):

for flat and slightly inclined laying surfaces to be used as roof gardens, The water proofing membrane must be extremely resistant to aggression by roots without the addition of substances that prevent growth or damage plants. It must also have good chemical inertia properties to make the waterproofing compatible with the chemical substances generally used in gardens (herbicides, fertilizers etc.)

FLEXINE CC (Vehicle Traffic):

for flat and slightly inclined coverings to be used as parking areas or for vehicle traffic; the waterproofing membrane must be thick and have excellent mechanical resistance as well as good resistance to accidental contact with hydrocarbons, oil and other substances from vehicles



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THE LAYER SYSTEMS

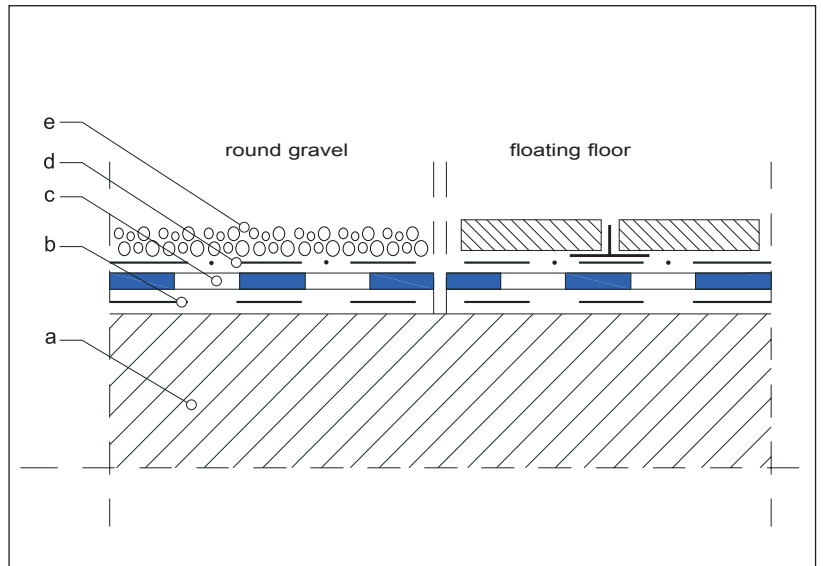
The most common layer systems used for waterproofing membranes consisting of synthetic and/or insulating membranes for coverings in civil and industrial building are indicated below:

1. Cold roof
2. Hot roof
3. Inverted roof
4. Sandwich roof

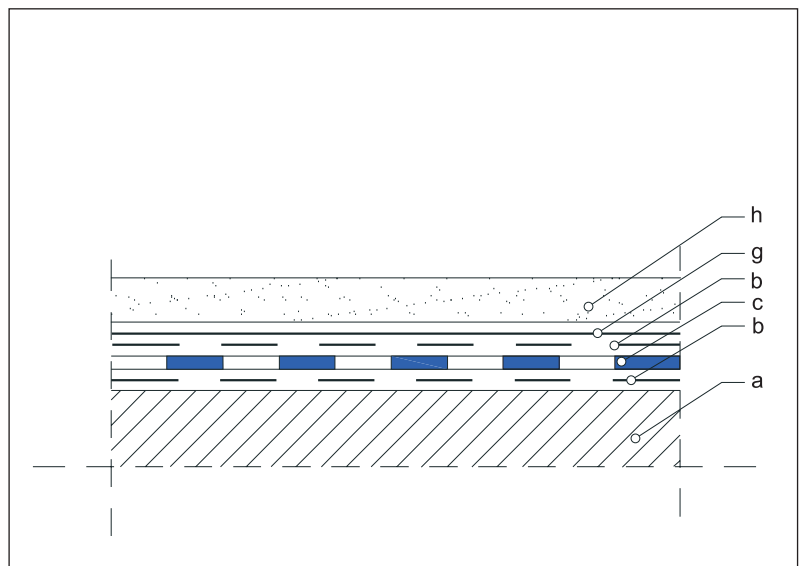
Different roofs and/or specific problems may be examined with our Technical Office to find the most appropriate solution for your project.

COLD ROOF WITH BALLASTED MEMBRANE

With mobile ballast
FLEXINE ZM

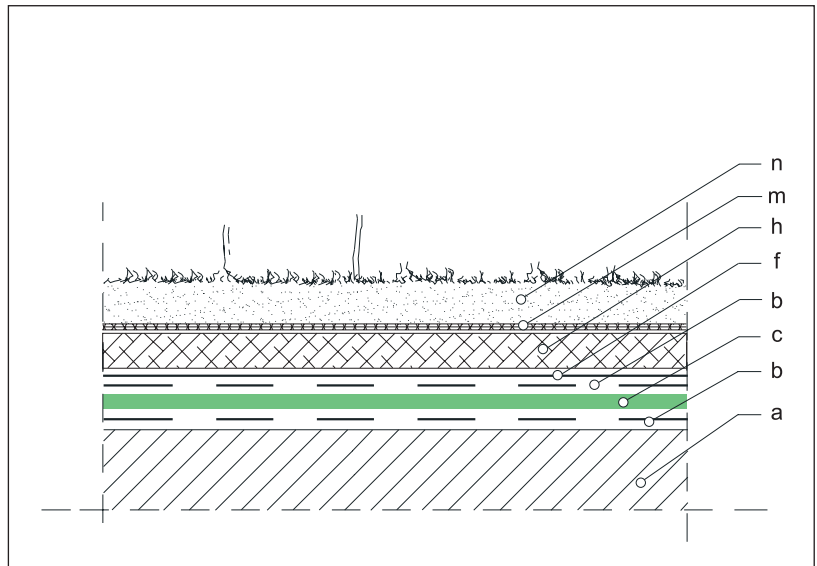


With fixed pedestrian traffic flooring
FLEXINE ZF

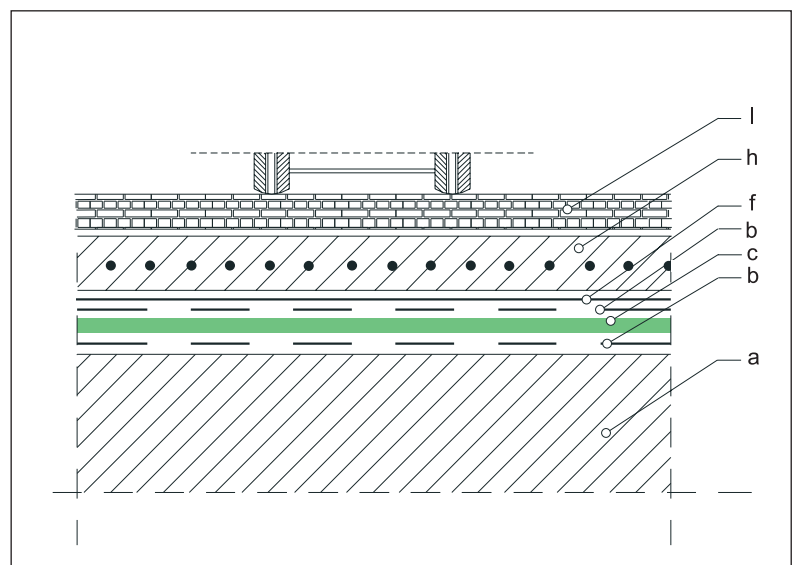


COLD ROOF WITH BALLASTED MEMBRANE

With garden roofs
FLEXINE GP



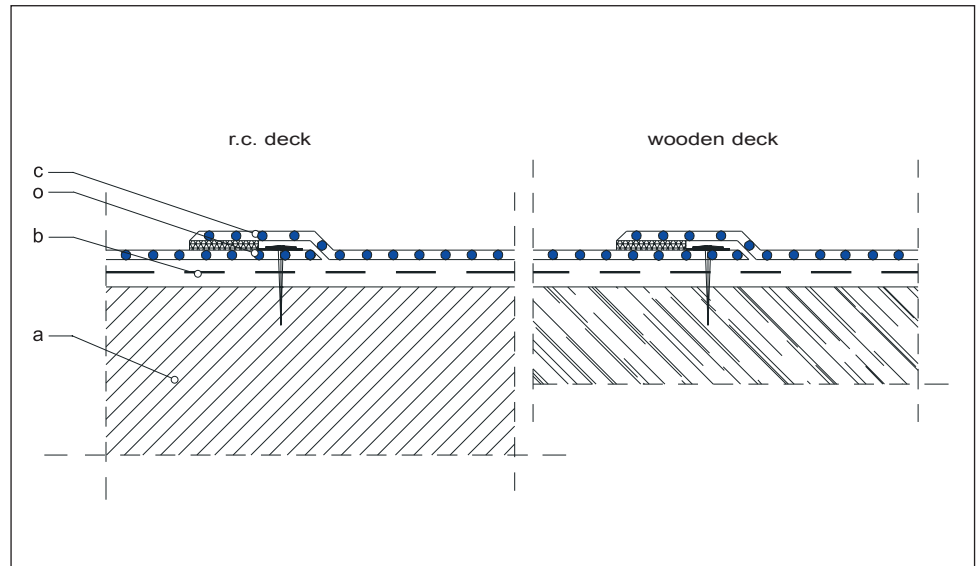
with fixed vehicle traffic flooring
FLEXINE CC



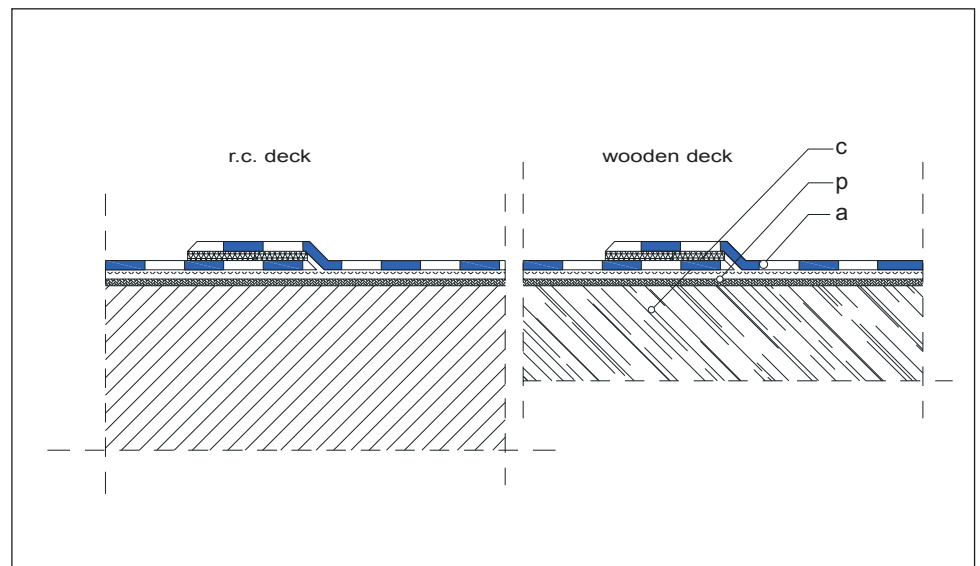
COLD ROOF

COLD ROOF WITH VISIBLE MEMBRANE

Fixed mechanically
FLEXINE VF



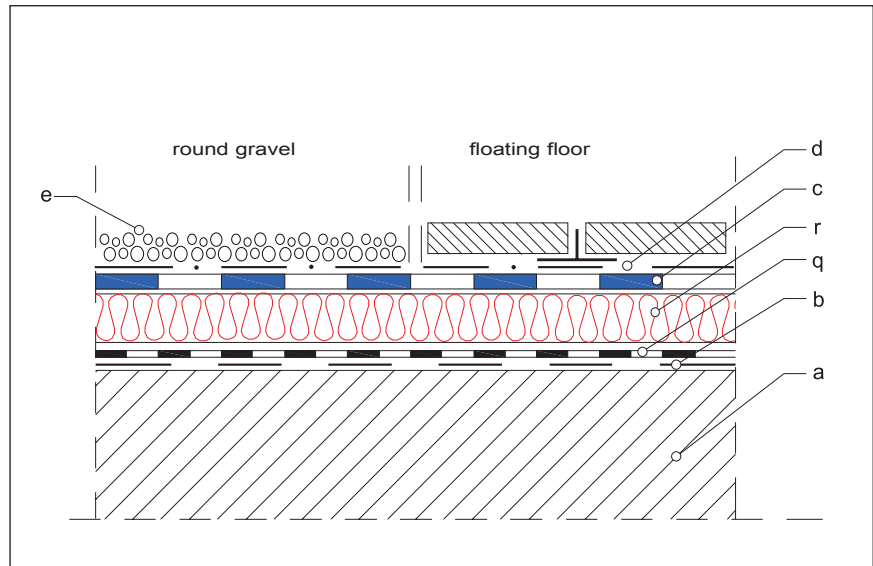
Glued
FLEXINE VI



COLD ROOF

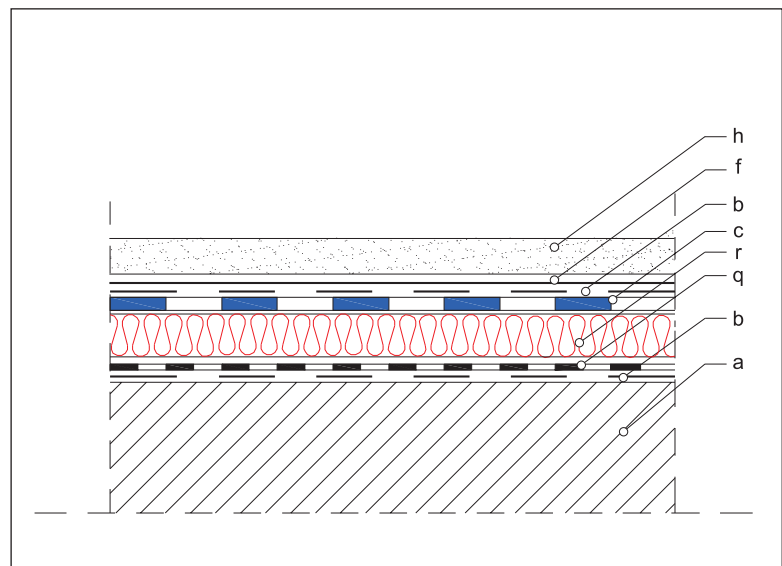
HOT ROOF WITH BALLASTED MEMBRANE

With mobile ballast
FLEXINE ZM



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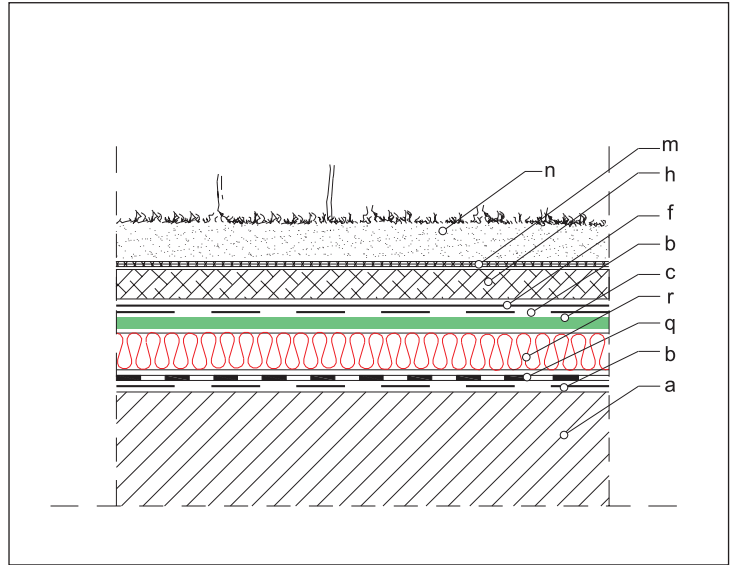
With fixed pedestrian traffic flooring
FLEXINE ZF



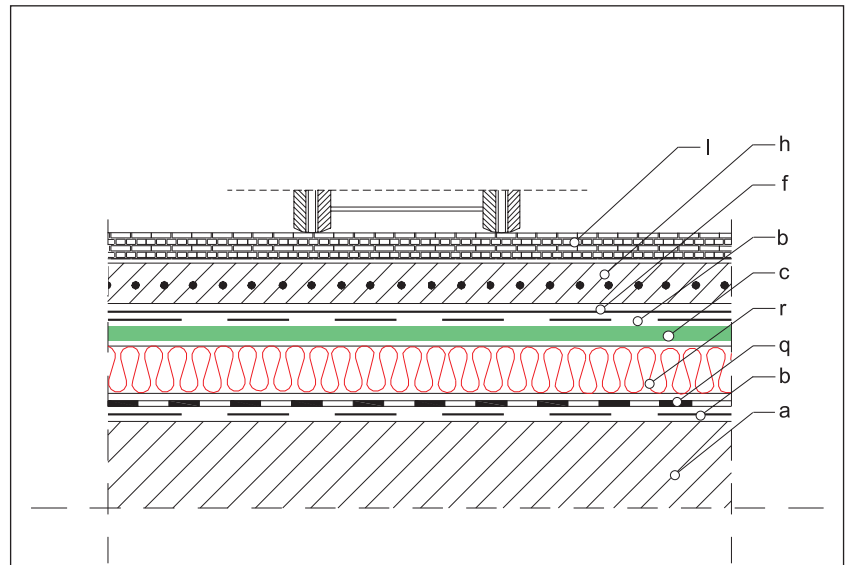
HOT ROOF

HOT ROOF WITH BALLASTED MEMBRANE

With garden roofs
FLEXINE GP



With fixed vehicle traffic flooring
FLEXINE CC

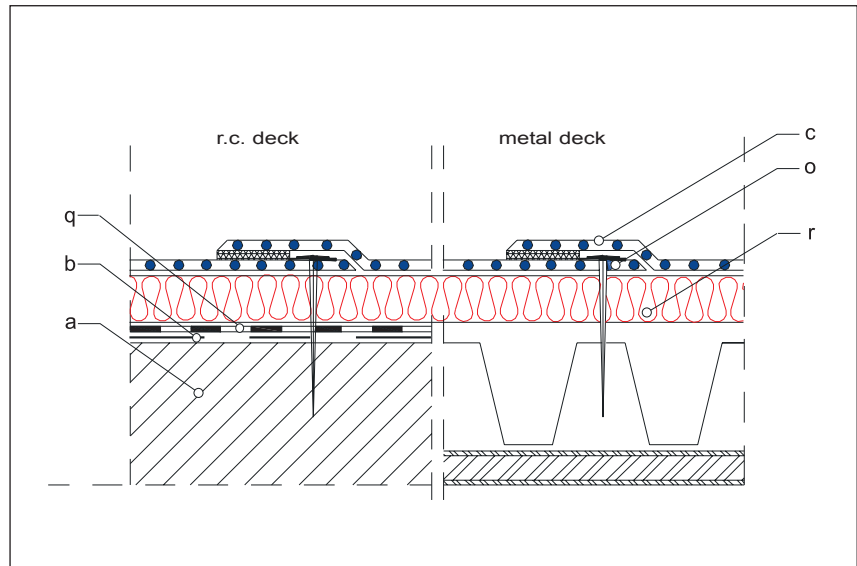


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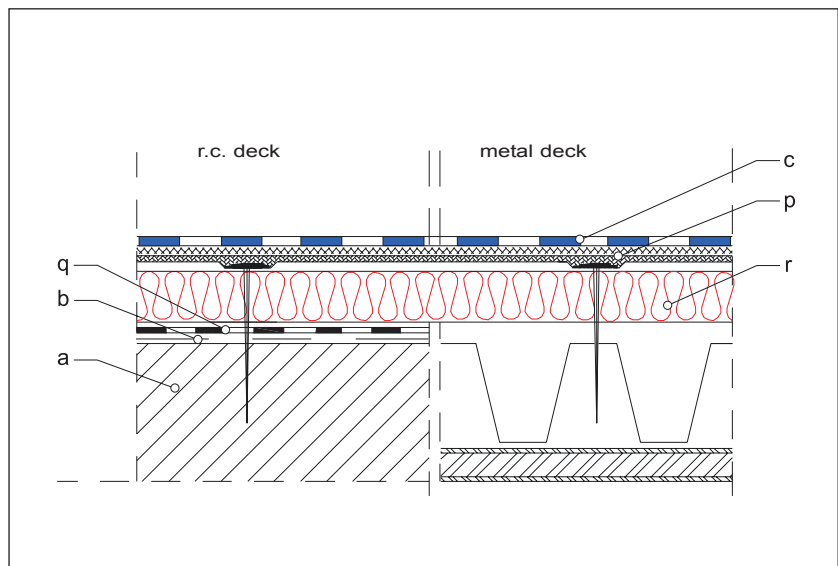
HOT ROOF

HOT ROOF WITH VISIBLE MEMBRANE

Fixed mechanically
FLEXINE VF



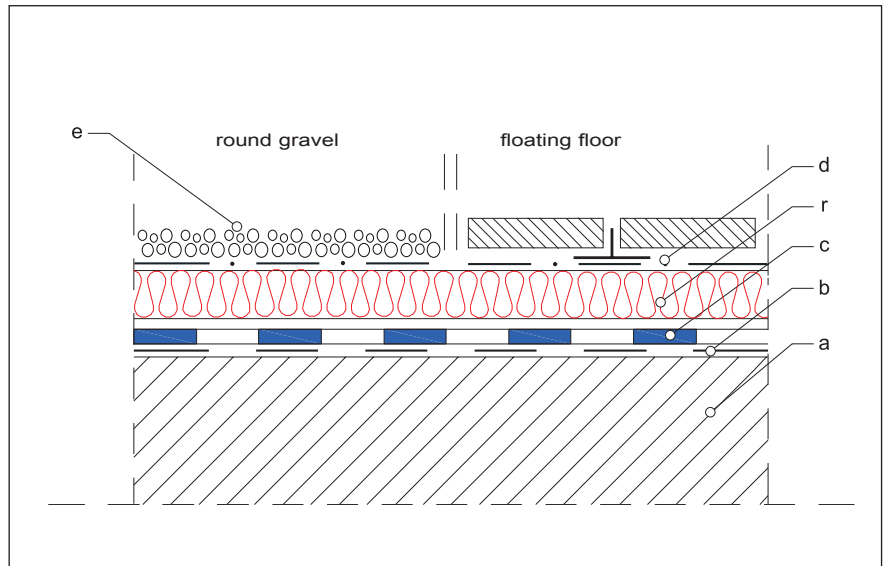
Glued
FLEXINE VI



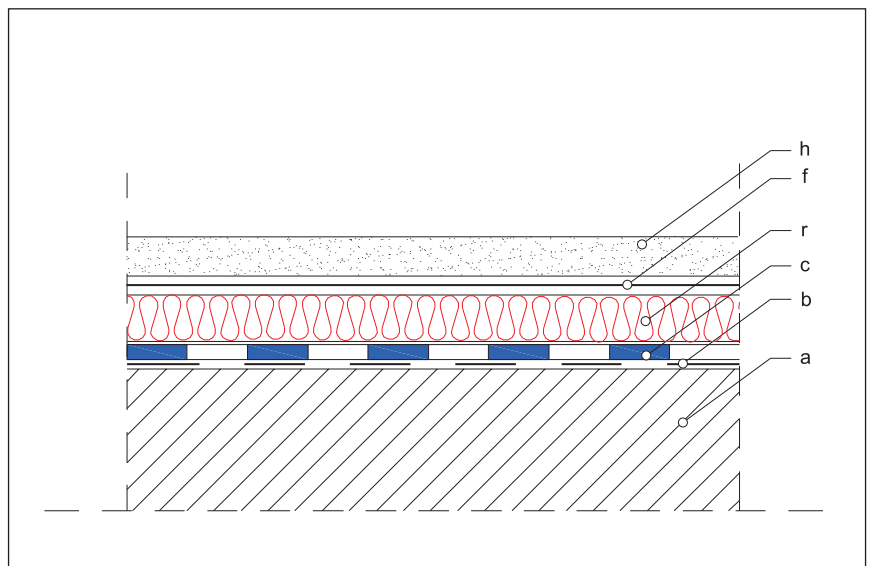
HOT ROOF

INVERTED ROOF WITH BALLASTED MEMBRANE

With mobile ballast
FLEXINE ZM



With fixed pedestrian
traffic flooring
FLEXINE ZF

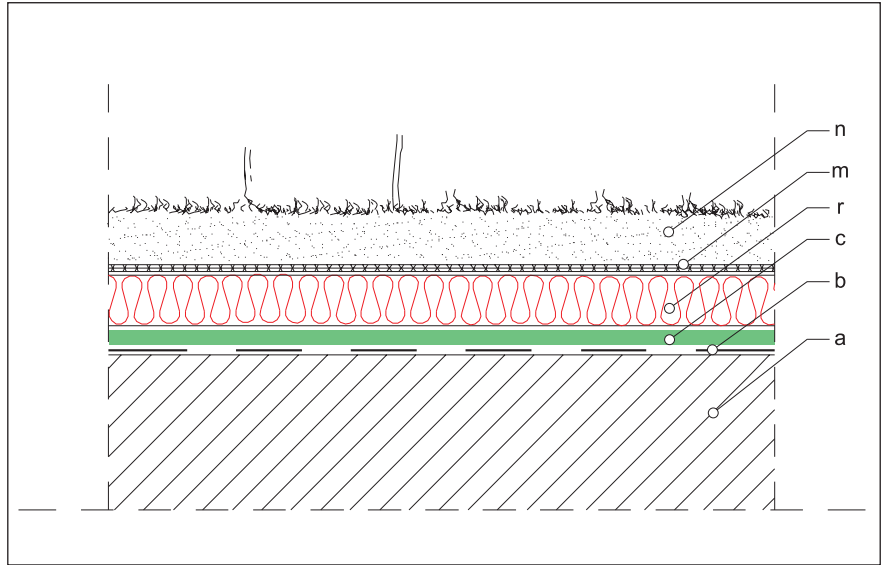


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INVERTED ROOF

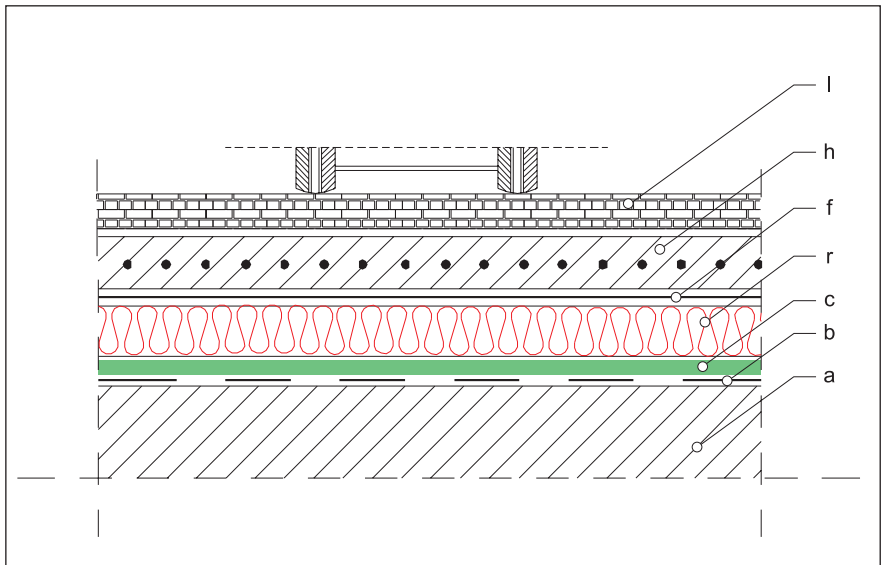
INVERTED ROOF WITH BALLASTED MEMBRANE

With garden roofs
FLEXINE GP



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With fixed vehicle
traffic flooring
FLEXINE CC

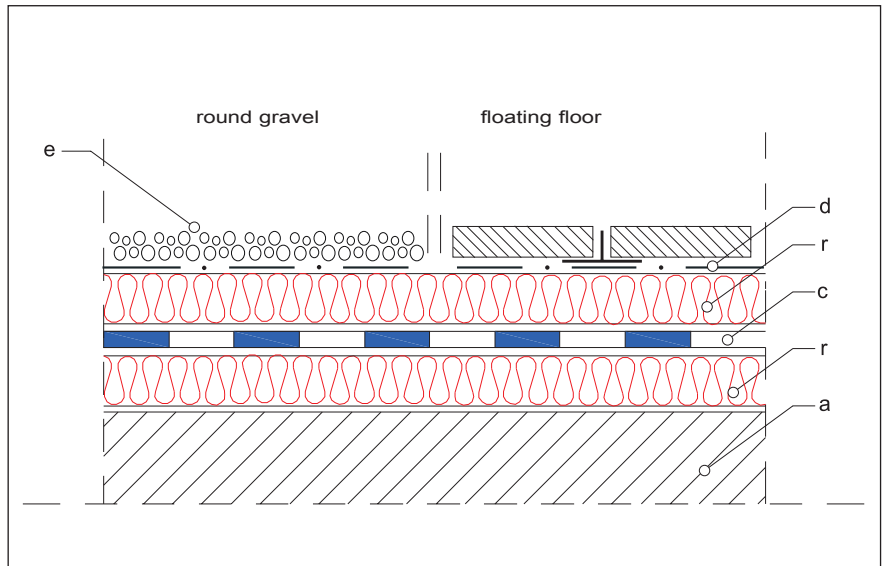


INVERTED ROOF

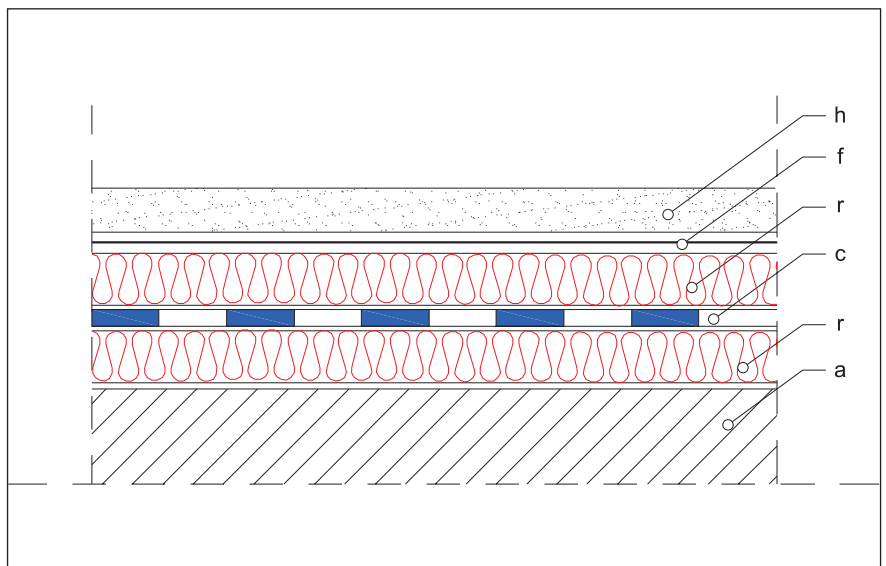


SANDWICH ROOF WITH BALLASTED MEMBRANE

With mobile ballast
FLEXINE ZM



With fixed pedestrian
traffic flooring
FLEXINE ZF

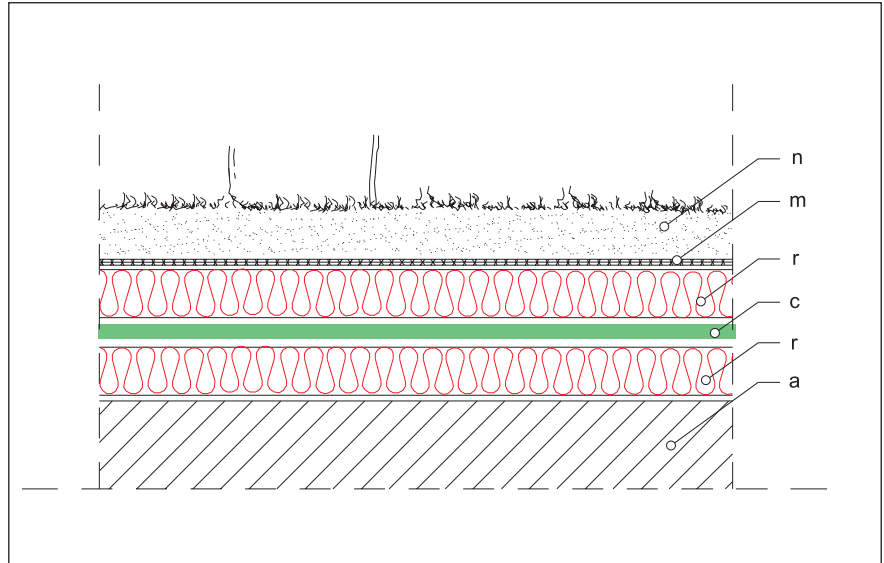


SANDWICH ROOF



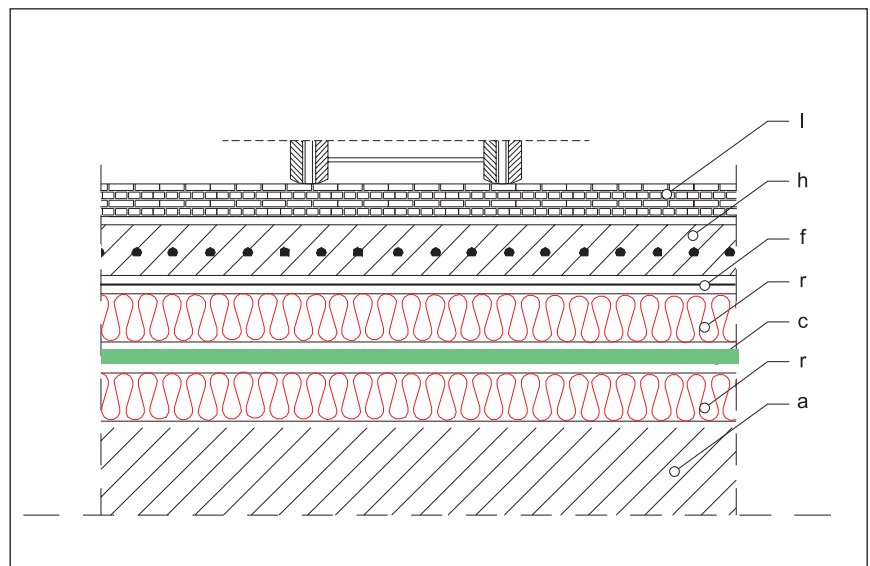
SANDWICH ROOF WITH BALLASTED MEMBRANE

With roof gardens
FLEXINE GP



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With fixed pedestrian
traffic flooring
FLEXINE CC



SANDWICH ROOF

THE COMPLEMENTARY LAYERS

The classification and definition of the most common complementary layers used to produce a waterproofing layered system with synthetic membranes may be summarised as follows:

■ **Protection and finishing layers:** Geotextiles and mats with different structure and chemical composition which prevent mechanical aggression to the adjacent layers such as compression, abrasion, cuts, breakage etc.; these must be selected specifically for the project requirements;

■ **Separation layers:** Geotextiles, glass mat, polythene film, etc. which eliminate the dangerous effects of chemical incompatibility between the layers in the system;

■ **Creep layers:** mainly Geotextiles that separate the waterproofing system from the other layers (which might pull the membrane due to structural movements and/or thermal expansion);

■ **Filtering and/or drainage layers:** Geotextiles, rigid panels etc. that prevent inert materials, sand and debris from coming into direct contact with the waterproofing membrane; these layers help to protect the membrane from mechanical damage and allow water to flow to the drainage system.

■ **Anti-penetration layers:** bitumen coated and/or paraffin felt paper polythene film are indispensable when a fixed ballasting layer is laid and might adhere after casting to the bottom layers dragging and scraping them as they move.

■ **Screening Layer and Vapour Barrier:** polythene film, bitumen membranes with or without aluminium sheet etc.; when choosing these layers remember to take into account the specific requirements of the project which cause the thermal and moisture conditions of the covering system and the permeability to vapour of the FLEXINE membranes;

■ **Thermal and sound insulation layers:** generally these are panels made of different materials. These are resistant to mechanical stress (above all compression) which reduce the thickness to the detriment of the insulating characteristics. Insulation that may come into contact with rainwater (inverted and sandwich roofs) should be selected according to its anisotropic capacity.

■ **Mobile ballasts, flooring, wear and tear layers, treading surface, rigid protection, earth etc.** mainly layers that complete the system selected according to the final use of the covering.



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THE ACCESSORIES

In covering systems, it is not only important to install the layers in the right order and select the most appropriate FLEXINE membrane but equally important to lay the waterproofing membrane very carefully; training courses on application and welding techniques and the relevant attendance certificate that Casali issues are a guarantee of the professional skill of the installers.

In order to lay perfectly impermeable coverings which are easy to inspect even after a long period of use, it is necessary to use accessories designed specifically for special requirements:

- **Special pieces:** indoor and outdoor corners, air vents, antenna holders and circular fluorescent fittings which are moulded with the raw material used for the basic FLEXINE membrane and hot welded to the membrane to ensure a perfect seal in any condition.
- **Drainage traps:** circular or square in different dimensions with vertical and/or sub-horizontal exhaust to couple the membrane to the rainwater drain complete with leaf and gravel grids.
- **Coated profiles:** in galvanised steel coupled to the FLEXINE membrane in order to couple the vertical embossments to the laying surface. The profiles are fixed mechanically to the perimeter wall and structural elements, and make it possible to hot weld the waterproofing membrane; after sealing with elastic sealant (if necessary) these give a secure and lasting finishing system.
- **Coated sheet plate:** in steel coupled to FLEXINE membranes; supplied in sheets to produce profiles having particular cross-sections.
- **Fixing profiles:** in suitably thick galvanised steel without sharp edges and holes, these are required for the linear mechanical fixing system.
- **Adhesives:** with different chemical composition designed for different requirements and recommended by our technicians for specific uses.
- **Laying tools:** manual and semi-automatic welders, rollers etc.; optimise laying times and help to ensure a perfect job.



THE FIXING SYSTEMS

The final visible waterproofing membrane of the covering system may be fixed as follows:

■ mechanical fixing means

- **Linear:** consists of fixing with screws, nails, blocks etc metal profiles with holes which are laid directly on the waterproofing membrane, making holes on the membrane and covering the profile with a strip of FLEXINE welded to the membrane of the layer to restore the seal;

- **Discontinuous:** the membrane is fixed with special elements over plates and/or washers to prevent tearing, generally along the edge of the sheet which is then overlapped by the next sheet.

The choice of fixing system depends on the wind force according to the exposure, height and geographic location of the building etc.

Please ask our Technical Office to develop a specific project to calculate the quantity, distribution and fixing means if no specifications are available.

■ gluing:

the FLEXINE membrane which is supplied in this case with fabric coupled to the bottom surface, is fully glued to the underlying layer which should be perfectly joined to the membrane when it is not the supporting slab. The choice of glue, generally a water-based polyurethane glue, depends on the layer that supports the FLEXINE membrane.

The membrane is glued when it is necessary to obtain an attractive and perfectly adhering finish which enhances the architectural appearance of the covering, or as an alternative to mechanical fixing.

When the vertical embossments are visible or exposed to wind, they should always be fixed to the perimeter walls and structural elements; in this case the FLEXINE membrane (with or without fabric support) will be glued using a specific contact adhesive.



SERVICING

The Servicing Department:

Casali's technicians provide assistance for all the different stages of instalment of the covering:

- contacts with the project technicians and companies to study the most appropriate layer system
- collaboration with the installer to define the economic aspects of the project
- verification of the risks of condensation in the covering system
- study of a mechanical fixing system
- direct assistance on site during laying operations
- inspections for replacement of coverings
- inspections to find the causes of infiltration
- theoretical and practical training courses for operators on site or at the Casali factory

We guarantee our assistance because we believe that the security of the waterproofing depends not only on the use of quality membranes but also on proper design and installation care.



NOTES

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