

5

TECHNICAL MANUAL

SIPHONIC DRAINAGE SYSTEMS

Installation rules and instructions

MADE IN ITALY

valsir®

QUALITY FOR PLUMBING

5

INSTALLATION RULES AND INSTRUCTIONS

5 INSTALLATION RULES AND INSTRUCTIONS

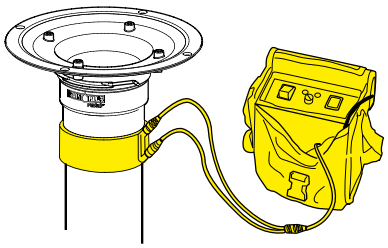
5.1 Roof outlets

Rainplus® roof outlets are particularly appreciated for their flexibility and adaptability to the main types of roofing that can be found in the building sector. Below are the installation instructions for the most common types of roofing; special installation cases not mentioned in this manual can be evaluated by contacting the Valsir technical office.

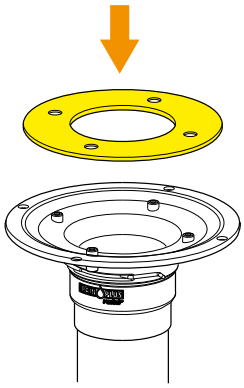
Below are reported the steps generally adopted for the installation and waterproofing of roofs in combination with Valsir systems. The installation rules or instructions of suppliers or manufacturers of gutters and membranes must always be considered.

5.1.1 Rainplus® 110 with 320x320 mm plate - installation in gutter by rivets

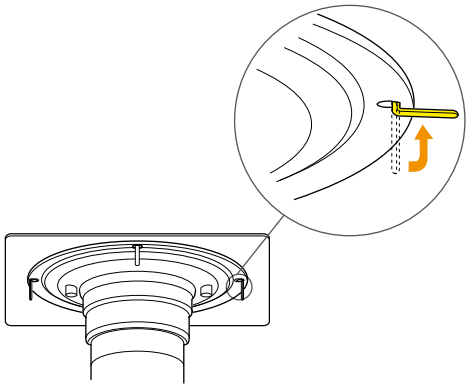
Installation indications



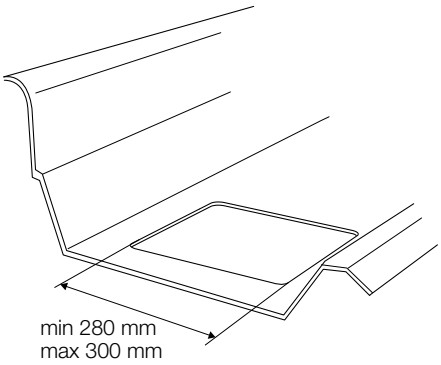
1) Weld to the HDPE connection socket, located below the outlet, a pipe section made of the same material. The diameter and length of this section must be as per design.



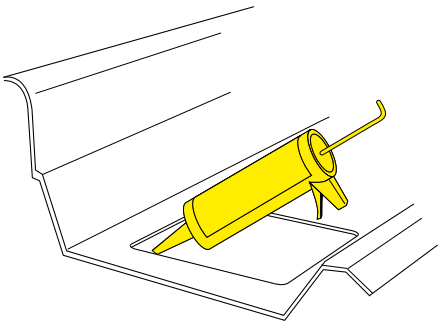
2) Insert the gasket on top of the outlet body.



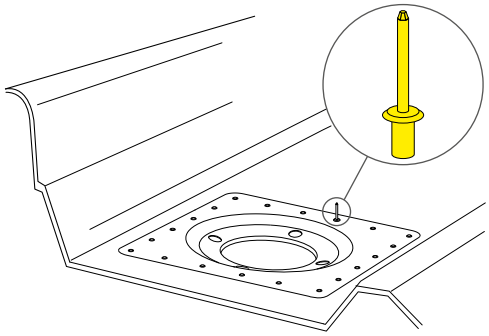
3) Open the "flaps" located under the plate, insert them into the appropriate holes on the body of the outlet and then fold them.



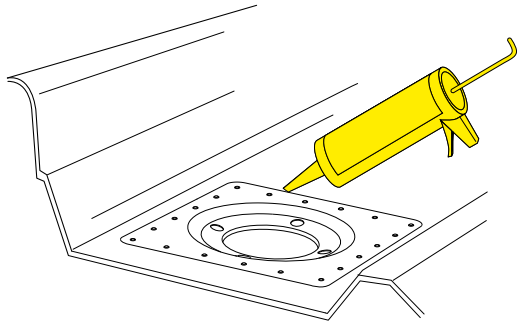
4) Create a through-hole inside the gutter.



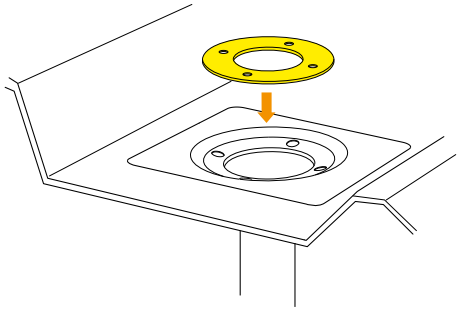
5) Apply specific mastic around the hole made in the gutter.



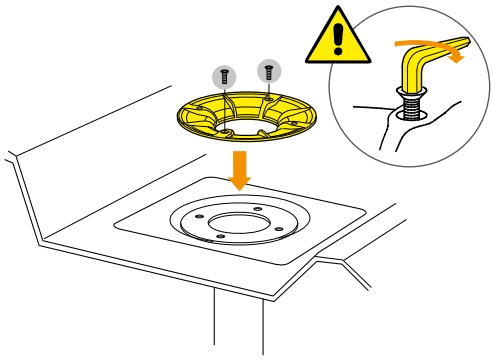
6) Position the plate so that the pipe section attached to it fits into the hole created earlier. Secure the plate to the gutter using rivets.



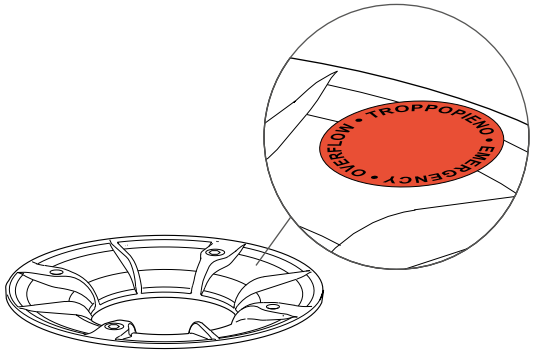
7) Apply specific mastic between plate and gutter.



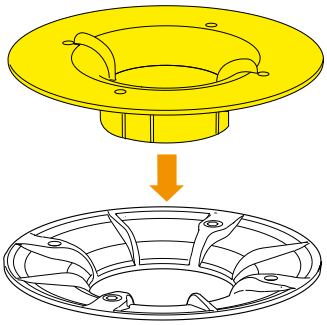
8) Insert the second gasket on top of the plate.



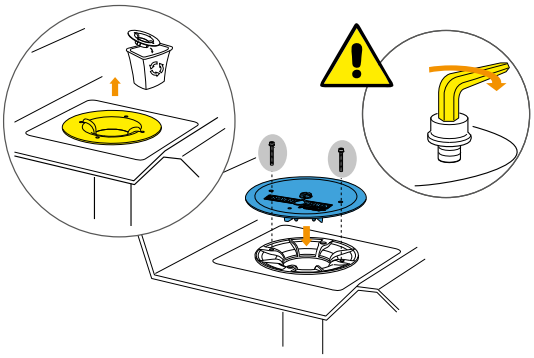
9) Place the flange over the second gasket and tighten the two tapered head screws.



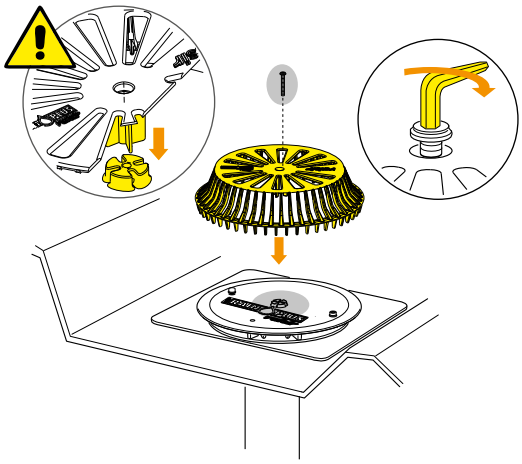
10) In case of a special outlet for the emergency system, apply the red "overflow" identification sticker.



11) If necessary, during the construction phase, install the yellow protective cap to prevent dirt from entering the system.



12) Before operating the system, remove the yellow cap and place the blue anti-vortex plate in the appropriate seat and tighten using the special screws.



13) Align the cross on the leaf guard with the seat on the top of the anti-vortex plate, press the guard so that the fastening teeth lock onto the plate and secure the guard with the suitable screw.

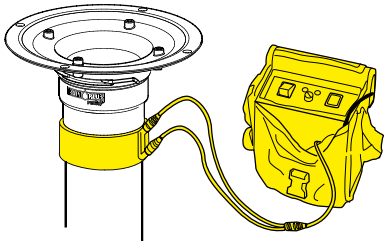
5.1.2 Rainplus® 110 with 320x320 mm plate - installation in gutter by welding

Installation indications

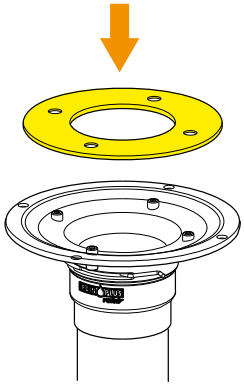


WARNING!

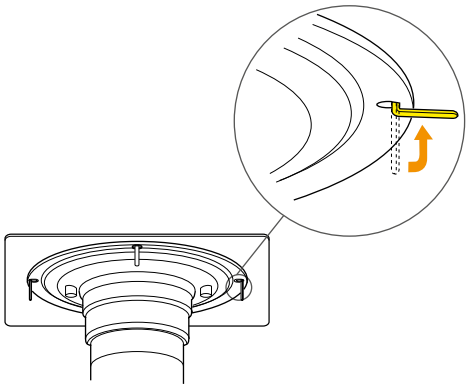
1) Before proceeding with the following instruction, check with the supplier of the gutter that its characteristics allow it to be welded to an AISI 304 stainless steel plate.



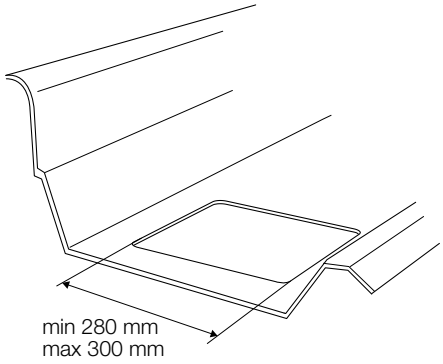
2) Weld to the HDPE connection socket, located below the outlet, a pipe section made of the same material.
The diameter and length of this section must be as per design.



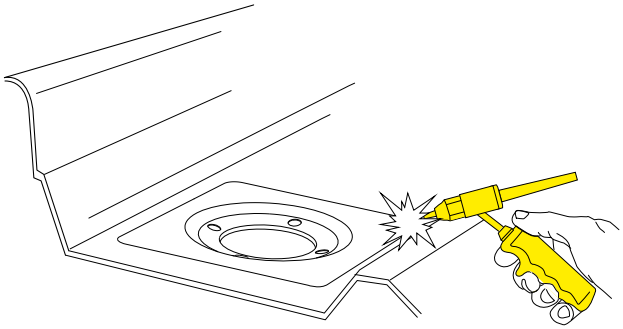
3) Insert the gasket on top of the outlet body.



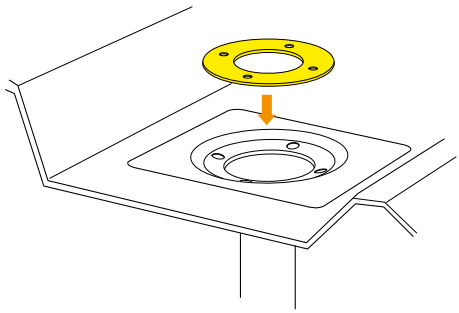
4) Open the "flaps" located under the plate, insert them into the appropriate holes on the body of the outlet and then fold them.



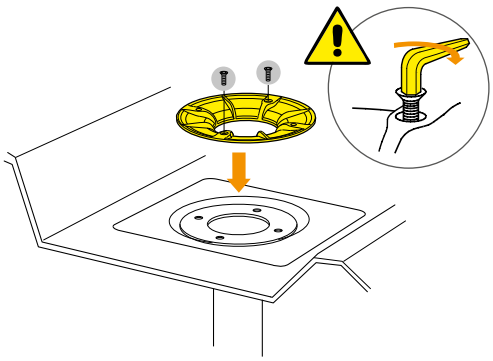
5) Create a through-hole inside the gutter.



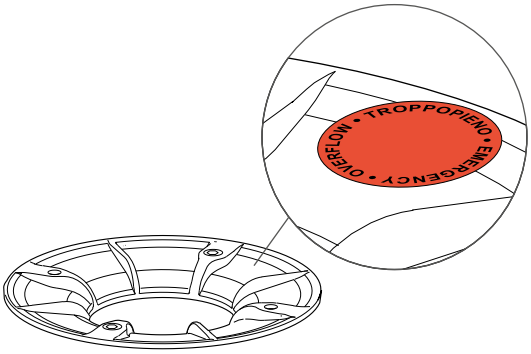
6) Position the plate so that the pipe section attached to it fits into the hole created earlier. Secure the plate to the gutter by welding.



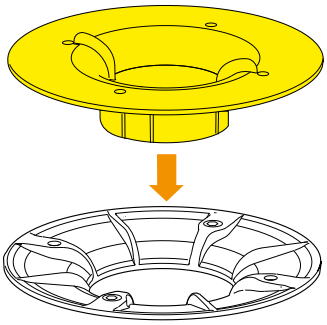
7) Insert the second gasket on top of the plate.



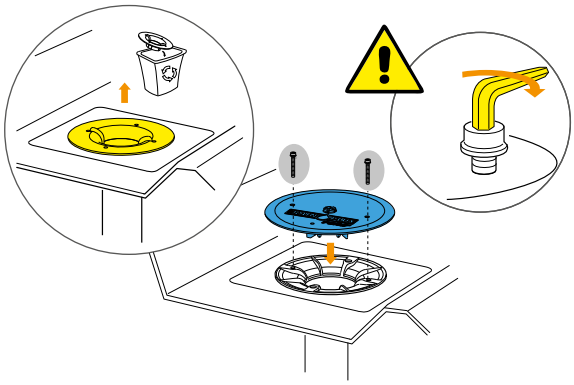
8) Place the flange over the second gasket and tighten the two tapered head screws.



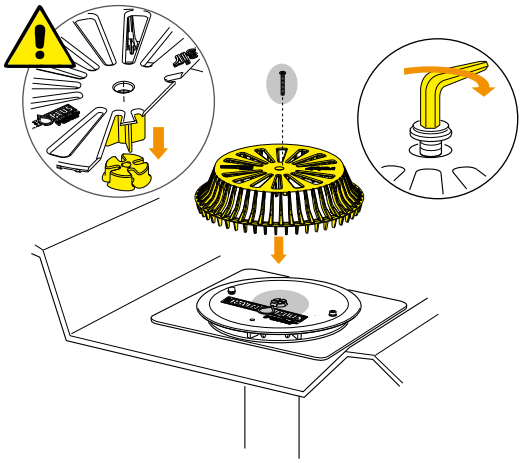
9) In case of a special outlet for the emergency system, apply the red "overflow" identification sticker.



10) If necessary, during the construction phase, install the yellow protective cap to prevent dirt from entering the system.



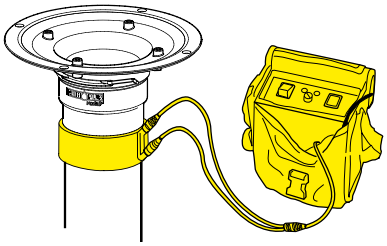
11) Before operating the system, remove the yellow cap and place the blue anti-vortex plate in the appropriate seat and tighten using the special screws.



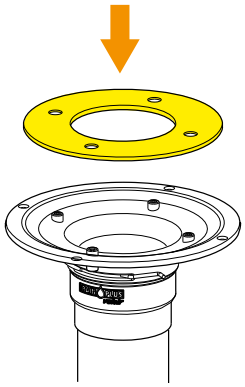
12) Align the cross on the leaf guard with the seat on the top of the anti-vortex plate, press the guard so that the fastening teeth lock onto the plate and secure the guard with the suitable screw.

5.1.3 Rainplus® 110 with 520x520 mm plate - installation on roof waterproofed with bituminous welded membrane (thickness between 2 mm and 8 mm)

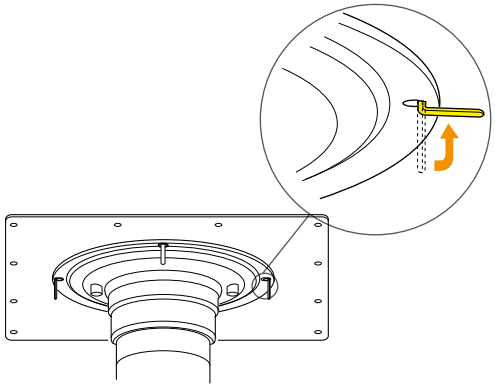
Installation indications



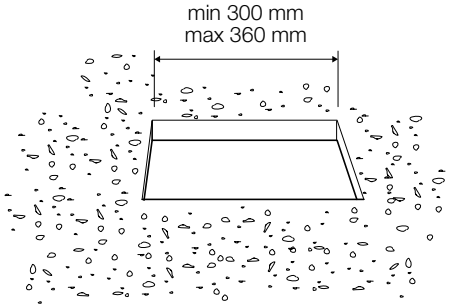
1) Weld to the HDPE connection socket, located below the outlet, a pipe section made of the same material.
The diameter and length of this section must be as per design.



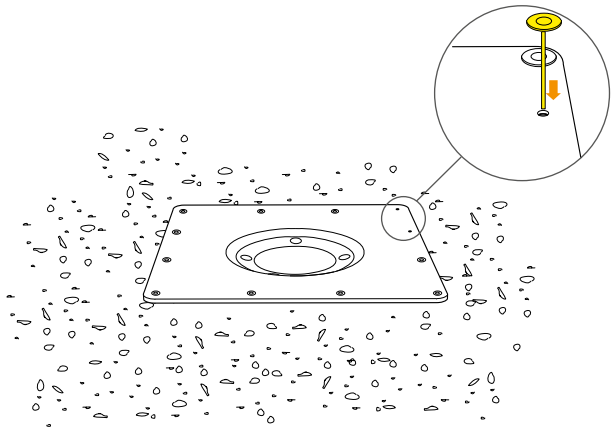
2) Insert the gasket on top of the outlet body.



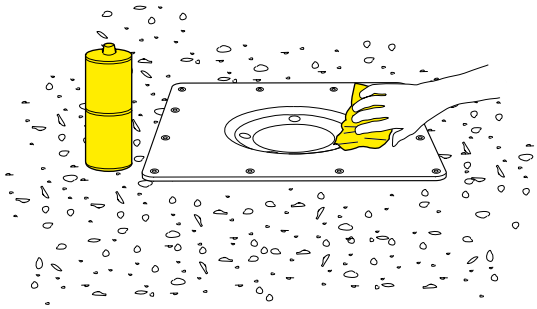
3) Open the "flaps" located under the plate, insert them into the appropriate holes on the body of the outlet and then fold them.



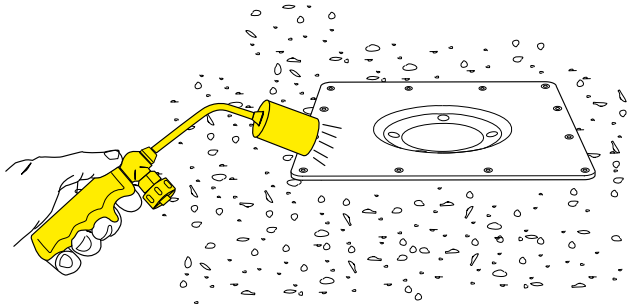
4) Create a through-hole on the roof.



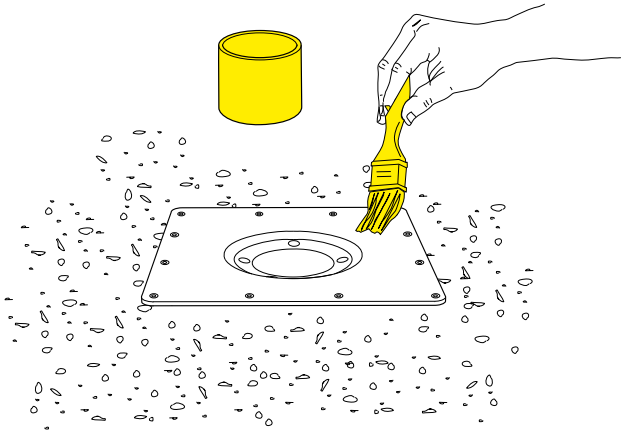
5) Position the plate so that the pipe section attached to it fits into the hole created in the roof. Secure the plate to the roof using rivets or other fasteners so that the plate cannot move.



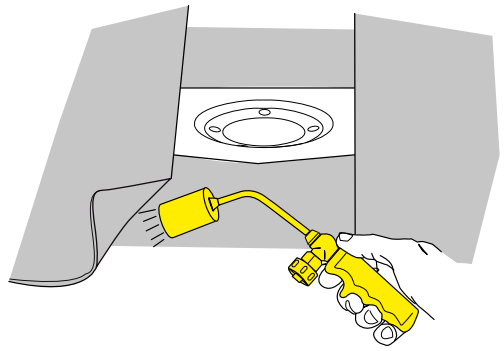
6) Clean the plate with appropriate products.



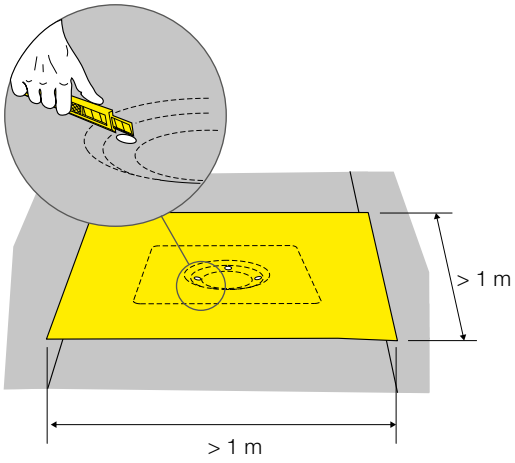
7) Heat the plate with a blowtorch.



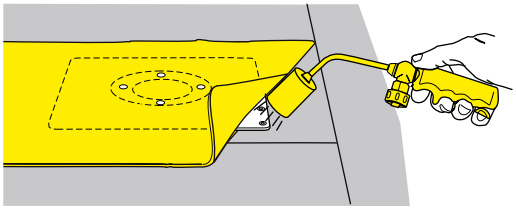
8) Apply bituminous membrane primer to the plate.



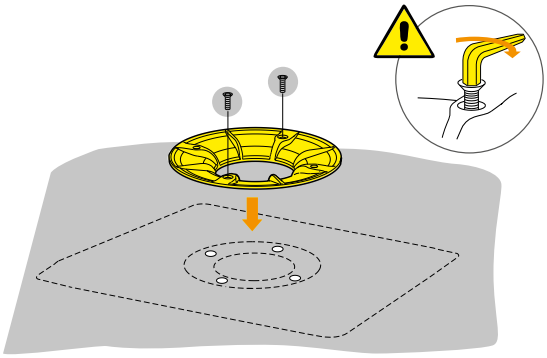
9) Make the membrane adhere on the metal plate up to a distance of about 15÷20 cm from the axis of the outlet, heating the plate lower surface with a blowtorch.



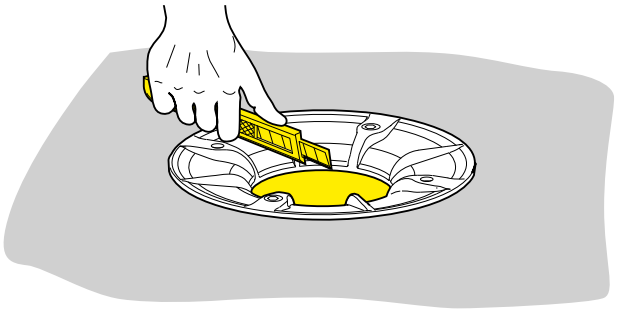
10) Cut a minimum 1x1 m portion of the membrane. Use the second gasket supplied as a reference to mark the four through-holes of screws and cut where marked.



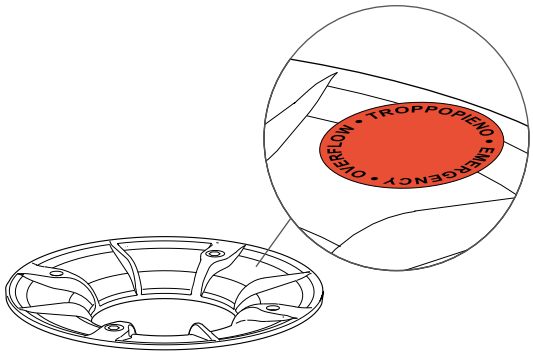
11) Position the portion of membrane previously cut using the holes made and heat its lower surface with a blowtorch so that it adheres to the plate and the membrane previously applied.



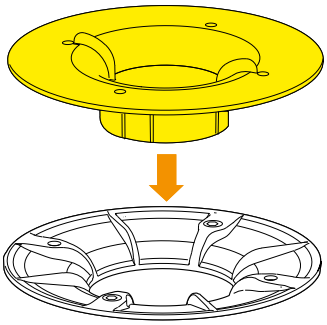
12) Position the flange and tighten the two tapered head screws while the membrane is still hot.



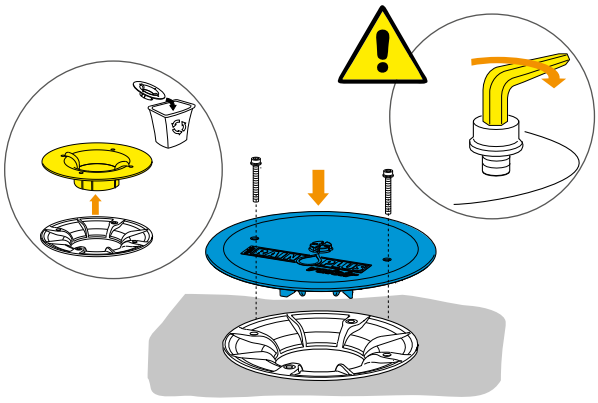
13) Cut the portion of membrane at the centre of the flange and remove it.



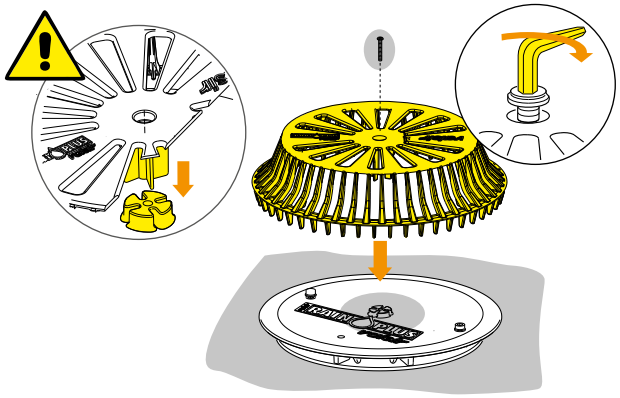
14) In case of a special outlet for the emergency system, apply the red "overflow" identification sticker.



15) If necessary, during the construction phase, install the yellow protective cap to prevent dirt from entering the system.



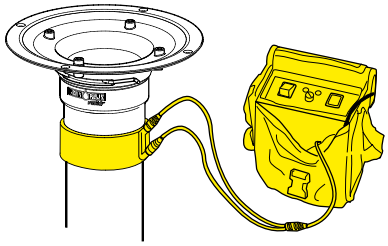
16) Before operating the system, remove the yellow cap and place the blue anti-vortex plate in the appropriate seat and tighten using the special screws.



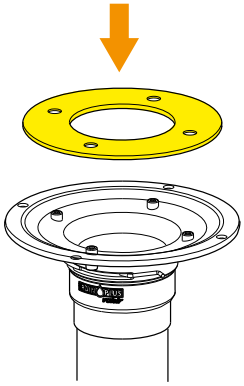
17) Align the cross on the leaf guard with the seat on the top of the anti-vortex plate, press the guard so that the fastening teeth lock onto the plate and secure the guard with the suitable screw.

5.1.4 Rainplus® 110 with 520x520 mm pre-drilled plate - installation on roof waterproofed with bituminous welded membrane (thickness between 2 mm and 8 mm)

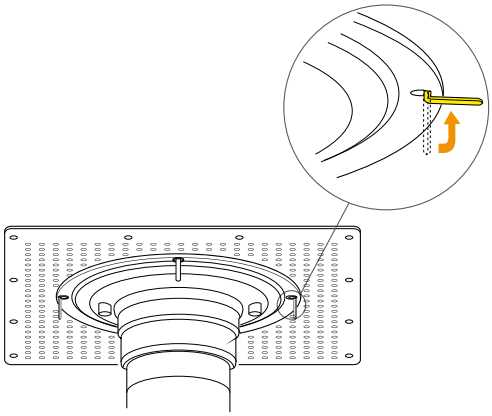
Installation indications



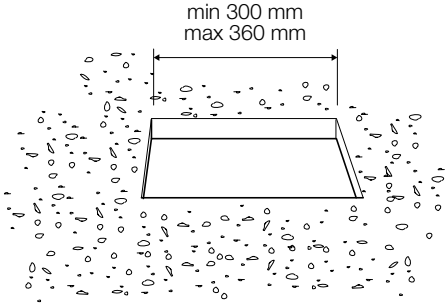
1) Weld to the HDPE connection socket, located below the outlet, a pipe section made of the same material.
The diameter and length of this section must be as per design.



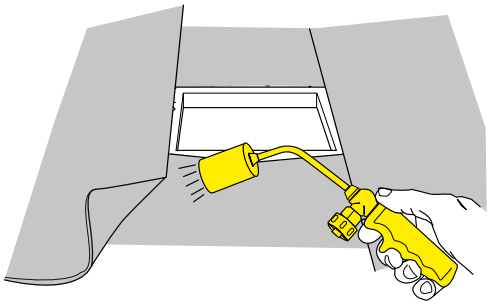
2) Insert the gasket on top of the outlet body.



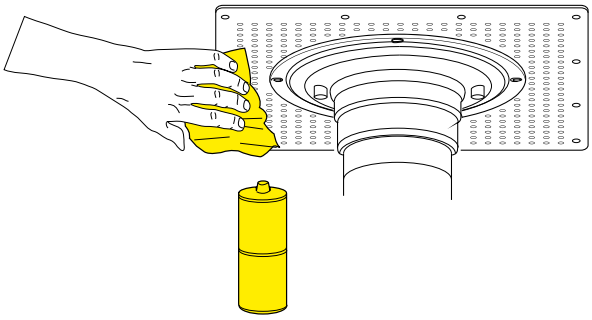
3) Open the "flaps" located under the plate, insert them into the appropriate holes on the body of the outlet and then fold them.



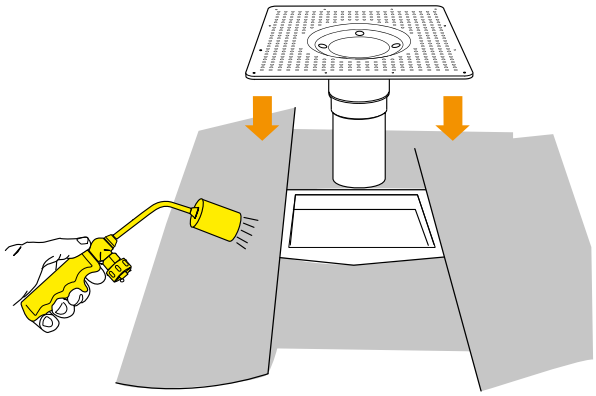
4) Create a through-hole on the roof.



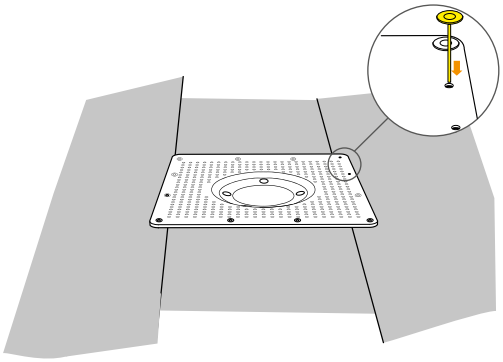
5) Lay the membrane so that it reaches the edges of the hole previously made.



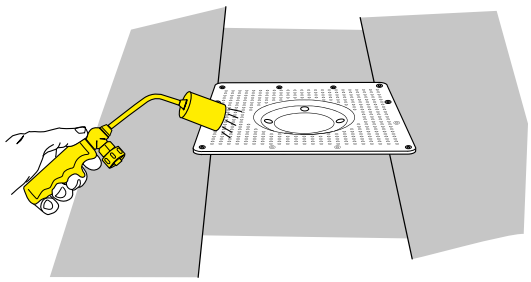
6) Clean the plate with appropriate products.



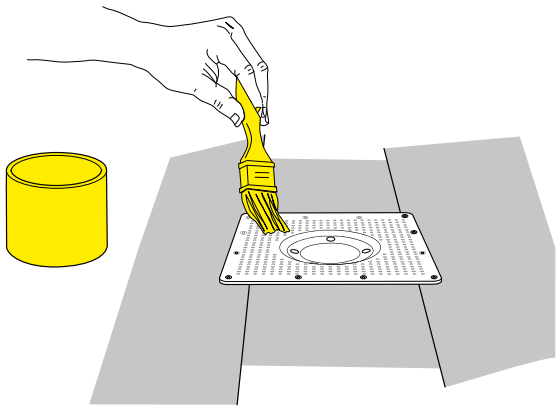
7) Using a blowtorch, heat the top surface of the membrane near the hole and make the plate adhere to the membrane.



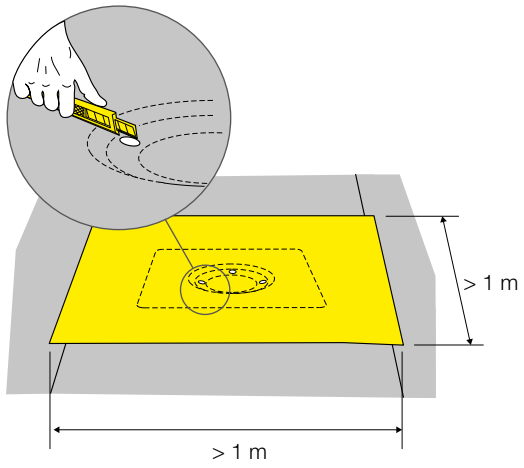
8) Secure the plate to the roof using rivets or other fasteners so that the plate cannot move.



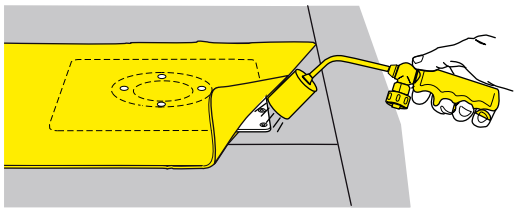
9) Heat the plate with a blowtorch.



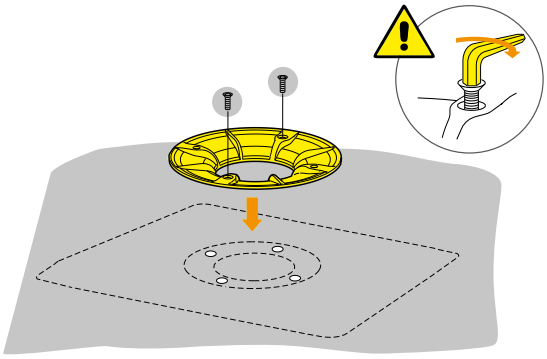
10) Apply bituminous membrane primer to the plate.



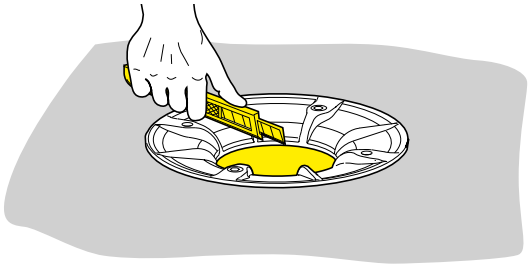
11) Cut a minimum 1x1 m portion of the membrane. Use the second gasket supplied as a reference to mark the four through-holes of screws and cut where marked.



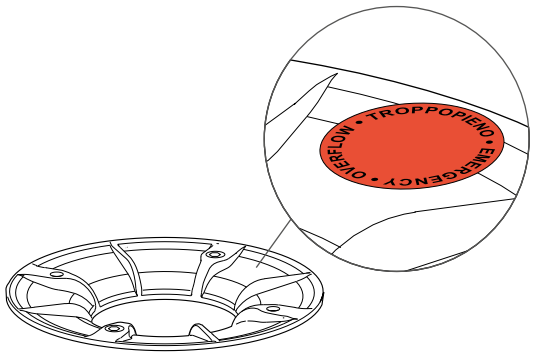
12) Position the portion of membrane previously cut using the holes made and heat its lower surface with a blowtorch so that it adheres to the plate and the membrane previously applied.



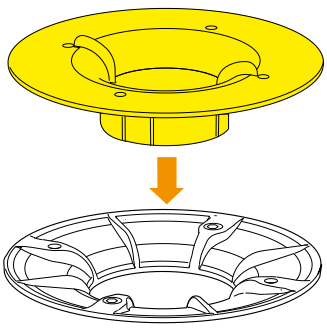
13) Position the flange and tighten the two tapered head screws while the membrane is still hot.



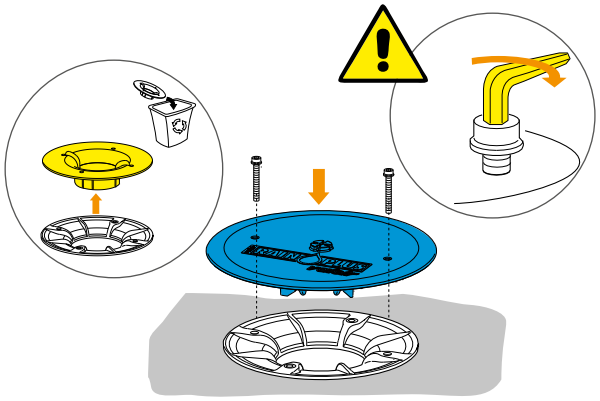
14) Cut the portion of membrane at the centre of the flange and remove it.



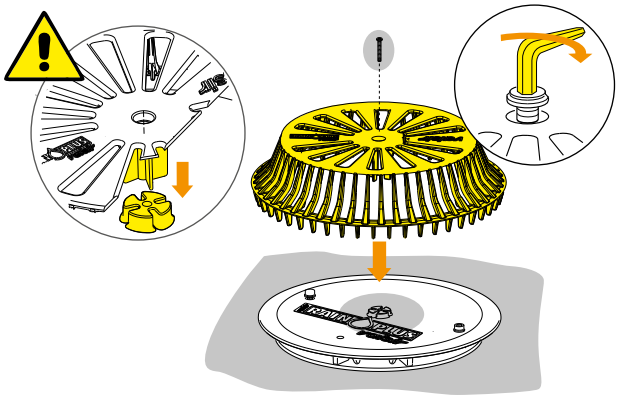
15) In case of a special outlet for the emergency system, apply the red "overflow" identification sticker.



16) If necessary, during the construction phase, install the yellow protective cap to prevent dirt from entering the system.



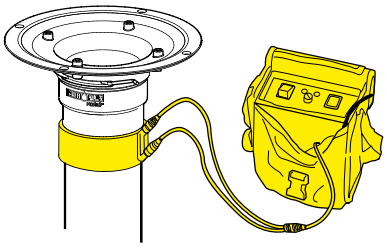
17) Before operating the system, remove the yellow cap and place the blue anti-vortex plate in the appropriate seat and tighten using the special screws.



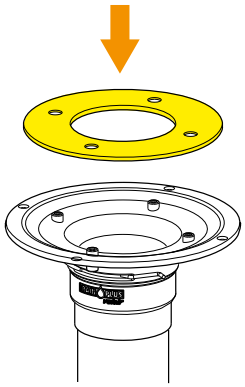
18) Align the cross on the leaf guard with the seat on the top of the anti-vortex plate, press the guard so that the fastening teeth lock onto the plate and secure the guard with the suitable screw.

5.1.5 Rainplus® 110 with 520x520 mm plate - installation on roof waterproofed with non-bituminous welded membrane (e.g.: TPO synthetic membranes)

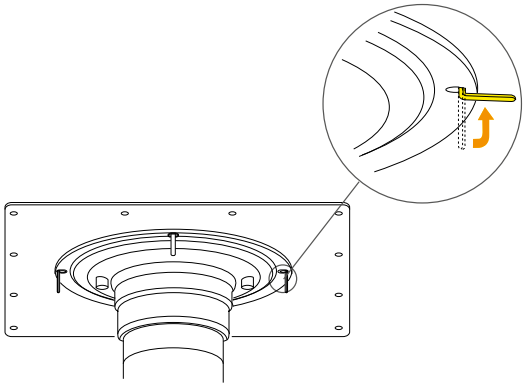
Installation indications



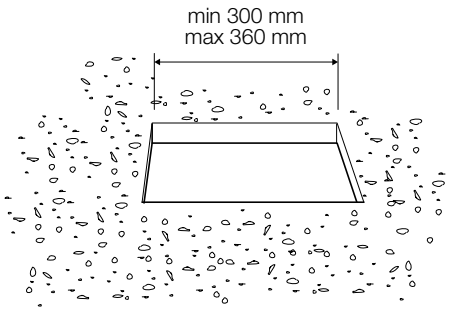
1) Weld to the HDPE connection socket, located below the outlet, a pipe section made of the same material.
The diameter and length of this section must be as per design.



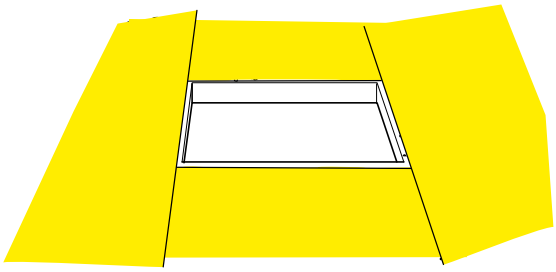
2) Insert the gasket on top of the outlet body.



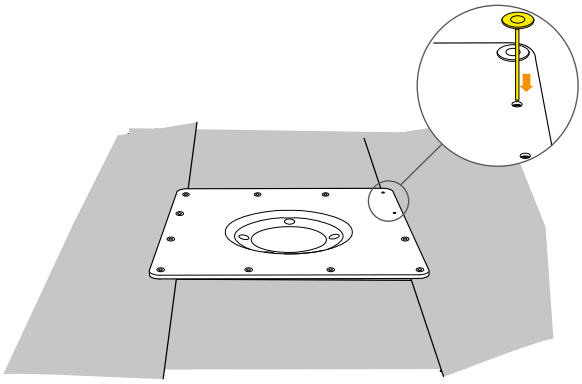
3) Open the "flaps" located under the plate, insert them into the appropriate holes on the body of the outlet and then fold them.



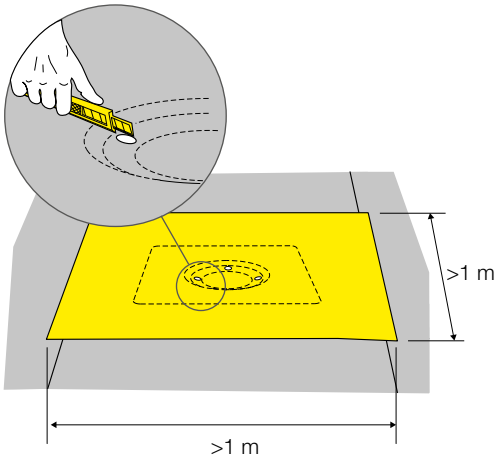
4) Create a through-hole on the roof.



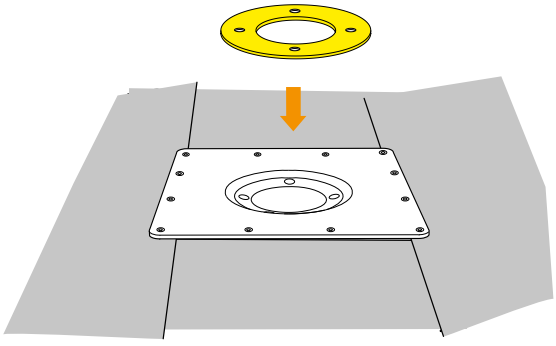
5) Lay the membrane so that it reaches the edges of the hole previously made.



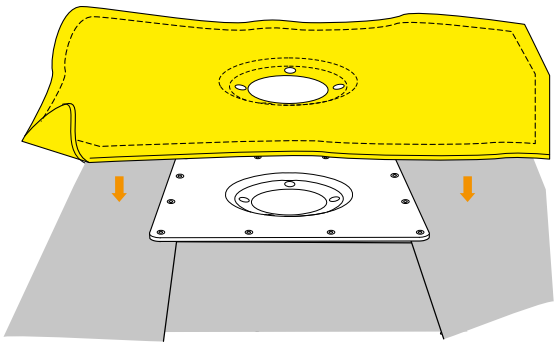
6) Position the plate so that the pipe section attached to it fits into the hole created in the roof. Secure the plate to the roof using rivets or other fasteners so that the plate cannot move.



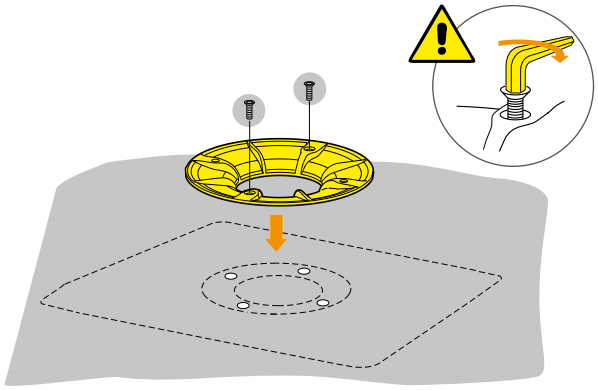
7) Cut a minimum 1x1 m portion of the membrane. Use the second gasket supplied as a reference to mark the four through-holes of screws and cut where marked.



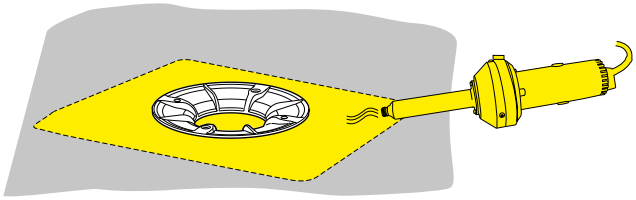
8) The mechanical sealing provided by the compression of the flange is guaranteed for membrane thickness values between 2 mm and 8 mm.
If a waterproofing membrane of lower thickness or a particularly rigid membrane is used, place the second gasket supplied with the plate in the relevant seat.



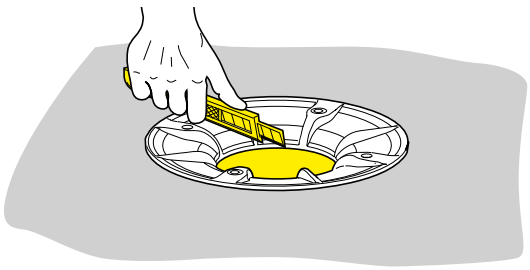
9) Position the previously cut portion of the membrane using the holes made.



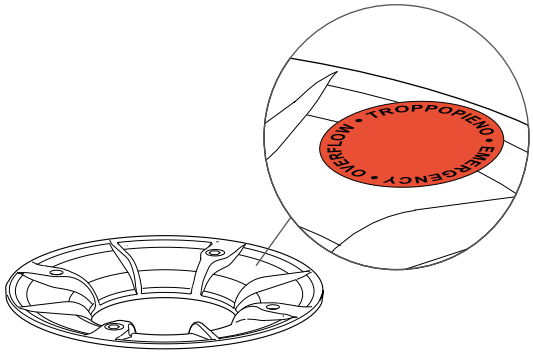
10) Place the flange and tighten the two tapered head screws.



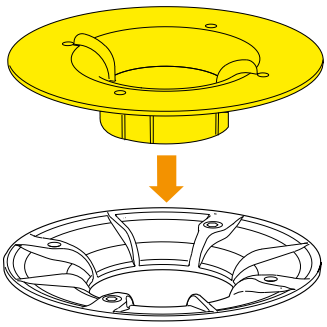
11) Using the suitable equipment, fasten the portion of membrane to the membrane previously laid on the roof.



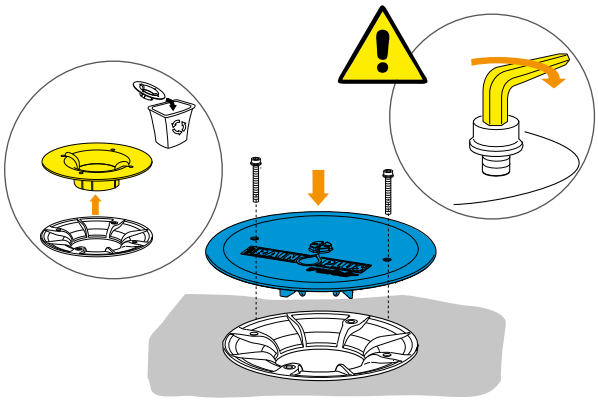
12) Cut the portion of membrane at the centre of the flange and remove it.



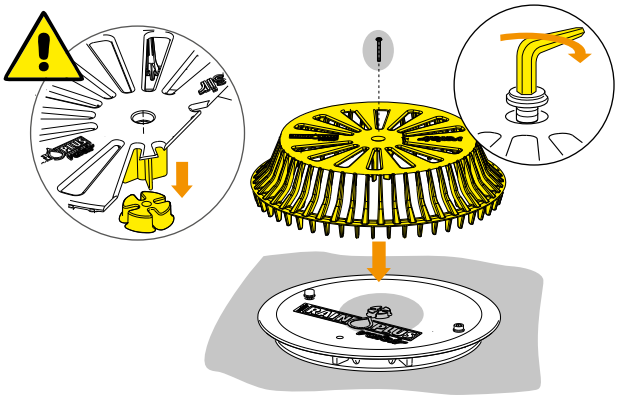
13) In case of a special outlet for the emergency system, apply the red "overflow" identification sticker.



14) If necessary, during the construction phase, install the yellow protective cap to prevent dirt from entering the system.



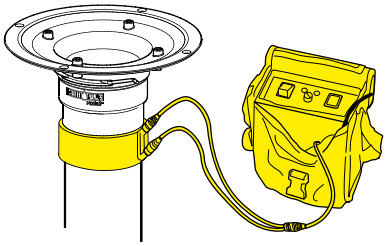
15) Before operating the system, remove the yellow cap and place the blue anti-vortex plate in the appropriate seat and tighten using the special screws.



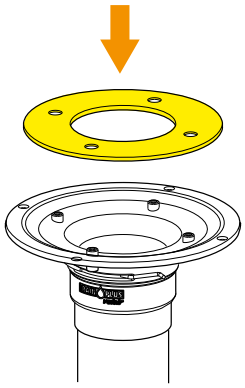
16) Align the cross on the leaf guard with the seat on the top of the anti-vortex plate, press the guard so that the fastening teeth lock onto the plate and secure the guard with the suitable screw.

5.1.6 Rainplus® 110 with 520x520 mm plate - installation on roof waterproofed with adhesive membrane

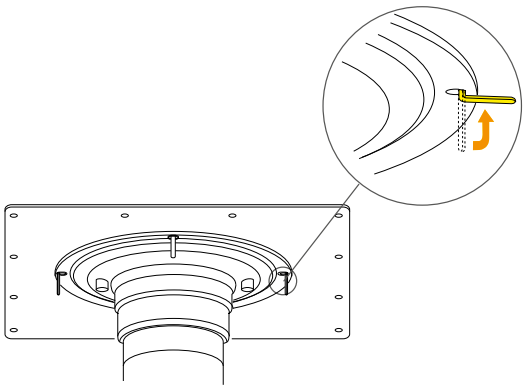
Installation indications



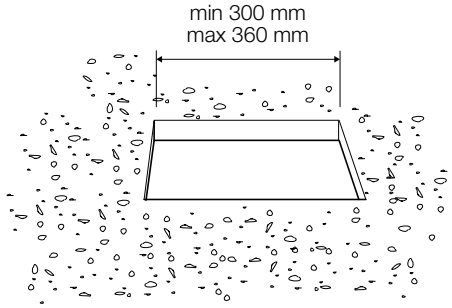
1) Weld to the HDPE connection socket, located below the outlet, a pipe section made of the same material.
The diameter and length of this section must be as per design.



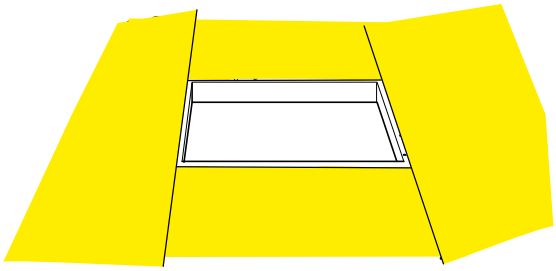
2) Insert the gasket on top of the outlet body.



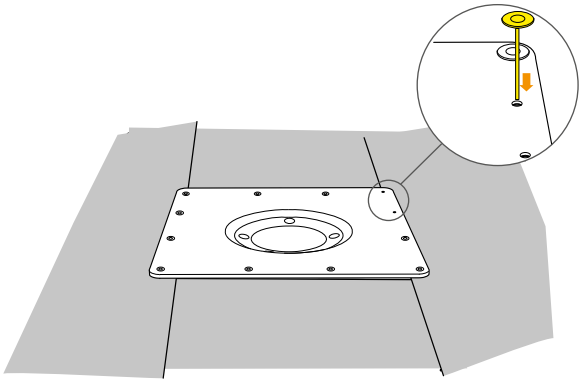
3) Open the "flaps" located under the plate, insert them into the appropriate holes on the body of the outlet and then fold them.



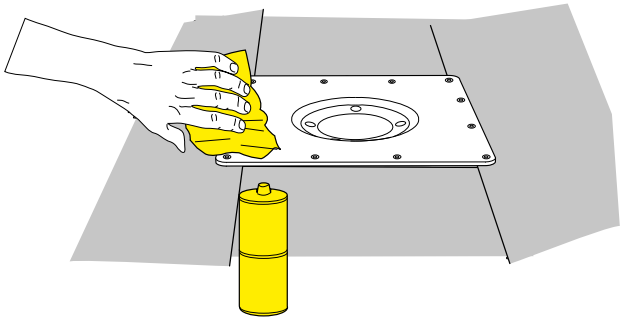
4) Create a through-hole on the roof.



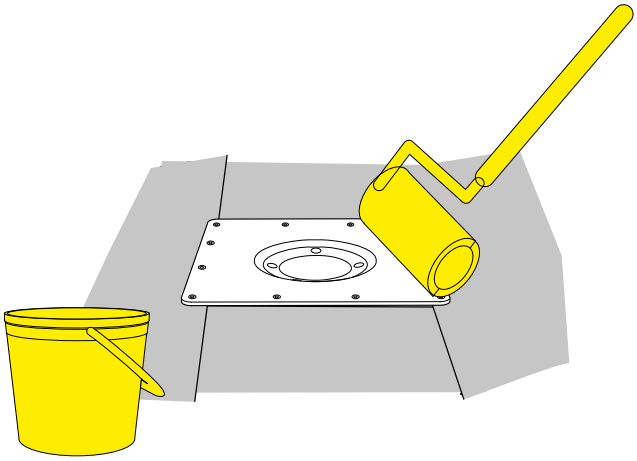
5) Lay the membrane so that it reaches the edges of the hole previously made.



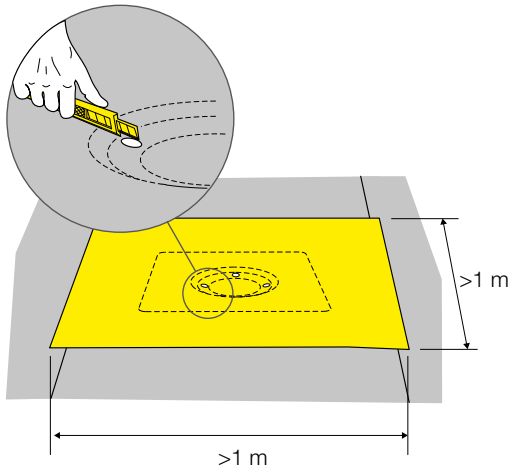
6) Position the plate so that the pipe section attached to it fits into the hole created in the roof. Secure the plate to the roof using rivets or other fasteners so that the plate cannot move.



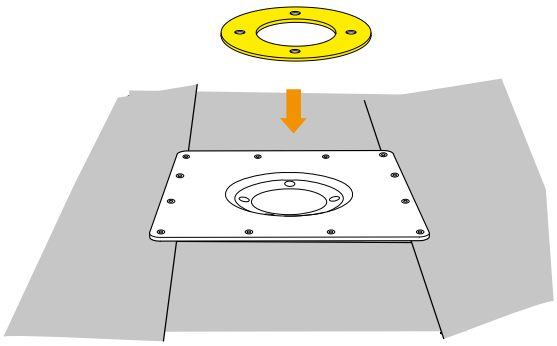
7) Clean the plate with appropriate products.



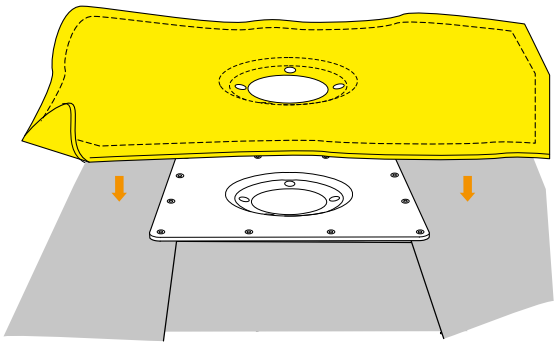
8) Apply the appropriate adhesive specified by the membrane manufacturer to the surface of the plate.



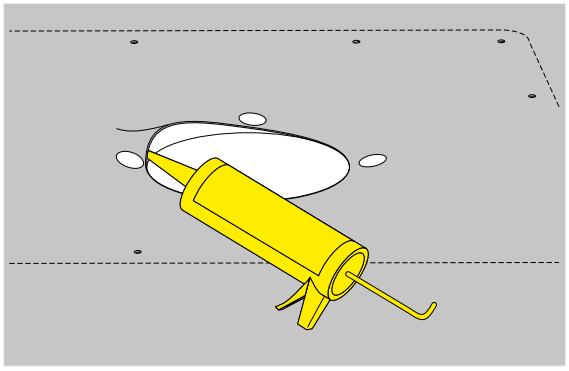
9) Cut a minimum 1 x 1 m portion of the membrane. Use the second gasket supplied as a reference to mark the four through-holes of screws and the central hole, cut where marked.



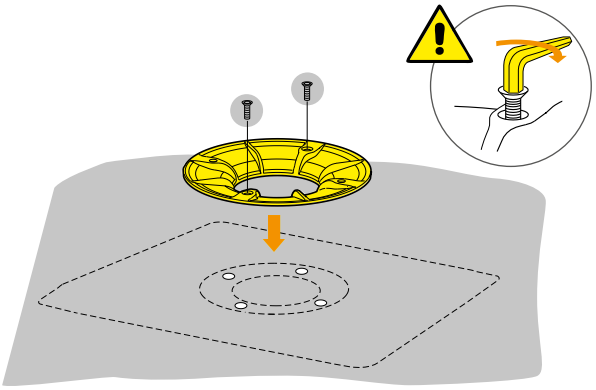
10) The mechanical sealing provided by the compression of the flange is guaranteed for membrane thickness values between 2 mm and 8 mm. If a waterproofing membrane of lower thickness or a particularly rigid membrane is used, place the second gasket supplied with the plate in the relevant seat.



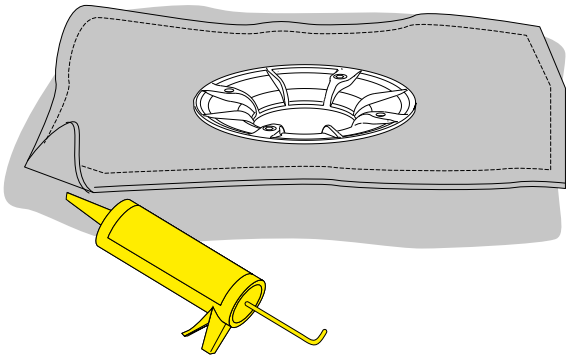
11) Position the previously cut portion of the membrane using the holes made.



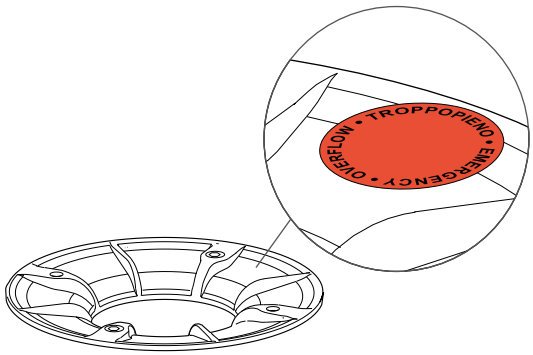
12) Apply specific mastic around the coupling hole between the membrane and the body of the outlet.



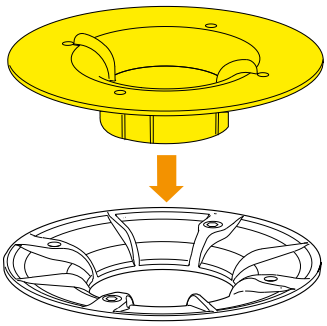
13) Place the flange and tighten the two tapered head screws.



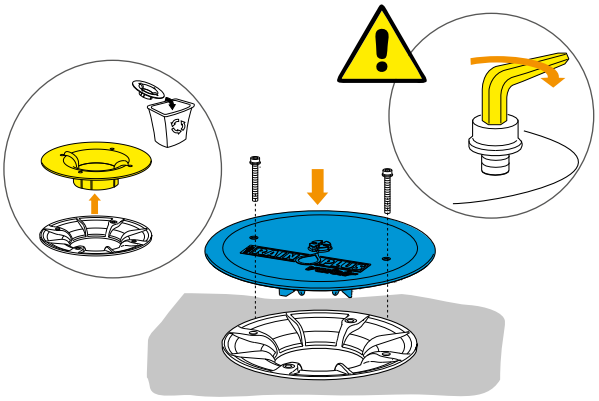
14) Using the suitable adhesive, fasten the portion of membrane to the membrane previously laid on the roof.



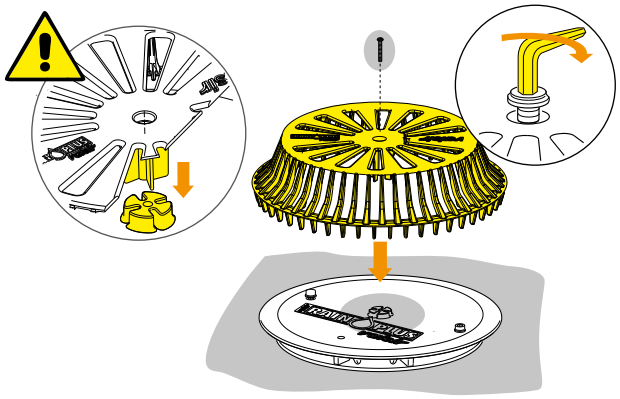
15) In case of a special outlet for the emergency system, apply the red "overflow" identification sticker.



16) If necessary, during the construction phase, install the yellow protective cap to prevent dirt from entering the system.



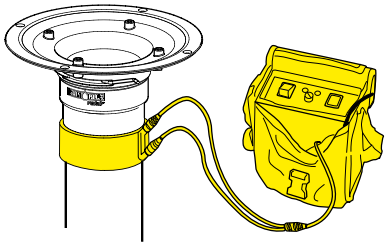
17) Before operating the system, remove the yellow cap and place the blue anti-vortex plate in the appropriate seat and tighten using the special screws.



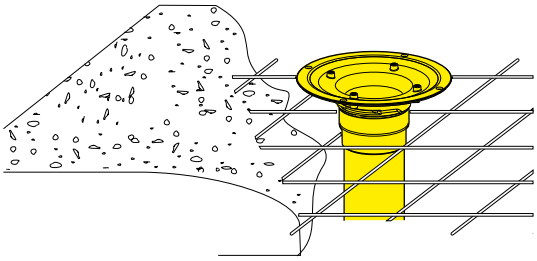
18) Align the cross on the leaf guard with the seat on the top of the anti-vortex plate, press the guard so that the fastening teeth lock onto the plate and secure the guard with the suitable screw.

5.1.7 Rainplus® 110 - installation with concrete casting with bituminous welded membrane (thickness between 2 mm and 8 mm)

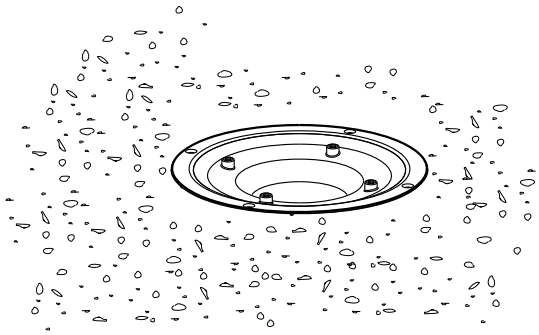
Installation indications



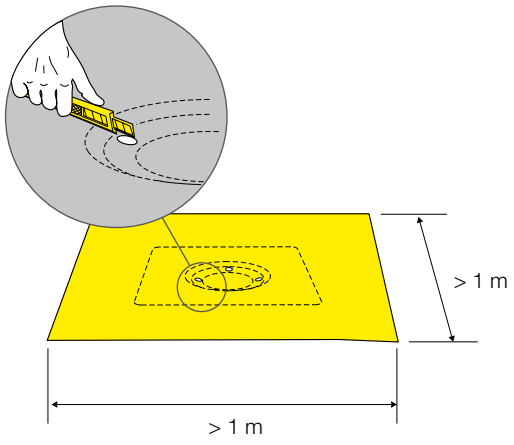
1) Weld to the HDPE connection socket, located below the outlet, a pipe section made of the same material.
The diameter and length of this section must be as per design.



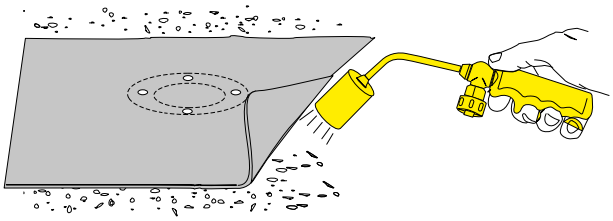
2) Place the outlet and keep it fixed in the desired position during the concrete casting phase in order to avoid possible movements. Protect the top of the outlet during this step.



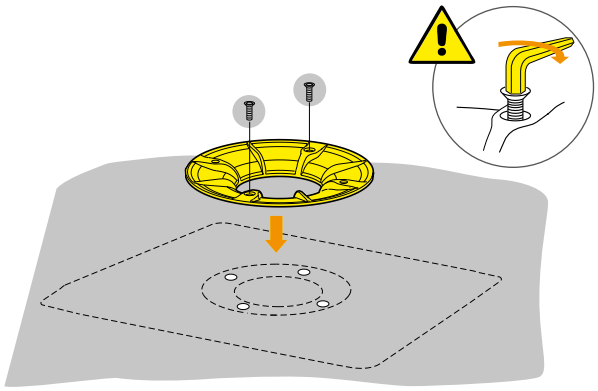
3) Once the concrete has been cast, wait for its hardening.



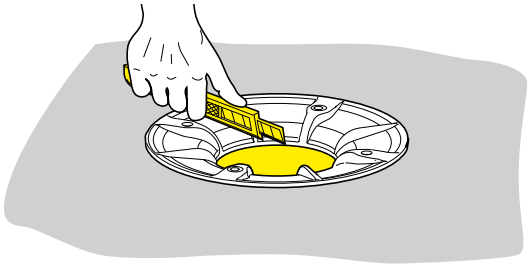
4) Cut a minimum 1x1 m portion of the membrane.
Use the flange supplied as a reference to mark the four through-holes of screws and cut where marked.



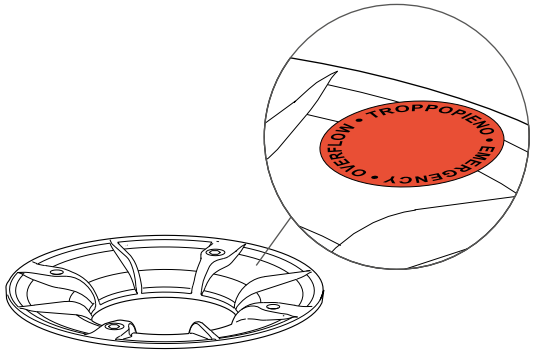
5) Position the portion of membrane previously cut using the holes made and heat its lower surface with a blowtorch so that it adheres to the outlet body and to the roof.



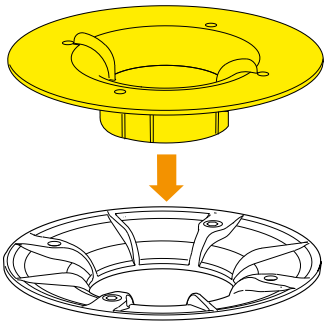
6) Position the flange and tighten the two tapered head screws while the membrane is still hot.



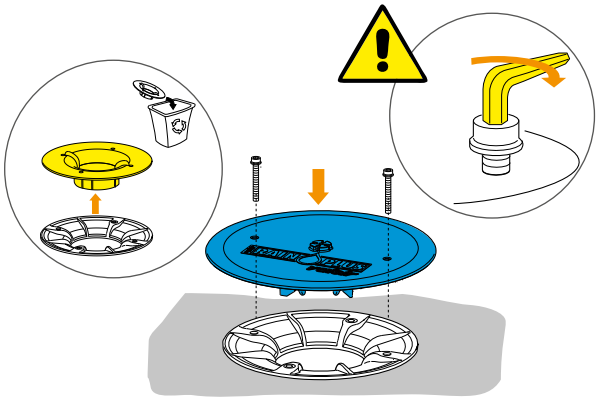
7) Cut the portion of membrane at the centre of the flange and remove it.



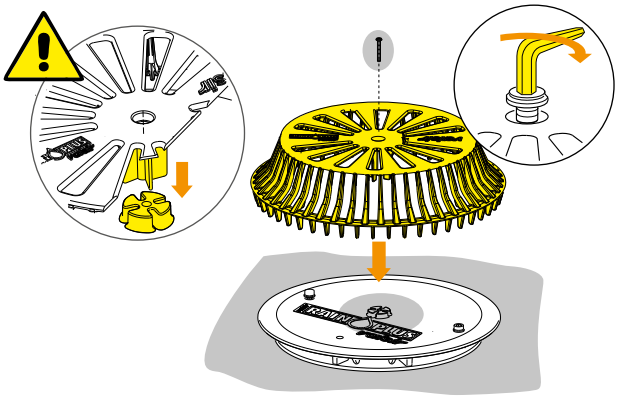
8) In case of a special outlet for the emergency system, apply the red "overflow" identification sticker.



9) If necessary, during the construction phase, install the yellow protective cap to prevent dirt from entering the system.



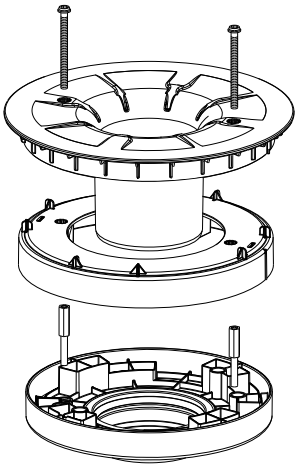
10) Before operating the system, remove the yellow cap and place the blue anti-vortex plate in the appropriate seat and tighten using the special screws.



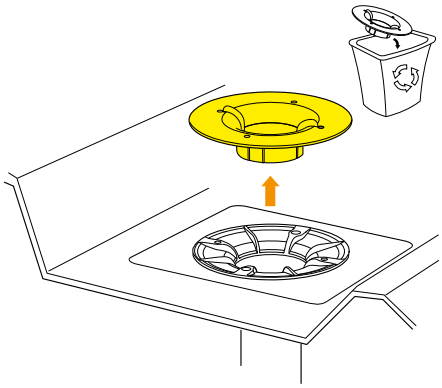
11) Align the cross on the leaf guard with the seat on the top of the anti-vortex plate, press the guard so that the fastening teeth lock onto the plate and secure the guard with the suitable screw.

5.1.8 Rainplus® 110 - Overflow Kit installation

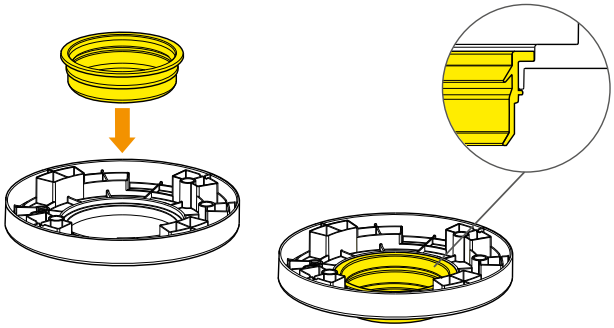
Installation indications



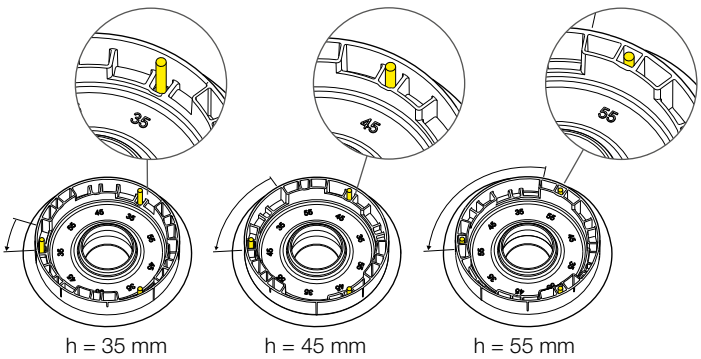
1) The Overflow Kit consists of three main elements: the lower part, the central spacer (to be used only in case the required overflow height is higher than 55 mm) and the upper part.



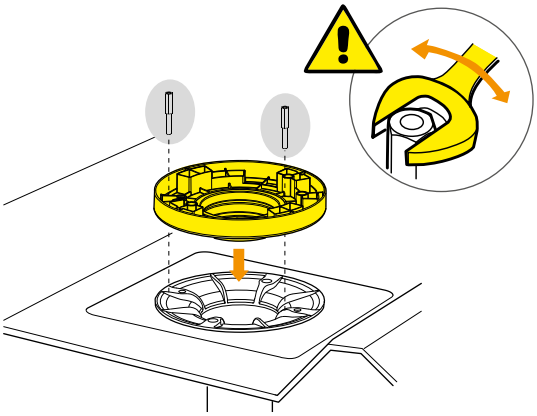
2) To install the Overflow Kit, start at the point where the flange has already been installed.
If present, remove the yellow protective cap.



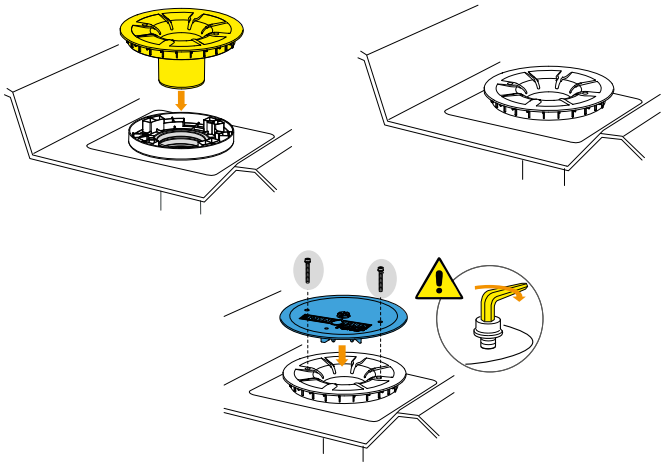
3) Insert the gasket into the central seat of the lower part of the Overflow Kit.



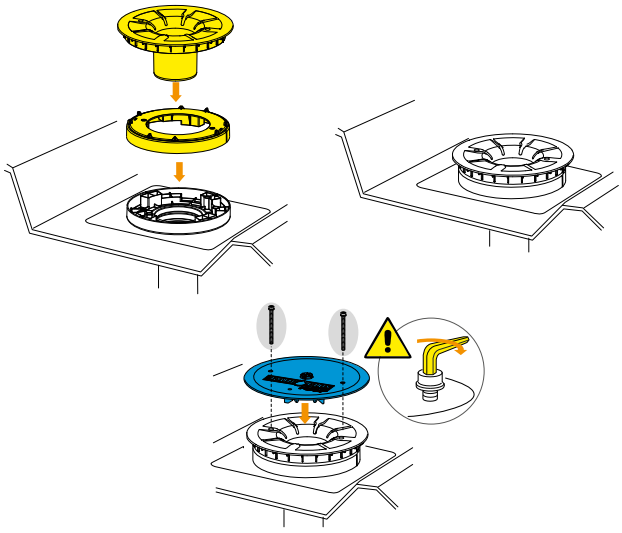
4) Based on the design overflow height, insert the two stud bolts inside the two holes present in the lower part of the kit, using the number indicated next to them to identify the correct holes.



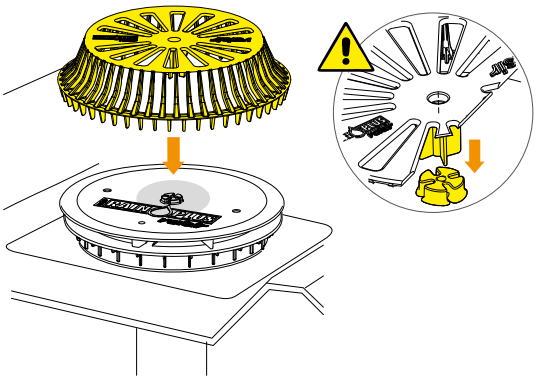
5) Place the lower part of the kit on the flange by aligning the relative holes and tighten the two stud bolts.



6a) In case of required overflow height of 35 mm, 45 mm or 55 mm, install the upper part of the Overflow Kit on the lower part, mount the anti-vortex plate aligning the holes, insert and tighten the two screws.



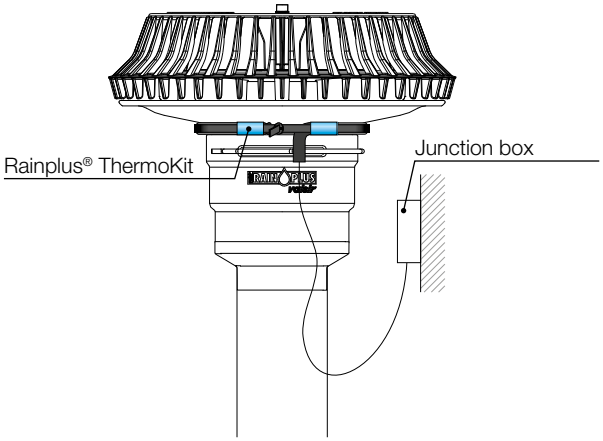
6b) In case of required overflow height of 65 mm, 75 mm or 85 mm, install the upper part of the kit on the lower part interposing the spacer supplied, mount the anti-vortex plate, insert and tighten the two screws. Centre the holes to make operations easier during the different phases.



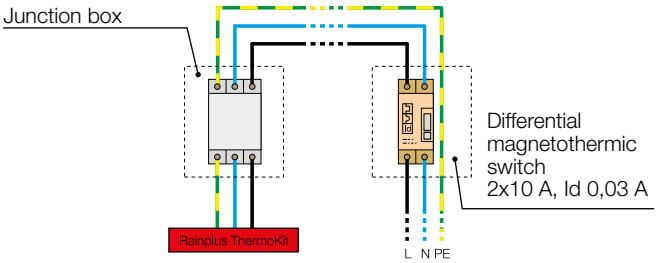
7) Align the cross on the leaf guard with the seat on the top of the anti-vortex plate, press the guard so that the fastening teeth lock onto the plate and secure the guard with the suitable screw.

5.1.9 Rainplus® 110 - ThermoKit installation

Installation indications



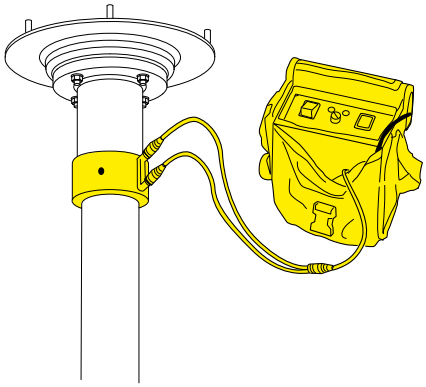
Installation
Wrap Rainplus® ThermoKit around the roof outlet over the junction area with the polyethylene socket and tighten the (long) locking clamp. The power cable must be pointing downward and the flat portion of the Rainplus® ThermoKit heating cable must adhere evenly to the surface of the outlet body.



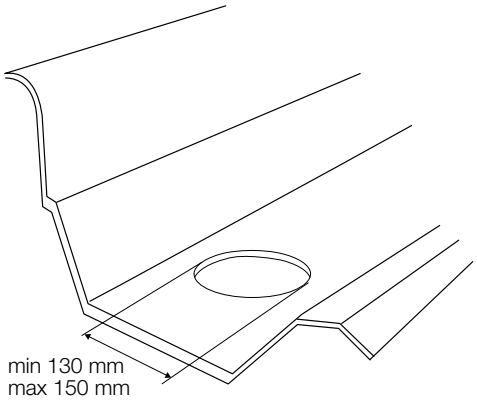
Electrical connection
Wiring must be carried out by a specialist using a protection system consisting of a differential magnetothermic switch Id=0.03 A.
The electrical connection must be made with protection degree IP65.
The use of a manual switch or thermostat is required for activation of the Rainplus® ThermoKit and subsequent deactivation during the warm season.

5.1.10 Rainplus® 56 with 180 mm diameter - installation in gutter by rivets

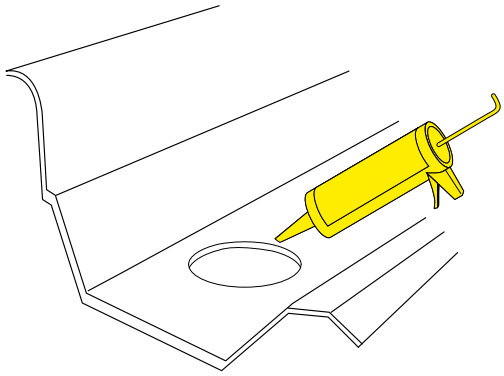
Installation indications



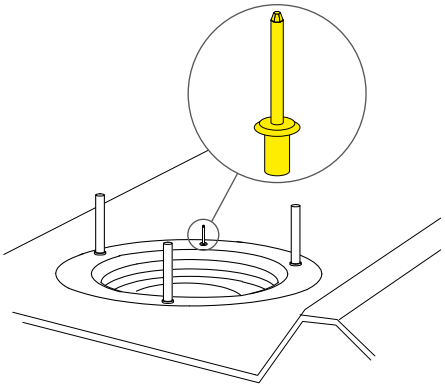
1) Weld to the HDPE connection socket, located below the outlet, a pipe section made of the same material.
The diameter and length of this section must be as per design.



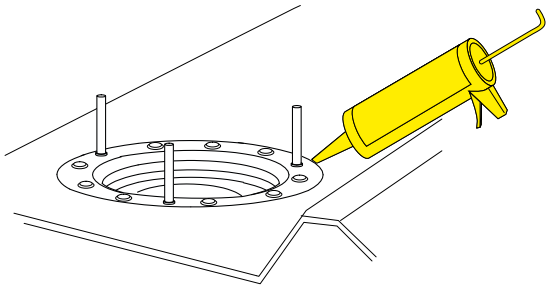
2) Create a through-hole inside the gutter.



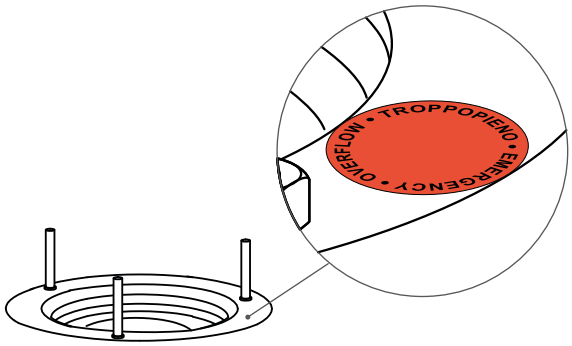
3) Apply specific mastic around the hole made in the gutter.



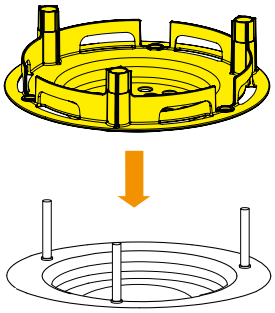
4) Position the outlet so that the pipe section attached to it fits into the hole created earlier. Fix the metal body of the outlet to the gutter using rivets.



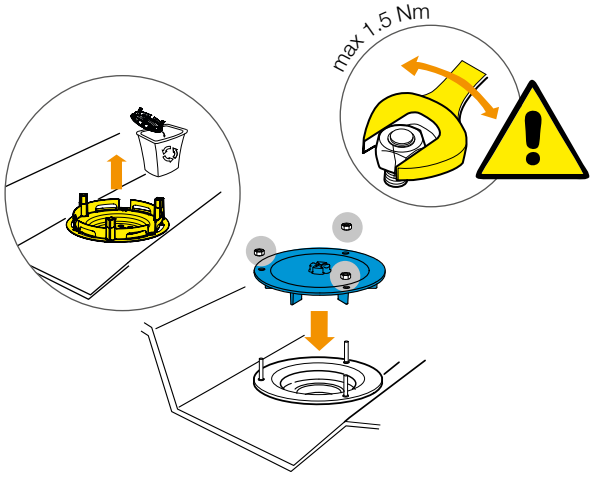
5) Apply specific mastic between the outlet metal body and the gutter.



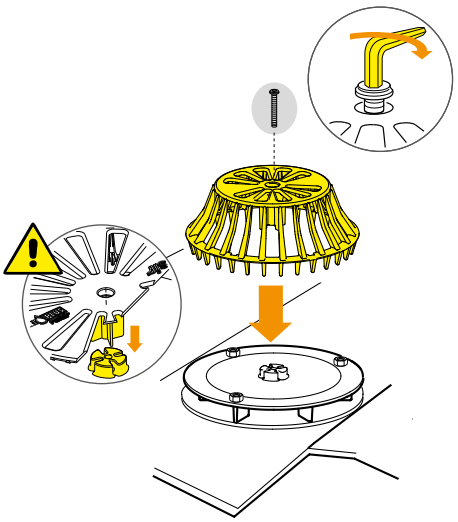
6) In case of a special outlet for the emergency system, apply the red "overflow" identification sticker.



7) If necessary, during the construction phase, install the yellow protective cap to prevent dirt from entering the system.



8) Before operating the system, remove the yellow cap and place the blue anti-vortex plate in the appropriate seat and tighten using the nuts supplied in the package. Maximum tightening torque for nuts equal to 1.5 Nm.



9) Align the cross on the leaf guard with the seat on the top of the anti-vortex plate, press the guard so that the fastening teeth lock onto the plate and secure the guard with the suitable screw.

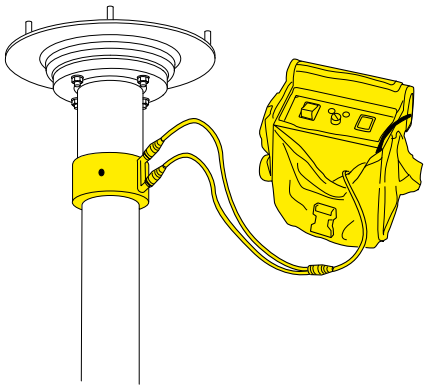
5.1.11 Rainplus® 56 with 180 mm diameter - installation in gutter by welding

Installation indications

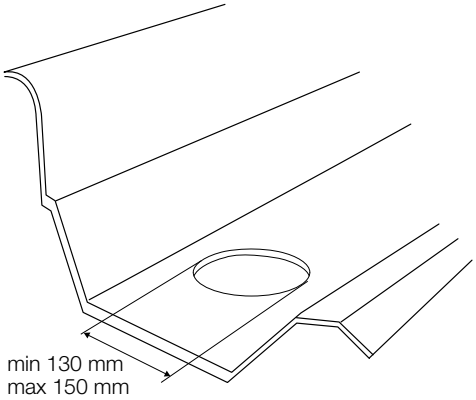


WARNING!

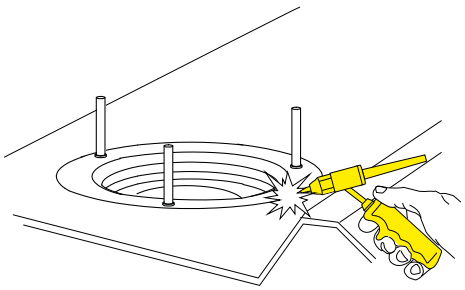
1) Before proceeding with the following instruction, check with the supplier of the gutter that its characteristics allow it to be welded to an AISI 304 stainless steel plate.



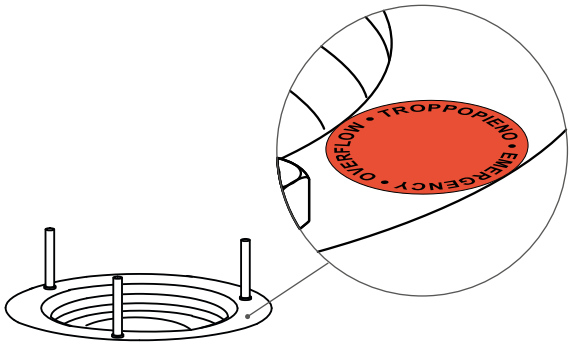
2) Weld to the HDPE connection socket, located below the outlet, a pipe section made of the same material.
The diameter and length of this section must be as per design.



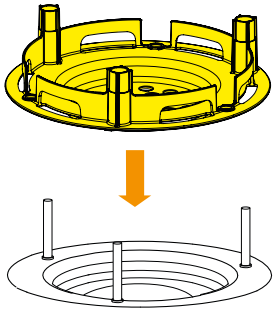
3) Create a through-hole inside the gutter.



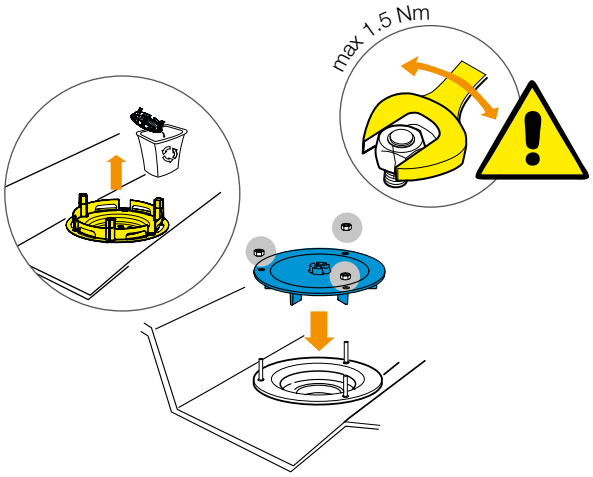
4) Position the outlet so that the pipe section attached to it fits into the hole created earlier. Fix the metal body of the outlet to the gutter by welding.



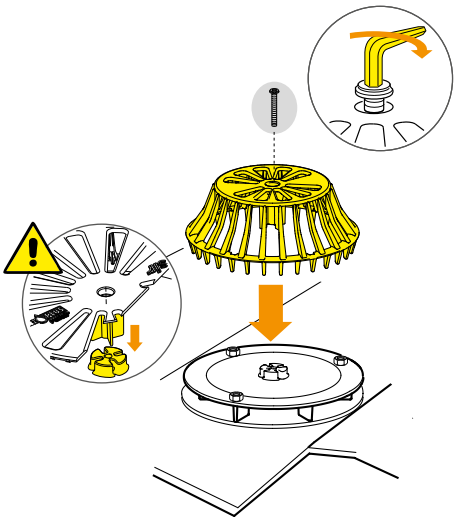
5) In case of a special outlet for the emergency system, apply the red "overflow" identification sticker.



6) If necessary, during the construction phase, install the yellow protective cap to prevent dirt from entering the system.



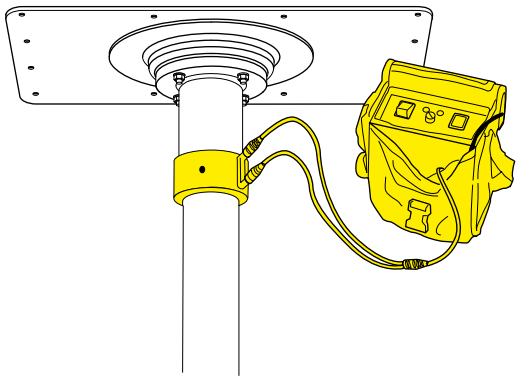
7) Before operating the system, remove the yellow cap and place the blue anti-vortex plate in the appropriate seat and tighten using the nuts supplied in the package. Maximum tightening torque for nuts equal to 1.5 Nm.



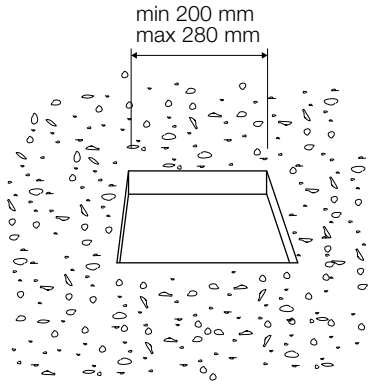
8) Align the cross on the leaf guard with the seat on the top of the anti-vortex plate, press the guard so that the fastening teeth locks onto the plate and secure the guard with the suitable screw.

5.1.12 Rainplus® 56 420x420 mm - installation on roof waterproofed with bituminous welded membrane (maximum thickness 4 mm)

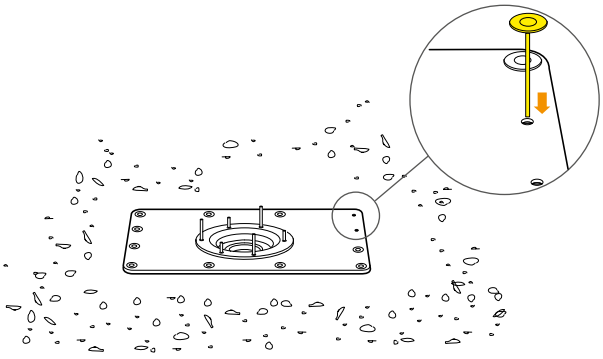
Installation indications



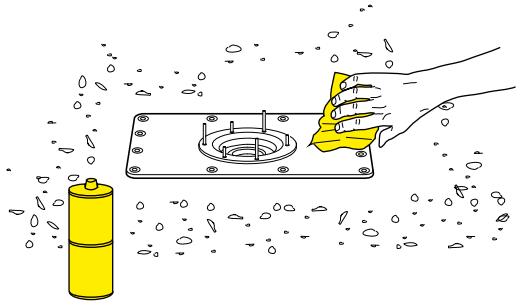
1) Weld to the HDPE connection socket, located below the outlet, a pipe section made of the same material.
The diameter and length of this section must be as per design.



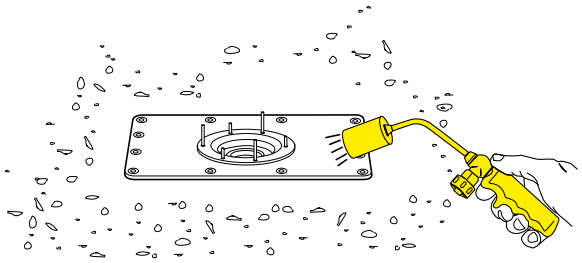
2) Create a through-hole on the roof.



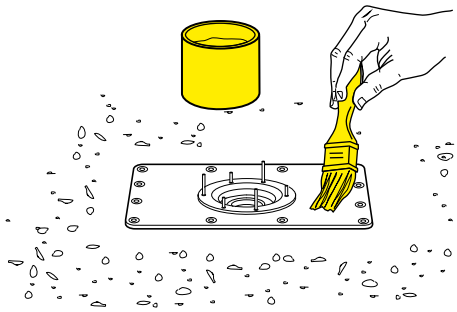
3) Position the outlet so that the pipe section attached to it fits into the hole made on the roof. Secure the metal body of the outlet to the roof using rivets or other fasteners so that it cannot move.



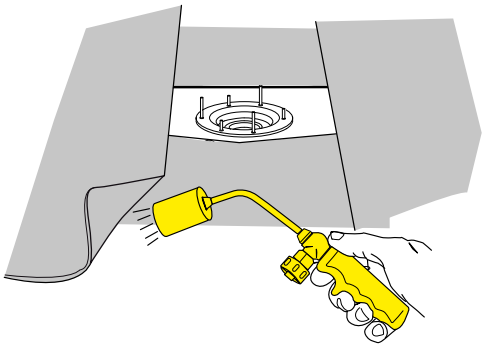
4) Clean the metal body of the outlet with suitable products.



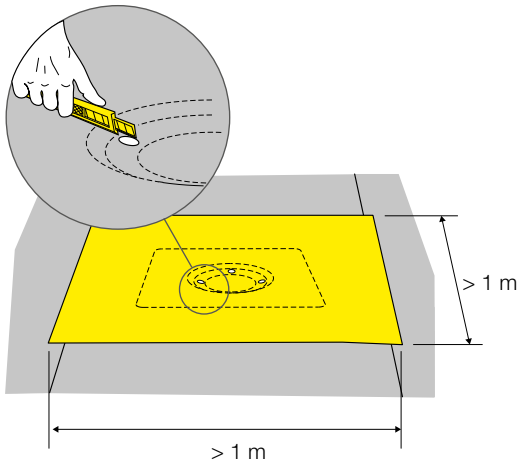
5) Heat the metal body of the outlet with a blowtorch.



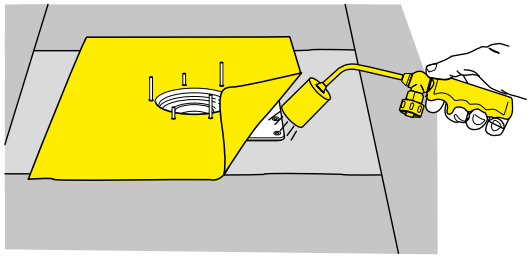
6) Apply bituminous membrane primer to the metal body of the outlet.



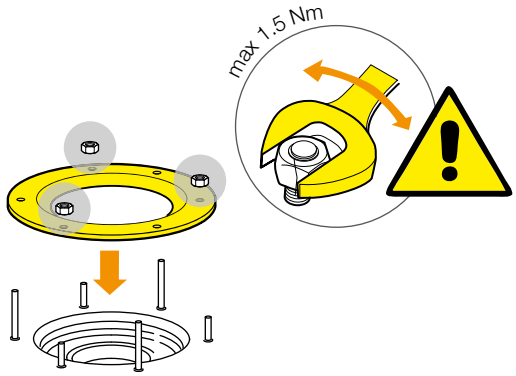
7) Make the membrane adhere on the metal body up to a distance of about 10÷15 cm from the axis of the outlet, heating its lower surface with a blowtorch.



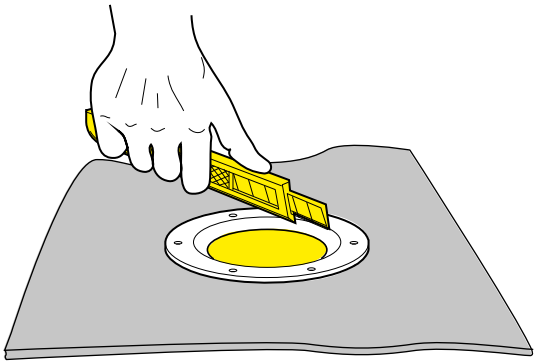
8) Cut a minimum 1x1 m portion of the membrane.
Use the flange supplied as a reference to mark the six through-holes of stud bolts and cut where marked.



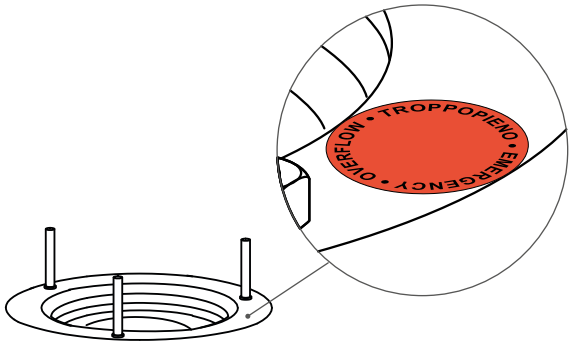
9) Position the portion of membrane previously cut using the stud bolts and heat its lower surface with a blowtorch so that it adheres to the metal body and the membrane previously applied.



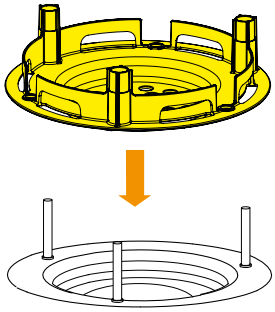
10) Position the flange and tighten the three nuts on the three short stud bolts while the membrane is still hot. Maximum tightening torque for nuts equal to 1.5 Nm.



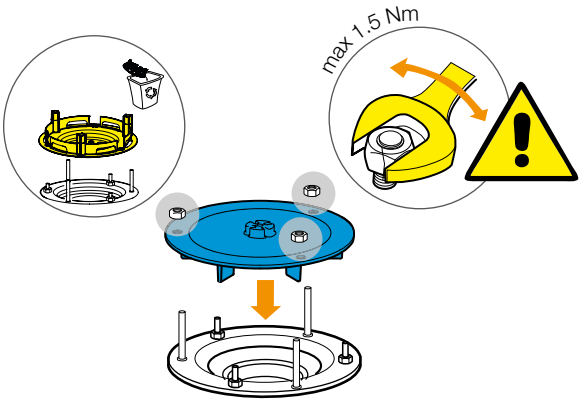
11) Cut the portion of membrane at the centre of the flange and remove it.



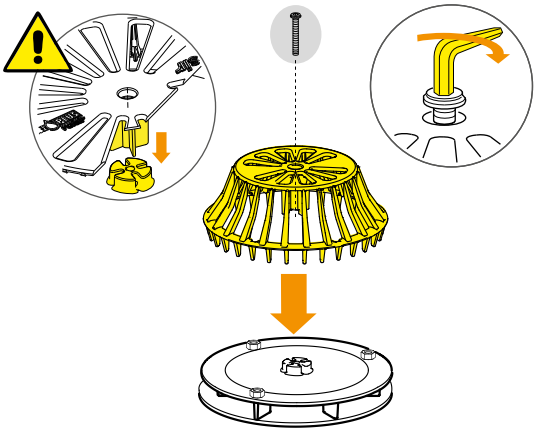
12) In case of a special outlet for the emergency system, apply the red "overflow" identification sticker.



13) If necessary, during the construction phase, install the yellow protective cap to prevent dirt from entering the system.



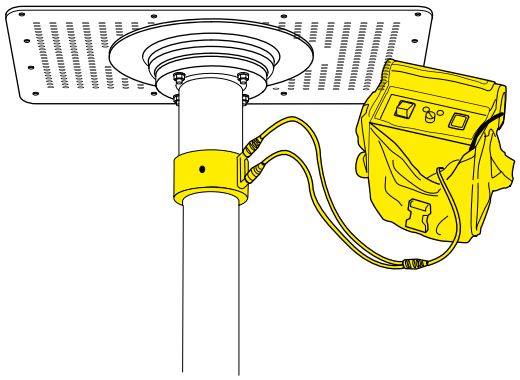
14) Before operating the system, remove the yellow cap and place the blue anti-vortex plate in the appropriate seat and tighten using the nuts supplied in the package. Maximum tightening torque for nuts equal to 1.5 Nm.



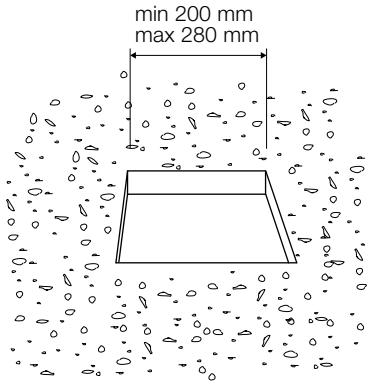
15) Align the cross on the leaf guard with the seat on the top of the anti-vortex plate, press the guard so that the fastening teeth lock onto the plate and secure the guard with the suitable screw.

5.1.13 Rainplus® 56 420x420 mm pre-drilled - installation on roof waterproofed with bituminous welded membrane (maximum thickness 4 mm)

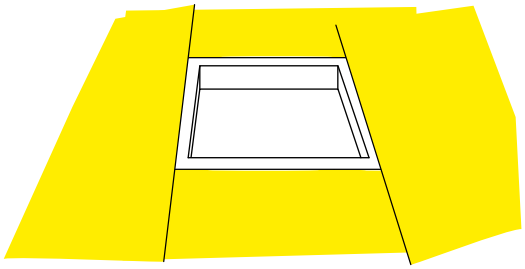
Installation indications



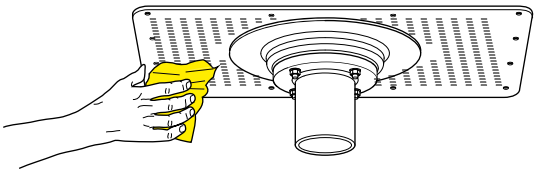
1) Weld to the HDPE connection socket, located below the outlet, a pipe section made of the same material.
The diameter and length of this section must be as per design.



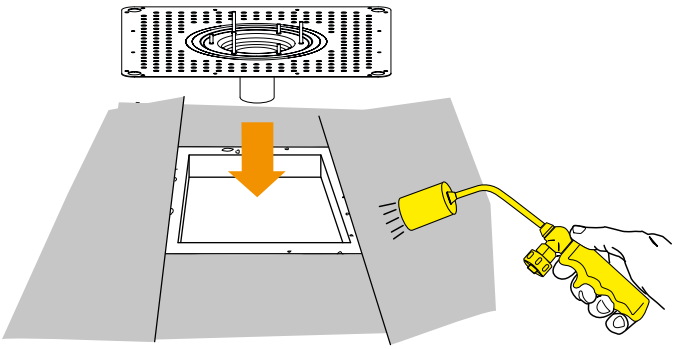
2) Create a through-hole on the roof.



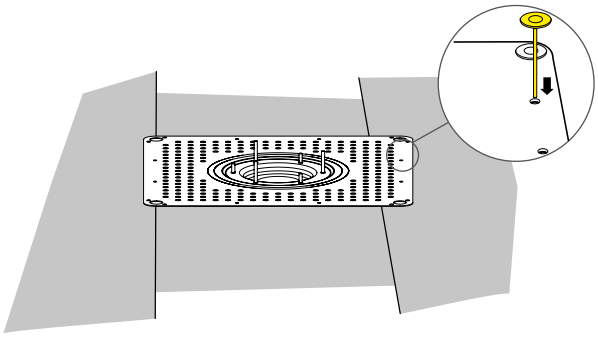
3) Lay the membrane so that it reaches the edges of the hole previously made.



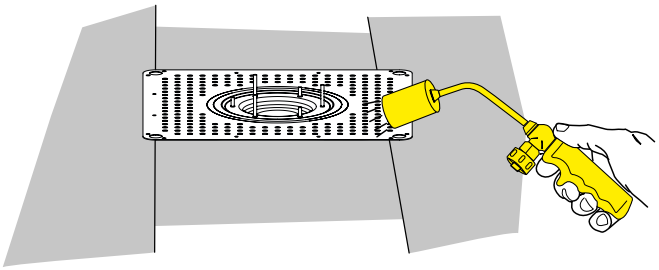
4) Clean the metal body of the outlet with suitable products.



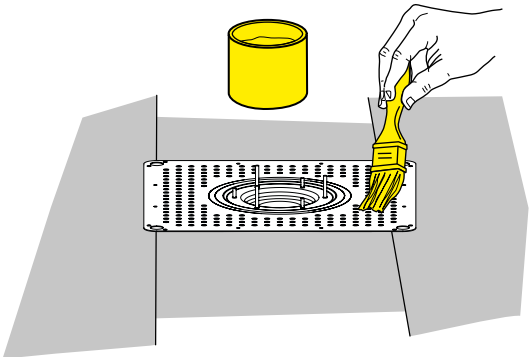
5) Using a blowtorch, heat the top surface of the membrane near the hole and make the metal body of the outlet adhere to the membrane.



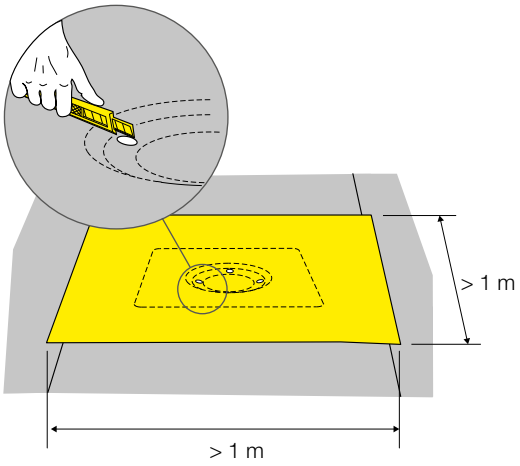
6) Secure the metal body of the outlet to the roof using rivets or other fasteners so that it cannot move.



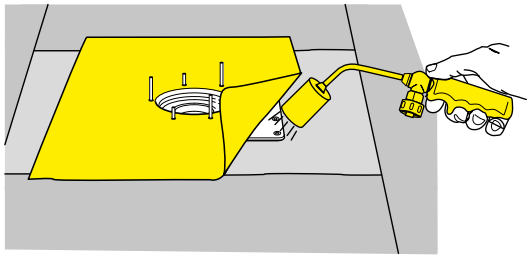
7) Heat the metal body of the outlet with a blowtorch.



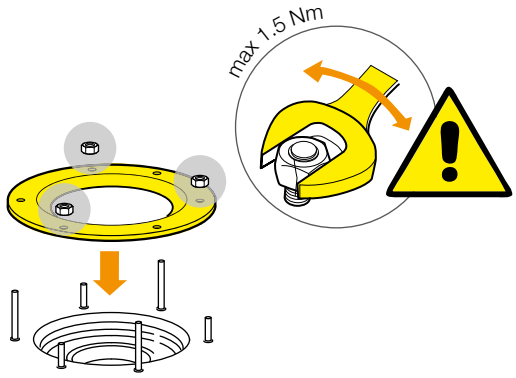
8) Apply bituminous membrane primer to the metal body of the outlet.



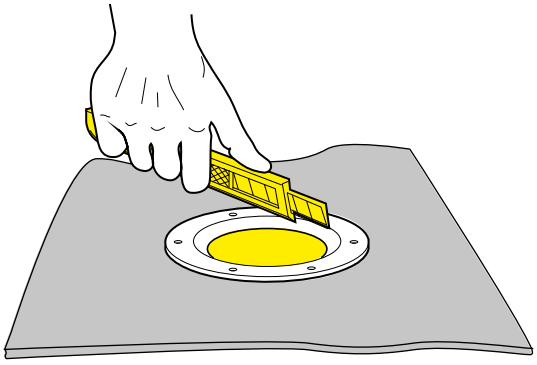
9) Cut a minimum 1x1 m portion of the membrane.
Use the flange supplied as a reference to mark the six through-holes of stud bolts and cut where marked.



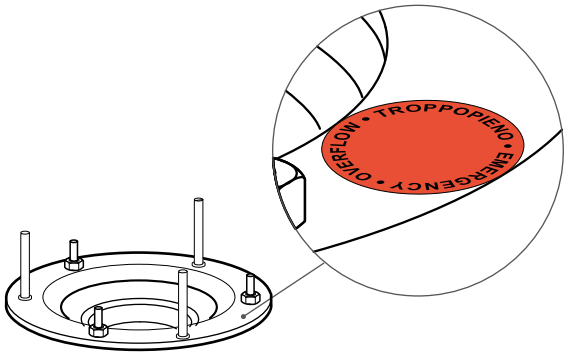
10) Position the portion of membrane previously cut using the stud bolts and heat its lower surface with a blowtorch so that it adheres to the metal body of the outlet and the membrane previously applied.



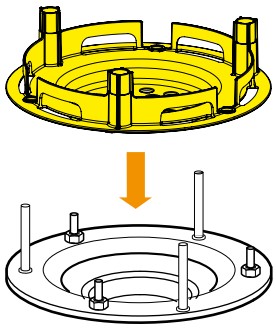
11) Position the flange and tighten the three nuts on the three short stud bolts while the membrane is still hot. Maximum tightening torque for nuts equal to 1.5 Nm.



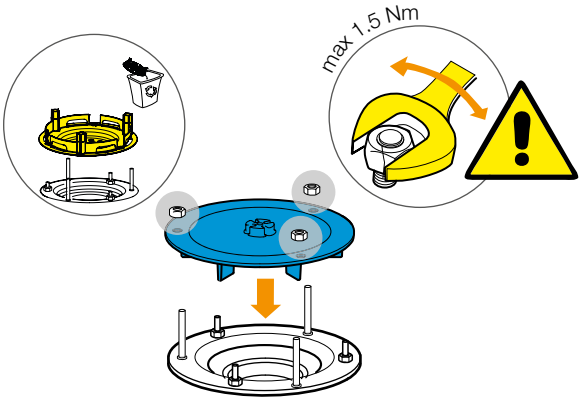
12) Cut the portion of membrane at the centre of the flange and remove it.



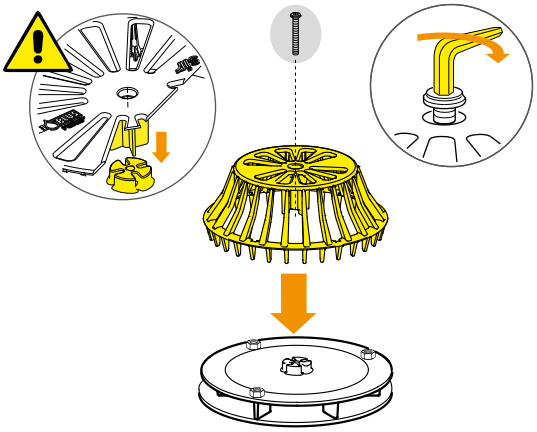
13) In case of a special outlet for the emergency system, apply the red "overflow" identification sticker.



14) If necessary, during the construction phase, install the yellow protective cap to prevent dirt from entering the system.



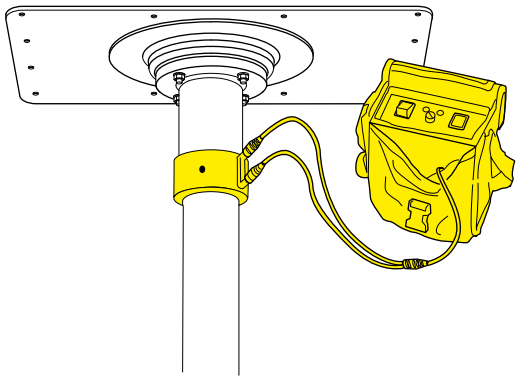
15) Before operating the system, remove the yellow cap and place the blue anti-vortex plate in the appropriate seat and tighten using the nuts supplied in the package. Maximum tightening torque for nuts equal to 1.5 Nm.



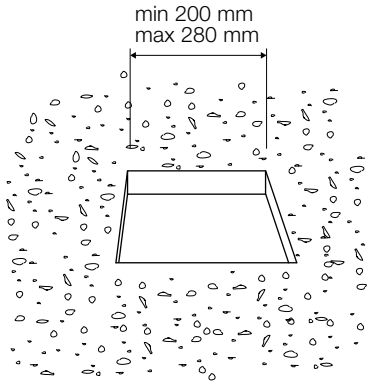
16) Align the cross on the leaf guard with the seat on the top of the anti-vortex plate, press the guard so that the fastening teeth lock onto the plate and secure the guard with the suitable screw.

5.1.14 Rainplus® 56 420x420 mm - installation on roof waterproofed with non-bituminous welded membrane (e.g.: TPO synthetic membranes)

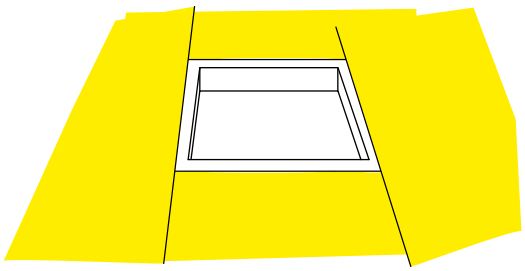
Installation indications



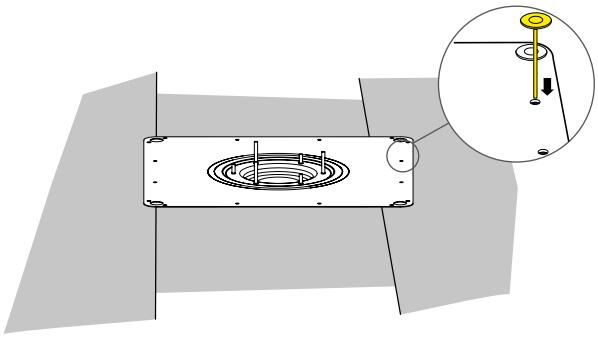
1) Weld to the HDPE connection socket, located below the outlet, a pipe section made of the same material.
The diameter and length of this section must be as per design.



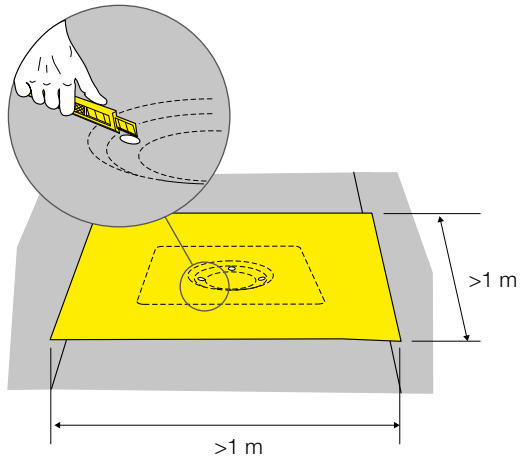
2) Create a through-hole on the roof.



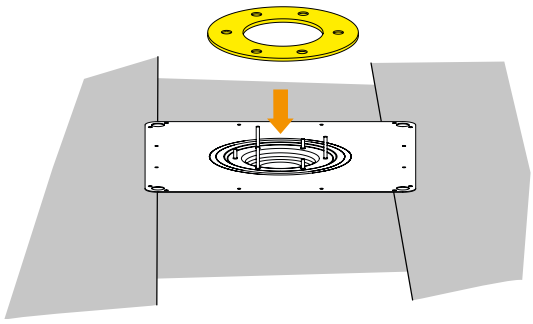
3) Lay the membrane so that it reaches the edges of the hole previously made.



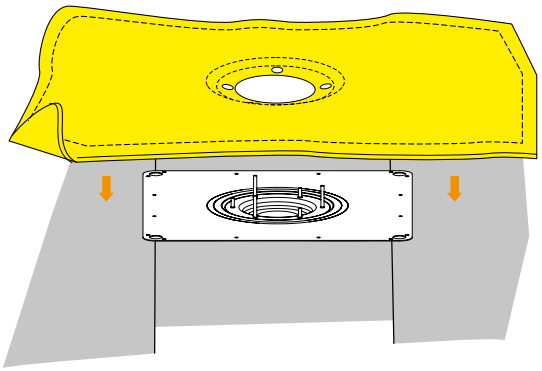
4) Position the outlet so that the pipe section attached to it fits into the hole made on the roof. Secure the metal body of the outlet to the roof using rivets or other fasteners so that it cannot move.



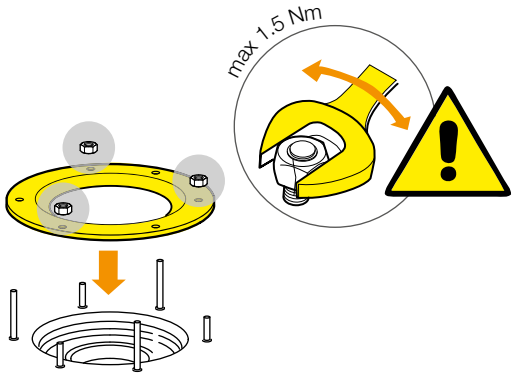
5) Cut a minimum 1x1 m portion of the membrane.
Use the flange supplied as a reference to mark the six through-holes of stud bolts and cut where marked.



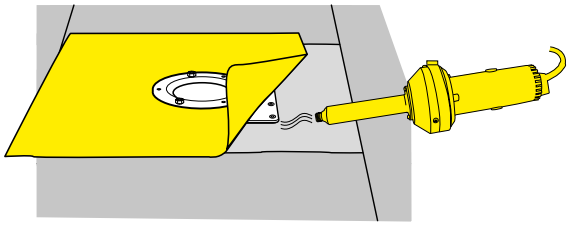
6) The mechanical sealing provided by the compression of the flange is guaranteed for thickness up to a maximum of 4 mm. Should the membrane be particularly rigid to such an extent as to prevent the hydraulic sealing provided by the flange, use the special optional sealing gasket (code VS0420156) aligning its holes with the stud bolts on the metal body of the outlet.



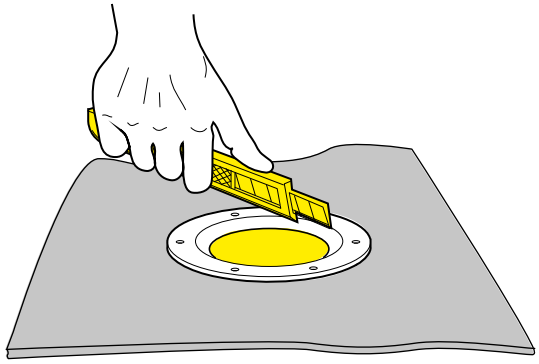
7) Position the previously cut portion of the membrane using the stud bolts.



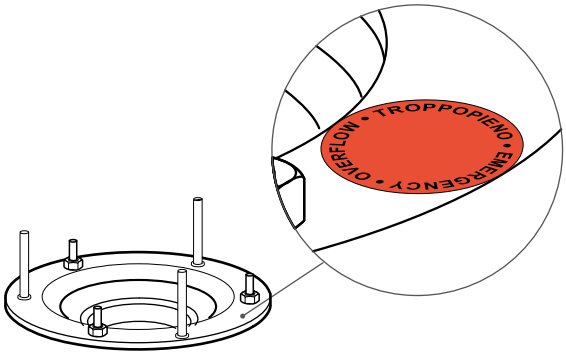
8) Position the flange and tighten the three nuts on the three short stud bolts. Maximum tightening torque for nuts equal to 1.5 Nm.



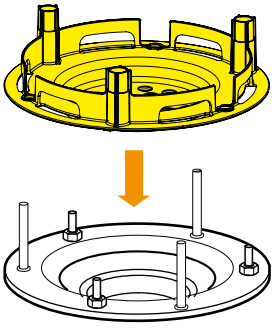
9) Using the suitable equipment, fasten the portion of membrane to the membrane previously laid on the roof.



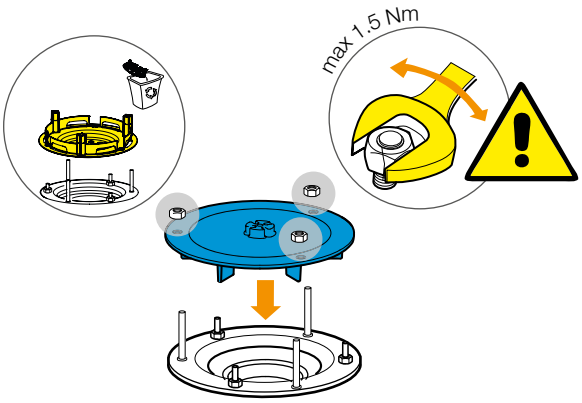
10) Cut the portion of membrane at the centre of the flange and remove it.



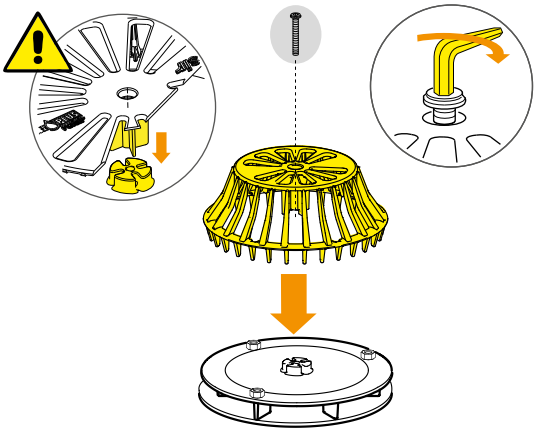
11) In case of a special outlet for the emergency system, apply the red "overflow" identification sticker.



12) If necessary, during the construction phase, install the yellow protective cap to prevent dirt from entering the system.



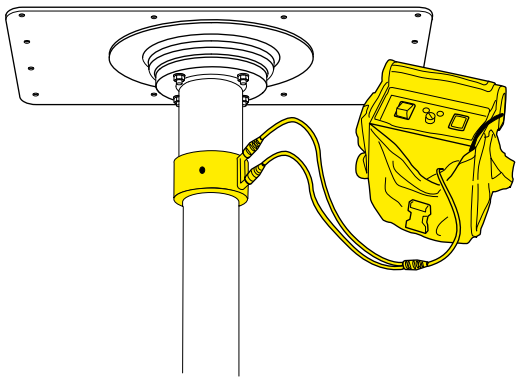
13) Before operating the system, remove the yellow cap and place the blue anti-vortex plate in the appropriate seat and tighten using the nuts supplied in the package. Maximum tightening torque for nuts equal to 1.5 Nm.



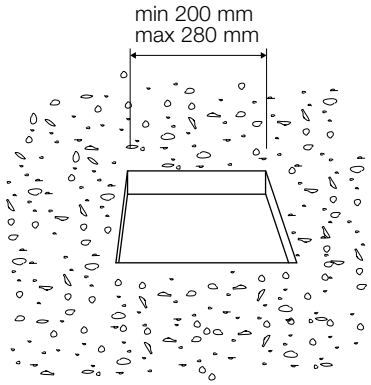
14) Align the cross on the leaf guard with the seat on the top of the anti-vortex plate, press the guard so that the fastening teeth lock onto the plate and secure the guard with the suitable screw.

5.1.15 Rainplus® 56 with 420x420 mm - installation on roof waterproofed with adhesive membrane

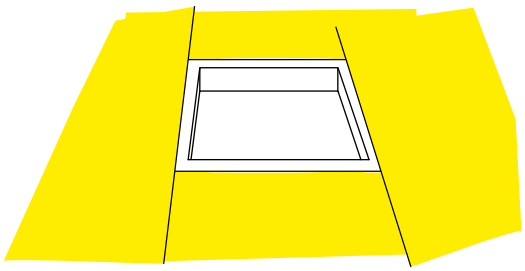
Installation indications



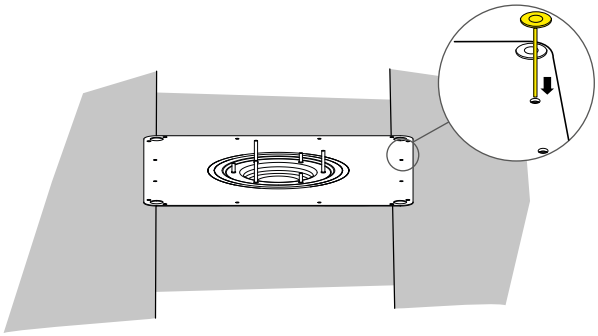
1) Weld to the HDPE connection socket, located below the outlet, a pipe section made of the same material.
The diameter and length of this section must be as per design.



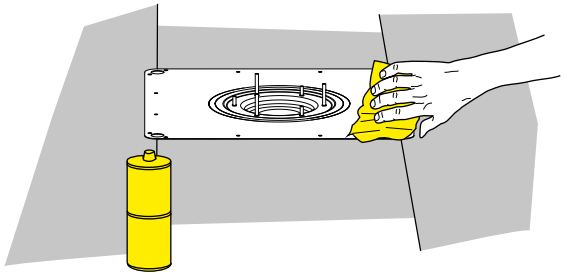
2) Create a through-hole on the roof.



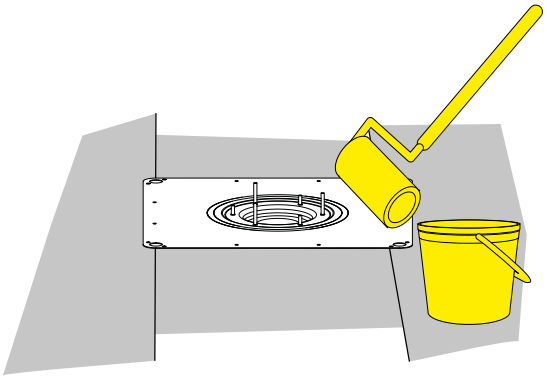
3) Lay the membrane so that it reaches the edges of the hole previously made.



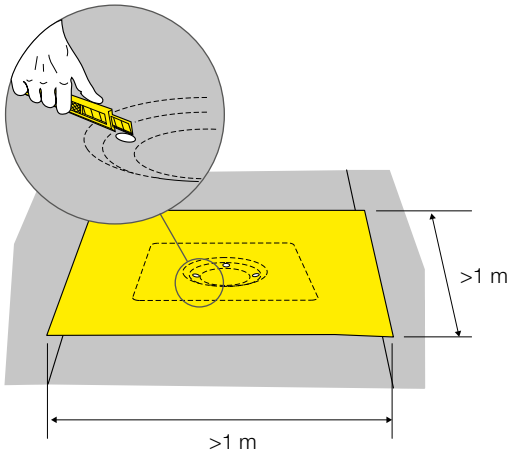
4) Position the outlet so that the pipe section attached to it fits into the hole made on the roof. Secure the metal body of the outlet to the roof using rivets or other fasteners so that it cannot move.



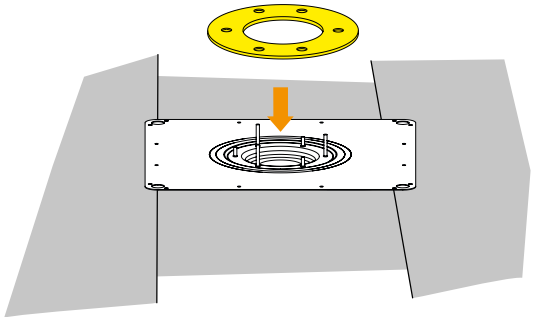
5) Clean the metal body of the outlet with suitable products.



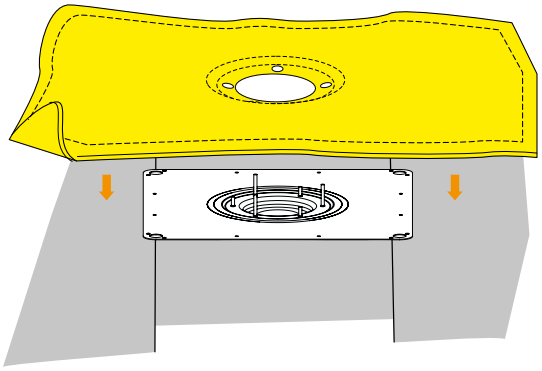
6) Apply the appropriate adhesive specified by the membrane manufacturer to the surface of the metal body of the outlet.



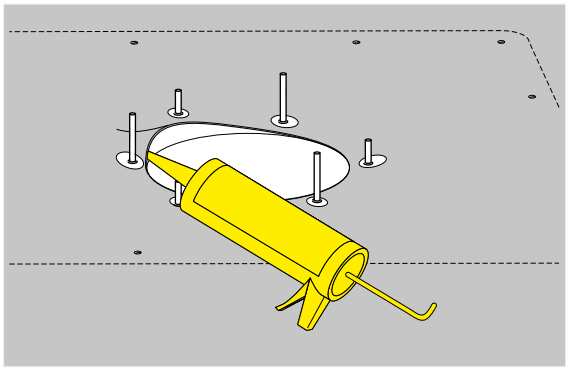
7) Cut a minimum 1x1 m portion of the membrane.
Use the flange supplied as a reference to mark the six through-holes of stud bolts and the central hole, cut where marked.



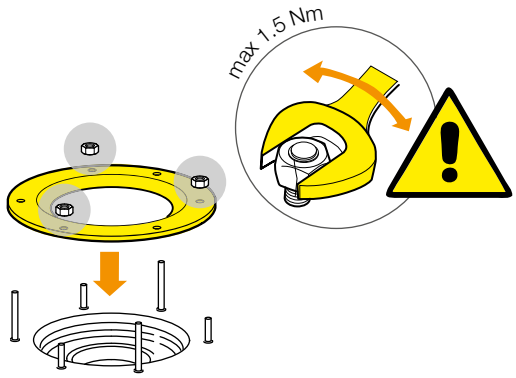
8) The mechanical sealing provided by the compression of the flange is guaranteed for thickness up to a maximum of 4 mm. Should the membrane be particularly rigid to such an extent as to prevent the hydraulic sealing provided by the flange, use the special optional sealing gasket (code VS0420156) aligning its holes with the stud bolts on the metal body of the outlet.



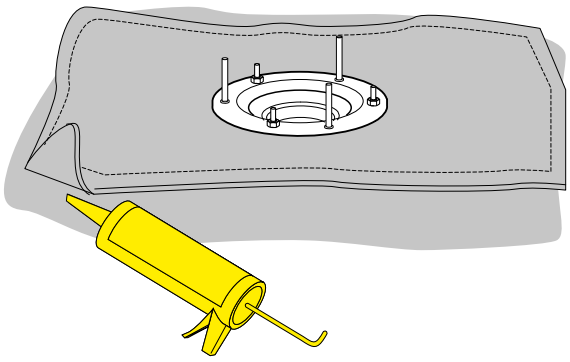
9) Position the previously cut portion of the membrane using the stud bolts.



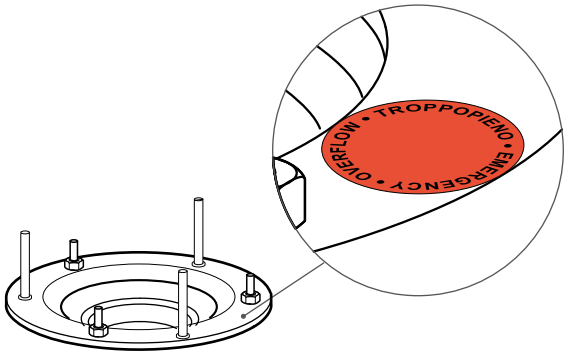
10) Apply specific mastic to the coupling hole between the membrane and the body of the outlet.



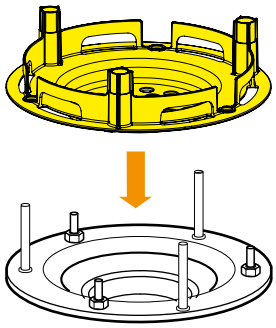
11) Position the flange and tighten the three nuts on the three short stud bolts. Maximum tightening torque for nuts equal to 1.5 Nm.



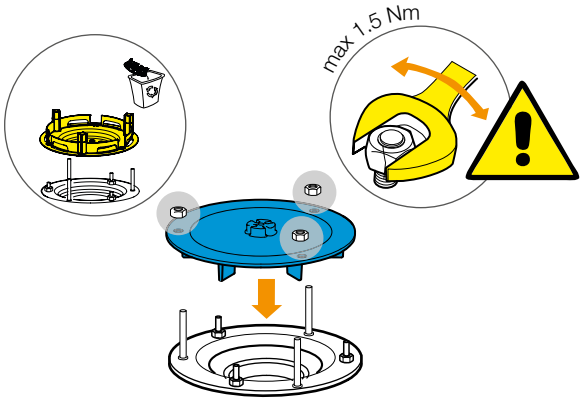
12) Using the suitable adhesive, fasten the portion of membrane to the membrane previously laid on the roof.



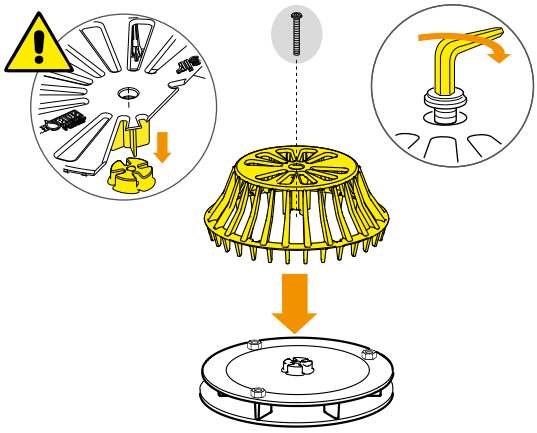
13) In case of a special outlet for the emergency system, apply the red "overflow" identification sticker.



14) If necessary, during the construction phase, install the yellow protective cap to prevent dirt from entering the system.



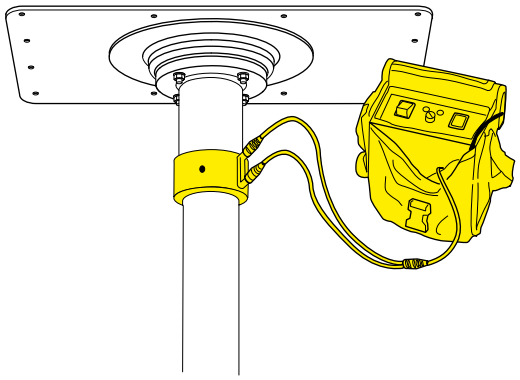
15) Before operating the system, remove the yellow cap and place the blue anti-vortex plate in the appropriate seat and tighten using the nuts supplied in the package. Maximum tightening torque for nuts equal to 1.5 Nm.



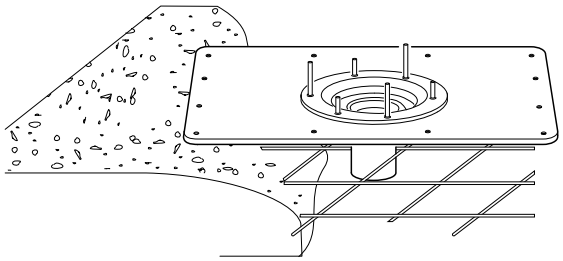
16) Align the cross on the leaf guard with the seat on the top of the anti-vortex plate, press the guard so that the fastening teeth lock onto the plate and secure the guard with the suitable screw.

5.1.16 Rainplus® 56 420x420 mm - installation with concrete casting with bituminous welded membrane (maximum thickness 4 mm)

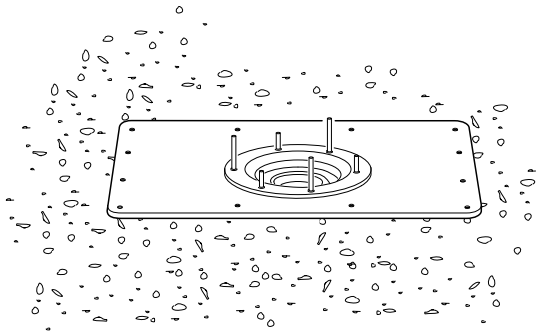
Installation indications



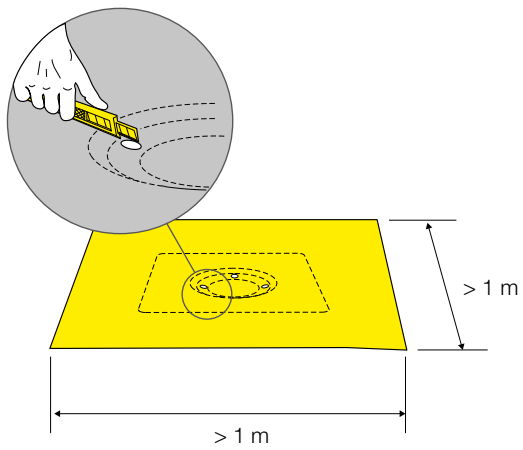
1) Weld to the HDPE connection socket, located below the outlet, a pipe section made of the same material.
The diameter and length of this section must be as per design.



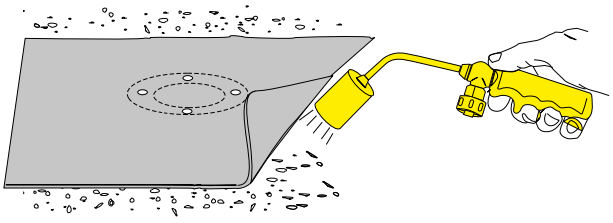
2) Place the outlet and keep it fixed in the desired position during the concrete casting phase in order to avoid possible movements. Protect the top of the outlet during this step.



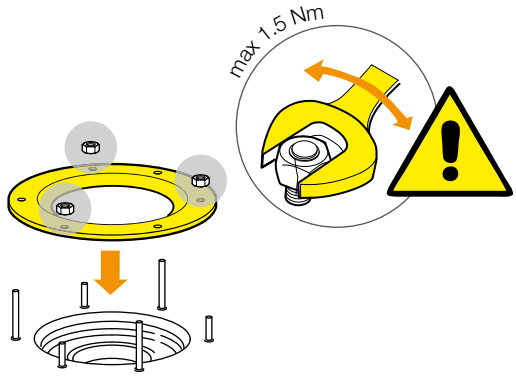
3) Once the concrete has been cast, wait for its hardening.



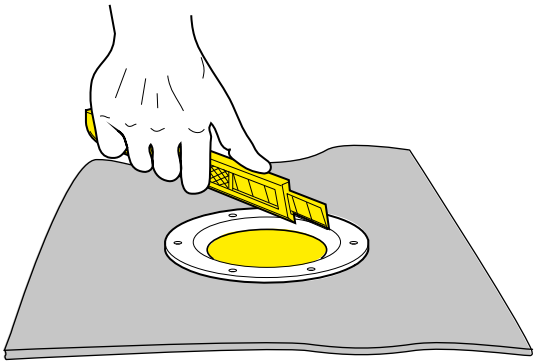
4) Cut a minimum 1x1 m portion of the membrane.
Use the flange supplied as a reference to mark the six through-holes of stud bolts and cut where marked.



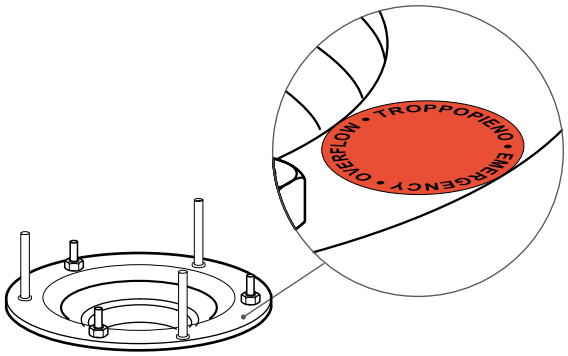
5) Position the portion of membrane previously cut using the stud bolts and heat its lower surface with a blowtorch so that it adheres to the outlet body and to the roof.



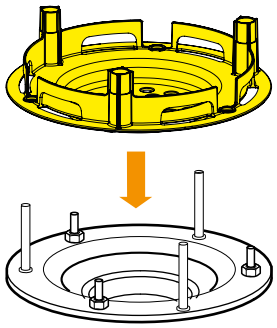
6) Position the flange and tighten the three nuts on the three short stud bolts while the membrane is still hot. Maximum tightening torque for nuts equal to 1.5 Nm.



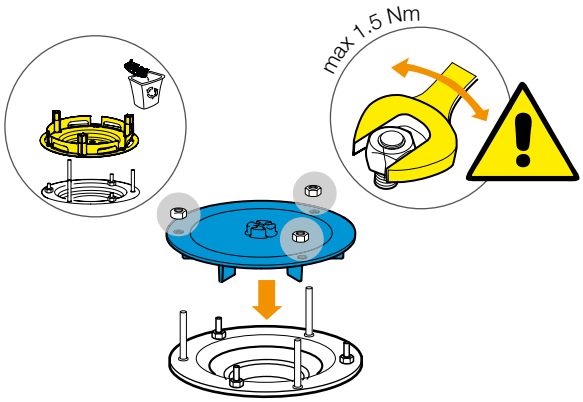
7) Cut the portion of membrane at the centre of the flange and remove it.



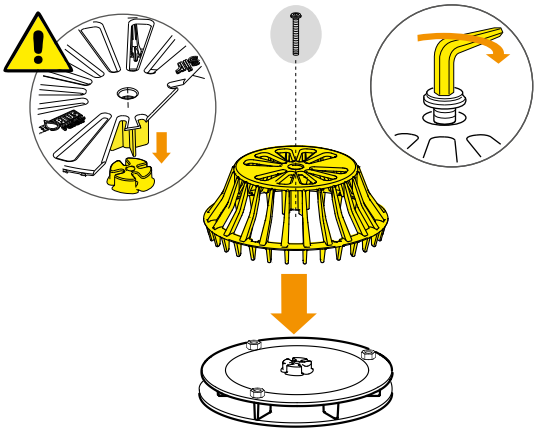
8) In case of a special outlet for the emergency system, apply the red "overflow" identification sticker.



9) If necessary, during the construction phase, install the yellow protective cap to prevent dirt from entering the system.



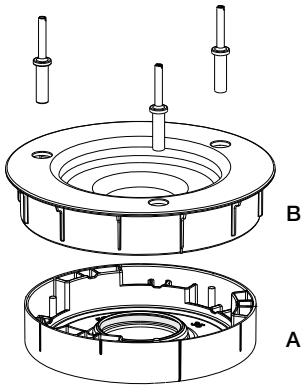
10) Before operating the system, remove the yellow cap and place the blue anti-vortex plate in the appropriate seat and tighten using the nuts supplied in the package. Maximum tightening torque for nuts equal to 1.5 Nm.



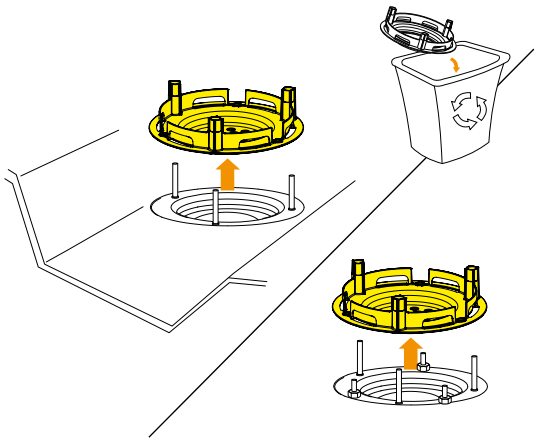
11) Align the cross on the leaf guard with the seat on the top of the anti-vortex plate, press the guard so that the fastening teeth lock onto the plate and secure the guard with the suitable screw.

5.1.17 Rainplus® 56 - Overflow Kit installation

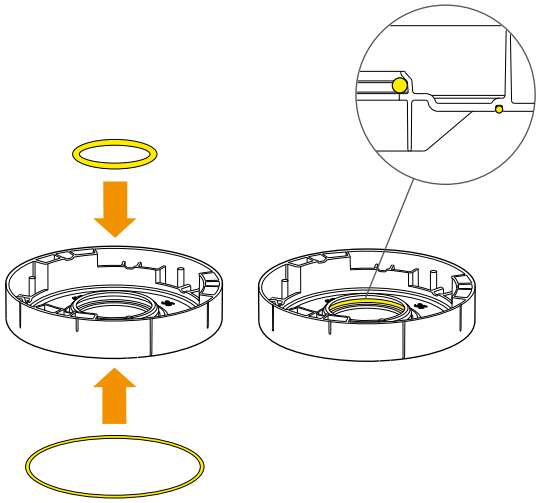
Installation indications



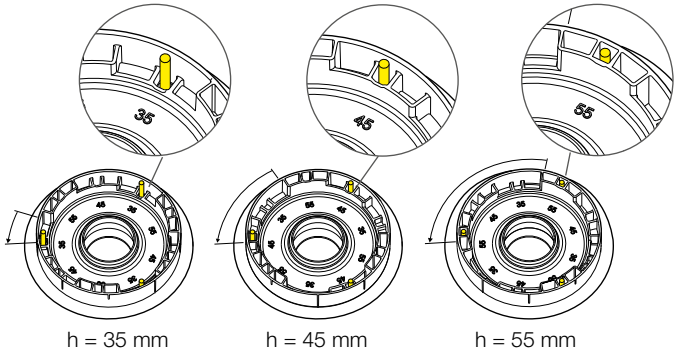
1) The Overflow Kit consists of two main elements: component A (lower) and component B (upper).



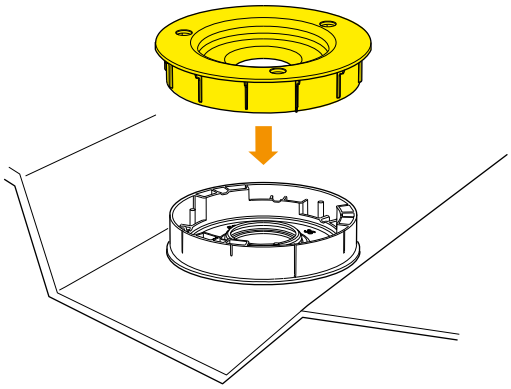
2) To install the Overflow Kit, in case of installation in the gutter, start from the point where the metal body of the outlet has already been fixed to the gutter. In the case of installation on roofs with waterproofed membranes, start from the point where the flange has already been installed. If present, remove the yellow protective cap.



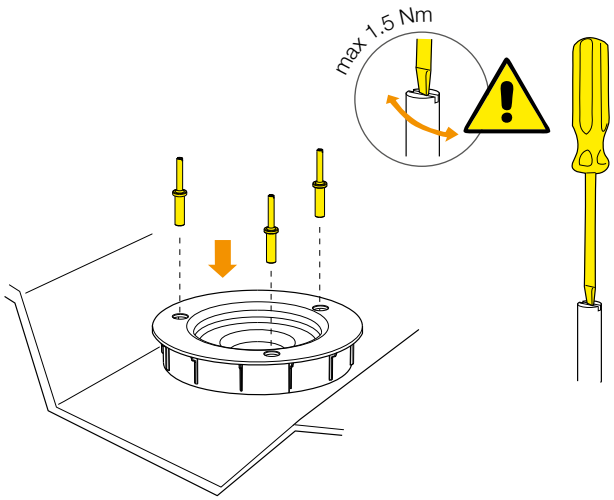
3) Insert the large gasket in the lower part of component A and the small gasket in the upper part of the same component.



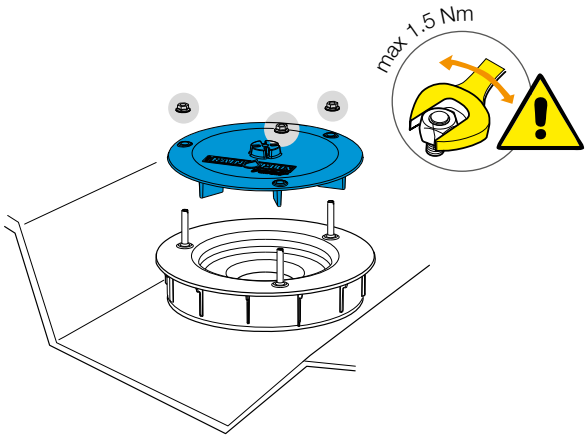
4) Based on the design overflow height, insert component A on the metal body of the outlet by aligning the long stud bolts on it, using the number indicated next to them to identify the correct holes.



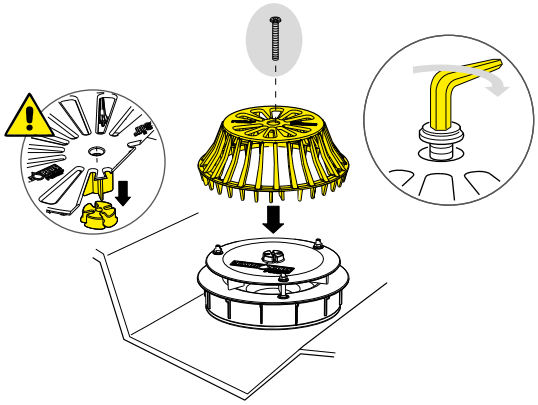
5) Place component B on top of component A and align the holes.



6) Insert the stud bolt extensions inside the three holes and screw them in. Maximum tightening torque for stud bolt extensions equal to 1.5 Nm.



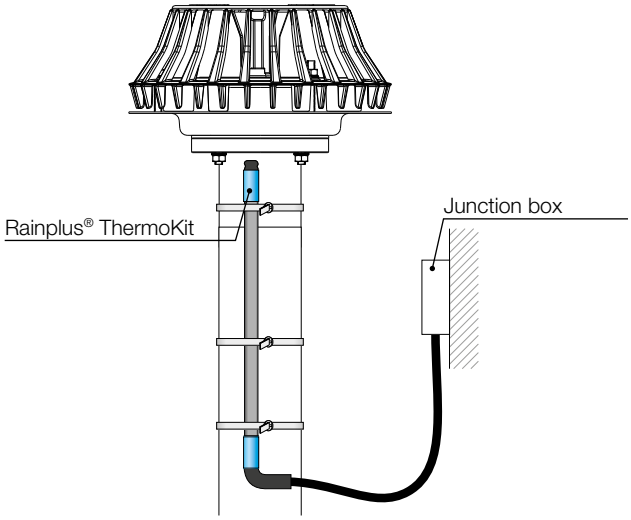
7) Position the anti-vortex plate centring the stud bolts with their respective holes and tighten the nuts. Maximum tightening torque for nuts equal to 1.5 Nm.



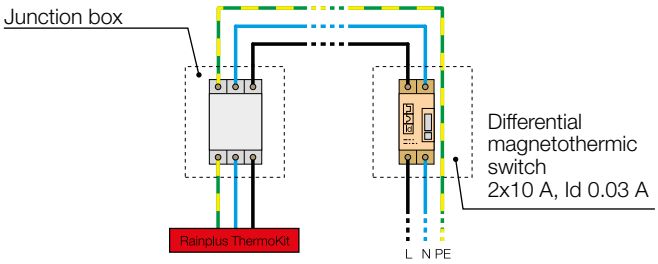
8) Align the cross on the leaf guard with the seat on the top of the anti-vortex plate, press the guard so that the fastening teeth locks onto the plate and secure the guard with the suitable screw.

5.1.18 Rainplus® 56 - ThermoKit installation

Installation indications



Installation
Remove the (long) locking clamp and place the Rainplus® ThermoKit vertically on the connecting pipe to the roof outlet. Make the flat portion of the Rainplus® ThermoKit heating cable adhere to the pipe using the three (short) locking clamps.



Electrical connection
Wiring must be carried out by a specialist using a protection system consisting of a differential magnetothermic switch Id=0.03 A.
The electrical connection must be made with protection degree IP65.
The use of a manual switch or thermostat is required for activation of the Rainplus® ThermoKit and subsequent deactivation during the warm season.

5.2 Piping

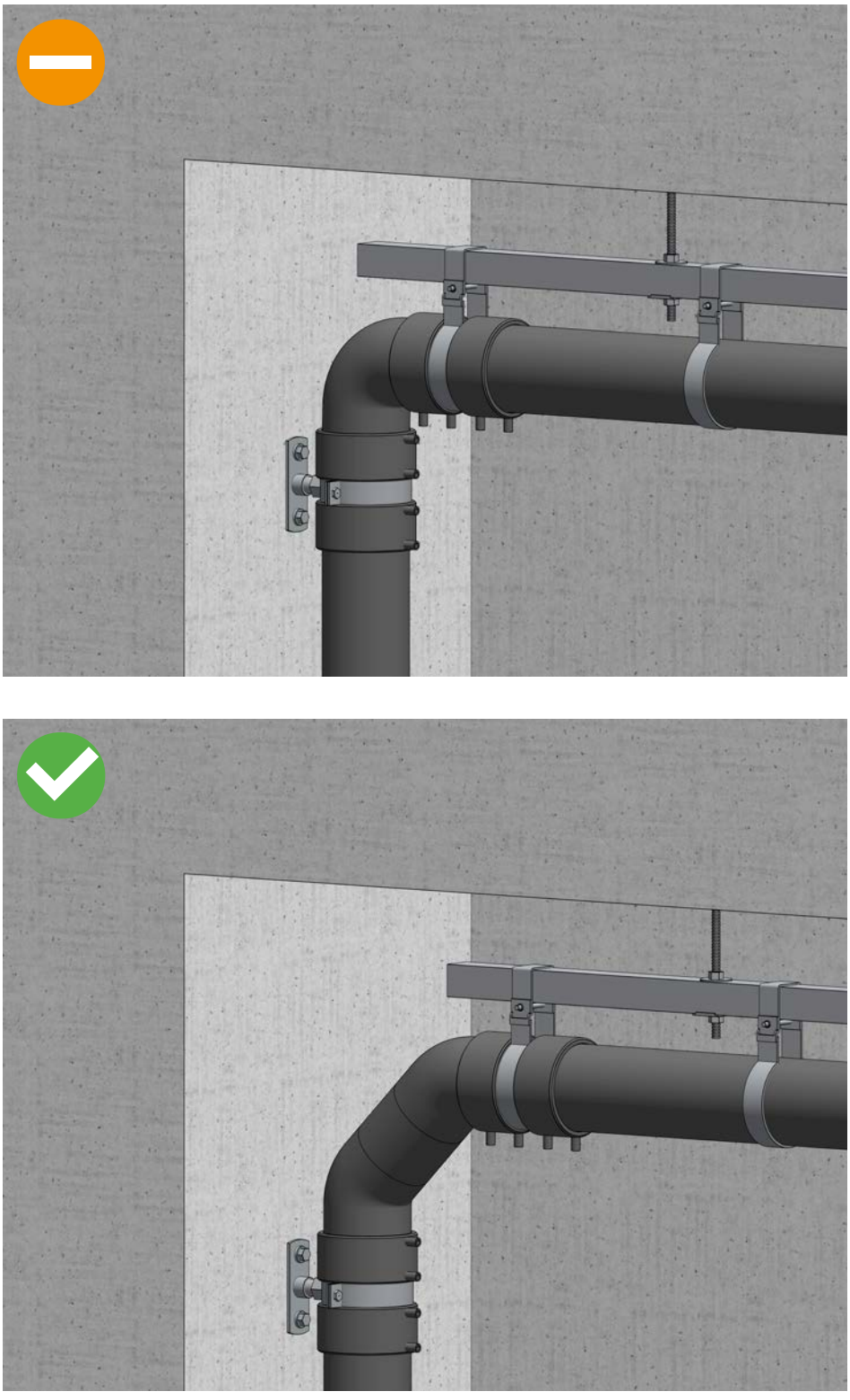
The following are general rules for Rainplus® system pipes and fittings and typical installation steps for the HDPE system.

5.2.1 General rules

5.2.1.1 Changes in direction

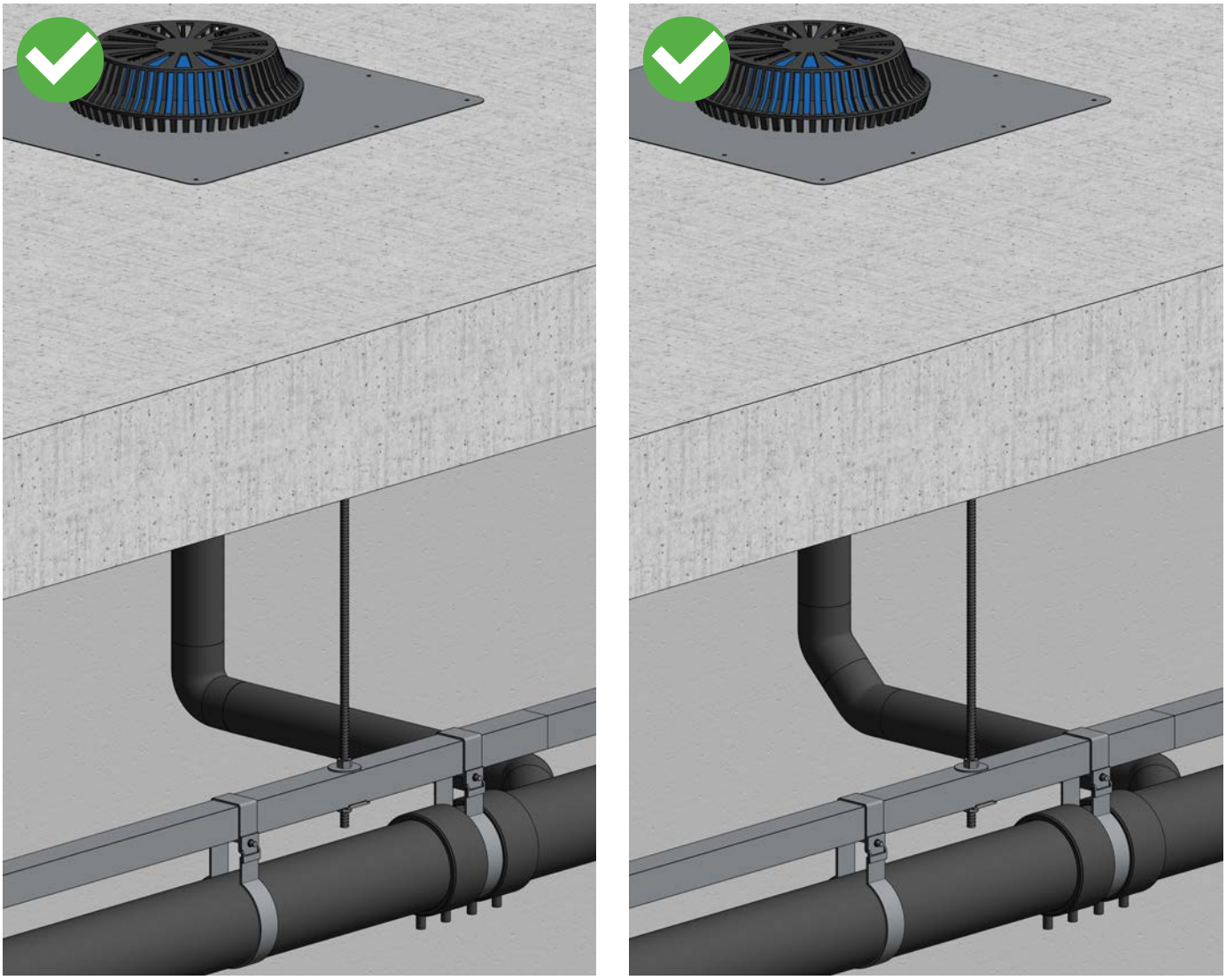
It is recommended to use two 45° bends for making 90° changes in direction.

Figure 5.1 Making 90° changes in direction.



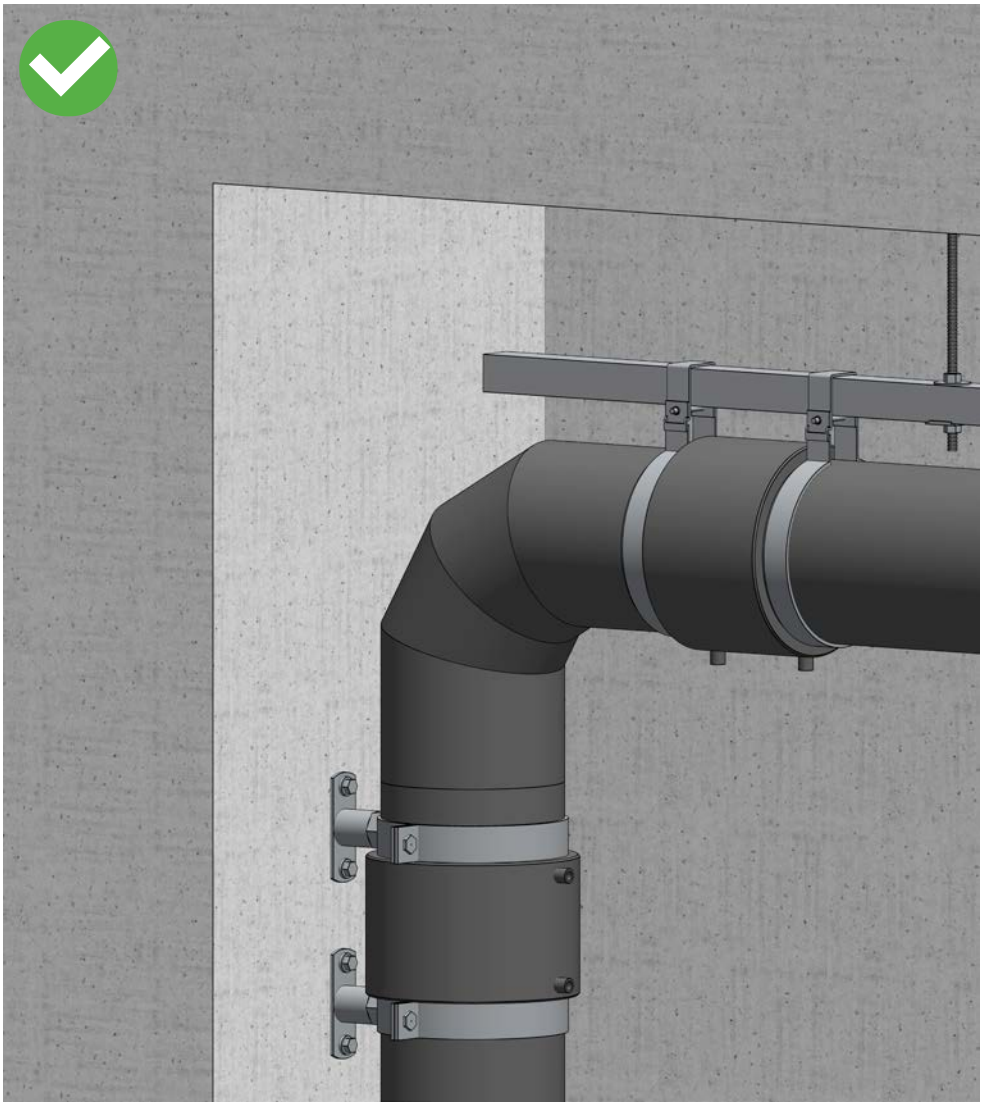
Exceptions to the above rule are changes in tail pipe direction from vertical to horizontal. Using a single 90° bend is also feasible in this case.

Figure 5.2 Making changes in direction at tail pipes with 90° bend or double 45° bend.



Another exception is for 90° changes in direction for pipes with diameters of 200 mm, 250 mm and 315 mm. In this case it is possible to use 90° long radius bends.

Figure 5.3 Making changes in direction with 90° long radius bends for diameters of 200 mm, 250 mm and 315 mm.



5.2.1.2 Changes in diameter

In order to increase or reduce the diameter of the piping, eccentric reductions must be used, maintaining the alignment of the piping at the top, as far as the horizontal is concerned, and towards the wall to which it is to be fixed, as far as the vertical is concerned.

Figure 5.4 Diameter changes for horizontal pipes.

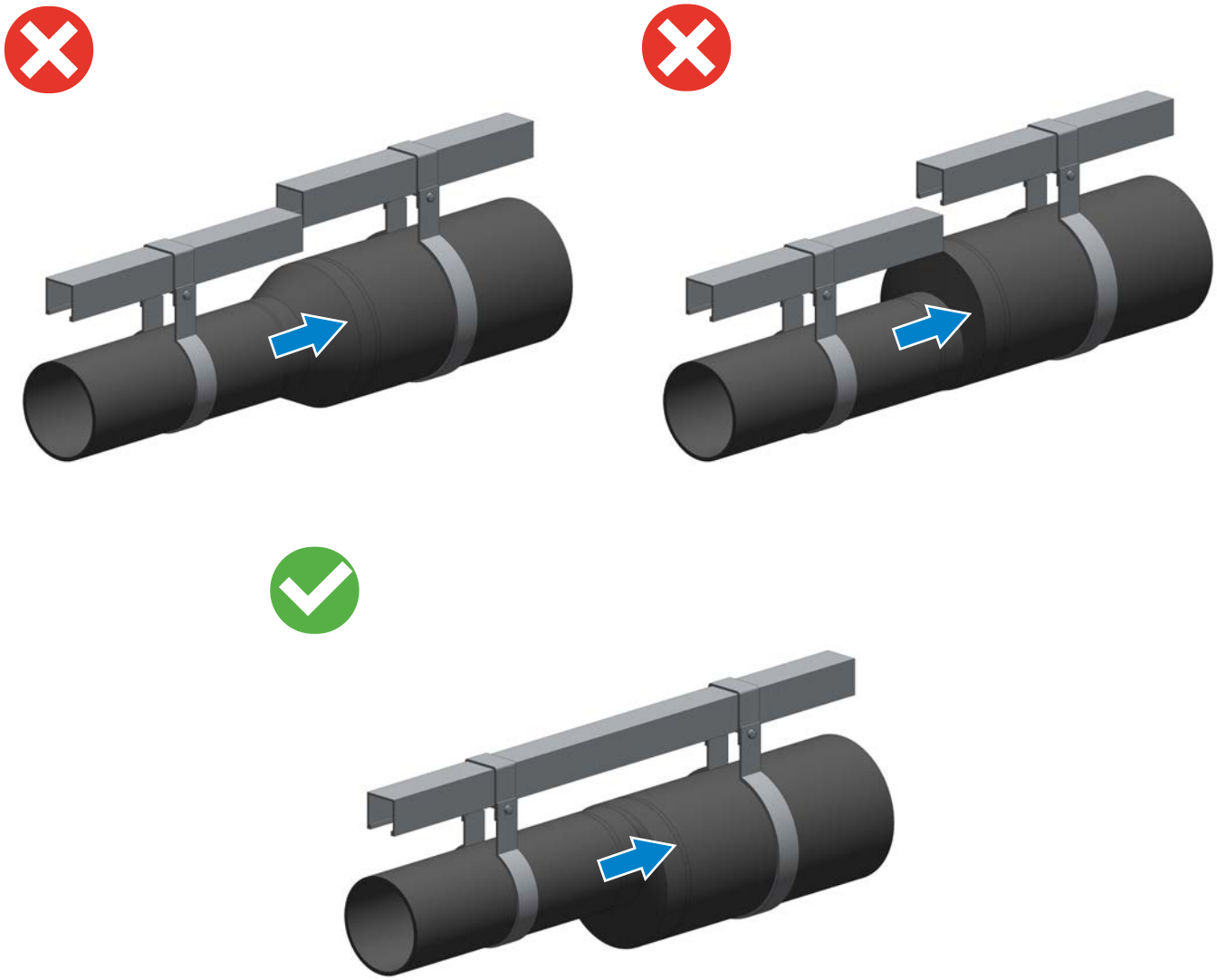
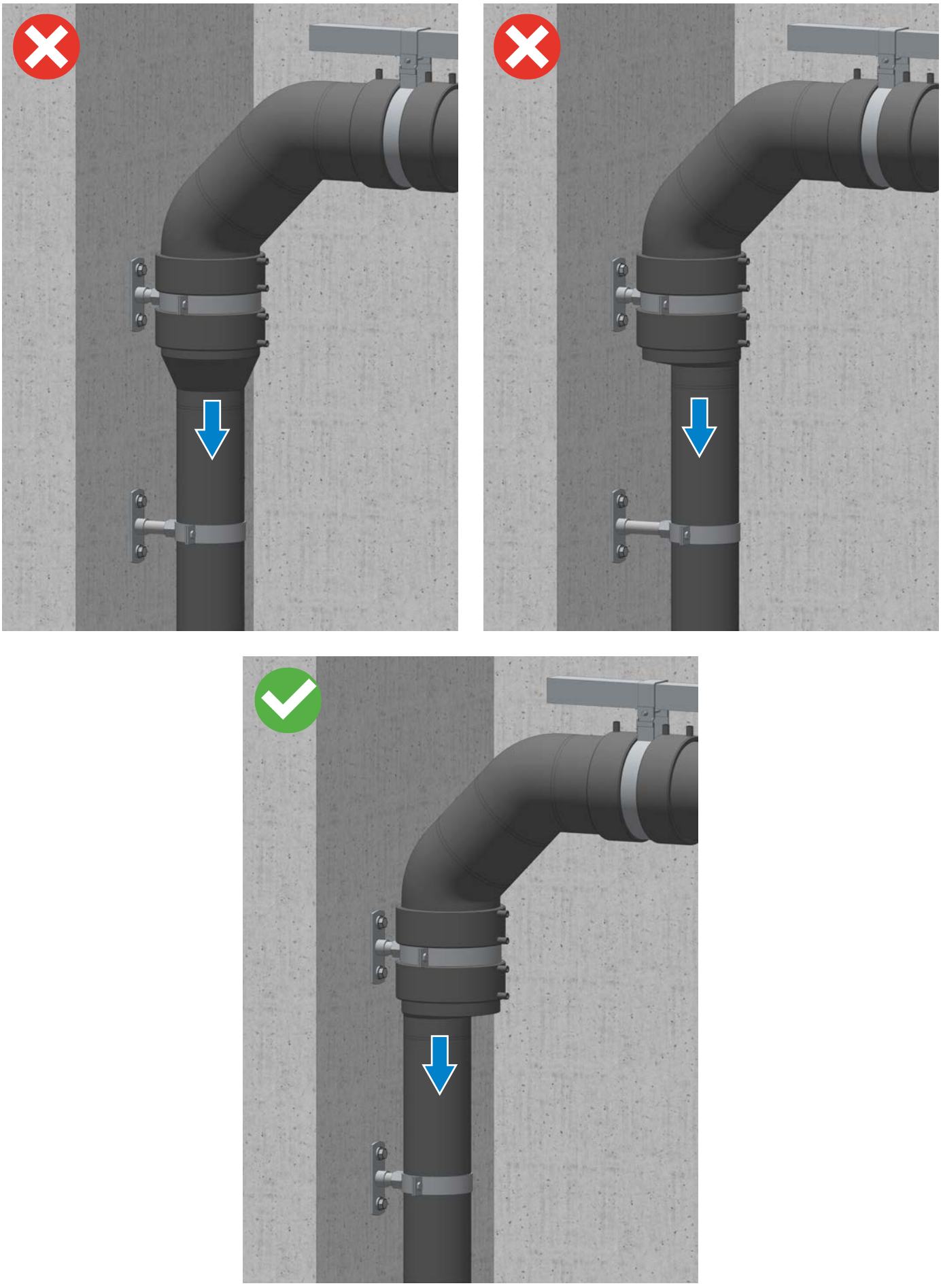


Figure 5.5 Diameter changes for vertical pipes.



If it is necessary to use different diameters in a piping section, it is always advisable to increase the diameter of the pipe in the direction of the flow for horizontal sections and reduce it for vertical sections.

Figure 5.6 Diameter enlargements for horizontal piping sections.

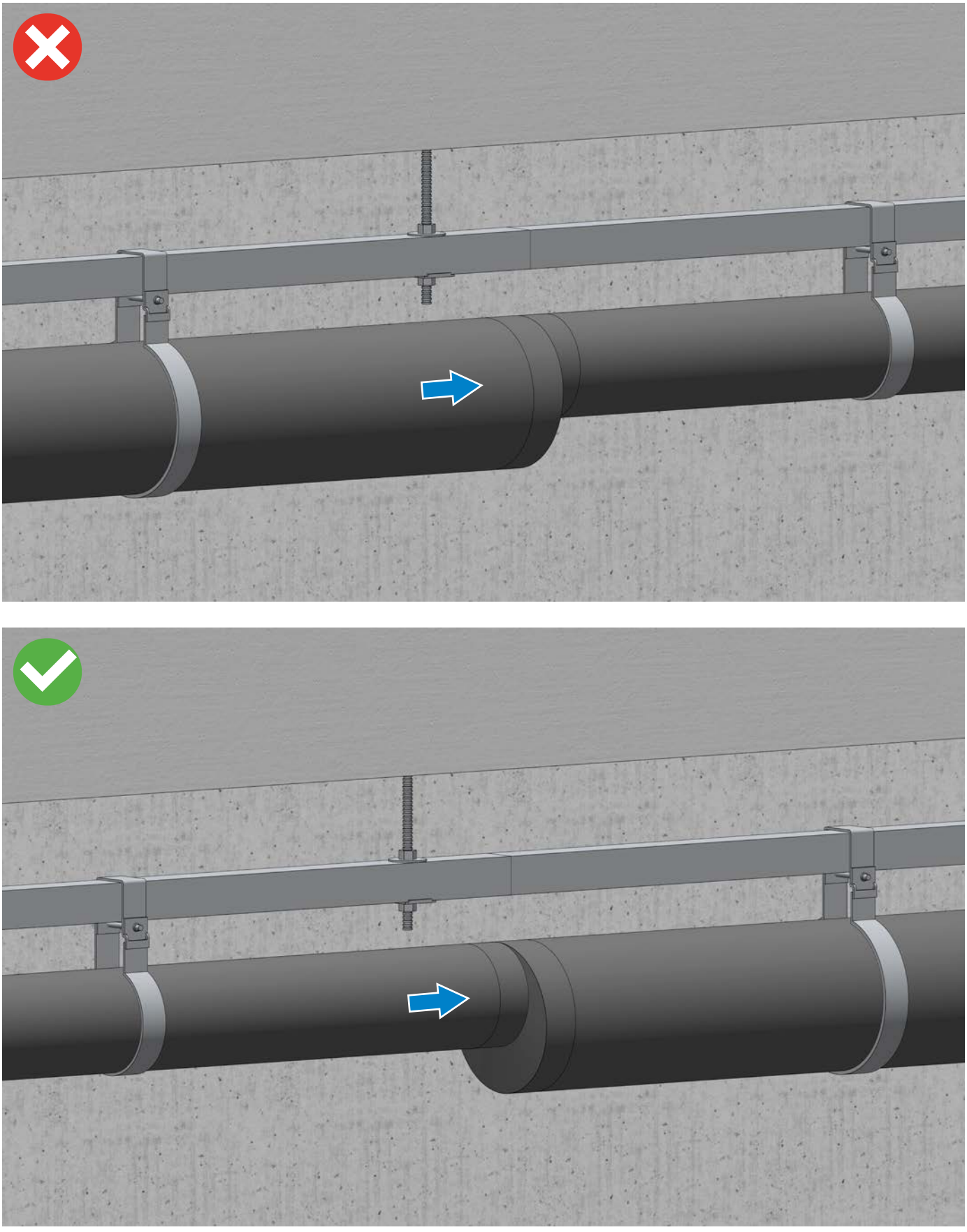
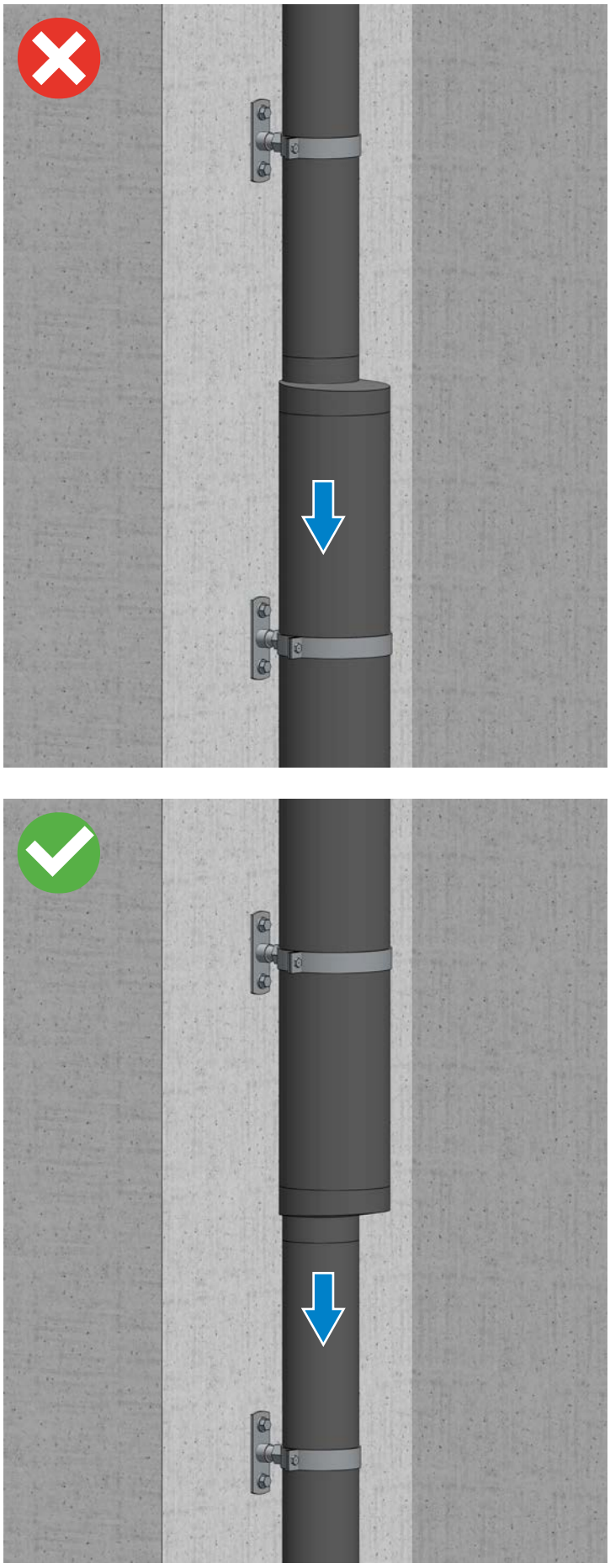
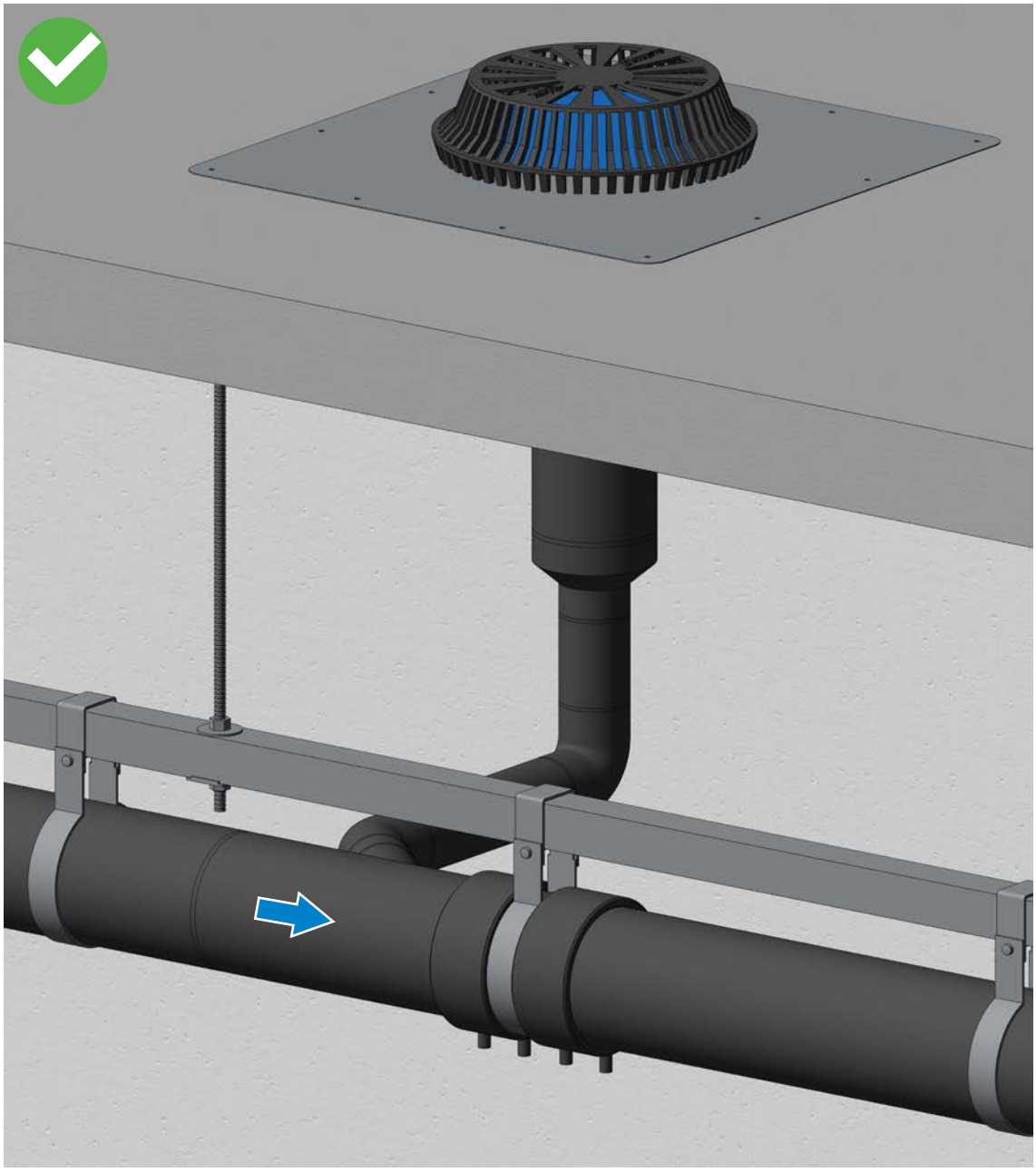


Figure 5.7 Diameter enlargements for vertical piping sections.



The only case where the use of concentric reductions is allowed is in the vertical sections of tail pipes.

Figure 5.8 Use of concentric reductions in the vertical sections of tail pipes.



5.2.1.3 Connection between pipes

The connection between two pipes must be made only with 45° branches.

Figure 5.9 Connection between pipes.

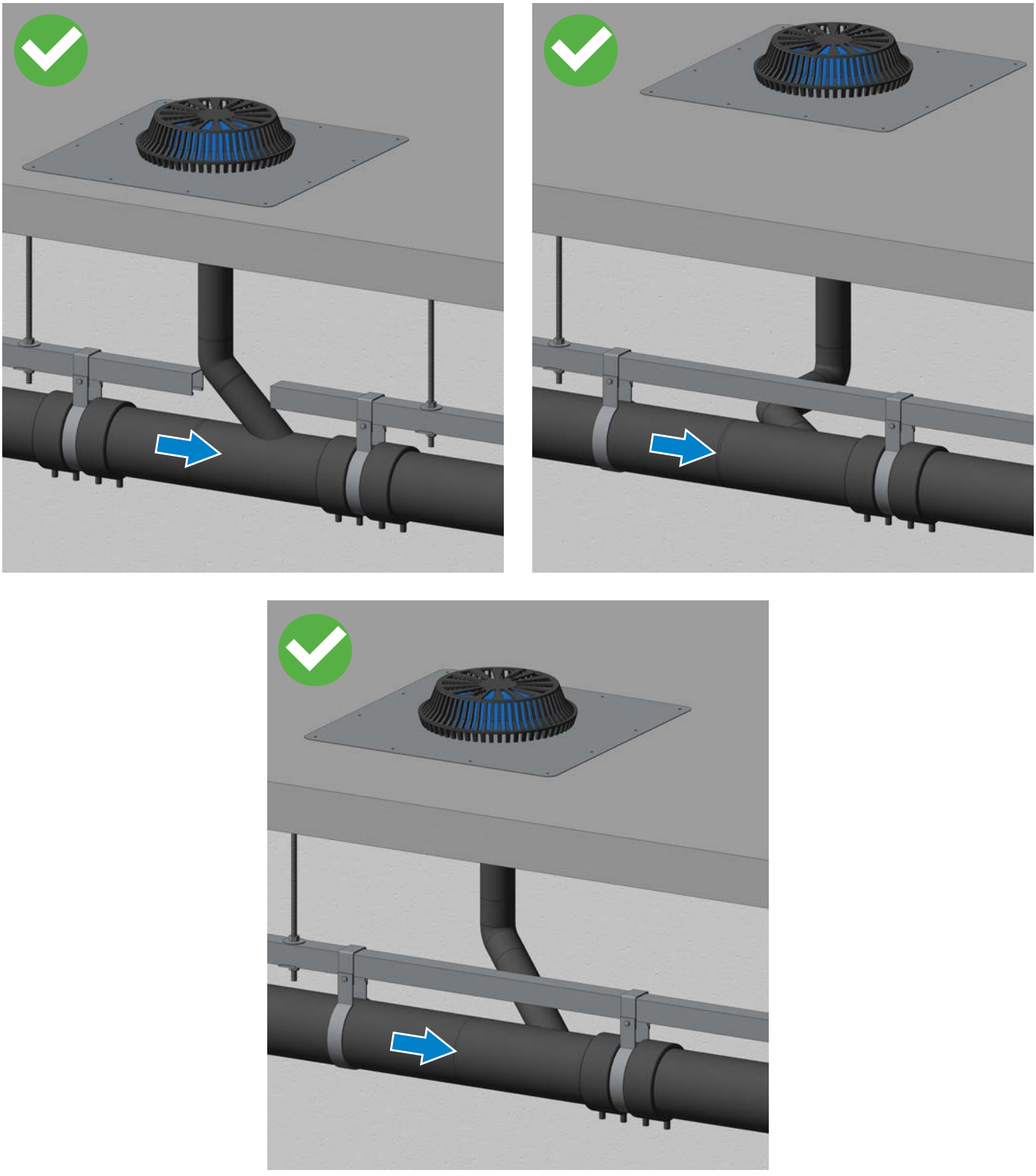




5.2.1.4 Connection between tail pipe and collector pipe

The connection between the tail pipe and the collector pipe can be made either vertically to the collector, namely by fitting the tail pipe from above, or laterally, that is by inserting the tail pipe on the side of the collector. Whenever possible, the second solution should always be preferred in order to ensure the continuity of the support bar.

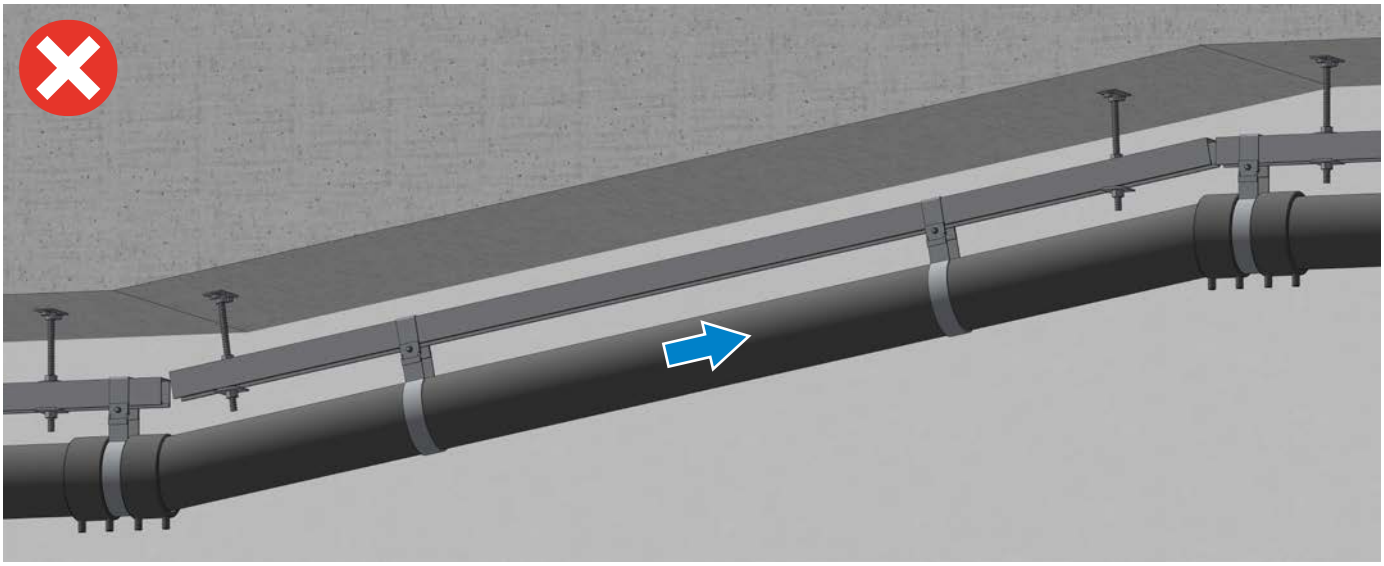
Figure 5.10 Different configurations for the connection between tail pipe and collector pipe.

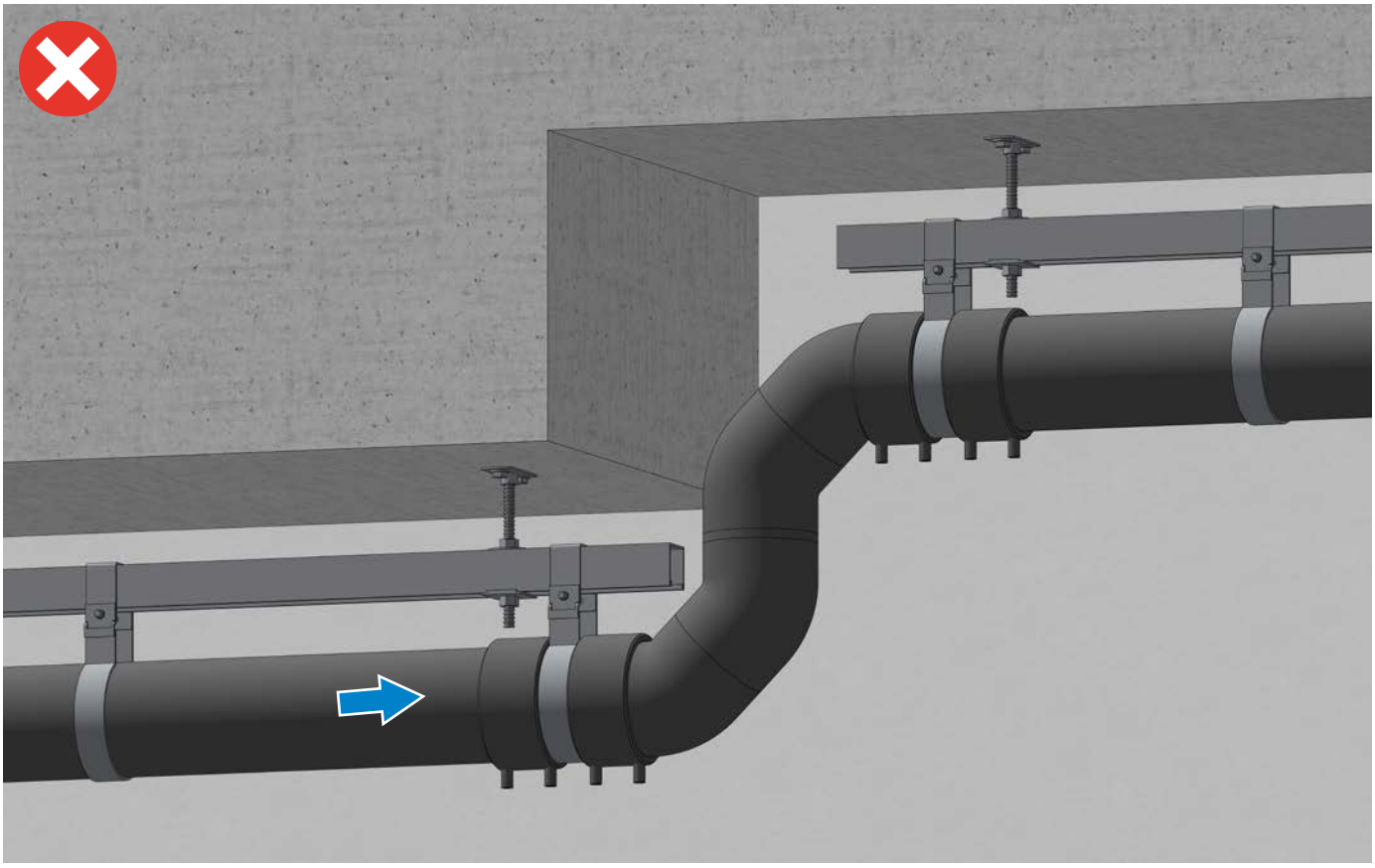


5.2.1.5 Horizontal pipe slopes

The siphonic system is known and characterised by the possibility of having perfectly flat horizontal pipes, without slope. Although the system is similar in some respects to pressurised pipes, negative slopes, i.e. upward displacement of the piping axis, are not allowed.

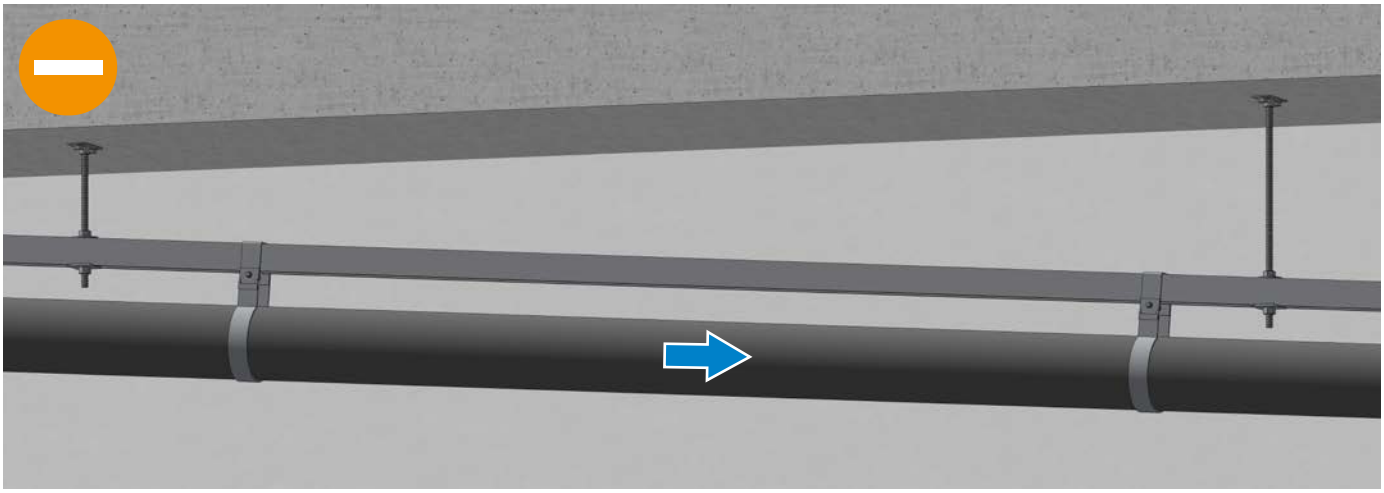
Figure 5.11 Negative pipe slope in the flow direction.





Positive slopes in the direction of the flow are not necessary; they are accepted, but discouraged because they may increase the triggering time of the siphonic effect and, therefore, the water head on the roof.

Figure 5.12 Positive pipe slope in the flow direction.



5.2.2 Jointing of HDPE pipes and fittings

5.2.2.1 Butt-welding by hand

Watch the video on website:
valsir.it/u/saldaturatestatesta

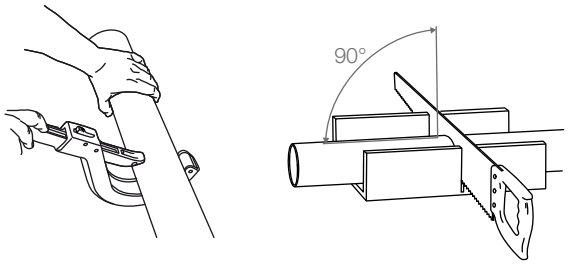
Main characteristics	
Type	This welding method allows the connection of pipes and/or fittings by using a completely manual procedure. Butt-welding consists of a heating process that produces the fusion of the surfaces to be welded using a metal plate (thermal plate). The surfaces are then united by creating the correct contact pressure. Butt-welding is characterised by a bulge of material that surrounds the area of the joint.
Diameters	32÷63 mm
Necessary tools	Pipe cutter, welding plate



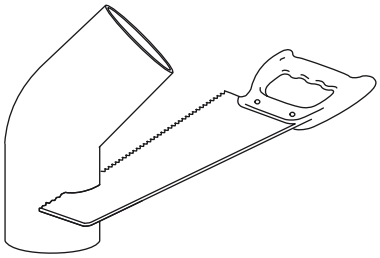
Installation indications

CAUTION!

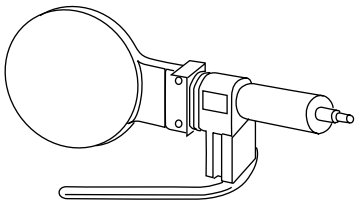
- Welding must be performed in favourable climatic conditions at environmental temperatures between -5°C and +40°C. In the presence of wind and/or humidity or in the event of temperatures below -5°C or greater than +40°C the work area will need to be heated or ventilated respectively by covering it with a canvas or other effective protective systems. At any rate it is recommended to perform a few welding tests.
- The temperature of the parts to be welded must be uniform at the time of welding. The ends of the joints that do not require welding must be closed with caps to avoid cooling the joints with the passage of air inside the pipes.
- The parts to be welded must be clean and kept clean throughout the welding process.
- The pipes, fittings and welding machine can be employed after they have been kept at the same room temperature to avoid an excessive or insufficient production of thermal energy. Pipes and/or fittings must not be exposed to rain, sun rays or sources of heat, before, during or immediately after welding.
- During welding and the other phases of the cycle (especially during cooling) the joint must absolutely not be subjected to any mechanical stress.



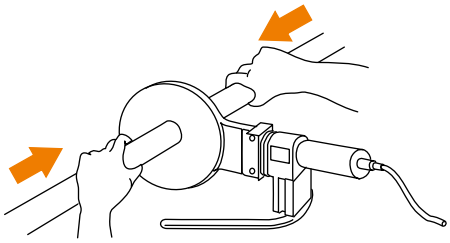
1) The pipes and/or fittings must always be cut square, accurately, with a clean cut, without burrs using a pipe cutter or fine-tooth saw. Clean the ends of the joints to be welded with a dry and clean cloth. It is recommended to chamfer the internal parts to be welded along the entire circumference in order to reduce the effect of the bulge in the internal cross-section of the pipe. Remove any burrs caused by chamfering from the inside of the pipe using a paper cloth or a clean brush. Do not touch the chamfered surfaces again with your hands.



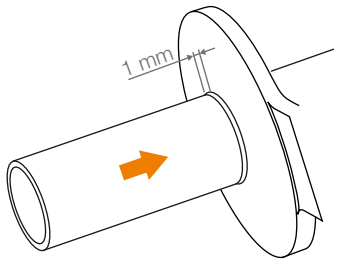
2) If necessary the ends of the fittings can be shortened by a length indicated with the letter K on the technical data sheet. The ends of the fittings must at any rate be sufficiently long for them to be handled and then welded.



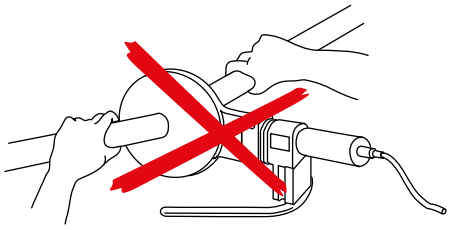
3) The temperature of the welding plate must be 210°C±5°C. For more information on use of the equipment, please consult the instructions in the handbook.



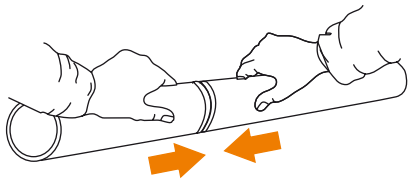
4) The first phase of the welding process consists of heating the parts to be welded. In this phase, place the welding plat between the parts to be welded, and hold them against the plate.



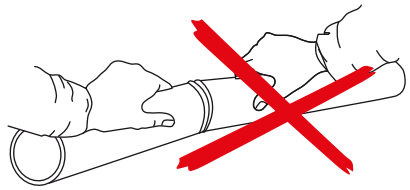
5) Apply enough pressure to create a bulge with a thickness of about 1 mm.



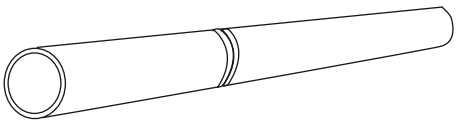
6) During the heating phase keep the parts to be welded perfectly aligned, avoiding movements or misalignments that would compromise the weld.



7) The second phase of the process consists of welding the parts together. Remove the parts therefore from the welding plate being careful not to damage the heated edges, and keeping them in axial alignment, bring them together in not more than 5 seconds to avoid them cooling. Then apply a uniform pressure until the welding seam has solidified.



8) During this phase avoid turning or flexing. To keep the parts in axial alignment during welding, a guide can be used.



9) The third and last phase of the process consists of cooling the joint. Keep the parts to be welded in position until the welding seal has solidified, this can be verified by pressing a finger on the seam. The welded joint must not be subjected to any mechanical stress until it has completely cooled down at room temperature. Do not accelerate the cooling process by contact with water or other liquids.

5.2.2.2 Butt-welding by machine

Watch the video on website:
valsir.it/u/saldaturamacchina

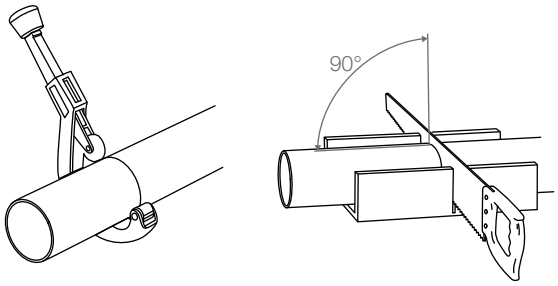
Main characteristics	
Type	This welding method allows the connection of pipes and/or fittings and requires the use of a welding machine. Butt-welding consists of a heating process that produces the fusion of the surfaces to be welded using a metal plate (thermal plate). The surfaces are then united using the welding machine and creating the correct contact pressure. Butt-welding is characterised by a bulge of material that surrounds the area of the joint.
Diameters	40÷315 mm
Necessary tools	Pipe cutter, welding machine



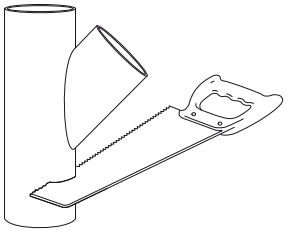
Installation indications

CAUTION!

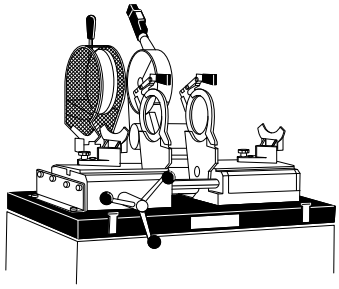
- Welding must be performed in favourable climatic conditions at environmental temperatures between -5°C and +40°C. In the presence of wind and/or humidity or in the event of temperatures below -5°C or greater than +40°C, the work area will need to be heated or ventilated respectively, by covering it with a canvas or other effective protective systems. At any rate it is recommended to perform a few welding tests.
- The temperature of the parts to be welded must be uniform at the time of welding. The ends of the joints that do not require welding must be closed with caps to avoid cooling the joints with the passage of air inside the pipes.
- The parts to be welded must be clean and kept clean throughout the welding process.
- The pipes, fittings and welding machine can be employed after they have been kept at the same room temperature to avoid an excessive or insufficient production of thermal energy. Pipes and/or fittings must not be exposed to rain, sun rays or sources of heat, before, during or immediately after welding.
- During welding and the other phases of the cycle (especially during cooling) the joint must absolutely not be subjected to any mechanical stress.
- The chemical and physical characteristics of the materials to be welded must be mutually compatible.



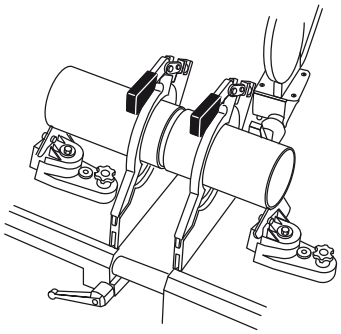
1) The pipes and/or fittings must always be cut square, accurately, with a clean cut and without burrs using a pipe cutter or fine-tooth saw. Clean the ends of the joints to be welded with a dry and clean cloth. It is recommended to chamfer the internal parts to be welded along the entire circumference in order to reduce the effect of the bulge in the internal cross-section of the pipe. Remove any burrs caused by chamfering from the inside of the pipe using a paper cloth or a clean brush. Do not touch the chamfered surfaces again with your hands.



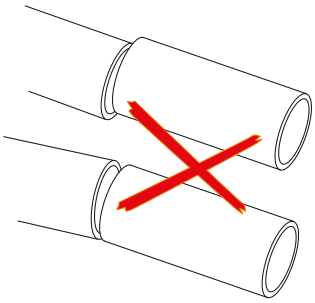
2) If necessary, the ends of the fittings can be shortened by a length indicated with the letter K on the technical data sheet. The ends of the fittings must at any rate be sufficiently long for them to be handled and then welded.



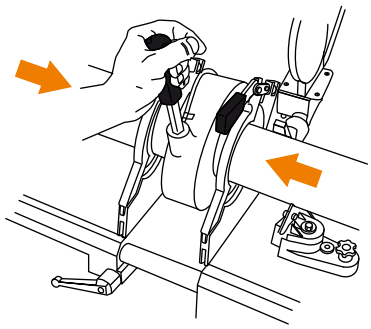
3) The temperature of the welding plate must be 210°C±5°C. For more information on the use of the equipment, please consult the instructions in the handbook.



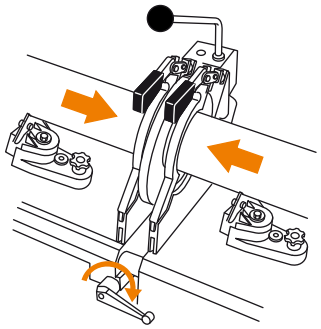
4) In the first phase the parts to be welded are blocked. Adjust the fasteners on the closing devices until the pipes and/or fittings have been correctly blocked in place; avoid excessive blocking as this causes crushing and ovalization of the pieces to be welded.



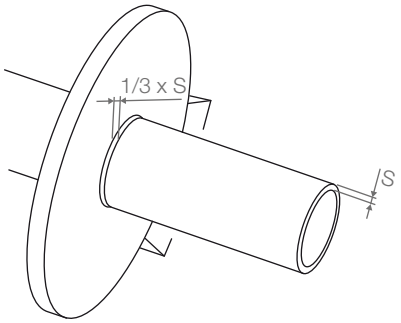
5) Block the pipes and/or fittings to be welded using the jaws of the welding machine, keeping them in axial alignment.



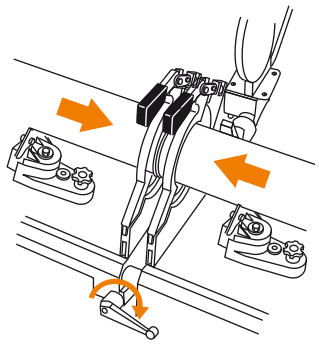
6) During the second phase the pipe parts are chamfered. The chamfering operation is fundamental to ensure that the surface of the ends is completely clean and plane. Insert the cutter between the pipe and/or fittings to be welded and activate the control on the hand grip. Push the pipe parts against the milling machine with a certain amount of pressure using the handwheel that moves the welding machine carriage. Remove the ends using the handwheel when the milling machine is still moving to avoid the formation of protusions on the surfaces to be welded. Remove the internal and external burrs using a paper cloth or a clean brush. Do not touch the chamfered surfaces again with your hands. A continuous and uniform polyethylene milling is an indication that the chamfering operation has been carried out correctly. Before welding, check the cut faces by bringing them together using the handwheel, they should be perfectly parallel.



7) The third phase concerns the heating of the parts to be welded. Position the heating plate between the parts to be welded and place them against it using the handwheel of the welding machine carriage.

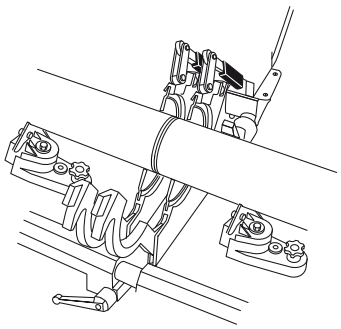


8) Apply sufficient pressure to create a melted bulge that is 1/3 of the wall thickness and/or the fitting. If necessary it is possible to block the parts to be welded in position until the bulge has formed completely using the appropriate locking device.



9) The fourth phase of the process is welding. Remove the parts to be welded from the heating plate, put the heating plate in the non-operating position to avoid damaging the heated heads and carefully press together both parts to be welded. This must be done in the space of a few seconds to avoid the pieces cooling down (from 5 seconds for diameters up to 110 mm and up to 8 seconds for diameter 315 mm). Using the carriage handwheel, progressively apply (in 5 seconds for diameters up 75 mm, to 9 seconds for diameter 315 mm) the necessary force F indicated in the table, according to the diameter OD and thickness s of the pipe and measured by the dynamometer on the welding machine. Once the welding force has been reached, block the carriage using the mechanical locking device and keep the parts in position for time Ts indicated in the table.

OD [mm]	40	50	56	63	75	90	90	110	110	125	125	160	160	200	200	250	250	315	315
s [mm]	3	3	3	3	3	3	3.5	3.4	4.2	3.9	4.8	4.9	6.2	6.2	7.7	7.7	9.6	10.9	12.1
F [kg]	5	7	7	8	10	12	14	17	21	22	27	36	45	57	70	88	109	140	173
Ts [min]	7	7	7	7	7	7	7	7	8	8	9	9	10	10	12	12	14	14	17



10) The last phase is cooling. Release the locking device but avoid sudden movements by controlling the handwheel. Open the clamps and remove the joint from the welding machine. Leave it to cool for the time Tr indicated in the table. During this phase the welded joint must not be subjected to any mechanical stress and do not accelerate cooling by contact with water or other liquids.

OD [mm]	40	50	56	63	75	90	90	110	110	125	125	160	160	200	200	250	250	315	315
s [mm]	3	3	3	3	3	3	3.5	3.4	4.2	3.9	4.8	4.9	6.2	6.2	7.7	7.7	9.6	10.9	12.1
Tr [min]	5	5	5	5	5	6	6	6	7	7	8	8	11	11	13	13	16	16	20

5.2.2.3 Electrofusion coupling

Watch the video on website:
valsir.it/u/saldaturaelettrica

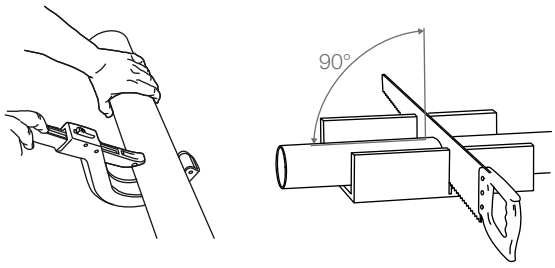
Main characteristics	
Type	This welding system allows pipes and/or fittings to be connected using electrofusion techniques with an electric sleeve.
Diameters	40÷315 mm
Necessary tools	Pipe cutter, pipe scraper, welding machine, pencil, ruler



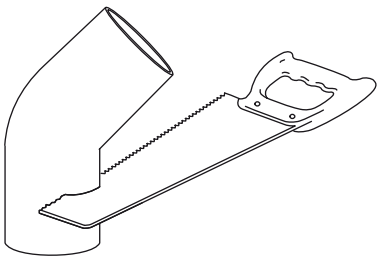
Installation indications

CAUTION!

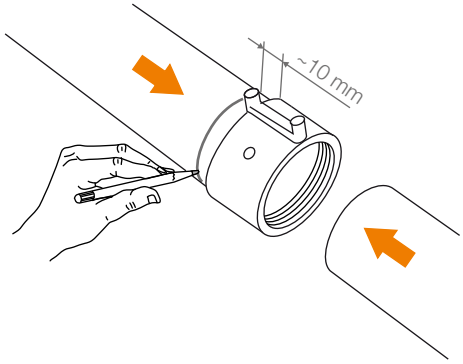
- Welding must be carried out in favourable climatic conditions at a temperature between -5°C and +40°C. In windy and/or damp conditions or if temperatures fall below -5°C or are greater than +40°C the work area will need to heating or ventilated by covering it with a canvas or another effective protective system. At any rate it is recommended to perform a few welding tests.
- The temperature of the parts to be welded must be uniform at the time of welding. The ends of the joints that do not require welding must be closed with caps to avoid cooling the joints with the passage of air inside the pipes.
- The parts to be welded must be clean and kept clean throughout the welding process.
- The pipes, fittings and welding machine can be employed after they have been kept at the same room temperature to avoid an excessive or insufficient production of thermal energy. Pipes and/or fittings must not be exposed to rain, sun rays or sources of heat, before, during or immediately after welding.
- During welding and the other phases of the cycle (especially during cooling) the joint must absolutely not be subjected to any mechanical stress.
- If large diameter pipes are to be welded it is recommended to place them on guide rollers.



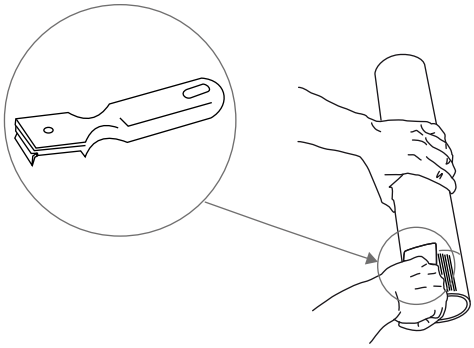
1) The pipes must be cut perpendicularly so that the turns of the electrofusion coupling remain in contact with the pipe and/ or fitting. Use a pipe cutter or fine-tooth saw. Use centering rings if ovalization of the pipe and/or fitting exceeds 1.5% x De (rounded down to 0.5 mm).



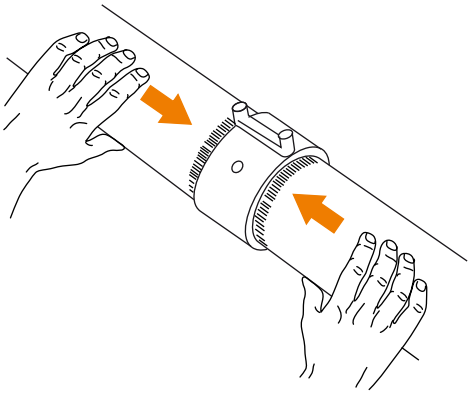
2) If necessary the ends of the fitting can be shortened as long as the remaining part is not shorter than the insertion depth of the electrofusion coupling as indicated on the technical data sheet.



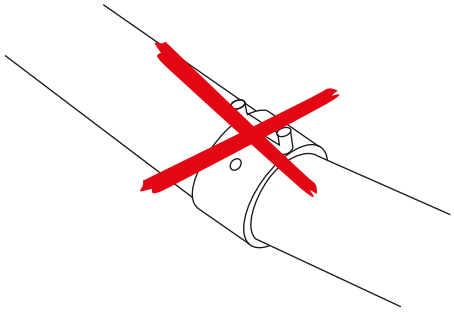
3) Clean and dry the welding ends. Mark a length of at least 10 mm greater that the insertion length of the electrofusion coupling on the pipe with a pencil, if necessary by temporarily inserting the parts into the coupler.



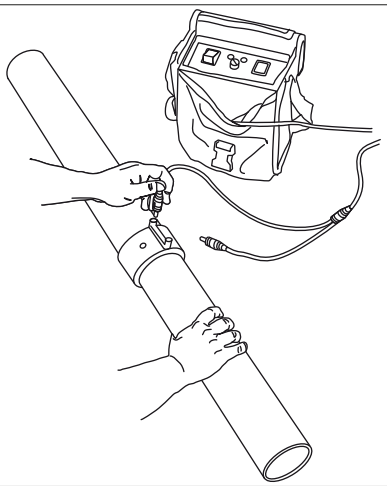
4) Scrape the welding ends; scraping must be uniform and complete to a depth of approximately 0.2 mm up to the pencil mark. Use appropriate pipe scrapers. In no case should cutters, sandpaper, files or emery-wheels be used.



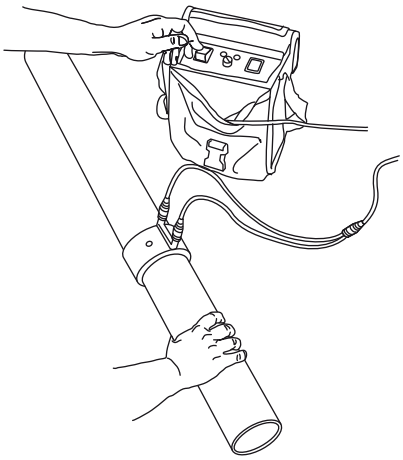
5) Inserts the parts to be welded into the electrofusion coupling up to insertion depth. The connection with the coupling must be free of tension such as those caused by any bracketing clips previously tightened near the weld area. The welding ends must remain dry during the whole welding process.



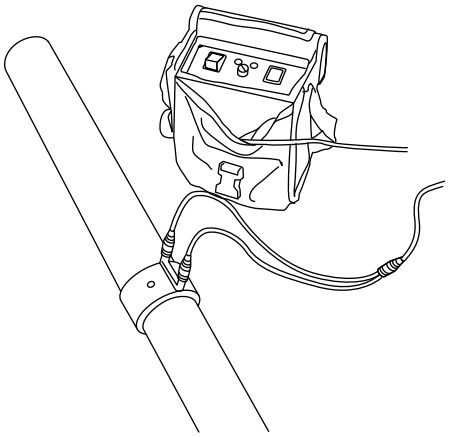
6) Keep the parts to be welded aligned and avoid any mechanical stress that could cause misalignment.



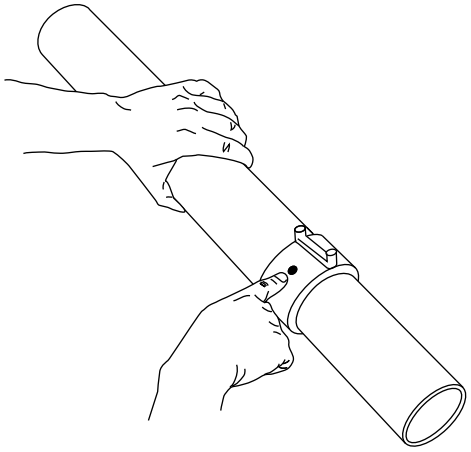
7) Connect the electrofusion coupling to the welding machine using the appropriate plugs according to the diameter to be welded (for more information please see the welding machine handbook).



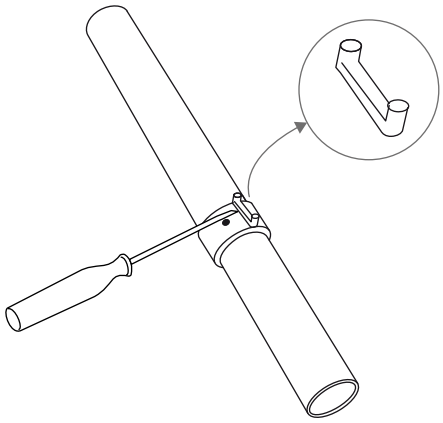
8) The welding time is determined automatically by the machine, which, when completed, will produce an audible signal. On no account can the same coupling be welded twice.



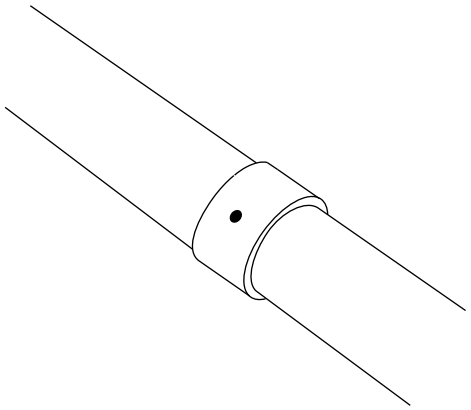
9) The parts to be welded must be kept in position and aligned; furthermore, they must not be subjected to any mechanical stress during welding. Any movement of the coupling during the welding could cause a short circuit of the turns and an incorrect weld.



10) An incomplete welding can be verified by the fact that the indicator on the electrofusion coupling has not changed colour (from white to black). Attention: the indicator does not guarantee a perfect weld which can be influenced by numerous factors such as dimensional tolerances, the ovality of the components to be welded, mechanical stress in the connection area. The parts to be welded must remain in position and aligned; they must not be subjected to any mechanical stress during cooling.



11) If required, the electrical connector sockets on the electrofusion couplings can be removed at the end of the cooling phase



12) Water must not be poured over the joint nor should any other action be taken to accelerate cooling of the electrofusion coupling.

5.3 Bracketing system

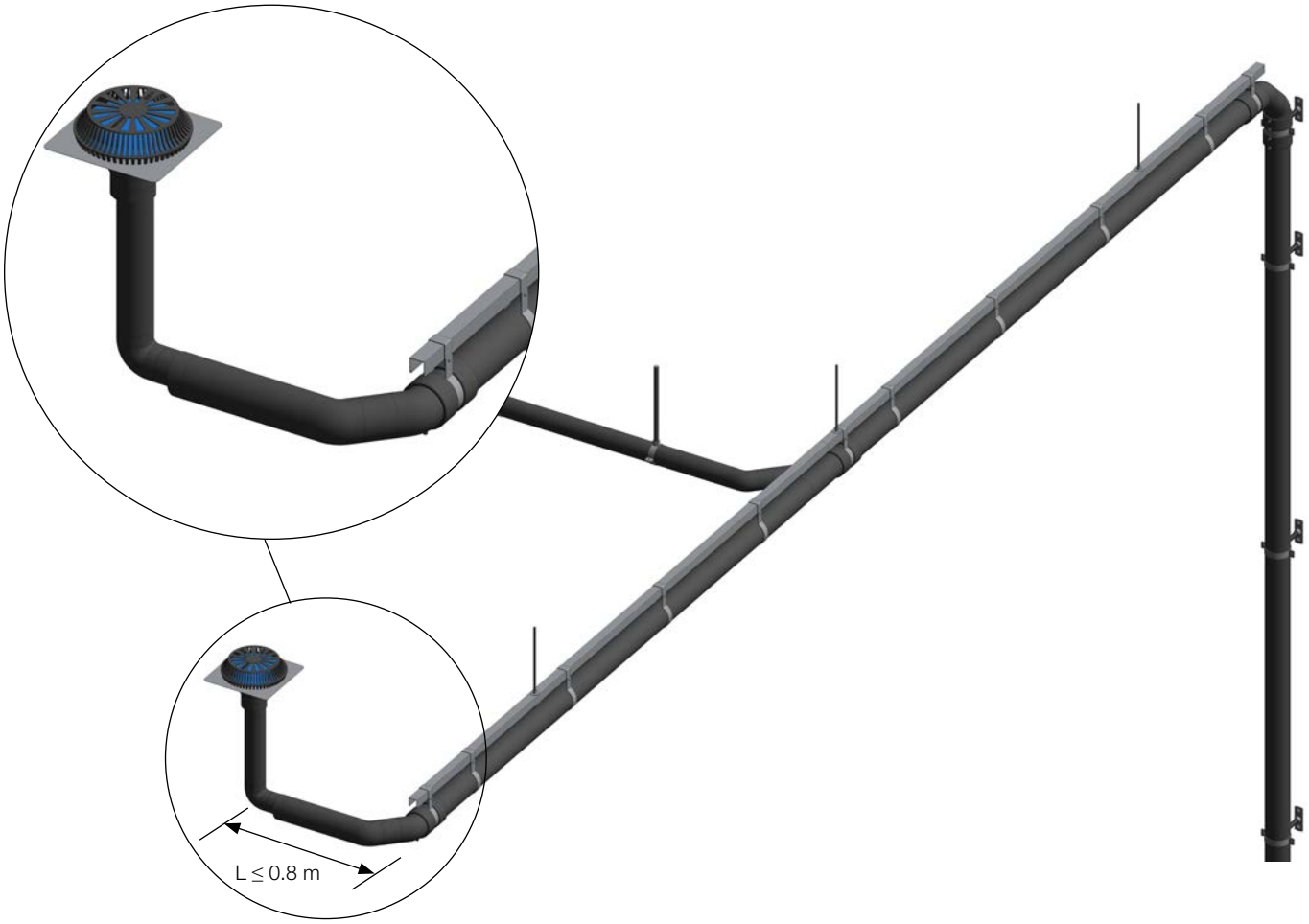
As previously mentioned, the bracketing system is very important within a siphonic drainage system. Therefore, it is important to use the right type and number of brackets in the correct positions of the system. All clips used must be installed in fixed-point mode, that is, tightening them until the pipe inside them is not able to slide.
Rainplus® software offers important help to the designer and installer as the quantities of clips to be used and the points in which they must be placed can be easily graphically identified within the work and printing environment.
Below are the rules of the most commonly used bracketing method recommended by Valsir.
There are special bracketing solutions that can be used in specific cases; they are not listed in this manual, but can be evaluated by contacting the Valsir technical office.

5.3.1 Rules for horizontal pipes

In the case of horizontal piping sections:

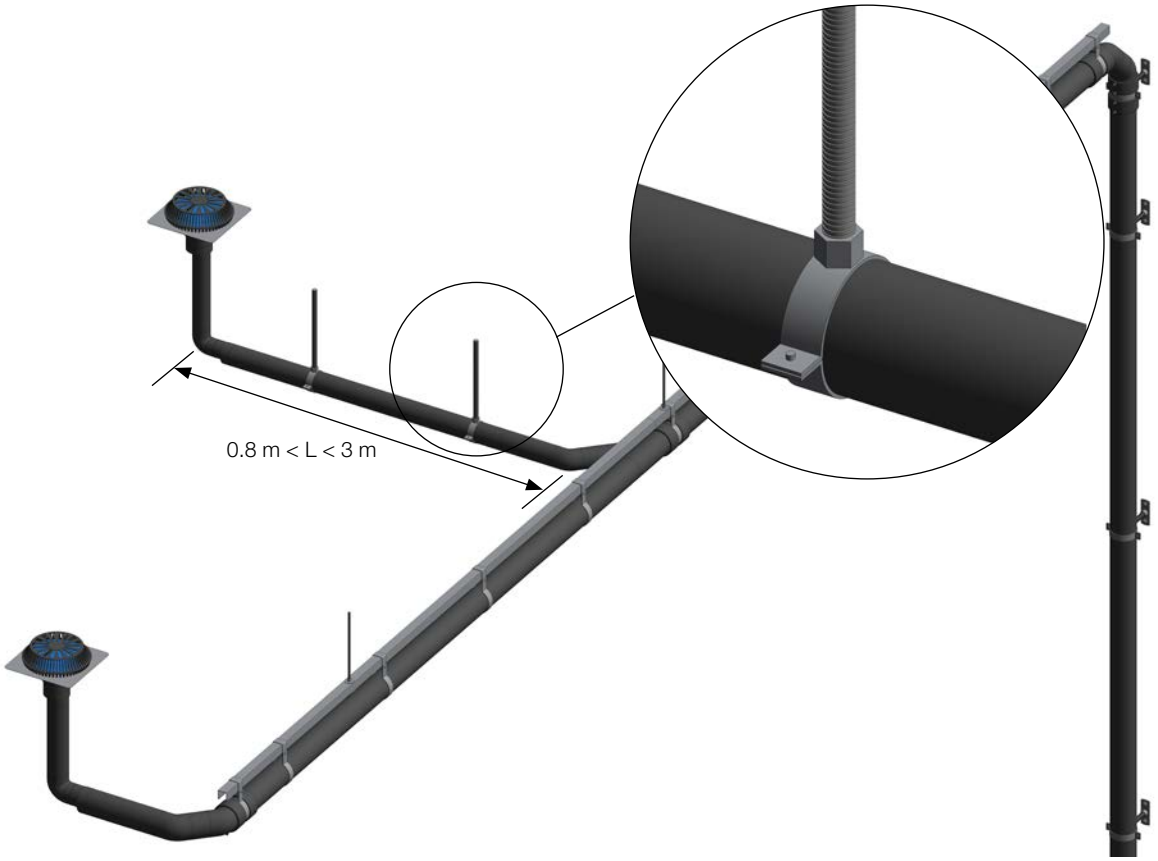
1) If L ≤ 0.8 m, no clip.

Figure 5.13 Rule for brackets in the case of horizontal pipes with L ≤ 0.8 m.



2) If 0.8 m < L < 3 m, clips fixed to the structure by means of a threaded rod.

Figure 5.14 Rule for brackets in the case of horizontal pipes with 0.8 m < L < 3 m.



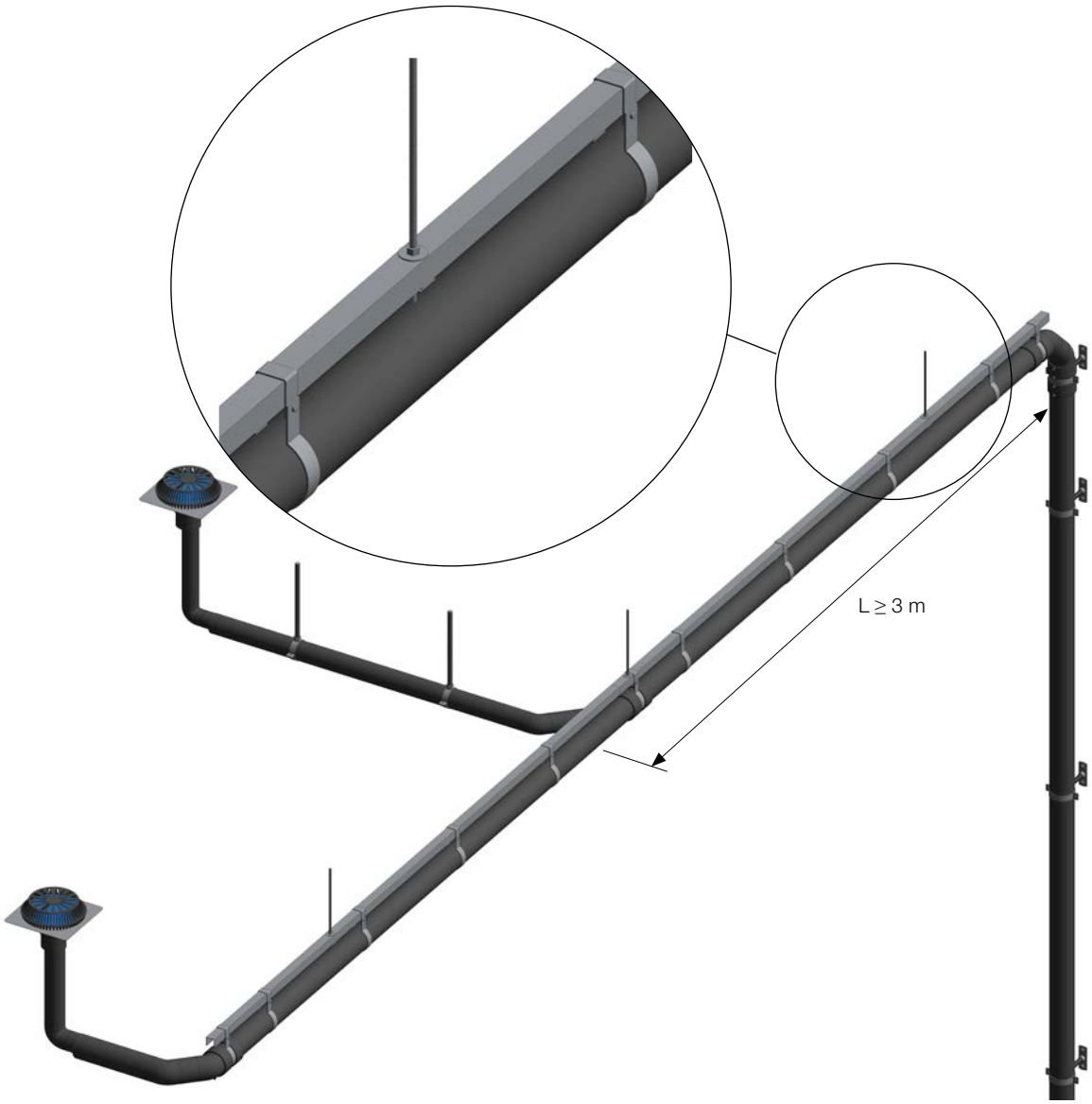
Refer to the following table for threaded rod size selection:

Table 5.1 Threaded rod size selection.

Distance from the structure [mm]	Diameter OD [mm]											
	40	50	56	63	75	90	110	125	160	200	250	315
1001 - 1100												
901- 1000												
801 - 900												
701 - 800												
601 - 700												
501 - 600												
401 - 500												
301 - 400												
201 - 300												
101- 200												
51 - 100												
0 - 50												

3) If L ≥ 3 m, Rainplus-S clips with support bar.

Figure 5.15 Rule for brackets in the case of horizontal pipes with L ≥ 3 m.

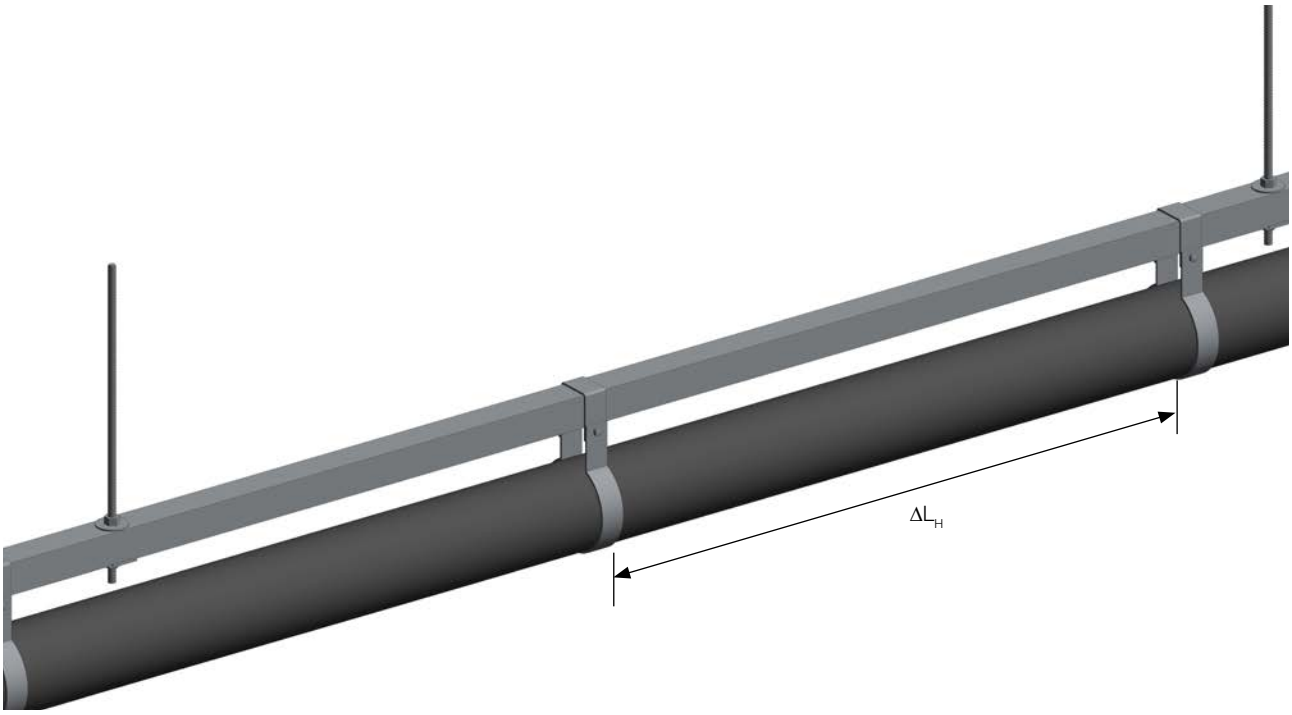


The ΔL_H distance between clips is calculated using the following formula:

$$\Delta L_H = 10 \cdot OD \qquad [5.1]$$

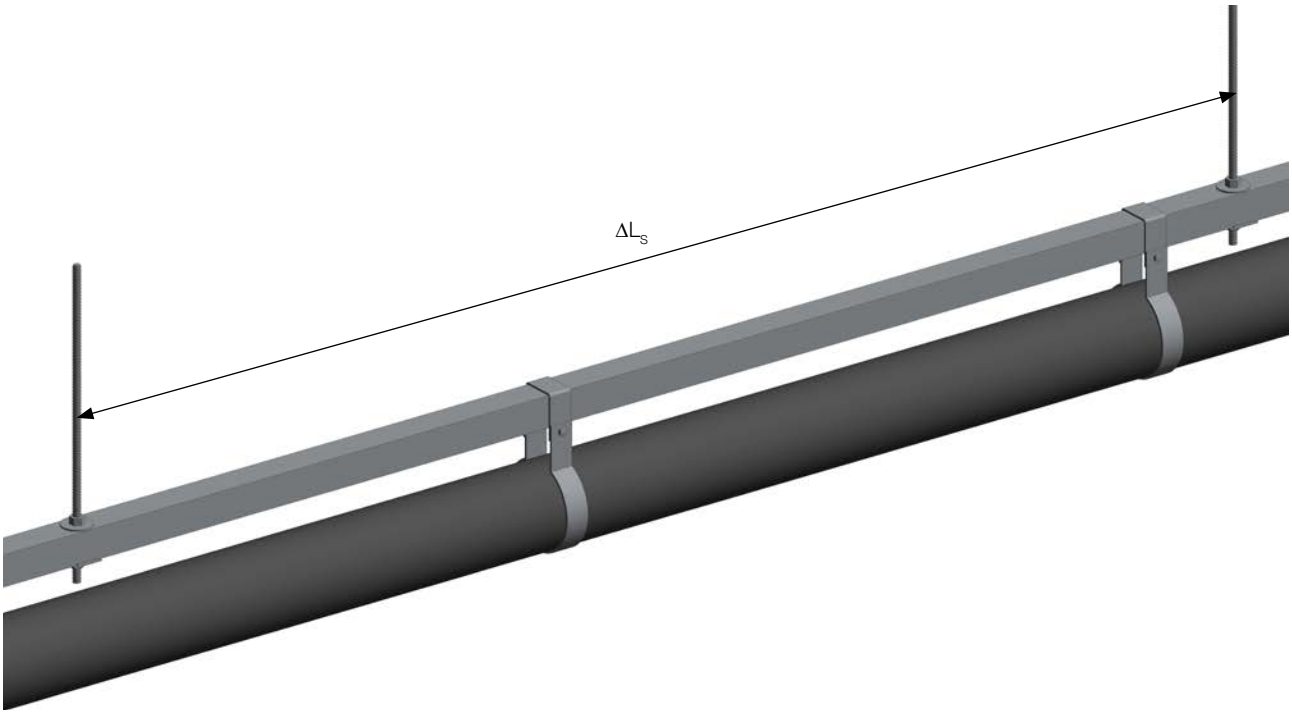
where OD is the outer diameter of the pipe; a minimum distance of 0.8 m and a maximum distance of 2 m are considered.

Figure 5.16 ΔL_H distance between clips in the case of horizontal pipes.



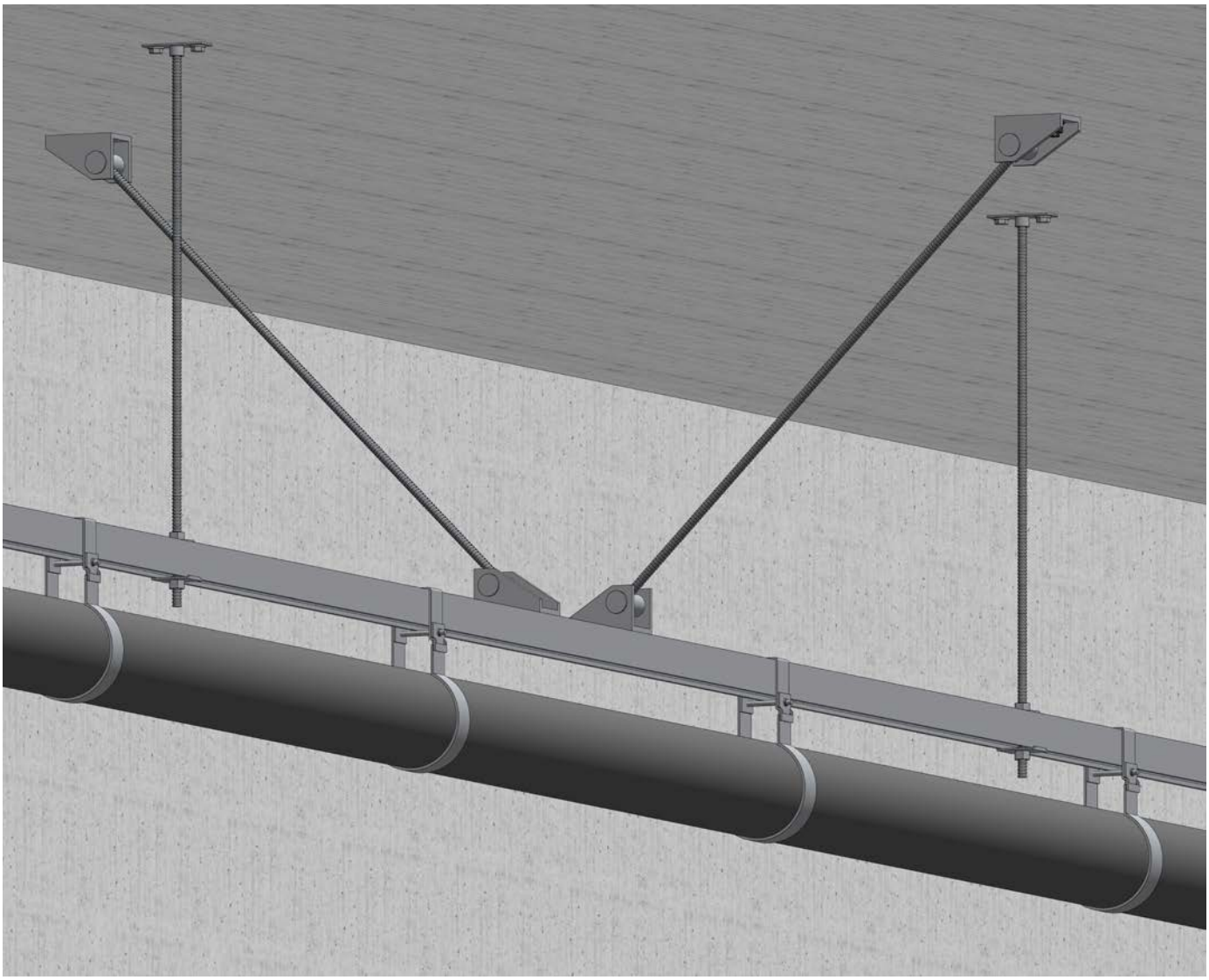
Regardless of the distance of the support bar from the structure used for fixing, the size of the threaded rod is M10. The maximum ΔL_s distance between one threaded rod and the next is 2.5 m for pipes up to 160 mm OD and 2 m for pipes with a larger outer diameter.

Figure 5.17 ΔL_s distance between threaded rods when the support bar is used.



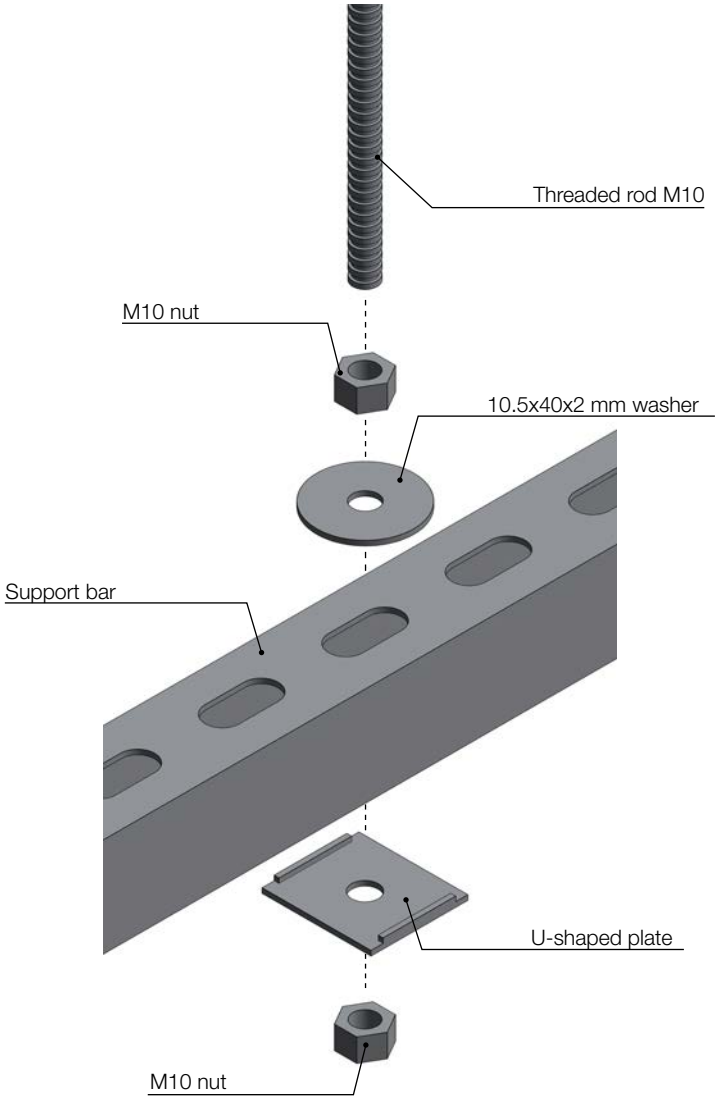
Although there are no limits for the lengths related to the threaded rod, the possibility of oscillation of the piping-bracketing system must be taken into account.
If the distances of the threaded rod from the structure of the building are greater than those commonly used (> 40÷50 cm) or in the case of piping routes characterised by numerous changes in direction, provide components that retain the bracketing system at the sides so as to limit possible oscillations to a minimum. The brackets to be adopted to prevent such oscillations must be evaluated on a case-by-case basis depending on the possible connections with the structure of the building; these components are not supplied by Valsir, but are easily available on the market.

Figure 5.18 Example of a bracketing system secured at the sides for Rainplus® system.



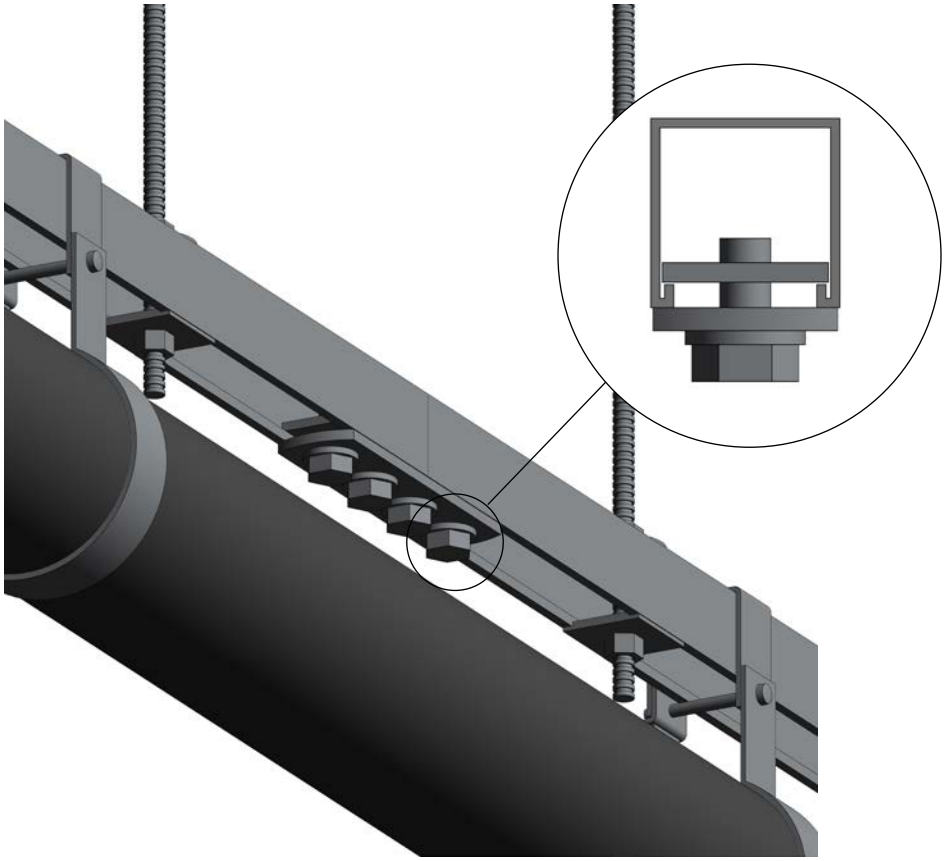
The threaded rod is connected to the support bar using the components shown in the following figure, while the best way to fasten the threaded rod to the building structure must be evaluated each time according to the type of structure to which it is to be connected.

Figure 5.19 Components for the connection of the threaded rod to the support bar.



Use the appropriate connector to connect two sections of a support bar.

Figure 5.20 Connector for Rainplus® support bars.

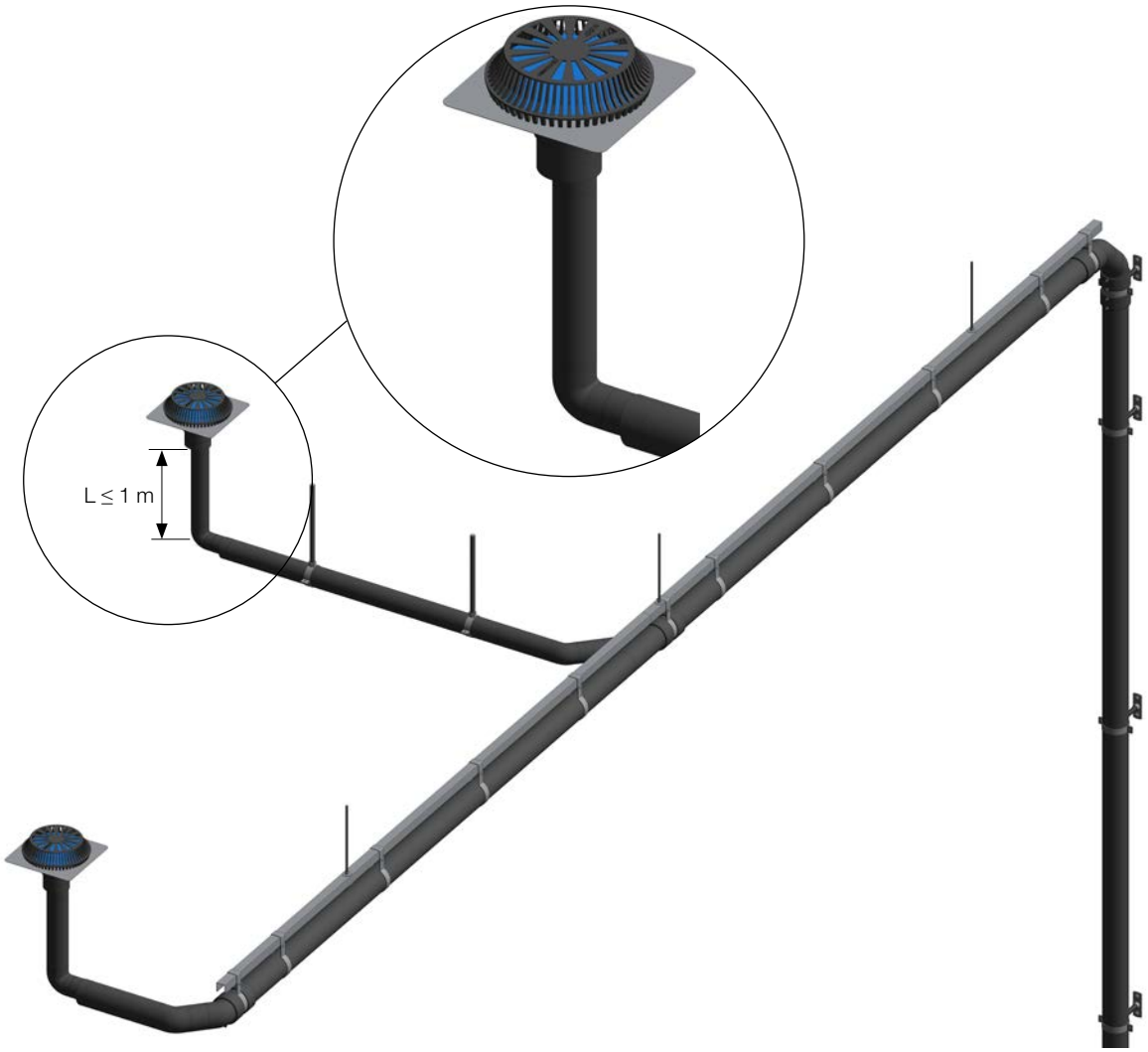


5.3.2 Rules for vertical pipes

In the case of vertical piping sections:

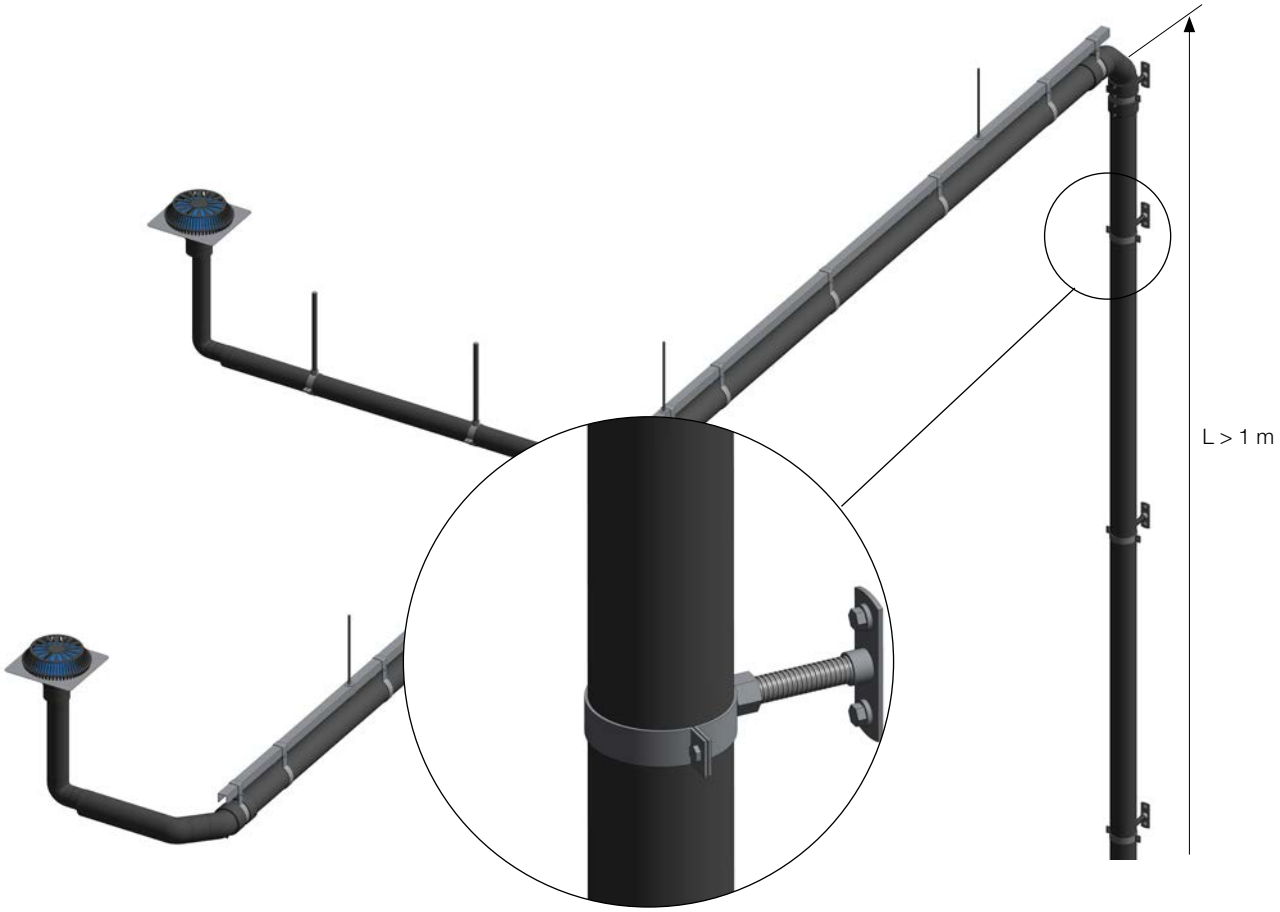
1) If L ≤ 1 m, no clip.

Figure 5.21 Rule for brackets in the case of vertical pipes with L ≤ 1 m.



2) If L > 1 m, clips fixed to the structure by means of a threaded rod.

Figure 5.22 Rule for brackets in the case of vertical pipes with L > 1 m.



Refer to the following table for threaded rod size selection:

Distance from the structure [mm]	Diameter OD [mm]											
	40	50	56	63	75	90	110	125	160	200	250	315
1001 - 1100												
901- 1000												
801 - 900												
701 - 800												
601 - 700												
501 - 600												
401 - 500												
301 - 400												
201 - 300												
101- 200												
51 - 100												
0 - 50												

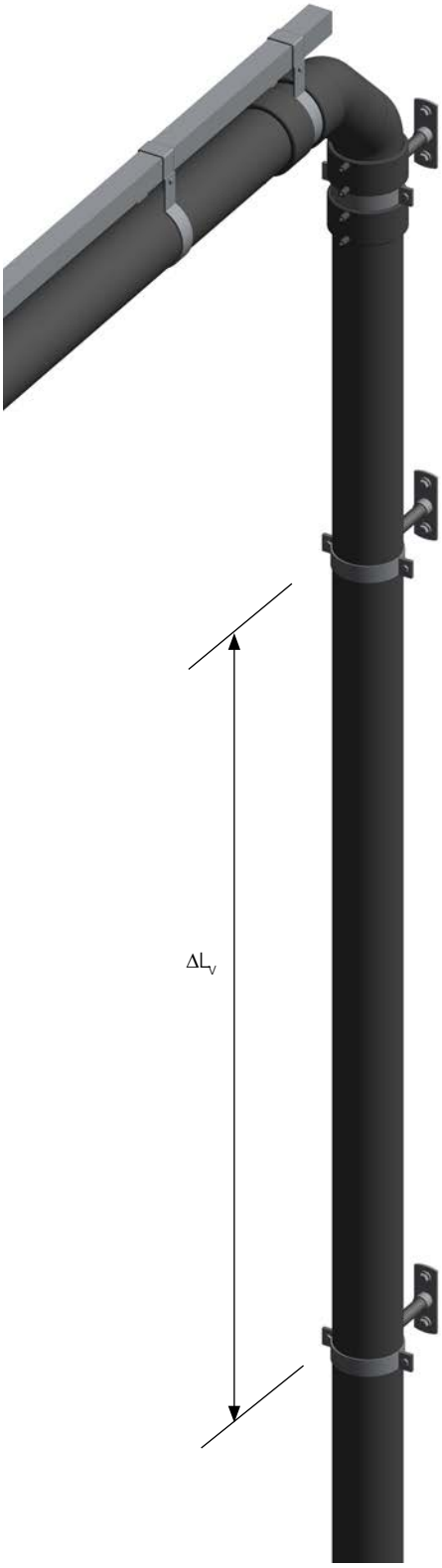
3/4”
1”¼
2”
1”
1”½
1/2”

The ΔL_V distance between clips is calculated using the following formula:

$$\Delta L_V = 15 \cdot OD \qquad [5.2]$$

where OD is the outer diameter of the pipe; a minimum distance of 1 m is considered as well as a maximum distance of 2 m (for pipes with 160 mm and 200 mm OD) and of 3 m (for pipes with 250 mm and 315 mm OD).

Figure 5.23 ΔL_V distance between collars in the case of vertical pipes.



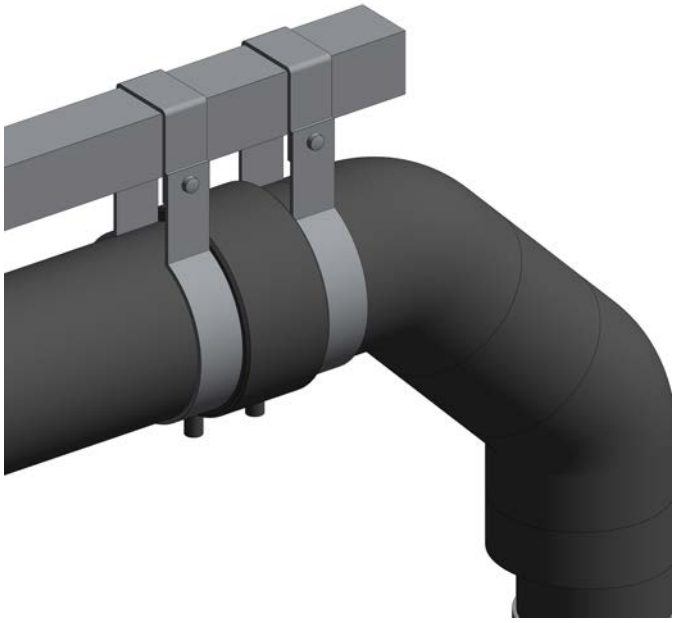
5.3.3 Rules for anchor points

There are points within the siphonic system that, due to thermal expansion of the pipes and the force of impact of water within them, may be considered more critical than others.
These points are normally identified with changes in direction and branches.
In order to reinforce them, a specific bracketing method, characterised by electrofusion couplings and bracketing clips joined together, must be implemented in these areas.

Figure 5.24 Making anchor points by combining electrofusion couplings and bracketing clips.



Solution 1



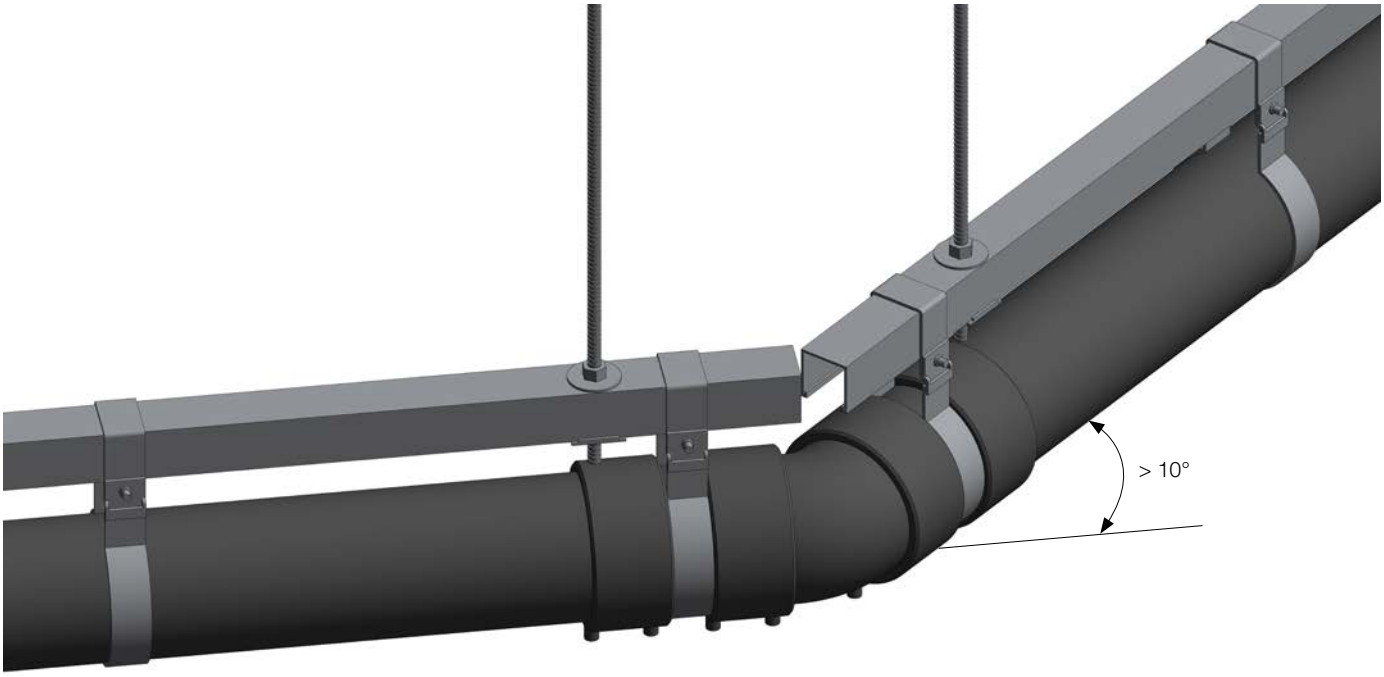
Solution 2

Both of the above solutions can be technically used. For economical reasons, solution 1 is usually used for pipes with outside diameter OD between 40 mm and 160 mm and solution 2 for larger diameters.

The rules for anchor points also require that:

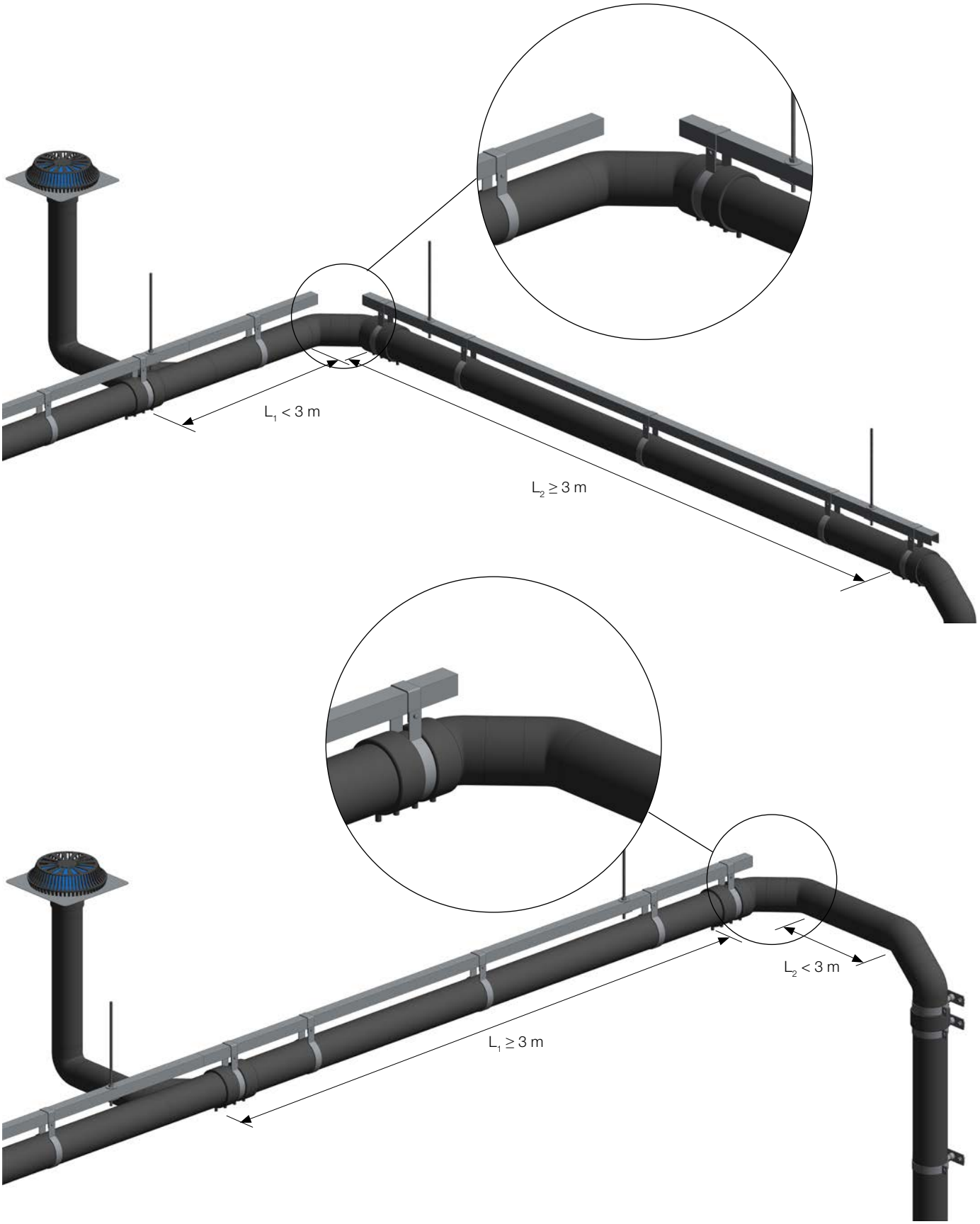
1) An anchor point must be made before and after each change in direction with an angle greater than 10°.

Figure 5.25 Making anchor points in the presence of changes in direction.



The anchor point before the change in direction can be avoided if the section before it is less than 3 m long. Similarly, the anchor point after the change in direction can be avoided if the section after it is less than 3 m long.

Figure 5.26 Exceptions when making anchor points in case of changes in direction.

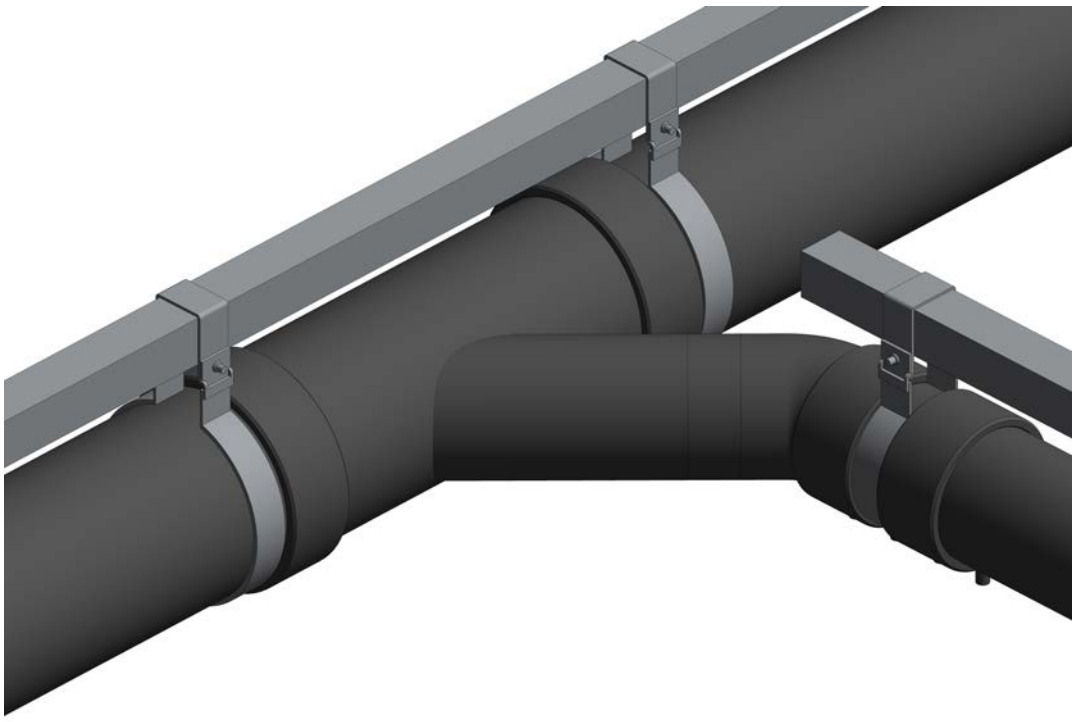


2) An anchor point must be provided in the presence of branches; there are two possible solutions for making it.

Figure 5.27 Making an anchor point in the presence of branches.



Solution 1

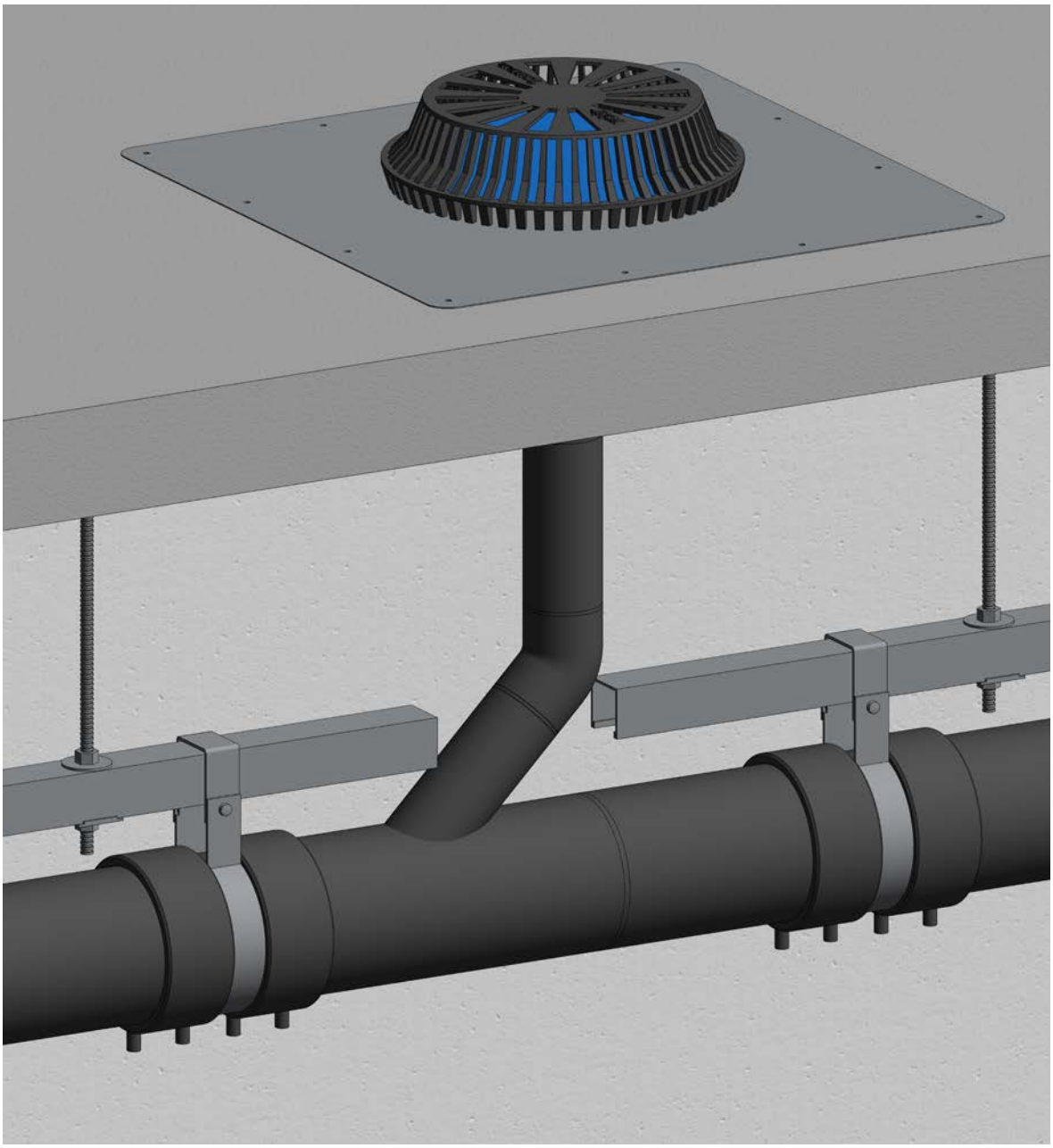


Solution 2

The section of the system that makes up and precedes the branch connection must be considered as a change in direction and, therefore, follows the rules in point 1).

3) If the tail pipe is fitted vertically in the collector pipe, thereby interrupting the continuity of the support bar, an anchor point must be provided both before and after the connection branch.

Figure 5.28 Making an anchor point when the tail pipe is fitted vertically in the collector pipe.



Below is a diagram of a typical system, highlighting the arrangement of anchor points according to the rules previously defined.

Figure 5.29 Example of application of the anchor point rules to a Rainplus® system.

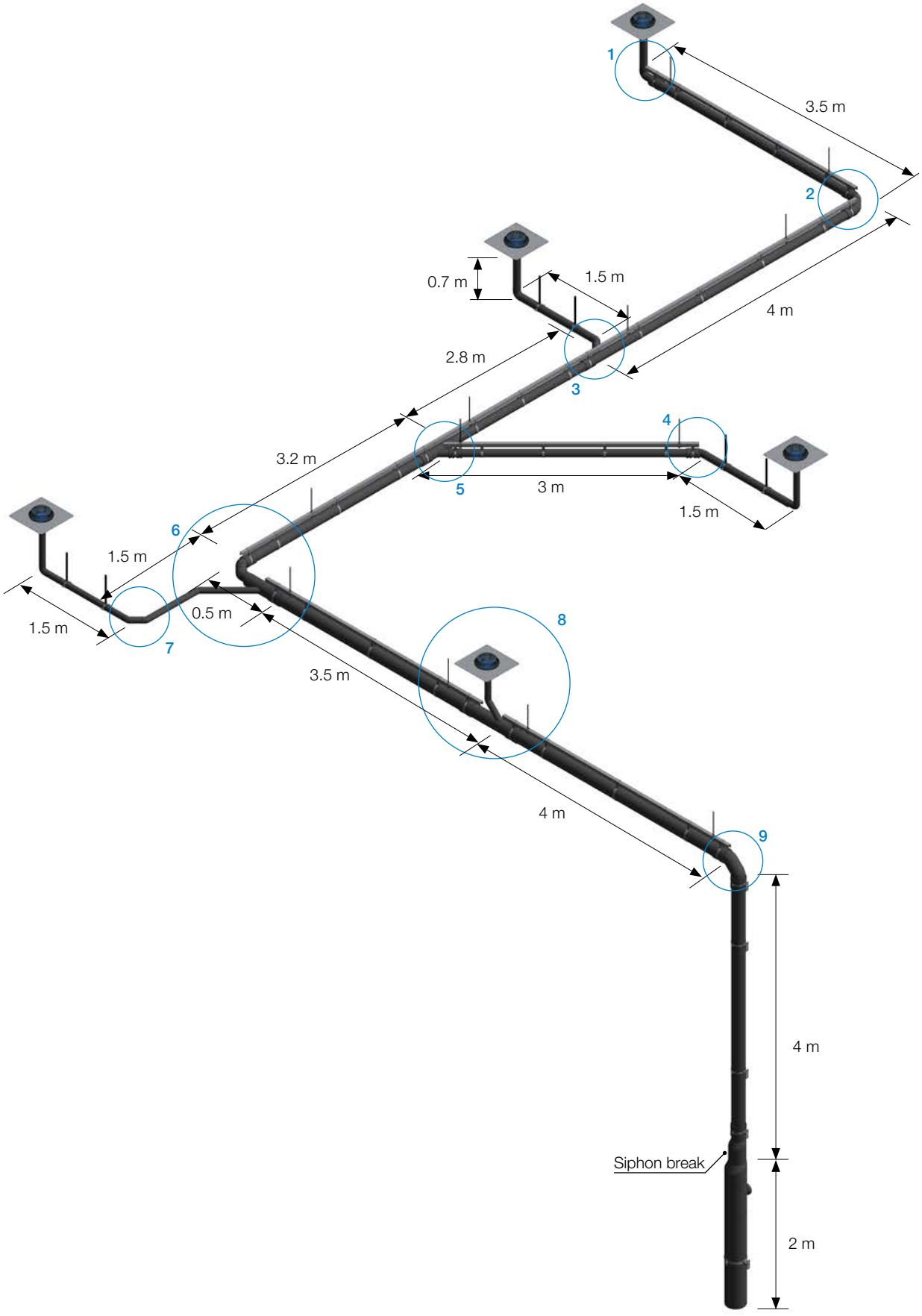
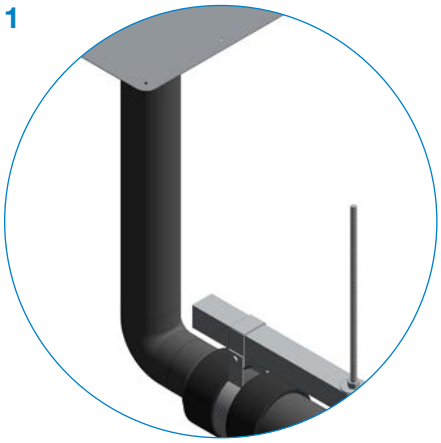
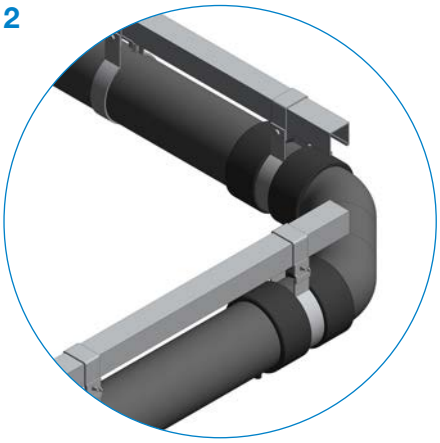


Figure 5.30 Details.

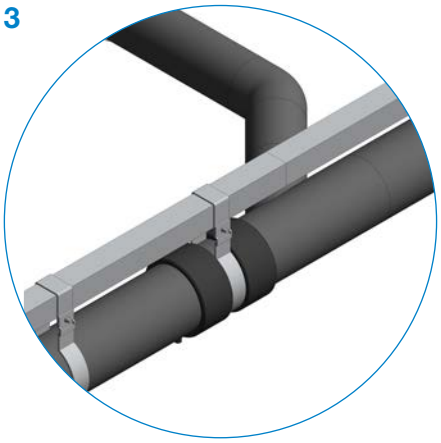
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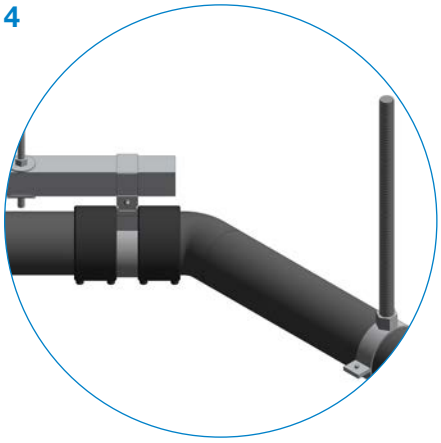
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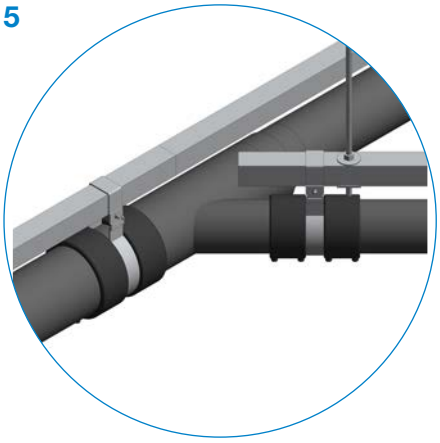
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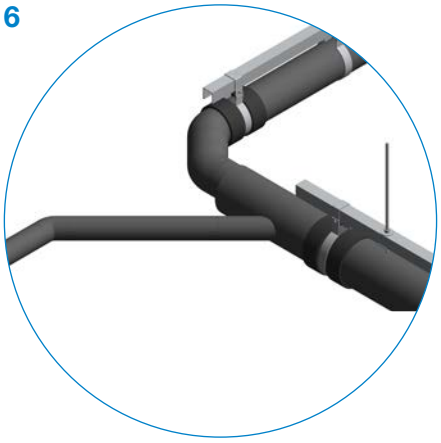
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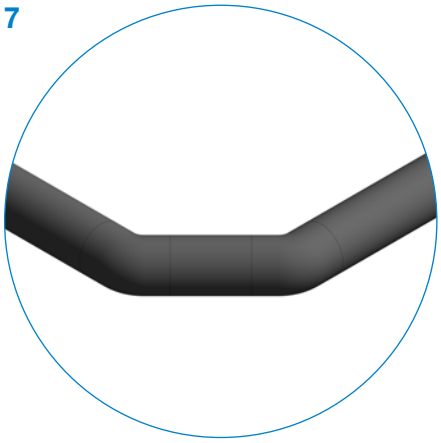
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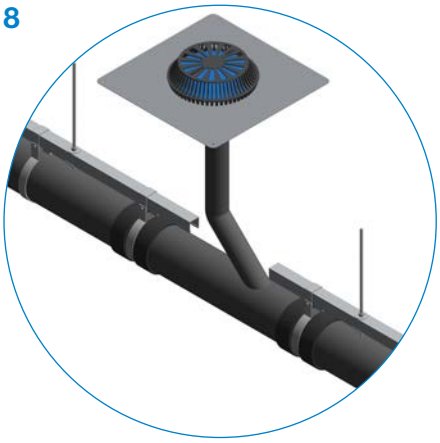
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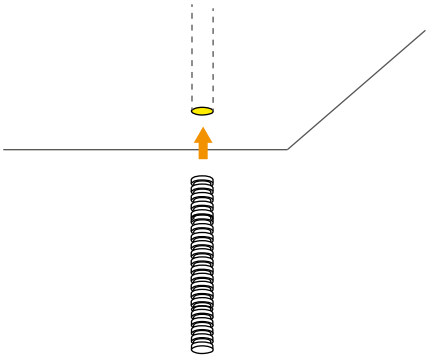


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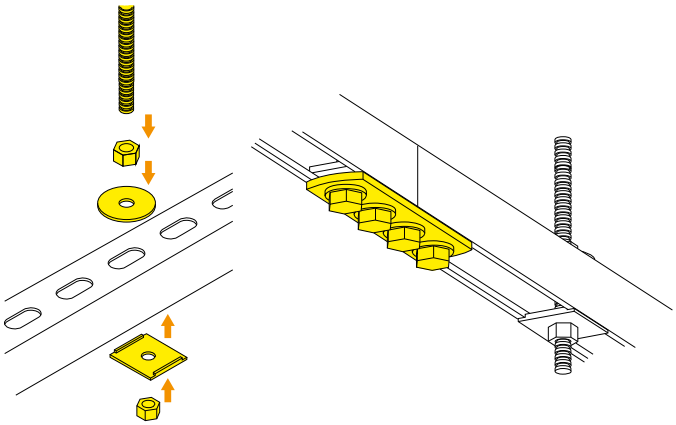


5.3.4 Rainplus-S bracketing system installation instructions

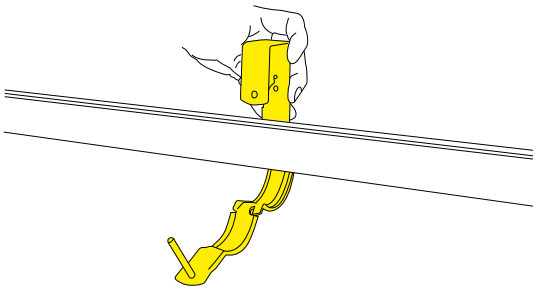
Installation indications



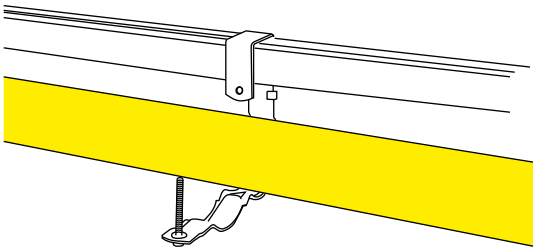
1) Fix the threaded rod to the building structure by evaluating the most appropriate fastening method.



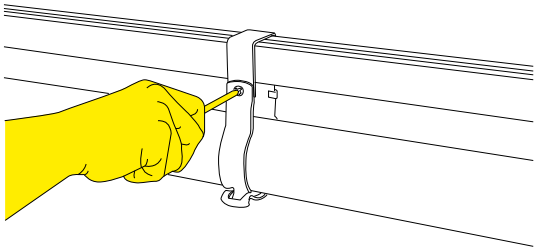
2) Fix the support bar to the threaded rods in point 1 using the suitable components. Should it be necessary to connect two support bar sections, use the connection plate.



3) Open the clip by loosening the screw and then place the inverted U-shaped upper part on the required point of the support bar.



4) Place the pipe in the special seat of the clip.



5) Close the clip and tighten the screw with a screwdriver.

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