



MAINTENANCE MANUAL



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INTRODUCTION

General Membrane's maintenance manual has the purpose of planning and documenting a suitable routine maintenance plan for the roofing system, protecting the user within the scope of the uses envisaged by the design, thus helping the user perform the operations required to keep the roofing system in perfect condition and therefore efficient over time. The most frequent cause of premature decay of a waterproofing system is given by the lack of a maintenance plan or by failure to carry out the simple routine maintenance operations described here, according to the intervals indicated. Before explaining the routine maintenance specifications and the maintenance plan for the roofing system, some basic aspects must always be taken into account during the entire service life of the roofing system.

BASIC ASPECTS

Use of the roofing system

The roofing system must be used for its stated use. Each roofing system designed by General Membrane or by a qualified professional, in all the functional layers it is made up of, must have a specific use, i.e. a specific intended use. The main types of intended use for roofing systems - with or without a thermal Insulation system - are the following:

- roofing systems completely exposed that cannot be walked on;
- ballasted roofing systems (gravel, clay) that cannot be walked on;
- roofing systems that can be walked on with tiles or fixed or mobile flooring;
- roofing systems that can be driven on with light or heavy vehicles;
- roofing systems for green roofs or roof gardens;
- roofing systems designed to accommodate photovoltaic systems.

It is therefore essential for the owner of the roofing system to always use it for the intended use for which it was designed. For example, flat roofing systems that are completely exposed and that cannot be walked on, with access only for routine maintenance or for the installation of technical systems, must not be walked on frequently. Failure to comply with this essential rule could compromise the watertightness of the roof over time, resulting in the need to perform extraordinary maintenance operations to restore the initial safety conditions.



Changing the intended use of the roofing system

The operations to change the intended use of a roofing system must be preceded by an accurate evaluation of the change of “intended use” and by the prior authorisation of the specialised installation company that will carry out the works, or its involvement, to provide for or dictate the operations required to make the roofing system suitable for the “different intended use”. New uses of the roofing system other than those envisaged during the design phase may be allowed only after evaluating the conditions of the roofing system and after implementing the necessary changes to make it suitable for the new use. The changes to be made on the sealing element (eliminating or building chimneys, closing or opening drains, skylights, hatches, etc.) must always be approved by the installation company, which in any case can only operate on the elements or layers that make up the waterproofing system installed. All actions must be carried out in agreement between the designer and the installation company that installed the waterproofing system.

Designing the roofing system

The correct design of the roofing system (UNI 8178), together with a workmanlike installation (UNI 11333/1-2) and the periodic performance of routine maintenance operations, are necessary and sufficient conditions to ensure the high performance of the waterproofing system over time. In addition to this, except for exceptional events, it will be possible to avoid subsequent extraordinary maintenance interventions, usually caused by failure to perform the operations mentioned above. The roofing system is designed by General Membrane’s technical department with specific requirement and installation specifications, or by qualified professionals supported by General Membrane. In any case, all solutions must meet the minimum requirements of the state-of-the-art or exceed them. The correct design of a roofing system, including its components and installation method, is the final result of a decision-making process that has taken into account the following parameters:

- the intended use of the roofing system;
- the intended use of the underlying rooms;
- the type of building to be waterproofed;
- whether or not it is necessary to thermally insulate the roof;
- the correct thermohygrometric balance;
- the climatic and meteorological characteristics of the site, with particular reference to the wind force in that area;
- the subsequent operational accessibility to the roof to be able to perform the maintenance operations in safe conditions for the operator.



MAINTENANCE AND SPECIFICATIONS

Based on the UNI 11540 guideline, this maintenance manual provides useful information to prepare and implement the routine maintenance plan of continuous roofing systems made with flexible waterproofing membranes.

Operational liability

The designer of the roofing system must draw up the maintenance plan and the Works Manager must make sure that it is correct. The routine maintenance operations are the responsibility of the user. Failure to comply with the maintenance plan may result in uncontrolled problems, which may cause serious damage and lead to possible legal disputes. The user is advised to keep the maintenance plan with the relative documents and appropriate updates.

Execution: installation company

General Membrane advises the user to assign the task of carrying out the maintenance operations directly to the company that installed the waterproofing system, since they have direct knowledge of the roofing system in question and of the system implemented, of the relative technical details and of the relative practicability limits, which allow for the maintenance activities to be planned correctly and performed in a workmanlike manner, provided that the following conditions are met:

- it is an installation company that can offer a customised maintenance contract with a workforce in accordance with standard UNI EN 11333;
- it is a specialised company that can intervene immediately and adequately if there are particular problems or restoration needs that may arise while performing maintenance operations.

It should also be noted that - regardless of the content of this manual - the installation company is civilly liable (art. 1667 and 1669 of the Italian Civil Code) for any damage due to incorrect installation or defects in the products used in the roofing system.



Minimum requirements of the maintenance plan

The maintenance plan provides, plans and schedules the maintenance activities of a construction in order to maintain its functionality, quality characteristics, efficiency and economic value over time. There are two maintenance levels:

- Level “1” normal;
- Level “2” optimal.

Level 2 is always required in the case of public and/or artistic interest or when the area is greater than 3000 square metres. The maintenance operations (both routine and extraordinary) are recorded in the maintenance log and are carried out by the Installation Company or by another company with requirements recognised by standard UNI EN 11333, officially appointed by the user, always respecting the different skills regarding routine maintenance and extraordinary maintenance. The maintenance plan consists of the following operational documents:

a) User manual:

It provides essential information to know how to best use the roofing system, limit any damage due to improper use and the routine operations required to preserve and maintain its functionality. The user manual must contain at least the following information concerning the roofing system:

- Where the parts mentioned are located in the building, with the identification of the different roofing areas the maintenance plan refers to;
- A graphic representation of the different roofs of the building;
- The composition of the roofing system and its elements, indicating the type of product/material, the thickness and installation method used, with the technical data sheets attached;
- The identification and indication of potential sources of aggressive agents, located on the roofing system and/or near it (gaseous fumes, fluids, dust, etc.);
- As far as possible, any incompatibilities and attention regarding the products and/or equipment to be used for the routine maintenance of the roofing system.

The user manual must also include the name and contact details of the maintenance service manager. The contents of the user manual do not differ for level 1 and level 2.



b) Maintenance manual:

It must provide the information necessary for correct maintenance, as well as the use of specific assistance and service staff. In the case of maintenance level 2, the manual must contain more information. Please refer to standard UNI 11540. The maintenance manual must be gradually updated following the changes made to the roofing system. Any anomalies found during the initial inspection, when the maintenance plan is accepted, must also be reported. The same manual must also include the name and contact details of the maintenance service manager and a copy of the maintenance contract may be attached.

c) Maintenance plan:

The maintenance operations must be performed at pre-established intervals or as required, in order to ensure the correct management of the roofing system during its service life. The maintenance plan indicates the different operations in chronological order, in order to provide information for the correct preservation of the roofing system. It also considers the actual visibility and accessibility of the individual elements or layers it is made up of. The maintenance plan refers to what is defined in the maintenance manual in terms of minimum performance and anomalies that may be found and contains:

- The checks to be performed
- The type of resources required (maintenance operations that can be performed directly by the user or by specialised personnel)
- Minimum frequency of the check
- Method and type of the intervention.

The contents of the maintenance plan do not differ for maintenance level 1 and for level 2. The maintenance plan must indicate the correct chronological order of the operations performed on the roofing system, with an indication of the changes made and of any anomalies found. For this purpose, the maintenance log, which collects this information, must be attached to the maintenance plan.

The restoration interventions to be performed on the roofing system, or on the individual elements or layers it is made up of, must always be preceded by a diagnostic phase and by possible monitoring during which the causes of the anomaly are identified, so that the intervention actually solves the problem and is effective.

Also in the event of an anomaly not directly related to the watertightness of the roof, the Customer must nevertheless be notified.

The roofing system booklet

The Maintenance Log of the Roofing System is part of the Roofing System Booklet, also kept by the User. The Roofing System Booklet collects all the data of the roofing system, according to its complexity (non-exhaustive list):

- Roofing system delivery and testing reports;
- Warranties and insurance issued on the roofing system;
- Declaration of conformity of the roofing system;
- List of materials used to build it, associated with the technical data sheets of the materials complete with the relative maintenance booklets;
- Roofing system specifications/designs, in their updated version;
- Position of the photovoltaic system (for waterproof roofing systems - photovoltaic) and all the data and designs relating to the electrical parts;
- Plan and section of the roofing system, in their updated version (it is advisable to also have the updated cad file in a computer-readable format);
- Photographic documentation of the roofing system delivered;
- Updated copy of the list of companies, indicating the company that installed the waterproofing system and also indicating any other companies that may have intervened later;
- Permissions subsequently issued by the installation company regarding any changes to the roofing system, if the changes were made by companies other than the installation company itself;
- Copy of this maintenance manual of the roofing system;
- Any other documents concerning characteristics of the roofing system such as fire prevention certificates, static calculations, etc.

Performing maintenance safely

It is of primary importance that any visual inspections, checks or restoration operations are always performed in conditions of complete safety:

- both for the operator assigned to the task, who must use all the personal protective equipment provided for by the safety plans and by the applicable laws in force
- and for the personnel performing normal work activities in the building, assessing any potential dangers of interaction between the two activities.

In any case, all the safety rules provided for by current legislation on the subject must always be complied with, according to the respective fields and skills. It is mandatory to always use safety equipment that protects the operators from falls and to always proceed

with the utmost caution. Do not go up on the roof in case of adverse weather conditions, such as strong wind, rain, ice.

In this regard, it is advisable to schedule the inspection in favourable periods of the year, in order to always be able to operate safely. Do not climb up or be hoisted on the roof using unsuitable devices that may create potentially dangerous situations. Do not approach the edges of the roof, unless it is safe to do so.

MAINTENANCE PLAN

Maintenance checks

This section describes the routine maintenance checks that the personnel in charge must carry out on the roofing system at least once a year. The frequency of the check must also be adequate for any significant and extreme weather events that may have affected the roofing system during the year, such as hailstorms, strong winds, etc. In these cases, it is advisable to perform further routine maintenance. If the outcome of an inspection reveals the need to restore the sealing element, the intervention of the installation company becomes extraordinary and it is recorded by the specialised company in an Extraordinary Maintenance Report. All Extraordinary Maintenance Reports must be attached to the Roofing System Maintenance Log.

Maintenance checklist.

Below is a checklist of the inspections to be performed on the roofing system. For each inspection listed in the checklist, the details of the actions to be performed to restore the system and any other actions to be performed in the event that the element under examination was found to be noncompliant are indicated. These actions include informing the user and/or requesting an intervention of the Installation Company which will perform extraordinary maintenance to restore the optimal conditions of the roofing system. This table serves as a general guide to support the specialist diagnostic analysis activity, in accordance with standard UNI 11540.



Checks to be performed		Type of resources	Minimum frequency of the check	Method and type of intervention
1	General appearance of the roofing system with reference to any visible anomalies such as corrugation, waves, lifting, bubbles and surface alterations concerning the sealing element	Specialised operator	Once a year (possibly before winter)	Monitor and record the phenomenon over time
2	General appearance of the finish of the roofing system or protection or ballasting of the sealing element such as tensions, dislocations, sinking, disintegration, displacements, punching, cuts and cracks related to the fixed protections and their joints	Specialised operator	Once a year (possibly before winter)	Monitor and record the phenomenon over time and restore if necessary
3	Presence of deposits on the roofing system (leaves, soil, deposits in the presence of stagnant water, vegetation and animals)	User and/or specialised operator	Twice a year (early winter and early summer)	Eliminate the deposits and wash area if necessary; restore the sealing element if necessary
4	Presence of debris, materials and objects in general on the roofing system	User and/or specialised operator	Once a year (possibly before summer)	Eliminate the debris; check that the roofing system is used correctly and wash the area if necessary; restore any damaged parts.
5	Hydraulic functionality of the rainwater collection system	User and/or specialised operator	Twice a year (early winter and early summer)	Remove any deposits and/or clogging, clean the elements and restore or replace any elements that are no longer working

Checks to be performed		Type of resources	Minimum frequency of the check	Method and type of intervention
6	Stability of end pieces and installations and integrity of their connection to the sealing element	Specialised operator	Once a year (possibly before summer)	If necessary, restore the stability of the end pieces, of the devices and of the hydraulic continuity with the sealing element
7	Integrity and watertightness of sub-systems and complementary elements and accessories on the roofing system and their connection with the sealing element	Specialised operator	Once a year (possibly before summer)	If necessary, restore the seals, gaskets and hydraulic continuity with the sealing element and replace any damaged elements and/or any elements that are no longer working properly
8	Functionality and integrity of the mechanical and/or watertight expansion joints	Specialised operator	Once a year (possibly before summer)	If necessary, restore the mechanical and/or hydraulic integrity
9	Watertightness of flashings, perimeter ridge caps, wall profiles, rain gutter channels, etc. with particular reference to the fastening elements and seals which are usually linear and accurate	Specialised operator	Once a year (possibly before summer)	If necessary, restore the seals, fastening elements, flashings and any accessory elements
10	Presence of flaking and/or cracks in the finishing and/or protective paints	Specialised operator	Once a year (possibly before summer)	Restore, monitor and record the phenomenon over time ⁽¹⁾
11	Presence of deformations or lesions near the mechanical fastening elements of the sealing element	Specialised operator	Once a year (possibly before summer)	Restore, monitor and record the phenomenon over time ⁽¹⁾

Checks to be performed		Type of resources	Minimum frequency of the check	Method and type of intervention
12	Presence of extraction phenomena from the mechanical fastening support of the sealing element and/or of the thermal-insulation element	Specialised operator	Once a year (possibly before summer)	If necessary, cut the sealing element in that area, remove and replace and fasten appropriately. Clean the sealing element and restore its watertightness
13	Presence of desoldering or detachment near the joints of the sealing element	Specialised operator	Once a year (possibly before summer)	Restore, monitor and record the phenomenon over time
14	Presence of lesions in the current part or at particular points	Specialised operator	Once a year	Restore, monitor and record the phenomenon over time
15	Presence of dislocations, breakages or deformations relating to possible actions exerted by the heavy fixed protections on the vertical turn-ups	Specialised operator	Once a year (possibly before summer)	Remove the portion of the fixed protection (its entire thickness) exerting the action on the vertical turn-up of the sealing element; restore the seal
16	Presence of dislocations, breakages or deformations relating to possible actions exerted by the heavy fixed protections on the turn-ups	Specialised operator	Once a year (possibly before winter)	Remove the portion of the mobile protection exerting the action; restore the seal
17	Presence of settlements, lesions and displacements of the bases of building services	Specialised operator	Once a year (possibly before summer)	Inform the owner of the property for inspections and possible interventions

Checks to be performed		Type of resources	Minimum frequency of the check	Method and type of intervention
18	Functionality of the building services installed on the roofing system	Specialised operator	Once a year (possibly before winter)	Restore functionality
19	Position of highly reflective elements that concentrate solar reflection directly on the sealing element	Specialised operator		Opacify and/or shield the reflective surfaces, to avoid possible deterioration of the sealing element. Monitor and record the phenomenon over time.
20	Localised absence (due to removal) of protective or ballasting layers initially envisaged	User and/or specialised operator	Once a year (possibly before summer)	Reposition or restore the protective element
21	Presence of emissions of potentially aggressive chemicals (industrial chimneys on the roofing system or near it)	Specialised operator	Once a year	If necessary, wash and/or restore the sealing element, taking suitable measures to prevent emissions and/or contact of the sealing element with aggressive chemical agents

⁽¹⁾ It is advisable to restore the finishing paints every two to five years depending on the slope of the roofing system, its exposure to the sun and the atmospheric pollution.

Criteria for recording activities and traceability of documents

In order to prove that the maintenance operations have been performed correctly in accordance with the maintenance plan, it is necessary to record the operations in a special maintenance log. This applies both when the visual inspection performed on the continuous roofing system is not followed by any type of intervention, and when it is necessary to perform routine or extraordinary maintenance operations. The checks performed on the roofing system and the relative outcomes must be recorded in specific inspection forms, indicating:

- The date of the inspection;
- The duration of the inspection (start time and end time);
- The person who performed the inspection and any other people present;
- The reason for the inspection (scheduled, extraordinary, following a particular weather event);
- Weather conditions during the inspection;
- Parts of the system inspected (if they do not coincide with the entire continuous roofing system);
- Conditions of the continuous roofing system;
- Evaluations and critical elements observed;
- Beneficial interventions and relative time required in terms of preventive actions;
- Necessary interventions and relative time required in terms of corrective actions;
- Necessary interventions and relative time required in terms of actual restorations;
- Any suggestions on how to use/preserve/manage the roofing system better.

The routine maintenance operations performed on the roofing system must be recorded in special maintenance forms, taking note of the following minimum information:

- Date of the intervention;
- Person performing the intervention;
- Description of the intervention (method used, products used and parts of the roofing system involved);
- Reason for the intervention;
- Weather conditions during the intervention;
- Outcome of the intervention (testing or equivalent verification);
- Acceptance by the maintenance service manager of the intervention performed.

Extraordinary maintenance operations usually require specific design and, by virtue of their importance, it is necessary to update the maintenance plan in all its parts.

In the maintenance log, it may be useful to keep a list of the interventions performed on the roofing system by third parties to equip the roof with building services or to install temporary structures, in order to keep track of all events during which the roofing system was subjected to significant traffic. The user manual, the maintenance manual, the

maintenance plan and the maintenance log must be kept by the owner and a copy must be kept by the maintenance service manager. The manual must be also available to the user. The control procedures set out by the regulations in force can also be summarised by areas and specific elements as indicated below:

General visual inspections on the roofing system

The general visual inspection of the roofing system must be performed at least one a year; General Membrane therefore recommends performing it every six months, for better efficiency and functionality.

General cleaning of the roofing system

Perform a visual inspection, every six months or at least once a year, to eliminate any foreign bodies on the roof: any abandoned materials, any vegetation that may have sprouted.

Areas with building services on the roof

Perform a visual inspection to eliminate any foreign bodies on the roof: any abandoned materials, any vegetation that may have sprouted. Near any building services, check that the maintenance technicians of said installations have not left tools, machining scraps, etc. which may compromise the integrity of the sealing element over time. Clean these areas carefully.

Inlets for drains, grates and downspouts

Visually inspect the cleanliness of the inlets for drains and their axial positioning; clean if necessary (recommended several times a year). This operation is essential to ensure that the water is correctly evacuated from the roofing system.

Check the leaf guards on the drains; replace them if deteriorated or broken or put them back in place if missing.

PLEASE NOTE: if any protective grates are missing / broken / damaged, which may have caused foreign bodies to enter the pipes, inspect the latter and any elbows too.

Gutters and downspouts: visually inspect and, if necessary, clean the gutters collecting rainwater, at least once a year. At the same time, check the fittings between the latter and the continuous sealing element.

Inspect the wells at the base of the downspouts; remove any foreign bodies to ensure that the rainwater flows properly.



Flashings and profiles, other metal trims

Visually inspect and, if necessary, restore the protective paint on flashings and profiles.

Visually inspect and, if necessary, restore the silicone mastic seals of all the flashings or profiles with visible sealed edges or of the studs of any other metal trims.

Please note: inspecting the seals consists in checking the adhesion and elasticity of the sealing element, possibly deteriorated by UV rays or detached due to the thermal expansion of the surrounding elements (metal sheets, panels, walls, etc.).

Visually inspect and, if necessary, restore the silicone mastic seals under the studs of any other metal trims.

Visually inspect the watertight ridge caps and look for any rust or corrosion and decide whether the damaged parts should be replaced or protected using special paints.

Visually inspect all the fastening elements of the watertight ridge caps and reinforce if necessary by adding new fastening elements.

Walkways

Visually inspect the concrete slabs of the walkways and/or their support feet or any other elements of the walkways used for routine and extraordinary maintenance (if present), in order to replace them if broken or to restore them if not stable.

Elements passing through the waterproofing membrane

Visually inspect each element passing through the primary waterproofing membrane (pipes, supports, tie-rods, antennas, etc.), restore their waterproofing coating if necessary or change any stainless steel clamps or reseal the elements using silicone mastics.

Structures and other works

Visually inspect and report any cracks, imperfections, settling of the structure and of the surrounding elements (chimneys, perimeter walls, technical spaces, railings, shafts, etc.) which may cause infiltrations attributed to the waterproofing system.

Please note: if the specialised installation company, in charge of the routine maintenance of the roofing system but not the installer of the original works, is commissioned to perform maintenance on these elements, the restoration methods must be agreed with the supplier or the customer and the original manufacturer must give its permission to perform the operations.

Domes and skylights



Visually inspect and report any anomalies on the domes and skylights to the user; indicate whether their seals are broken or whether their fastening elements are damaged, which may cause infiltrations erroneously attributed to the waterproofing system.

Please note: if the specialised installation company, in charge of the routine maintenance of the roofing system but not the installer of the original works, is commissioned to perform maintenance on these elements, the restoration methods must be agreed with the supplier or the customer and the original installer must give its permission to perform the operations.

CHECKING THE SEALING ELEMENTS

Direct operations with visual inspection

Correct routine maintenance, performed at the specified intervals, is a necessary and preventive condition to minimise the need to perform extraordinary maintenance on the roofing system. Below is a list of specific routine visual inspections to be performed in order to check the conditions of the sealing element. Remember that the visual inspections on the roofing system must be performed by the competent body that installed the work and is responsible for its maintenance (Installation Company). The visual inspections are always the responsibility of the owner or user of the system, who must notify said competent body immediately if any anomalies are found. Failure to comply with this may result in uncontrolled problems, which may cause serious damage and lead to possible legal disputes.

Extraordinary maintenance may be necessary when the following anomalies, which may lead to serious problems, are found during routine visual inspections:

Corrugations and abnormal lifting

While visually inspecting all the flat parts on the extrados of the sealing element, abnormal corrugations and raised parts may be found. According to their shape, width and geometric connotation, they may indicate situations of instability of the current waterproof section, due to the action of the wind on the flat roof or due to its own geometric instability. This onset of this phenomenon may be ultimately caused by design errors (failure to appropriately evaluate the force of the wind on the specific site) or incorrect installation of the layers, even if they were designed correctly. Extraordinary maintenance involves a localised intervention on the areas affected by the phenomenon, with appropriate anchoring of the base layers and the restoration of the waterproofing membranes of the roofing system.



Technical note: small individual local corrugations are recognised by the technical literature of flat roofing systems and accepted by the state-of-the-art of the same, since they are induced by the differentiated thermal expansion coefficient of the different functional layers, they can be covered by warranty and they do not give rise to problems thanks to the physical/mechanical performance of the waterproofing layers required for the specific intended uses.

Cracks in the sealing element

While visually inspecting all the flat parts on the extrados of the sealing element, some cracks may be found due to the physical/mechanical functional limits of the material caused by incorrect installation or intrinsic elements.

Extraordinary maintenance involves a localised intervention on the areas affected by the phenomenon, with reinforcement strips on the cracked element and restoration of the watertightness of the roofing system.

Visible welds

While visually inspecting all visible welds, some detachments may be found, due to abnormal tensioning or ineffective welding of the overlap. Extraordinary maintenance involves a localised intervention on the welds of dubious effectiveness, with torching and restoration of the sealing element overlap. If necessary, safety strips are applied on the overlaps in question, thus restoring the watertightness of the roofing system.

Mechanical damage

While visually inspecting all the flat parts, mechanical damage to the sealing element is found (holes, cuts, etc.), caused by unauthorised activities on the waterproofing system or by foreign and blunt objects (shards, bottles, nails, fireworks, machining scraps, etc.) which may have arrived or been brought onto the roof improperly. Extraordinary maintenance involves an intervention on the damaged areas with localised reinforcement patches on the lesion and the restoration of the watertightness of the roofing system and an accurate inspection of the areas adjacent to the interventions to identify any other similar situations.

Vertical turn-ups

Detachment of the sealing element at the top with the formation of pockets and relative damage to the overlaps to the detriment of the watertightness. The phenomenon may be caused by incorrect torching of the sealing element or unsuitable preparation of the vertical support or lack of watertightness of the ridge caps. Extraordinary maintenance involves an intervention on the areas with compromised adhesion and restoration by



cutting the areas, repairing torching and adding reinforcement patches. At the same time, it is necessary to check the airtightness of the vertical ridge caps.

Near vertical and perimeter turn-ups

While visually inspecting the areas near vertical and perimeter turn-ups and corners, some displacements of the waterproof section may be found, with the formation of folds and corrugation on the surface of the sealing element, causing the detachment of the membranes and thus compromising the overlaps to the detriment of the watertightness. It is symptomatic of tangible danger for the roofing system in general and usually due to an incorrect interpretation of the wind force on the waterproofing system; more rarely, and in a more contained and less extended form, the displacement at the base of the perimeter could be caused by differentiated structural movements on the intersection between the horizontal and the vertical plane. Extraordinary maintenance involves serious assessments and an appropriate intervention plan to permanently stop the problem. Typically, structural mechanical fixing is required to block the compromised layers and waterproofing membranes; it is also necessary to cover the affected area with a new membrane. In the event that the phenomenon is induced by localised structural movements, it is advisable to rebuild the specific area, inserting suitable joints and fastening elements as per the procedure indicated above.

Please note: if the phenomenon described has affected a very large area, due to a lack of annual routine maintenance, extraordinary maintenance consists in rebuilding the entire waterproofing system.

Central areas of the roof

While visually inspecting the roofing system, pay careful attention to the central areas of the roof and to any displacements of the waterproofing membrane, with relative formation of folds and corrugation on the surface of the sealing element, resulting in the possible detachment of the membranes and thus compromising the overlaps to the detriment of the watertightness. This phenomenon rarely arises in these areas (less subject to wind suction) and usually it is due to insufficient adhesion of the waterproofing membranes to the insulating material the layers are made of, or it may be triggered by the “flambage” phenomenon between insulating panels (known phenomenon and not a symptom of a pathology) not controlled by the perfect adhesion of the waterproofing membranes to the latter.

Extraordinary maintenance involves a local intervention to stop the spread of folds and corrugation to other areas of the roof. Typically, structural mechanical fixing is required to block the compromised layers or the entire adhesion of the area is restored if the waterproofing system is still well anchored to its base support. In both cases, the area is covered with a new finishing membrane.



Near pipe unions, aerators and other special parts

While visually inspecting pipe unions, overflows (even vents or through elements), some displacements or the detachment of the sealing element may be found. This situation occurs for specific problems caused by the wind, with relative lack of local fastening of the “special part” in question or also by collection actions with the alteration of the drainage flow or by overflowing, again with a lack of initial fastening elements. Extraordinary maintenance involves a local intervention on the elements with permanent fastening to the base support and with covering patches.

Fixed wearing courses

While visually inspecting the roofing system, with a fixed wearing course, significant cracks may be found, which may imply an activation of a tension and stress condition on the underlying layers with membrane fatigue, due to differentiated mobility between the walls of the crack. Extraordinary maintenance might involve a localised intervention on the flooring only if the phenomenon that has arisen, with relative infiltration, is not significant; in this case, the sealing conditions are restored locally.

Please note: if the described condition has spread and the watertightness has been compromised significantly, extraordinary maintenance consists in rebuilding the entire roofing system with the removal of the entire waterproofing membranes.

Ballasted roofing systems with removable parts

While visually inspecting ballasted roofing systems with removable parts, on the sensitive areas of the roofing systems such as perimeters and pipe unions, move them for the visual inspection (move gravel from the perimeter, remove rain gutters, etc.). In the event of any type of occurrence, extraordinary maintenance involves eliminating it locally.

Ballasted roofing systems with tiles

While visually inspecting ballasted roofing systems with tiles on polypropylene plinths or similar, and on the support areas of the same, due to a lack of protective layers or due to accidental overloads, some penetrations in the surface layers of the waterproofing membrane might be found. In this case, extraordinary maintenance involves assessing the depth of the penetration and its extension (event that involves all layers or only some improperly stressed locally); if minor, add a mechanical protection layer and distribute the loads; if more serious, install a portion of waterproofing membrane and then the protective layer.

Thermally insulated roofs - pedestrian traffic

While visually inspecting thermally insulated roofs, areas subjected to improper pedestrian traffic incapable of properly distributing the loads due to such traffic may be found. This



happens when the load-bearing capacity of the insulating panel fails, thus causing a detachment of the membranes, making them vulnerable to the action of the wind. If the phenomenon is minor, extraordinary maintenance involves providing protection by means of distributed ballasting (tiles on feet or similar) of the affected areas with the simultaneous formation of “roof walkways” for maintenance performed by third parties; if it is more serious, it is necessary to rebuild the area by replacing the insulating panel, then providing a new waterproofing system and forming the walkways.

Other parts unrelated to waterproofing

While visually inspecting other parts of the roofing system unrelated to waterproofing (for example near the top of the waterproofing membranes, plaster or other elements), anomalies may be found. The latter may be a potential cause of infiltrations due to the lack of watertightness of the waterproofing elements.

Extraordinary maintenance involves eliminating the anomaly or, at least, if the specialised installation company is not directly involved, informing the user, in order to restore safe conditions.

Waterproofing membranes with mechanical fastening elements

While visually inspecting waterproofing membranes installed using mechanical fastening elements (usually thermally insulated roofing systems), the screw heads may be found to have damaged the waterproofing membrane due to direct walking over the fastening element or its imperfect positioning. Extraordinary maintenance involves assessing the extent of the defect and intervening locally or adding a reinforcing membrane or fixing the mechanical fastening element and then installing a section of protective membrane.

Please note: if the phenomenon affects a large area of the roofing system, due to unsuitable fastening or other reasons, check that the layers are safely anchored and not affected by the action of the wind and, if necessary, perform interventions to fix the problem.

