1

technical specifications

DERMABIT FF

Flame-free polymer bituminous single-layer waterproofing systems

DESCRIPTION OF THE MEMBRANE DERMABIT® FF SINGLE-PLY RANGE

APPLICATIONS

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GENERAL INFORMATION

Dermabit® FF Single-Ply is a polymer bitumen membrane formulated as single-layer waterproofing laid with hot air welding system on decks of different kinds. Dermabit® FF Single-Ply may be laid ***without the use of propane torch or flame burners or bitumen molten in special boilers (a method which is today very rarely used).***

The flame free welding technique applied to polymer bitumen membranes is a result of the innovative research work developed by Casali S.p.A.
This document is intended as a support for designers and operators and is a practical guide to follow to ensure correct planning and laying of the single-layer waterproofing system.

Installers must receive appropriate training on the laying techniques of Dermabit® FF Single-Ply. Casali S.p.A. organises specific courses on the laying techniques which include introductory theoretical aspects associated to a practical session using specific models. The theoretical and practical course is based on UNI 11333 regulations and is a professional refresher course for operators in this industry. A certificate of participation and qualification will be issued to participants to attest their attendance of the training course and confirm the technical laying skills acquired during the demonstration. This certificate, together with full compliance with the specifications of the technical documents, guarantees correct laying by installers who are certified to lay Dermabit® FF Single-Ply.

The information provided by the technical specifications generally provide full details on the most common worksite cases. In the case of projects involving technical details and layers not indicated by the technical specifications, installers should contact Casali's Technical Office to request information on the correct laying methods.

Complementary layers of the single-layer Dermabit® FF waterproofing membrane, such as vapour barriers, insulating and separator layers etc., not produced and/or supplied by Casali S.p.A. must be approved by the Technical Office during the design stage of the layer packet. The specific Dermabit® FF Single-Ply warranties will not be granted if materials and/or layers that have not been approved are used.

Materials for gluing and mechanical fastening not produced and/or supplied by Casali should bear the warranty of the relevant producer/supplier who should also provide directions for their use complying with the project specifications of the layer packet.

The prefabricated accessories, which are mandatory for the technical details of the roofing, should be indicated by the project of the layer packet in order to ensure correct and efficient waterproofing.

In certain cases the warranties provided for the Dermabit® FF Single-Ply system may only be granted against a routine maintenance programme for the covering, which should be agreed by the Technician (maintenance person) and the end customer (customer), in accordance with the procedures and protocols advised by Casali S.p.A.
Casali's technicians should be allowed to carry out inspections at the worksite and/or on coverings laid with the Dermabit® FF flame free single-layer waterproofing system.

TECHNICAL SPECIFICATIONS 1

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Dermabit® FF Single-Ply range

The Dermabit® FF Single-Ply system is designed for installation without the use of propane torches or other flame burners. The waterproofing layer may be applied with standard laying methods such as:
- glue
- mechanical fastening
- ballasted.

The joints of the single sheets, which are always a critical aspect, are welded with hot air. Using a membrane that has been tried and tested in more than 30 years of applications, Casali has developed a number of morphological modifications that make Dermabit® Extra compatible with "COLD" laying systems. Dermabit® FF Single-Ply is therefore available in 3 different versions:

DERMABIT FF gluty

for fully bonding on different types decks; adherence is ensured with glue or adhesive applied over the entire surface on which the single-layer membrane is laid.

DERMABIT FF fixus

for partial bonding installation on different types decks provided the supporting deck permits the anchorage of mechanical fasteners; these ensure that the single-layer membrane is resistant to wind action.

DERMABIT FF liber

for loose laying installation on different types decks; a ballast should be installed on the single-layer membrane with standard techniques.

This Chapter describes the specifications for each of the three types of membranes in the Dermabit® FF Single-Ply system, including the layer structure conditions on which they may be used and the technical instructions to follow to lay safe waterproofing that will last in time. Any modifications to the instructions provided by this chapter should be agreed in advance with the Technical Office of Casali S.p.A.'s Membrane Division.

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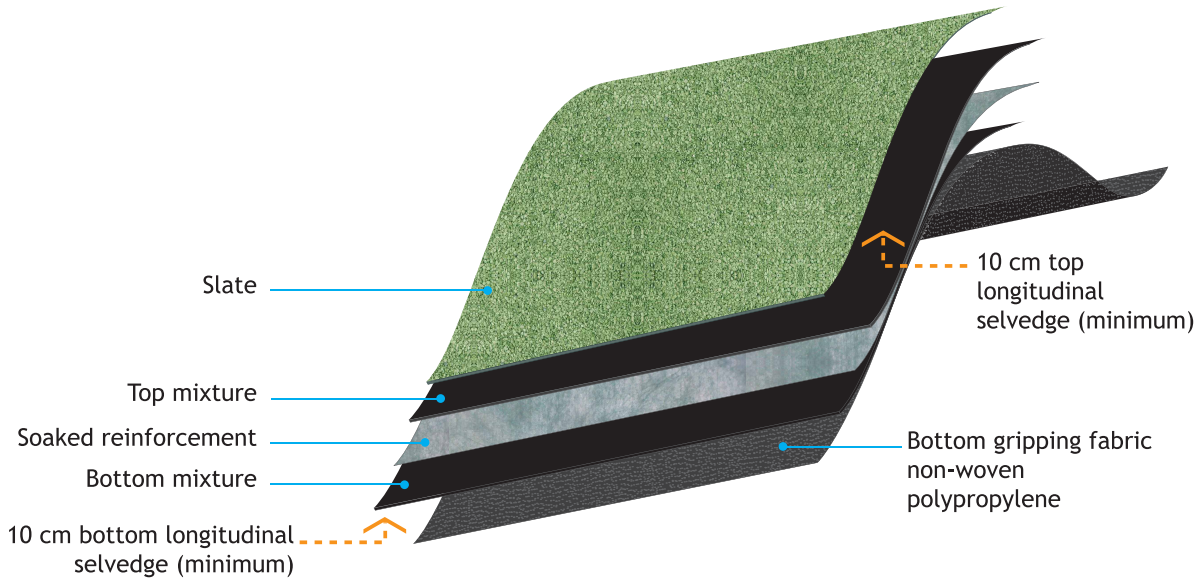
DERMABIT FF

gluty

APPLICATIONS



COMPOSITION OF THE GLUTY MEMBRANE

Bottom gripping geotextile: this is a non-woven polypropylene geotextile coupled to the molten compound during production; the adhesive which is laid on the surface penetrates into the fibres and guarantees adherence of the membrane to the underlying layer.

Bitumen mass with reinforcement: this is a bitumen and polyester reinforcement layer. The compound contains APAO polymers (Amorphous Poly-Alpha Olefins) which ensure excellent elasticity, adhesion, elevated stability at high temperatures, good flexibility at cold temperatures and resistance to thermal ageing and Ultraviolet rays. The reinforcement makes the membrane extremely resistance and dimensionally stable. The use of controlled high quality materials guarantees a long service life without loss of mechanical and water sealing properties.

Slate: these are calibrated slate chips which are spread uniformly on the top bituminous mass during production. The slate chips protect the underlying compound from UV rays.

Top/bottom longitudinal selvedge: this is a width of at least 10 cm of the sheet on which the geotextile layer and protection coating are not applied. By overlapping the two selvedges correctly, only the bitumen compound surfaces are in contact. The fusion of the two contact layers ensures the perfect mechanical and waterproof seal of the joints. This solution is necessary because when welding with hot air, the two surfaces that are melted and joined are not visible, so that it is impossible to check if residues of other materials (as occurs with torching) create gaps in the adhesion.
In particular cases (temperature, dusty or humid environments etc.), the selvedge may be protected with a strip of silicone-treated paper which may be removed quickly and easily before bonding.

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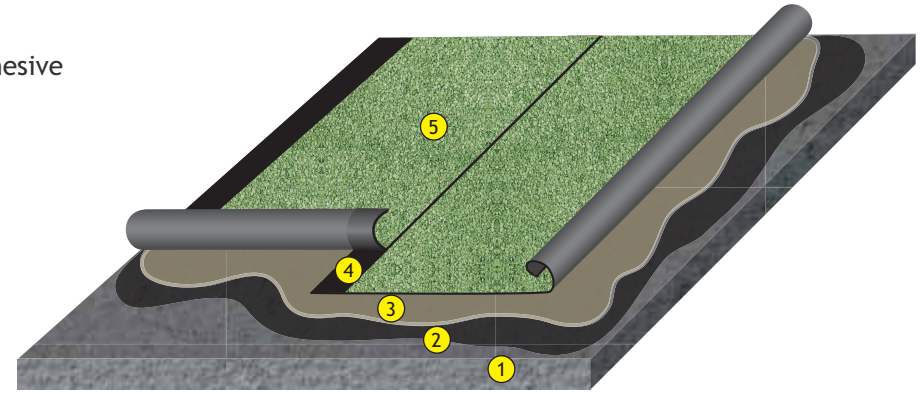
USES

COLD ROOF WITH SURFACE-MOUNTED MEMBRANE

(a type of roofing for which no thermal insulation of any type is used)

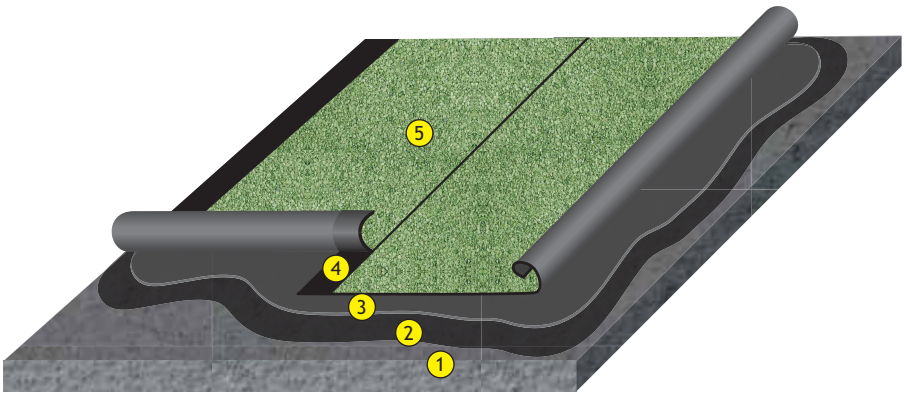
GLUING WITH ADHESIVE

1- Deck
2- Primer (Idroprimer, Dermaprimer)
3- Single Component polyurethane adhesive (Dermapur)
4- Hot air welding
5- Dermabit® FF Gluty



GLUING WITH BITUMEN ADHESIVE

1- Deck
2- Primer (Idroprimer, Dermaprimer)
3- Cold bituminous glue (Dermastik BA, Dermastik BS)
4- Hot air welding
5- Dermabit® FF Gluty



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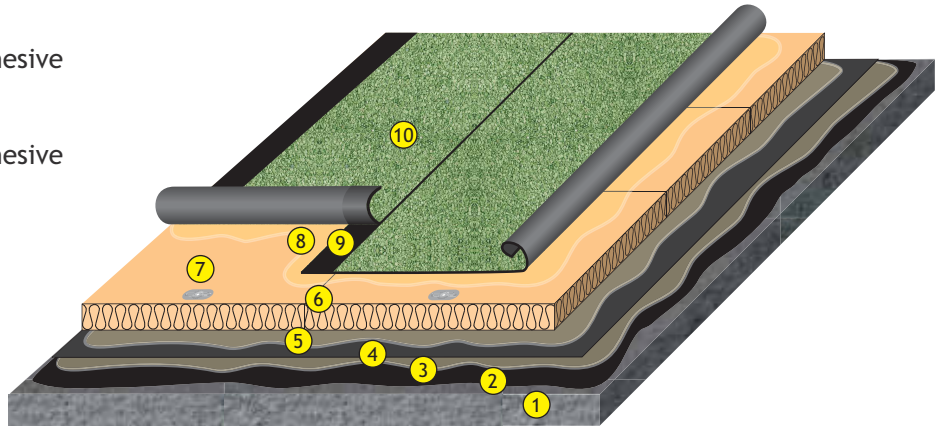
USES

WARM ROOF WITH SURFACE-MOUNTED MEMBRANE

(roofing with thermal insulation installed under the waterproofing membrane)

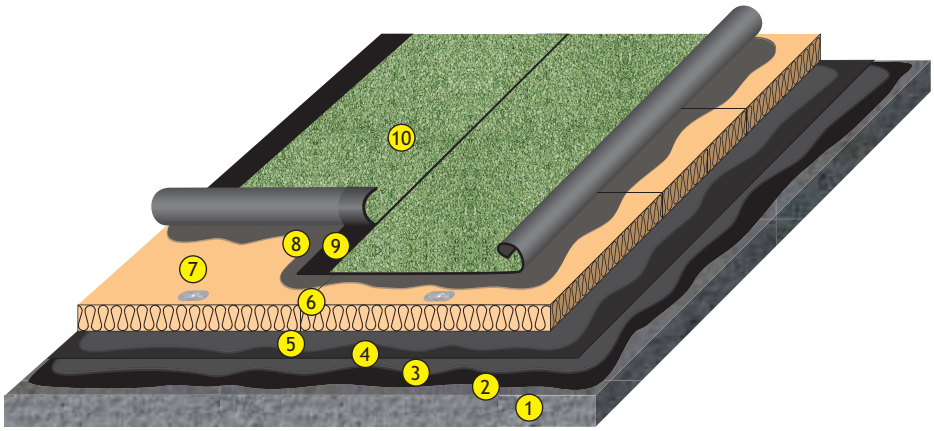
GLUING WITH ADHESIVE

1- Deck
2- Primer (Idroprimer, Dermaprimer)
3- Single Component polyurethane adhesive (Dermapur)
4- Vapour barrier layer (Vaporex)
5- Single Component polyurethane adhesive (Dermapur)
6- Insulating panel
7- Mechanical fastening of panel
8- Single Component polyurethane adhesive (Dermapur)
9- Hot air welding
10- Dermabit® FF Gluty



GLUING WITH BITUMEN ADHESIVE

1- Deck
2- Primer (Idroprimer, Dermaprimer)
3- Cold bituminous glue (Dermastik BA, Dermastik BS)
4- Vapour barrier layer (Vaporex)
5- Cold bituminous glue (Dermastik BA, Dermastik BS)
6- Insulating panel
7- Mechanical fastening of panel
8- Cold bituminous glue (Dermastik BA, Dermastik BS)
9- Hot air welding
10- Dermabit® FF Gluty



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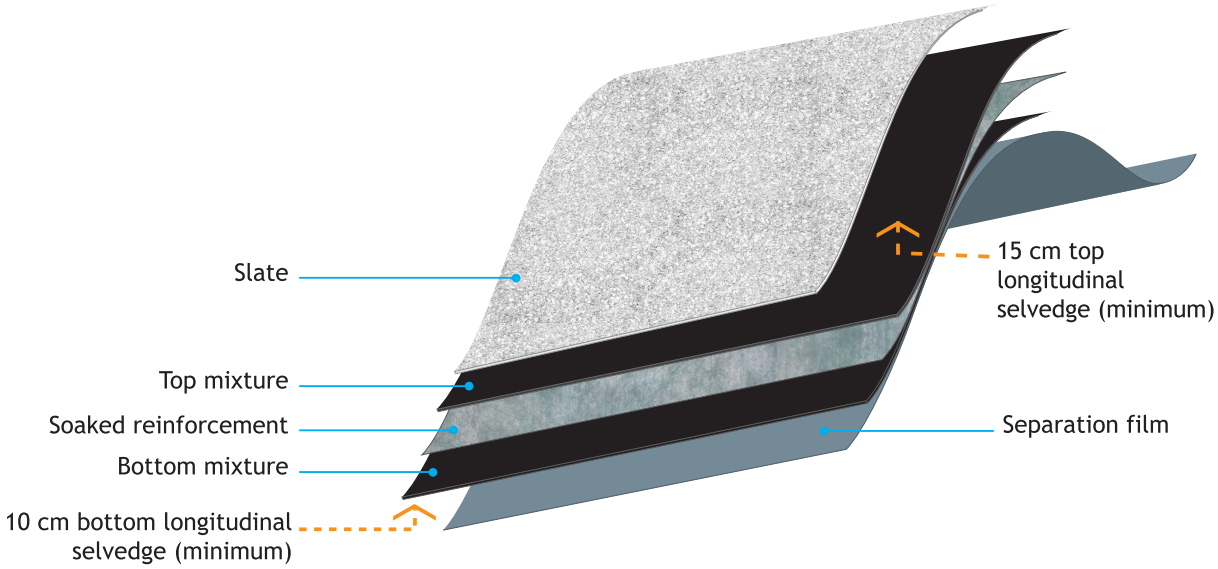

COMPOSITION OF THE FIXUS MEMBRANE

Lower separation film: this is a centesimal polyethylene film which not only prevents the membrane filaments from sticking, both when the product is packaged through to the time the membrane is laid on the deck but also separates (in the case of Inverted Roof applications) the waterproofing and insulating layer.

Bitumen mass with reinforcement: this is a bitumen and polyester reinforcement layer. The compound contains APAO polymers (Amorphous Poly-Alpha Olefins) which ensure excellent elasticity, adhesion, elevated stability at high temperatures, good flexibility at cold temperatures and resistance to thermal ageing and Ultraviolet rays. The reinforcement makes the membrane extremely resistance and dimensionally stable. The use of controlled high quality materials guarantees a long service life without loss of mechanical and water sealing properties.

Slate: these are calibrated slate chips which are spread uniformly on the top bituminous mass during production. The slate chips protect the underlying compound from UV rays.

Top/bottom longitudinal selvedge: this is a width of at least 10 cm of the sheet on which the geotextile layer and protection coating are not applied. By overlapping the two selvedges correctly, only the bitumen compound surfaces are in contact. The fusion of the two contact layers ensures the perfect mechanical and waterproof seal of the joints. This solution is necessary because when welding with hot air, the two surfaces that are melted and joined are not visible, so that it is impossible to check if residues of other materials (as occurs with torching) create gaps in the adhesion.
In particular cases (temperature, dusty or humid environments etc.), the selvedge may be protected with a strip of silicone-treated paper which may be removed quickly and easily before bonding.

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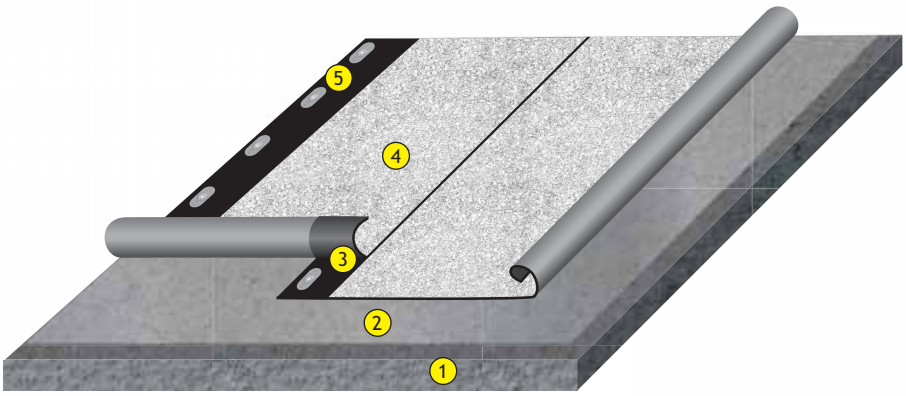
USES

COLD ROOF WITH SURFACE-MOUNTED MEMBRANE

(a type of roofing for which no thermal insulation of any type is used)

SPOT-FASTENING

1- Deck
2- Separation layer (if necessary)
3- Hot air welding
4- Dermabit® FF Fixus
5- Spot-Fastening



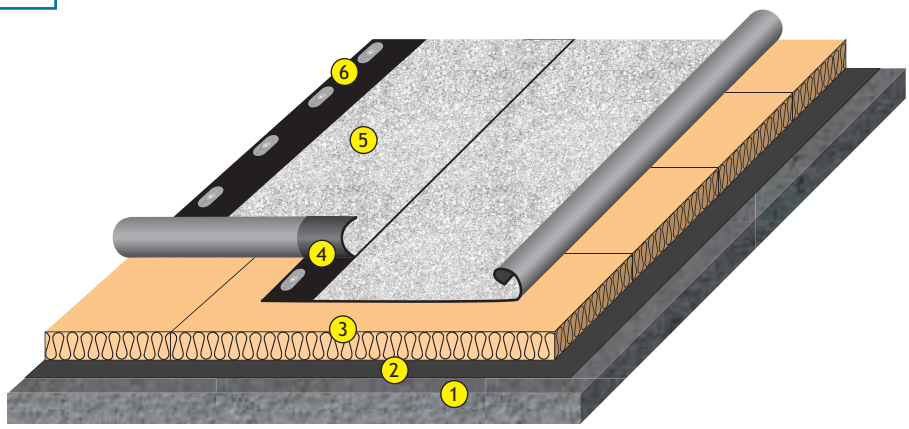
USES

WARM ROOF WITH SURFACE-MOUNTED MEMBRANE

(roofing with thermal insulation installed under the waterproofing membrane)

SPOT-FASTENING

1- Deck
2- Vapour barrier layer (Vaporex)
3- Insulating panel
4- Hot air welding
5- Dermabit® FF Fixus
6- Spot-Fastening



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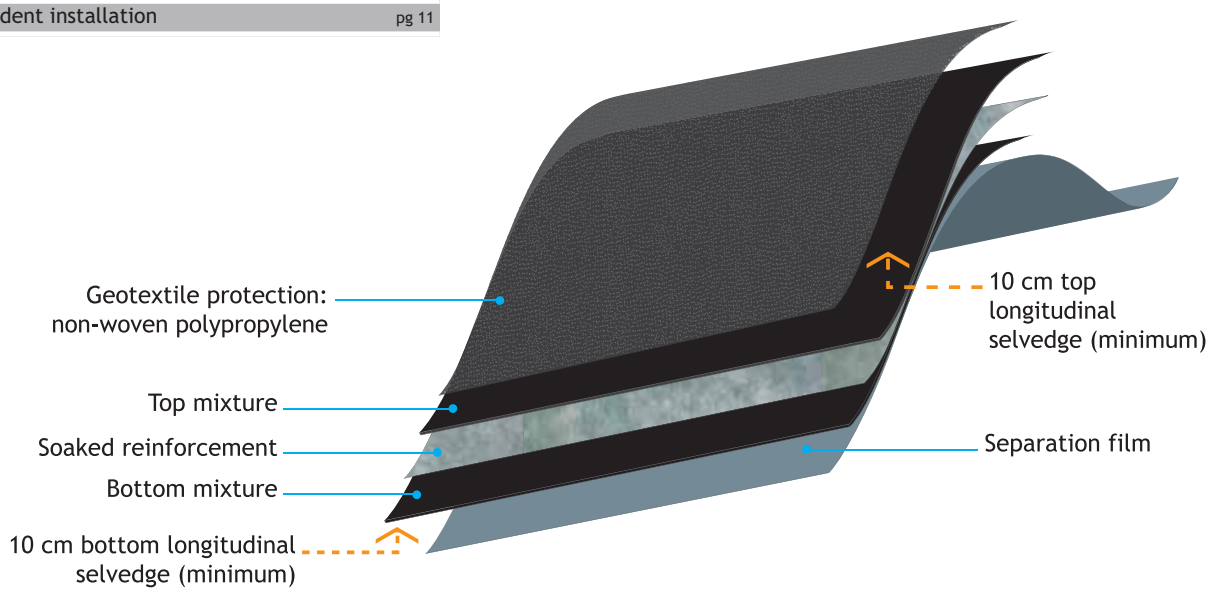
APPLICATIONS



COMPOSITION OF THE LIBER MEMBRANE

Lower separation film: this is a centesimal polyethylene film which not only prevents the membrane filaments from sticking, both when the product is packaged through to the time the membrane is laid on the deck but also separates (in the case of Inverted Roof applications) the waterproofing and insulating layer.

Bitumen mass with reinforcement: this is a bitumen and polyester reinforcement layer. The compound contains APAO polymers (Amorphous Poly-Alpha Olefins) which ensure excellent elasticity, adhesion, elevated stability at high temperatures, good flexibility at cold temperatures and resistance to thermal ageing and Ultraviolet rays. The reinforcement makes the membrane extremely resistance and dimensionally stable. The use of controlled high quality materials guarantees a long service life without loss of mechanical and water sealing properties.

Protection geotextile: a polyester fabric layer which not only protects the membrane from mechanical damage during installation of the fixed or mobile ballast but also separates (in the case of duo and Inverted Roof applications) the waterproofing and insulating layers.

Top/bottom longitudinal selvedge: this is a width of at least 10 cm of the sheet on which the geotextile layer and protection coating are not applied. By overlapping the two selvedges correctly, only the bitumen compound surfaces are in contact. The fusion of the two contact layers ensures the perfect mechanical and waterproof seal of the joints. This solution is necessary because when welding with hot air, the two surfaces that are melted and joined are not visible, so that it is impossible to check if residues of other materials (as occurs with torching) create gaps in the adhesion.
In particular cases (temperature, dusty or humid environments etc.), the selvedge may be protected with a strip of silicone-treated paper which may be removed quickly and easily before bonding.

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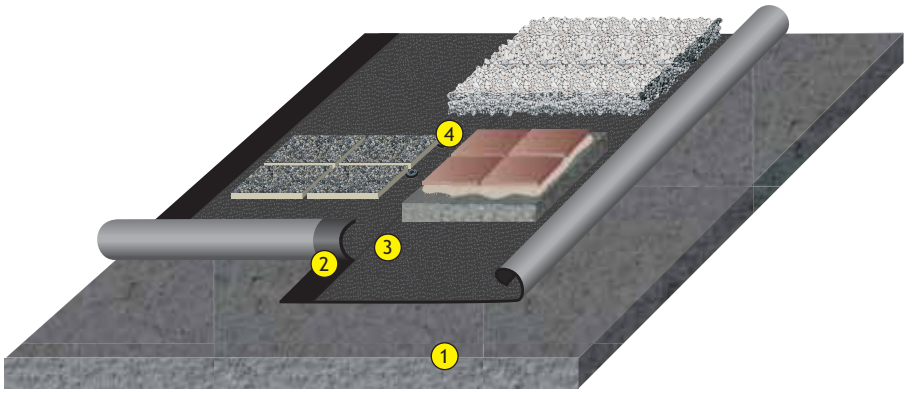
USES

COLD ROOF WITH LOOSE LAYING MEMBRANE AND BALLAST APPLICATION

(a type of roofing for which no thermal insulation of any type is used)

FULLY INDEPENDENT INSTALLATION

1- Deck
2- Hot air welding
3- Dermabit® FF Liber
4- Fixed or mobile ballast layer



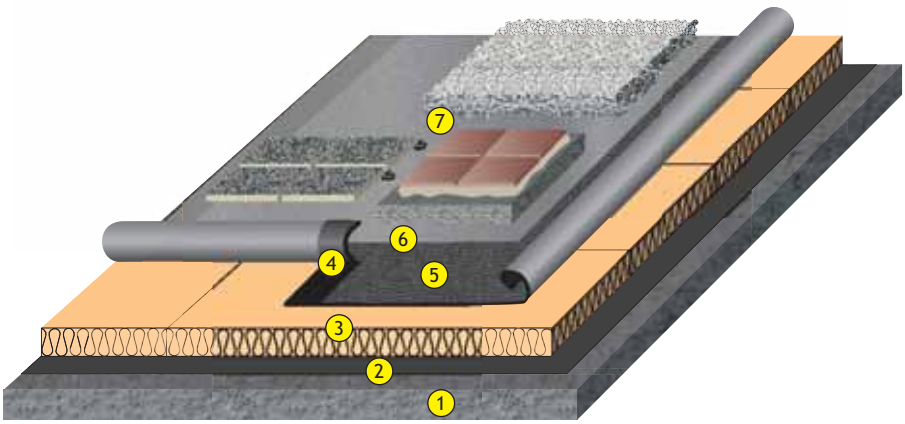
USES

WARM ROOF WITH LOOSE LAYING MEMBRANE AND BALLAST APPLICATION

(roofing with thermal insulation installed under the waterproofing membrane)

FULLY INDEPENDENT INSTALLATION

1- Deck
2- Vapour barrier layer (Vaporex)
3- Insulating panel
4- Hot air welding
5- Dermabit® FF Liber
6- Separation/Creep layer (if necessary)
7- Fixed or mobile ballast layer



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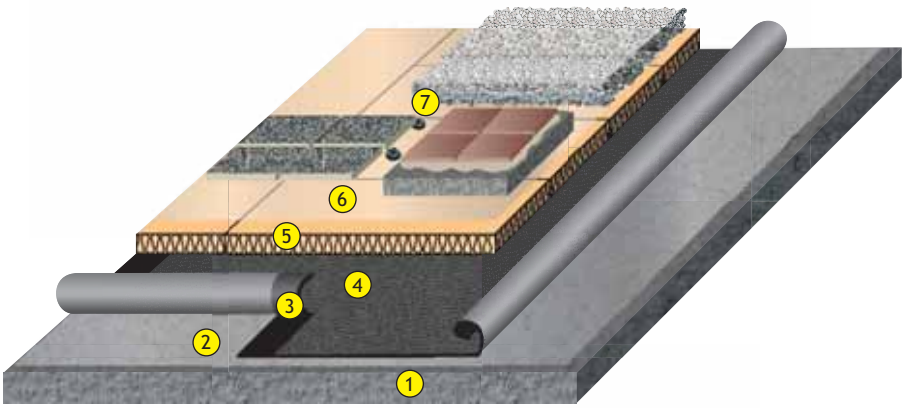
USES

INVERTED ROOF WITH LOOSE LAYING MEMBRANE AND BALLAST APPLICATION

(roofing with thermal insulation installed on the waterproofing membrane)

FULLY INDEPENDENT INSTALLATION

1- Deck
2- Separation layer (if necessary)
3- Hot air welding
4- Dermabit® FF Liber
5- Insulating panel
6- Filter layer
7- Fixed or mobile ballast layer



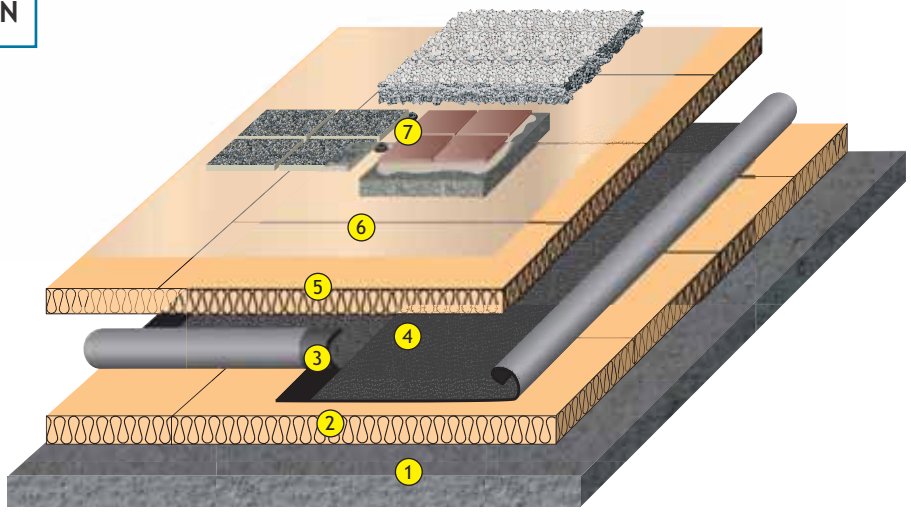
USES

DUO ROOF WITH LOOSE LAYING MEMBRANE AND BALLAST APPLICATION

(roofing with 2 layers of thermal insulation laid above and below the waterproofing membrane)

FULLY INDEPENDENT INSTALLATION

1- Deck
2- First insulating layer
3- Hot air welding
4- Dermabit® FF Liber
5- Second insulating layer
6- Creep layer
7- Fixed or mobile ballast layer



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USES

APPLICATION MAP

COMPLIANCE SPECIFICATIONS		DERMABIT® FF Gluty	DERMABIT® FF Fixus	DERMABIT® FF Liber
 **UNI EN 13707** Regulation for surface-mounted single-layer applications	COLD ROOF WITH SURFACE-MOUNTED MEMBRANE	Total bonding	Mechanical fastening	⊗
	WARM ROOF WITH SURFACE-MOUNTED MEMBRANE	Total bonding	Mechanical fastening	⊗
 **UNI EN 13707** Regulation for single-layer applications under heavy protection	COLD ROOF WITH BALLASTED MEMBRANE	⊗	⊗	Loose laid
	WARM ROOF WITH BALLASTED MEMBRANE	⊗	⊗	Loose laid
	INVERTED ROOF	⊗	⊗	Loose laid
	DUO ROOF	⊗	⊗	Loose laid

⊗ use does not comply with specifications.

Specifications 2, 3, 4, 5, 6 and 7, which are an integral part of the technical documents for the DERMABIT® FF Single-Ply system, give a detailed explanation of the different packet components compatible with the Dermabit® FF Single-Ply system as well as a description of the functions of the single layers, the minimum technical characteristics required and laying specifications. Please contact Casali's Technical Office for any information you may require to correctly design the layers, the specifications or any other doubts you cannot resolve by reading this documentation.

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technical specifications 2

DERMABIT FF

Flame-free polymer bituminous single-layer waterproofing systems

THE COLD ROOF SYSTEM

CASALI
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GENERAL INFORMATION

Dermabit® FF Single-Ply is a polymer bitumen membranes formulated as single-layer waterproofing laid with hot air welding system on decks of different kinds. Dermabit® FF Single-Ply may be laid ***without the use of propane torch or flame burners or bitumen molten in special boilers (a method which is today very rarely used).***

The flame free welding technique applied to polymer bitumen membranes is a result of the innovative research work developed by Casali S.p.A.
This document is intended as a support for designers and operators and is a practical guide to follow to ensure correct planning and laying of the single-layer waterproofing system.

Installers must receive appropriate training on the laying techniques of Dermabit® FF Single-Ply. Casali S.p.A. organises specific courses on the laying techniques which include introductory theoretical aspects associated to a practical session using specific models. The theoretical and practical course is based on UNI 11333 regulations and is a professional refresher course for operators in this industry. A certificate of participation and qualification will be issued to participants to attest their attendance of the training course and confirm the technical laying skills acquired during the demonstration. This certificate, together with full compliance with the specifications of the technical documents, guarantees correct laying by installers who are certified to lay Dermabit® FF Single-Ply.

The information provided by the technical specifications generally provide full details on the most common worksite cases. In the case of projects involving technical details and layers not indicated by the technical specifications, installers should contact Casali's Technical Office to request information on the correct laying methods.

Complementary layers of the single-layer Dermabit® FF waterproofing membrane, such as vapour barriers, insulating and separator layers etc., not produced and/or supplied by Casali S.p.A. must be approved by the Technical Office during the design stage of the layer packet. The specific Dermabit® FF Single-Ply warranties will not be granted if materials and/or layers that have not been approved are used.

Materials for gluing and mechanical fastening not produced and/or supplied by Casali should bear the warranty of the relevant producer/supplier who should also provide directions for their use complying with the project specifications of the layer packet.

The prefabricated accessories, which are mandatory for the technical details of the roofing, should be indicated by the project of the layer packet in order to ensure correct and efficient waterproofing.

In certain cases the warranties provided for the Dermabit® FF Single-Ply system may only be granted against a routine maintenance programme for the covering, which should be agreed by the Technician (maintenance person) and the end customer (customer), in accordance with the procedures and protocols advised by Casali S.p.A.
Casali's technicians should be allowed to carry out inspections at the worksite and/or on coverings laid with the Dermabit® FF flame free single-layer waterproofing system.

TECHNICAL SPECIFICATIONS 2

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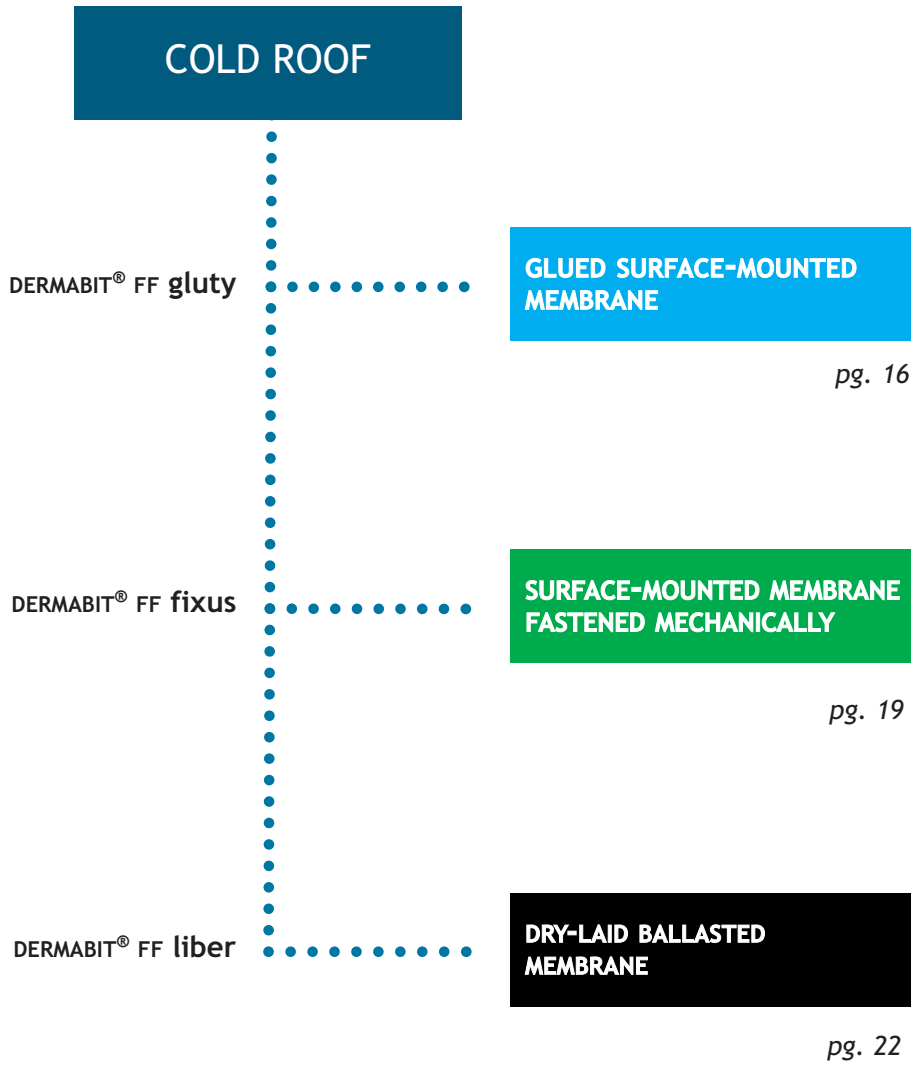
Cold Roofs have no thermal insulation layer, not even a layer in cellular or lightweight concrete etc.; the waterproofing membrane is laid directly on the supporting deck after laying the slope for rainwater runoff. The anchorage systems and type of Dermabit® FF Single-Ply to use are as follows:



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DERMABIT FF

gluty

MAIN COMPONENTS

1. LOAD-BEARING DECK
2. PRIMER *(if necessary)*
3. ADHESION ELEMENT
4. WATERPROOFING LAYER

1. LOAD-BEARING DECK

■ **Prefabricated structure in reinforced concrete, clay-cement, or cast in situ or mixed.**

■ **Prefabricated steel structure**, assembled in situ the laying surface may be a composite reinforced concrete screed or any other horizontal plane surface. Given the different thermal expansion behaviour of steel and membranes, this waterproofing should not be laid on flat sheet plate or a membrane glued on sheet plate but may be laid semi-independently with mechanical fasteners or dry laid and ballasted.

■ **Wooden prefabricated structure, assembled in situ**; the laying surface may consist of wooden planks or other material. Ensure that the resinous binders used for production of the planks are chemically compatible with the glue and membrane Dermabit® FF Single-Ply compound.

LOAD-BEARING DECK GENERAL INFORMATION

The laying surface on which the membrane Dermabit® FF Single-Ply is to be laid must:

- Have a sub-horizontal plane inclined by at least 2% to ensure rainwater runoff to the drainage system.
- Be perfectly smooth and clean with no rough parts or hollows that may prevent water runoff or cause mechanical damage to the membrane.
- Be sufficiently sturdy to support the deck loads without causing significant deformation.
- Be chemically compatible with the waterproofing membrane.

2. PRIMER (if necessary)

Before gluing the Dermabit® FF Single-Ply membrane with adhesive or bituminous glue, ensure that these adhere efficiently to the deck; if the deck is dusty or irregular it may be necessary to apply a primer that should however be approved from time to time according to the specific conditions of the worksite. Please note however that not all cases of poor adherence may be resolved simply with a primer.

PRIMER GENERAL INFORMATION

- Please remember that water-based primers generally take longer to dry than solvent-based primers and that adhesive materials should be applied to a dry surface.
- The primer should contain a solvent complying with applicable laws on the protection of operators and the environment, and in the permitted quantity.
- The product used should be easy to lay on the deck with standard laying methods (spray, roller etc.)
- The dry residue should be chemically compatible with the membrane laid after its application.

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3. ADHESION ELEMENT

◆ Single component **polyurethane adhesive** in drums or tins (applied by roller) or pressurised cans applied with nozzle applicator. The expansion typical of this material should be limited in order to prevent an irregular layer thickness which would produce unattractive undulation in the membrane. The adhesion curing time must be long enough to allow possible corrections to the position of the glued sheet, but must be short enough to ensure that wind action, operator traffic or other causes do not damage the same. If the membrane is subject to stress before complete adhesion, fasten the sheets mechanically to prevent them from moving. This should in any case be done if the inclination of the laying surface is more than 7%. The quantity of solvents used should be sufficient to make the product fluid and easy to apply but the quantity used should not be incompatible with the Dermabit® FF Single-Ply compound.

◆ **Solvent-based bitumen adhesive** applied by roller, brush or toothed squeegee having characteristics which guarantee that the original resistance to low temperatures and elasticity remain constant for a long period of time. If the membrane is subject to stress before complete adhesion, fasten the sheets mechanically to prevent deformation. This should in any case be done if the inclination of the laying surface is more than 7%. The solvent quantity and quality recommendations given for polyurethane adhesives apply in this case as well.

◆ **Water-based bitumen adhesive** applied by roller, brush or toothed squeegee having characteristics which guarantee that the original resistance to low temperatures and elasticity remain constant for a long period of time. If the membrane is subject to stress before complete adhesion, fasten the sheets mechanically to prevent deformation. This should in any case be done if the inclination of the laying surface is more than 7%.

ADHESION ELEMENT GENERAL INFORMATION

• The adhesive should be applied on a smooth, clean, dry, dust-free surface without irregularities.

• In the case of long adhesive curing times whereby the membrane might be subject to wind action, mechanical stress due to operator traffic or gravitational creep, the sheets should also be fastened mechanically.

• In the case of decks having an inclination of more than 7%, fasten the head of the sheets, and if necessary, the part under the longitudinal overlaps mechanically.

• The glue or bitumen adhesive should be applied over the whole surface ensuring that the membrane is completely fastened. In the case of partial gluing, i.e. in strips or spots etc., please follow the instructions of the glue or bitumen adhesive manufacturer who should also indicate the quantities and application method and provide the necessary guarantees for its life and compatibility with the membrane Dermabit® FF Single-Ply.

• If the case of partial gluing of the membrane Dermabit® FF Single-Ply, there should be no swelling or creasing on its surface caused by the thickness of the adhesive.

• In proximity of the connection necks of projecting parts and along the perimeter walls, sheets laid horizontally should be fastened mechanically with expansion dowels and oval plates; they may be fastened both horizontally and vertically, in this case by fastening a folded portion of the sheet overlapped upwards by at least 5 cm.

• Contact adhesives, namely those that are applied on both sides of the surfaces, may also be used, joining them once the solvent has evaporated; this method should however only be used for small surfaces or particular cases in that once the two surfaces have been jointed they adhere immediately and it will not be possible to correct the position of the sheet in any way.

• The rule of thumb is that any type of adhesive or glue used must always reduce risks to health and the environment as far as possible, in accordance with applicable laws.

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4. WATERPROOFING LAYER

► The *membrane* to use as a single layer glued on the deck is DERMABIT® FF Gluty which has a bottom non-woven polypropylene geotextile layer with weight of 30 g/sq.m.; this first layer improves cohesion with the bitumen adhesive or glue.

► The *waterproofing mass* consists of the compound used for the production of Dermabit® Extra, like the type of stabilised polyester geotextile reinforcement.

► The *protection layer* consists of slate chips spread on the molten compound.

► The *longitudinal overlaps (top and bottom)* of the sheets are at least 10 cm. wide and have no accessory materials to ensure perfect hot air welding.

In particular cases (temperature, dusty or humid environments etc.), the selvedge may be protected with a strip of silicone-treated paper which may be removed quickly and easily before bonding.

► For the *head overlaps*, please follow the instructions provided by the technical leaflet "Laying Manual for the Dermabit® FF Single-Ply System".

► The same applies to the installation of *vertical necks, technical details and the application of prefabricated finishing accessories* that should be supplied only by Casali.

WATERPROOFING LAYER GENERAL INFORMATION

- Flame torches may not be used for the installation of Dermabit® FF Single-Ply.
- The membrane Dermabit® FF Gluty must be laid in accordance with good state-of-the-art procedures; specifications different to the standard technical procedures commonly used for the other membranes are described by the relevant laying manual. The laying manual is an integral part of the technical documents of the *Dermabit® FF Single-Ply System* and the relevant technical specifications must be communicated to all installers who apply the membranes.
- The rolls must be laid out and positioned carefully so as to permit application of the glue or adhesive uniformly over the full surface to waterproof; mechanical actions of peeling may occur in areas where the membrane is not glued to the deck subject to wind pressure; in small areas that cannot be glued for any reason, the membrane should be fastened with supplementary mechanical means to help gluing particularly in the case of heavy stress conditions.
- Considering that this is a single-layer system, all finishes must be executed with great care including hot air welding of joints.
- All the vertical overlaps of above ground and perimeter containment assemblies must be waterproofed with Dermabit® Extra or Aderix glued or fastened to the deck and then coated with Dermabit® FF Single-Ply, following the instructions indicated by the laying manual.
- Ensure that hot air welding has been carried out correctly by checking that the molten bitumen seam runs out of the edge and mechanically controlling the same.
- Please contact Casali's Technical Service for any explanations you may require regarding correct waterproofing procedures.

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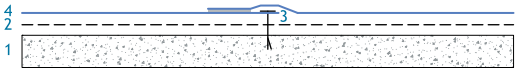
MAIN COMPONENTS

1. LOAD-BEARING DECK
2. SEPARATION LAYER
3. MECHANICAL FASTENING
4. WATERPROOFING LAYER



1. LOAD-BEARING DECK

■ **Prefabricated structure in reinforced concrete, clay-cement, or cast in situ.**

■ **Steel prefabricated structure, assembled in situ**; the laying surface may be a composite reinforced concrete screed or any other horizontal plane surface. in the case of flat sheet plate laying surfaces, the membrane may be laid semi independently with mechanical fasteners.

■ **Wooden prefabricated structure, assembled in situ**; the laying surface may consist of wooden planks or other material. Ensure that the resinous binders used for production of the planks are chemically compatible with the glue and membrane Dermabit® FF Single-Ply.

LOAD-BEARING DECK GENERAL INFORMATION

The laying surface on which the membrane Dermabit® FF Single-Ply is to be laid must:

- Have a sub-horizontal plane inclined by at least 2% to ensure rain runoff to the drainage system.
- Be perfectly smooth and clean with no rough parts or hollows that may prevent water runoff or cause mechanical damage to the membrane.
- Be sufficiently sturdy to support the deck loads without causing significant deformation.
- Be mechanically resistant to ensure anchorage of the mechanical fasteners.
- Be chemically compatible with the waterproofing membrane.

2. SEPARATION LAYER

► It may be necessary to lay a separation layer if the finish of the deck on which the waterproofing layer is laid does not protect the latter from abrasion, perforation or other mechanical or static stress that may damage the semi-independent membrane.

► The use of a non-woven geotextile may generally be sufficient to prevent the above damages. Consistency, area mass and resistance of the geotextile should be adjusted according to the roughness of the deck.

► Sheets are laid dry, overlapping them by at least 10 cm.

► Should application of the geotextile not be sufficient to protect the surface, the causes of possible mechanical damage should be eliminated, even by means of filling materials to ensure that the surface is smooth and clean.

SEPARATION LAYER GENERAL INFORMATION

The layer on which the membrane Dermabit® FF Single-Ply is installed should have the following essential characteristics:

- Sufficiently resistant to perforation.
- Rot-proof and contain no substances that are chemically incompatible with the membrane Dermabit® FF Single-Ply or deck on which it is to be laid (for example, a polyester layer may be damaged if in contact with cellular concrete).
- Maintain its properties for the expected working life.
- Not make it difficult to make the holes for the mechanical fasteners.
- Be free from metal residues or sharp filaments used during production for needle punching.

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3. FASTENING

◆ DERMABIT® FF Fixus sheets should generally be fastened mechanically along the longitudinal and transverse overlaps; any additional fastening that may be required outside these areas should be covered with strips of DERMABIT® FF Single-Ply and hot air welded to the horizontal surface so as to smooth over the gaps created by the holes of the fasteners.

◆ The fasteners used to fasten DERMABIT® FF Fixus should be made of materials treated against corrosion.

◆ The fasteners consist of 2 element:
- a fastener
- a plate to distribute tear strain.

◆ The fastener should be suited to the type of load-bearing deck on which the membrane is to be laid, and long enough to penetrate the compact layer, in accordance with the instructions of the manufacturer of the fastener.

◆ The plate should have a diameter or width or no more than 45 mm. and should be made of steel that has undergone appropriate anti-corrosion treatment.

◆ When positioned on the membrane, the thickness of the plate should not damage the membrane or create unattractive swelling.

◆ Plastic plates must be approved in advance by Casali, and backed by a warranty of efficiency issued by the manufacturer and/or supplier of the same.

◆ The number and layout of the fasteners on the laying surface to waterproof should be calculated in accordance with the provisions of applicable laws. Information supplied by Casali's Technical Office should in any case be checked and verified by the installer.

MECHANICAL FASTENING GENERAL INFORMATION

• The mechanical fastener should be positioned so that the plate is 5 mm. inside the edge of the sheet.

• After drilling the holes on the deck for housing or fastening the screws, remove any dust, shavings or other debris from the area where the overlaps are to be welded.

• Before welding the overlaps, remove unused or damaged fasteners on the membrane to prevent them from penetrating and damaging the membrane Dermabit® FF Single-Ply; check that the ends of the fasteners (heads of screws, nuts etc.) do not project above the plate.

• Do not use fasteners on unstable decks such as lightweight concrete surfaces, load-bearing sheet plate with thickness under 0.6 mm., thin or non-compact wooden or chipboard panels that are thin or not compact.

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4. WATERPROOFING LAYER

► The *membrane* to use as single-layer fastened mechanically to the deck is DERMABIT® FF Fixus, which has a bottom polyethylene film that prevents the spontaneous adherence of the packaged roll filaments.

► The *waterproofing mass* consists of the same compound used for the production of Dermabit® Extra, like the type of stabilised polyester geotextile reinforcement.

► The *surface protection layer* consists of slate chips spread over the molten compound.

► The *bottom longitudinal overlaps* of the sheets should be at least 10 cm. wide and must not be covered by the heat sensitive film to ensure perfect hot air welding.

► The *top longitudinal overlaps* of the sheets should be at least 15 cm. wide and must not be covered by slate chips to ensure perfect hot air welding. The extra width permits housing the plates and hot air weld the remaining 10 cm.
In particular cases (temperature, dusty or humid environments etc.), the selvedge may be protected with a strip of silicone-treated paper which may be removed quickly and easily before bonding.

► For the *head overlaps*, please follow the instructions indicated by the technical leaflet "Laying Manual for the Dermabit® FF Single-Ply System".

► The same applies to the installation of *vertical necks, technical details and the application of prefabricated finishing accessories* that should be supplied only by Casali.

WATERPROOFING LAYER GENERAL INFORMATION

Flame torches may not be used for the installation of Dermabit® FF Single-Ply.

- The membrane Dermabit® FF Fixus must be laid in accordance with good state-of-the-art procedures; specifications different to the standard technical procedures commonly used for the other membranes are described by the relevant laying manual. The laying manual is an integral part of the technical documents of the *Dermabit® FF Single-Ply System* and the relevant technical specifications must be communicated to all installers who apply the membranes.
- The rolls must be laid out and positioned carefully so as to permit application of the fasteners, leaving a width of 10 cm. free on the overlaps for hot air welding.
- Always check that the fasteners is securely anchored in the section of membrane into which it has been fastened.
- Ensure that hot air welding has been carried out correctly by checking that the molten bitumen seam runs out of the edge and mechanically controlling the same.
- Please contact Casali's Technical Service for any explanations you may require regarding correct waterproofing procedures.

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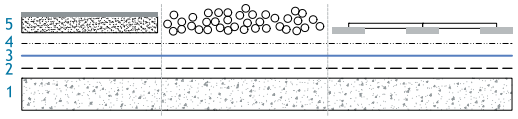
MAIN COMPONENTS

1. LOAD-BEARING DECK
2. SEPARATION LAYER
3. WATERPROOFING LAYER
4. SEPARATION/CREEP LAYER
5. BALLAST LAYER



1. LOAD-BEARING DECK

■ **Prefabricated structure in reinforced concrete, cast in situ or mixed**; the laying surface consisting of cement screed must be inclined by at least 2% to ensure rainwater runoff to the drainage system.

■ **Prefabricated steel structure, assembled in situ**; the laying surface may be a composite reinforced concrete screed or any other horizontal plane surface.

■ **Wooden prefabricated structure, assembled in situ;** the laying surface may consist of wooden planks or other material. Ensure that the resinous binders used for production of the planks are chemically compatible with the membrane Dermabit® FF Single-Ply compound.

LOAD-BEARING DECK GENERAL INFORMATION

The laying surface on which the membrane Dermabit® FF Single-Ply is to be laid must:

- Have a sub-horizontal plane inclined by at least 2% to ensure rain runoff to the drainage system.
- Be perfectly smooth and clean with no rough parts or hollows that may prevent water runoff or cause mechanical damage to the membrane.
- Be sufficiently sturdy to support the deck loads without causing significant deformation.

2. SEPARATION LAYER

► It may be necessary to lay a separation layer if the finish of the deck on which the waterproofing layer is laid does not protect the latter from abrasion, perforation or other mechanical or static stress that may damage the semi-independent membrane.

► The use of a non-woven geotextile may generally be sufficient to prevent the above damages. Consistency, area mass and resistance of the geotextile should be adjusted according to the roughness of the deck.
► Sheets are laid dry, overlapping them by at least 10 cm.

► Should application of the geotextile not be sufficient to protect the surface, the causes of possible mechanical damage should be eliminated, even by means of filling materials to ensure that the surface is smooth and clean.

SEPARATION LAYER GENERAL INFORMATION

The layer on which the membrane Dermabit® FF Single-Ply is installed should have the following essential characteristics:

- Sufficiently resistant to perforation.
- Rot-proof and contain no substances that are chemically incompatible with the membrane Dermabit® FF Single-Ply or deck on which it is to be laid (for example, a polyester layer may be damaged if in contact with cellular concrete).
- Maintain its properties for the expected working life.
- Be free from metal residues or sharp filaments used during production for needle punching.

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3. WATERPROOFING LAYER

► The *membrane* to use as dry laid single-layer on the deck is DERMABIT® FF Liber which has a bottom polyethylene film that prevents spontaneous adherence of the filaments of the packaged rolls.

► The *waterproofing mass* consists of the same compound used for the production of Dermabit® Extra, like the type of stabilised polyester geotextile reinforcement.

► The *surface protection layer* consists of non-woven polypropylene geotextile having a weight of 30 g/sq.m.; the geotextile protects the membrane when the heavy ballast is laid and acts as separation layer which absorbs small movements of the latter.

► The *longitudinal overlaps (top and bottom)* of the sheets are at least 10 cm. wide and have no accessory materials to ensure perfect hot air welding.
In particular cases (temperature, dusty or humid environments etc.), the selvedge may be protected with a strip of silicone-treated paper which may be removed quickly and easily before bonding.

► For the *head overlaps*, please follow the instructions provided by the technical leaflet "Laying Manual for the Dermabit® FF Single-Ply System".

► The same applies to the installation of *vertical necks, technical details and the application of prefabricated finishing accessories* that should be supplied only by Casali.

WATERPROOFING LAYER GENERAL INFORMATION

Flame torches may not be used for the installation of Dermabit® FF Single-Ply.

• The membrane Dermabit® FF Liber must be laid in accordance with good state-of-the-art procedures; specifications different to the standard technical procedures commonly used for the other membranes are described by the relevant laying manual. The laying manual is an integral part of the technical documents of the "DERMABIT® FF Single-Ply System" and the relevant technical specifications must be communicated to all installers who apply the membranes.

• Before applying the next layers always ensure that there are no foreign bodies, debris or other materials on the membrane that might cause mechanical damage.

• Ensure that hot air welding has been carried out correctly by checking that the molten bitumen seam runs out of the edge and mechanically controlling the same.

• Please contact Casali's Technical Service for any explanations you may require regarding correct waterproofing procedures.

4. SEPARATION / CREEP LAYER

► A creep layer should be applied when:
- this must be laid independently from the membrane and from differentiated movements of the ballast layer in order to prevent dragging or abrasion of the membrane;
- it is necessary to protect the membrane from mechanical damage caused by the permanent load of the ballast layer;
- it is necessary to prevent contact between the membrane and ballast due to chemical incompatibility.

► This layer may also be used as protection against dynamic punching.

SEPARATION/CREEP LAYER GENERAL INFORMATION

The layer applied on the membrane Dermabit® FF Single-Ply to isolate it from the ballast should have the following essential characteristics:

• Sufficiently resistant to perforation.

• Rot-proof and contain no substances that are chemically incompatible with the membrane Dermabit® FF Single-Ply or deck on which it is to be laid (for example, a polyester layer may be damaged if in contact with cellular concrete).

• Maintain its properties for the expected working life.

• When laid before a concrete or sand screed, it must not allow any cement grout that may leak during casting to pass through to and adhere to the membrane below.

• Be free from metal residues or sharp filaments used during production for needle punching.

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5. BALLAST LAYER

► The ballast layer protects the dry laid membrane from kinetic wind pressure, deterioration by Ultra violet rays, mechanical damage caused by foot traffic on the deck or mechanical punching from hail.

► This is a 45 kg sq.m. layer which may consist of:

- **loose** round river 16/32 mm **gravel** (mobile ballast) over the entire waterproofed horizontal surface, for a thickness of 4 cm., which may be increased in the case of considerable kinetic pressure;

- **floating floor** (mobile ballast) consisting of prefabricated marble-chips, dry laid on polypropylene circular supports with rounded base edges. The flooring should be laid over the entire waterproofed horizontal surface, with additional gravel added to the perimeter areas or next to above ground structures, if necessary;

- **concrete screed** (fixed ballast) with or without steel reinforcement (depending on permanent or accidental loads), with thickness of at least 5 cm. The waterproofed horizontal surface should be covered in full, or a mobile ballast added if necessary. The screed as described above may act as the deck for appropriately laid fastened floor if any.

BALLAST LAYER GENERAL INFORMATION

- The gravel should be laid and levelled very carefully on the membrane to avoid any damage to the underlying membrane.
- The floating floor should be applied and laid very carefully with great care so as to avoid mechanical damage to the membrane; in the case of considerable stress on the same from assembly structures, these should be spaced from the membrane by a protection layer, that may be partial if necessary.
- Particular care should be taken when laying concrete screed layers or moving steel bars or nets used for reinforcement.
- Screeds should laid at a suitable inclination with the necessary expansion joints to avoid water pooling; the screeds should be isolated from the membrane with compressible material in the perimeter areas to prevent them from pressing the membrane against the vertical overlaps.
- If the ballast layer produces heavy mechanical stress on the membrane, an additional protection layer should be dry laid on the membrane.
- Before applying the ballast layer, above all in the case of fixed ballasts, check the water seal of the waterproofing by flooding with water.
- Despite the many recommendations to operators who intervene after the waterproofing is installed, often the waterproofing will have damage that is not reported. It is therefore a good rule for a representative of the installation company to supervise the different working stages through to total protection of the membrane.
- Before applying the next layer, always ensure that there are no foreign bodies, debris or other material on the membrane that may cause mechanical damage.
- Always check that hot air welding is carried out correctly, ensuring that the molten bitumen seam runs out from the edge.
- Please contact Casali's Technical Service for any doubts you may have on application of the waterproofing.

Technical specifications 2, 3, 4, 5, 6 and 7, which are an integral part of the technical documents for the DERMABIT® FF Single-Ply system, give a detailed explanation of the different packet components compatible with the Dermabit® FF Single-Ply system as well as a description of the functions of the single layers, the minimum technical characteristics required and laying specifications. Please contact Casali's Technical Office for any information you may require to correctly design the layers, the specifications or any other doubts you cannot resolve by reading this documentation.

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technical specifications 3

DERMABIT FF

Flame-free polymer bituminous single-layer waterproofing systems

WARM ROOF SYSTEM

CASALI
www.casaligroup.it

GENERAL INFORMATION
Dermabit® FF Single-Ply is a polymer bitumen membrane formulated as single-layer waterproofing laid with hot air welding system on decks of different kinds. Dermabit® FF Single-Ply may be laid ***without the use of propane torch or flame burners or bitumen molten in special boilers (a method which is today very rarely used).***

The flame free welding technique applied to polymer bitumen membranes is a result of the innovative research work developed by Casali S.p.A.
This document is intended as a support for designers and operators and is a practical guide to follow to ensure correct planning and laying of the single-layer waterproofing system.

Installers must receive appropriate training on the laying techniques of Dermabit® FF Single-Ply. Casali S.p.A. organises specific courses on the laying techniques which include introductory theoretical aspects associated to a practical session using specific models. The theoretical and practical course is based on UNI 11333 regulations and is a professional refresher course for operators in this industry. A certificate of participation and qualification will be issued to participants to attest their attendance of the training course and confirm the technical laying skills acquired during the demonstration. This certificate, together with full compliance with the specifications of the technical documents, guarantees correct laying by installers who are certified to lay Dermabit® FF Single-Ply.

The information provided by the technical specifications generally provide full details on the most common worksite cases. In the case of projects involving technical details and layers not indicated by the technical specifications, installers should contact Casali's Technical Office to request information on the correct laying methods.

Complementary layers of the single-layer Dermabit® FF waterproofing membrane, such as vapour barriers, insulating and separator layers etc., not produced and/or supplied by Casali S.p.A. must be approved by the Technical Office during the design stage of the layer packet. The specific Dermabit® FF Single-Ply warranties will not be granted if materials and/or layers that have not been approved are used.

Materials for gluing and mechanical fastening not produced and/or supplied by Casali should bear the warranty of the relevant producer/supplier who should also provide directions for their use complying with the project specifications of the layer packet.

The prefabricated accessories, which are mandatory for the technical details of the roofing, should be indicated by the project of the layer packet in order to ensure correct and efficient waterproofing.

In certain cases the warranties provided for the Dermabit® FF Single-Ply system may only be granted against a routine maintenance programme for the covering, which should be agreed by the Technician (maintenance person) and the end customer (customer), in accordance with the procedures and protocols advised by Casali S.p.A.
Casali's technicians should be allowed to carry out inspections at the worksite and/or on coverings laid with the Dermabit® FF flame free single-layer waterproofing system.

TECHNICAL SPECIFICATIONS 3

Contents of the Specifications

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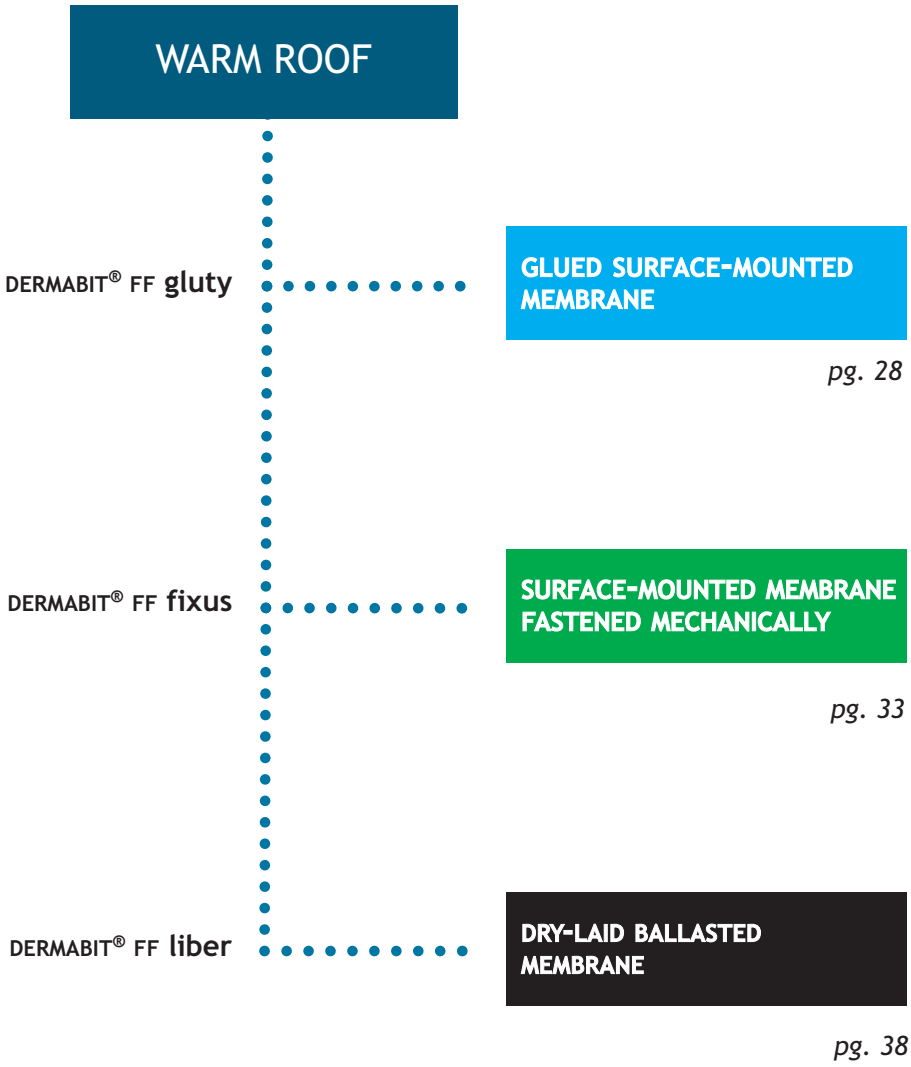
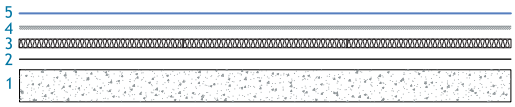
Warm Roofs require the installation of thermal insulation which may be cellular or lightweight concrete etc.; the insulation layer is installed under the waterproofing layer so that it is necessary to check if condensation forms between the deck and the last layer. If vapour condensation at dew point (in the insulating layer) occurs, it is necessary to stop the vapour from migrating upwards and ensure that it condenses; to stop vapour migration, install a vapour barrier on the deck before laying the insulation layer. If the vapour barrier consists of a polymer bitumen membrane, ensure that it is compatible with the deck. The anchorage systems and type of Dermabit® FF Single-Ply to use are as follows:



MAIN COMPONENTS

1. LOAD-BEARING DECK
2. VAPOUR BARRIER
3. INSULATING LAYER
4. ADHESION ELEMENT
5. WATERPROOFING LAYER



1. LOAD-BEARING DECK

■ **Prefabricated structure in reinforced concrete, clay-cement, or cast in situ or mixed.**

■ **Prefabricated steel structure, assembled in situ**; the laying surface may be a composite reinforced concrete screed or any other horizontal plane surface

■ **Wooden prefabricated structure, assembled in situ**; the laying surface may consist of wooden planks or other material. Ensure that the resinous binders used for production of the planks are chemically compatible with the glue and membrane Dermabit® FF Single-Ply compound.

LOAD-BEARING DECK GENERAL INFORMATION

The laying surface on which the membrane Dermabit® FF Single-Ply is to be laid must:

- Have a sub-horizontal plane inclined by at least 2% to ensure rainwater runoff to the drainage system.
- Be perfectly smooth and clean with no rough parts or hollows that may prevent water runoff or cause mechanical damage to the membrane.
- Be sufficiently sturdy to support the deck loads without causing significant deformation.
- Be chemically compatible with the waterproofing membrane.

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2. VAPOUR BARRIER

✹ The vapour barrier recommended for the single-layer Dermabit® FF Single-Ply system is the polymer bitumen membrane 3 mm VAPOREX AL with centesimal aluminium sheet.

✹ When this layer acts as temporary waterproofing layer, and is to be fastened to the deck in order to ensure resistance to wind kinetic pressure, the following are recommended as alternative:
- 4 mm polymer bitumen membrane with polyester reinforcement and aluminium sheet, 4 mm polyester VAPOREX dry laid and anchored with mechanical elements or glued (if necessary in part) with bitumen glue or adhesive. Sheet overlaps should be hot air welded.
- 2 mm self-adhesive polymer bitumen membrane with polyester reinforcement and aluminium sheet, 2 mm polyester ADERIX AL. Sheet overlaps should be sealed with a heavy roller, exploiting the self-adhesive properties of the bitumen compound.

✹ The vapour barrier layer should be overlapped vertically by at least 2/3 cm with respect to the total thickness of the next insulating layer.

✹ The vapour barrier layer should be connected to the prefabricated drainage outlets by hot air welding in the case of VAPOREX or by self-adhesion in the case of ADERIX.

VAPOUR BARRIER GENERAL INFORMATION

• The vapour barrier should be laid on a smooth and clean deck, and if it is to be glued totally or in part, the deck should also be dry. The deck should slope towards the eaves gutter and drains and should have no hollows or protruding parts that may damage the membrane.

• The layer may be dry and fastened mechanically or glued when there is a risk of wind damage or translations tangent to the deck in the case of steep falls.

• If the vapour barrier is realised with bi-adhesive membrane, it cannot act as a supporting layer to which the next insulating layer is applied by self-adhesion. The characteristics of the latter and the irregular surface of the deck do not guarantee perfect adhesion; each panel should therefore be fastened mechanically to ensure proper anchorage.

• Always check that the vapour barrier and the layers in direct contact with the same are chemically compatible. If not, apply a separation layer (see Technical leaflet no. 2 “surface-mounted membrane fastened mechanically” point 2.)

• If there are vapour vents that create gaps, these should be installed in such a way as to prevent condensation of vapour on the inner surface of the vent.

• Remember that the purpose of this layer is to prevent vapour in the building from reaching dew point; if this happens to a negligible extent, a vapour screen may be used instead of a vapour barrier. Always ensure decreasing resistance to the passage of vapour from lower to higher layers so as too facilitate evaporation during the summer of any condensation that may form during the winter. As a further precaution, install appropriately dimensioned and spaced condensation vents.

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3. INSULATING LAYER

► The purpose of the insulating layer is to increase the resistance of the covering system to endogenous and exogenous transmission of thermal energy. This capacity depends on the presence of stagnant air in the cells of the structure of the material used.

► In the case of Warm Roofs with glued surface-mounted waterproofing membrane, this layer also acts as deck for the next membrane Dermabit® FF Gluty so that it should have the following characteristics:
- consistent cellular structure not subject to delamination or flaking;
- resistance to compression caused by permanent or accidental loads, and consequently having deformation values that protect the waterproofing layer from traction caused by excessive bending stress; it should also be remembered that the low compression resistance of some materials will reduce the original thickness and thus to the detriment of the quantity of air that ensures the isolating properties of the material;
- rot-proof and anhygroscopic, if possible, to maintain isolating properties in time;
- easy to work in order to adapt it to the shape of the covering;
- dimensionally stable, namely it should not be subject to excessive thermal expansion and planar deformation caused by internal vapour pressure or other reasons;
- chemically compatible with the top and bottom layers or any compressed glue or bitumen adhesion used to glue Dermabit® FF Gluty;
- the surface finish should be suitable for gluing.

► A seamless insulating layer consisting of lightweight or cellular concrete may not have the mechanical resistance, dimensional stability, chemical compatibility or anhygroscopic properties etc, suitable for the other layers required for the type of Warm Roof treated, so that it is necessary to obtain approval of the stratigraphy from Casali's Technical Service.

INSULATING LAYER GENERAL INFORMATION

• Insulating panels should be placed perfectly alongside each other, without spaces between the same so as to obtain a seamlessly flat laying deck while keeping thermal bridges to a minimum.

• Ensure that the anchorage of the insulation to the deck is resistant to kinetic wind pressure and dimensional deformations of any kind; when the vapour is solidly connected to the deck, gluing the vapour barrier may not be sufficient to fasten the panel. Remember that in this case the insulation acts as the laying surface on which the single-layer Dermabit® FF Single-Ply membrane is to be glued; improper fastening of just one of the layer components will compromise efficiency and above all the life of the system.

• If the insulating panels also form the inclination level, the packet should be laid in two stages, namely the thickness of the first layer should be variable to obtain the required slope and the thickness of the second layer should be constant, with the joints staggered with respect to the underlying joints.

• Two or more overlaying layers and staggered joints are also recommended in the case of very thick insulation.

• The vertical and inclined surfaces of Warm Roofs, which may transmit heat, should also be insulated.

• As mentioned previously, insulating panels that are simply glued to the vapour barrier may not ensure the stability of the system. The dimensional stability of inconsistent insulating materials is higher but these may be subject to flaking or delamination; if, on the contrary, materials are more compact, they will not be subject to flaking or delamination but they will be subject to uncontrolled deformation. In addition to gluing, the panels should therefore also be fastened mechanically. Insulating layer and adhesive manufacturers provide instructions for state-of-the-art installation.

• Damage by rodents or small insects may not only compromise the thermal resistance of the covering but may also damage the waterproofing membrane; please consult the insulation manufacturer for information on how to prevent this problem.

• Loose insulating materials on which concrete hoods are installed may be used only if the mechanical resistance, compactness and flatness of the same are appropriate for installation of the waterproofing layer with the relevant laying technique.

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4. ADHESION ELEMENT

◆ Single component **polyurethane adhesive** in drums or tins (applied by roller) or pressurised cans applied with nozzle applicator. The expansion typical of this material should be limited in order to prevent an irregular layer thickness which would produce unattractive undulation in the membrane. The adhesion curing time must be long enough to allow possible corrections to the position of the glued sheet, but must be short enough to ensure that wind action, operator traffic or other causes do not damage the same. If the membrane is subject to stress before complete adhesion, fasten the sheets mechanically to prevent them from moving. This should in any case be done if the inclination of the laying surface is more than 7%. The quantity of solvents used should be sufficient to make the product fluid and easy to apply but the quantity used should not be incompatible with the Dermabit® FF Single-Ply compound.

◆ **Solvent-based bitumen adhesive** applied by roller, brush or toothed squeegee having characteristics which guarantee that the original resistance to low temperatures and elasticity remain constant for a long period of time. If the membrane is subject to stress before complete adhesion, fasten the sheets mechanically to prevent deformation. This should in any case be done if the inclination of the laying surface is more than 7%. The solvent quantity and quality recommendations given for polyurethane adhesives apply in this case as well.

◆ **Water-based bitumen adhesive** applied by roller, brush or toothed squeegee having characteristics which guarantee that the original resistance to low temperatures and elasticity remain constant for a long period of time. If the membrane is subject to stress before complete adhesion, fasten the sheets mechanically to prevent deformation. This should in any case be done if the inclination of the laying surface is more than 7%.

ADHESION ELEMENT GENERAL INFORMATION

• The adhesive should be applied on a smooth, clean, dry, dust-free surface without irregularities.

• In the case of long adhesive curing times whereby the membrane might be subject to wind action, mechanical stress due to operator traffic or gravitational creep, the sheets should also be fastened mechanically.

• In the case of decks having an inclination of more than 7%, fasten the head of the sheets, and if necessary, the part under the longitudinal overlaps mechanically.

• The glue or bitumen adhesive should be applied over the whole surface ensuring that the membrane is completely fastened. In the case of partial gluing, i.e. in strips or spots etc., please follow the instructions of the glue or bitumen adhesive manufacturer who should also indicate the quantities and application method and provide the necessary guarantees for its life and compatibility with the membrane Dermabit® FF Single-Ply.

• If the case of partial gluing of the membrane Dermabit® FF Single-Ply, there should be no swelling or creasing on its surface caused by the thickness of the adhesive.

• In proximity of the connection necks of projecting parts and along the perimeter walls, sheets laid horizontally should be attached mechanically with expansion dowels and oval plates; they may be fastened both horizontally and vertically, in this case by fastening a folded portion of the sheet overlapped upwards by at least 5 cm.

• Contact adhesives, namely those that are applied on both sides of the surfaces, may also be used, joining them once the solvent has evaporated; this method should however only be used for small surfaces or particular cases in that once the two surfaces have been jointed they adhere immediately and it will not be possible to correct the position of the sheet in any way.

• The rule of thumb is that any type of adhesive or glue used must always reduce risks to health and the environment as far as possible, in accordance with applicable laws.

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5. WATERPROOFING LAYER

► The *membrane* to use as a single layer glued on the deck is DERMABIT® FF Gluty which has a bottom non-woven polypropylene geotextile layer with weight of 30 g/sq.m.; this first layer improves cohesion with the bitumen adhesive or glue.

► The *waterproofing mass* consists of the compound used for the production of Dermabit® Extra, like the type of stabilised polyester geotextile reinforcement.

► The *protection layer* consists of slate chips spread on the molten compound.

► The *longitudinal overlaps (top and bottom)* of the sheets are at least 10 cm. wide and have no accessory materials to ensure perfect hot air welding.

In particular cases (temperature, dusty or humid environments etc.), the selvedge may be protected with a strip of silicone-treated paper which may be removed quickly and easily before bonding.

► For the *head overlaps*, please follow the instructions provided by the technical leaflet "Laying Manual for the Dermabit® FF Single-Ply System".

► The same applies to the installation of *vertical necks, technical details and the application of prefabricated finishing accessories* that should be supplied only by Casali.

WATERPROOFING LAYER GENERAL INFORMATION

- Flame torches may not be used for the installation of Dermabit® FF Single-Ply.
- The membrane Dermabit® FF Gluty must be laid in accordance with good state-of-the-art procedures; specifications different to the standard technical procedures commonly used for the other membranes are described by the relevant laying manual. The laying manual is an integral part of the technical documents of the *Dermabit® FF Single-Ply System* and the relevant technical specifications must be communicated to all installers who apply the membranes.
- The rolls must be laid out and positioned carefully so as to permit application of the glue or adhesive uniformly over the full surface to waterproof; mechanical actions of peeling may occur in areas where the membrane is not glued to the deck subject to wind pressure; in small areas that cannot be glued for any reason, the membrane should be fastened with supplementary mechanical means to help gluing particularly in the case of heavy stress conditions.
- Considering that this is a single-layer system, all finishes must be executed with great care including hot air welding of joints.
- All the vertical overlaps of above ground and perimeter containment assemblies must be waterproofed with Dermabit® Extra or Aderix glued or fastened to the deck and then coated with Dermabit® FF Single-Ply, following the instructions indicated by the laying manual.
- Ensure that hot air welding has been carried out correctly by checking that the molten bitumen seam runs out of the edge and mechanically controlling the same.
- Please contact Casali's Technical Service for any explanations you may require regarding correct waterproofing procedures.

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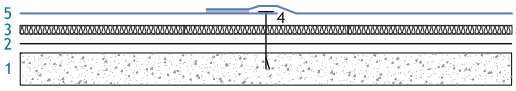
MAIN COMPONENTS

1. LOAD-BEARING DECK
2. VAPOUR BARRIER
3. INSULATING LAYER
4. MECHANICAL FASTENING
5. WATERPROOFING LAYER



1. LOAD-BEARING DECK

■ **Prefabricated structure in reinforced concrete, clay-cement, or cast in situ or mixed.**

■ **Prefabricated steel structure, assembled in situ**; the laying surface may be a composite reinforced concrete screed or any other horizontal plane surface.

■ **Wooden prefabricated structure, assembled in situ**; the laying surface may consist of wooden planks or other material. Ensure that the resinous binders used for production of the panels are chemically compatible with the glue used and the compound of vapour barrier layer.

LOAD-BEARING DECK GENERAL INFORMATION

The laying surface on which the vapour barrier is to be laid must:

- Have a sub-horizontal plane inclined by at least 2% to ensure rain runoff to the drainage system.
- Be perfectly smooth and clean with no rough parts or hollows that may prevent water runoff or cause mechanical damage to the membrane.
- Be sufficiently sturdy to support the deck loads without causing significant deformation.
- Be mechanically resistant to ensure anchorage of the mechanical fasteners.
- Be chemically compatible with the waterproofing membrane.

 Disclaimer on page 156

2. VAPOUR BARRIER

✹ The vapour barrier recommended for the single-layer Dermabit® FF Single-Ply system is the polymer bitumen membrane 3 mm VAPOREX AL with centesimal aluminium sheet.

✹ When this layer acts as temporary waterproofing layer, and is to be fastened to the deck in order to ensure resistance to wind kinetic pressure, the following are recommended as alternative:
- 4 mm polymer bitumen membrane with polyester reinforcement and aluminium sheet, 4 mm polyester VAPOREX dry laid and anchored with mechanical elements or glued (if necessary in part) with bitumen glue or adhesive. Sheet overlaps should be hot air welded.
- 2 mm self-adhesive polymer bitumen membrane with polyester reinforcement and aluminium sheet, 2 mm polyester ADERIX AL. Sheet overlaps should be sealed with a heavy roller, exploiting the self-adhesive properties of the bitumen compound.

✹ The vapour barrier layer should be overlapped vertically by at least 2/3 cm with respect to the total thickness of the next insulating layer.

✹ The vapour barrier layer should be connected to the prefabricated drainage outlets by hot air welding.

VAPOUR BARRIER GENERAL INFORMATION

• The vapour barrier should be laid on a smooth and clean deck, and if it is to be glued totally or in part, the deck should also be dry. The deck should slope towards the eaves gutter and drains and should have no hollows or protruding parts that may damage the membrane.

• The layer may be dry and fastened mechanically or glued when there is a risk of wind damage or translations tangent to the deck in the case of steep falls.

• If the vapour barrier is realised with bi-adhesive membrane, it cannot act as a supporting layer to which the next insulating layer is applied by self-adhesion. The characteristics of the latter and the irregular surface of the deck do not guarantee perfect adhesion; each panel should therefore be fastened mechanically to ensure proper anchorage.

• Always check that the vapour barrier and the layers in direct contact with the same are chemically compatible. If not, apply a separation layer (see Technical leaflet no. 2 “surface-mounted membrane fastened mechanically” point 2.)

• If there are vapour vents that create gaps, these should be installed in such a way as to prevent condensation of vapour on the inner surface of the vent.

• Remember that the purpose of this layer is to prevent vapour in the building from reaching dew point; if this happens to a negligible extent, a vapour screen may be used instead of a vapour barrier. Always ensure decreasing resistance to the passage of vapour from lower to higher layers so as too facilitate evaporation during the summer of any condensation that may form during the winter. As a further precaution, install appropriately dimensioned and spaced condensation vents.

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3. INSULATING LAYER

► The purpose of the insulating layer is to increase the resistance of the covering system to endogenous and exogenous transmission of thermal energy. This capacity depends on the presence of stagnant air in the cells of the structure of the material used.

► In the case of Warm Roofs with surface membrane fastened mechanically, this layer acts as support for the next Dermabit® FF Fixus membrane.
So that it should have the following characteristics:
- resistance to compression caused by permanent or accidental loads, and consequently having deformation values that protect the waterproofing layer from traction caused by excessive bending stress; it should also be remembered that the low compression resistance of some materials will reduce the original thickness and thus to the detriment of the quantity of air that ensures the isolating properties of the material;
- rot-proof and anhygroscopic, if possible, to maintain isolating properties in time;
- easy to work in order to adapt it to the shape of the covering;
- dimensionally stable, namely it should not be subject to excessive thermal expansion and planar deformation caused by internal vapour pressure or other reasons;
- chemically compatible with the top and bottom layers.

► A seamless insulating layer consisting of lightweight or cellular concrete may not have the mechanical resistance, dimensional stability, chemical compatibility or anhygroscopic properties etc, suitable for the other layers required for the type of Warm Roof treated, so that it is necessary to obtain approval of the stratigraphy from Casali's Technical Service.

INSULATING LAYER GENERAL INFORMATION

• Insulating panels should be placed perfectly alongside each other, without spaces between the same so as to obtain a seamlessly flat laying deck while keeping thermal bridges to a minimum.

• Ensure that the anchorage of the insulation to the deck is resistant to kinetic wind pressure and dimensional deformations of any kind. Taking into account that the next membrane is fastened mechanically to the deck, each panel must be secured by the latter; failing this, the panels should be fastened to the deck with at least 4 independent fasteners on each sheet.

• If the insulating panels also form the inclination level, the packet should be laid in two stages, namely the thickness of the first layer should be variable to obtain the required slope and the thickness of the second layer should be constant, with the joints staggered with respect to the underlying joints.

• Two or more overlaying layers are also recommended in the case of very thick insulation.

• The vertical and inclined surfaces of Warm Roofs, which may transmit heat, should also be insulated.

• Damage by rodents or small insects may not only compromise the thermal resistance of the covering but may also damage the waterproofing membrane; please consult the insulation manufacturer for information on how to prevent this problem.

• Loose insulating materials on which concrete hoods are installed may be used only if the mechanical resistance, compactness and flatness of the same are appropriate for installation of the waterproofing layer with the relevant laying technique.

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4. FASTENING

◆ DERMABIT® FF Fixus sheets should generally be fastened mechanically along the longitudinal and transverse overlaps; any additional fastening that may be required outside these areas should be covered with strips of DERMABIT® FF Single-Ply and hot air welded to the horizontal surface so as to smooth over the gaps created by the holes of the fasteners.

◆ The fasteners used to fasten DERMABIT® FF Fixus should be made of materials treated against corrosion.

◆ The fasteners consist of 2 element:
- a fastener
- a plate to distribute tear strain.

◆ The fastener should be suited to the type of load-bearing deck on which the membrane is to be laid, and long enough to penetrate the compact layer, in accordance with the instructions of the manufacturer of the fastener.

◆ The plate should have a diameter or width or no more than 45 mm. and should be made of steel that has undergone appropriate anti-corrosion treatment.

◆ When positioned on the membrane, the thickness of the plate should not damage the membrane or create unattractive swelling.

◆ Plastic plates must be approved in advance by Casali, and backed by a warranty of efficiency issued by the manufacturer and/or supplier of the same.

◆ The number and layout of the fasteners on the laying surface to waterproof should be calculated in accordance with the provisions of applicable laws. Information supplied by Casali's Technical Office should in any case be checked and verified by the installer.

MECHANICAL FASTENING GENERAL INFORMATION

• The mechanical fastener should be positioned so that the plate is 5 mm. inside the edge of the sheet.

• After drilling the holes on the deck for housing or fastening the screws, remove any dust, shavings or other debris from the area where the overlaps are to be welded.

• Before welding the overlaps, remove unused or damaged fasteners on the membrane to prevent them from penetrating and damaging the membrane Dermabit® FF Single-Ply; check that the ends of the fasteners (heads of screws, nuts etc.) do not project above the plate.

• Do not use fasteners on unstable decks such as lightweight concrete surfaces, load-bearing sheet plate with thickness under 0.6 mm., thin or non-compact wooden or chipboard panels that are thin or not compact.

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5. WATERPROOFING LAYER

► The *membrane* to use as single-layer fastened mechanically to the deck is DERMABIT® FF Fixus, which has a bottom polyethylene film that prevents the spontaneous adherence of the packaged roll filaments.

► The *waterproofing mass* consists of the same compound used for the production of Dermabit® Extra, like the type of stabilised polyester geotextile reinforcement.

► The *surface protection layer* consists of slate chips spread over the molten compound.

► The *bottom longitudinal overlaps* of the sheets should be at least 10 cm. wide and must not be covered by the heat sensitive film to ensure perfect hot air welding.

► The *top longitudinal overlaps* of the sheets should be at least 15 cm. wide and must not be covered by slate chips to ensure perfect hot air welding. The extra width permits housing the plates and hot air weld the remaining 10 cm.
In particular cases (temperature, dusty or humid environments etc.), the selvedge may be protected with a strip of silicone-treated paper which may be removed quickly and easily before bonding.

► For the *head overlaps*, please follow the instructions indicated by the technical leaflet "Laying Manual for the Dermabit® FF Single-Ply System".

► The same applies to the installation of *vertical necks, technical details and the application of prefabricated finishing accessories* that should be supplied only by Casali.

WATERPROOFING LAYER GENERAL INFORMATION

Flame torches may not be used for the installation of Dermabit® FF Single-Ply.

- The membrane Dermabit® FF Fixus must be laid in accordance with good state-of-the-art procedures; specifications different to the standard technical procedures commonly used for the other membranes are described by the relevant laying manual. The laying manual is an integral part of the technical documents of the *Dermabit® FF Single-Ply System* and the relevant technical specifications must be communicated to all installers who apply the membranes.
- The rolls must be laid out and positioned carefully so as to permit application of the fasteners, leaving a width of 10 cm. free on the overlaps for hot air welding.
- Always check that the fastener is securely anchored in the section of membrane into which it has been fastened.
- Ensure that hot air welding has been carried out correctly by checking that the molten bitumen seam runs out of the edge and mechanically controlling the same.
- Please contact Casali's Technical Service for any explanations you may require regarding correct waterproofing procedures.

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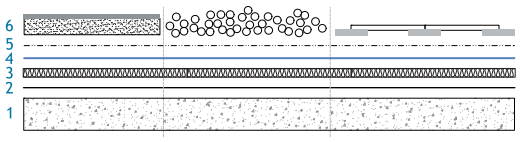
MAIN COMPONENTS

1. LOAD-BEARING DECK
2. VAPOUR BARRIER
3. INSULATING LAYER
4. WATERPROOFING LAYER
5. SEPARATION/CREEP LAYER
6. BALLAST LAYER



1. LOAD-BEARING DECK

■ **Prefabricated structure in reinforced concrete, clay-cement, or cast in situ or mixed.**

■ **Prefabricated steel structure, assembled in situ**; the laying surface may be a composite reinforced concrete screed or any other horizontal plane surface.

■ **Wooden prefabricated structure, assembled in situ**; the laying surface may consist of wooden planks or other material. Always check that any resin binders that the panels may contain are compatible with the adhesive and mixture of the vapour barrier layer.

LOAD-BEARING DECK GENERAL INFORMATION

The laying surface on which the vapour barrier is to be laid must:

- Have a sub-horizontal plane inclined by at least 2% to ensure rain runoff to the drainage system.
- Be perfectly smooth and clean with no rough parts or hollows that may prevent water runoff or cause mechanical damage to the membrane.
- Be sufficiently sturdy to support the deck loads without causing significant deformation.
- This should ensure anchorage of fasteners and/or gluing of the vapour barrier.

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2. VAPOUR BARRIER

✹ The vapour barrier recommended for the single-layer Dermabit® FF Single-Ply system is the polymer bitumen membrane 3 mm VAPOREX AL with centesimal aluminium sheet.

✹ When this layer acts as temporary waterproofing layer, and is to be fastened to the deck in order to ensure resistance to wind kinetic pressure, the following are recommended as alternative:
- 4 mm polymer bitumen membrane with polyester reinforcement and aluminium sheet, 4 mm polyester VAPOREX dry laid and anchored with mechanical elements or glued (if necessary in part) with bitumen glue or adhesive. Sheet overlaps should be hot air welded.
- 2 mm self-adhesive polymer bitumen membrane with polyester reinforcement and aluminium sheet, 2 mm polyester ADERIX AL. Sheet overlaps should be sealed with a heavy roller, exploiting the self-adhesive properties of the bitumen compound.

✹ The vapour barrier layer should be overlapped vertically by at least 2/3 cm with respect to the total thickness of the next insulating layer.

✹ The vapour barrier layer should be connected to the prefabricated drainage outlets by hot air welding in the case of VAPOREX or by self-adhesion in the case of ADERIX.

VAPOUR BARRIER GENERAL INFORMATION

• The vapour barrier should be laid on a smooth and clean deck, and if it is to be glued totally or in part, the deck should also be dry. The deck should slope towards the eaves gutter and drains and should have no hollows or protruding parts that may damage the membrane.

• The layer may be dry and fastened mechanically or glued when there is a risk of wind damage or translations tangent to the deck in the case of steep falls.

• If the vapour barrier is realised with bi-adhesive membrane, it cannot act as a supporting layer to which the next insulating layer is applied by self-adhesion. The characteristics of the latter and the irregular surface of the deck do not guarantee perfect adhesion; each panel should therefore be fastened mechanically to ensure proper anchorage.

• Always check that the vapour barrier and the layers in direct contact with the same are chemically compatible. If not, apply a separation layer (see Technical leaflet no. 2 “surface-mounted membrane fastened mechanically” point 2.)

• If there are vapour vents that create gaps, these should be installed in such a way as to prevent condensation of vapour on the inner surface of the vent.

• Remember that the purpose of this layer is to prevent vapour in the building from reaching dew point; if this happens to a negligible extent, a vapour screen may be used instead of a vapour barrier. Always ensure decreasing resistance to the passage of vapour from lower to higher layers so as too facilitate evaporation during the summer of any condensation that may form during the winter. As a further precaution, install appropriately dimensioned and spaced condensation vents.

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3. INSULATING LAYER

► The purpose of the insulating layer is to increase the resistance of the covering system to endogenous and exogenous transmission of thermal energy. This capacity depends on the presence of stagnant air in the cells of the structure of the material used.

► In the case of Warm Roofs with ballasted waterproofing membrane, this layer also acts as support for the next Dermabit® FF Liber membrane so that it should have the following characteristics:
- resistance to compression caused by permanent or accidental loads, and consequently having deformation values that protect the waterproofing layer from traction caused by excessive bending stress; it should also be remembered that the low compression resistance of some materials will reduce the original thickness and thus to the detriment of the quantity of air that ensures the isolating properties of the material;
- rot-proof and anhygroscopic, if possible, to maintain isolating properties in time;
- easy to work in order to adapt it to the shape of the covering;
- dimensionally stable, namely it should not be subject to excessive thermal expansion and planar deformation caused by internal vapour pressure or other reasons;
- chemically compatible with the top and bottom layers.

► A seamless insulating layer consisting of lightweight or cellular concrete may not have the mechanical resistance, dimensional stability, chemical compatibility or anhygroscopic properties etc, suitable for the other layers required for the type of Warm Roof treated, so that it is necessary to obtain approval of the stratigraphy from Casali's Technical Service.

INSULATING LAYER GENERAL INFORMATION

- Insulating panels should be placed perfectly alongside each other, without spaces between the same so as to obtain a seamlessly flat laying deck while keeping thermal bridges to a minimum.
- If the insulating panels also form the inclination level, the packet should be laid in two stages, namely the thickness of the first layer should be variable to obtain the required slope and the thickness of the second layer should be constant, with the joints staggered with respect to the underlying joints.
- Two or more overlaying layers are also recommended in the case of very thick insulation.
- The vertical and inclined surfaces of Warm Roofs, which may transmit heat, should also be insulated.
- Damage by rodents or small insects may not only compromise the thermal resistance of the covering but may also damage the waterproofing membrane; please consult the insulation manufacturer for information on how to prevent this problem.
- Loose insulating materials on which concrete hoods are installed may be used only if the mechanical resistance, compactness and flatness of the same are appropriate for installation of the waterproofing layer with the relevant laying technique.

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4. WATERPROOFING LAYER

► The *membrane* to use as dry laid single-layer on the deck is DERMABIT® FF Liber which has a bottom polyethylene film that prevents spontaneous adherence of the filaments of the packaged rolls.

► The *waterproofing mass* consists of the same compound used for the production of Dermabit® Extra, like the type of stabilised polyester geotextile reinforcement.

► The *surface protection layer* consists of non-woven polypropylene geotextile having a weight of 30 g/sq.m.; the geotextile protects the membrane when the heavy ballast is laid and acts as separation layer which absorbs small movements of the latter.

► The *longitudinal overlaps (top and bottom)* of the sheets are at least 10 cm. wide and have no accessory materials to ensure perfect hot air welding.
In particular cases (temperature, dusty or humid environments etc.), the selvedge may be protected with a strip of silicone-treated paper which may be removed quickly and easily before bonding.

► For the *head overlaps*, please follow the instructions provided by the technical leaflet "Laying Manual for the Dermabit® FF Single-Ply System".

► The same applies to the installation of *vertical necks, technical details and the application of prefabricated finishing accessories* that should be supplied only by Casali.

WATERPROOFING LAYER GENERAL INFORMATION

Flame torches may not be used for the installation of Dermabit® FF Single-Ply.

• The membrane Dermabit® FF Liber must be laid in accordance with good state-of-the-art procedures; specifications different to the standard technical procedures commonly used for the other membranes are described by the relevant laying manual. The laying manual is an integral part of the technical documents of the "DERMABIT® FF Single-Ply System" and the relevant technical specifications must be communicated to all installers who apply the membranes.

• Before applying the next layers always ensure that there are no foreign bodies, debris or other materials on the membrane that might cause mechanical damage.

• Ensure that hot air welding has been carried out correctly by checking that the molten bitumen seam runs out of the edge and mechanically controlling the same.

• Please contact Casali's Technical Service for any explanations you may require regarding correct waterproofing procedures.

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5. SEPARATION / CREEP LAYER

► A creep layer should be applied when:
- this must be laid independently from the membrane and from differentiated movements of the ballast layer in order to prevent dragging or abrasion of the membrane;
- it is necessary to protect the membrane from mechanical damage caused by the permanent load of the ballast layer;
- it is necessary to prevent contact between the membrane and ballast due to chemical incompatibility.

► This layer may also be used as protection against dynamic punching.

SEPARATION/CREEP LAYER GENERAL INFORMATION

The layer applied on the membrane Dermabit® FF Single-Ply to isolate it from the ballast should have the following essential characteristics:

- Sufficiently resistant to perforation.
- Rot-proof and contain no substances that are chemically incompatible with the membrane Dermabit® FF Single-Ply or deck on which it is to be laid (for example, a polyester layer may be damaged if in contact with cellular concrete).
- Maintain its properties for the expected working life.
- When laid before a concrete or sand screed, it must not allow any cement grout that may leak during casting to pass through to and adhere to the membrane below.
- Be free from metal residues or sharp filaments used during production for needle punching.

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6. BALLAST LAYER

► The ballast layer protects the dry laid membrane from kinetic wind pressure, deterioration by Ultra violet rays, mechanical damage caused by foot traffic on the deck or mechanical punching from hail.

► This is a 45 kg sq.m. layer which may consist of:

- **loose** round river 16/32 mm **gravel** (mobile ballast) over the entire waterproofed horizontal surface, for a thickness of 4 cm., which may be increased in the case of considerable kinetic pressure;

- **floating floor** (mobile ballast) consisting of prefabricated marble-chips, dry laid on polypropylene circular supports with rounded base edges. The flooring should be laid over the entire waterproofed horizontal surface, with additional gravel added to the perimeter areas or next to above ground structures, if necessary;

- **concrete screed** (fixed ballast) with or without steel reinforcement (depending on permanent or accidental loads), with thickness of at least 5 cm. The waterproofed horizontal surface should be covered in full, or a mobile ballast added if necessary. The screed as described above may act as the deck for appropriately laid fastened floor if any.

BALLAST LAYER GENERAL INFORMATION

- The gravel should be laid and levelled very carefully on the membrane to avoid any damage to the underlying membrane.
- The floating floor should be applied and laid very carefully with great care so as to avoid mechanical damage to the membrane; in the case of considerable stress on the same from assembly structures, these should be spaced from the membrane by a protection layer, that may be partial if necessary.
- Particular care should be taken when laying concrete screed layers or moving steel bars or nets used for reinforcement.
- Screeds should laid at a suitable inclination with the necessary expansion joints to avoid water pooling; the screeds should be isolated from the membrane with compressible material in the perimeter areas to prevent them from pressing the membrane against the vertical overlaps.
- If the ballast layer produces heavy mechanical stress on the membrane, an additional protection layer should be dry laid on the membrane.
- Before applying the ballast layer, above all in the case of fixed ballasts, check the water seal of the waterproofing by flooding with water.
- Despite the many recommendations to operators who intervene after the waterproofing is installed, often the waterproofing will have damage that is not reported. It is therefore a good rule for a representative of the installation company to supervise the different working stages through to total protection of the membrane.
- Before applying the next layer, always ensure that there are no foreign bodies, debris or other material on the membrane that may cause mechanical damage.
- Please contact Casali's Technical Service for any doubts you may have on application of the waterproofing.

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3

Technical specifications 2, 3, 4, 5, 6 and 7, which are an integral part of the technical documents for the DERMABIT® FF Single-Ply system, give a detailed explanation of the different packet components compatible with the Dermabit® FF Single-Ply system as well as a description of the functions of the single layers, the minimum technical characteristics required and laying specifications. Please contact Casali's Technical Office for any information you may require to correctly design the layers, the specifications or any other doubts you cannot resolve by reading this documentation.

CASALI S.p.A. Z.I. C.I.A.F. 60015 - Castelferretti (AN) - Tel. +39 071 9162095 - fax +39 071 9162098 - www.casaligroup.it - info@casaligroup.it

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technical specifications 4

DERMABIT FF

Flame-free polymer bituminous single-layer waterproofing systems

INVERTED ROOF SYSTEM

CASALI
www.casaligroup.it

GENERAL INFORMATION

Dermabit® FF Single-Ply is a polymer bitumen membrane formulated as single-layer waterproofing laid with hot air welding system on decks of different kinds. Dermabit® FF Single-Ply may be laid ***without the use of propane torch or flame burners or bitumen molten in special boilers (a method which is today very rarely used).***

The flame free welding technique applied to polymer bitumen membranes is a result of the innovative research work developed by Casali S.p.A.
This document is intended as a support for designers and operators and is a practical guide to follow to ensure correct planning and laying of the single-layer waterproofing system.

Installers must receive appropriate training on the laying techniques of Dermabit® FF Single-Ply. Casali S.p.A. organises specific courses on the laying techniques which include introductory theoretical aspects associated to a practical session using specific models. The theoretical and practical course is based on UNI 11333 regulations and is a professional refresher course for operators in this industry. A certificate of participation and qualification will be issued to participants to attest their attendance of the training course and confirm the technical laying skills acquired during the demonstration. This certificate, together with full compliance with the specifications of the technical documents, guarantees correct laying by installers who are certified to lay Dermabit® FF Single-Ply.

The information provided by the technical specifications generally provide full details on the most common worksite cases. In the case of projects involving technical details and layers not indicated by the technical specifications, installers should contact Casali's Technical Office to request information on the correct laying methods.

Complementary layers of the single-layer Dermabit® FF waterproofing membrane, such as vapour barriers, insulating and separator layers etc., not produced and/or supplied by Casali S.p.A. must be approved by the Technical Office during the design stage of the layer packet. The specific Dermabit® FF Single-Ply warranties will not be granted if materials and/or layers that have not been approved are used.

Materials for gluing and mechanical fastening not produced and/or supplied by Casali should bear the warranty of the relevant producer/supplier who should also provide directions for their use complying with the project specifications of the layer packet.

The prefabricated accessories, which are mandatory for the technical details of the roofing, should be indicated by the project of the layer packet in order to ensure correct and efficient waterproofing.

In certain cases the warranties provided for the Dermabit® FF Single-Ply system may only be granted against a routine maintenance programme for the covering, which should be agreed by the Technician (maintenance person) and the end customer (customer), in accordance with the procedures and protocols advised by Casali S.p.A.
Casali's technicians should be allowed to carry out inspections at the worksite and/or on coverings laid with the Dermabit® FF flame free single-layer waterproofing system.

TECHNICAL SPECIFICATIONS 4

Contents of the Specifications

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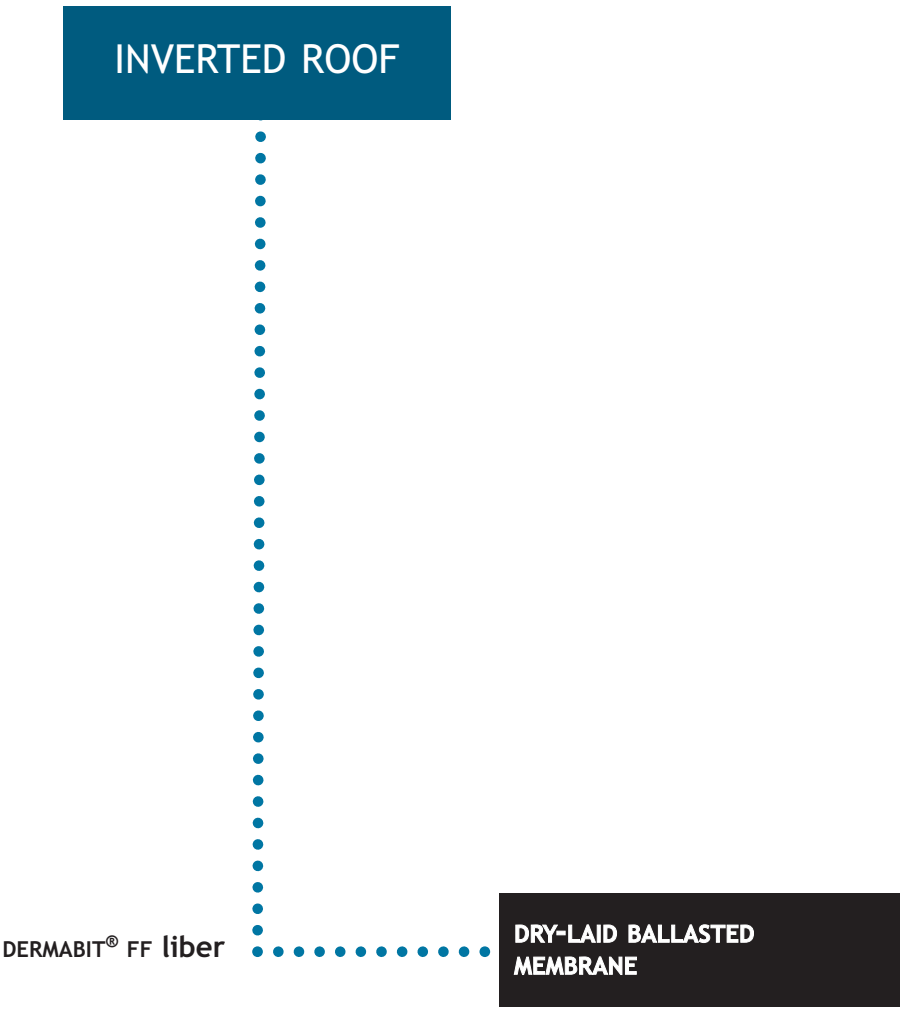
Inverted Roofs require the installation of thermal insulation to reduce the endogenous and exogenous transmission of heat through the roofing packet. Contrary to Warm Roofs, the waterproofing membrane is laid directly on the deck at an appropriate slope and the insulating layer is then applied. The type of Dermabit® FF Single-Ply to use is the following:



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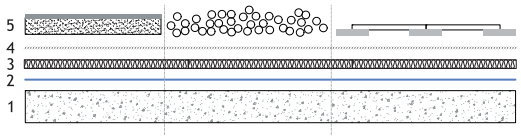
MAIN COMPONENTS

1. LOAD-BEARING DECK
2. WATERPROOFING LAYER
3. INSULATING LAYER
4. FILTER LAYER
5. BALLAST LAYER



1. LOAD-BEARING DECK

■ **Prefabricated structure in reinforced concrete, clay-cement, or cast in situ or mixed.**

■ **Prefabricated steel structure, assembled in situ**; the laying surface may be a composite reinforced concrete screed or any other horizontal plane surface.

■ **Wooden prefabricated structure, assembled in situ**; the laying surface may consist of wooden planks or other material. Ensure that the resinous binders used for production of the planks are chemically compatible with the next waterproofing layer.

LOAD-BEARING DECK GENERAL INFORMATION

The laying surface on which the vapour barrier is to be laid must:

- Have a sub-horizontal plane inclined by at least 2% to ensure rain runoff to the drainage system.
- Be perfectly smooth and clean with no rough parts or hollows that may prevent water runoff or cause mechanical damage to the membrane. If the load-bearing deck is irregular and does not adequately protect waterproofing layer, a geotextile protection layer of appropriate grammage should be installed.
- Be sufficiently sturdy to support the deck loads without causing significant deformation.
- This must ensure anchorage of the mechanical fasteners and/or gluing of the next layer.

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2. WATERPROOFING LAYER

► The *membrane* to use as dry laid single-layer on the deck is DERMABIT® FF Liber which has a bottom polyethylene film that prevents spontaneous adherence of the filaments of the packaged rolls.

► The *waterproofing mass* consists of the same compound used for the production of Dermabit® Extra, like the type of stabilised polyester geotextile reinforcement.

► The *surface protection layer* consists of non-woven polypropylene geotextile having a weight of 30 g/sq.m.; the purpose of the geotextile is to protect the membrane when the insulating panel is laid and prevent direct contact between the membrane and bituminous mass.

► The *longitudinal overlaps (top and bottom)* of the sheets are at least 10 cm. wide and have no accessory materials to ensure perfect hot air welding.
In particular cases (temperature, dusty or humid environments etc.), the selvedge may be protected with a strip of silicone-treated paper which may be removed quickly and easily before bonding.

► For the *head overlaps*, please follow the instructions provided by the technical leaflet "Laying Manual for the Dermabit® FF Single-Ply System".

► The same applies to the installation of *vertical necks, technical details and the application of prefabricated finishing accessories* that should be supplied only by Casali.

WATERPROOFING LAYER GENERAL INFORMATION

Flame torches may not be used for the installation of Dermabit® FF Single-Ply.

• The membrane Dermabit® FF Liber must be laid in accordance with good state-of-the-art procedures; specifications different to the standard technical procedures commonly used for the other membranes are described by the relevant laying manual. The laying manual is an integral part of the technical documents of the "DERMABIT® FF Single-Ply System" and the relevant technical specifications must be communicated to all installers who apply the membranes.

• All the vertical embossments of projecting parts and the perimeter edges must be waterproofed with Dermabit® FF Extra or Aderix glued or fastened to the deck and then coated with Dermabit® FF Single-Ply, following the instructions provided by the installation manual.

• Before applying the next layers always ensure that there are no foreign bodies, debris or other materials on the membrane that might cause mechanical damage.

• Ensure that hot air welding has been carried out correctly by checking that the molten bitumen seam runs out of the edge and mechanically controlling the same.

• If the insulating and ballasting layers are not laid immediately after the waterproofing layer, remember to protect the works from kinetic wind pressure and other factors. In some cases it may be necessary to fasten the waterproofing membrane mechanically or glue it using the most appropriate Dermabit® FF Single-Ply product.

• Please contact Casali's Technical Service for any explanations you may require regarding correct waterproofing procedures.

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3. INSULATING LAYER

► The purpose of the insulating layer is to increase the resistance of the covering system to endogenous and exogenous transmission of thermal energy. This capacity depends on the presence of stagnant air in the cells of the structure of the material used.

► In the case of Inverted Roofs, this layer also acts as deck for the ballast layer and should therefore have the following characteristics:
- resistance to compression caused by permanent or accidental loads; it should also be remembered that the low compression resistance of some materials will reduce the original thickness to the detriment of the quantity of air that ensures the isolating properties of the material;
- rot-proof and anhygroscopic, if possible, to maintain isolating properties in time, and should not absorb water;
- easy to work in order to adapt it to the shape of the covering;
- dimensionally stable, namely it should not be subject to excessive thermal expansion and planar deformation caused by internal vapour pressure or other reasons;
- chemically compatible with the waterproofing layer below.

► Seamless insulating concrete layers should not be used due to the soaking properties of the same.

INSULATING LAYER GENERAL INFORMATION

• Insulating panels should be placed perfectly alongside each other, without spaces between the same so as to obtain a seamlessly flat laying deck while keeping thermal bridges to a minimum.

• Two or more overlaying layers and staggered joints are recommended in the case of very thick insulation.

• The vertical and inclined surfaces of Inverted Roofs, which may transmit heat, should also be insulated.

• Damage by rodents or small insects may not only compromise the thermal resistance of the covering but may also damage the waterproofing membrane; please consult the insulation manufacturer for information on how to prevent this problem.

4. FILTER LAYER

► A filter layer is necessary to prevent debris or silt from plugging the joints of the insulating panels when open.

► This layer acts as creep or anti-soaking layer when the ballast consists of a cement screed cast in situ.

► It may also act as protection against dynamic punching.

FILTER LAYER GENERAL INFORMATION

The layer applied to the insulating layer to protect it from the ballast must have the following characteristics:

• Sufficiently resistant to perforation.

• Rot-proof and contain no substances that are chemically incompatible with the insulation or ballast layer.

• Maintain its properties for the expected working life.

• When laid before a concrete or sand screed, it must not allow any cement grout that may leak during casting to pass through to and adhere to the panel below.

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5. BALLAST LAYER

► The ballast layer protects the dry laid membrane from kinetic wind pressure, deterioration by Ultra violet rays, mechanical damage caused by foot traffic on the deck

► This is a 45 kg sq.m. layer which may consist of:

- **loose** round river 16/32 mm **gravel** (mobile ballast) over the entire waterproofed horizontal surface, for a thickness of 4 cm., which may be increased in the case of considerable kinetic pressure;

- **floating floor** (mobile ballast) consisting of prefabricated marble-chips, dry laid on polypropylene circular supports with rounded base edges. The flooring should be laid over the full horizontal waterproofed surface, adding gravel as described previously along the perimeter or around projecting parts.

- **concrete screed** (fixed ballast) with or without steel reinforcement (depending on permanent or accidental loads), with thickness of at least 5 cm. The waterproofed horizontal surface should be covered in full, or a mobile ballast added if necessary. The screed as described above may act as the deck for appropriately laid fastened floor if any.

BALLAST LAYER GENERAL INFORMATION

- The gravel on the insulating panel should be laid and levelled carefully to prevent movement of or damages to the underlying layer.
- The same applies to application and laying of the floating floor.
- Particular care should be taken when laying concrete screed layers or moving steel bars or nets used for reinforcement.
- Screeds should laid at a suitable inclination with the necessary expansion joints to avoid water pooling; the screeds should be isolated from the membrane with compressible material in the perimeter areas to prevent them from pressing the membrane against the vertical overlaps.
- Before applying the ballast layer, above all in the case of fixed ballasts, check the water seal of the waterproofing by flooding with water.

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4

Technical specifications 2, 3, 4, 5, 6 and 7, which are an integral part of the technical documents for the DERMABIT® FF Single-Ply system, give a detailed explanation of the different packet components compatible with the Dermabit® FF Single-Ply system as well as a description of the functions of the single layers, the minimum technical characteristics required and laying specifications. Please contact Casali's Technical Office for any information you may require to correctly design the layers, the specifications or any other doubts you cannot resolve by reading this documentation.

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technical specifications 5

DERMABIT FF

Flame-free polymer bituminous single-layer waterproofing systems

DUO ROOF SYSTEM

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GENERAL INFORMATION

Dermabit® FF Single-Ply is a polymer bitumen membrane formulated as single-layer waterproofing laid with hot air welding system on decks of different kinds. Dermabit® FF Single-Ply may be laid ***without the use of propane torch or flame burners or bitumen molten in special boilers (a method which is today very rarely used).***

The flame free welding technique applied to polymer bitumen membranes is a result of the innovative research work developed by Casali S.p.A.
This document is intended as a support for designers and operators and is a practical guide to follow to ensure correct planning and laying of the single-layer waterproofing system.

Installers must receive appropriate training on the laying techniques of Dermabit® FF Single-Ply. Casali S.p.A. organises specific courses on the laying techniques which include introductory theoretical aspects associated to a practical session using specific models. The theoretical and practical course is based on UNI 11333 regulations and is a professional refresher course for operators in this industry. A certificate of participation and qualification will be issued to participants to attest their attendance of the training course and confirm the technical laying skills acquired during the demonstration. This certificate, together with full compliance with the specifications of the technical documents, guarantees correct laying by installers who are certified to lay Dermabit® FF Single-Ply.

The information provided by the technical specifications generally provide full details on the most common worksite cases. In the case of projects involving technical details and layers not indicated by the technical specifications, installers should contact Casali's Technical Office to request information on the correct laying methods.

Complementary layers of the single-layer Dermabit® FF waterproofing membrane, such as vapour barriers, insulating and separator layers etc., not produced and/or supplied by Casali S.p.A. must be approved by the Technical Office during the design stage of the layer packet. The specific Dermabit® FF Single-Ply warranties will not be granted if materials and/or layers that have not been approved are used.

Materials for gluing and mechanical fastening not produced and/or supplied by Casali should bear the warranty of the relevant producer/supplier who should also provide directions for their use complying with the project specifications of the layer packet.

The prefabricated accessories, which are mandatory for the technical details of the roofing, should be indicated by the project of the layer packet in order to ensure correct and efficient waterproofing.

In certain cases the warranties provided for the Dermabit® FF Single-Ply system may only be granted against a routine maintenance programme for the covering, which should be agreed by the Technician (maintenance person) and the end customer (customer), in accordance with the procedures and protocols advised by Casali S.p.A.
Casali's technicians should be allowed to carry out inspections at the worksite and/or on coverings laid with the Dermabit® FF flame free single-layer waterproofing system.

TECHNICAL SPECIFICATIONS 5

Contents of the Specifications

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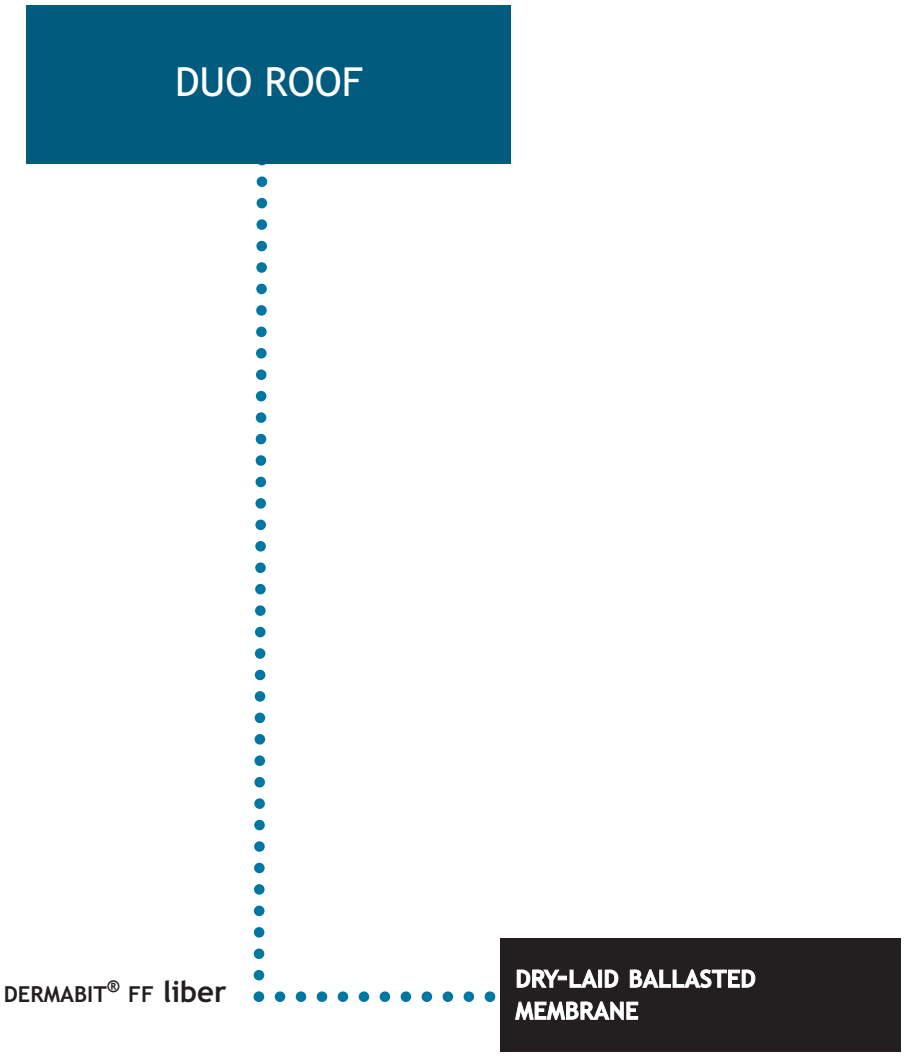
Duo Roofs require the installation of thermal insulation to reduce the endogenous and exogenous transmission of heat through the roofing packet. Contrary to Warm Roofs, the waterproofing membrane is dry laid between 2 insulating panels with specific characteristics. The type of Dermabit® FF Single-Ply to use is the following:



pg. 56

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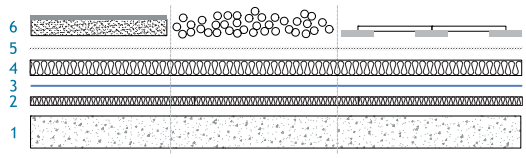
MAIN COMPONENTS

1. LOAD-BEARING DECK
2. FIRST INSULATING LAYER
3. WATERPROOFING LAYER
4. SECOND INSULATING LAYER
5. FILTER LAYER
6. BALLAST LAYER



1. LOAD-BEARING DECK

■ **Prefabricated structure in reinforced concrete, clay-cement, or cast in situ or mixed.**

■ **Prefabricated steel structure, assembled in situ**; the laying surface may be a composite reinforced concrete screed or any other horizontal plane surface.

■ **Prefabricated wooden structure, assembled on site**; the laying surface may consist of wooden planks or other material. Ensure that the resinous binders used for production of the panels are chemically compatible with the next insulating layer.

LOAD-BEARING DECK GENERAL INFORMATION

The laying surface on which the membrane Dermabit® FF Single-Ply is to be laid must:

- Have a sub-horizontal plane inclined by at least 2% to ensure rainwater runoff to the drainage system.
- Be perfectly smooth and clean with no rough parts or hollows that may prevent water runoff or cause mechanical damage to the membrane.
- Be sufficiently sturdy to support the deck loads without causing significant deformation.
- Be chemically compatible with the waterproofing membrane.

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2. FIRST INSULATING LAYER

► The purpose of the insulating layer is to increase the resistance of the covering system to the endogenous and exogenous transmission of thermal energy. This capacity depends on the presence of stagnant air in the cells of the structure of the material used.

► In the case of Duo Roofs, this layer also acts as deck for the next waterproofing layer and should therefore have the following characteristics:
- resistance to compression caused by permanent or accidental loads; it should also be remembered that the low compression resistance of some materials will reduce the original thickness and thus to the detriment of the quantity of air that ensures the isolating properties of the material;
- rot-proof and anhygroscopic, if possible;
- easy to work in order to adapt to the shape of the covering;
- dimensionally stable, namely it should not be subject to excessive thermal expansion and planar deformation caused by internal vapour pressure or other reasons;
- chemically compatible with the overlying waterproofing layer and deck.

► If lightweight concrete screeds are used as the first insulating layer, check that the resulting insulation does not change the dew point under that of the waterproofing membrane.
Always check the following properties: mechanical strength, dimensional stability, chemical compatibility with the other layers, anhygroscopic properties etc. and contact Casali's Technical Office to confirm whether use is appropriate in the layer structure.

FIRST INSULATING LAYER GENERAL INFORMATION

• The insulating panels should in any case be placed perfectly alongside each other, without spaces between the same so as to obtain a flat laying deck while keeping thermal bridges to a minimum.

• Two or more overlaying layers are also recommended in the case of very thick insulation.

• If the insulating panels also form the inclination level, the packet should be laid in two stages, namely the thickness of the first layer should be variable to obtain the required slope and the thickness of the second layer should be constant, with the joints staggered with respect to the underlying joints.

• Two or more overlaying layers are also recommended in the case of very thick insulation. The vertical and inclined surfaces of Duo Roofs, which may transmit heat, should also be insulated.

• Damage by rodents or small insects may not only compromise the thermal resistance of the covering but may also damage the waterproofing membrane; please consult the insulation manufacturer for information on how to prevent this problem.

• Loose insulating materials, on which concrete hoods are installed, may be used only if their mechanical strength, compactness and flatness are sufficient to install the waterproofing layer.

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3. WATERPROOFING LAYER

► The *membrane* to use as single-ply dry laid layer on the first insulating layer is Dermabit® FF Liber which has a bottom polyethylene film that prevents adhesion of the packaging roll spires and direct contact of the bituminous mass with the underlying panel.

► The *waterproofing mass* consists of the same compound used for the production of Dermabit® Extra, like the type of stabilised polyester geotextile reinforcement.

► The *surface protection layer* consists of non-woven polypropylene geotextile having a weight of 30 g/sq.m.; the geotextile protects the membrane when the second insulating layer is laid and prevents direct contact between the insulating layer and the bituminous mass.

► The *longitudinal overlaps (top and bottom)* of the sheets are at least 10 cm. wide and have no accessory materials to ensure perfect hot air welding.
In particular cases (temperature, dusty or humid environments etc.), the selvedge may be protected with a strip of silicone-treated paper which may be removed quickly and easily before bonding.

► For the *head overlaps*, please follow the instructions provided by the technical leaflet "Laying Manual for the Dermabit® FF Single-Ply System".

► The same applies to the installation of *vertical necks, technical details and the application of prefabricated finishing accessories* that should be supplied only by Casali.

WATERPROOFING LAYER GENERAL INFORMATION

Flame torches may not be used for the installation of Dermabit® FF Single-Ply.

• The membrane Dermabit® FF Liber must be laid in accordance with good state-of-the-art procedures; specifications different to the standard technical procedures commonly used for the other membranes are described by the relevant laying manual. The laying manual is an integral part of the technical documents of the "DERMABIT® FF Single-Ply System" and the relevant technical specifications must be communicated to all installers who apply the membranes.

• All the vertical embossments of projecting parts and the perimeter edges must be waterproofed with Dermabit® FF Extra or Aderix glued or fastened to the deck and then coated with Dermabit® FF Single-Ply, following the instructions provided by the installation manual.

• Before applying the next layers always ensure that there are no foreign bodies, debris or other materials on the membrane that might cause mechanical damage.

• Ensure that hot air welding has been carried out correctly by checking that the molten bitumen seam runs out of the edge and mechanically controlling the same.

• If the insulating and ballasting layers are not laid immediately after the waterproofing layer, remember to protect the works from kinetic wind pressure and other factors. In some cases it may be necessary to fasten the waterproofing membrane mechanically or glue it using the most appropriate Dermabit® FF Single-Ply product.

• Please contact Casali's Technical Service for any explanations you may require regarding correct waterproofing procedures.

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4. SECOND INSULATING LAYER

► The purpose of the insulating layer is to increase the resistance of the covering system to endogenous and exogenous transmission of thermal energy. This capacity depends on the presence of stagnant air in the cells of the structure of the material used.

► In the case of Duo Roofs, the insulating layer also acts as laying deck for the ballast layer and should therefore be:
- resistant to compression caused by permanent or accidental loads; remember that the unsatisfactory compression resistance of some materials reduces the original thickness, diminishing the air which ensures the insulation efficiency of the material;
- rot-proof and anhygroscopic, if possible, to maintain isolating properties in time, and should not absorb water;
- easy to work in order to adapt it to the shape of the covering;
- dimensionally stable, namely it should not be subject to excessive thermal expansion and planar deformation caused by internal vapour pressure or other reasons;
- chemically compatible with the waterproofing layer below.

► Seamless insulating concrete layers should not be used because they are absorbing.

INSULATING LAYER GENERAL INFORMATION

- Insulating panels should be placed perfectly alongside each other, without spaces between the same so as to obtain a seamlessly flat laying deck while keeping thermal bridges to a minimum.
- In the case of thick insulation layers, 2 or more overlapping layers should be applied.
- The vertical and inclined surfaces of Duo Roofs, which may transmit heat, should also be insulated.
- Damage by rodents or small insects may not only compromise the thermal resistance of the covering but may also damage the waterproofing membrane; please consult the insulation manufacturer for information on how to prevent this problem.

5. FILTER LAYER

► A filter layer is necessary to prevent debris or silt from plugging the joints of the insulating panels when open.

► This layer acts as creep or anti-soaking layer when the ballast consists of a cement screed cast in situ.

► It may also act as protection against dynamic punching.

FILTER LAYER GENERAL INFORMATION

The layer applied to the insulating layer to protect it from the ballast must have the following characteristics:

- Sufficiently resistant to perforation.
- Rot-proof and contain no substances that are chemically incompatible with the insulation or ballast layer.
- Maintain its properties for the expected working life.
- When laid before a concrete or sand screed, it must not allow any cement grout that may leak during casting to pass through to and adhere to the panel below.

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6. BALLAST LAYER

► The ballast layer protects the dry laid membrane from kinetic wind pressure, deterioration by Ultra violet rays, mechanical damage caused by foot traffic on the deck.

► This is a 45 kg sq.m. layer which may consist of:

- **loose** round river 16/32 mm **gravel** (mobile ballast) over the entire waterproofed horizontal surface, for a thickness of 4 cm., which may be increased in the case of considerable kinetic pressure;

- **floating floor** (mobile ballast) consisting of prefabricated marble-chips, dry laid on polypropylene circular supports with rounded base edges. The flooring should be laid over the full horizontal waterproofed surface, adding gravel as described previously along the perimeter or around projecting parts.

- **concrete screed** (fixed ballast) with or without steel reinforcement (depending on permanent or accidental loads), with thickness of at least 5 cm. The waterproofed horizontal surface should be covered in full, or a mobile ballast added if necessary. The screed as described above may act as the deck for appropriately laid fastened floor if any.

BALLAST LAYER GENERAL INFORMATION

- Spread and level the gravel on the insulating panel with great care without moving or damaging the underlying layer.
- The same applies to application and laying of the floating floor.
- Particular care should be taken when laying concrete screed layers or moving steel bars or nets used for reinforcement.
- Screeds should laid at a suitable inclination with the necessary expansion joints to avoid water pooling; the screeds should be isolated from the membrane with compressible material in the perimeter areas to prevent them from pressing the membrane against the vertical overlaps.
- Before applying the ballast layer, above all in the case of fixed ballasts, check the water seal of the waterproofing by flooding with water.

Technical specifications 2, 3, 4, 5, 6 and 7, which are an integral part of the technical documents for the DERMABIT® FF Single-Ply system, give a detailed explanation of the different packet components compatible with the Dermabit® FF Single-Ply system as well as a description of the functions of the single layers, the minimum technical characteristics required and laying specifications. Please contact Casali's Technical Office for any information you may require to correctly design the layers, the specifications or any other doubts you cannot resolve by reading this documentation.

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technical specifications 6

DERMABIT FF

Flame-free polymer bituminous single-layer waterproofing systems

REFURBISHMENT OF EXISTING ROOFING WITH THE DERMABIT® FF SYSTEM

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GENERAL INFORMATION

Dermabit® FF Single-Ply is a polymer bitumen membrane formulated as single-layer waterproofing laid with hot air welding system on decks of different kinds. Dermabit® FF Single-Ply may be laid ***without the use of propane torch or flame burners or bitumen molten in special boilers (a method which is today very rarely used).***

The flame free welding technique applied to polymer bitumen membranes is a result of the innovative research work developed by Casali S.p.A.
This document is intended as a support for designers and operators and is a practical guide to follow to ensure correct planning and laying of the single-layer waterproofing system.

Installers must receive appropriate training on the laying techniques of Dermabit® FF Single-Ply. Casali S.p.A. organises specific courses on the laying techniques which include introductory theoretical aspects associated to a practical session using specific models. The theoretical and practical course is based on UNI 11333 regulations and is a professional refresher course for operators in this industry. A certificate of participation and qualification will be issued to participants to attest their attendance of the training course and confirm the technical laying skills acquired during the demonstration. This certificate, together with full compliance with the specifications of the technical documents, guarantees correct laying by installers who are certified to lay Dermabit® FF Single-Ply.

The information provided by the technical specifications generally provide full details on the most common worksite cases. In the case of projects involving technical details and layers not indicated by the technical specifications, installers should contact Casali's Technical Office to request information on the correct laying methods.

Complementary layers of the single-layer Dermabit® FF waterproofing membrane, such as vapour barriers, insulating and separator layers etc., not produced and/or supplied by Casali S.p.A. must be approved by the Technical Office during the design stage of the layer packet. The specific Dermabit® FF Single-Ply warranties will not be granted if materials and/or layers that have not been approved are used.

Materials for gluing and mechanical fastening not produced and/or supplied by Casali should bear the warranty of the relevant producer/supplier who should also provide directions for their use complying with the project specifications of the layer packet.

The prefabricated accessories, which are mandatory for the technical details of the roofing, should be indicated by the project of the layer packet in order to ensure correct and efficient waterproofing.

In certain cases the warranties provided for the Dermabit® FF Single-Ply system may only be granted against a routine maintenance programme for the covering, which should be agreed by the Technician (maintenance person) and the end customer (customer), in accordance with the procedures and protocols advised by Casali S.p.A.
Casali's technicians should be allowed to carry out inspections at the worksite and/or on coverings laid with the Dermabit® FF flame free single-layer waterproofing system.

TECHNICAL SPECIFICATIONS 6

Contents of the Specifications

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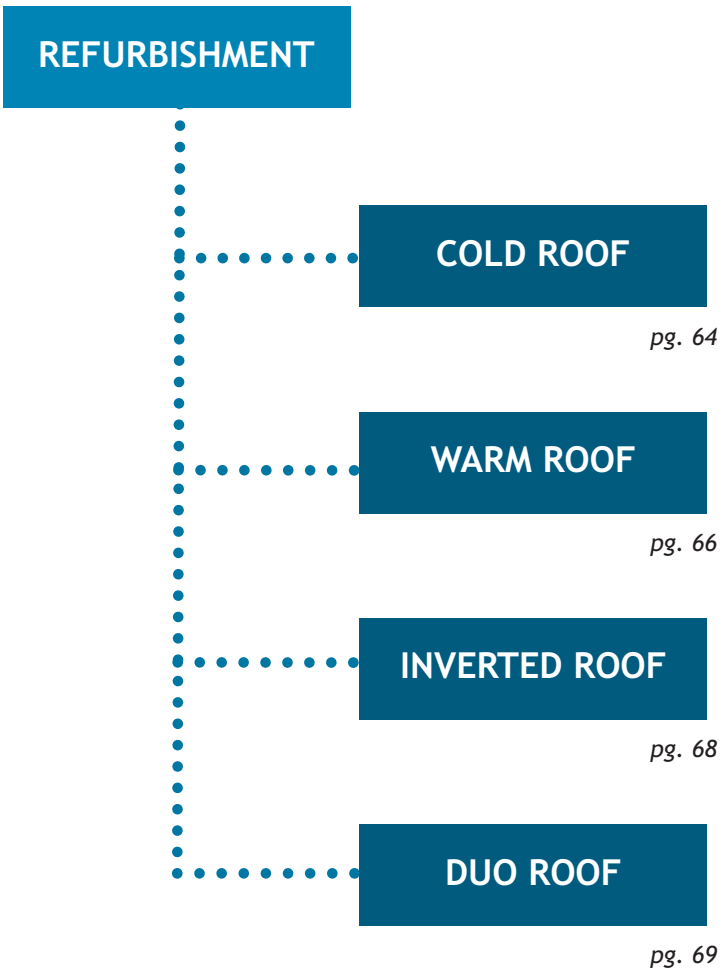
Due to the age of buildings, it has become increasing common to resurface existing waterproofing packets; mainly, the works involved aim at restoring the original functions of the roofing, namely protecting the last horizontal diaphragm of the buildings and consequently the building as a whole from rainwater seepage. The need to repair the waterproofing is however not the only reason for which these works are carried out; it may for example be indispensible to secure a waterproofing system before installing a photovoltaic plant, upgrade the thermal transmission properties in accordance with new energy efficiency regulatory requirements for coverings or resolve condensation problems.
When planning a refurbishment project the golden rule is to carefully analyse what has undermined the efficiency of the existing waterproofing system with respect to the required functions. These technical specifications describe the materials that may be used in the layer structure for each type of roof (cold, hot, inverted and duo) as well as any problems that normally occur after a certain period of time of use, including general information regarding the measures to adopt to ensure that the refurbishment works are not only feasible but as durable and economically sustainable as possible. Given that this is a vast and complex argument, we recommend that you request the assistance of Casali's Technical Office who is ready to carefully examine your requirements.



GENERAL INFORMATION

Cold Roofs do not have thermal insulation. These may be recent industrial roofs or residential buildings dating to a time when roofing insulation was very rarely used. The waterproofing layer may consist of different materials laid with various techniques that may include (but not in a limiting sense) the following:

A MULTIPLE LAYERS ALTERNATED WITH BITUMINIZED FELT AND HOT LAID OXIDISED BITUMEN LAYERS

Multiple layers alternated with bituminized felt and hot laid oxidised bitumen layers, fixed to the deck. The membrane may be surface mounted (with or without lightweight protection) or protected by a fixed or mobile ballast.

POTENTIAL PROBLEMS

- Deterioration, through to complete loss, of the lightweight protection.
- Crystallisation and stiffening of the bitumen.
- Rotting of the bituminized felt and consequent loss of mechanical resistance.
- Damage caused by hail or accidental mechanical damage.
- Air bubbles or water caused respectively by vapour pressure and seepage.
- Deterioration of the load-bearing deck (flaky cement, wood rot, corrosion of sheet plate etc.).
- Deterioration of the fixed ballast and mechanical damage to the waterproofing layer.
- Partial removal or displacement of the mobile ballast.
- Formation of water pooling, lime or sludge due to insufficient inclination, movement of drainage elements or creation of hollows on the deck.
- Weeds with or without root penetration of the waterproofing layer.

B MULTIPLE, DOUBLE OR SINGLE LAYER POLYMER BITUMEN MEMBRANE

Multiple, double or single layer polymer bitumen membrane (due to layers installed over the existing layers). The membrane may be surface mounted (with or without lightweight protection, and fastened to the deck) or protected by a fixed or mobile ballast.

POTENTIAL PROBLEMS

- Deterioration, through to complete loss, of the lightweight protection.
- Crystallisation and stiffening of the bitumen.
- Damage caused by hail or accidental mechanical damage.
- Loss of planarity and wind damage or abnormal shrinkage of membranes including damage to or translation of the drainage components.
- Damage caused by low resistance to low temperatures.
- Loss of mechanical resistance of the membrane reinforcement.
- Air bubbles or water caused respectively by vapour pressure and seepage.
- Deterioration of the load-bearing deck (flaky cement, wood rot, corrosion of sheet plate etc.).
- Deterioration of the fixed ballast and mechanical damage to the waterproofing layer.
- Partial removal or displacement of the mobile ballast.
- Formation of water pooling, lime or sludge due to insufficient inclination, movement of drainage elements or creation of hollows on the deck.
- Weeds with or without root penetration of the waterproofing layer.

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C PLASTOMER OR ELASTOMER SYNTHETIC MEMBRANES

Plastomer or elastomer synthetic membranes, generally in single-layer version. The membrane may be surface mounted (and fixed to the deck) or protected by a fixed or mobile ballast.

POTENTIAL PROBLEMS

- Crystallisation and stiffening of the synthetic membrane.
- Damage caused by hail or accidental mechanical damage.
- Loss of planarity and wind damage or abnormal shrinkage of membranes including damage to or translation of the drainage components.
- Damage caused by low resistance to low temperatures.
- Loss of mechanical resistance of the membrane reinforcement.
- Loss of wind resistance due to corrosion of the mechanical fasteners.
- Deterioration of the load-bearing deck (flaky cement, wood rot, corrosion of sheet plate etc.).
- Deterioration of the fixed ballast and mechanical damage to the waterproofing layer.
- Partial removal or displacement of the mobile ballast.
- Formation of water pooling, lime or sludge due to insufficient inclination, movement of drainage elements or creation of hollows on the deck.
- Weeds with or without root penetration of the waterproofing layer.

D SYNTHETIC RESIN SINGLE OR MULTILAYER

Synthetic resin single or multilayer seamless membranes applied by roller or spray coating etc. Generally, these are membranes which are fully bonded to the deck, consisting of a thin layer, surface-mounted or protected by a fixed or mobile ballast.

POTENTIAL PROBLEMS

- Crystallisation and stiffening of the resin.
- Damage caused by hail or accidental mechanical damage.
- Damage caused by low resistance to low temperatures.
- Damage and cracking caused by expansion or structural movements of the deck.
- Deterioration of the load-bearing deck (flaky cement, wood rot, corrosion of sheet plate etc.).
- Deterioration of the fixed ballast and mechanical damage to the waterproofing layer.
- Partial removal or displacement of the mobile ballast.
- Formation of water pooling, lime or sludge due to insufficient inclination, movement of drainage elements or creation of hollows on the deck.
- Weeds with or without root penetration of the waterproofing layer.

E DISCONTINUOUS WATERPROOFING MEMBRANE IN SHEETS

Discontinuous waterproofing membrane in sheets (asbestos-cement, fibre cement, corrugated or fretted steel etc.), fastened to the deck or to load-bearing purlins, with mechanical fasteners.

POTENTIAL PROBLEMS

- Insufficient inclination of the roof (namely less than 7% of the inclination recommended by good practice) with water backwash through the discontinuity joints.
- Breakage of asbestos-cement or fibre cement slabs.
- Corrosion of fretted steel sheet plates.
- Damages caused by hail or mechanical punching.
- Deterioration of the load-bearing deck (flaky cement, wood rot, corrosion of load-bearing steel structure).
- Loss of resistance to kinetic wind pressure due to corrosion of the mechanical fasteners.
- Corrosion of sheet metal works.
- Deposits of silt and sludge in the drain gutter, with or without weeds and/or partial plugging of the drainage outlets.

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GENERAL INFORMATION

These have been used for several decades; initially fairly thin insulating layers were used (40 mm) while more recently, above all as a result of new laws on the energy efficiency of buildings, the thickness of the insulation has increased significantly. This has considerably increased the thermal stress of the waterproofing membrane which builds up large amounts of heat due to reduced diffusion through the underlying layer. Waterproofing layers consisting of different materials laid with various techniques may be used, some of which are indicated below.

A MULTIPLE LAYERS ALTERNATED WITH BITUMINIZED FELT AND HOT LAID OXIDISED BITUMEN LAYERS

Multiple layers alternated with bituminized felt and hot laid oxidised bitumen layers, fixed to the deck. The membrane may be surface mounted (with or without lightweight protection) or protected by a fixed or mobile ballast.

POTENTIAL PROBLEMS

- Deterioration, through to complete loss, of the lightweight protection.
- Crystallisation and stiffening of the bitumen.
- Rotting of the bituminized felt and consequent loss of mechanical resistance.
- Damages caused by hail or mechanical punching.
- Air bubbles or water caused respectively by vapour pressure and seepage.
- Deterioration of the insulation layer caused by the absorption of vapour condensate or water seepage.
- Shifting of insulating panels caused by damage to the fasteners with embossments and breaking of the waterproofing membrane and water pooling.
- Rupture caused by static or dynamic punching due to poor compression resistance of the insulation.
- Deterioration of the load-bearing deck (flaky cement, wood rot, corrosion of load-bearing steel structure).
- Deterioration of the fixed ballast and mechanical damage to the waterproofing layer.
- Partial removal or displacement of the mobile ballast.
- Formation of water pooling, lime or sludge due to insufficient inclination, movement of drainage elements or creation of hollows on the deck.
- Weeds with or without root penetration of the waterproofing layer.

B MULTIPLE, DOUBLE OR SINGLE LAYER POLYMER BITUMEN MEMBRANE

Multiple, double or single layer polymer bitumen membrane (due to layers installed over the existing layers). The membrane may be surface mounted (with or without lightweight protection, and fixed to the deck) or protected by a fixed or mobile ballast.

POTENTIAL PROBLEMS

- Deterioration, through to complete loss, of the lightweight protection.
- Crystallisation and stiffening of the bitumen.
- Damage caused by hail or accidental mechanical damage.
- Deterioration of the insulation layer caused by the absorption of vapour condensate or water seepage.
- Shifting of insulating panels caused by damage to the fasteners with embossments and breaking of the waterproofing membrane and water pooling.
- Rupture caused by static or dynamic punching due to poor compression resistance of the insulation.
- Loss of planarity and wind damage or abnormal shrinkage of membranes including damage to or translation of the drainage components.
- Damage caused by low resistance to low temperatures.
- Loss of mechanical resistance of the membrane reinforcement.
- Air bubbles or water caused respectively by vapour pressure and seepage.
- Deterioration of the load-bearing deck (flaky cement, wood rot, corrosion of load-bearing steel structure).
- Deterioration of the fixed ballast and mechanical damage to the waterproofing layer.
- Partial removal or displacement of the mobile ballast.
- Formation of water pooling, lime or sludge due to insufficient inclination, movement of drainage elements or creation of hollows on the deck.
- Weeds with or without root penetration of the waterproofing layer.

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C PLASTOMER OR ELASTOMER SYNTHETIC MEMBRANES

Plastomer or elastomer synthetic membranes, generally in single-layer version. The membrane may be surface mounted (and fixed to the deck) or protected by a fixed or mobile ballast.

POTENTIAL PROBLEMS

- Crystallisation and stiffening of the synthetic membrane.
- Damage caused by hail or accidental mechanical damage.
- Deterioration of the insulation layer caused by the absorption of vapour condensate or water seepage.
- Shifting of insulating panels caused by damage to the fasteners with embossments and breaking of the waterproofing membrane and water pooling.
- Rupture caused by static or dynamic punching due to poor compression resistance of the insulation.
- Loss of planarity and wind damage or abnormal shrinkage of membranes including damage to or translation of the drainage components.
- Damage caused by low resistance to low temperatures.
- Loss of mechanical resistance of the membrane reinforcement.
- Loss of wind resistance due to corrosion of the mechanical fasteners.
- Deterioration of the load-bearing deck (flaky cement, wood rot, corrosion of load-bearing steel structure).
- Deterioration of the fixed ballast and mechanical damage to the waterproofing layer.
- Partial removal or displacement of the mobile ballast.
- Formation of water pooling, lime or sludge due to insufficient inclination, movement of drainage elements or creation of hollows on the deck.
- Weeds with or without root penetration of the waterproofing layer.

D DISCONTINUOUS WATERPROOFING MEMBRANE IN SHEETS

Discontinuous waterproofing membrane in sheets (asbestos-cement, fibre cement, corrugated or fretted steel etc.), fixed to the deck or to load-bearing purlins, with mechanical fasteners.

POTENTIAL PROBLEMS

- Insufficient inclination of the roof (namely less than 7% of the inclination recommended by good practice) with water backwash through the discontinuity joints.
- Breakage of asbestos-cement or fibre cement slabs.
- Corrosion of fretted steel sheet plates.
- Damage caused by hail or accidental mechanical damage.
- Deterioration of the insulation layer caused by the absorption of vapour condensate or water seepage.
- Deterioration of the load-bearing deck (flaky cement, wood rot, corrosion of load-bearing steel structure).
- Loss of wind resistance due to corrosion of the mechanical fasteners.
- Corrosion of sheet metal works.
- Deposits of silt and sludge in the drain gutter, with or without weeds and/or partial plugging of the drainage outlets.

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GENERAL INFORMATION

These have been used since very low hygroscopic polystyrene insulation has been available; the waterproofing membrane is more protected from thermal and mechanical stress. Waterproofing layers consisting of different materials laid with various techniques may be used, some of which are indicated below (but not in a limiting sense):

A MULTIPLE, DOUBLE OR SINGLE LAYER POLYMER BITUMEN MEMBRANE

Multiple, double or single layer polymer bitumen membrane (due to layers installed over the existing layers). The membrane is dry laid or bonded under the insulating layer.

POTENTIAL PROBLEMS

- Crystallisation and stiffening of the bitumen.
- Air bubbles or water caused respectively by vapour pressure and seepage.
- Damage caused by hail or accidental mechanical factors following removal of the top layers.
- Deterioration of the insulating layer caused by absorption.
- Break up caused by anomalous shrinkage of membranes and damage or translation of the drainage elements.
- Damage caused by low resistance to low temperatures.
- Loss of mechanical resistance of the membrane reinforcement.
- Deterioration of the load-bearing deck (flaky cement, wood rot, corrosion of load-bearing steel structure).
- Deterioration of the fixed ballast and mechanical damage to the waterproofing layer.
- Partial removal or displacement of the mobile ballast.
- Formation of water pooling, lime or sludge due to insufficient inclination, movement of drainage elements or creation of hollows on the deck.
- Weeds with or without root penetration of the waterproofing layer.

B PLASTOMER OR ELASTOMER SYNTHETIC MEMBRANES

Plastomer or elastomer synthetic membranes, generally in single-layer version. The membrane is dry laid under the insulating layer.

POTENTIAL PROBLEMS

- Crystallisation and stiffening of the synthetic membrane.
- Damage caused by hail or accidental mechanical factors following removal of the top layers.
- Deterioration of the insulating layer caused by absorption.
- Rupture caused by static or dynamic punching due to poor compression resistance of the insulation.
- Loss of planarity and wind damage or abnormal shrinkage of membranes including damage to or translation of the drainage components.
- Damage caused by low resistance to low temperatures.
- Loss of mechanical resistance of the membrane reinforcement.
- Deterioration of the load-bearing deck (flaky cement, wood rot, corrosion of load-bearing steel structure).
- Deterioration of the fixed ballast and mechanical damage to the waterproofing layer.
- Partial removal or displacement of the mobile ballast.
- Formation of water pooling, lime or sludge due to insufficient inclination, movement of drainage elements or creation of hollows on the deck.
- Weeds with or without root penetration of the waterproofing layer.

 Disclaimer on page 156

These have been used since very low hygroscopic polystyrene insulation has been available; the waterproofing membrane has more protection from overhead and bottom thermal and mechanical stress. Waterproofing layers consisting of different materials laid with various techniques may be used, some of which are indicated below (but not in a limiting sense):

A POLYMER BITUMEN MEMBRANE

Polymer bituminous membrane (a solution which is not commonly used) in a single layer, double or multiple layers (overlapped on the existing membrane). The membrane is dry laid or bonded above the first insulating layer.

POTENTIAL PROBLEMS
- Crystallisation and stiffening of the bitumen.
- Damage caused by hail or accidental mechanical factors following removal of the top layers.
- Deterioration of the insulation layer caused by the absorption of vapour condensate or water seepage.
- Break up caused by anomalous shrinkage of membranes and damage or translation of the drainage elements.
- Damage caused by low resistance to low temperatures.
- Loss of mechanical resistance of the membrane reinforcement.
- Deterioration of the load-bearing deck (flaky cement, wood rot, corrosion of load-bearing steel structure).
- Deterioration of the fixed ballast and mechanical damage to the waterproofing layer.
- Partial removal or displacement of the mobile ballast.
- Formation of water pooling, lime or sludge due to insufficient inclination, movement of drainage elements or creation of hollows on the deck.
- Weeds with or without root penetration of the waterproofing layer.

B PLASTOMER OR ELASTOMER SYNTHETIC MEMBRANES

Plastomer or elastomer synthetic membranes, generally in single-layer version. The membrane is dry laid on the first insulating layer.

POTENTIAL PROBLEMS
- Crystallisation and stiffening of the bitumen.
- Damage caused by hail or accidental mechanical factors following removal of the top layers.
- Deterioration of the insulation layer caused by the absorption of vapour condensate or water seepage.
- Rupture caused by static or dynamic punching due to poor compression resistance of the insulation.
- Loss of planarity and wind damage or abnormal shrinkage of membranes including damage to or translation of the drainage components.
- Damage caused by low resistance to low temperatures.
- Loss of mechanical resistance of the membrane reinforcement.
- Deterioration of the load-bearing deck (flaky cement, wood rot, corrosion of load-bearing steel structure).
- Deterioration of the fixed ballast and mechanical damage to the waterproofing layer.
- Partial removal or displacement of the mobile ballast.
- Formation of water pooling, lime or sludge due to insufficient inclination, movement of drainage elements or creation of hollows on the deck.
- Weeds with or without root penetration of the waterproofing layer.

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PRELIMINARY STEPS

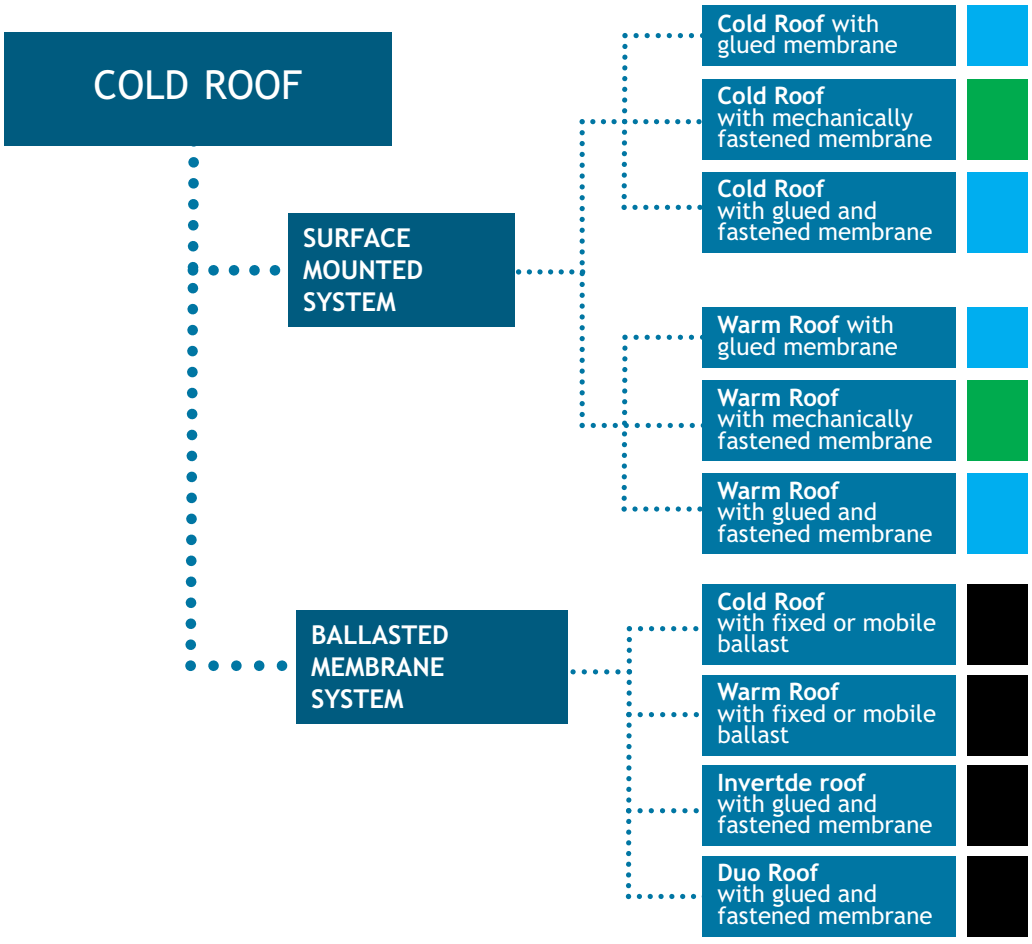
When refurbishment existing waterproofed roofs with the Dermabit® FF Single-Ply system, the following preliminary steps should be followed in the order indicated:

1. Examine the roofing carefully to identify critical aspects and the reasons for which refurbishment is necessary.
2. Take photographs of the current condition of the roofing.
3. Carry out a layout and dimensional survey of the horizontal surfaces, equipment, perimeter railings etc.
4. Carry out a survey of the distribution of drains, ensuring that rainwater runoff is efficient.
6. Probe the packet to check the state of conservation and efficiency of the single layers.
7. Take samples of the layers to check the presence of chemical or physical anomalies with respect to the presumed original condition.
8. Check the access to the roofing and the possibility of installing temporary or permanent safety means.
9. Inspect the rooms under the roofing to check for damage due to inefficiency of the same.
10. Check for vapour condensation on the roofing slab soffit.
11. Establish what the customer expects from the new roofing packet.
12. Define the potential stratigraphy, including the project times and method, any temporary structures that may be required to prevent infiltration during works and a carry out a simulation of the energy performance of the finished roofing

PROJECT METHOD

The stratigraphies that may be realised to resurface existing roofing are those indicated by Technical Leaflets 2, 3, 4, e 5. i.e.: Cold Roof, Warm Roof, Inverted Roof and Duo Roof. After identifying the existing stratigraphy, the defects and results expected from the project, the best solution may be decided.

The previous Technical Leaflets provide information on how to obtain the best and most efficient results in different cases. Applications may be grouped into two main families of laying systems:



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INFORMATION ON SURFACE-MOUNTED MEMBRANES

Stability and resistance to kinetic wind pressure of systems with surface-mounted membranes is guaranteed exclusively by the efficiency of the deck anchorage. It is therefore essential to check that the following conditions are respected before making a final decision:

• In the case of gluing, the layer on which the new Dermabit® FF Single-Ply membrane is to be laid and the complete underlying packet must be solidly connected to the deck. It should be remembered however that it is not possible to fully predict the future behaviour of the existing sub-layers, or that the safety conditions ascertained when refurbishment will last. Glue may not be used on existing synthetic membranes for laying purposes, even if fully glued to the deck. Possible chemical and/or mechanical incompatibility (shrinkage, expansion etc.) between the old and new waterproofing, makes it necessary to lay a separation layer. The Dermabit® FF Single-Ply membrane selected should therefore be fixed mechanically.

• In the case of mechanical fastening, the deck into which the fasteners are inserted must be sufficiently consistent and compact to ensure that the fasteners do not pull out.

• If mixed fasteners are used (gluing and mechanical fastening), the above conditions in any case apply.

• The layer on which the Dermabit® FF Single-Ply is applied must in any case be perfectly flat. Folds, stretching, swelling and hollows etc. must be removed from the surface of the layer if necessary.

• In all cases, ensure that the layers under the new waterproofing membrane (whether old or new) do not transmit deformation, creep or mechanical stress to the latter, since these may compromise its solidity. Dermabit® FF Single-Ply should also be fastened mechanically at the base of each vertical overlap and around drain outlets, condensation and air vents etc.

OTHER PRECAUTIONS

Additional general aspects that should be taken into account during the design and installation stages are as follows:

• If possible, do not remove the existing layers, both in terms of the expense and to prevent problems of infiltration when laying the new waterproofing membrane.

• When transforming a Cold Roof into a Warm Roof, carry out the necessary calculations to ensure that the existing layer will efficiently prevent the build up of condensation in the insulating panel (the first layer should be more resistant to vapour than the Dermabit® FF Single-Ply layer); if not install a vapour barrier.

• In the case of existing Warm Roofs, if the insulation is soaked but has not undergone physical or chemical damage, verify whether it is possible to resolve the problem by allowing the same to evaporate so as to avoid the need to remove and dispose of the same. You can speed up the humidity evaporation process by means of vents.

• In all cases, the correct inclination of the surface must be restored using materials that are chemically and physically compatible with the new Dermabit® FF Single-Ply membrane (insulating layers of different thicknesses, or lightened concrete may be used provided that they do not cause areas of high basicity levels in which polyester reinforcement may deteriorate).

• Before installation on existing sheet plate or fretted and undulated surfaces, check that the irregular membrane is sound. Any problems of corrosion should be resolved and the necessary static resistance guaranteed. The laying surface may be levelled with stiff insulating sheets, that may be profiled if necessary, wooden boards or flat sheet plate. The type of anchorage system for the new deck should be decided according to the specific conditions. Do not use steel screws on sheet plate having a thickness under 0.6 mm; fibre cement slabs may become less compact in time and asbestos-cement slabs should be treated in accordance with the procedures provided by applicable laws.

• We recommend that you work with teams specialised in different fields whose help will ensure the success of the end result.

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INFORMATION REGARDING SYSTEMS WITH BALLASTED MEMBRANE

Stability and resistance to kinetic wind pressure of ballasted systems is guaranteed exclusively by the efficiency of the fixed or mobile ballast, which should cover the entire new waterproofing membrane. It is therefore essential to check that the following conditions are respected before making a final decision:

- The static resistance of the deck should ensure that it does not bend under the ballast load or other permanent or accidental loads. The static resistance of all the other vertical and horizontal supporting structures should also be checked.
- Existing insulating layers should be sufficiently resistant to compression in order to reduce deformation caused by crushing; in addition to ensuring that the insulating volume remains unaltered, it is also necessary to guarantee that the new waterproofing membrane does not undergo undue static and dynamic stress that may damage the same. The installation of a new and more resistant insulation layer will in this case distribute the compression stress over a wider area.
- The type of ballast and relevant installation method must be decided so as to protect the membrane from kinetic wind action and mechanical damage, in the first case in compliance with applicable laws and in the second case in accordance with the operating conditions of the roofing.
- The layer on which the Dermabit® FF Single-Ply membrane is applied should in any case be perfectly level. Folds, stretching, swelling and hollows etc. must be removed from the surface of the layer if necessary.
- In all cases, ensure that the layers under the new waterproofing membrane (whether old or new) do not transmit deformation, creep or mechanical stress to the latter, since these may compromise its solidity.

OTHER PRECAUTIONS

Additional general aspects that should be taken into account during the design and installation stages are as follows:

- If possible, do not remove the existing layers, both in terms of the expense and to prevent problems of infiltration when laying the new waterproofing membrane. In this case, the Dermabit® FF Single-Ply membrane is dry laid so that the necessary creep, separation and protection layers etc. may be installed between the new and the old layers.
- When transforming a Cold Roof into a Warm Roof, carry out the necessary calculations to ensure that the existing layer will efficiently prevent the build up of condensation in the insulating panel (the first layer should be more resistant to vapour than the Dermabit® FF Single-Ply layer); if not install a vapour barrier.
- When transforming a Warm Roof into a Duo Roof, the thickness of the bottom insulation should calculated to ensure that the dew point is above the new waterproofing membrane. If this is not possible, a vapour barrier should be laid on the existing layer before installing the rest of the packet.
- In the case of existing Warm Roofs, if the insulation is soaked but has not undergone physical or chemical damage, verify whether it is possible to resolve the problem by allowing the same to evaporate so as to avoid the need to remove and dispose of the same. You can speed up the humidity evaporation process by means of vents.
- In all cases, the correct inclination of the surface must be restored using materials that are chemically and physically compatible with the new Dermabit® FF Single-Ply membrane (insulating layers of different thicknesses, or lightened concrete may be used provided that they do not cause areas of high basicity levels in which polyester reinforcement may deteriorate).
- Dermabit® FF Single-Ply should also be fixed mechanically at the base of each vertical overlap and around drain outlets.
- Before installation on existing sheet plate or fretted and undulated surfaces, check that the irregular membrane is sound. Any problems of corrosion should be resolved and the necessary static resistance guaranteed. The laying surface may be levelled with stiff insulating sheets, that may be profiled if necessary, wooden boards or flat sheet plate. Asbestos-cement slabs should be treated in accordance with the procedures provided by applicable laws.
- We recommend that you work with teams specialised in different fields whose help will ensure the success of the end result.

Technical specifications 2, 3, 4, 5, 6 and 7, which are an integral part of the technical documents for the DERMABIT® FF Single-Ply system, give a detailed explanation of the different packet components compatible with the Dermabit® FF Single-Ply system as well as a description of the functions of the single layers, the minimum technical characteristics required and laying specifications. Please contact Casali's Technical Office for any information you may require to correctly design the layers, the specifications or any other doubts you cannot resolve by reading this documentation.

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technical specifications 7

DERMABIT FF

Flame-free polymer bituminous single-layer waterproofing systems

MODELS

TECHNICAL DETAILS

CASALI
www.casaligroup.it

GENERAL INFORMATION

Dermabit® FF Single-Ply is a polymer bitumen membrane formulated as single-layer waterproofing laid with hot air welding system on decks of different kinds. Dermabit® FF Single-Ply may be laid ***without the use of propane torch or flame burners or bitumen molten in special boilers (a method which is today very rarely used).***

The flame free welding technique applied to polymer bitumen membranes is a result of the innovative research work developed by Casali S.p.A.
This document is intended as a support for designers and operators and is a practical guide to follow to ensure correct planning and laying of the single-layer waterproofing system.

Installers must receive appropriate training on the laying techniques of Dermabit® FF Single-Ply. Casali S.p.A. organises specific courses on the laying techniques which include introductory theoretical aspects associated to a practical session using specific models. The theoretical and practical course is based on UNI 11333 regulations and is a professional refresher course for operators in this industry. A certificate of participation and qualification will be issued to participants to attest their attendance of the training course and confirm the technical laying skills acquired during the demonstration. This certificate, together with full compliance with the specifications of the technical documents, guarantees correct laying by installers who are certified to lay Dermabit® FF Single-Ply.

The information provided by the technical specifications generally provide full details on the most common worksite cases. In the case of projects involving technical details and layers not indicated by the technical specifications, installers should contact Casali's Technical Office to request information on the correct laying methods.

Complementary layers of the single-layer Dermabit® FF waterproofing membrane, such as vapour barriers, insulating and separator layers etc., not produced and/or supplied by Casali S.p.A. must be approved by the Technical Office during the design stage of the layer packet. The specific Dermabit® FF Single-Ply warranties will not be granted if materials and/or layers that have not been approved are used.

Materials for gluing and mechanical fastening not produced and/or supplied by Casali should bear the warranty of the relevant producer/supplier who should also provide directions for their use complying with the project specifications of the layer packet.

The prefabricated accessories, which are mandatory for the technical details of the roofing, should be indicated by the project of the layer packet in order to ensure correct and efficient waterproofing.

In certain cases the warranties provided for the Dermabit® FF Single-Ply system may only be granted against a routine maintenance programme for the covering, which should be agreed by the Technician (maintenance person) and the end customer (customer), in accordance with the procedures and protocols advised by Casali S.p.A.
Casali's technicians should be allowed to carry out inspections at the worksite and/or on coverings laid with the Dermabit® FF flame free single-layer waterproofing system.

TECHNICAL SPECIFICATIONS 7

Contents of the Specifications

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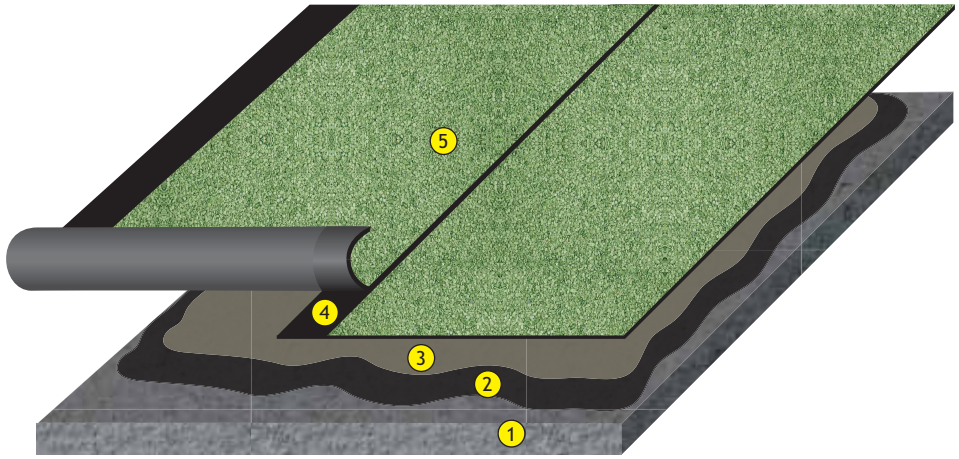
1. COLD ROOF

1.1 SURFACE-LAID MEMBRANE FULLY BONDED TO THE DECK



1- Deck
2- Primer (Idroprimer, Dermaprimer)
3- Glue (Dermastik BA, Dermastik BS, Dermapur)
4- 10 cm. selvedge
5- Dermabit® FF Gluty

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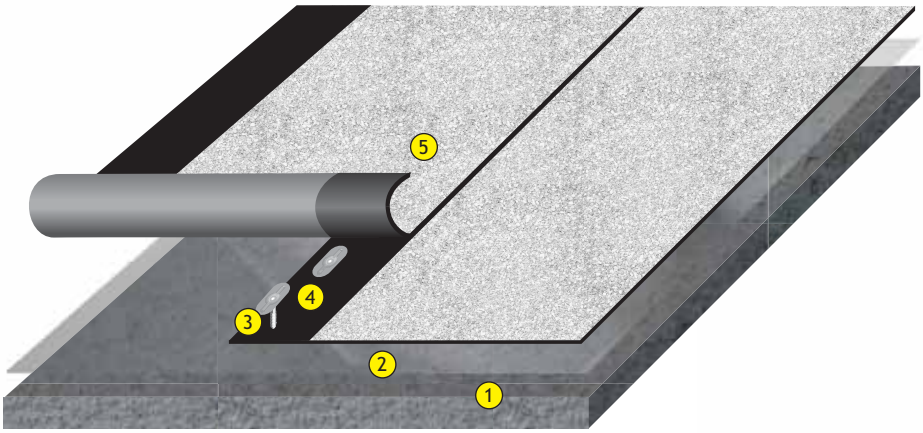
1. COLD ROOF

1.2 SURFACE-LAID MEMBRANE FASTENED MECHANICALLY TO THE DECK



1- Deck
2- Separation layer (if necessary)
3- Mechanical fastening
4- 15 cm. selvedge
5- Dermabit® FF Fixus

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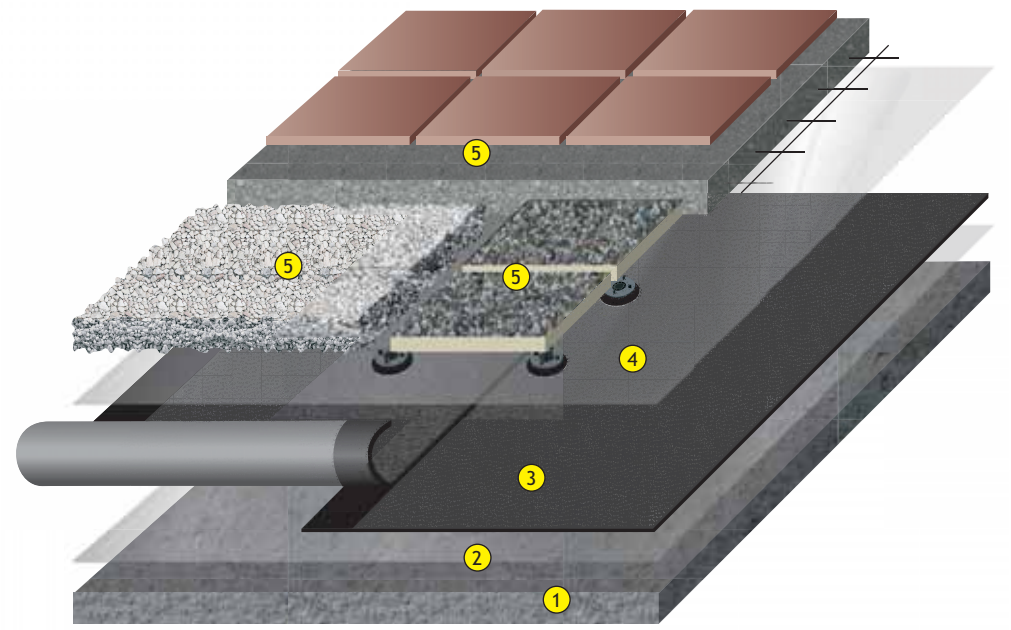
1. COLD ROOF

1.3 BALLASTED MEMBRANE (MOBILE OR FIXED BALLAST)



1- Deck
2- Separation layer (if necessary)
3- Dermabit® FF Liber
4- Separation/creep layer (if necessary)
5- Ballast layer

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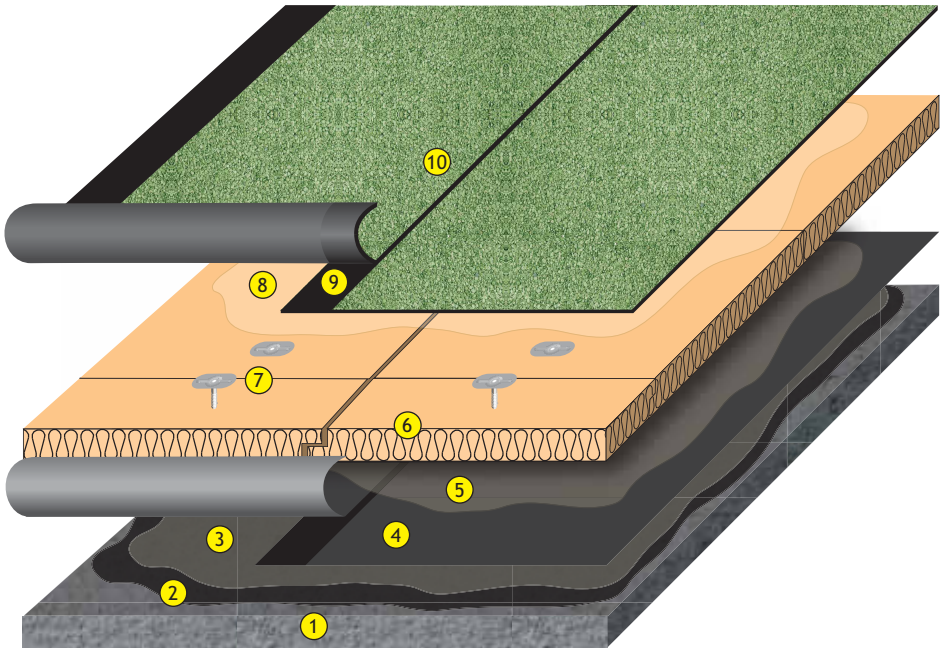
2. WARM ROOF

2.1 SURFACE-LAID MEMBRANE FULLY BONDED TO THE DECK



1- Deck
2- Primer (Idroprimer, Dermaprimer)
3- Glue (Dermastik BA, Dermastik BS, Dermapur)
4- Vapour barrier (Casali Vaporex)
5- Glue (Dermastik BA, Dermastik BS, Dermapur)
6- Insulation
7- Safety mechanical fastening
8- Glue (Dermastik BA, Dermastik BS, Dermapur)
9- 10 cm. selvedge
10- Dermabit® FF Gluty

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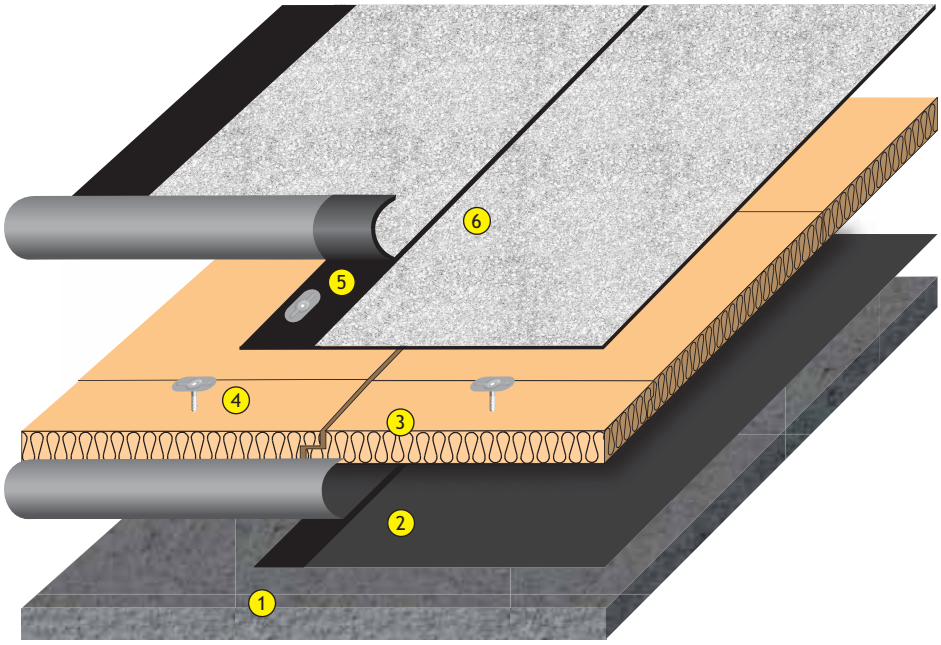
2. WARM ROOF

2.2 SURFACE-LAID MEMBRANE FASTENED MECHANICALLY TO THE DECK



1- Deck
2- Vapour barrier (Casali Vaporex)
3- Insulation
4- Mechanical fastening
5- 15 cm. selvedge
6- Dermabit® FF Fixus

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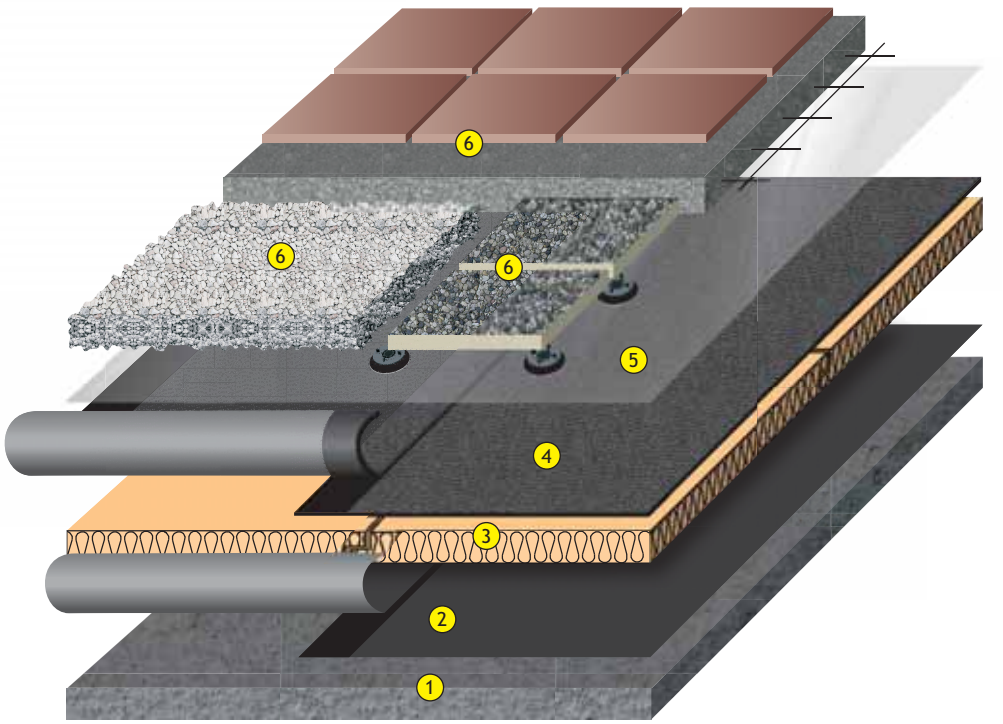
2. WARM ROOF

2.3 BALLASTED MEMBRANE (MOBILE OR FIXED BALLAST)



1- Deck
2- Vapour barrier (Casali Vaporex)
3- Insulation
4- Dermabit® FF Liber
5- Separation/creep layer (if necessary)
6- Ballast layer

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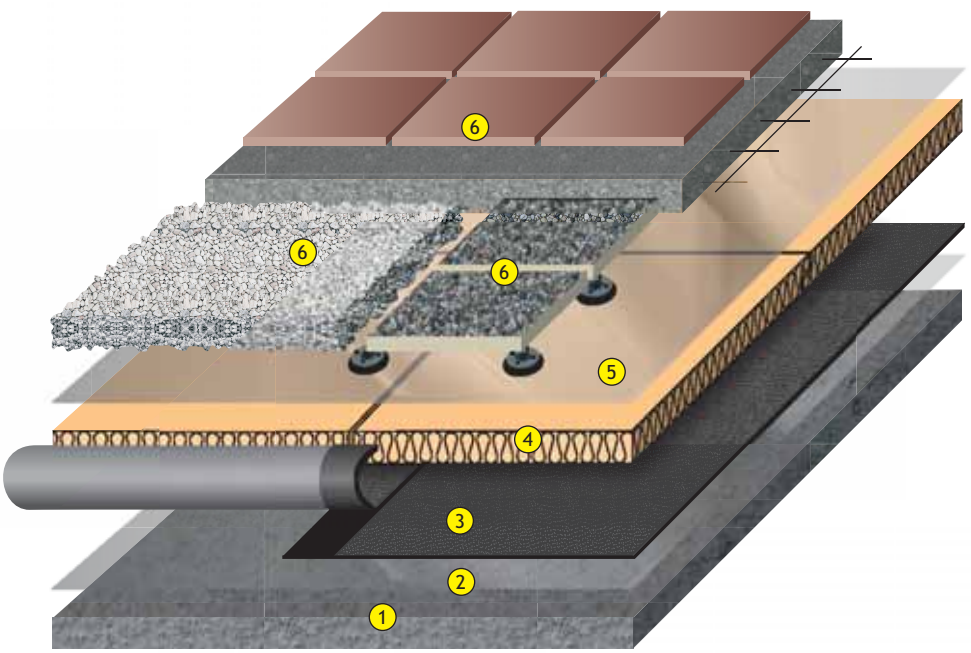
3. INVERTED ROOF

3.1 BALLASTED MEMBRANE (MOBILE OR FIXED BALLAST)



1- Deck
2- Separation layer (if necessary)
3- Dermabit® FF Liber
4- Insulation
5- Filtering layer
6- Ballast layer

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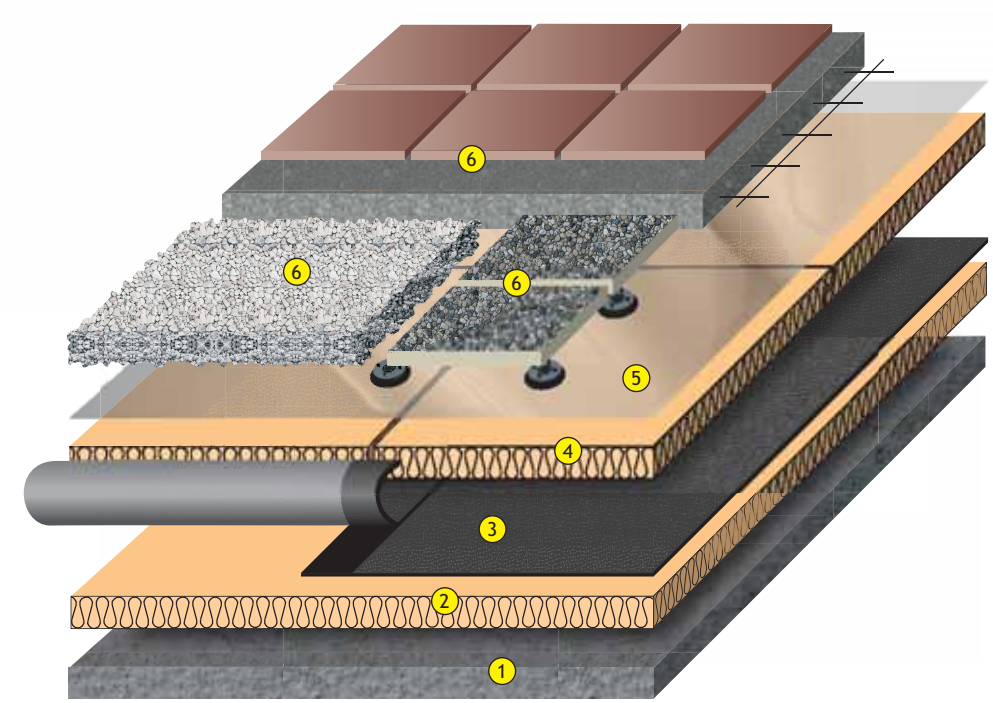
4. DUO ROOF

4.1 BALLASTED MEMBRANE (MOBILE OR FIXED BALLAST)



1- Deck
2- Insulation
3- Dermabit® FF Liber
4- Insulation
5- Filtering layer
6- Ballast layer

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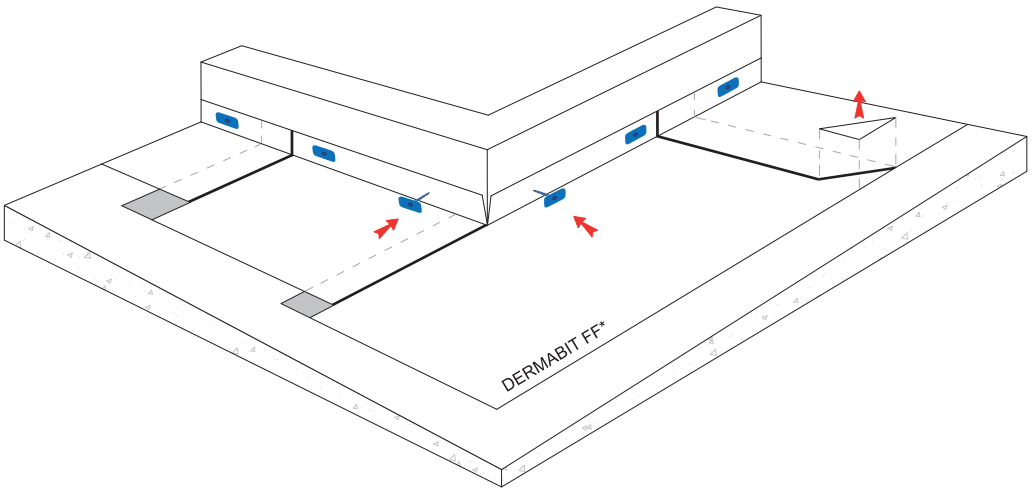
INSTALLATION PROCEDURE 1: EXTERNAL CORNER ON PERIMETER EDGE

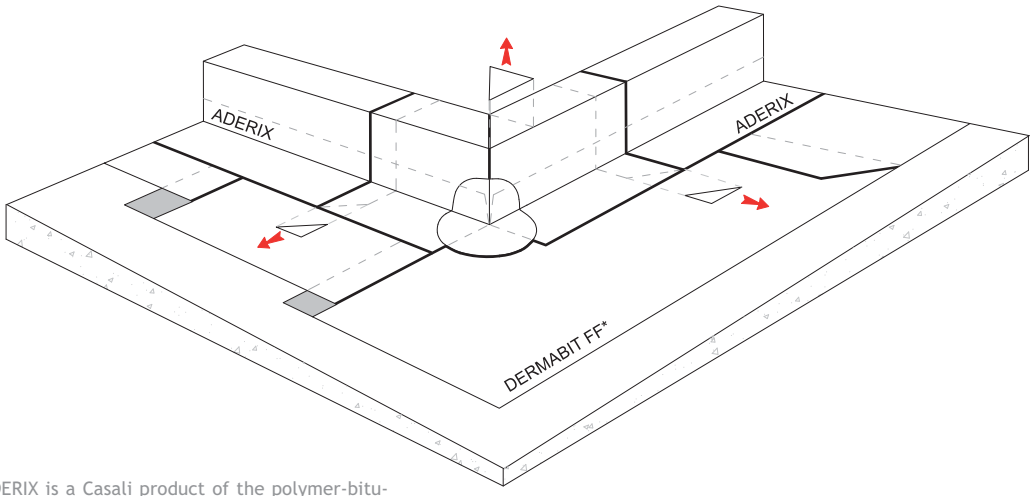
1.1 LAYING, FASTENING AND BONDING *DERMABIT® FF* * ON A HORIZONTAL SURFACE

a - lay the *Dermabit® FF* membrane overlapping the sheet on the selvedge **b -** fasten the membrane to the deck (according to the laying method used) **c -** fasten *Dermabit® FF* mechanically to the vertical deck, with flat plates **d -** cut at an angle of 45° and remove the section of overlapped sheets that project from the selvedge **e -** bond with hot air welder.



1.2 LAYING ADERIX(1) AND THE EXTERNAL CORNER ON THE VERTICAL NECK

a - lay the *Aderix* membrane on the vertical neck overlapping the sheets **b -** cut at an angle of 45° and remove the overlapping section of the sheets **c -** bond with hot air welder **d -** position and bond the bituminous prefabricated corner with a hot air welder.



(1) ADERIX is a Casali product of the polymer-bitumen self-adhesive membrane range. For more information please read the catalogue of the relevant Membrane line or contact Casali's Technical Office.

**The Dermabit® FF Single-Ply range: the Dermabit® FF product to choose (Gluty, Fixus, Liber) depends on the application method (glue - mechanical fastening - dry laid) and finish.*

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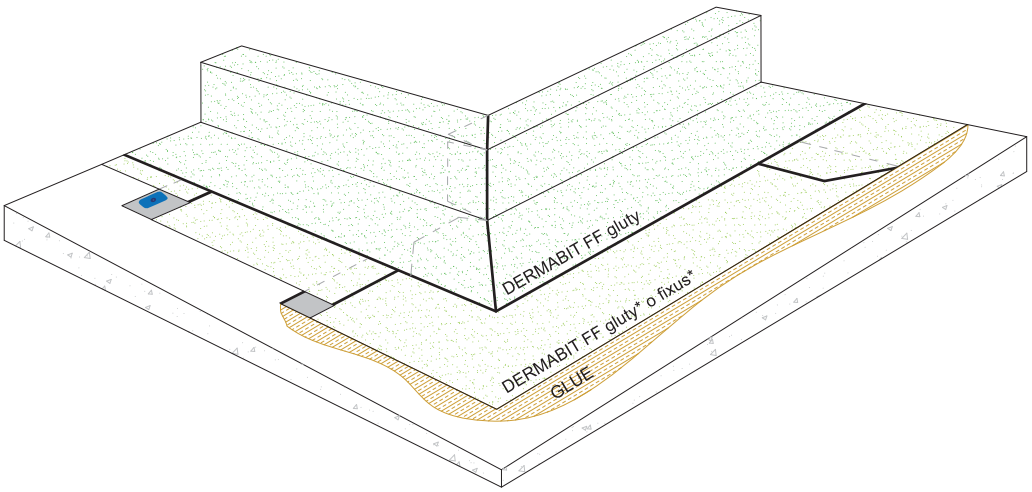
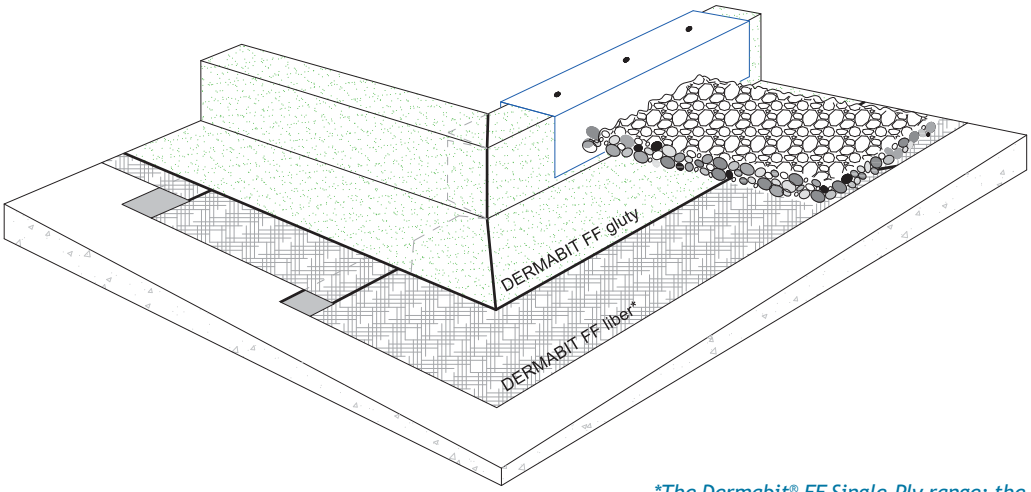
1.3 DETAIL COMPLETED WITH SURFACE-MOUNTED *DERMABIT® FF* * MEMBRANE

a - lay the *Dermabit® FF* membrane on the vertical neck overlapping the sheets **b -** bond with hot air welder.



1.4 DETAIL COMPLETED WITH BALLASTED *DERMABIT® FF* * MEMBRANE

a - lay the *Dermabit® FF* membrane on the vertical neck overlapping the sheets **b -** bond with hot air welder
c - lay the metal protection of the vertical neck and fasten mechanically **d -** lay the ballasting elements.



**The Dermabit® FF Single-Ply range: the Dermabit® FF product to choose (Gluty, Fixus, Liber) depends on the application method (glue - mechanical fastening - dry laid) and finish.*

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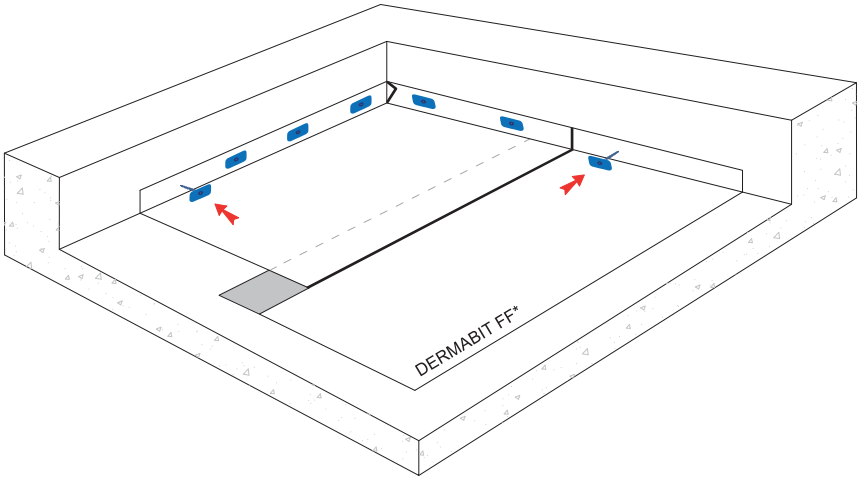
INSTALLATION PROCEDURE 2: INTERNAL CORNER ON PERIMETER EDGE

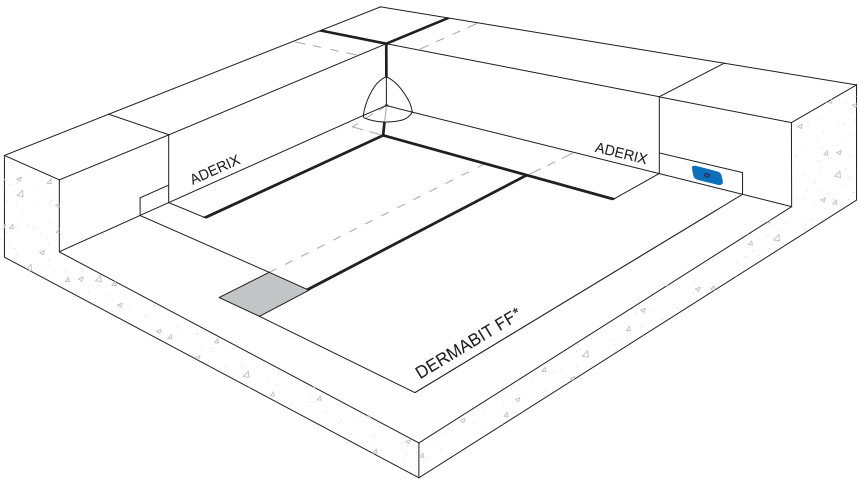
2.1 LAYING, FASTENING AND BONDING *DERMABIT® FF* * ON A HORIZONTAL SURFACE

a - lay the *Dermabit® FF** membrane overlapping the sheet on the selvedge **b -** fasten the membrane to the deck (according to the laying method used) **c -** fasten *Dermabit® FF* mechanically to the vertical deck, with flat plates **d -** bond with hot air welder.



2.2 LAYING *ADERIX*(1) AND THE INTERNAL CORNER ON VERTICAL NECK

a - lay the *Aderix* membrane on the vertical neck overlapping the sheets **b -** cut at an angle of 45° and remove the overlapping section of the sheets **c -** bond with hot air welder **d -** position and bond the bituminous prefabricated corner with a hot air welder.



(1) ADERIX is a Casali product of the polymer-bitumen self-adhesive membrane range. For more information please read the catalogue of the relevant Membrane line or contact Casali's Technical Office.

**The Dermabit® FF Single-Ply range: the Dermabit® FF product to choose (Gluty, Fixus, Liber) depends on the application method (glue - mechanical fastening - dry laid) and finish.*

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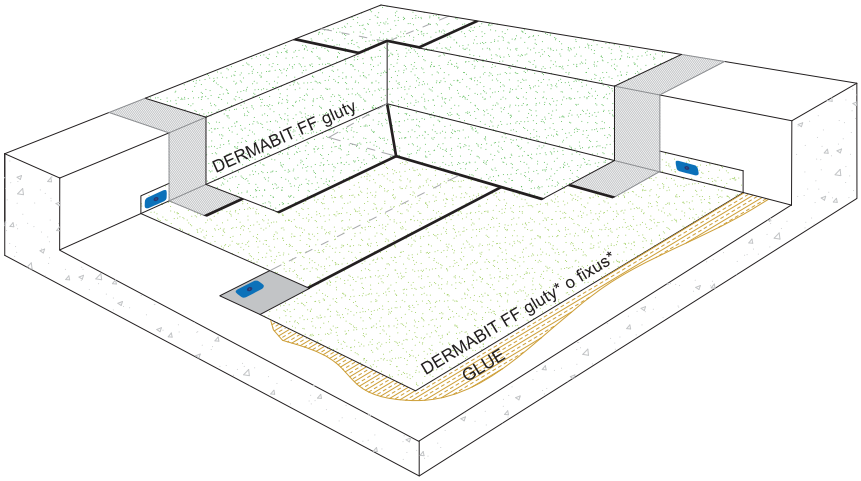
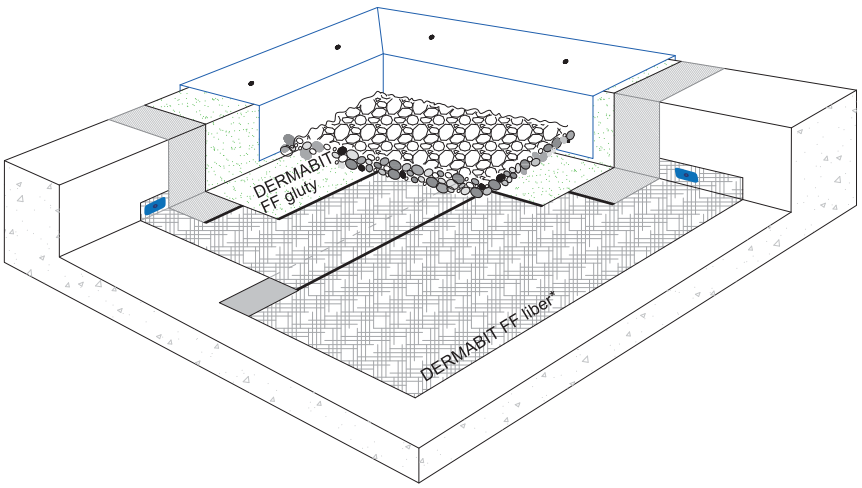
2.3 DETAIL COMPLETED WITH SURFACE-LAID *DERMABIT® FF ** MEMBRANE

a - lay the *Dermabit® FF* membrane overlapping the sheets **b -** bond with hot air welder.



2.4 DETAIL COMPLETED WITH BALLASTED *DERMABIT® FF ** MEMBRANE

a - lay the *Dermabit® FF* membrane on the vertical neck overlapping the sheets **b -** bond with hot air welder
c - lay the metal protection of the vertical neck and fasten mechanically **d -** lay the ballasting elements.



**The Dermabit® FF Single-Ply range: the Dermabit® FF product to choose (Gluty, Fixus, Liber) depends on the application method (glue - mechanical fastening - dry laid) and finish.*

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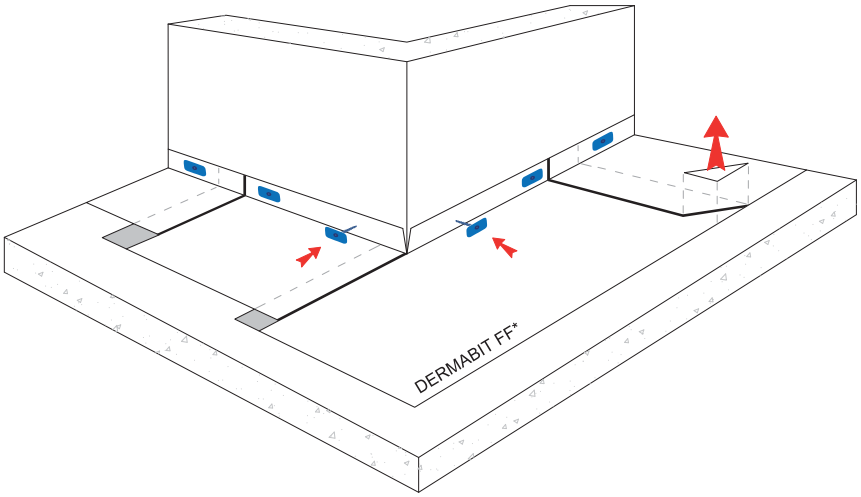
INSTALLATION PROCEDURE 3: EXTERNAL CORNER ON PLANT JOINT

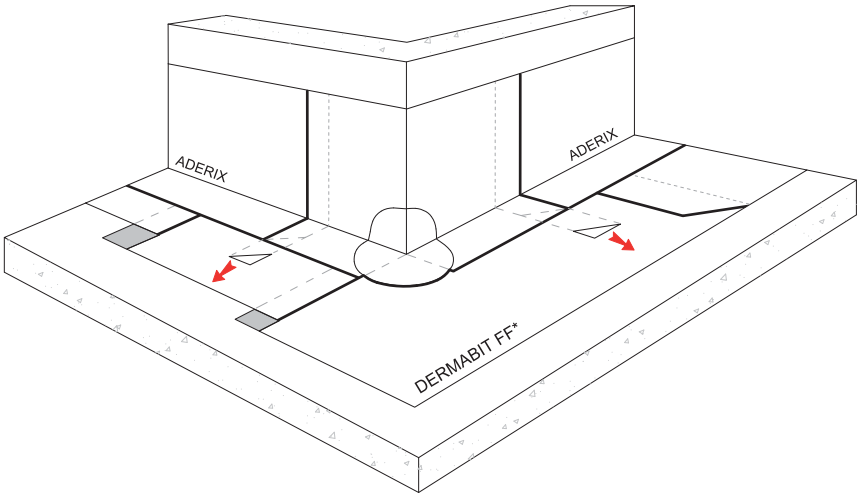
3.1 LAYING, FASTENING AND BONDING *DERMABIT® FF* * ON A HORIZONTAL SURFACE

a - lay the *Dermabit® FF** membrane overlapping the sheet on the selvedge **b -** fasten the membrane to the deck (according to the laying method used) **c -** fasten *Dermabit® FF* mechanically to the vertical deck, with flat plates **d -** bond with hot air welder.



3.2 LAYING *ADERIX*(1) AND THE EXTERNAL CORNER ON VERTICAL NECK

a - lay the *Aderix* membrane on the vertical neck overlapping the sheets **b -** cut at an angle of 45° and remove the overlapping section of the sheets **c -** bond with hot air welder **d -** position and bond the bituminous prefabricated corner with a hot air welder.



(1) ADERIX is a Casali product of the polymer-bitumen self-adhesive membrane range. For more information please read the catalogue of the relevant Membrane line or contact Casali's Technical Office.

**The Dermabit® FF Single-Ply range: the Dermabit® FF product to choose (Gluty, Fixus, Liber) depends on the application method (glue - mechanical fastening - dry laid) and finish.*

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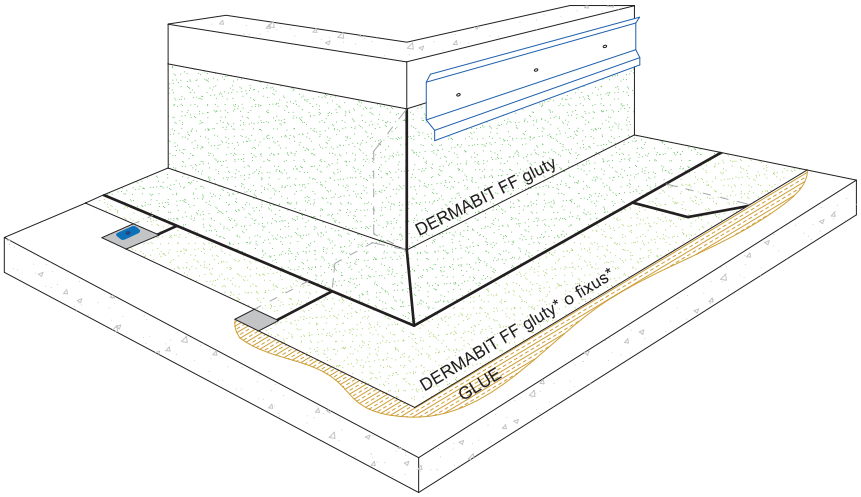
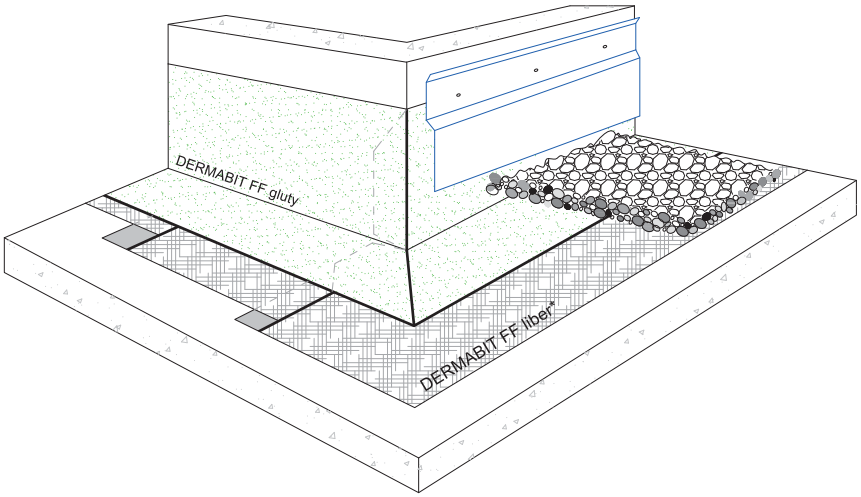
3.3 DETAIL COMPLETED WITH SURFACE-LAID *DERMABIT® FF* * MEMBRANE

a - lay the *Dermabit® FF* membrane overlapping the sheets **b -** bond with hot air welder.



3.4 DETAIL COMPLETED WITH BALLASTED *DERMABIT® FF* * MEMBRANE

a - lay the *Dermabit® FF* membrane on the vertical neck overlapping the sheets **b -** bond with hot air welder
c - lay the metal protection of the vertical neck and fasten mechanically **d -** lay the ballasting elements.



**The Dermabit® FF Single-Ply range: the Dermabit® FF product to choose (Gluty, Fixus, Liber) depends on the application method (glue - mechanical fastening - dry laid) and finish.*

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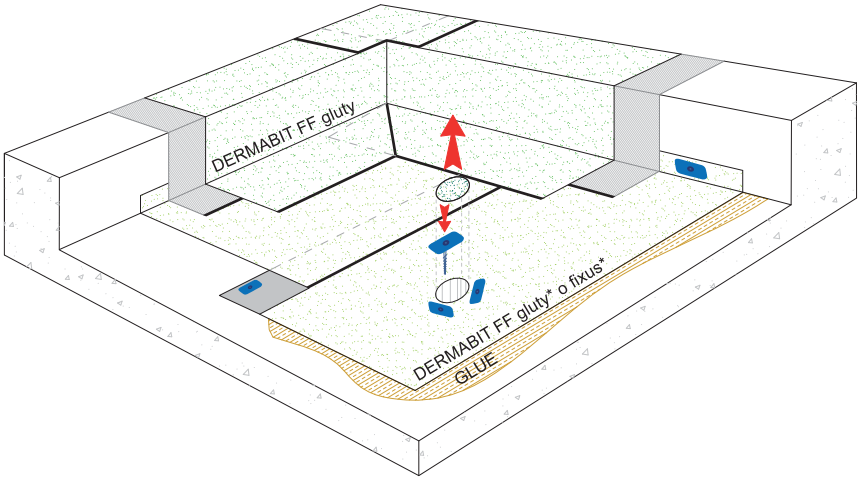
INSTALLATION PROCEDURE 4: VERTICAL DRAIN TRAP

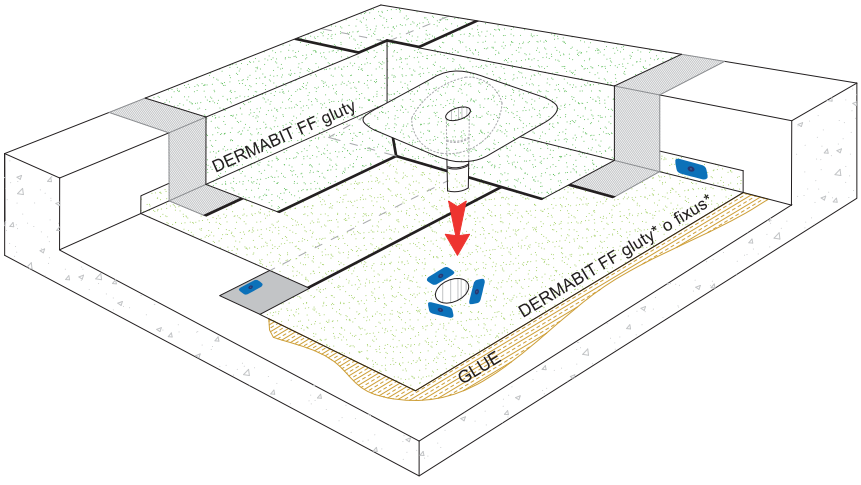
4.1 POSITIONING THE DRAIN TRAP ON A HORIZONTAL SURFACE

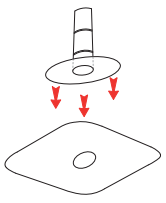
a - lay the membrane of the deck and vertical section as indicated by drawings 2.1 - 2.2 - 2.3 (page 86-87) **b -** cut and remove the *Dermabit® FF** membrane of the horizontal deck in proximity of the descending section **c -** prepare the area where the drain trap is to be installed torching off the slate of the horizontal deck **d -** fasten *Dermabit® FF** mechanically to the horizontal deck, with flat plates, in proximity of the descending section.



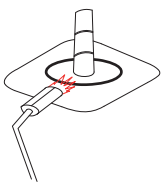
4.2 LAYING THE TRAP ON THE HOLE IN PROXIMITY OF THE DESCENDING SECTION

4.2a - prepare a small "portion" of *Dermabit® FF** on which the prefabricated trap is to be installed **4.2b -** torch on the portion of *Dermabit® FF** to the prefabricated trap separately **c -** position the prefabricated trap on the horizontal surface.





4.2a



4.2b

**The Dermabit® FF Single-Ply range: the Dermabit® FF product to choose (Gluty, Fixus, Liber) depends on the application method (glue - mechanical fastening - dry laid) and finish.*

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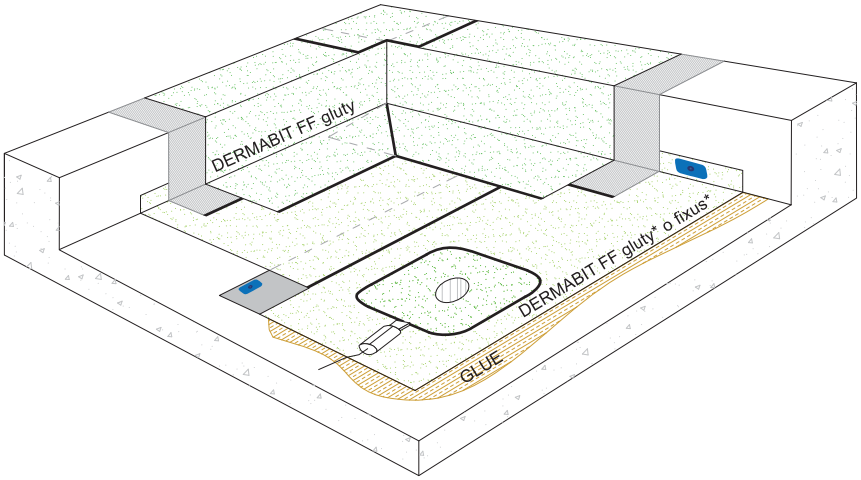
4.3 FINISH WITH PREFABRICATED TRAP

a - use a hot air welder to bond the cover of the prefabricated trap to the horizontal deck.



**The Dermabit® FF Single-Ply range: the Dermabit® FF product to choose (Gluty, Fixus, Liber) depends on the application method (glue - mechanical fastening - dry laid) and finish.*

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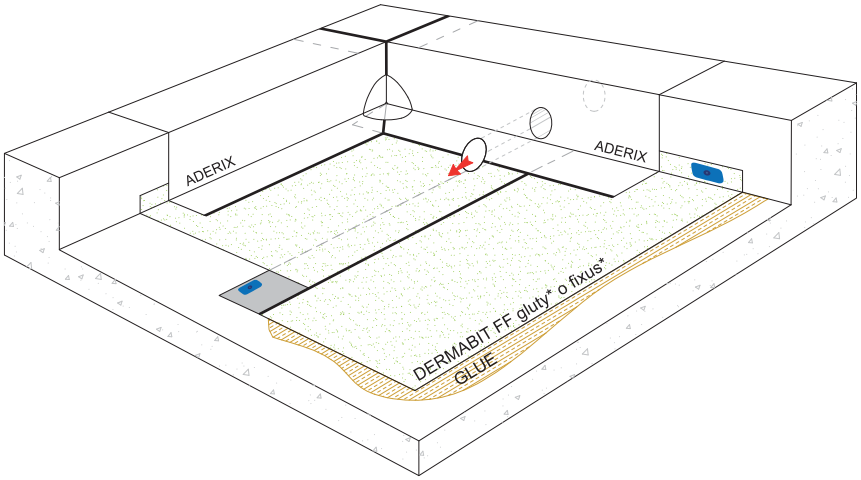
INSTALLATION PROCEDURE 5: HORIZONTAL DRAIN TRAP

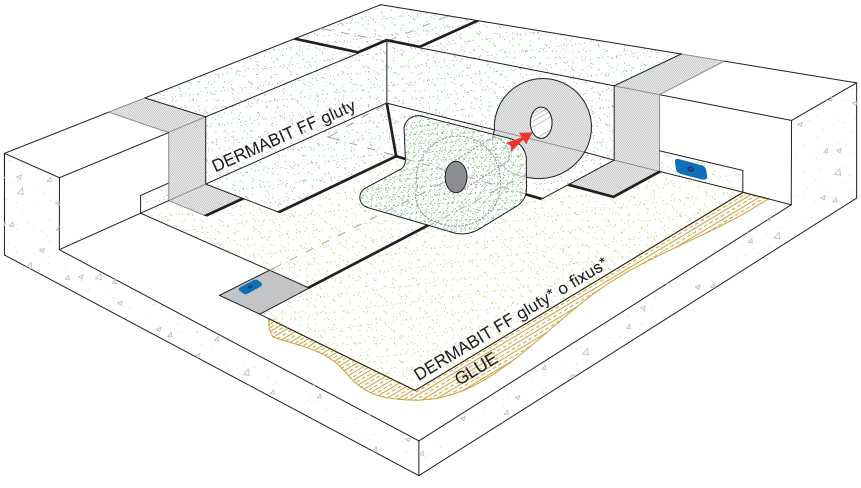
5.1 POSITIONING THE DRAIN TRAP ON THE VERTICAL NECK

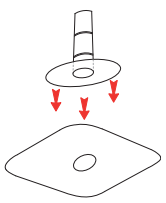
a - lay the membrane of the deck and vertical section as indicated by drawings 2.1 - 2.2 - 2.3 (page 86-87)
b - cut and remove the Aderix membrane of the vertical neck.

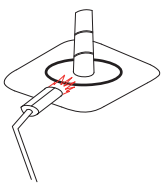


5.2 PREPARING THE TRAP AND HOLE OF THE VERTICAL NECK

5.2a - prepare a small "portion" of Dermabit® FF* on which the prefabricated trap is to be installed **5.2b -** torch on the "portion" of Dermabit® FF* to the prefabricated trap **c -** lay the Dermabit® FF* membrane on the vertical neck as indicated by drawing 2.3 (page 87) **d -** cut the Dermabit® FF* membrane* in proximity of the hole of the descending section




5.2a


5.2b

**The Dermabit® FF Single-Ply range: the Dermabit® FF product to choose (Gluty, Fixus, Liber) depends on the application method (glue - mechanical fastening - dry laid) and finish.*

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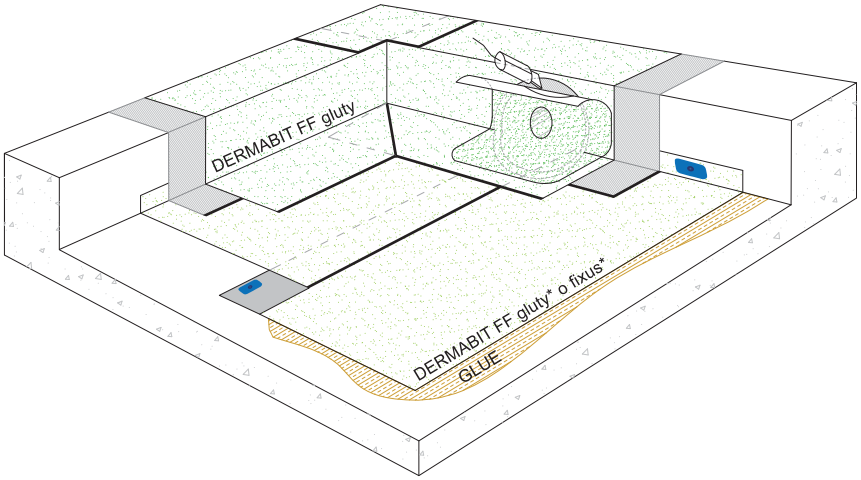
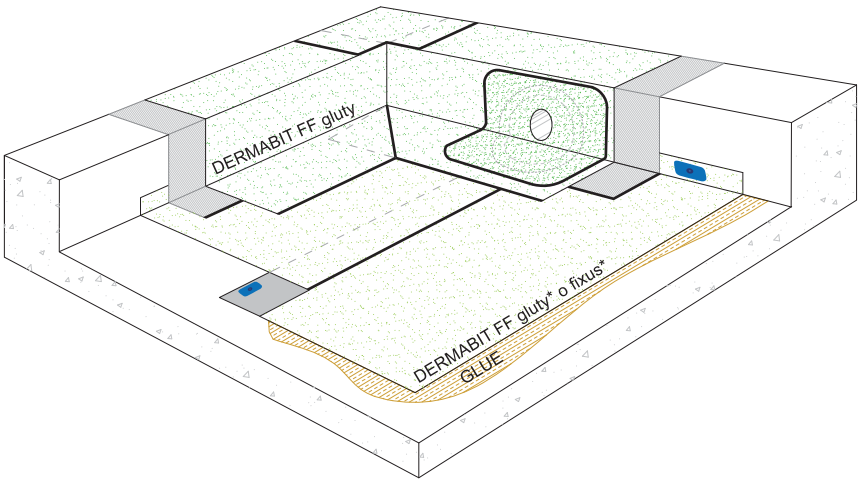
5.3 POSITIONING THE TRAP IN THE HOLE OF THE VERTICAL NECK

a - lay the prefabricated trap in proximity of the hole of the descending section **b -** use a hot air welder to bond the prefabricated trap to the Aderix membrane of the vertical neck.



5.4 FINISH WITH PREFABRICATED TRAP

a - lay the Dermabit® FF membrane on the vertical neck overlapping the sheets **b -** cut the Dermabit® FF membrane in proximity of the prefabricated trap **c -** use a hot air welder to bond the "portion" of the prefabricated trap to the membrane of the vertical neck Dermabit® FF.



**The Dermabit® FF Single-Ply range: the Dermabit® FF product to choose (Gluty, Fixus, Liber) depends on the application method (glue - mechanical fastening - dry laid) and finish.*

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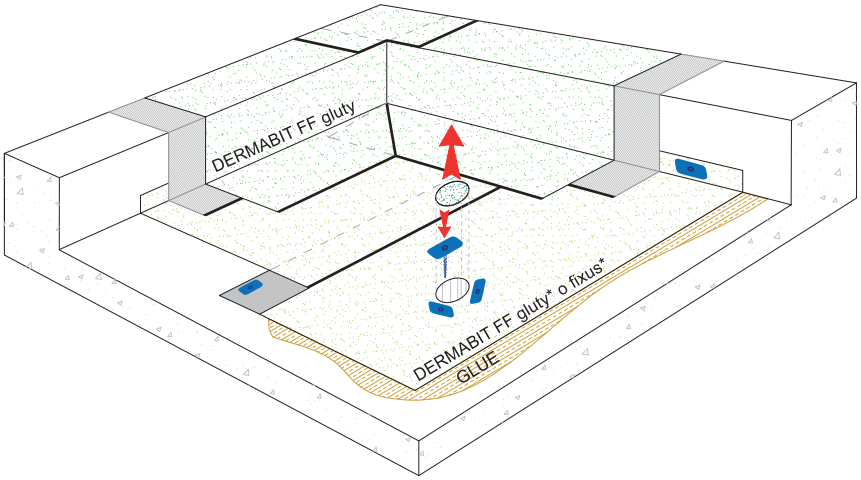
INSTALLATION PROCEDURE 6: BREATHER VENT ON HORIZONTAL DECK

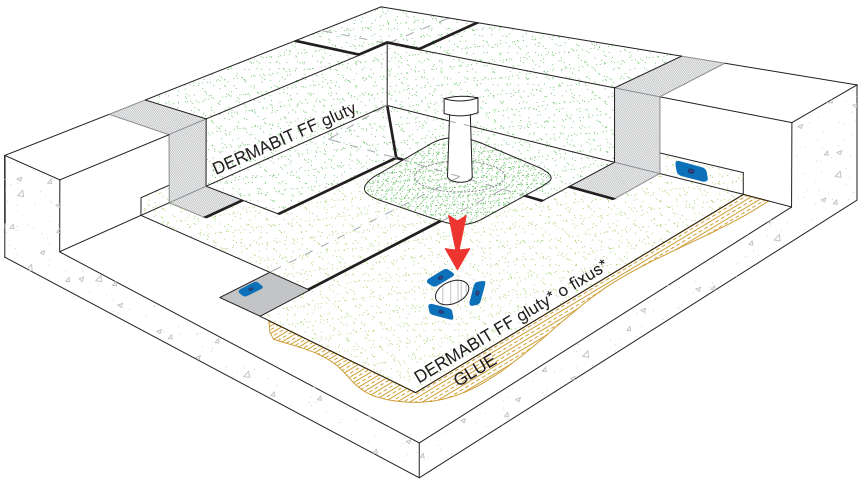
6.1 PREPARING THE INSTALLATION OF THE BREATHER VENT

a - lay the membrane of the deck and vertical section as indicated by drawings 2.1 - 2.2 - 2.3 (page 86-87) **b -** cut and remove the Dermabit® FF* membrane of the horizontal deck **c -** prepare the area in which the breather vent is to be installed torching off the slate of the horizontal deck **d -** fasten Dermabit® FF* mechanically, with flat plates, to the horizontal deck in proximity of the descending section.

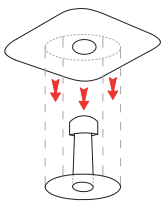


6.2 PREPARATION AND INSTALLATION OF THE BREATHER VENT

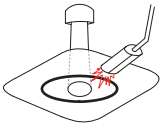
6.2a - prepare a small "portion" of Dermabit® FF* on which the breather vent is to be installed **6.2b -** torch on the "portion" to the prefabricated vent **c -** place the prefabricated vent on a horizontal surface.



6.2a



6.2b



**The Dermabit® FF Single-Ply range: the Dermabit® FF product to choose (Gluty, Fixus, Liber) depends on the application method (glue - mechanical fastening - dry laid) and finish.*

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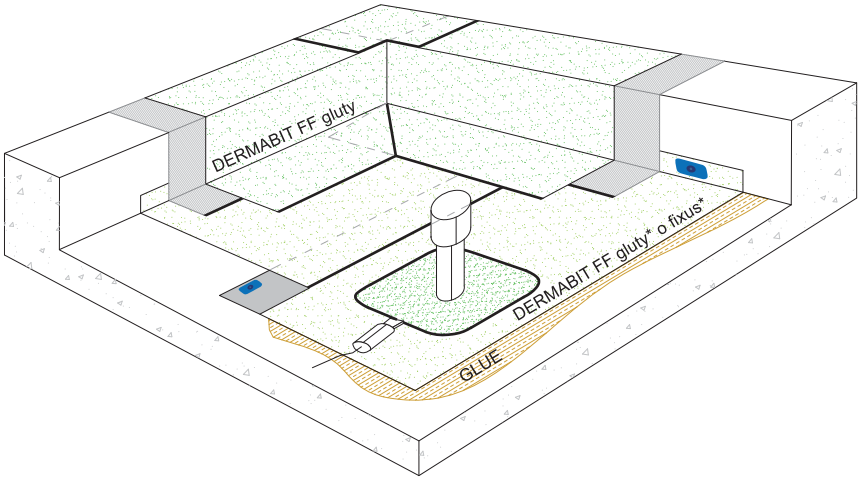
6.3 FINISH WITH BREATHER VENT

a - use a hot air welder to bond the prefabricated breather vent prepared separately, to the horizontal deck.



**The Dermabit® FF Single-Ply range: the Dermabit® FF product to choose (Gluty, Fixus, Liber) depends on the application method (glue - mechanical fastening - dry laid) and finish.*

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7

Technical specifications 2, 3, 4, 5, 6 and 7, which are an integral part of the technical documents for the DERMABIT® FF Single-Ply system, give a detailed explanation of the different packet components compatible with the Dermabit® FF Single-Ply system as well as a description of the functions of the single layers, the minimum technical characteristics required and laying specifications. Please contact Casali's Technical Office for any information you may require to correctly design the layers, the specifications or any other doubts you cannot resolve by reading this documentation.

CASALI S.p.A. Z.I. C.I.A.F. 60015 - Castelferretti (AN) - Tel. +39 071 9162095 - fax +39 071 9162098 - www.casaligroup.it - info@casaligroup.it

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technical specifications 9

DERMABIT FF

Flame-free polymer bituminous single-layer waterproofing systems

LAYING MANUAL

CASALI
www.casaligroup.it

GENERAL INFORMATION

Dermabit® FF Single-Ply is a polymer bitumen membrane formulated as single-layer waterproofing laid with hot air welding system on decks of different kinds. Dermabit® FF Single-Ply may be laid ***without the use of propane torch or flame burners or bitumen molten in special boilers (a method which is today very rarely used).***

The flame free welding technique applied to polymer bitumen membranes is a result of the innovative research work developed by Casali S.p.A.
This document is intended as a support for designers and operators and is a practical guide to follow to ensure correct planning and laying of the single-layer waterproofing system.

Installers must receive appropriate training on the laying techniques of Dermabit® FF Single-Ply. Casali S.p.A. organises specific courses on the laying techniques which include introductory theoretical aspects associated to a practical session using specific models. The theoretical and practical course is based on UNI 11333 regulations and is a professional refresher course for operators in this industry. A certificate of participation and qualification will be issued to participants to attest their attendance of the training course and confirm the technical laying skills acquired during the demonstration. This certificate, together with full compliance with the specifications of the technical documents, guarantees correct laying by installers who are certified to lay Dermabit® FF Single-Ply.

The information provided by the technical specifications generally provide full details on the most common worksite cases. In the case of projects involving technical details and layers not indicated by the technical specifications, installers should contact Casali's Technical Office to request information on the correct laying methods.

Complementary layers of the single-layer Dermabit® FF waterproofing membrane, such as vapour barriers, insulating and separator layers etc., not produced and/or supplied by Casali S.p.A. must be approved by the Technical Office during the design stage of the layer packet. The specific Dermabit® FF Single-Ply warranties will not be granted if materials and/or layers that have not been approved are used.

Materials for gluing and mechanical fastening not produced and/or supplied by Casali should bear the warranty of the relevant producer/supplier who should also provide directions for their use complying with the project specifications of the layer packet.

The prefabricated accessories, which are mandatory for the technical details of the roofing, should be indicated by the project of the layer packet in order to ensure correct and efficient waterproofing.

In certain cases the warranties provided for the Dermabit® FF Single-Ply system may only be granted against a routine maintenance programme for the covering, which should be agreed by the Technician (maintenance person) and the end customer (customer), in accordance with the procedures and protocols advised by Casali S.p.A.
Casali's technicians should be allowed to carry out inspections at the worksite and/or on coverings laid with the Dermabit® FF flame free single-layer waterproofing system.

TECHNICAL SPECIFICATIONS 9

Contents of the Specifications

 Disclaimer on page 156

1. DESCRIPTION OF THE MANUAL

This manual gives practical information regarding the laying technique for Polymer Bituminous DERMABIT® FF Single-Ply membranes.
The layer structures typical of the different waterproofing packet systems are described in part one of the manual, which is the theoretical part of the manual.
The other parts of the manual provide the following more practical information:
• different methods to lay the various layers;
• the steps to follow to lay DERMABIT® FF Single-Ply;
• completion of the finishing details;
• application of the membrane accessories.

Following the steps provided in this manual ensures the most efficient and best results, without the use of free flame tools. Please remember however that packets with the DERMABIT® FF Single-Ply may only be laid by duly qualified installers, certified by Casali S.p.A., who should follow the specific instructions of the project in question. A qualification certificate will be issued only to installers who attend the specific courses on laying techniques organised by Casali for its installers.
If you have any doubts or if the manual does not provide specific instructions for particular cases, please contact Casali's technical assistance department.

SPECIFICATIONS no. 1 give a description of the characteristics of the different versions of DREMABIT® FF Single-Ply which make up the SINGLE-PLY system.

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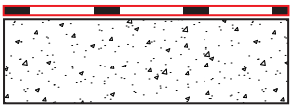
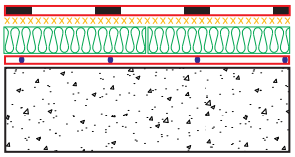
2. ROOFING WATERPROOF SOLUTIONS:

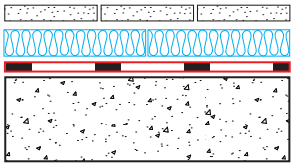
COLD ROOF ..... waterproofing packet with **no** thermal insulation layer. .....➤



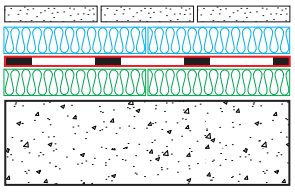
WARM ROOF ..... waterproofing packet with thermal insulation layer, laid **under** the waterproofing membrane. .....➤



INVERTED ROOF ..... waterproofing packet with thermal insulation layer, laid **over** the waterproofing membrane. .....➤



DUO ROOF ..... waterproofing packet with two insulation layers laid under and over the waterproofing layer. .....➤



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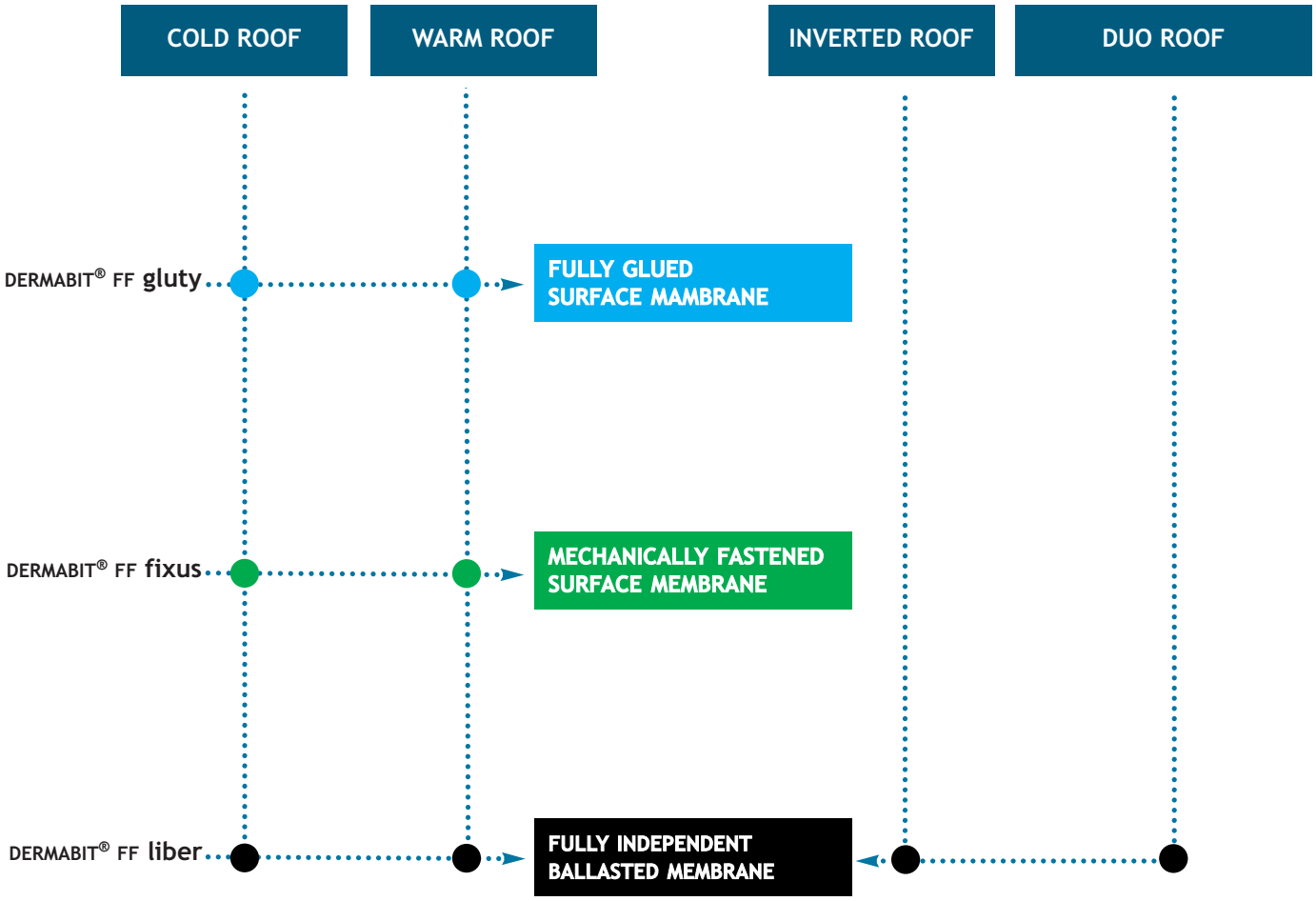
3. SPECIFICATIONS FOR USE OF DERMABIT® FF SINGLE-PLY MEMBRANES IN DIFFERENT ROOFING SYSTEMS



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4. LAYING THE LAYER ELEMENTS

LAYER	PHYSICAL-CHEMICAL ASPECTS	FUNCTION	LAYING METHOD
SUPPORTING DECK	deck in concrete, concrete-masonry, wood, steel or other materials.	horizontal subdivision of roofing.	n.b.[1]
SLOPE SCREED	sand and cement mortar, light or cellular cement, panels of different thicknesses.	formation of the slope floors.	n.b.[1]
PRIMER	bitumen-based liquid in water or solvent dispersion.	more efficient adherence of membrane to deck.	apply in full or in part, by roller or spray gun.
VAPOUR SCREEN	ldpe[2] membrane or polymer bitumen sheets.	**reduces** vapour flow from the interior to exterior[3] of the building.	dry laid, for ballasted roofs; glued or fixed to the deck for roofs with surface-mounted membrane.
VAPOUR BARRIER	polymer bitumen membrane with aluminium sheet.	**prevents** vapour flow from the interior to exterior of the building.	dry laid, for ballasted roofs; glued or fixed to the deck for roofs with surface-mounted membrane.
LAYER INSULATION (WARM ROOF): FIRST INSULATION LAYER IN A DUO ROOF	pur, pir, eps and xps or other panels; screeds in light or cellular cement.	reduces thermal transmission of the roofing.	dry laid panels for ballasted roofs, or glued or fixed for roofs with surface-mounted membrane. Lightweight or cellular cement screeds, laid on site.
LAYER INSULATION (DUO ROOF, INVERTED ROOF)	xps in panels.	reduces thermal transmission of the roofing.	dry laid panels
SEPARATION LAYER	pp or pe non-woven geotextile.	separates the waterproofing membrane from other non-compatible layers.	generally dry laid, but may also be glued.
WATERPROOFING LAYER	polymer bitumen membrane.	waterproofs the roofing packet.	dry laid if ballasted, glued or fixed in the case of surface-mounted membranes.
CREEP LAYER	ldpe in sheets.	reduces friction between the ballast and waterproofing layers.	dry laid.
PROTECTION LAYER	pp or pe non-woven geotextile.	prevents punching on the waterproofing membrane.	dry laid.
BALLAST/WEAR LAYER	loose gravel, screed with walkable surace, floating floor or flanged in mortar[4].	protects the waterproofing membrane from UV rays and other mechanical damage[5].	dry laid for mobile layers, laid on site in the case of fixed layers.
DRAINAGE TRAP	bitumen or epdm moulded prefabricated part.	drains rainwater to drain pipes.	torched on to the waterproofing membrane.
BREATHER VENT	bitumen or epdm moulded prefabricated part.	improves vapour evacuation.	torched on to the waterproofing membrane.
ADHESION LAYER	polyurethane glue, bituminous glue.	glues the different layers together.	follow manufacturer's instructions.
FASTENERS	nails or expansion plugs and steel oval plates.	anchors all the other layers to the deck[6].	follow manufacturer's instructions.

[1] Installed by the builder.
[2] When laying LDPE sheets on irregular screeds, lay a protection and separation layer to reduce the risk of damage to the layer.
[3] Build up of vapour in the waterproofing packet should be prevented, if the condensate produced during summer has not evaporated. The general rule however is that the resistance to vapour flow of this layer is greater than that of the overlying layers.
[4] The packets for roof gardens are also considered to be ballast/wear layers, but their use is not recommended with single-layer waterproofing systems.
[5] A double layer should be used to waterproof the vertical embossments. The exposed layer will in this way be protected against UV rays.
[6] In order to fasten the different layers to the deck securely, it may be necessary to use mechanical fasteners in addition to glue or bituminous glue. Casali's technical assistance department will be happy to provide the necessary instructions.

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5. PRELIMINARY OPERATIONS

5.1 LAYING DECK

- Remove any debris and loose parts, fill and level off the deck.
- Check and restore the slope planes, check the height of the drains.
- Remove “cove” couplings at the base of vertical embossments if they make it impossible to fasten the membrane mechanically.
- Repair existing polymer bituminous membranes (remove swellings and folds, remove or repair gluing that is detached from the membrane etc.).
- Remove existing synthetic membranes if a new fully bonded membrane is to be applied.
- Cut existing synthetic membranes into 1.00 x 1.00 lm squares, removing the vertical embossments if a new dry laid or semi-independent membrane is to be applied.
- Check that it is possible to make vertical embossments of at least 25 cm above the height of the last exposed layer.
- Check that the surface of vertical walls is not crumbled or does not ensure efficient adhesion of the membrane.
- Clean thoroughly.

5.2 VAPOUR BARRIER/SCREEN, INSULATION

- Place the rolls of membrane or LDPE on the deck you are waterproofing in their original packaging and remove from the package only when you are ready to lay.
- Place the insulating panels on the deck you are waterproofing in their original package and remove from the package only when you are ready to lay.
- Protect any material that is sensitive to humidity from bad weather conditions, high and low temperatures when stored at the worksite.
- Store the material on the deck so that it does not interfere with the other laying operations.
- Store materials in accordance with the manufacturer’s instructions.

5.3 ADHESIVES AND FASTENERS

- Store adhesives so as to avoid any damage to persons, property and the environment in the case accidental spillage.
- Protect materials which are sensitive to fire.
- Protect materials subject to oxidation by humidity.
- Ensure that the deck and materials are compatible with the glue and fasteners by testing these on small sections.

5.4 MEMBRANE DERMABIT® FF

- Place the rolls of DERMABIT® FF Single-Ply membrane on the surface you are waterproofing in their original packaging and remove from the package only when you are ready to lay. Protect the coating fabrics of Dermabit® FF Gluty from humidity.
- Ensure that the welders are powered correctly so that there are no voltage or power drops during use.
- Carry out a welding test to regulate the temperature and speed of welding.
- Take any measures that may be required to prevent rainwater seepage between the layers when works are suspended.
- Arrange temporary ballasts to prevent any sheets that have been laid from moving while the glue is setting.

5.5 BALLAST LAYERS

- Do not place heavy materials on membranes that have been laid.
- Protect membranes that have been laid from damages caused by wheelbarrows and trolleys.
- Store any ballasting materials so that they do not interfere with laying operations.

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6. TOOLING

WELDER

Manual hot air welder with 80 mm nozzle.
220 v, resistance 3400W.

WELDER

Automatic hot air welder with 100 mm nozzle, 380 v, resistance 6500W.

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PRESS ROLLERS

Silicone 80 mm for linear completion welding

Silicone 40 mm for welding details

PTFE (teflon) 20 mm for welding details

CUTTING TOOLS

12” scissors

CUTTING TOOLS

Safety cutter with hooked blade

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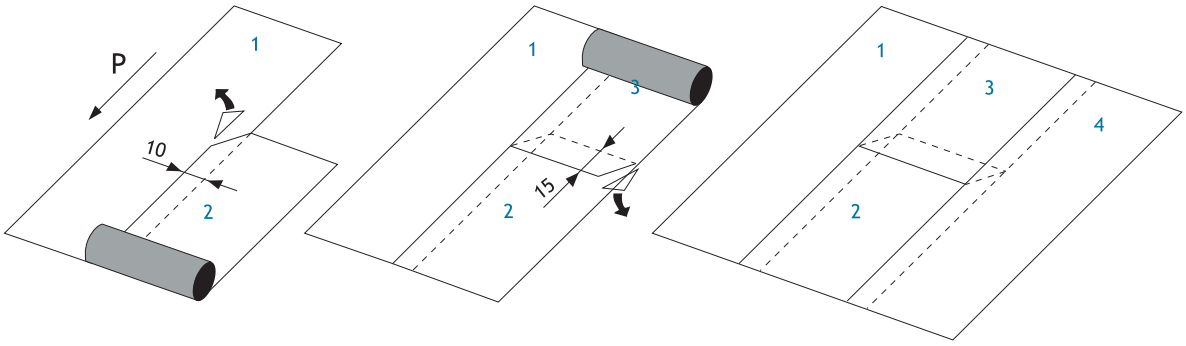
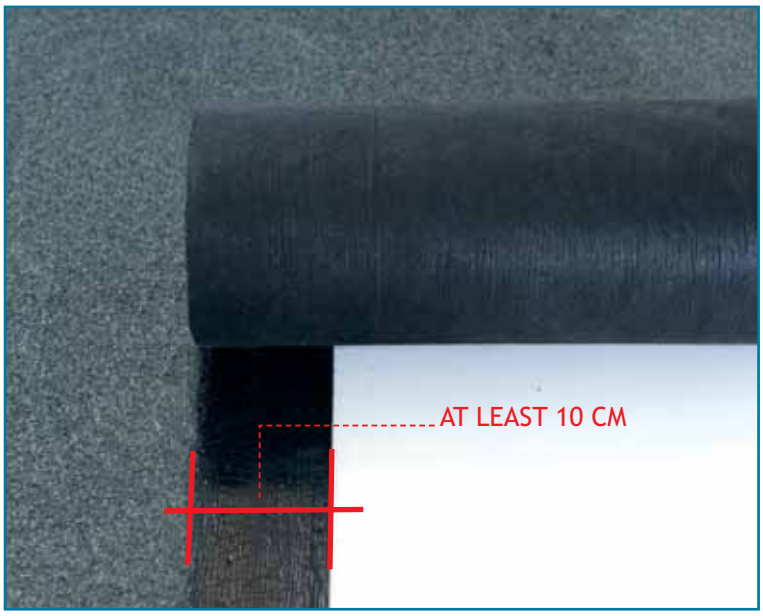
7. OVERLAPPING THE SHEETS

7.1 CORRECT POSITIONING (UNI 11333 standard)



7.2 CORRECT OVERLAPPING

7.2.1 Longitudinal welding for dry laid or fully glued membranes



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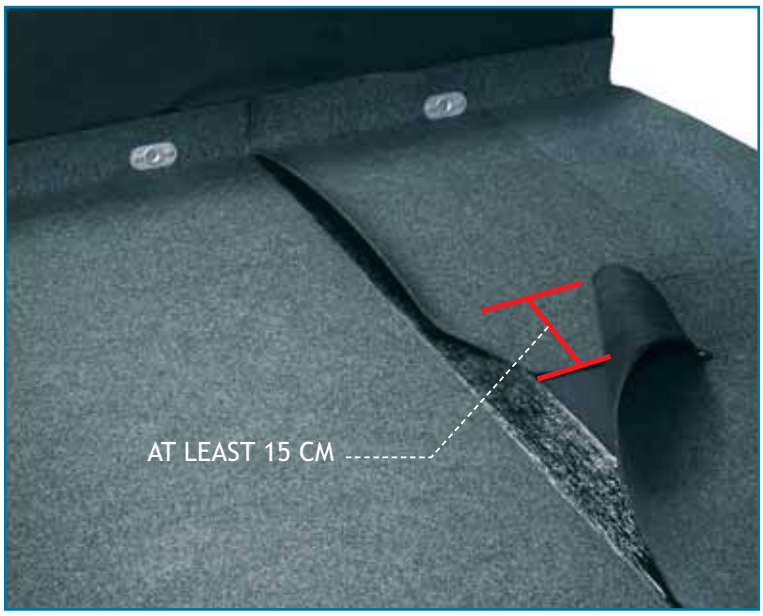
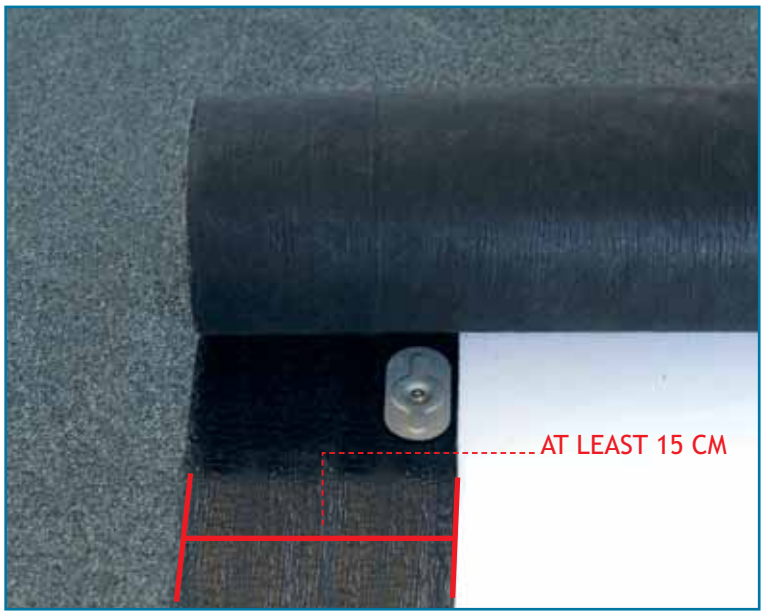
7.2.2 Head overlapping for any type of laying



7.2.3 Longitudinal overlapping for mechanically fastened membranes



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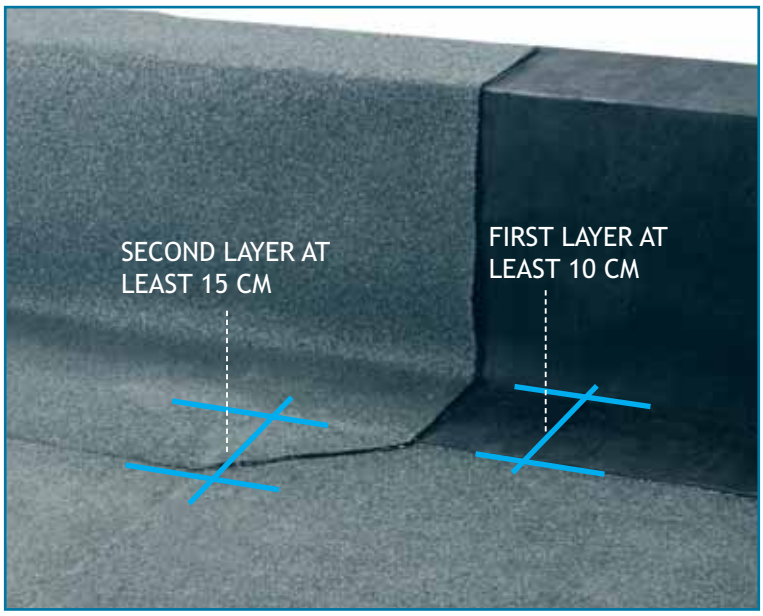
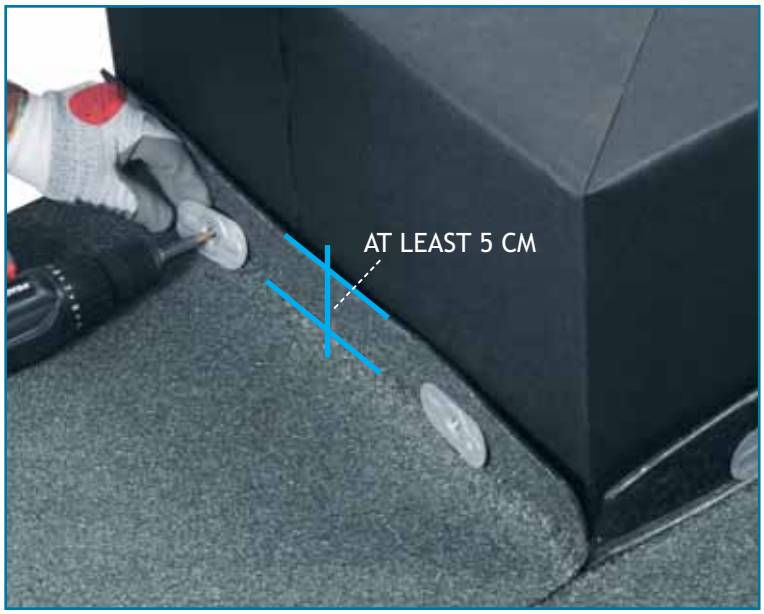
7.2.4 Overlapping at the base of vertical embossments



7.2.5 Vertical embossment for safety mechanical fasteners



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8. HOT AIR HAND WELDING

8.1

Pin the sides to fasten the sheets and prevent them from moving.

8.2

Start welding with the manual hot air welder and the 100 mm. press roller:
a) the nozzle should be moved in the direction indicated by the arrow, working over edge of the side by at least 5 mm;
b) apply the required pressure to the roller following the work at a distance of about 20 mm.

8.3

The bonding temperature and roller pressure are correct if a 2/3 cm seam of bitumen escapes from the edge. Welding should be checked only when the hot mass has cooled completely.

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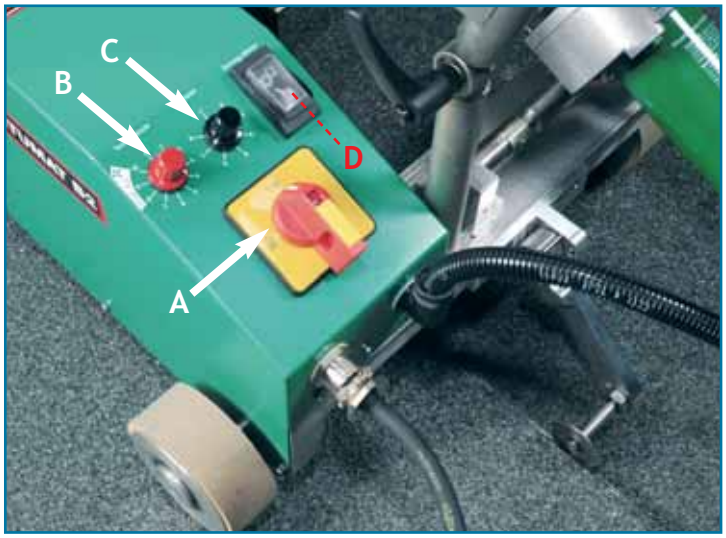
9. HOT AIR AUTOMATIC WELDING

9.1

Regulate the weight of the welder by increasing the ballast proportionally to the rigidity of the layer below the membrane you are welding.

9.2

Use a metal brush to remove any carbon residues from the 100 mm nozzle.



9.3

To turn on the machine:
a) Turn main switch A to position 1.
b) Regulate the air temperature with knob B.
c) Regulate the speed with knob C.

IMPORTANT INSTRUCTIONS

The temperature and speed should be regulated according to the environmental conditions by carrying out a preliminary welding test.

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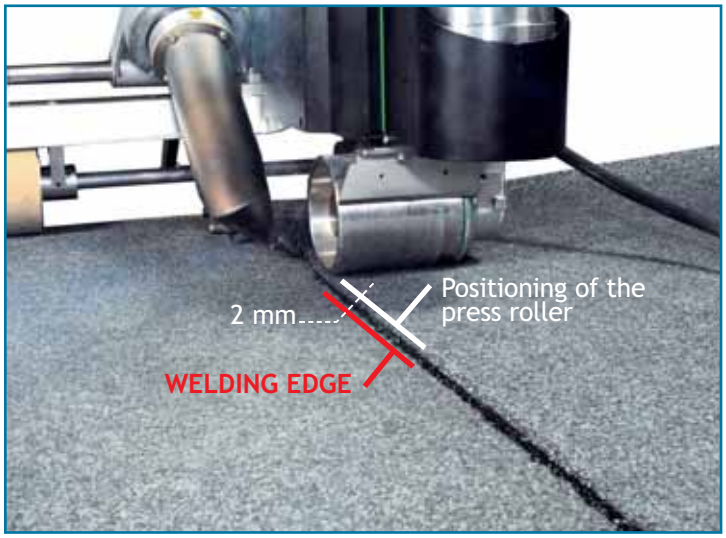
9.4

Regulate the air with knob E; a very strong air flow may break up the molten bituminous mixture.

9.5

Position the machine and start welding:
a) Position the machine on the overlap you are welding, by aligning wheel F (fig. 9.4) to the upper side.
b) Insert the nozzle between the two sheets and push in the carriage of the gun blocking it between the two sides.
c) Place switch D, which starts movement (fig. 9.3), on position 1.



9.6

Welding:
a) Start welding, ensuring that alignment wheel F slides along the edge of the upper side;
b) keep the steel press roller about 2 mm back from the edge to avoid contact with the molten bitumen mixture that seeps from the joints.

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9.7

Butt welds and T-joints:
a) reduce the speed a little on the butt welds to better melt the mixture protected by the slate;
b) further reduce the speed on the T-joints pressing down slightly on the body of the machine.

9.8

The welding temperature and speed are correct if a uniform seam of molten bitumen seeps from the overlap. Both along the horizontal parts and on the T-joints.

IMPORTANT INSTRUCTIONS

The hot air used with the above techniques not only has a lower temperature with respect to that of a propane flame but also heats much smaller areas.
To ensure efficient welding follow these steps:
• melt both sides together and press firmly so that they stick together;
• do not heat very long sections to avoid cooling before they stick;
• check that there are no foreign bodies, humidity or dirt between the sides.

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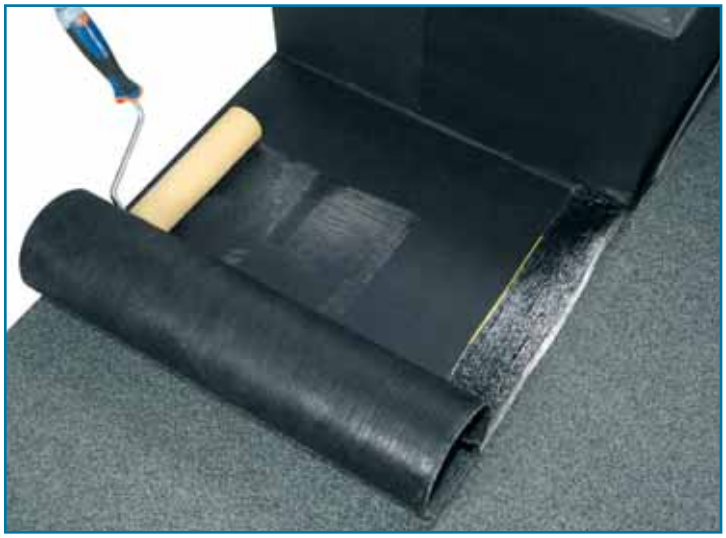
10. LAYING THE EXTERNAL CORNER

10.1

Carry out the preliminary steps on the surfaces you are waterproofing: clean, level, smooth, and if necessary apply primer etc.



10.2

Lay the membrane on the horizontal section using the required technique (glue, fasten, dry lay), folding it back vertically to leave an area for the fasteners to secure it along the perimeter (see photo 7.2.5)

10.3

Weld the joints with a hand or automatic welder (points 8 and 9).

10.4

Glue the extra flap of membrane that projects beyond the width of the fastening support.

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10.5

Fully bond the first waterproofing layer to the deck (use self-adhesive Aderix membrane or Dermabit® FF Liber membrane glued with polyurethane or bituminous glue with the fabric coated side turned towards the deck). The sheet laid should be at least 15 cm longer in order to fold it back it on the orthogonal side.

10.6

Cut a triangular portion of the projecting strip, as indicated by the figure. Fold back and glue both the sides that have been cut with hot air, to the orthogonal face of the vertical deck.

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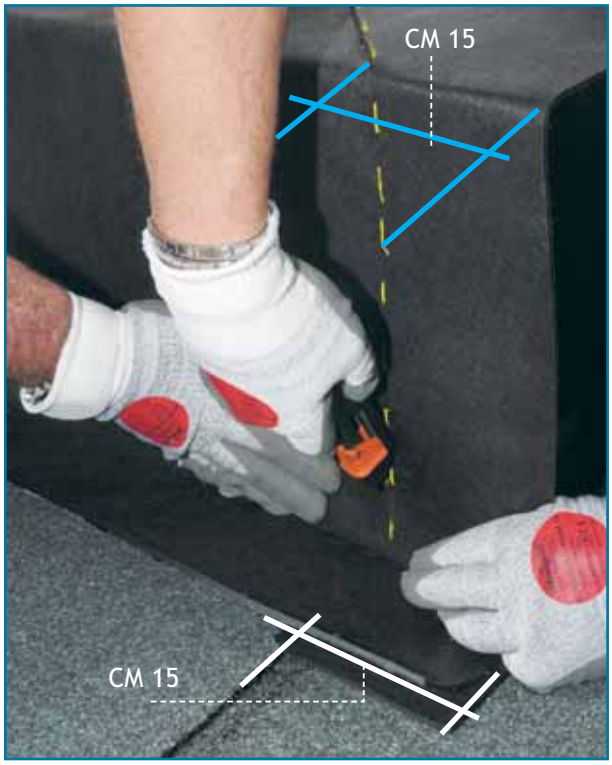
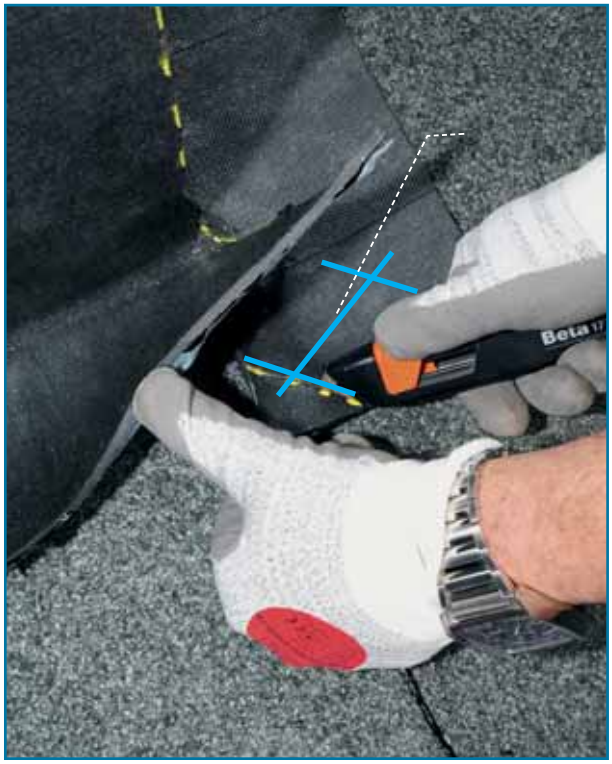


10.7

Prepare the covering strip of the orthogonal side, leaving a length of 15 cm beyond the edge and trim off the extra parts, as shown by the next two figures.



10.8

Finish cutting off the extra parts of the second strip and remove a triangle from the embossment of the first, as shown by the figure. Removing the triangle as described above is the same as the butt overlap indicated by figure 7.2.2

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10.9

Remove the silicone coated paper from the self-adhesive surface of the Aderix membrane.

10.10

Press down to ensure adhesion. If you are not using a self-adhesive membrane, apply glue and ensure that it sticks properly.

10.11

Use a manual hot air welder to weld the base of the vertical embossment.

10.12

Weld all the sealing sides with a hot air welder.

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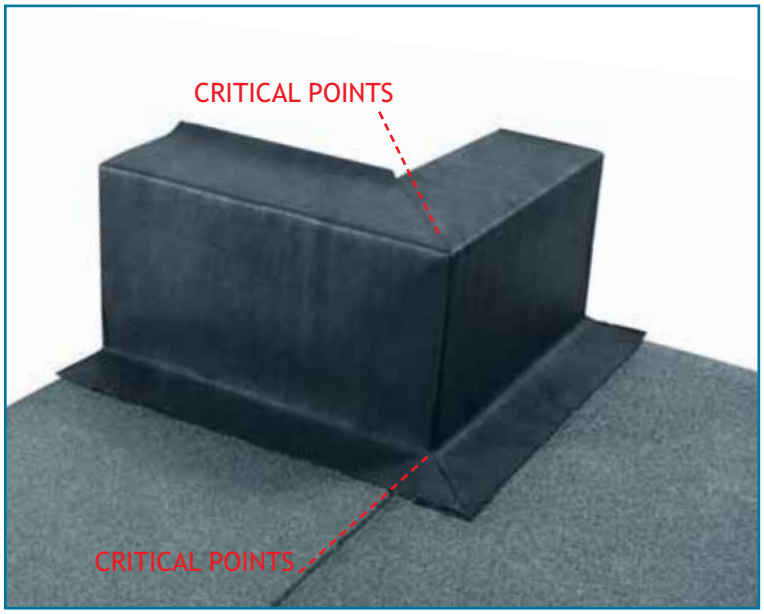
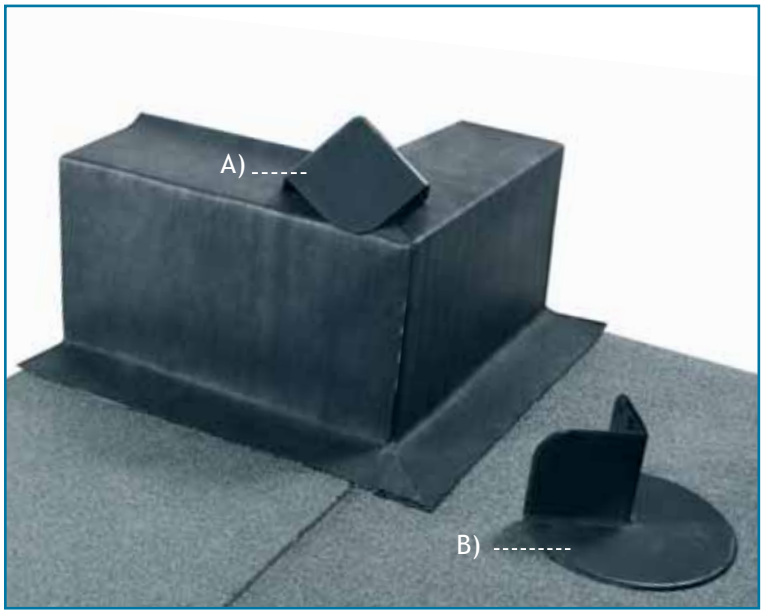


10.13

Complete the external corner before applying the finishing accessories.



10.14

Prefabricated finishing details:
A) internal corner
B) external corner

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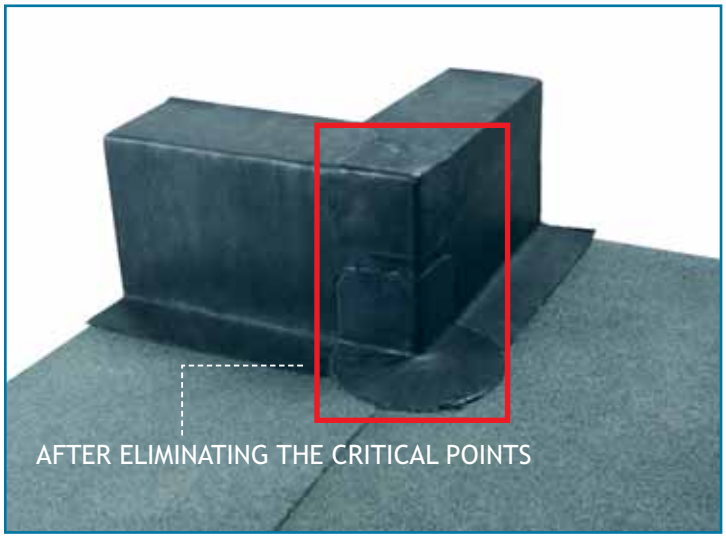
10.15

Apply accessory B), external corner, positioning and securing it at the base of the vertical embossment and weld with hot air.

10.16

Apply accessory A), internal corner, positioning and securing it at the top of the vertical embossment and weld with hot air.



10.17

Detail of the external corner, after application of the prefabricated accessories on the first water-proofing layer.

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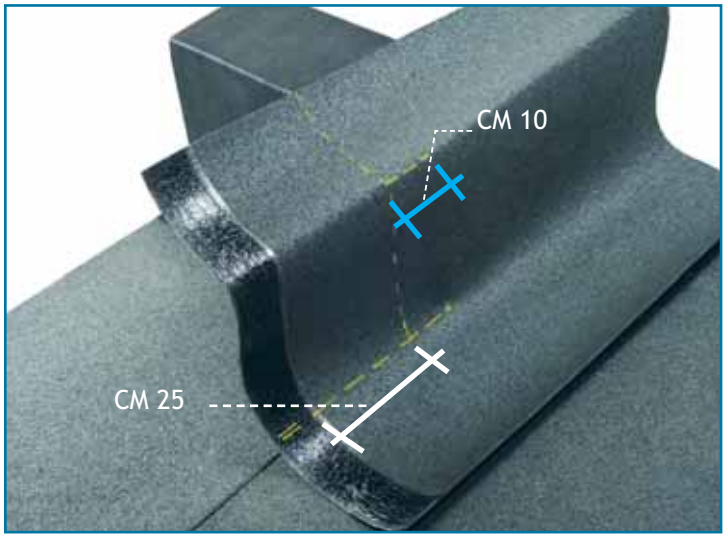

10.18

Prepare the strip of Dermabit® FF Gluty to apply as final coating to the previously waterproofed details by repeating the above steps. Mark in the cuts as indicated by the figure.

10.19

Remove a triangular portion of the strip at the top of the vertical embossment.

10.20

Glue the strip to the first layer waterproofing layer.

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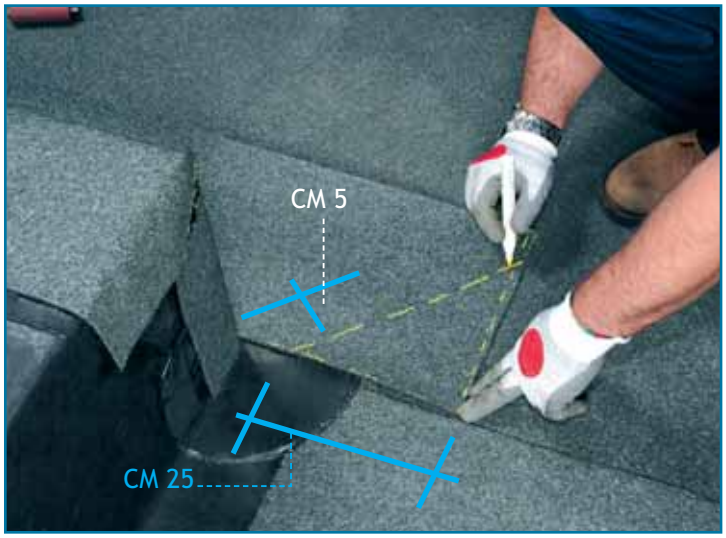
10.21

Glue the portions that are to be folded on the orthogonal side, heating the bituminous mixture with hot air and pressing down with the press roller.



10.22

Remove a triangular portion at the base of the vertical embossment as indicated by the figure.

10.23

Weld.

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10.24

The first part of the covering has been completed.

10.25

Prepare and cut a second strip of covering for the orthogonal part of the details, as indicated by the figure.

10.26

Glue by heating the bituminous mixture with hot air or use specific glue or bituminous glue.

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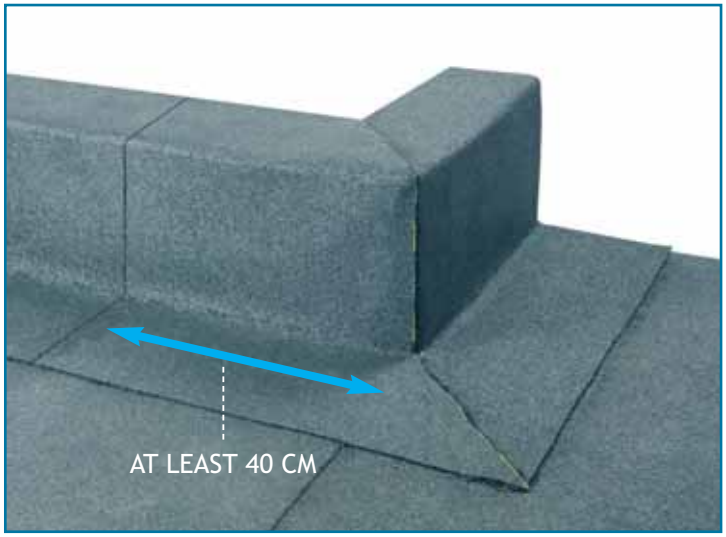
10.27

Weld as required.



10.28

Detail of the completed external corner.

IMPORTANT INSTRUCTIONS FOR LAYING THE *EXTERNAL CORNER*

- Waterproofing of the vertical embossments must always be carried out in a double layer.
- The first layer must be fully bonded to the deck and primer applied if necessary.
- Any critical points must be sealed with bitumen prefabricated accessories, which are part of the Dermabit® FF Single-Ply system.
- Dermabit® FF Gluty must be used for the second protection layer. The 15 cm embossment on the plane permits welding with an automatic welder.
- When welding the membrane strips for the detail, these should be welded to the rest of the embossment, at a distance of at least 40 cm from the edge.
- The membrane laid on the horizontal plane should be secured to the base of the deck with safety mechanical fasteners.

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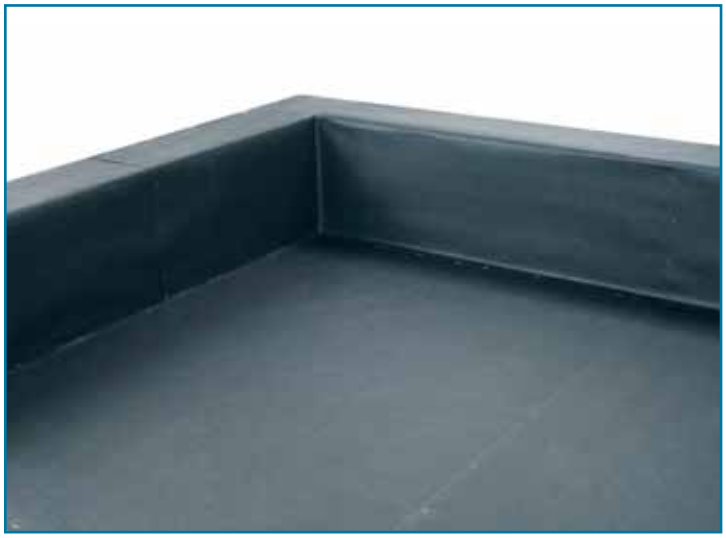
11. LAYING THE INTERNAL CORNER



11.1

Carry out the preliminary operations on the surface you are waterproofing: clean, level, smooth and if necessary apply primer, etc.

11.2

Lay the membrane on the horizontal section, using the required technique (glue, fixed or dry laid), folding it back vertically to allow a space for the security fasteners along the perimeter.

11.3

Remove a square portion of membrane at the crossing of the corners.

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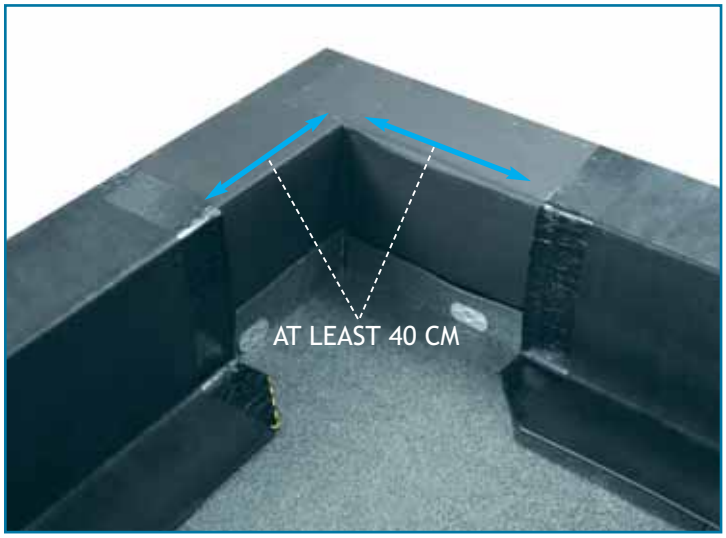

11.4

Apply the strips of the first layer of the embossment, cut and glue as shown by the figure.

11.5

Weld the bottom edges of the embossment on the membrane laid on the horizontal plane.

11.6

Prepare the sealing strip, and then cut as shown by drawing 11.7.

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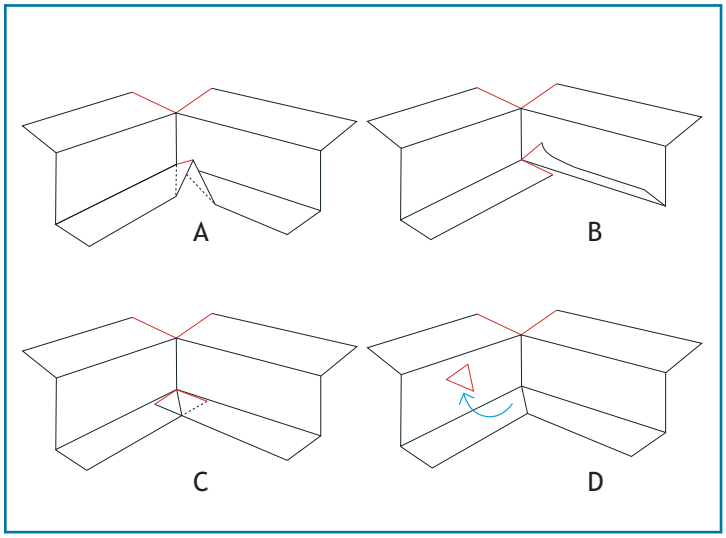
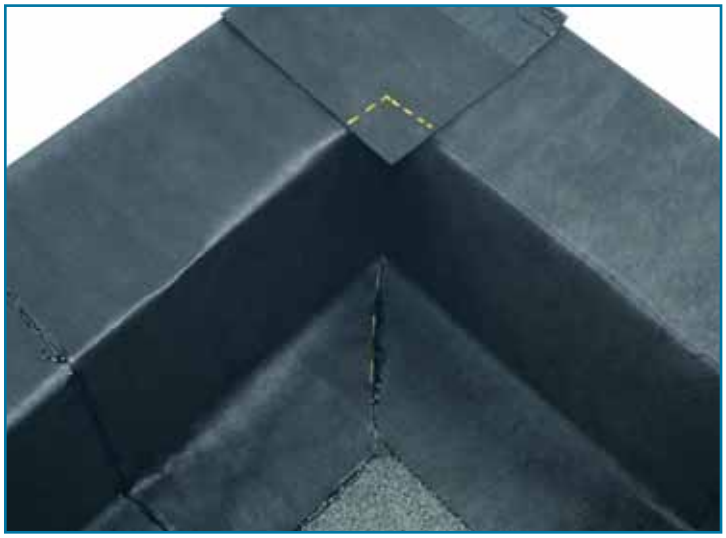


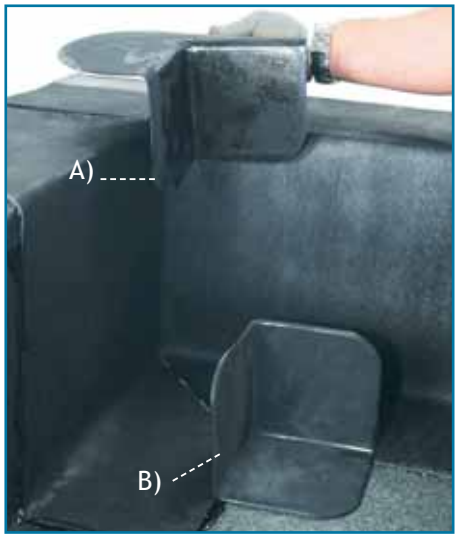
11.7

A- Top and bottom cut
B- Positioning the bottom strips
C- Positioning the upper strip
D- Removal of triangular portion



11.8

Weld as necessary after gluing the strip to the deck, and cover the square area left by the strip at the top of the embossment.



11.9

Prepare the prefabricated finishing accessories to seal the critical points:
a) external corner
b) internal corner

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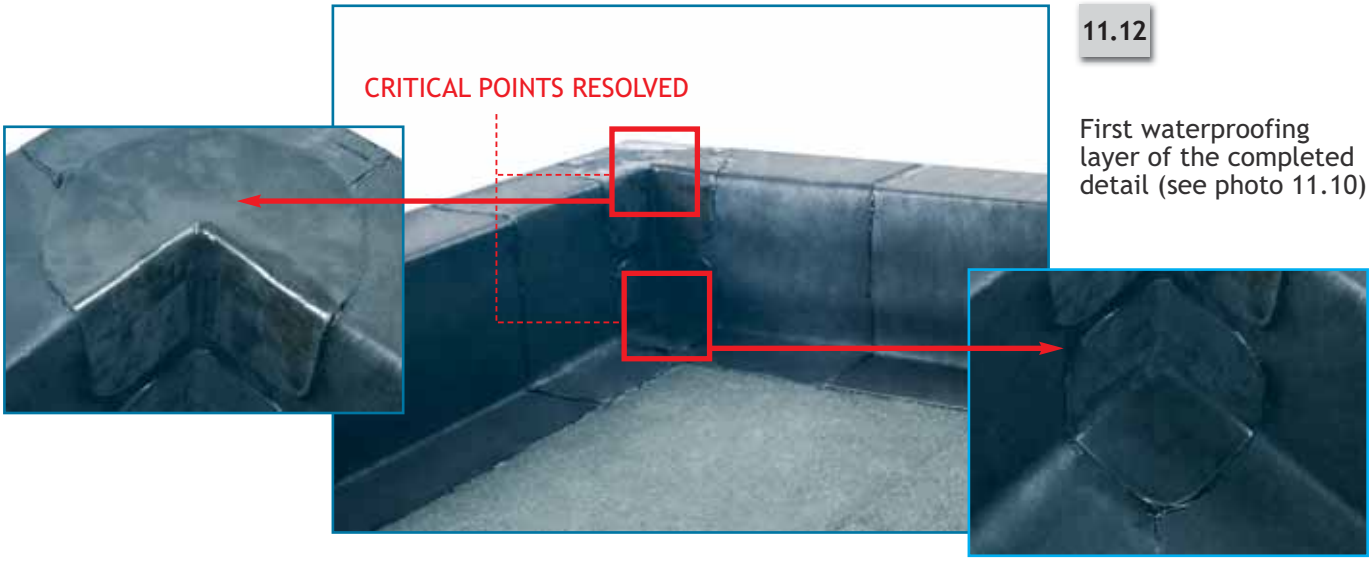
11.10

Use a hot air welder to bond the internal corner at the base of the embossment.

11.11

Use a hot air welder to bond the external corner at the top of the embossment.



11.12

First waterproofing layer of the completed detail (see photo 11.10)

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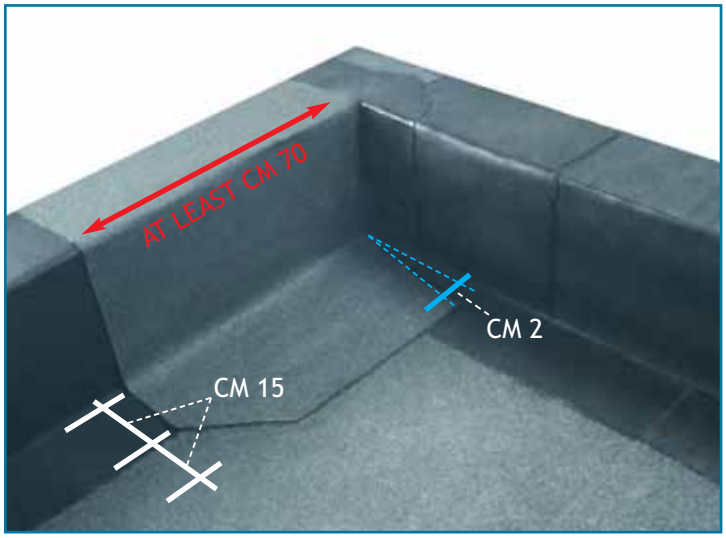
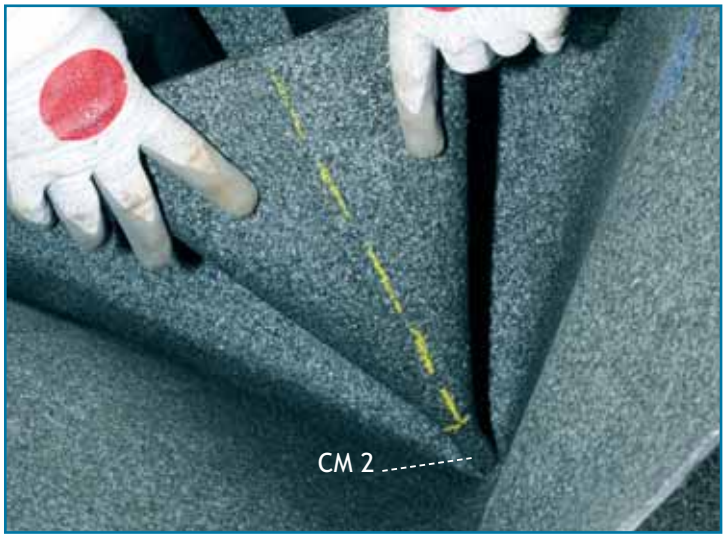


11.13

Prepare, glue to the first layer and weld to the base, a strip of membrane for the second layer, as shown by the figure.

11.14

Prepare a strip of membrane for the covering of the detail on the orthogonal side.



11.15

Trace the cut at the base of the embossment, in proximity of the diagonal line, stopping 2 cm before the corner.

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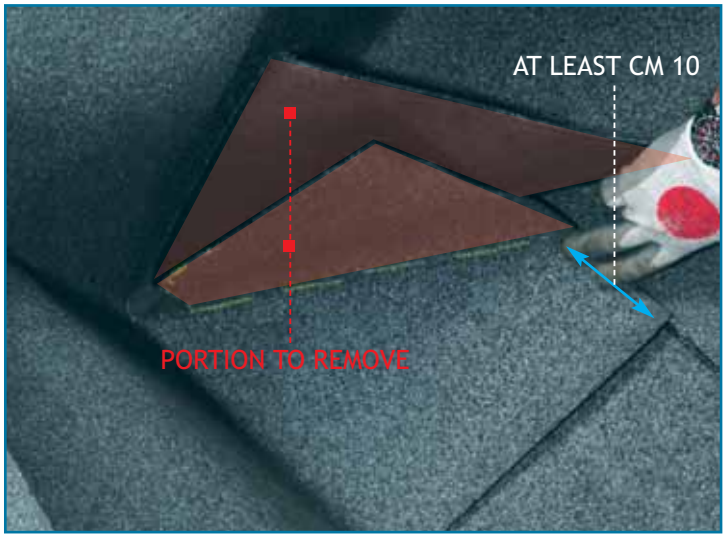

11.16

Make a first cut along the line you have traced and remove the triangular portions of the membrane as shown by the figure.

11.17

Cut the strip at the top of the embossment, as shown by the figure.

11.18

Make the connection and seal welds.

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11.19

Covering of the completed internal corner, apply the membrane on the remaining parts of the embossment.

IMPORTANT INSTRUCTIONS FOR LAYING THE *INTERNAL CORNER*

- Waterproofing of the vertical embossments must always be carried out in a double layer.
- The first layer must be fully bonded to the deck and primer applied if necessary.
- Any critical points must be sealed with bitumen prefabricated accessories, which are part of the Dermabit® FF Single-Ply system.
- Dermabit® FF Gluty must be used for the second protection layer. The 15 cm embossment on the plane permits welding with an automatic welder.
- When welding the membrane strips for the detail, these should be welded to the rest of the embossment, at a distance of at least 40 cm from the edge.
- The membrane laid on the horizontal plane should be secured to the base of the deck with safety mechanical fasteners.

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12. APPLYING THE PREFABRICATED DRAIN

12.1

Remove a circular portion from the membrane, with the same diameter as that of the prefabricated drain you are installing, in proximity of the drain pipe mouth. Secure with mechanical fasteners (flat plates).

12.2

Torch on the prefabricated element to a square portion of membrane, with sides having the same size as that indicated by the figure.
This should be prepared whenever possible with a propane torch, either at or off the worksite.

12.3

Place the piece prepared in the required position, round the four corners then mark in the overall sizes of the portion.

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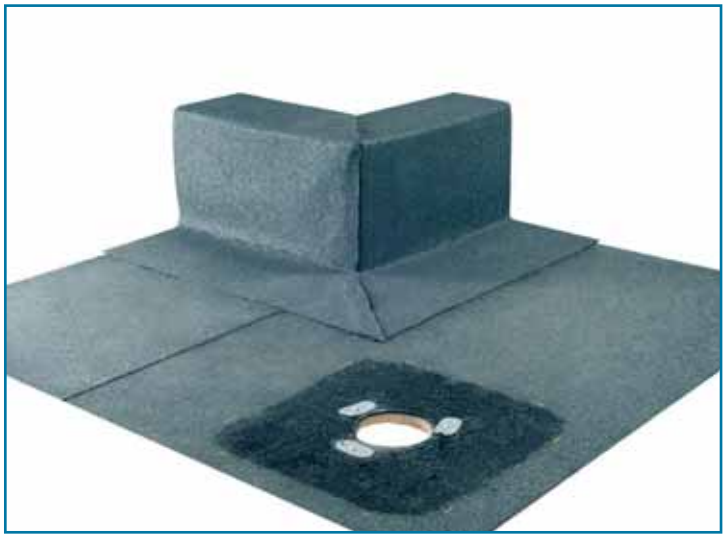
12.4

Remove the protection slate, heating the membrane with hot air (for Gluty and Fixus membranes).



12.5

Remove the completed slate.

12.6

Insert the piece and then: spot weld to secure it, and carry out a first internal sealing weld.

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12.7

Make the sealing weld.

12.8

Trim the weld along the internal edge of the trap, using a 40 mm nozzle and 20 mm roller.

12.9

Application is now complete.

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13. APPLICATION OF THE PREFABRICATED BREATHER VENT

13.1

Remove a circular portion from the membrane, with the same diameter as that of the prefabricated vent you are installing, in proximity of the drain pipe mouth. Secure with mechanical fasteners (flat plates).

13.2

Torch on the prefabricated element to a square portion of membrane, with sides having the same size as that indicated by the figure.
This should be prepared whenever possible with a propane torch, either at or off the worksite.

13.3

Remove the slate protection from the Dermabit® FF Single-Ply membrane, by heating it with hot air, from the surface on which the prepared piece is to be applied.

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13.4

Place the piece in position, pinning it to the membrane and make a first weld (remember to round the 4 corners of the square portion).

13.5

Complete the application by carrying out the external sealing weld.

13.6

Detail of the completed breather vent.

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14. PACKAGING, TRANSPORT AND STORAGE

THE PALLETS

Casali pallets have three different types of wrap:
a) for membranes:
- **Metal blue** shrink wrapped coextruded polyethylene exterior with white Casali brand
- **White** shrink wrapped coextruded polyethylene exterior with blue Casali brand

b) for thermal insulation:
- **Transparent white** with blue Casali brand

HANDLING THE PALLETS

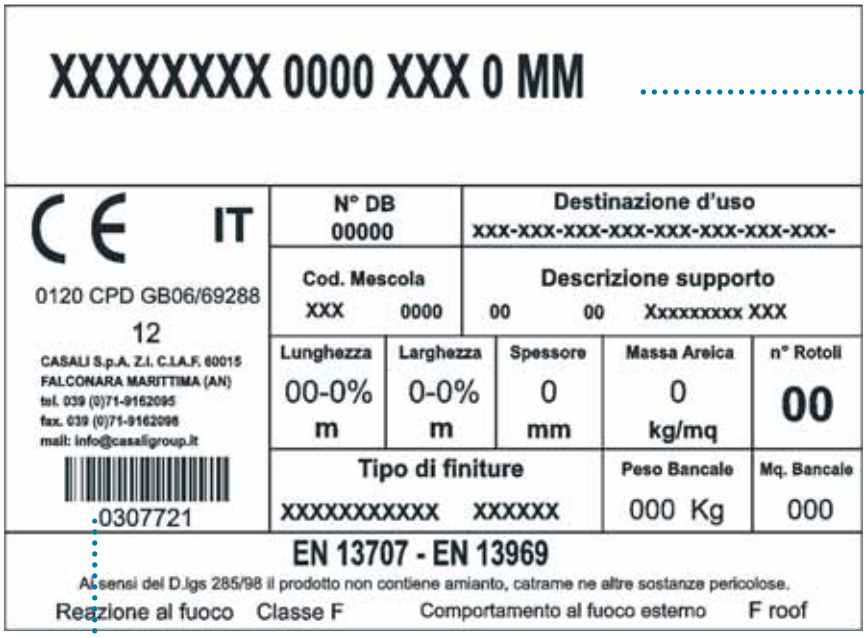
Packaging
Membranes are supplied in taped rolls packaged on pallets. The number of rolls per pallet varies according to the type, weight, thickness and length of the membrane, as indicated by the respective data sheets. The rolls are palletised upright and must remain in this position. Pallets are covered by a shrink wrapped polyethylene wrap which makes them suitable for transport.

Loading / Unloading
Pallets should be handled with appropriate means in upright position with the complete packaging. Individual rolls should be handled with care, without pressing, folding, cutting or jolting; cables should not be used for lifting.

Storage
Pallets should be stored in the warehouse or under roofing, and sheltered from uncontrolled low and high temperatures. This should also be done on the worksite to ensure the best climatic conditions for application. Do not stack rolls more than two high (one high in the case of slated or self-protected membranes in metal lamina and SBS) separating the two pallets with a dividing layer: this will ensure that the rolls underneath do not deform and the stack will be more stable. Loose rolls must be stored upright on a smooth surface.

Transport
During transport pallets must be perfectly secured and stable so as to prevent damage to third parties. Materials should be secured with protected transverse corner stops that do not leave marks on the membrane roll. Pallets should be secured in such a way as to avoid any cuts or jolting due to sudden braking, above all at critical temperature conditions. Rolls should be kept upright at all times during transport.

LABELS ON PALLETS AND ROLLS (facsimile)



identification number

A clear description of the product is given on the:
- pallet label
- roll label
- transport document (delivery note)
- price lists
- catalogues
- invoices
- conformity sheets

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PRODUCT AND PACKAGING TAPING

roll **gluty** | roll **fixus** | roll **liber**

upper tape Dermabit FF

centre tape Single-ply

bottom tape Gluty

bottom tape Fixus

bottom tape Liber

flame free

When applied, this logo indicates that the product may be used in all cases where a free flame may not be used during application (e.g. roofing installed with technologies involving the use of wood or insulation sensitive to combustion).

QUALITY SYSTEM

Casali S.p.A. has a Quality System that has been certified since 1996 in accordance with UNI EN ISO 9001:2000 standards. The system entails ongoing control of all the company processes, including design, production and commercial processes (through to pre and post-sales assistance).

The mixture of Casali's waterproofing membranes consists of distilled bitumen and resins of the finest quality, which has always distinguished the products of the company. Thanks to ongoing controls, in accordance with the standards of the UNI EN ISO 9001:2000 quality system, Casali S.p.A. guarantees that its products are free from manufacturing defects and ensures performance for 10 (ten) years provided the warranty conditions are complied with.

The products in the Dermabit® line, comply with the current CE marking standards and have been approved over the years by leading international organisations in the industry. These top of the range Casali membrane products are certified by the company under the Enduring Quality brand thanks to an operating life, in many cases, of more than thirty years, and tried and tested technical performance in different climatic conditions. Please contact Casali's technical office for any further information you may require or if you wish to view the certificates.

CE

Enduring Quality

DISCLAIMER: *the contents of these guidelines specifications are the result of Casali's many years of worksite and laboratory experience. The multi-year warranty will only be issued if works are carried out correctly and in compliance with the instructions provided by this document. The instructions given by way of example, by the DERMABIT® FF Single-Ply specifications, are intended as approximate and are not binding for access to the multi-year warranty, which is however subject to compliance with the Project specifications that give a detailed description of the procedures and individual interventions. The Project may be prepared directly by Casali S.p.A.'s Technical Office or, failing this, should be approved by the same.*
Casali reserves the right to modify and/or supplement the information provided herein without prior notice. Casali S.p.A. declines all and any liability should the DERMABIT® FF product not be applied in accordance with the instructions provided herein.
For further information please contact Casali's Technical Office.

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