SPECIFICATION MANUAL

AKASISON XL

SIPHONIC ROOF DRAINAGE

akasison

PRACTICAL BY PRINCIPLE.

Akatherm has been a supplier and producer of high quality plastic pipe systems for more than 50 years.

We offer system solutions for drainage of rain and waste water, as well as for the supply of hot and cold water. We design, produce and market all our own products, making sure that our plastic pipe systems are the best quality and offer absolute reliability.

Akasison is a full bore flow rainwater drainage concept from Akatherm and is based on eight principles.

We take full responsibility for providing optimal rainwater drainage; we deliver a complete product range, consisting of roof outlets, fasteners, pipes and fittings; we offer technical solutions for every type of building; our customers have a single contact person who organises the project from start to finish; you will always be offered the most economical solution based on our experience; and as a customer working with Akasison, you are always assured of an optimal system.

At www.akasison.com you can read more about the Akasison concept and our eight principles. Convince yourself.

INFORMATION AND SAFETY RECOMMENDATIONS

Applicability
This Specification Manual is applicable for installations with the Akasison XL roof drainage system.

Validity
This Specification Manual is valid from 2019. With the appearance of this manual previous manuals are no longer valid. Full technical documentation can be downloaded at www.akasison.com.

This Specification Manual is produced with extreme care. All measurements and weights are approximate and errors and changes reserved. Akatherm BV does not accept any liability for damage caused by omitted or incorrect data mentioned in this manual.

Important information and pictograms
This manual contains pictograms to emphasise important or beneficial information.

Important information to be taken into account

Consult Akasison Sales or Customer Service

Benefit

Disclaimer
The Akasison Drainage System is designed and developed for drainage of rain water only. Other applications are prohibited and are not the responsibility of Akatherm.

All applicable national and international assembly, installation, accident prevention and safety regulations must be followed. Furthermore the information in this Specification Manual must be followed during the installation of the Akasison XL roof drainage system.

The applicable laws, standards, guidelines, regulations and instructions for environmental protection, professional associations and the local utility companies must also be followed.

Applications not covered in this Specification Manual (special applications) require consultation with our technical department. For specific advice please consult the Akatherm Sales Office.

The planning and installation instructions are directly related to the respective Akasison products. The reference to standards or regulations is of a general nature only. Be aware of the current status of guidelines, standards and regulations. Other standards, regulations and guidelines regarding the planning, installation and operation of drainage or building systems also need to be taken into account and are not part of this Specification Manual.

For your safety and proper application of our products, please check regularly for any updates or replacements of this Specification Manual. The issue date is always mentioned on the cover. The valid technical information can be obtained from your Akasison wholesaler, the Akatherm Sales Office and can be downloaded at www.akasison.com.

Safety and operating instructions
- Read the safety and operating instructions completely and carefully for your own safety and the safety of others before starting installation
- Store these instructions and keep them available
- If the safety instructions or installation instructions are unclear, please contact the Akatherm Sales Office

General precautions
- Keep your work area clean and free from obstructions
- Provide adequate lighting of your work area
- Keep unauthorised persons away from tools and the work area, especially during renovations in inhabited areas
- Use only Akatherm and Akasison system components. The use of non-system components may lead to leakage or other problems

During assembly
- Always read and follow the operating instructions of the tools used
- Improper use of tools can cause severe cuts, bruising or dismemberment
- Improper use of tools can damage components and cause leaks
- Pipe cutters have sharp blades. Store and handle without risk of injury
- Note the safety distance between your hand and cutting tool when cutting pipes
- Never grab the cutting part of the tool or moving parts during the cutting process

1. Application and design guidelines

2. Material properties

3. Standards and quality

4. Product range

5. Installation instructions

6. Mounting system

7. Pipe system

8. Jointing methods

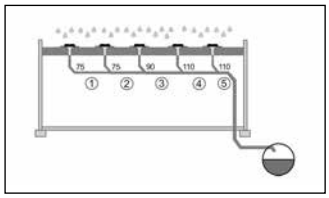
1 APPLICATIONS AND DESIGN GUIDELINES

1.1 SIPHONIC ROOF DRAINAGE SYSTEM EXPLAINED

The Akasison system for siphonic roof drainage considerably expands the possibilities for buildings with large and complex roofs. To respond, whether a consultant or installer, to the challenges faced by your clients and end users the Akasison system offers the following benefits:

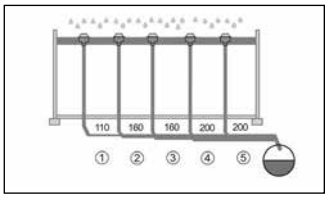
- Save space for the function and mechanical services of the building
- Total freedom & flexibility of roof drainage design
- Economical installation with a light, plastic (HDPE) and welded pipe system
- Full peace of mind from a sophisticated risk management system

Siphonic roof drainage



- Fewer down pipes
- Level pipe work
- Smaller diameters
- Less groundwork in building structure
- High speed
- Self-cleaning

Conventional roof drainage



- Many down pipes
- Gradient pipe work
- Larger diameters
- Groundwork in building structure
- Low speed

The Akasison siphonic roof drainage system is engineered on the concept of full bore (a fill rate of 100%). This implies that rainwater flows at high speed through small diameter pipe work, at normally zero gradient. This siphonic effect is created by the (kinetic) energy derived from the hydraulic head, caused by the difference in height between the roof outlet and the discharge point in a building. Specialised roof outlets prevent air from being sucked into the system. The engineering principle of siphonic roof drainage design is based on the Bernoulli energy equation for a steady flow of an incompressible fluid with constant density. In order to balance the equation, and to guarantee the required siphonic effect according to the rainfall's intensity, the ideal pipe dimensions per flow path need to be determined.

$$\rho_1 / \rho . g + V_1^2 / 2 . g + Z_1 = \rho_2 / \rho . g + V_2^2 / 2 . g + Z_2 + \Sigma h_f$$

Equation 1.1

1.1.1 BASIC PRINCIPLES

The capacity of siphonic roof drainage systems is calculated according to national standards and guidelines. The basic principles of a siphonic system are:

- Rain intensity for a standard system is measured in l/s/ha according to national legislation. For Dutch legislation, for example, this intensity relates to the rain intensity that occurs on average twice a year.
- Rain intensity for emergency overflow systems also need to be installed to conform to national legislation. For the Netherlands this is the rain intensity that occurs on average once every 50 years. According to national legislation, either the emergency system, or the combination of the standard and the emergency system, must be able to fulfil that capacity.
- Collectors can be installed level without any incline.
- For optimum performance under pressure, the collector must hang between 0,8 m and 1,0 m below the roof.
- Different roofs can be connected to one siphonic roof drainage system if the height difference of the roof surface is less than one metre.
- The connection of a green roof and an ordinary roof on a single system is not permitted.
- Large roof surfaces (> + 5.000 m^2) must be connected to at least two independent down pipes.

1.1.2 DESIGN

The total volume of rainwater that has to be evacuated by the system can be calculated using equation 1.2.

$$V = i . \alpha . \beta . A/10.000$$

Equation 1.2

V = total drainage volume (l/s)
i = rain intensity (l/s/ha)
α = reduction factor roof type
β = reduction factor effective roof surface with roof under an angle
A = effective roof surface (m^2)

Having calculated the total volume of rainwater that has to be drained, the number of roof outlets can be calculated using equation 1.3.

$$N_{DT} = V / V_{DT}$$

Equation 1.3

N_{DT} = number of roof outlets
V = total drainage volume
V_{DT} = drainage capacity of one roof outlet (l/s)

To determine the number of roof outlets, the structural details of the building like fire walls, roof construction and other (small) roofs that drain their rainwater onto the calculated roof surface must be taken into account. A roof outlet has to be placed on each lowest point of the roof construction. The maximum distance between two outlets is 20 m. The correct roof outlet can be chosen from the product range depending on roof construction, roof membrane, and the need for a heating element.

1.1.3 CALCULATION PRINCIPLES

A roof from which rainwater is drained by means of a siphonic system generally contains several roof outlets that are collected into a single downpipe. The Bernouli equation needs to be applied to every flow path from roof outlet (entry point) to the transition to partial filling (exit point).

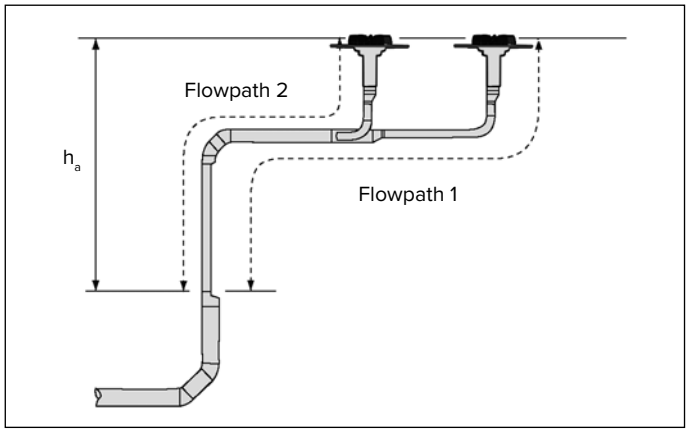


Illustration 1.1

The purpose of the calculation is to keep the static residual pressure at the exit point of every flow path within ±100 mbar.

The static residual pressure of a flow path is equal to the available pressure difference created by the height difference between the entry point and the exit point (h_a in equation 1.5) minus the pressure loss caused by the pipe friction in the auxiliary sections of the system.

$$\Delta p_{rest} = \Delta p_{available} - \Delta p_{loss}$$

Equation 1.4

The available pressure difference is calculated as indicated in equation 1.5.

$$\Delta p_{available} = \Delta h_a \cdot g \cdot \rho$$

Equation 1.5

Δha = available height from roof membrane to exit point
ρ = mass density of water at 10°C: 1.000 kg/m³
g = gravitational acceleration: 9,81 (m/s²)

Pressure loss is calculated as specified in equation 1.6.

$$\Delta p_{loss} = \Sigma (l \cdot R + Z)$$

Equation 1.6

l = pipe length (m)
R = pipe friction pressure loss (Pa/m)
Z = drag (Pa)

1.1.4 CALCULATIONS

The calculation of the various flow paths must begin with the most unfavourable flow path (insofar as pipe friction is concerned). In most cases, this flow path is from the roof outlet furthest removed from the exit point. To properly calculate the pressure difference and pressure loss for every flow path, and to test it against the 100 mbar standard, every flow path is divided into pipe sections (PS), see illustration 1.2. The pressure loss calculations for each individual section are summed up (Σ in equation 1.6) and subtracted from the summed up pressure differences for each pipe section. The pipe section runs from fitting (change of direction or diameter) to fitting, with the roof outlet being a separate pipe section (RO). If a section is longer than 10 m, it must be split into two parts in order to make the optimisation of diameters possible.

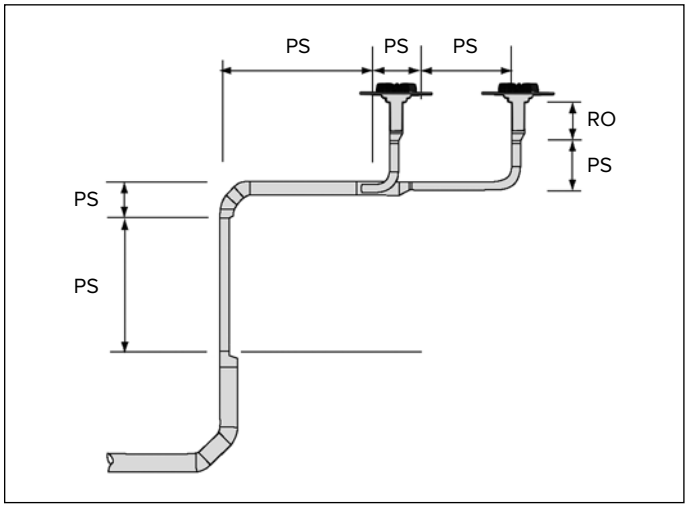


Illustration 1.2

Calculating the pressure difference of a pipe section

The available pressure difference of a pipe section is computed by replacing the Δh_a of equation 1.5 by the height difference of the pipe section.

$$\Delta p_{available,\ ls} = \Delta h_{ls} \cdot g \cdot \rho$$

Equation 1.7

Calculating the pressure loss of a pipe section

The pressure loss of a pipe section is calculated by using equation 1.6 without the accumulation symbol Σ.

$$\Delta p_{loss,\ ls} = l \cdot R + Z$$

Equation 1.8

l = pipe length (m) = the length of the pipe section
R = pipe friction pressure loss (Pa/m) = (λ/d_i) (0,5 . v² x r) with:
λ = pipe friction factor according to Pradtl-Colebrook (wall roughness kb = 0,25 mm)
d_i = pipe section design diameter (m)
v = flow velocity in flow path (m/s) = Q_h/d_i
ρ = mass density of water at 10°C: 1.000 kg/m³
Q_h = rainwater load for the total roof section drained by the pipe

The flow path design diameter (d_i) is the only variable in the entire calculation (with the exception of down pipe diameter) that can be modified if the 100 mbar standard cannot be met.

Pipe friction is calculated in equation 1.9.

$$Z = \Sigma \zeta \cdot (0{,}5 \cdot v^2 \times \rho)$$

Equation 1.9

ζ = pipe friction of fitting
v = flow velocity in flow path (m/s)
ρ = mass density of water at 10°C: 1.000 kg/m³

Table 1.1 indicates the friction factors for each fitting. If the friction factor for the roof outlet is not reported separately, the standard factor can be taken from the table.

Fitting	ζ
Bend 15°	0,1
Bend 30°	0,3
Bend 45°	0,4
Bend 70°	0,6
Bend 90°	0,8
Bend 45° branch	0,6
Bend 45° through	0,3
Reduction	0,3
Transition to partial filling	1,8
Roof outlet	1,5

Table 1.1

In contrast to a standard reduction, the exit point (transition to partial filling) has a larger friction factor. This point can be incorporated in the downpipe but also in the underground pipe (horizontal).

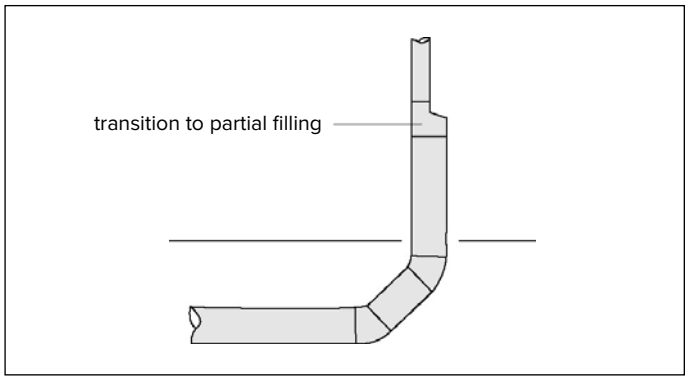


Illustration 1.3

The residual pressure is then determined by accumulating and offsetting the pressure differences and pressure losses of every pipe section.

$$\Delta p_{rest} = \Sigma\, \Delta p_{available} - \Sigma\, \Delta p_{loss}$$

Equation 1.10

If the result of the residual pressure does not remain under the stated standard of ±100 mbar, the design diameters of one or more pipe section must be adjusted and retested.

1.1.5 SYSTEM REQUIREMENTS

This paragraph provides details about the most important factor affecting the performance of a siphonic system: the static residual pressure of ± 100 mbar at the exit point. In addition, there are a few other requirements relating to pipe strength, self-cleaning, flow velocity and the design diameter of the downpipe.

Static pressure

Due to pipe strength, the static pressure at any given point (x) in a flow path must remain within the below-stated limits:

40 - 160 mm (s12,5) : -800 mbar
200 - 315 mm (s12,5) : -800 mbar
200 - 315 mm (s16) : -450 mbar

In contrast to the exit point where the residual pressure only entails static pressure, the residual pressure at every other point (x) in the pipe system consists of static and dynamic pressure. The equation for residual pressure at point x is:

$$\Delta p_{rest,\,x} = \Delta p_{static} + \Delta p_{dynamic,\,x}$$

Equation 1.11

The dynamic pressure in the system is calculated using equation 1.12.

$$\Delta p_{dynamic,\,x} = 0{,}5 \,.\, v_x^{\,2} \times \rho$$

Equation 1.12

v_x = *flow velocity at point x*

The available pressure difference and the flow losses for point x must then also be calculated. Equation 1.12 can hence be re-written as equation 1.13.

$$\Delta p_{static,\,x} + \Delta p_{dynamic,\,x} = \Delta p_{aavailable,\,x} - \Delta p_{loss,\,x}$$

Equation 1.13

The applicable equation for static pressure at point x can now be written as equation 1.14.

$$\Delta p_{static,\,x} = \Delta p_{available,\,x} - \Delta p_{loss,\,x} + \Delta p_{dynamic,\,x}$$

Equation 1.14

$\Delta p_{available,\,x}$ = $\Delta h_x \,.\, g \,.\, \rho$ *(available height difference between the entry point and point x)*
$\Delta p_{loss,\,x}$ = $\Sigma\,(l.R + Z)$ *(summed losses until point x)*

Self-cleaning and velocities

To ensure the self-cleaning effect, the velocity in the system must be higher than 0,7 m/s. At the exit point, velocity must not be higher than 2,5 m/s. If a discharge pit is used, the velocity at the end point is not limited.

Design diameter of the down pipe

If the collector pipe is less than 1 m below one or more entry points, the drainage at the transition point from collector pipe to downpipe must satisfy equation 1.15.

$$Q_{start} = Q_h \cdot \sqrt{\frac{\Delta H_i}{\Delta H_a}}$$

Equation 1.15

Q_{start} = *minimum drainage at the transition point from the collector pipe to the down pipe (l/s)*
Q_h = *total rainwater load connected to the down pipe (l/s)*
ΔHi = *height difference between entry point and the midpoint of the collector pipe (m)*
ΔHa = *height difference between entry point and exit point (m)*

Subsequently determine the design guidelines for the downpipe according to EN 12056, in which $Q_{start} > 1{,}2 . Q_{min}$ and the length of the down pipe must be at least 4 m.

1.1.6 EMERGENCY OVERFLOW

According to the standards, every flat roof should be able to cope with the five minute rainfall which occurs once in 100 years. A light construction (steel) roof should always have an emergency overflow system. With all other roofs it needs to be checked if an emergency overflow system is necessary. This depends on the construction and shape of the roof and the expected rainfall. The emergency overflow should be able to drain the amount of rainfall exceeding the amount on which the standard system was calculated, or even the maximum 100 year storm. This differs per country, and sometimes by region.

An emergency overflow system can be constructed in a number of ways:

- Spouts through the roof edge
- Traditional gravitational system
- Siphonic roof drainage system

In a standard situation, an emergency overflow is a rectangular or round opening. This is the most economical solution, but not always possible or desired. In many projects it is necessary to drain the extra rainfall with emergency overflow roof outlets which are placed higher than the roof surface.

In the case of a siphonic emergency overflow system, the location of the emergency overflow roof outlets is important to prevent the intake of air. The location must be determined in collaboration between the builder and the designer of the emergency overflow system. In addition, the roof outlets and the connected pipes of the emergency overflow system can be divided into smaller drainage areas, with each collector having a separate outlet. The emergency overflow system must not be connected to the sewer. The individual emergency overflow roof outlets should be no more than 30 m apart.

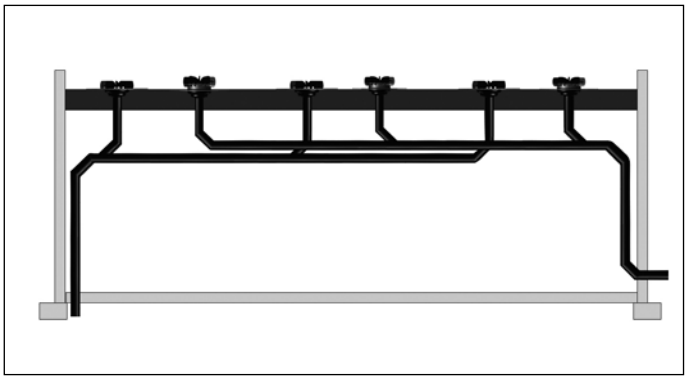


Illustration 1.4: Siphonic roof drainage system with siphonic emergency overflow (not connected to sewer)

Overflow raising piece

Several Akasison emergency outlets are available. Standard outlets can also used as long as they are installed 40 mm higher than the roofing. The required solution differs by country.

Illustration 1.5 Examples of Emergency outlets

The capacity of roof outlets with overflow raising pieces is the same as their original capacity, but without overflow raising pieces (capacity as defined in standard EN 1253).

1.2 REINFORCEMENT OF THE ROOF-PROFILES

The holes required for the roof outlets impair the strength of the trapezoidal roof-profiles. According to local legislation these impairments may need to be (partly) compensated.

The reinforcement plate compensates for the impairment of the trapezoidal roof profiles. The plate is 600x600 mm, and 1,5 mm thick. The plate needs to cover at least two full sections of the trapezium profile at each side of the roof outlet. This specific plate is approved for Salzgitter types PS35, PS40, PS40S, PS85, PS100, PS135, PS153 and PS158 with a maximum thickness of 1,0 mm.

The reinforcement plate also absorbs tension/movement of the roof outlets caused by extensions of the drainage system (e.g. due to fluctuations in temperature) and prevents the roof outlet damaging the surface of the roof.

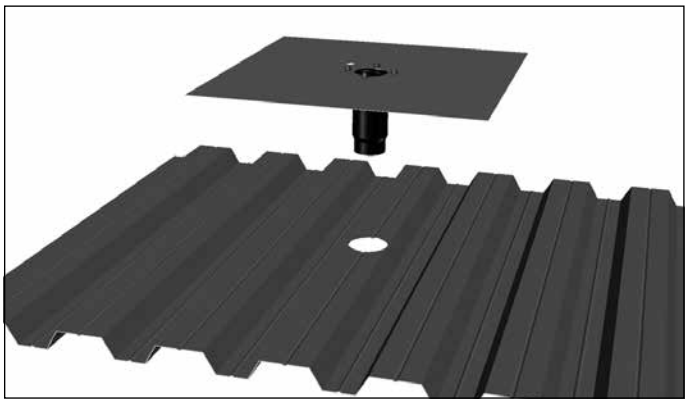


Illustration 1.6

The reinforcement plate also has the advantage that the pipe and mounting system can be installed independently from the installation of the outlets.

1.3 VAPOUR BARRIER/DAMP-PROOF MEMBRANE

The vapour barrier prevents moisture from penetrating roof insulation and protects from a loss of thermal insulation value. The vapour barrier is usually a foil layer below the thermal insulation. The holes required for the roof outlets will usually perforate this vapour barrier, which can lead to local moist accumulation. However, the damp proof membrane can be sealed to the Akasison reinforcement plate, providing a simple solution for any type of damp proof membrane.

Mounting sleeve

The 200x200 mm mounting sleeve has the advantage of independent installation. The vapour layer can also be sealed to the mounting sleeve. This product is used as an alternative for situations where reinforcement is not required.

Illustration 1.7 200 x 200 mm mounting sleeve

1.4 FIRE PREVENTION

Fire prevention measures are designed to reduce the risk of fire. They also ensure that if a fire does occur, its spread is delayed long enough to allow the occupants of a building to escape safely. The necessary measures will vary according to local requirements and legislation often differs by region and country. These requirements may relate to the time a building needs to be protected against collapse, the ability of fire barriers, and requirements related to the flammability of materials used.

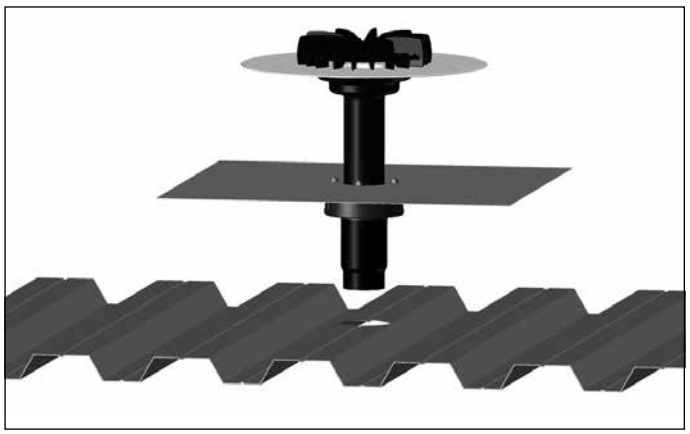


Illustration 1.8

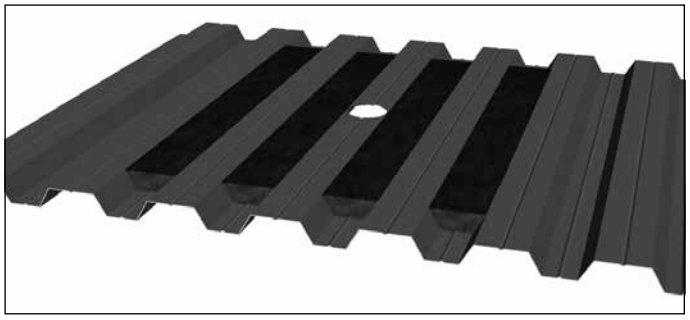


Illustration 1.9

In case of fire this sleeve closes the roof outlet completely to prevent any chimney effect taking place and to prevent the fire from skipping to the insulation or roof surface .

The Akasison fireproof version is tested in accordance with DIN 18234/ IndBauRL by the Research Centre for Fire Protection at the Karlsruhe Institute of Technology.

To ensure good fire protection, it is important to fill the cavities between reinforcement plates and trapezoidal profiles with fire resistant material.

1.5 CONDENSATION

Condensation occurs when water vapour present in the air makes contact with a 'colder' surface. Air at a given temperature can contain only a certain amount of water vapour. If the air temperature drops when it comes into contact with a colder pipe system, the excess water vapour will condense. The temperature of the air at which it becomes saturated with water vapour is called the 'dew point'. Condensation occurs when pipework has a temperature under the dew point of the surrounding air. Condensation depends on a number of factors:

- Room temperature
- Relative humidity of the air
- Temperature of the pipe surface

Akasison rain drainage has a relatively good thermal coefficient. Experience shows that HDPE used in heated buildings (with an inside temperature of around 17°C) no condensation should occur during a short storm.

To determine exactly when and how to insulate, an h-x (Mollier) diagram should be used and a detailed calculation performed. The type and function of the building determines whether condensation can be permitted.

When insulating the pipe system, diffusion-proof, closed cell insulation material should be used. Open cell insulation must have an impermeable outer layer. The entire pipe network must be insulated and an insulated pipe system must always be a closed circuit.

1.6 MOUNTING SYSTEM

The Akasison mounting system is designed specifically for horizontal siphonic roof drainage pipe systems. It absorbs changes in length without transferring tension onto the roof construction. The brackets can be installed single-handedly using easy clip on mounting. This allows maximum freedom of movement high in the building.

Benefits of this fixing system:

- Larger spans possible
- Less mounting onto the roof construction
- Prefabrication on ground level possible
- Only simple tools needed
- Room to apply insulation

2 MATERIAL PROPERTIES

Polyethylene (PE for short), is a semi crystalline thermoplastic and is a generic term for many variations of the polymer. The most common are:

- LDPE (density: 0,9 - 0,91 g/cm^3)
- MDPE (density: 0,93 - 0,94 g/cm^3)
- HDPE (density: 0,94 - 0,965 g/cm^3)

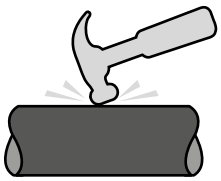
Akasison uses High Density Polyethylene (HDPE) for its products. The mechanical characteristics (elasticity, and stiffness) are important for the production of our pipes and different fittings. HDPE has a high resistance to damage from acids, bases and aqueous salt solutions. HDPE also has good resistance against light ionised radiation without becoming radioactive itself. The properties and benefits of Akatherm HDPE are highlighted in table 2.1 and 2.2.

Property	Unit	Test method	Value
Density at +23°C	g/cm^3	ISO 1183	0,954
Elasticity modulus (secant betw. 0,05% and 0,25% expansion)	N/mm^2	ISO 527	850
Tensile creep modulus **1 hr. value** **1000 hrs. value**	N/mm^2	ISO 899	 640 300
Bending creep modulus **1 min. value**	N/mm^2	DIN 54852-Z4	 1000
Tensile strength	N/mm^2	ISO 527 Test speed 50 mm/min	22
Elongation at break +23°C	%	ISO R 527	300
3,5% Bending stress	N/mm^2	ISO 178 Test speed 2 mm/min	19
Average linear expansion coefficient	mm/m*K	DIN 53752	0,18
Shore hardness		ISO 868	61
Operational temperature range without mechanical stress	°C	-	-40 bis +100
Fire behaviour		DIN 4102	B2
Water absorption at +23°C (96h)	mg	ISO 62	< 0,5
Melt Flow Rate MFR 190 / 5	g/10 min	ISO 1133	0,43

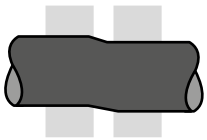
Table 2.1

MATERIAL PROPERTIES

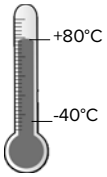
Material advantages



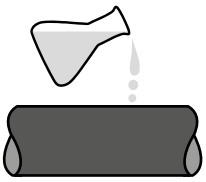
Impact-resistant and tough:
Unbreakable at temperatures above 5°C



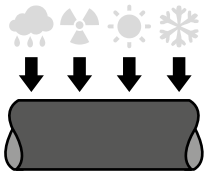
Elastic and flexible:
Adjusts to local ground movement for underground use



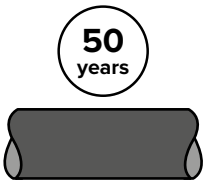
Thermal resistant:
Applications possible between -40°C and 80°C. Up to 100°C for short periods of time.



Chemical resistant:
Suitable for transport of polluted waste water

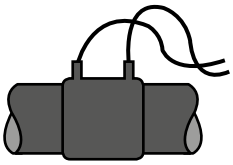


UV & weather resistant:
Unrestricted outside use through carbon black additives

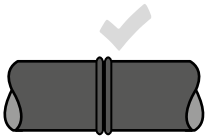


Wear resistant:
Lower cost due to long lifetime

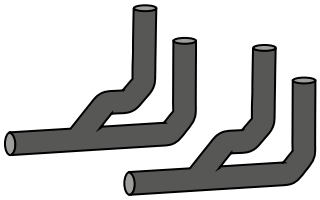
System advantages



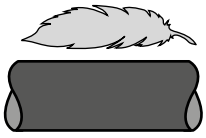
Welded system:
Simple and secure installation using butt-welding and electrofusion



Homogeneous welded joints:
Pull tight and leak proof for a completely closed system



Prefabrication:
Fast and cost-saving installation of repetitive systems



Light in weight:
Cost saving in transport and handling

Low heat conductivity:
No condensation insulation required during short periods of cooling

Nontoxic:
100% recyclable and environmental friendly

Table 2.2

3 STANDARDS AND QUALITY

Akasison stands for best quality products and services. To ensure we always meet the highest standards required we follow strict business practices which are externally audited. All certificates are also externally verified and validated.

We are fully ISO 9001 compliant and all our product development and manufacturing adheres to EN 1519 and other international and nationally approved standards.

The Akasison system has the appropriate national approval for most countries. These are all based on the international EN 1519.

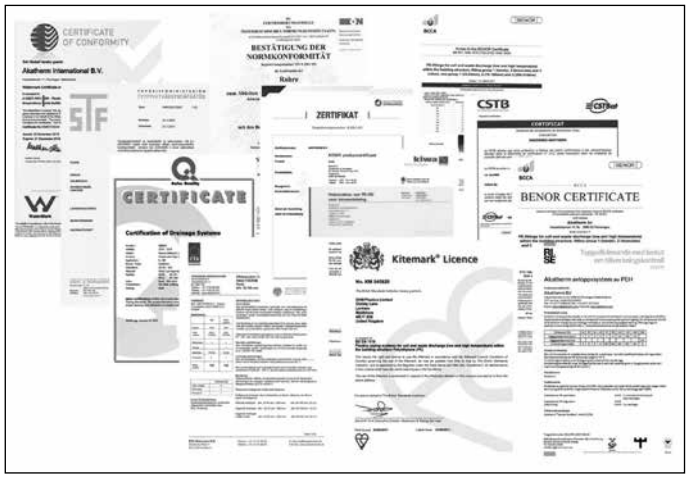


Image 3.1

ISO 9001

Akatherm, producer of Akasison, has a quality management system in full accordance with ISO 9001. It includes all business processes within Akatherm, ranging from development and production, to marketing and supply of plastic pipe systems. Conformity with ISO 9001 emphasises our quality, care and our continuous improvements in customer satisfaction. The certification of our management systems by Lloyd's Register Quality Assurance, further underscores Akatherm's standing as a leading brand of specialist drainage systems.

Image 3.2

ISO 14001

Akatherm, producer of Akasison, has integrated the ISO 14001 environmental management system into our quality management. ISO 14001 is a standard which controls and improves our overall environmental performance and focuses our attention on environmental factors during our everyday operations. It ensures that we make permanent environmental improvements and that we conform with all rules and regulations.

Image 3.3

Warranty

Above all, we provide our customers with peace of mind. We go to great lengths to ensure that our products perform as intended. The training we provide before installation begins; our technical support during construction, and inspection afterwards if required, allow us to guarantee the proper functioning of your Akasison system. All Akatherm products have a 15 year warranty (details available on request).

4 PRODUCT RANGE

The following pages provide an overview of the Akasison product range. This includes:

- Roof technology
- Fixing technology
- Pipes
- Fittings
- Tools
- Spare parts

4.1 DIMENSIONS

The dimensions of the pipes and fittings in the product tables are all in mm unless otherwise stated. The European standard EN12056 has been applied since 2001 and replaces local standards. EN12056 dimensions are based on the outside diameter, compared with wall thickness.

DN	De	e (S12,5)	Application
32	32	3	BD
40	40	3	BD
50	50	3	BD
56	56	3	BD
63	63	3	BD
75	75	3	BD
90	90	3,5	BD
110	110	4,2	BD
125	125	4,8	BD
160	160	6,2	BD
200	200	7,7	BD
250	250	9,6	BD
315	315	12,1	BD

Table 4.1

DN	De	e (type S16)	Application
200		6,2	B
250		7,7	B
315		9,7	B

Table 4.2

Scope application B = inside the building structure
Scope application BD = inside and buried outside the building structure

4.2 PIPE

Akasison pipe is made of polyethylene (PE). Akatherm produces tempered pipe according to the standard NEN1519. It undergoes an extra heat treatment after extrusion which results in less shrinkage when cooled from high operational temperatures. This reduces stress on joints and provides longer life.

Akasison tempered pipes are suited for applications where the temperature of the pipe can get relatively high, or vary considerably. Both can be caused by the ambient temperature of the medium.

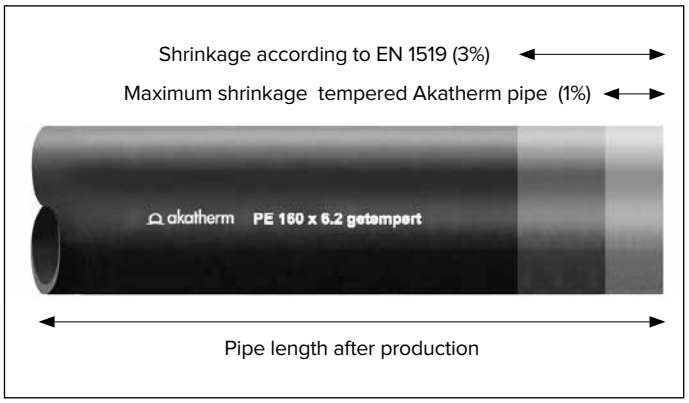


Image 4.1

4.3 ELECTROFUSION

Akatherm products can be welded by electrofusion unless stated otherwise in the product table. Electrofusion is the preferred method of on-site jointing.

4.4 BUTT-WELDING AND THE K-DIMENSION

All Akatherm products can be welded using this jointing method. Fittings can be shortened by up to the k-dimension (when indicated in the catalogue), thus allowing butt-welding on a standard butt-welding machine.

Only identical materials can be welded.

4.5 ABBREVIATIONS

Abbreviation	
A	Cross section area flow
Code	Article number
D	External dimension filling part
d_1, d^2 ...	External dimension fitting/pipe
DN	Nominal size
e	Wall thickness
k_1, k_2 ...	Maximum length for shortening fittings
L	Total length fitting
l_1, l_2 ...	Partial length of fitting
S	Pipe class according to ISO-S (SDR-1)/2
SDR	Ratio diameter/wall thickness d_1/e

Table 4.3

4.6 HANDLING AND STORAGE

Pipes
The high impact strength of Akatherm HDPE provides some protection against damage, but care should still be taken at all stages of handling, transportation and storage. Pipe must be transported by a suitable vehicle and properly loaded and unloaded. Whenever possible it should be moved by hand or mechanical lifting equipment. Pipes must not be dragged across the ground. The storage should be flat, level, and free from sharp objects.

Lengths
Pipe lengths stored individually should be stacked in a pyramid of not more than one metre high, with the bottom layer fully restrained by wedges. Where possible, the bottom layer of pipes should be laid on timber battens up to one metre apart. On site, pipes may be laid out individually. Where appropriate, protective barriers should be placed with adequate warning signs and lamps.

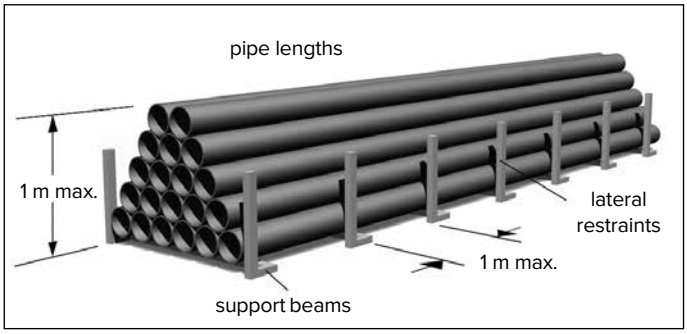


Image 4.2

Bundles
Bundled packs of pipe should be stored on clear, level ground with the battens supported from the outside by timber or concrete blocks. For safety, bundled packs should not be stacked more than 3 m high. Smaller pipes may be nested inside larger pipes. Side bracing should be provided to prevent stack collapse.

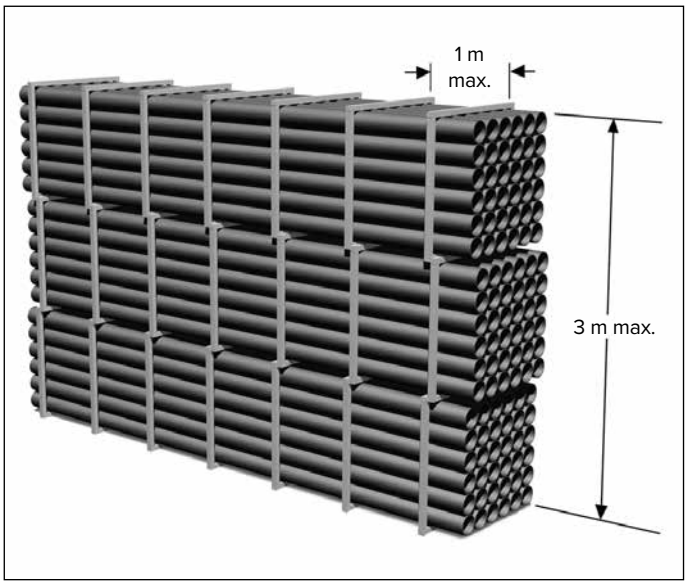


Image 4.3

Fittings
Fittings and electrofusion couplers need to be stored in a dry place. To prevent oxidation and contamination, it is recommended to leave fittings in their original packaging until required for use.

Tools
All tools - especially electrical - ones must be protected against moisture and dust, and should not be dropped.

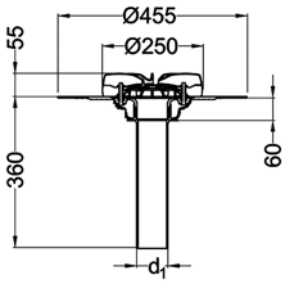
Recycling residual waste
To comply with regulations, residual waste materials should be recycled:

PE/electrofusion couplers	: recycle/residual waste
Carton boxes	: recycled paper
Plastic containers	: residual waste
Chips	: residual waste
Cleaning cloths	: residual waste

Roof outlet Akasison XL75 PVC

with 75 mm connection

HDPE/PVC



d_1	Code	Type	Description
75	**74 75 14**	Akasison XL75 PVC	PVC foil
75	**74 75 15**	Akasison XL75 H PVC	PVC foil, heated

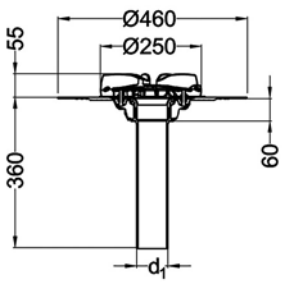
Akasison roof outlet with PVC clamp flange acc. to EN 1253 for siphonic roof drainage systems. Suitable for homogeneous securing/sealing of PVC roof sealing membrane.

Delivery includes	:	Akasison air baffle with integrated leaf guard (UV-stabilized). Akasison roof outlet incl. PVC flange. Connection to HDPE. Heated models include a 230V heating element.
Application	:	Cold roof. Warm roof.
Insulation thickness	:	between 60 and 330 mm.
Connection to HDPE	:	with electrofusion coupler d75 mm Code 410795.
Outlet	:	d_1 = 75 mm horizontally.
Drilling core size	:	Ø □ 80 mm. 140 mm in combination with mounting sleeve Code 747713 160 mm in combination with reinforcement plate Code 747711 and reinforcement plate with fire protection Code 747722
Performance	:	1-17,7 l/s.
Material	:	ASA, PVC, HDPE.

Roof outlet Akasison XL75 C

with 75 mm connection

HDPE/ASA



d_1	Code	Type	Description
75	**74 75 00**	Akasison XL75 C	Clamp flange
75	**74 75 01**	Akasison XL75 HC	Clamp flange, heated

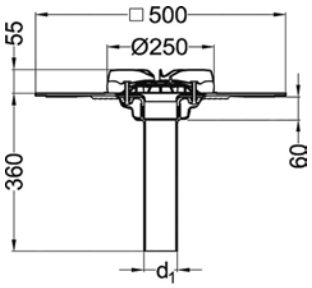
Akasison roof outlet with clamp flange acc. to EN 1253 for siphonic roof drainage systems. Suitable for mechanical securing/sealing of roof sealing membrane.

Delivery includes	:	Akasison air baffle with integrated leaf guard (UV-stabilized). Clamp flange with suitable seal. Connection to HDPE. Heated models include a 230V heating element.
Application	:	Cold roof. Warm roof.
Insulation thickness	:	between 60 and 330 mm.
Connection to HDPE	:	with electrofusion coupler d75 mm Code 410795.
Outlet	:	d_1 = 75 mm.
Drilling core size	:	Ø □ 80 mm. 140 mm in combination with mounting sleeve Code 747713 160 mm in combination with reinforcement plate Code 747711 and reinforcement plate with fire protection Code 747722
Performance	:	1-17,7 l/s.
Material	:	ASA, stainless steel, HDPE.

Roof outlet Akasison XL75 B

with 75 mm connection

HDPE/ASA/Bitumen



d_1	Code	Type	Description
75	**74 75 02**	Akasison XL75 B	Bitumen
75	**74 75 03**	Akasison XL75 HB	Bitumen, heated

Akasison roof outlet with prefixed bituminous flange acc. to EN 1253 for siphonic roof drainage systems. Suitable for roofs with bituminous roof sealing.

Delivery includes : Akasison air baffle with integrated leaf guard (UV-stabilized).
Prefixed bituminous flange.
Connection to HDPE.
Stainless steel clamp ring
Fireproof lid for protection during application of roofing membrane
Heated models include a 230V heating element.

Application : Cold roof.
Warm roof.

Insulation thickness : between 60 and 330 mm.

Connection to HDPE : with electrofusion coupler d75 mm Code 410795.

Outlet : d_1 = 75 mm.

Drilling core size : Ø □ 80 mm.
140 mm in combination with mounting sleeve Code 747713
160 mm in combination with reinforcement plate Code 747711 and reinforcement plate with fire protection Code 747722

Performance : 1-17,7 l/s.

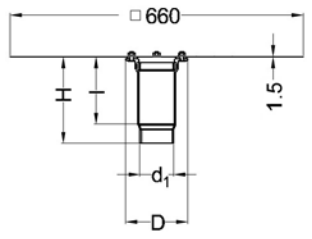
Material : ASA, stainless steel, bitumen, HDPE.

Akasison XL75 reinforcement plate with vapour barrier connection

according to DIN 18807

HDPE/galvanised steel/stainless steel

SBR and EPDM seal



d_1	Code	D	H	l	n	M
75	**74 77 11**	140	300	200	4	8

Akasison XL75 reinforcement plate according to DIN 18807 for the vapour barrier connection in siphonic roof drainage systems. Applied in insulated metal roofs in combination with roof outlet Akasison XL75. At the top of the metal plate a vapour barrier foil or bitumen can be applied. In combination with specific roofs the metal plate can be used as reinforcing plate. The HDPE socket can be connected for pre-completion building drainage when insulation and roof outlets are not yet installed.

Delivery includes : Galvanised plate.
HDPE socket.
Flange and EPDM seal.

Application : Warm roof (Metalleichtbau) and applications acc. to DIN 18234.

Connection pipe system : Electrofusion coupler Code 410795.
Ring groove for snap socket d75 mm Code 400730.

Outlet : d_1 = 75 mm.

Drilling core size : Ø □ 160 mm.

Material : HDPE, galvanised steel, stainless steel, SBR, EPDM.

n = number of bolts
M = thread

Akasison XL75 installation socket
according to DIN 18807

HDPE/galvanised steel/stainless steel

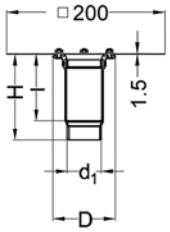
SBR and EPDM seal

d_1	Code	D	H	l	n	M
75	**74 77 13**	140	190	120	4	8

Akasison XL75 installation socket for pre-completion building drainage when insulation and roof outlets are not yet installed.

Delivery includes : Galvanised plate.
HDPE socket.
Flange and EPDM seal.
Application : Warm roof and applications according to DIN 18234
Connection pipe system : Electrofusion coupler d 75 mm Code 410795.
Outlet : d_1 = 75 mm.
Drilling core size : Ø □ 160 mm.
Material : HDPE, galvanised steel, stainless steel, SBR, EPDM.

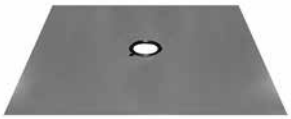
n = number of bolts
M = thread



Akasison XL75 reinforcement plate without connector
according to DIN 18807

HDPE/galvanised steel/stainless steel

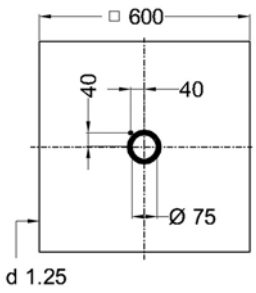
SBR and EPDM seal



d_1	Code	D
	74 77 12	140

Akasison XL75 reinforcement plate according to DIN 18807 for the vapour barrier connection in siphonic roof drainage systems. Applied in insulated metal roofs in combination with roof outlet Akasison XL75. At the top of the metal plate a vapour barrier foil or bitumen can be applied. In combination with specific roofs the metal plate can be used as reinforcing plate.

Delivery includes : Galvanised plate.
Application : Warm roof and applications acc. to DIN 18234.
Connection pipe system : Electrofusion coupler Code 410795.
Material : Galvanised steel, EPDM.



Akasison XL75 reinforcement plate with vapour barrier connection and fire protection

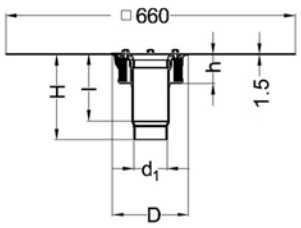
HDPE/intumescent material/galvanised steel/stainless steel

according to DIN 18234 to 18807

SBR and EPDM seal

d_1	Code	D	H	l	h	n	M
75	**74 77 22**	140	190	120	60	4	8

Akasison XL75 reinforcement plate according to DIN 18807 for the vapour barrier connection and fire collar according to 18234 in siphonic roof drainage systems. Applied in insulated metal roofs in combination with roof outlet Akasison XL75. At the top of the metal plate a vapour barrier foil or bitumen can be applied. In combination with specific roofs, the metal plate can be used as reinforcing plate. The HDPE socket can be connected for pre-completion building drainage when insulation and roof outlets are not yet installed.



Delivery includes : Galvanised plate incl. Akasison fire collar.
HDPE socket.
Flange and EPDM seal.
Application : Warm roof (Metalleichtbau) and applications acc. to DIN 18234.
Connection pipe system : Electrofusion coupler Code 410795.
Ring groove for snap socket d75 mm Code 400730.
Outlet : d_1 = 75 mm.
Drilling core size : Ø □ 160 mm.
Material : HDPE, galvanised steel, stainless steel, SBR, EPDM.

n = number of bolts
M = thread

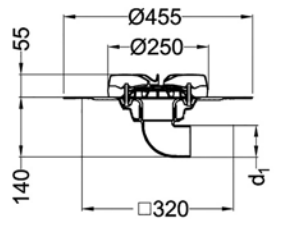
Roof outlet Akasison XL75 HR PVC

HDPE/PVC

with 75 mm connection

d_1	Code	Type	Description
75	**74 75 84**	Akasison XL75 HR PVC	PVC
75	**74 75 85**	Akasison XL75 HR H PVC	PVC, heated

Akasison roof outlet with PVC clamp flange acc. to EN 1253 for siphonic roof drainage systems. Suitable for homogeneous securing/sealing of PVC roof sealing membrane.



Delivery includes : Akasison air baffle with integrated leafguard (UV-stabilized).
Akasison roof outlet incl. PVC flange.
Connection to HDPE.
Heated models include a 230V heating element.
Application : Cold roof.
Warm roof.
Thermal insulation : 140 mm.
Connection to HDPE : with electrofusion coupler d75 mm Code 410795.
Outlet : d_1 = 75 mm horizontally.
Performance : 1-17,7 l/s.
Material : ASA, PVC, HDPE.

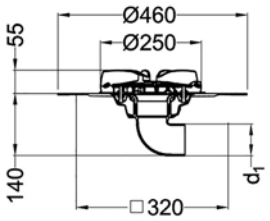
Roof outlet Akasison XL75 HR

with 75 mm connection

HDPE/ASA

d_1	Code	Type	Description
75	**74 75 80**	Akasison XL75 HR	Clamp flange
75	**74 75 81**	Akasison XL75 HR H	Clamp flange, heated

Akasison roof outlet with clamp flange acc. to EN 1253 for siphonic roof drainage systems. Suitable for mechanical securing/sealing of roof sealing membrane.



Delivery includes	:	Akasison air baffle with integrated leafguard (UV-stabilized). Clamp flange with suitable seal. Connection to HDPE. Heated models include a 230V heating element.
Application	:	Cold roof. Warm roof.
Insulation thickness	:	140 mm.
Connection to HDPE	:	with electrofusion coupler d75 mm Code 410795.
Outlet	:	d_1 = 75 mm horizontally.
Performance	:	1-17,7 l/s.
Material	:	ASA, stainless steel, HDPE.

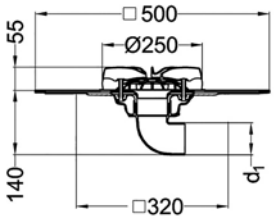
Roof outlet Akasison XL75 HR B

with 75 mm horizontal connection

HDPE/ASA/Bitumen

d_1	Code	Type	Description
75	**74 75 82**	Akasison XL75 HR B	Bitumen
75	**74 75 83**	Akasison XL75 HR H B	Bitumen, heated

Akasison roof outlet with prefixed bituminous flange acc. to EN 1253 for siphonic roof drainage systems. Suitable for roofs with bituminous roof sealing.



Delivery includes	:	Akasison air baffle with integrated leafguard (UV-stabilized). Prefixed bituminous flange. Connection to HDPE. Stainless steel clamp ring Fireproof lid for protection during application of roofing membrane Heated models include a 230V heating element.
Application	:	Cold roof. Warm roof.
Insulation thickness	:	140 mm.
Connection to HDPE	:	with electrofusion coupler d75 mm Code 410795.
Outlet	:	d_1 = 75 mm horizontally.
Material	:	ASA, stainless steel, bitumen, HDPE, EPS.

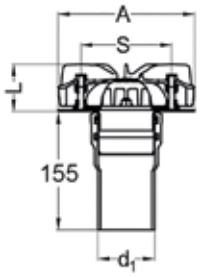
Roof outlet Akasison XL75 HR B for gutter

HDPE/ASA/RVS/PVC

with 75 mm connection

d_1	Code	Type	Description
75	**74 78 00**	Akasison XLR75 MET	Metal gutter
75	**74 78 01**	Akasison XL7R5 CON	Concrete gutter
75	**74 78 02**	Akasison XL7R5 COV MET	Clad metal gutter
75	**74 78 03**	Akasison XL7R5 COV CON	Clad concrete gutter

Akasison roof outlet for gutter acc. to EN 1253 for siphonic roof drainage systems.
Gutter outlet with holes for application in metal or concrete gutter.



Delivery includes : Akasison air baffle with integrated leafguard (UV-stabilized).
Knock-in bolts for installation concrete gutter (CON version).
Flange for installation covered gutter (COV versie).
Connection to HDPE
Application : Gutter.
Insulation thickness : n.a.
Connection to HDPE : with electrofusion coupler d75 mm Code 410795.
Dimensions>: d_1 = 75 mm.
L = 55 mm
S = 120 mm
A = 180 mm
Outlet : d_1 = 75 mm.
Drilling core size : Ø □ 110 mm.
Performance : 1-18,0 l/s.
Material : ASA, RVS, PVC, HDPE.

Roof outlet Akasison XL90 PVC

HDPE/PVC

with 90 mm connection

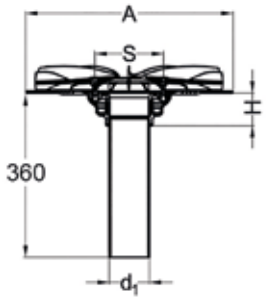
d_1	Code	Type	Description
90	**74 90 04**	Akasison XL90 PVC	PVC

Akasison roof outlet with PVC clamp flange acc. to EN 1253 for siphonic roof drainage systems. Suitable for homogeneous securing/ sealing of PVC roof sealing membrane.

Delivery includes:

Code 749053 Akasison leaf guard set
- Akasison air baffle with integrated leaf guard (UV-stabilized).
- Bolts.

Code 749044 Akasison XL90 roof outlet PVC
- Roof outlet with PVC clamp flange for connection with PVC roof sealing membrane.
- Connection to HDPE.



Application : Cold roof (metal/concrete).
Warm roof (metal/concrete)
Insulation thickness : between 60 and 300 mm
Connection to HDPE : Electrofusion d90 mm Code 410995.
Dimensions : d_1 = 90 mm.
H = 55 mm
S = 455 mm
A = 180 mm
Outlet : d_1 = 90 mm.
Drilling core size : Ø □ 100 mm.
Performance : 1-29,0 l/s.
Material : ASA, PVC, HDPE.

Akasison XL90 installation socket

according to DIN 18807

HDPE/galvanised steel/stainless steel

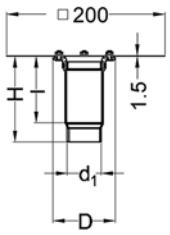
SBR and EPDM seal

d_1	Code	D	H	l	n	M
90	**74 92 01**	140	255	180	4	8

Akasison XL90 installation socket for pre-comnpletion building drainage when insulation and roof outlets are not yet installed.

Delivery includes : Galvanised plate.
HDPE socket.
Flange and EPDM seal.
Application : Warm roof and applications according to DIN 18234
Connection pipe system : Electrofusion coupler d 90 mm Code 410995.
Outlet : d_1 = 90 mm.
Drilling core size : Ø □ 160 mm.
Material : HDPE, galvanised steel, stainless steel, SBR, EPDM.

n = number of bolts
M = thread



Emergency overflow set for Akasison XL75 and 90

ASA/stainless steel

Height raising element = 40 mm

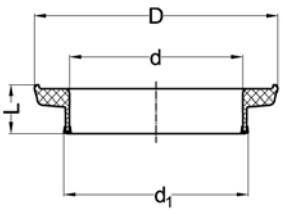
EPDM seal

d_1	Code	d	D	L	n	M
187	**74 75 90**	176	245	44	2	8

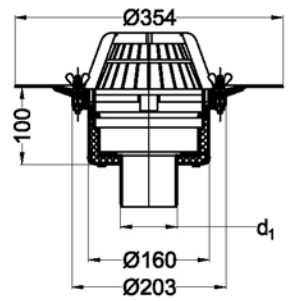
The emergency overflow set can be applied in combination with Akasison roof outlets XL75 and 90.

Delivery includes : Emergency overflow flange.
EPDM seal.
Air baffle and leaf guard fixation extension (set of 2).
Application : Emergency overflow system.
Performance : 1-17,7 l/s.
Material : ASA, EPDM and stainless steel.

n = number of bolts
M = thread



Roof outlet Akasison X62FS for conventional roof drainage



d_1	Code	Type	
75	**62 16 41**	Akasison X62FS-75 FPO-PP	Screw flange
75	**62 16 41**	Akasison X62FS-75 FPO-PP	Screw flange, heated
75	**62 16 41**	Akasison X62FS-75 FPO-PP	Bitumen
75	**62 16 41**	Akasison X62FS-75 FPO-PP	Bitumen
75	**62 16 41**	Akasison X62FS-75 FPO-PP	PVC foil
75	**62 16 41**	Akasison X62FS-75 FPO-PP	PVC foil, heated
75	**62 16 41**	Akasison X62FS-75 FPO-PP	FPO-PP foil
75	**62 16 41**	Akasison X62FS-75 FPO-PP	FPO-PP foil, heated
90	**62 16 58**	Akasison X62FS-90 FPO-PP	FPO-PP foil
110	**62 10 61**	Akasison X62FS-100	Screw flange
110	**62 11 60**	Akasison X62FS-100 H	Screw flange, heated
110	**62 20 68**	Akasison X62FS-100 B	Bitumen
110	**62 21 67**	Akasison X62FS-100 HB	Bitumen, heated
110	**62 30 65**	Akasison X62FS-100 PVC	PVC foil
110	**62 31 64**	Akasison X62FS-100 H PVC	PVC foil, heated
110	**62 16 65**	Akasison X62FS-110 FPO-PP	FPO-PP foil
125	**62 10 85**	Akasison X62FS-125	Screw flange
125	**62 11 84**	Akasison X62FS-125 H	Screw flange, heated
125	**62 20 82**	Akasison X62FS-125 B	Bitumen
125	**62 21 81**	Akasison X62FS-125 HB	Bitumen, heated
125	**62 30 89**	Akasison X62FS-125 PVC	PVC foil
125	**62 31 88**	Akasison X62FS-125 H PVC	PVC foil, heated
125	**62 16 89**	Akasison X62FS-125 FPO-PP	FPO-PP foil
160	**62 10 92**	Akasison X62FS-150	Screw flange
160	**62 11 91**	Akasison X62FS-150 H	Screw flange, heated
160	**62 20 99**	Akasison X62FS-150 B	Bitumen
160	**62 21 98**	Akasison X62FS-150 HB	Bitumen, heated
160	**62 30 96**	Akasison X62FS-150 PVC	PVC foil
160	**62 31 95**	Akasison X62FS-150 H PVC	PVC foil, heated

Roof outlet Akasison X62 FS acc. to DIN EN 1253.
For conventional roof drainage.
The drainage element is heat insulated. Outlet: d110, d125 or d160 vertical, delivery includes leaf guard and protective cover.

With stainless steel flange for mounting of polymer roof membranes. Material: Polypropylene, UV stabilized.

Type B : with prefixed butiminous flange.
Type PVC : with extra wide PVC flange for connection to PVC roof membranes. Material: PVC
Type H: Heated roof outlet possible: direct connection to 230V. Heating element acc. to VDE 0721, part 1/3.78 tested.

Roof outlet Akasison 63K/90K

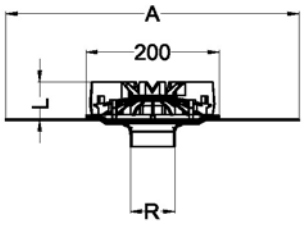
Aluminium/stainless steel

Code	Type	R	A	n	M	L
74 06 30	63K	2"	480	8	6	55
74 09 30	90K	3"	480	8	6	65

Roof outlet Akasison 63K/90K with clamp flange according to EN 1253. For siphonic roof drainage systems. Delivered with air baffle and integrated leaf guard. To be connected with connector Code 7492xx.

Application : Cold roof.
Warm roof.
Insulation thickness : n.a.
Connection pipe system : Code 74928x.

Performance : 63K = 12,90 l/s at 43 mm
90K = 29,0 l/s at 64 mm.
Material : Stainless steel body, aluminium air baffle and leaf guard.



n = number of bolts
M = thread

Roof outlet Akasison 63B/90B

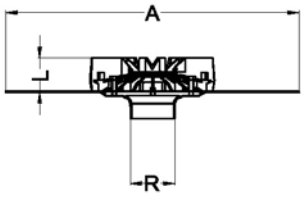
Aluminium/stainless steel

Code	Type	R	A	L
74 06 32	63B	2"	480	55
74 09 32	90B	3"	480	65

Roof outlet Akasison 63B/90B for bituminous sealings according to EN 1253. For siphonic roof drainage systems. Delivered with air baffle and integrated leaf guard. To be connected with connector Code 7492xx.

Application : Cold roof.
Warm roof.
Insulation thickness : n.a.
Connection pipe system : Code 74928x.

Performance : 63B = 12,90 l/s at 43 mm
90B = 29,0 l/s at 64 mm.
Material : Stainless steel body, aluminium air baffle and leaf guard, stainless steel fasteners.



n = number of bolts
M = thread

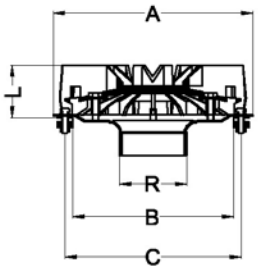
Gutter outlet Akasison R63/R90

Aluminium/stainless steel

d_1	Code	Type	R	A	B	C	n	M	L
63	**74 06 50**	R63	2"	200	160	180	8	6	55
90	**74 09 50**	R90	3"	260	210	230	8	6	65

Gutter outlet according to EN 1253. For siphonic roof drainage systems. Delivered with air baffle/leaf guard. To be connected with connector Art. Nr. 7492xx.

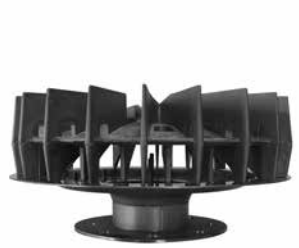
Application : Gutter.
Insulation thickness : n.a.
Connection pipe system : Connection set Art. Nr. 7492xx.
Performance : 63R = 12,90 l/s at 43 mm
90R = 29,0 l/s at 64 mm.
Material : Stainless steel body, aluminum air baffle/leaf guard, stainless steel fasteners.



N = number of bolds
M = thread

Gutter outlet Akasison R110

Aluminium/stainless steel

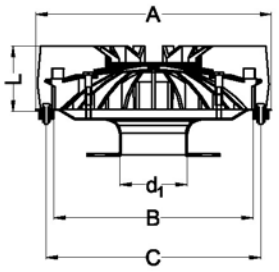


d_1	Code	Type	A	B	C	n	M	L
110	**74 11 50**	R110	390	330	355	10	6	105

Gutter outlet Akasison R110 according to EN 1253. For siphonic roof drainage systems. Delivered with air baffle and leaf guard.

Application : Gutter.
Insulation thickness : n.a.
Connection pipe system : Code 741187.

Performance : 1-80 l/s (ideally designed for 40 l/s).
Material : Stainless steel body, aluminium air baffle and leaf guard, stainless steel fasteners.



Q = 1-80 l/s

n = number of bolts
M = thread

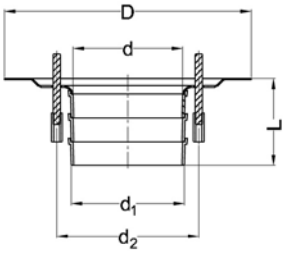
Emergency overflow set for Akasison R90

Aluminium/stainless steel

d_1	Code	D	d	d_2	L	r	n	M
120	**74 09 90**	260	115	150	30	1	2	8
120	**74 09 91**	260	115	150	60	2	2	8
120	**74 09 92**	260	115	150	90	3	2	8

The Akasison emergency overflow set can be applied in combination with Akasison roof outlet R90 for gutter.

Delivery includes : 1, 2 or 3 aluminium emergency overflow flanges (30 mm high).
Stainless steel body for air baffle and leaf guard.
: Air baffle and leaf guard fixation extension (set of 2).
Application : Emergency overflow system.
Performance : 29,0 l/s at 64 mm.
Material : Aluminium/stainless steel.



r = number of overflow flanges
n = number of bolts
M = thread

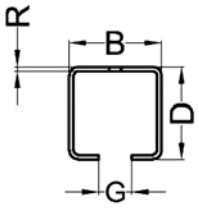
Rail

Galvanised steel

Rail length = 5 m

Code	B	D	G	R
70 00 05	30	30	14,5	2
70 00 07	41	41	14,5	2

Application : Code 700005 for brackets 40 to 200 mm.
Code 700007 for brackets 250 and 315 mm.

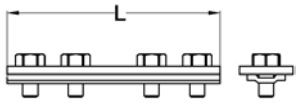


Rail connector

Galvanised steel

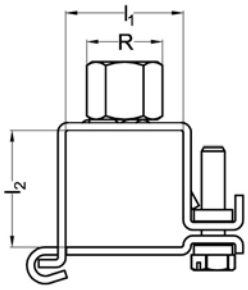
Code	Type	L
70 00 15	straight	140
70 00 16	L-angle	-
70 00 17	T-angle	-

Bolts M10.



Rail suspension

Galvanised steel

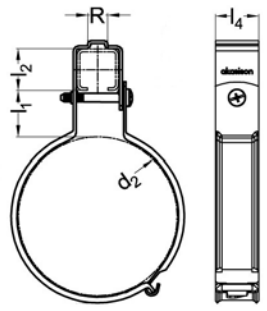


Code	l_1	l_2	R
70 00 25	30	30	M10
70 00 27	41	41	M10

Application : Code 700025 for rail 30 x 30 mm (Code 700005).
Code 700027 for rail 41 x 41 mm (Code 700007).

Rail bracket

Galvanised steel



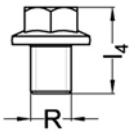
d_1	Code	d_2	l_1	l_2	l_4	R
40	**75 04 35**	42	35	30	30	M10
50	**75 05 35**	52	35	30	30	M10
56	**75 56 35**	58	35	30	30	M10
63	**75 06 35**	65	35	30	30	M10
75	**75 07 35**	77	35	30	30	M10
90	**75 09 35**	92	35	30	30	M10
110	**75 11 35**	112	35	30	30	M10
125	**75 12 35**	127	35	30	30	M10
160	**75 16 35**	162	35	30	30	M10
200	**75 20 35**	202	35	30	30	M10
250	**75 25 35**	252	35	41	40	M10
315	**75 31 35**	317	35	41	40	M10

Anchor point set

Galvanised steel

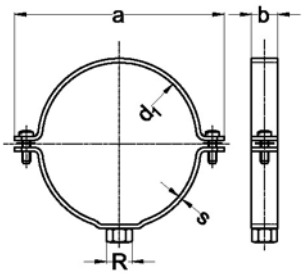
Code	l_4	R
73 00 25	21	M10
73 00 27	40	M10

Application for anchor point d200, 250 and 315 mm.
Includes 2 M10 bolts.



Guide bracket

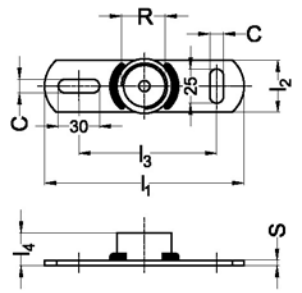
Galvanised steel



d_1	Code	a	b	s	R
40	**70 04 78**	93	30	3	½"
50	**70 05 78**	104	30	3	½"
56	**70 56 78**	113	30	3	½"
63	**70 06 78**	113	303	3	½"
75	**70 07 78**	126	30	3	½"
90	**70 09 78**	143	30	3	½"
110	**70 11 78**	161	30	3	½"
125	**70 12 78**	178	30	3	½"
160	**70 16 78**	215	30	3	½"
200	**70 20 80**	283	40	4	1"
250	**70 25 80**	333	40	4	1"
315	**70 31 80**	398	40	4	1"

Fully welded

Mounting plate for guide bracket Galvanised steel



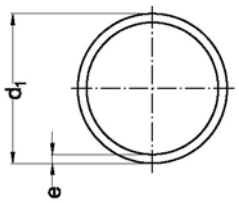
Code	R	l_1	l_2	l_3	l_4	S	C
70 94 78	½"	145	38	90	25	4	8,5
70 94 80	1"	145	38	90	25	4	8,5

Fully welded

Pipe tempered

HDPE

Pipe length = 5 m

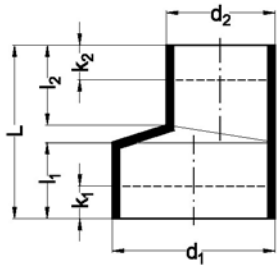


d_1	Code	S	e	A (cm^2)	kg/m
40	**10 04 00**	12,5	3,0	9,1	0,36
50	**10 05 00**	12,5	3,0	15,2	0,45
56	**10 56 00**	12,5	3,0	19,6	0,51
63	**10 06 00**	12,5	3,0	25,5	0,58
75	**10 07 00**	12,5	3,0	37,4	0,70
90	**10 09 00**	12,5	3,5	54,1	0,98
110	**10 11 00**	12,5	4,2	80,7	1,43
125	**10 12 00**	12,5	4,8	104,2	1,85
160	**10 16 00**	12,5	6,2	171,1	3,04
200	**10 20 10**	12,5	7,7	267,6	4,69
250	**10 25 10**	12,5	9,6	418,4	7,30
315	**10 31 10**	12,5	12,1	664,2	11,60

Drainage pipe d40-315 mm according to EN 1519 for application in buildings, d110-315 mm for burried pipe application according EN 12666.

S= pipe class.
A (cm^2) = cross sectional area of flow.

Reducer eccentric HDPE



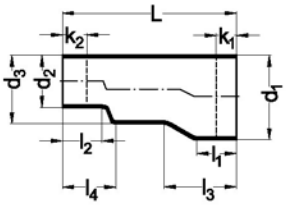
d_1/d_2	Code	L	l_1	l_2	k_1	k_2
50/40	**16 05 04**	80	35	37	20	20
56/40	**16 56 04**	80	35	37	20	20
56/50	**16 56 05**	80	35	37	20	20
63/40	**16 06 04**	80	35	37	20	20
63/50	**16 06 05**	80	35	37	20	20
63/56	**16 06 56**	80	35	37	20	20
75/40	**16 07 04**	80	35	30	20	20
75/50	**16 07 05**	80	35	37	20	20
75/56	**16 07 56**	80	35	37	20	20
75/63	**16 07 06**	80	35	37	20	20
90/40	**16 09 04**	80	30	33	20	20
90/50	**16 09 05**	80	30	34	20	20
90/56	**16 09 56**	80	30	36	20	20
90/63	**16 09 06**	80	30	39	20	20
90/75	**16 09 07**	80	30	44	20	20
110/40	**16 11 04**	80	31	34	20	20
110/50	**16 11 05**	80	31	34	20	20
110/56	**16 11 56**	80	31	35	20	20
110/63	**16 11 06**	80	31	34	20	20
110/75	**16 11 07**	80	31	36	20	20
110/90	**16 11 09**	80	31	41	20	20
125/50	**16 12 05**	80	35	37	20	20
125/56	**16 12 56**	80	35	37	20	20
125/63	**16 12 06**	80	35	37	20	20
125/75	**16 12 07**	80	35	30	20	20
125/90	**16 12 09**	80	35	32	20	20
125/110	**16 12 11**	80	36	36	20	20
160/110	**16 16 11**	80	28	36	20	20
160/125	**16 16 12**	80	32	36	20	20

Reducer eccentric long

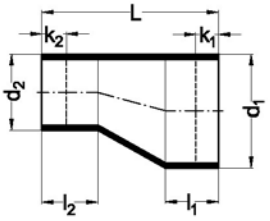
HDPE

d_1/d_2	Code	Type	L	l_1	l_2	l_3	l_4	d_3	k_1	k_2
200/110	**14 20 11**	A	335	95	36	165	55	160	75	20
200/125	**14 20 12**	A	335	95	36	165	55	160	75	20
200/160	**14 20 16**	B	260	95	95				75	75
250/200	**14 25 20**	B	290	105	95				85	75
315/200	**14 31 20**	A	580	115	95	235	190	250	95	75
315/250	**14 31 25**	B	340	115	105				75	85

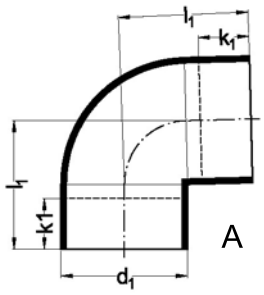
A

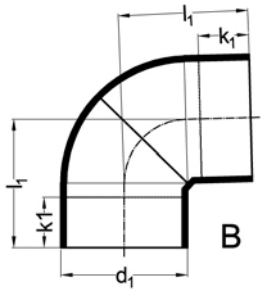


B



Elbow 88,5° HDPE





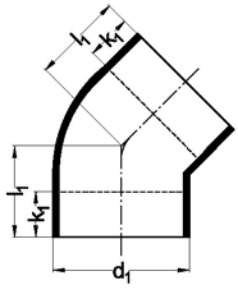
d_1	Code		Type	l_1	k_1
40	**12 04 88**		A	55	25
50	**12 05 88**		A	60	20
56	**12 56 88**		A	65	20
63	**12 06 88**		A	70	20
75	**12 07 88**		A	75	20
90	**12 09 88**		A	80	20
110	**12 11 88**		A	95	25
125	**12 12 88**		A	100	25
160	**12 16 88**		A	120	25
200	**12 20 88**	1)	B	290	60
250	**12 25 88**	2)	B	350	60
315	**12 31 88**	2)	B	360	60

1) fabricated

2) fabricated / wall thickness e according to S12,5

Elbow 45°

HDPE

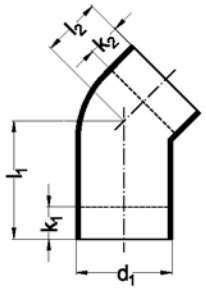


d_1	Code		l_1	k_1
40	**12 04 45**		40	20
50	**12 05 45**		45	20
56	**12 56 45**		45	20
63	**12 06 45**		50	20
75	**12 07 45**		50	20
90	**12 09 45**		55	20
110	**12 11 45**		60	25
125	**12 12 45**		65	25
160	**12 16 45**		69	20
200	**12 20 45**		173	60
250	**12 25 45**	[1]	182	60
315	**12 31 45**	[1]	195	60

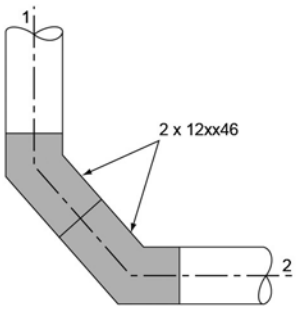
[1] wall thickness e according to S12,5

Elbow 45° with long side

HDPE



d_1	Code	l_1	l_2	k_1	k_2
75	**12 07 46**	145	50	120	25
90	**12 09 46**	150	55	120	25
110	**12 11 46**	147	60	120	25

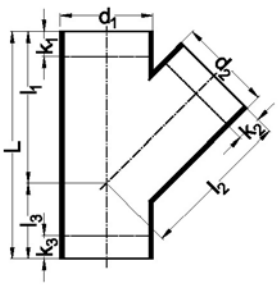


Elbows 45° with long side are applied for making the transition from stack to building drain acc. to EN 12056 (see drawing).

1 stack
2 building drain

Y-branch 45°

HDPE



d_1/d_2	Code		L	l_1/l_2	l_3	k_1	k_2	k_3
40/40	**30 04 04**		135	90	45	30	30	25
50/40	**30 05 04**		165	110	55	45	45	40
50/50	**30 05 05**		165	110	55	20	20	35
56/40	**30 56 04**		180	120	60	35	30	60
56/50	**30 56 05**		180	120	60	30	30	40
56/56	**30 56 56**		180	120	60	25	25	40
63/40	**30 06 04**		195	130	65	40	45	45
63/50	**30 06 05**		195	130	65	30	30	50
63/56	**30 06 56**		195	130	65	25	25	45
63/63	**30 06 06**		195	130	65	20	20	40
75/40	**30 07 04**		210	140	70	60	50	65
75/50	**30 07 05**		210	140	70	40	30	70
75/56	**30 07 56**		210	140	70	35	25	55
75/63	**30 07 06**		210	140	70	35	25	45
75/75	**30 07 07**		210	140	70	25	25	40
90/40	**30 09 04**		240	160	80	65	55	75
90/50	**30 09 05**		240	160	80	50	40	80
90/56	**30 09 56**		240	160	80	45	35	75
90/63	**30 09 06**		240	160	80	40	30	70
90/75	**30 09 07**		240	160	80	35	30	65
90/90	**30 09 09**		240	160	80	20	20	50
110/40	**30 11 04**		270	180	90	75	60	95
110/50	**30 11 05**		270	180	90	55	50	95
110/56	**30 11 56**		270	180	90	45	40	90
110/63	**30 11 06**		270	180	90	40	35	85
110/75	**30 11 07**		270	180	90	35	30	75
110/90	**30 11 09**		270	180	90	30	25	65
110/110	**30 11 11**		270	180	90	20	20	55
125/40	**30 12 04**		300	200	100	115	60	75
125/50	**30 12 05**		300	200	100	115	60	75
125/56	**30 12 56**		300	200	100	110	50	45
125/63	**30 12 06**		300	200	100	60	45	105
125/75	**30 12 07**		300	200	100	50	40	95
125/90	**30 12 09**		300	200	100	35	30	30
125/110	**30 12 11**		300	200	100	25	25	25
125/125	**30 12 12**		300	200	100	20	20	20
160/50	**30 16 05**	[1]	375	250	125	120	115	65
160/56	**30 16 56**	[1]	375	250	125	120	115	65
160/63	**30 16 06**	[1]	375	250	125	120	115	65
160/75	**30 16 07**		375	250	125	120	115	65
160/90	**30 16 09**		375	250	125	110	105	55
160/110	**30 16 11**		375	250	125	50	40	45
160/125	**30 16 12**		375	250	125	10	20	40
160/160	**30 16 16**		375	250	125	10	15	25
200/50	**30 20 05**	[2]	540	360	180	95	15	175
200/56	**30 20 56**	[2]	540	360	180	95	15	175
200/63	**30 20 06**	[2]	540	360	180	95	15	175
200/75	**30 20 07**	[3]	540	360	180	95	160	175
200/90	**30 20 09**	[3]	540	360	180	80	150	165

[1] fabricated

[2] fabricated from branch 200/75 mm with concentric reducer

[3] wall thickness e according to S12,5

-- to be continued --

Y-branch 45° - continuation -

d_1/d_2	Code		L	l_1/l_2	l_3	k_1	k_2	k_3
200/110	**30 20 11**	3)	540	360	180	65	140	150
200/125	**30 20 12**	3)	540	360	180	55	130	140
200/160	**30 20 16**	3)	540	360	180	35	85	115
200/200	**30 20 20**	3)	555	375	180	0	0	95
250/75	**30 25 07**	1)	660	440	220	170	205	235
250/90	**30 25 09**	1)	660	440	220	160	195	225
250/110	**30 25 11**	1)	660	440	220	150	185	215
250/125	**30 25 12**	1)	660	440	220	140	175	205
250/160	**30 25 16**	1)	660	440	220	120	130	180
250/200	**30 25 20**	1)	660	440	220	90	50	150
250/250	**30 25 25**	1)	900	600	300	160	160	250
315/75	**30 31 07**	1)	840	560	280	255	280	325
315/90	**30 31 09**	1)	840	560	280	245	270	315
315/110	**30 31 11**	1)	840	560	280	235	260	305
315/125	**30 31 12**	1)	840	560	280	220	250	290
315/160	**30 31 16**	1)	840	560	280	200	205	270
315/200	**30 31 20**	1)	840	560	280	175	125	240
315/250	**30 31 25**	1)	840	560	280	140	130	205
315/315	**30 31 31**	1)	950	610	340	170	170	280

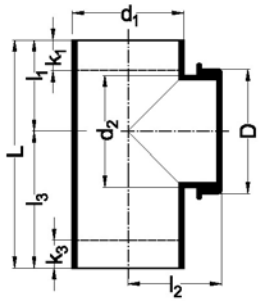
1) fabricated

2) fabricated from branch 200/75 mm with concentric reducer

3) wall thickness e according to S12,5

Clean out branch 90°

HDPE

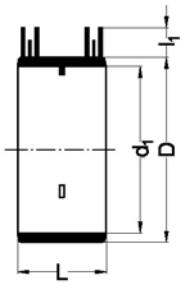


d_1/d_2	Code	D	L	l_1	l_2	l_3	k_1	k_3
40/40	**23 04 00**	64	130	55	80	75	25	45
50/50	**23 05 00**	72	150	60	72	90	25	55
56/56	**23 56 00**	83	175	70	100	105	30	65
63/63	**23 06 00**	87	175	70	100	105	30	60
75/75	**23 07 00**	91	175	70	100	105	25	55
90/90	**23 09 00**	118	200	80	100	120	25	70
110/110	**23 11 20**	127	225	90	105	135	20	65
125/110	**23 12 00**	140	250	100	123	150	20	80
160/110	**23 16 20**	134	350	140	120	210	60	135
200/110	**23 20 00**	140	360	180	160	180	90	90
250/110	**23 25 00**	140	440	220	185	220	110	110
315/110	**23 31 00**	140	560	280	220	280	170	170

Clean out branches 90° can be applied in horizontal and vertical pipes.

Electrofusion coupler

HDPE



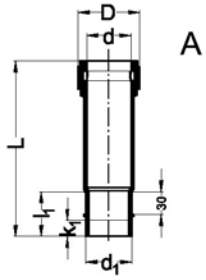
d_1	Code	D	L	l_1	System
40	**41 04 95**	52	54	22	5A/80s
50	**41 05 95**	62	54	22	5A/80s
56	**41 56 95**	68	54	22	5A/80s
63	**41 06 95**	75	54	22	5A/80s
75	**41 07 95**	87	54	22	5A/80s
90	**41 09 95**	102	56	22	5A/80s
110	**41 11 95**	123	60	16	5A/80s
125	**41 12 95**	137	66	22	5A/80s
160	**41 16 95**	172	66	22	5A/80s
200	**41 20 65**	233	175	31	220V/420s
250	**41 25 65**	283	175	31	220V/420s
315	**41 31 65**	349	175	31	220V/420s

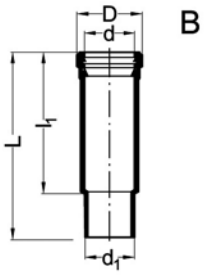
The electrofusion couplers are delivered with centre stops. These stops can easily be removed with a knife or screwdriver (200, 250, 315), so that the coupler can be used as a slide-coupler. Before welding, cut pipe ends squarely with a pipe cutting tool, remove the oxide film with a scraper and mark the insertion depth. The couplers can easily be welded with our Akatherm control box and other suitable control boxes.

Expansion socket with anchor point
with protection plug

HDPE

SBR seal

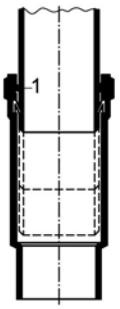




d_1	Code		Type	D	d	L	l_1	k_1
40	**40 04 20**		B	58	41	172	135	
50	**40 05 20**		B	68	51	172	135	
56	**40 56 20**		B	74	57	172	135	
63	**40 06 20**	[1]	B	78	64	155	135	
75	**42 07 20**		A	100	76	256	75	35
90	**42 09 20**		A	116	91	256	75	35
110	**42 11 20**		A	137	112	256	75	35
125	**42 12 20**		A	153	127	256	75	35
160	**42 16 20**		A	189	162	265	75	35
200	**40 20 20**	[2]	B	230	202	310	245	
250	**40 25 20**	[2]	B	300	253	330	265	
315	**40 31 20**	[2]	B	370	319	360	290	

[1] butt-weld only

[2] without protection plug, butt-weld only



1 sealing ring

The expansion sockets can absorb length changes of pipes with a max. length of 6 m. A temperature difference of 10°C will result in expansion or contraction of 8 mm. The insertion depths at ambient temperature of 0°C and 20°C are indicated on the sockets.

Expansion sockets d75-160 mm have an intergrated anchor point, that is able to incorporate extension of the 5 meter down pipe of the Akasison system.

Electrofusion control box CB160-U

d_1	Code	Dim.	V~	Hz	kg	A max	W max
40-160	**41 98 30**	65x200x85	230	50/60	1,7	5	1150

The Akatherm CB160-U control box is suitable for welding electrofusion couplers from d = 40-160 mm.

Electrofusion control box CB315-U

d_1	Code	Dim.	V~	Hz	kg	A max	W max
40-315	**41 99 10**	440x220x180	230	50/60	5	10,9	2500

The Akatherm CB315-U control box is suitable for welding electrofusion couplers from d = 40-160 mm (with yellow cable) and electrofusion couplers from d = 200-315 mm (with blue cable).
Yellow and blue output leads are supplied as standard with control box Code 419910.

Output leads for control box CB315-U

d_1	Code	System	Colour
40-160	**41 99 71**	5A/80s	yellow
200-315	**41 99 72**	220V/420s	blue

Weld extension cable

d_1	Code
40-315	41 99 75

Connection cable USB

	Code
	41 99 77

Butt-welding machine 160C

d_1	Code	L	B	H	kg
40-160	**49 20 00**	835	565	760	87

d_1 = 40-50-63-75-90-110-125-160.
Suitable for welding Y-branches 45°.

Butt-welding machine 250 C

d_1	Code	L	B	H	kg
75-250	**49 30 00**	835	565	760	160

d_1 = 75-90-110-125-160-200-250.
Suitable for welding Y-branches 45°.

Butt-welding machine 315 C

d_1	Code	L	B	H	kg
90-315	**49 40 00**	1200	680	1045	187

d_1 = 90-110-125-160-200-250-315.
Suitable for welding Y-branches 45°.

Scraper Spider

Code		L	B	H	kg
41 98 60	1)	105	80	60	0,460
41 98 65	2)	260	210	80	1,600
41 98 69	3)	260	210	80	1,600

1) excluding case and accessories

2) including Spider, case and accessories (handle and blade for replacement)

3) including Spider and case

For the quick removal of the oxide-layer of pipes d50-125 mm.

Spider accessories

Code	Accessories
41 98 61	Replacement blades
41 98 62	Roller set 3x
41 98 63	Roller holder
41 98 64	Replacement screw M2, 5x6 for blades
41 98 66	Case

Scraper

Code
61 33 11

Rotation scraper for the complete removal of the oxidic layer of PE pipes and fittings d75-225 mm. The scraper is delivered in a useful aluminium transportation case, and includes a set of spare blades.

Manual scraper

Code
419600

PE cleaner

Code
60 10 00

Reclosable container with 100 cleaning cloths.

Grease pencil

Code
41 96 20

Fixing bolts for Akasison leaf guard (set of 2) Stainless steel

Code
74 55 51

Fixing bolts for Akasison clamp flange (set of 6) Stainless steel

Code
74 55 62

Fixing bolts for reinforcement plate Akasison XL75 (set of 4) Stainless steel

Code
74 57 23

Leaf guard and air baffle Akasison

ASA

Code
74 55 50

For roof outlet Akasison XL75.
Without fixing bolts.

Air baffle Akasison XL90

ASA

Code
74 90 53

For roof outlet Akasison XL90.
With fixing bolts.

Clamp flange Akasison

Stainless steel

Code
74 55 66

For roof outlets Akasison Code 747500 and 747501.
Without fixing bolts.

Seal for clamp flange Akasison

EPDM

Code
74 55 65

For roof outlets Akasison Code 747500, 747501 747580 and 747581.

Heating element 230V/7W Akasison

Code	V	Watt
74 55 40	230	7

For roof outlets Akasison XL75.
Self regulation heating element.
Direct connection to 230 V.
Including 1 m cable.

Fire protective collar Akasison

Code
74 77 30

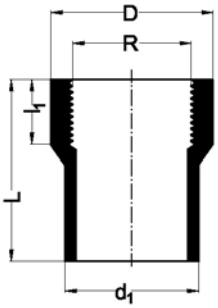
For Akasison XL75 Art. Nr. 747722.
Metal body with intumescent material.

Connector with internal thread for gutter and roof outlet 63/90

HDPE

d_1	Code	R	L	l_1	D
63	**74 92 83**	2"	105	31	73
90	**74 92 85**	3"	105	31	102

Connector for:
- gutter Code 740x50.
- roof outlet Code 740x3x.



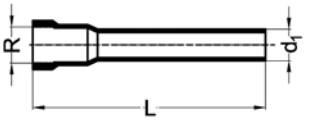
Connector with internal thread for gutter and roof outlet 63

HDPE

Length = 500 mm

d_1	Code	R	L	l_1	D
40	**74 04 83**	2"	500	31	73
50	**74 05 83**	2"	500	31	73
56	**74 56 83**	2"	500	31	73
63	**74 06 83**	2"	500	31	73

For connecting roof outlets Code 740650, 740632, 740630.

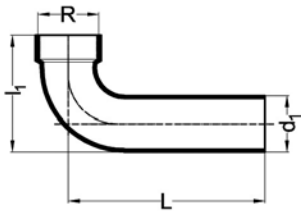


Connector horizontally with internal thread for gutter R63 and roof outlet 63

HDPE

d_1	Code	R	L	l_1	D
63	**74 96 83**	2"	210	117	73

For connecting roof outlets Code 740650, 740632, 740630.



Air baffle for metal roof- and gutter outlets

Aluminium

d_1	Code	A	B
63	**74 06 51**	74 06 50	74 06 3x
90	**74 09 51**	74 09 50	74 09 3x
110	**74 11 51**	74 11 51	

Heating element

Code		V	Watt
74 06 01	[1]	230	10
74 09 01	[2]	230	10

[1] For: gutter Code 740650 / roof outlet 63B Code 740632 / roof outlet 63K Code 740630

[2] For: gutter Code 740950 / roof outlet 63B Code 740932 / roof outlet 63K Code 740930

Including: power cable and earth connection.

5 INSTALLATION INSTRUCTIONS

ASSEMBLY INSTRUCTIONS: INSTALLATION SOCKET 200 x 200 x 1,5

1. Provide trapezoidal profile with hole for installation socket.

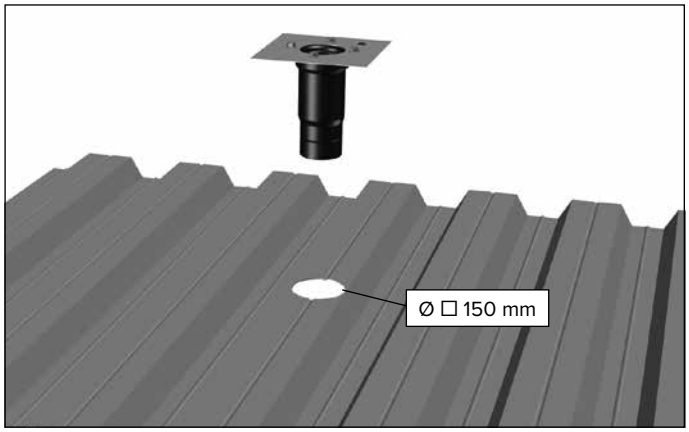


Image 5.1

2. Attach installation socket to trapezoidal roof profile.

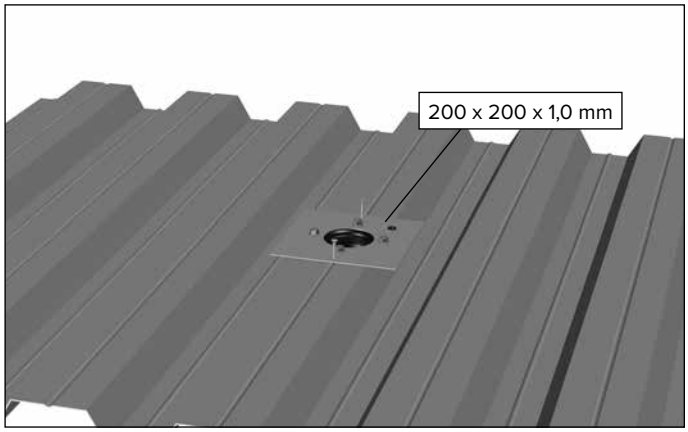


Image 5.2

3. Cut hole for heating cable (optional).

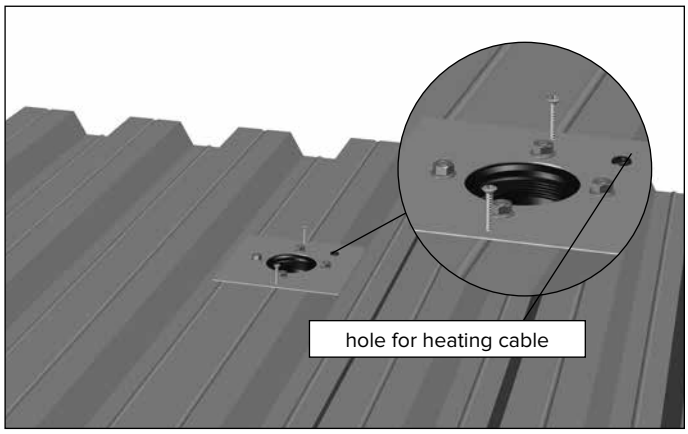


Image 5.3

4. Attach vapour barrier to installation socket.

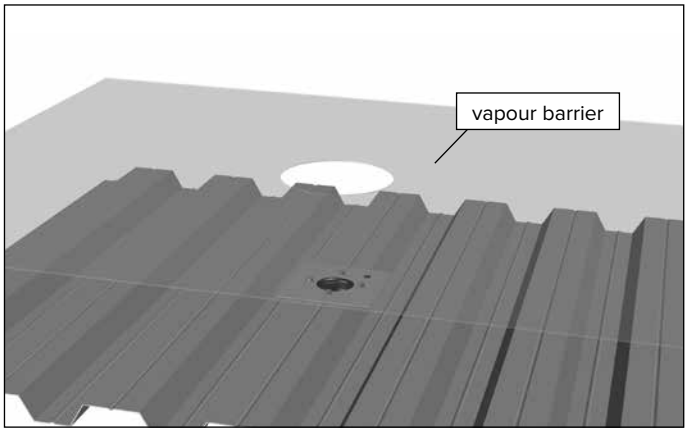


Image 5.4

5. Short connector of roof outlet (length of connector of roof outlet = height of insulation and roof covering + 100 mm).

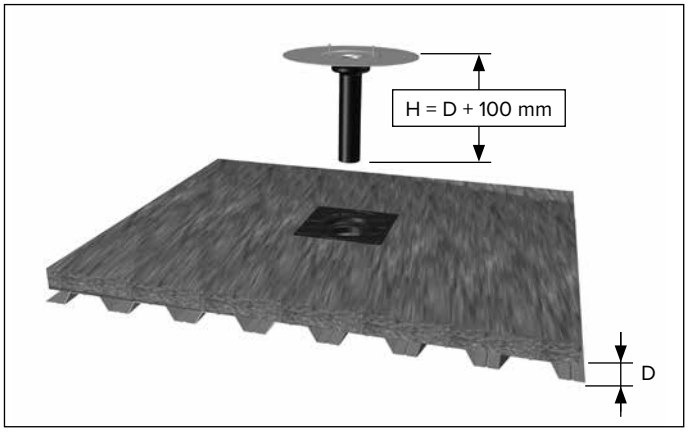


Image 5.5

6. Place roof outlet according to installation instructions.

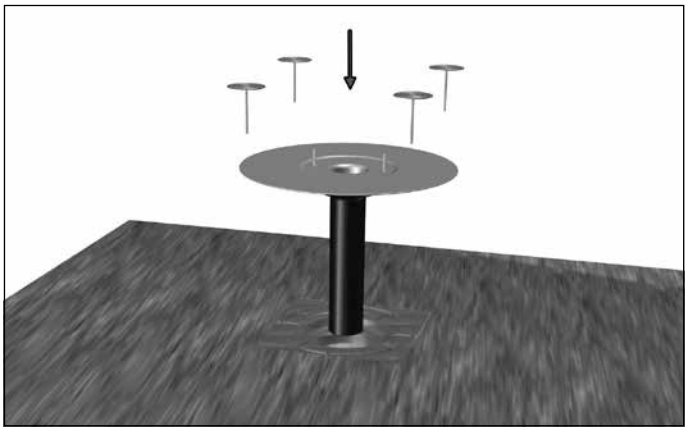


Image 5.6

ASSEMBLY INSTRUCTIONS: REINFORCEMENT PLATE 660 X 660 X 1,5

1. Provide trapezoidal profile with hole for reinforcement plate.

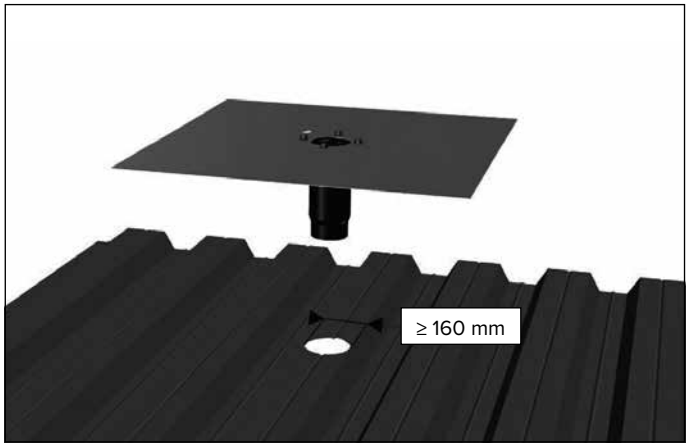


Image 5.7

2. Attach reinforcement plate to trapezoidal roof profile.

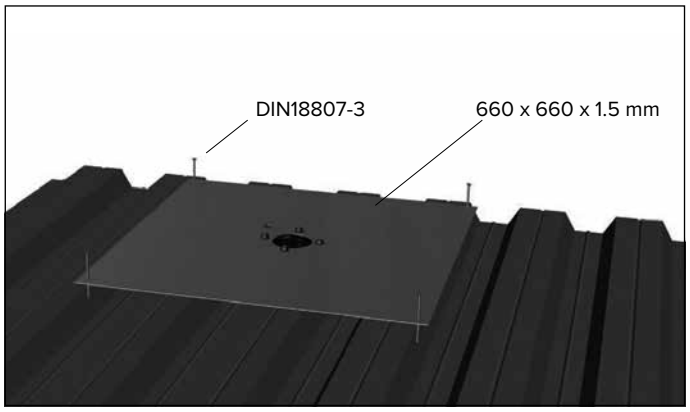


Image 5.8

3. Attach vapour barrier to reinforcement plate.

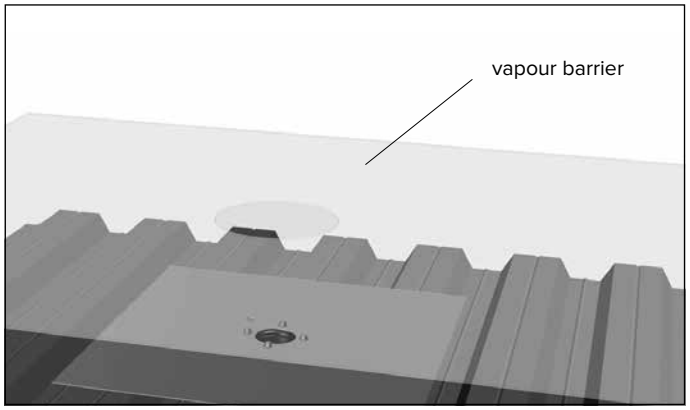


Image 5.9

4. Short connector of roof outlet (length of connector of roof outlet = height of insulation and roof covering + 100 mm).

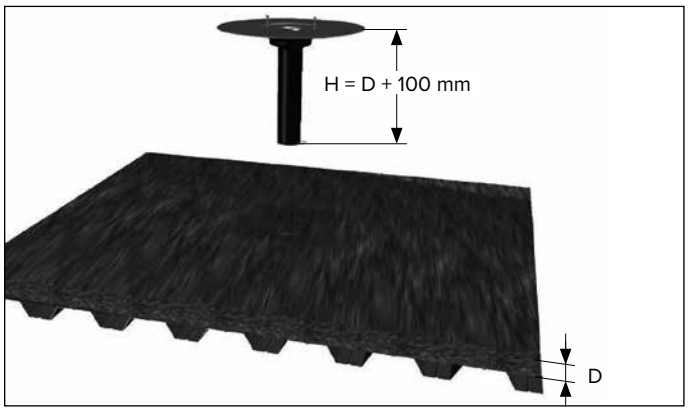


Image 5.10

5. Place roof outlet according to installation instruction.

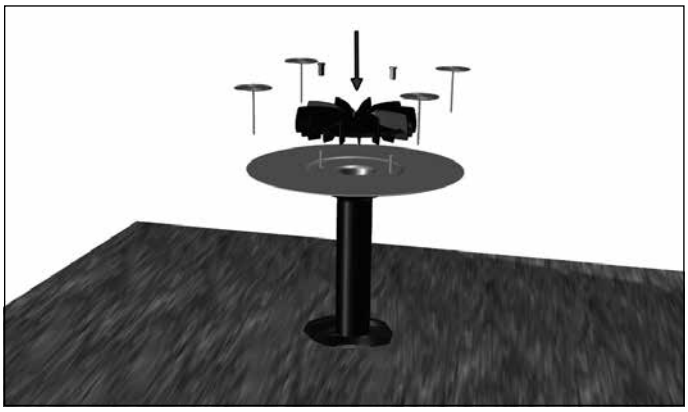


Image 5.11

ASSEMBLY INSTRUCTIONS: REINFORCEMENT PLATE INCLUDING FIRE PROTECTION 660 x 660 x 1,5

1. Provide a trapezium profile with hole for reinforcement plate including fire protection.

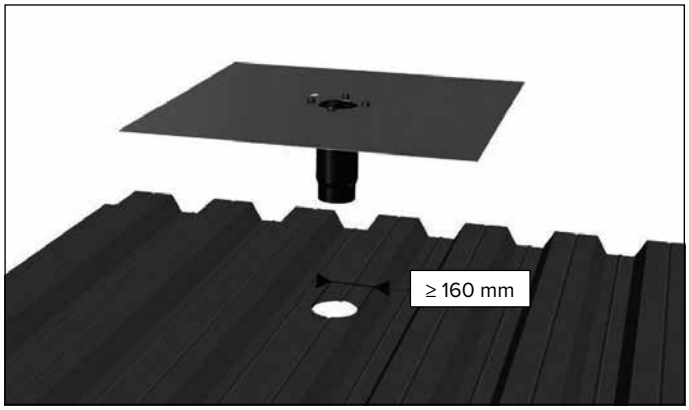


Image 5.12

2. Fill the space between the trapezoidal profile and the reinforcement plate with fire-resistant insulation.

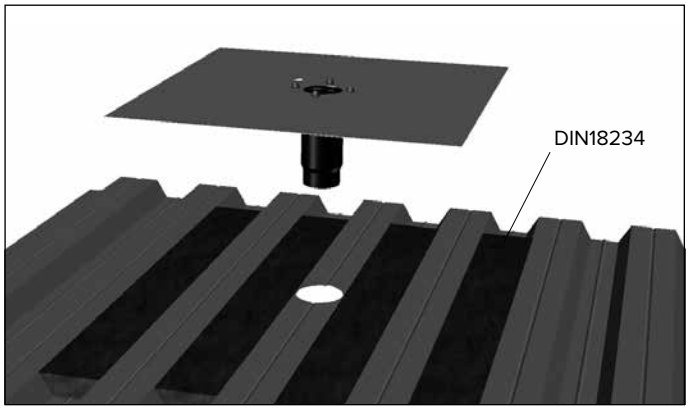


Image 5.13

3. Attach reinforcement plate to trapezoidal roof profile.

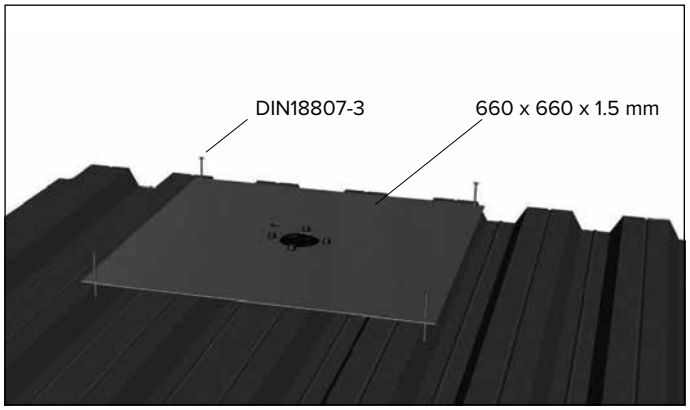


Image 5.14

4. Attach vapour barrier to reinforcement plate.

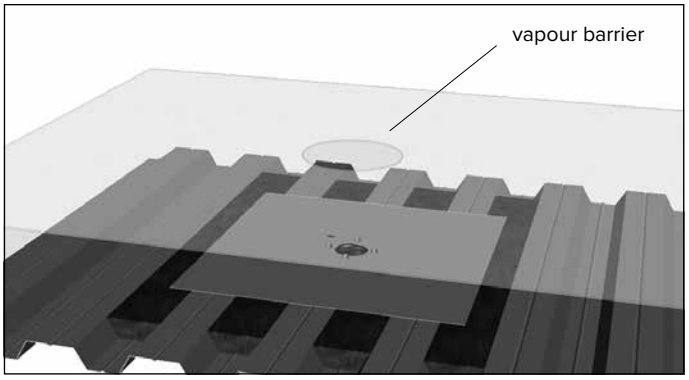


Image 5.15

5. Provide plate and trapezoidal profile with hole for heating cable (optional).

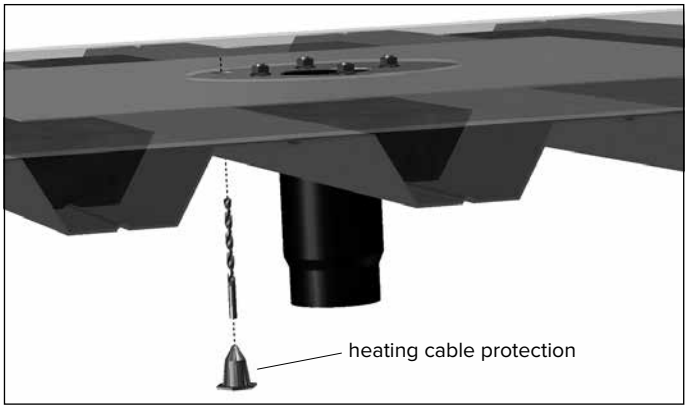


Image 5.16

6. Short connection of roof outlet (length of connection of roof outlet = height of insulation and roof covering + 100 mm).

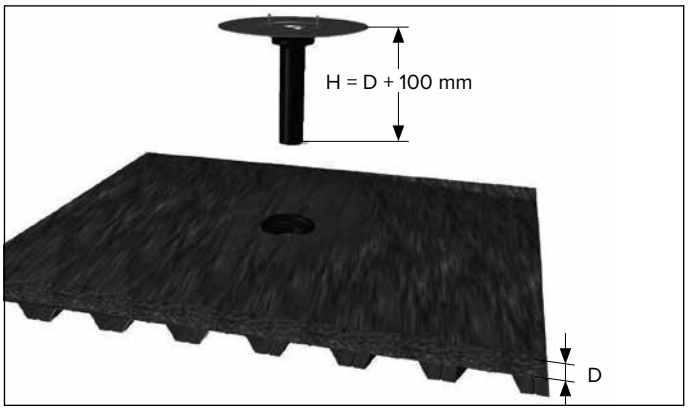


Image 5.17

7. Place roof outlet according to installation instructions.

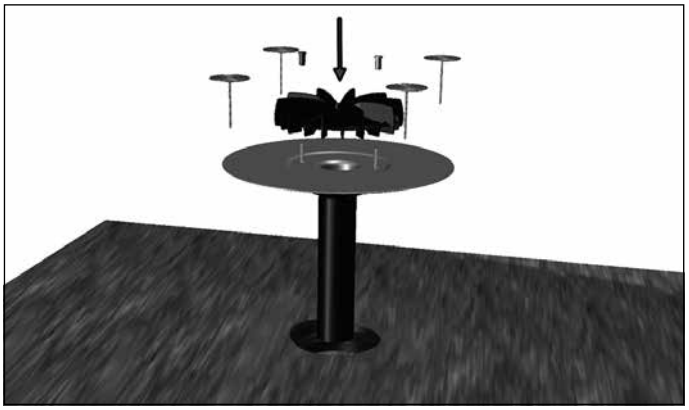


Image 5.18

ASSEMBLY INSTRUCTIONS: ROOF OUTLET XL75 PVC

1. Roof outlet XL75 PVC.

Image 5.19

2. Provide trapezoidal profile with hole for roof outlet.

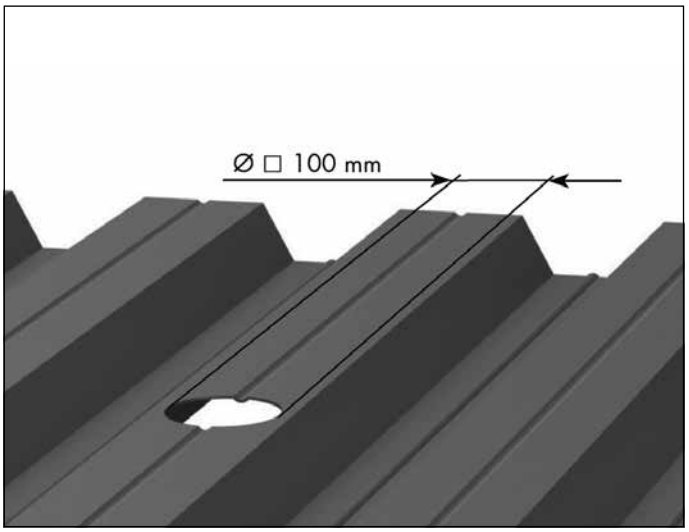


Image 5.20

3. Place insulation and provide insulation with hole for roof outlet. Alternatively: Provide insulation with hole for EPS-block and place EPS-block (not included).

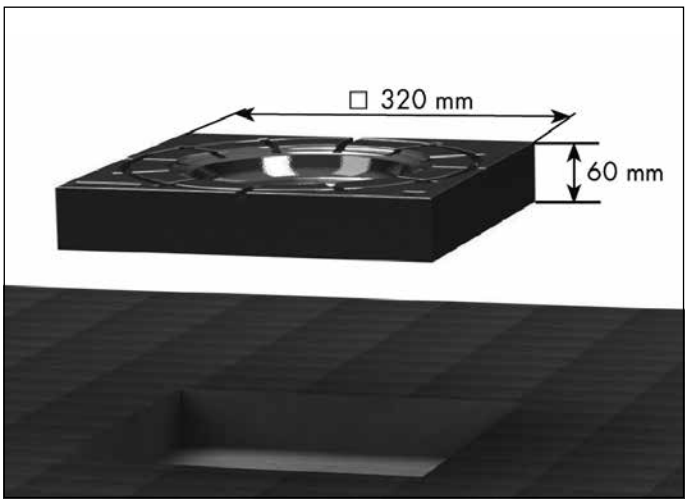


Image 5.21

4. Place roof outlet and secure with insulating screws.

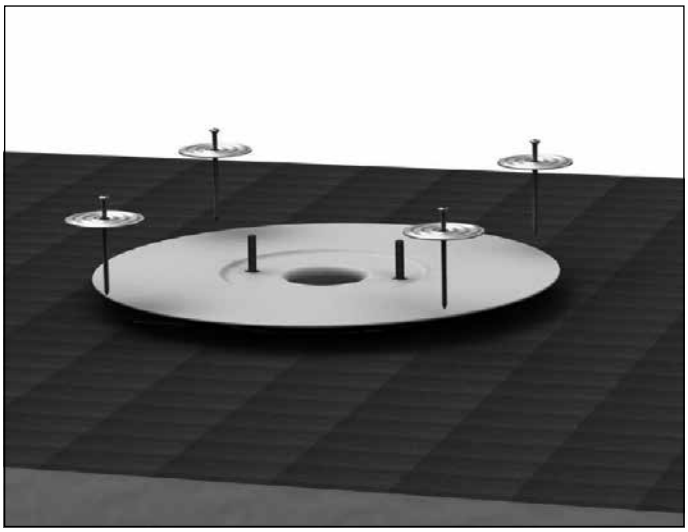


Image 5.22

5. Provide PVC roof covering with hole at roof outlet and attach PVC roof to roof outlet using a hot air gun.

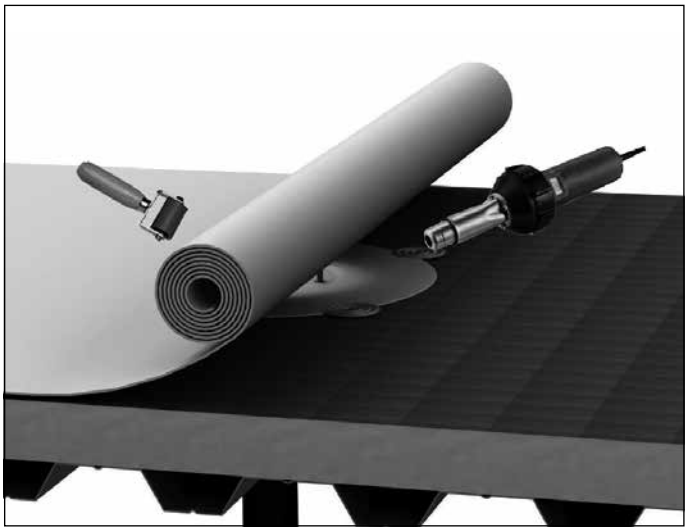


Image 5.23

6. Mount air baffle with the nuts supplied.

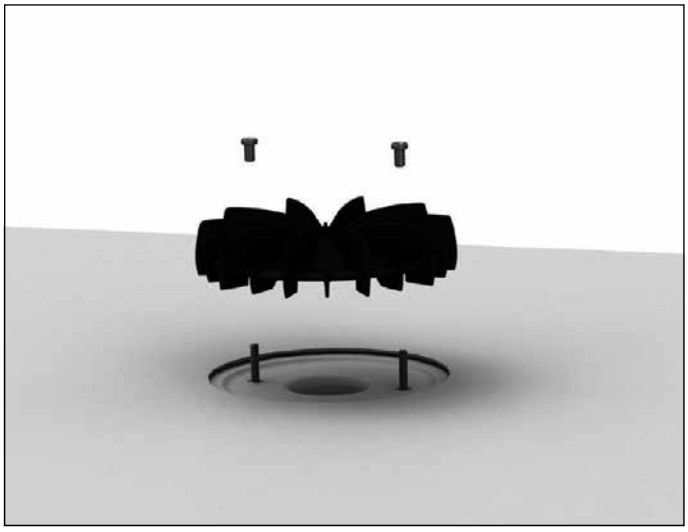


Image 5.24

ASSEMBLY INSTRUCTIONS: ROOF OUTLET XL75 BITUMEN

1. Mount roof outlet XL75 B plate on connector.

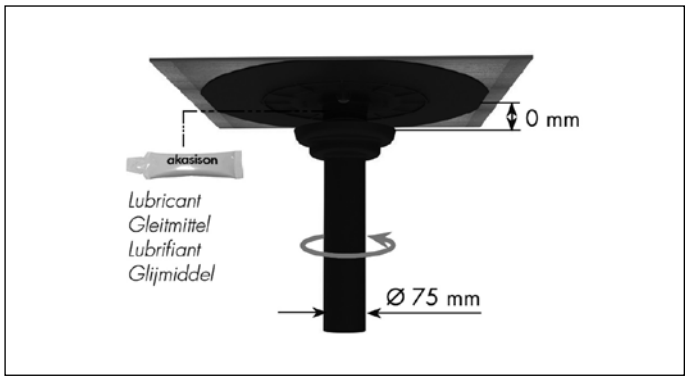


Image 5.25

2. Provide trapezoidal profile with hole for roof outlet.

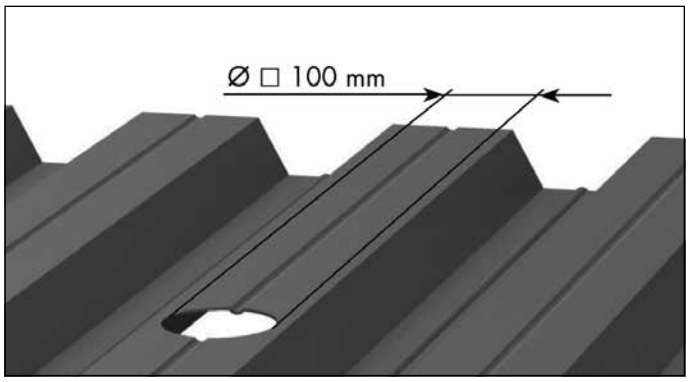


Image 5.26

3. Place insulation and provide insulation with hole for roof outlet. Alternatively: Provide insulation with hole for EPS-block and place EPS-block (not included).

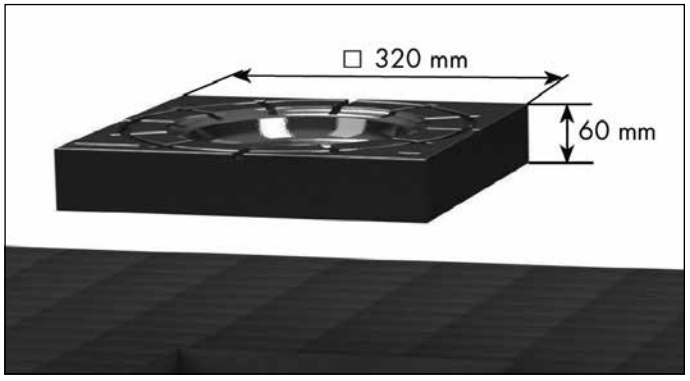


Image 5.27

4. Place roof outlet and secure with insulating screws. Place heat-resistant plate over roof outlet.

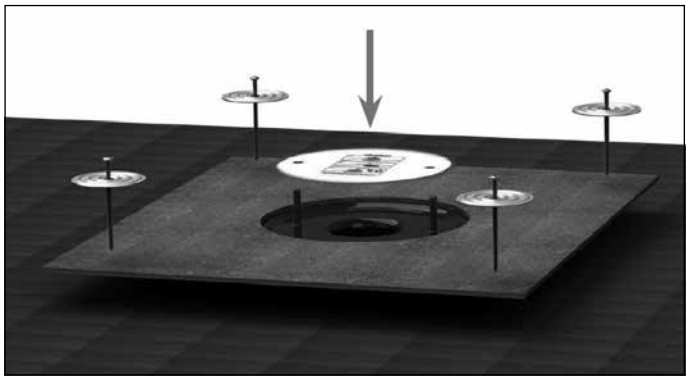


Image 5.28

5. Provide bitumen interlayer on hole for roof outlet and burn bitumen interlayer to the roof outlet.

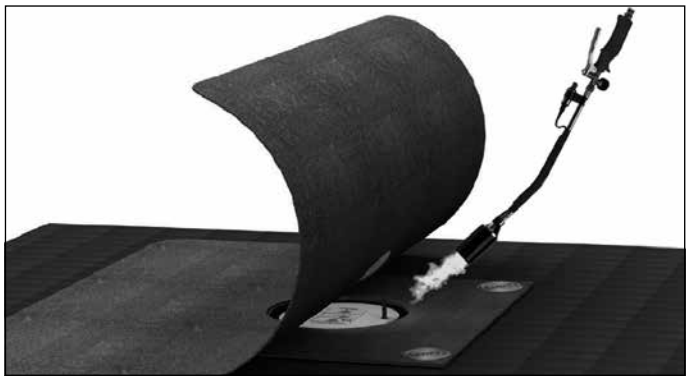


Image 5.29

6. Provide bitumen roof covering with hole for the roof outlet and burn bitumen roofing to the roof outlet with intermediate layer.

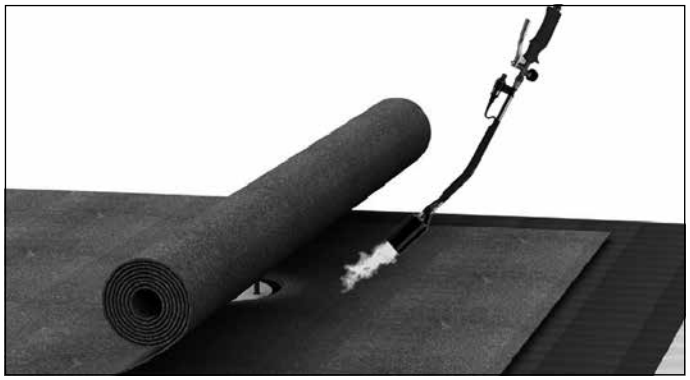


Image 5.30

7. Remove heat-resistant plate.

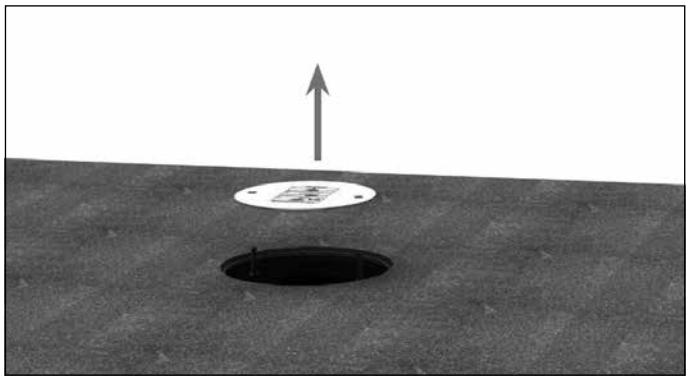


Image 5.31

8. Place cover plate to protect bitumen and mount air baffle with nuts supplied.

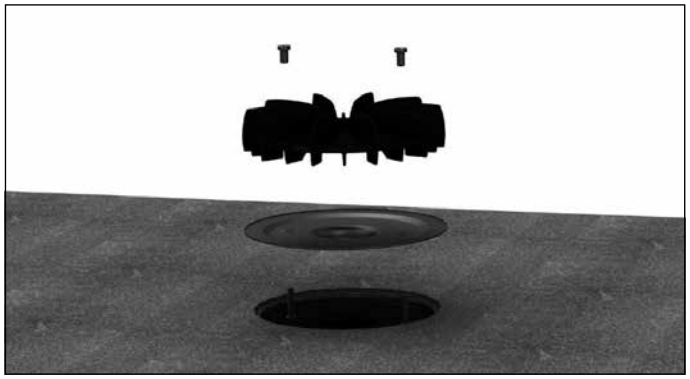


Image 5.32

ASSEMBLY INSTRUCTIONS: ROOF OUTLET XL75 CLAMP FLANGE

1. Mount roof outlet XL75 C plate on connector.

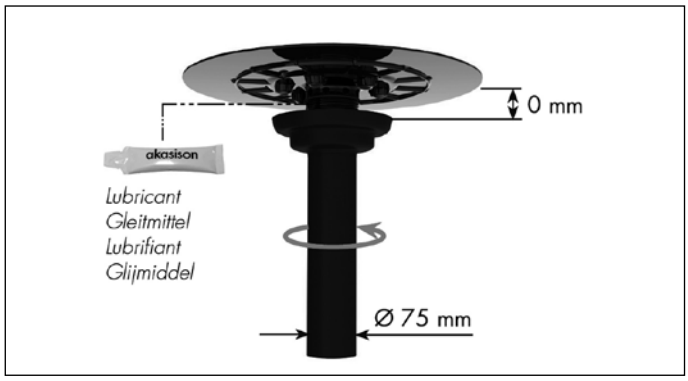


Image 5.33

2. Provide trapezoidal profile with hole for roof outlet.

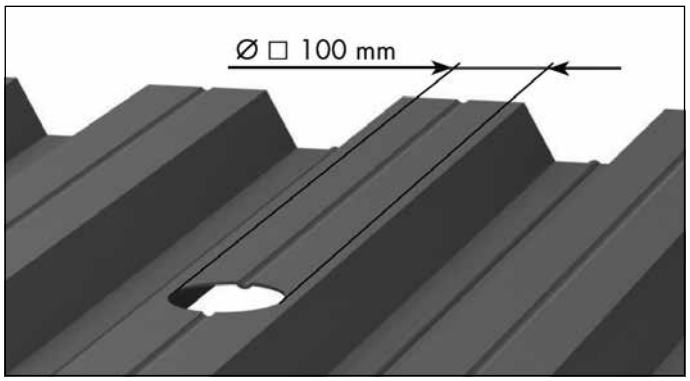


Image 5.34

3. Place insulation and provide insulation with hole for roof outlet. Alternatively: Provide insulation with hole for EPS-block and place EPS-block (not included).

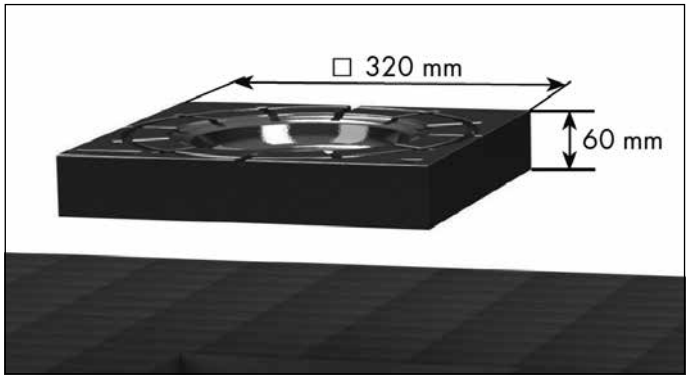


Image 5.35

4. Place roof outlet and secure it with insulating screws.

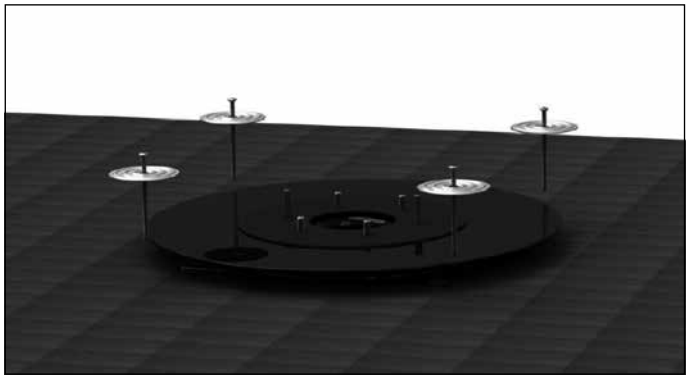


Image 5.36

5. Roll out roofing.

Image 5.37

6. Provide roofing with holes for studs and hole for drainage. Place roofing over studs.

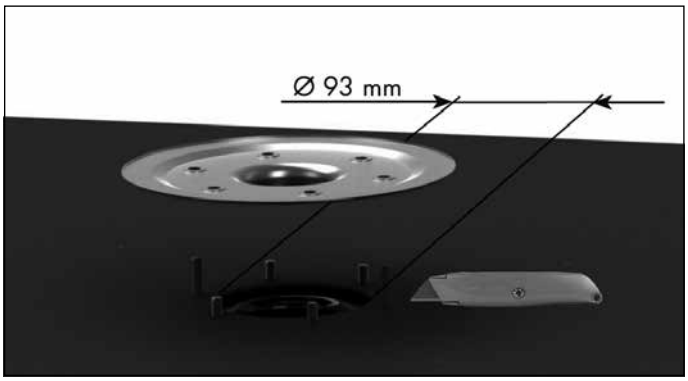


Image 5.38

7. Mount clamping ring with nuts supplied.

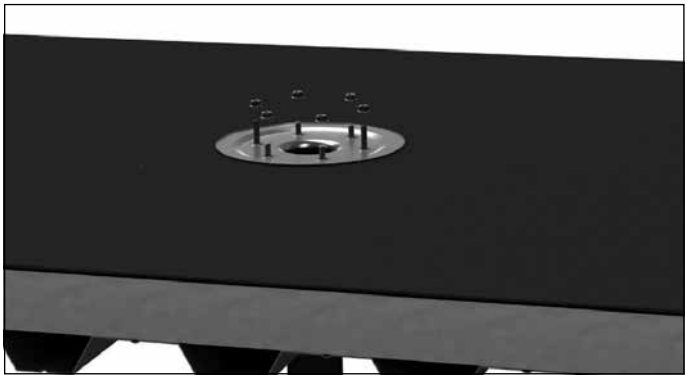


Image 5.39

8. Mount air baffle with nuts supplied.

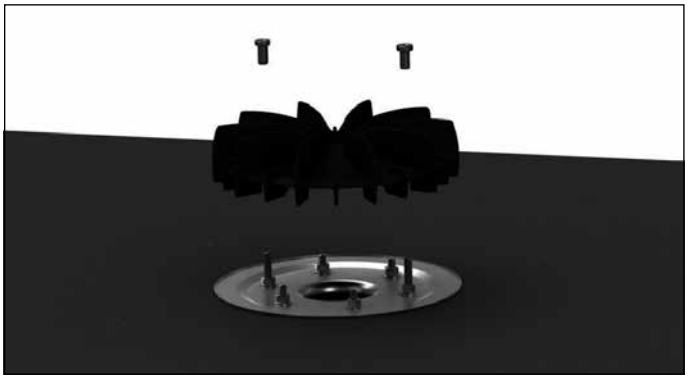


Image 5.40

ASSEMBLY INSTRUCTIONS: ROOF OUTLET XL75 PVC HR

1. Mount roof outlet XL75 PVC plate on 90° connector.

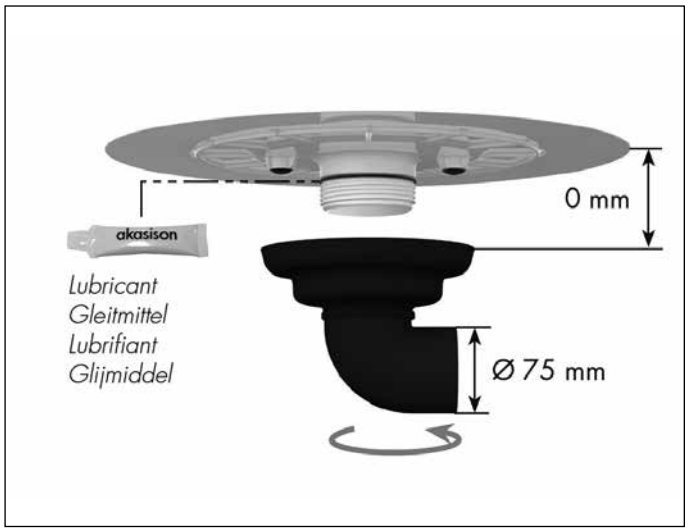


Image 5.41

2. Install roof outlet on the roof to the drainage system.

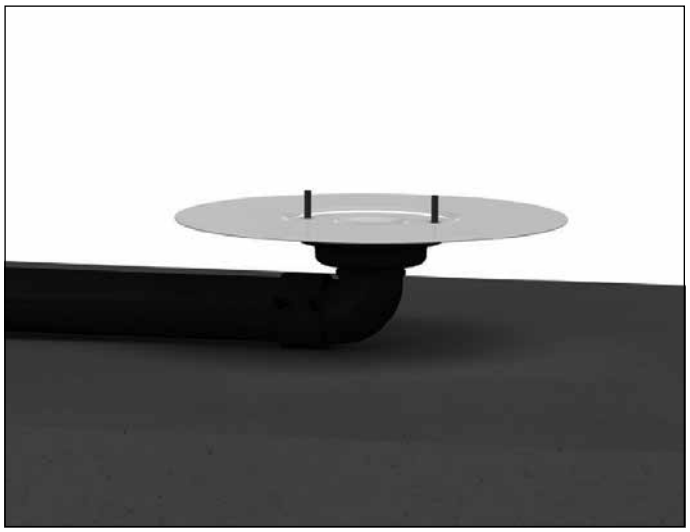


Image 5.42

3. Add roof insulation.

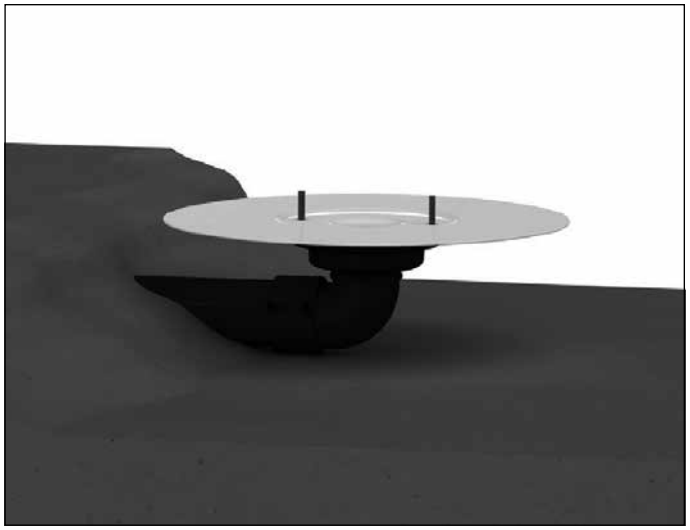


Image 5.43

4. Connect insulation with roof outlet.

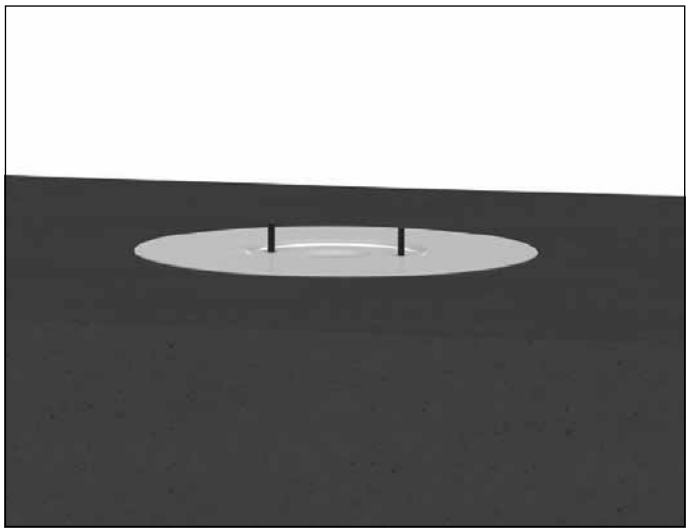


Image 5.44

5. Provide PVC roof covering with hole for roof outlet and connect PVC covering with hot air gun to roof outlet.

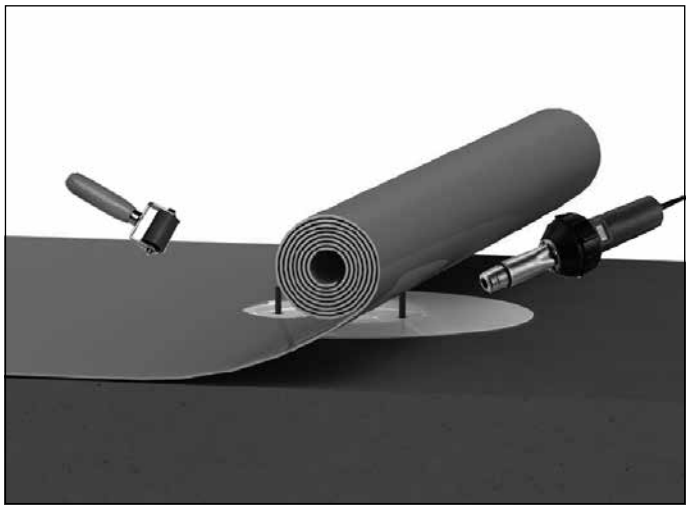


Image 5.45

6. Mount air baffle with nuts supplied.

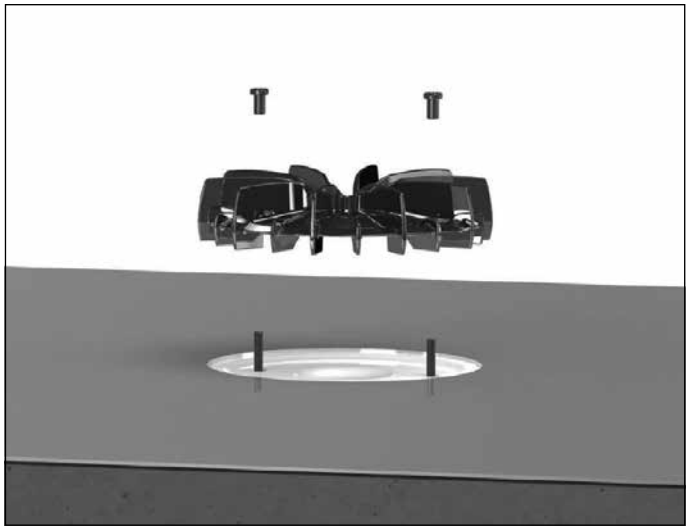


Image 5.46

ASSEMBLY INSTRUCTIONS: ROOF OUTLET XL75 BITUMEN HR

1. Mount Roof outlet XL 75 B plate on 90° connector.

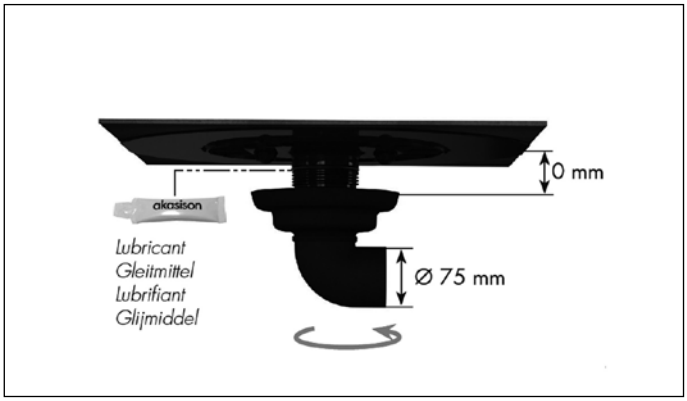


Image 5.47

2. Install roof outlet on the roof to the drainage system.

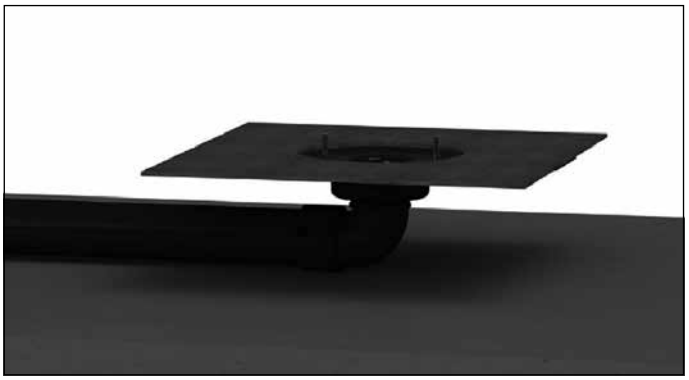


Image 5.48

3. Provide roof with insulation and connect insulation with roof outlet.

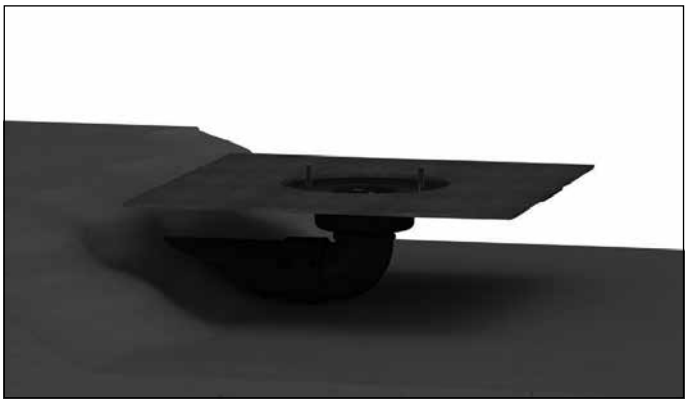


Image 5.49

4. Place heat-resistant plate over roof outlet.

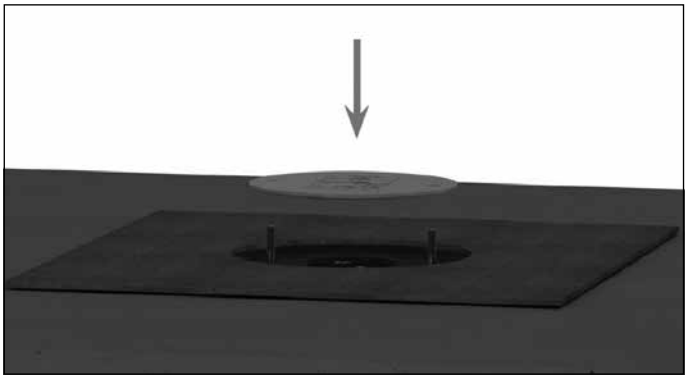


Image 5.50

5. Provide bitumen roof covering with hole for roof outlet and burn bitumen roofing to the roof outlet.

Image 5.51

6. Remove heat-resistant plate.

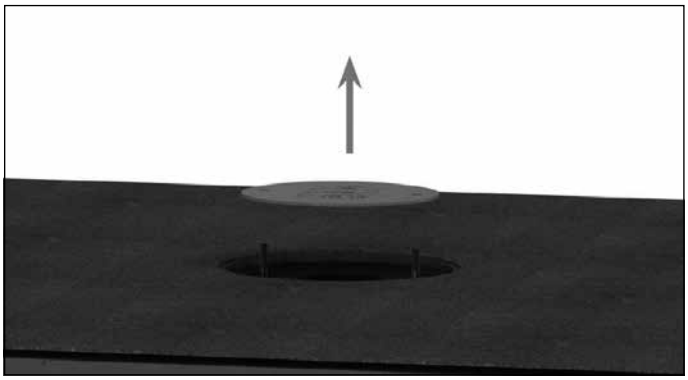


Image 5.52

7. Place cover plate for protection of bitumen and mount air baffle with nuts supplied.

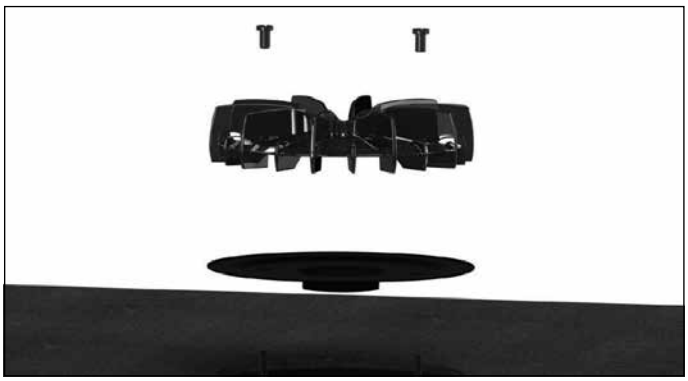


Image 5.53

ASSEMBLY INSTRUCTIONS: ROOF OUTLET XL75 CLAMP FLANGE HR

1. Mount roof outlet XL75 C plate on 90° connector.

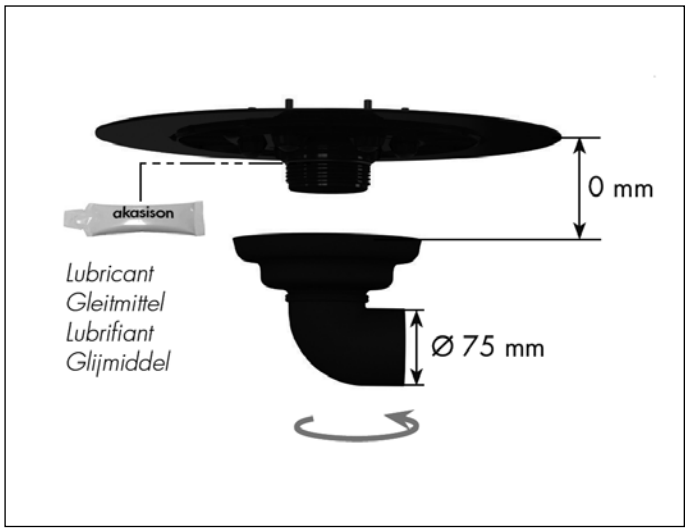


Image 5.54

2. Install roof outlet on roof to drainage system.

Image 5.55

3. Add roof insulation.

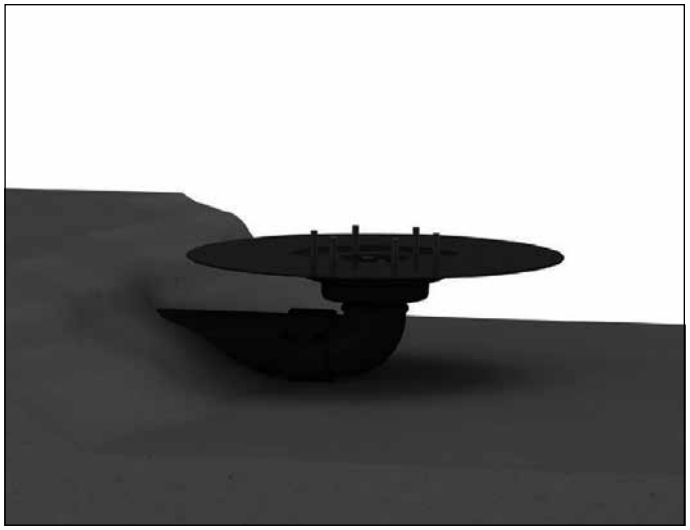


Image 5.56

4. Connect insulation with roof outlet.

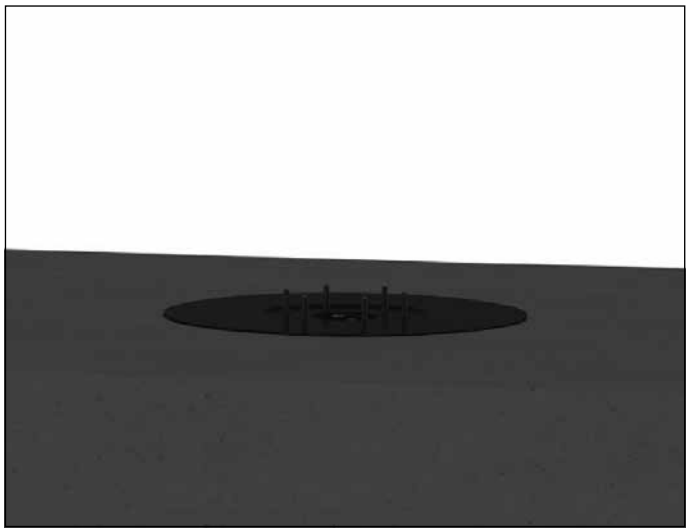


Image 5.57

5. Provide roofing with holes for studs and hole for drainage. Place roofing over studs.

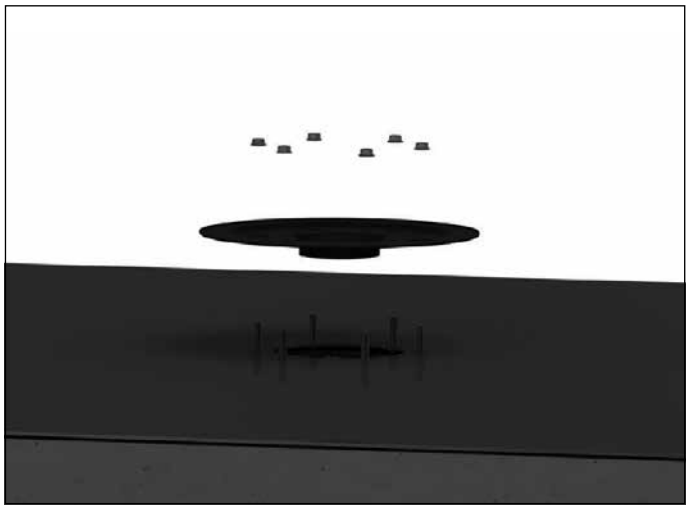


Image 5.58

6. Mount the air baffle with nuts supplied.

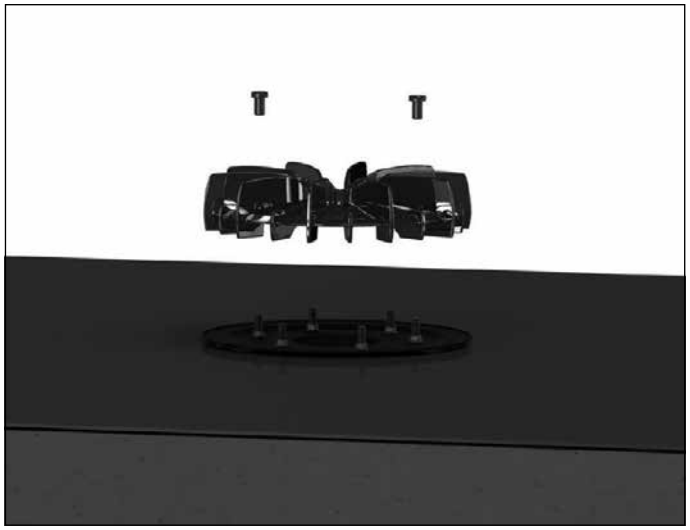


Image 5.59

MOUNTING INSTRUCTIONS: CONCRETE GUTTER OUTLET AKASISON XL 75

1. Drill hole with diameter of 100 mm.

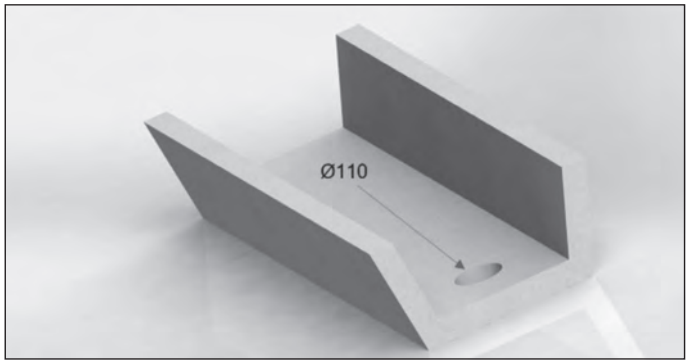


Image 5.60

2. Insert the base outlet into the hole and indicate the area covered by the outlet and mark the holes for the plugs.

Image 5.61

3. Drill holes for the knock-in-plugs (Ø6 mm) 45 mm deep.

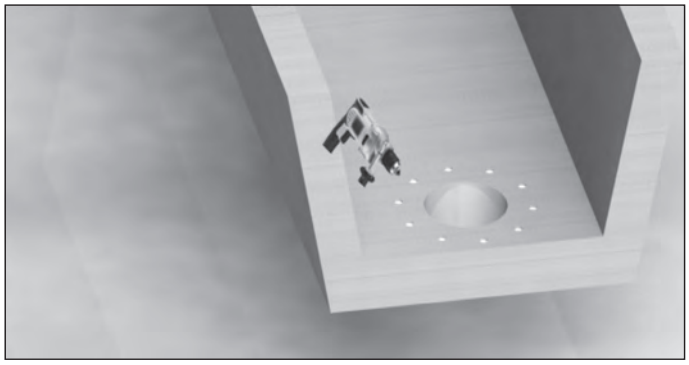


Image 5.62

4. Clean and remove grease at area of the gutter. For example use acetone.

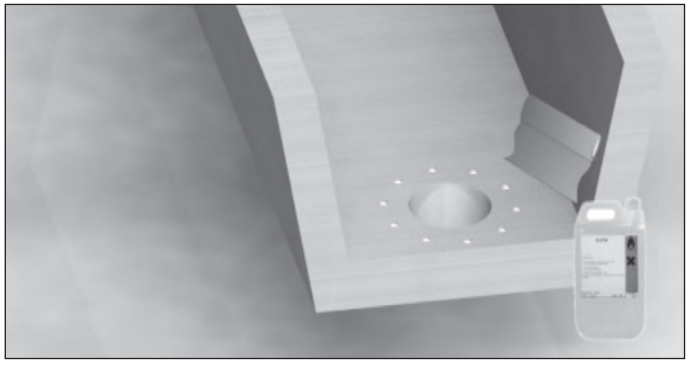


Image 5.63

5. Apply primer to the gutter.

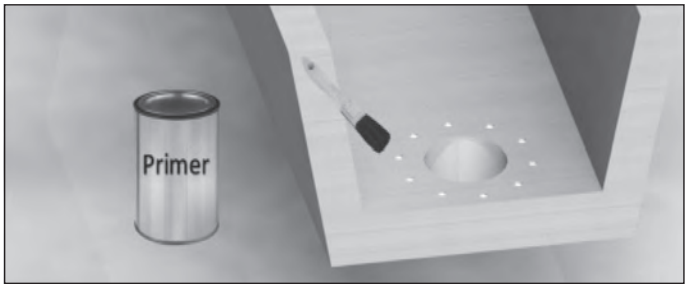


Image 5.64

6. Apply kit to make connection of the gutter and the outlet leak-tight.

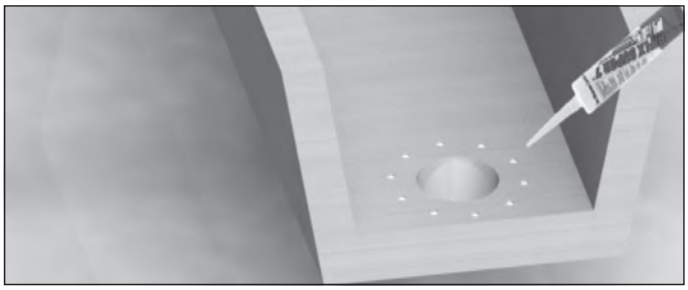


Image 5.65

7. Fasten outlet with the knock in plugs.

Image 5.66

8. Secure the air baffle with the nuts provided.

Image 5.67

8. Secure the air baffle with the nuts provided.

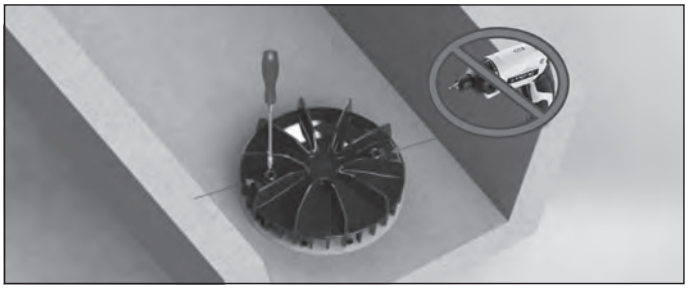


Image 5.68

MOUNTING INSTRUCTIONS: CONCRETE GUTTER WITH COVERING OUTLET AKASISON XL 75

1. Drill hole with diameter of 100 mm.

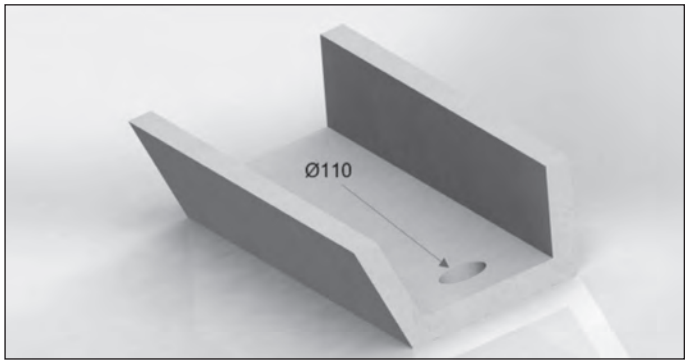


Image 5.69

2. Insert the base outlet in the hole and indicate the area covered by the outlet and mark the holes for the plugs.

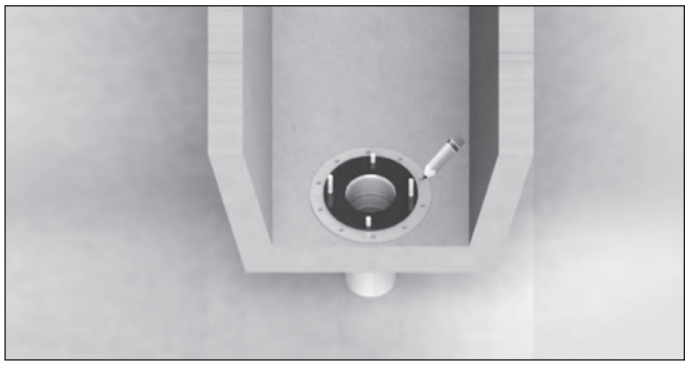


Image 5.70

3. Drill holes for the knock-in-plugs (Ø6 mm) 45 mm deep.

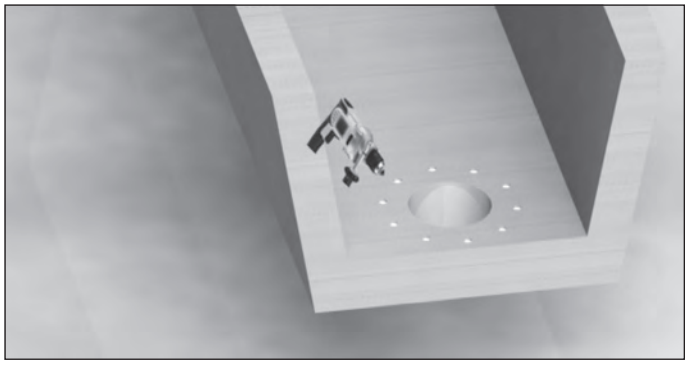


Image 5.71

4. Clean and remove grease at area of the gutter. For example use acetone.

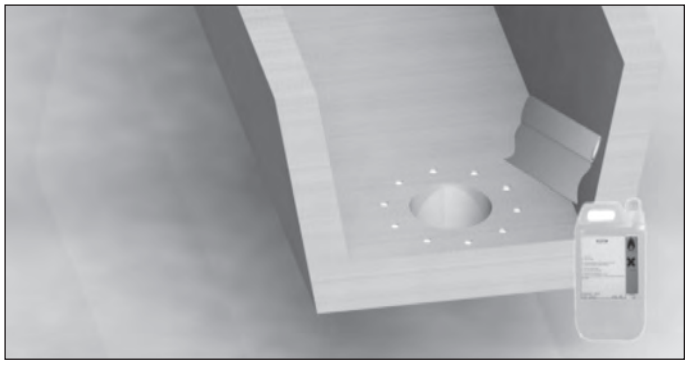


Image 5.72

5. Apply primer to the gutter outlet.

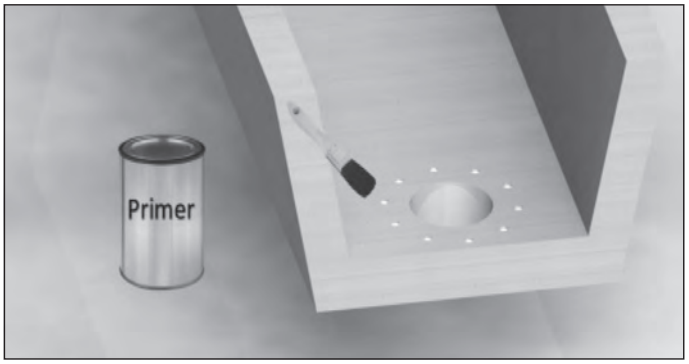


Image 5.73

6. Apply kit to make the connection of the gutter and the outlet leak-tight.

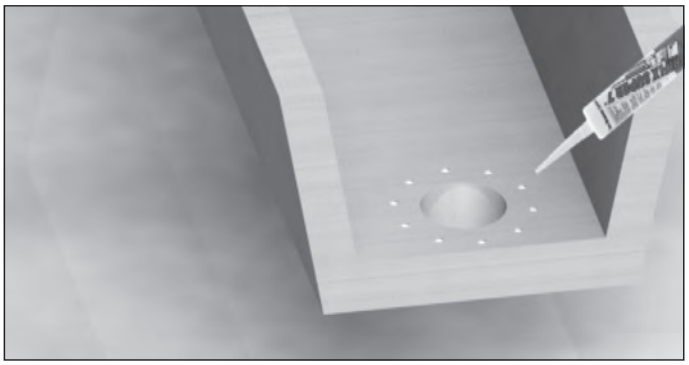


Image 5.74

7. Place the gutter outlet and fix it using the knock in plugs.

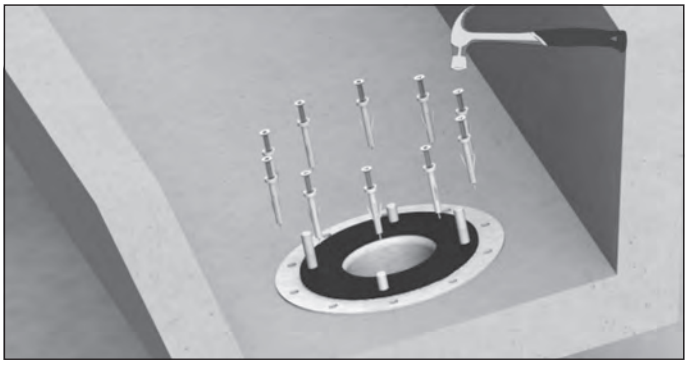


Image 5.75

8. Seal the gutter outlet around and at the location of the screws.

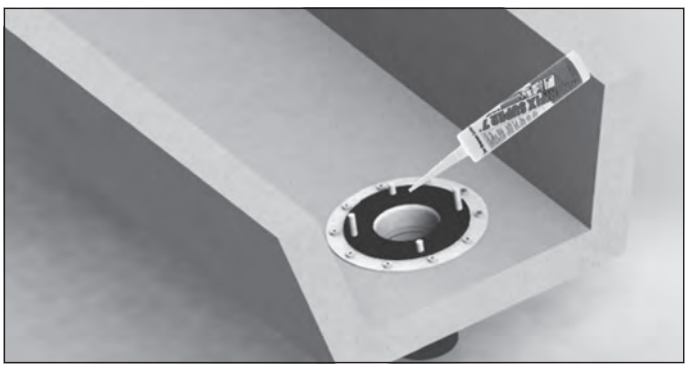


Image 5.76

9. Cut the covering in the area of the studs and guide the cover over the studs.

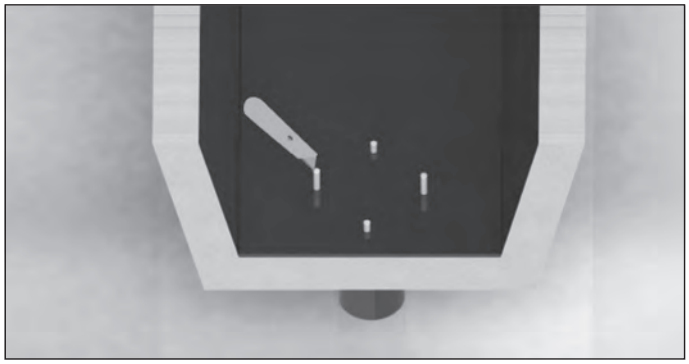


Image 5.77

10. Mount the clamping flange with the supplied bolts.

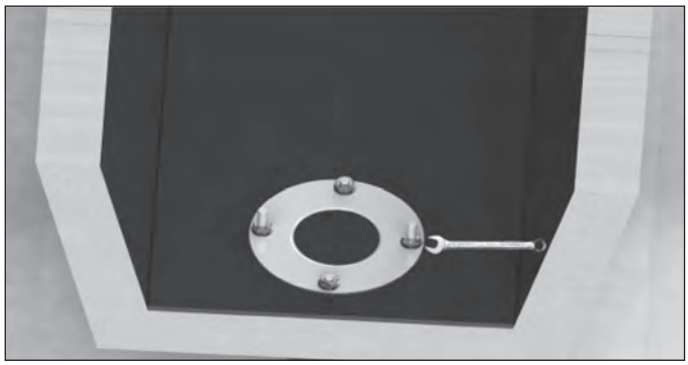


Image 5.78

11. Cut a hole in the covering the size of the hole in the clamping flange.

Image 5.79

12. Secure the air baffle with the nuts provided.

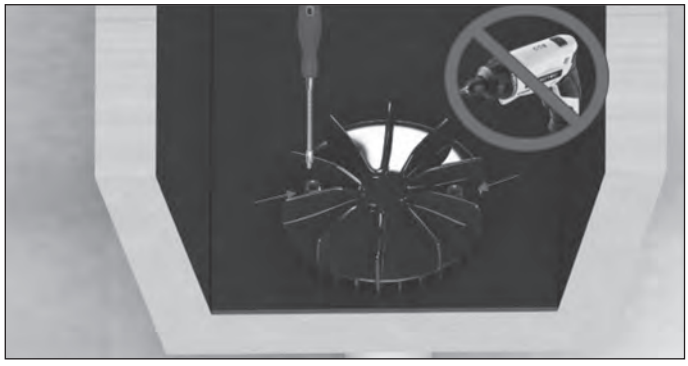


Image 5.80

MOUNTING INSTRUCTIONS: METAL GUTTER OUTLET AKASISON XL 75

1. Drill/cut hole with diameter of 110 mm.

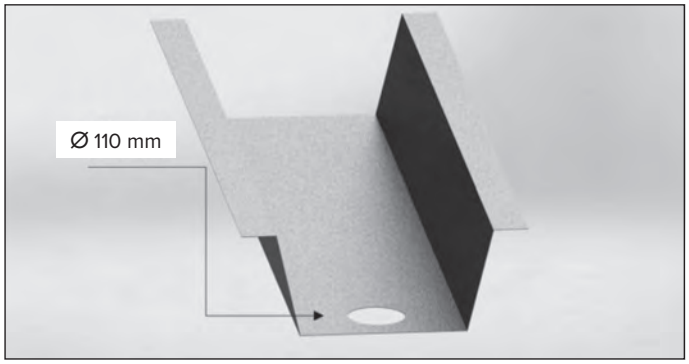


Image 5.81

2. Insert the outlet into the hole and indicate the area covered by the outlet and mark the holes for the plugs.

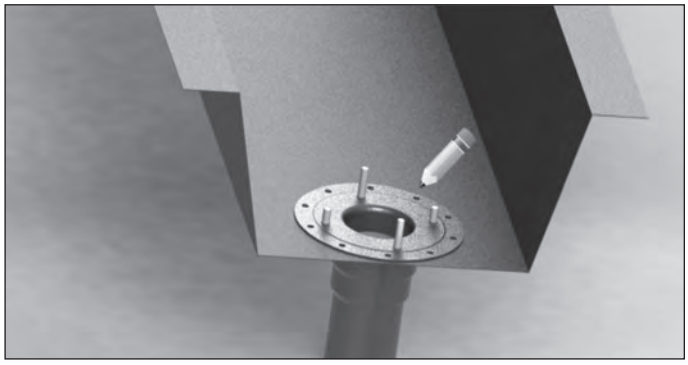


Image 5.82

3. Drill holes for pop rivets (Ø 6 mm).

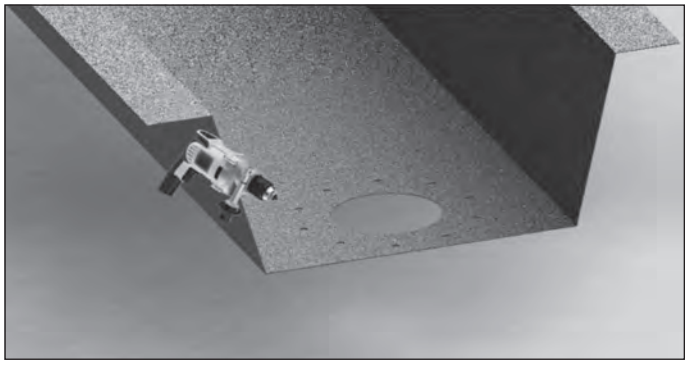


Image 5.83

4. Clean the area of the gutter covered by the outlet with acetone.

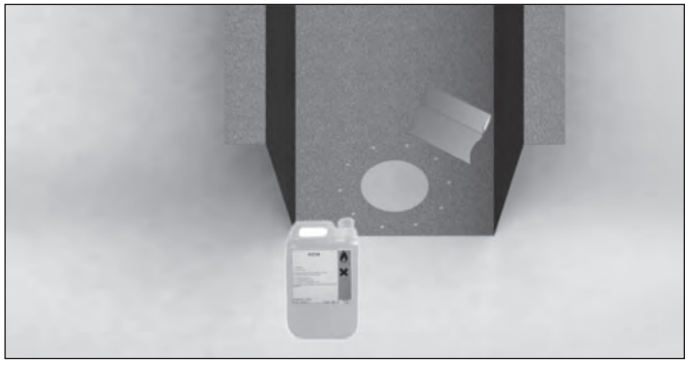


Image 5.84

5. Place outlet and mount it with pop rivets.

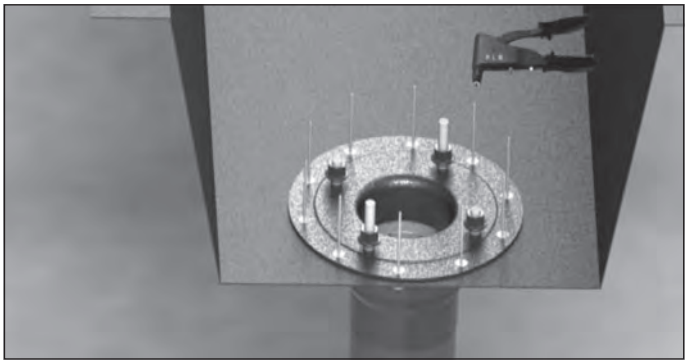


Image 5.85

6. Solder the rivets and outlet watertight to the gutter.

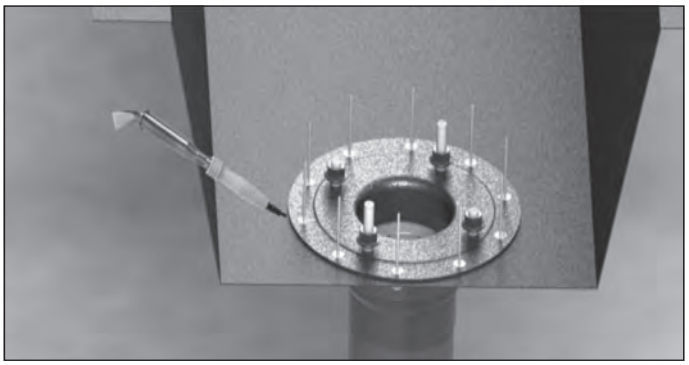


Image 5.86

7. Secure the air baffle with the nuts provided.

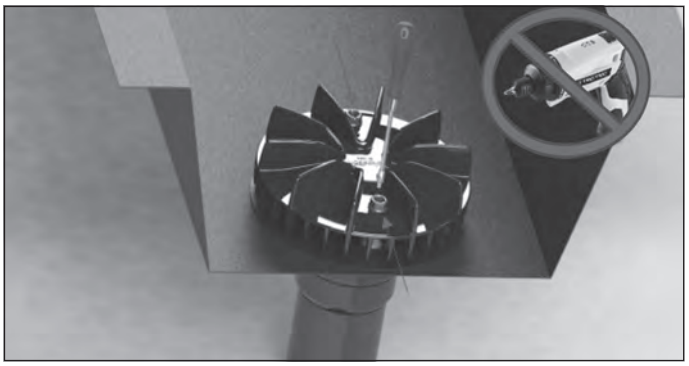


Image 5.87

MOUNTING INSTRUCTIONS: METAL GUTTER WITH COVERING OUTLET AKASISON XL 75

1. Drill/cut hole with diameter of 100 mm in the metal gutter.

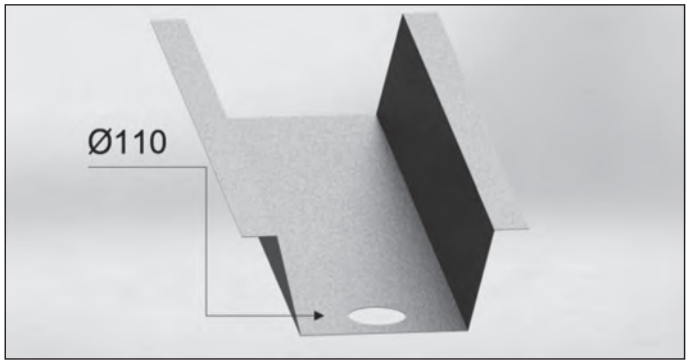


Image 5.88

2. Insert the base chute into the hole, draw the circumference of the chute funnel and mark the holes.

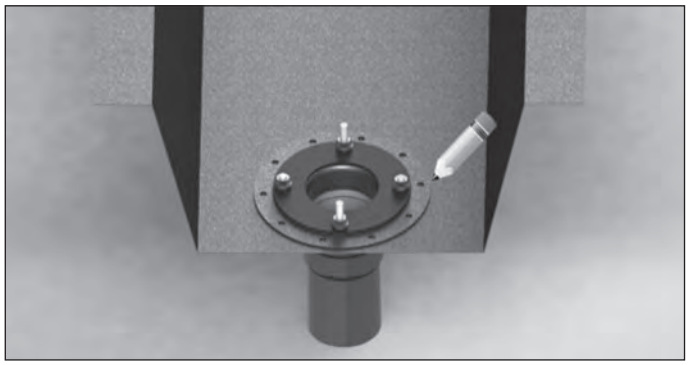


Image 5.89

3. Drill holes for pop rivets (Ø6 mm).

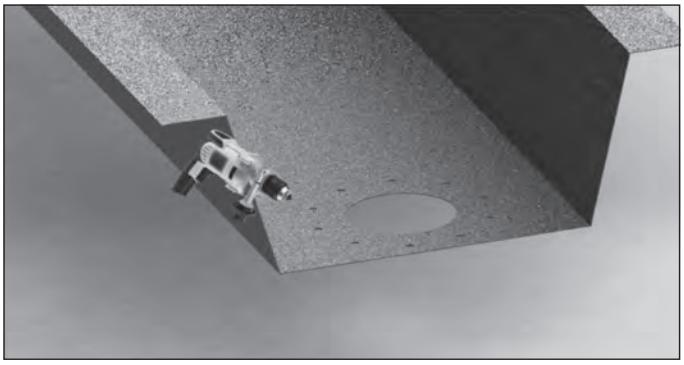


Image 5.90

4. Clean the area of the gutter covered by the outlet with acetone.

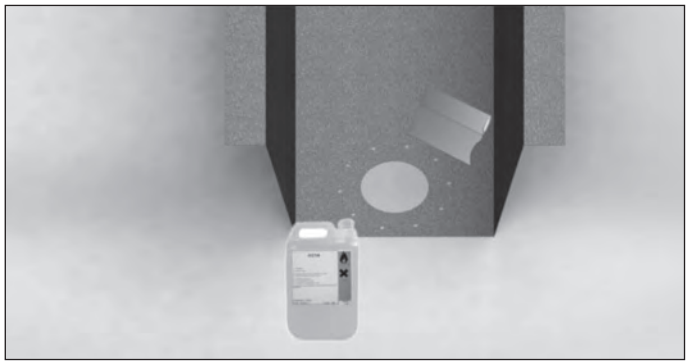


Image 5.91

5. Place outlet and mount it with pop rivets.

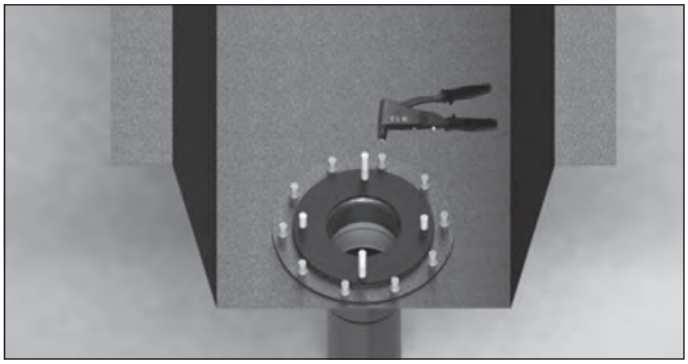


Image 5.92

6. Solder/kit the rivets.

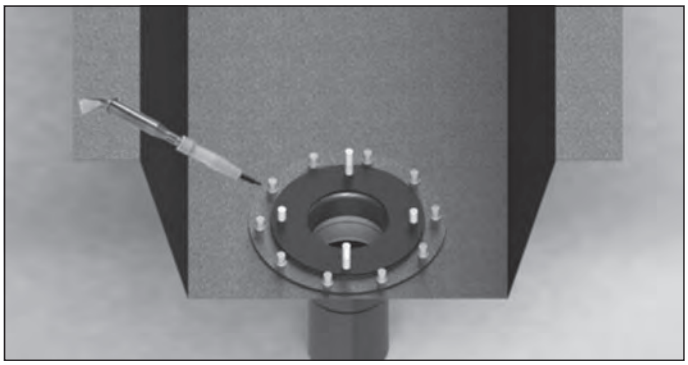


Image 5.93

7. Cut the covering in the area of the studs and guide the cover over the studs.

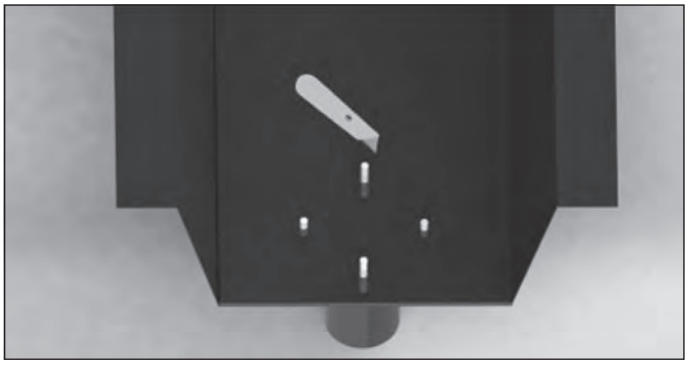


Image 5.94

8. Mount the clamping flange with the supplied bolts.

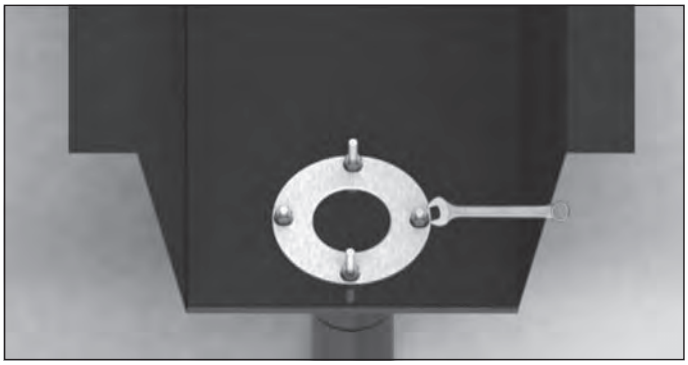


Image 5.95

9. Cut a hole in the covering the size of the hole in the clamping flange.

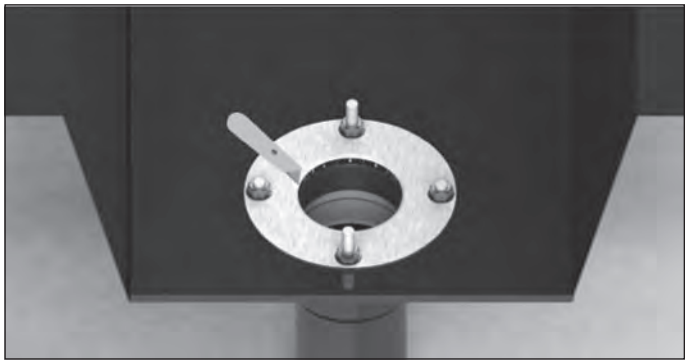


Image 5.96

10. Secure the air baffle with the nuts provided.

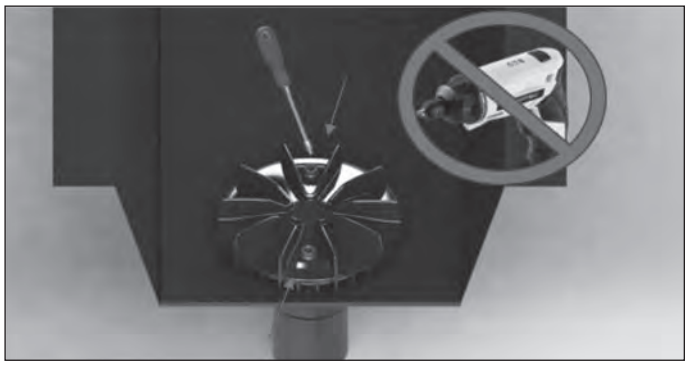


Image 5.97

HEATING ELEMENT
Most Akasison outlets have the option of a heating element. The heating element ensures the inlet of the outlet remains free of ice and makes it possible for meltwater to flow into the outlet. The heating element only keeps the inlet free of ice and does not melt snow or ice from the roof or gutter.

The heating element of the heated version of the Akasison XL75 roof outlet is already integrated and cannot be added afterwards.

The table below indicates the maximum number of roof outlets that can be connected within one group. The number of outlets depends on the start-up temperature. All heating elements are provided with a three wire cable (L, N and PE) and have a length of approximately 80 cm.

	6 Apm	10 Apm	16 Amp	20 Amp
5	124	208	292	-
0	120	200	292	-
-15	96	164	260	292

Table 5.1

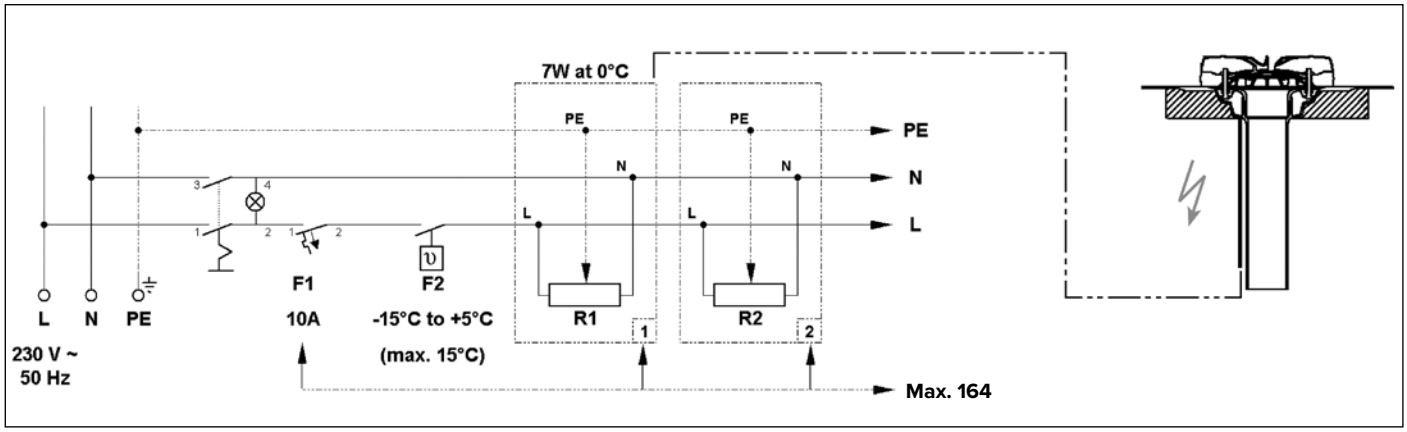


Image 5.98

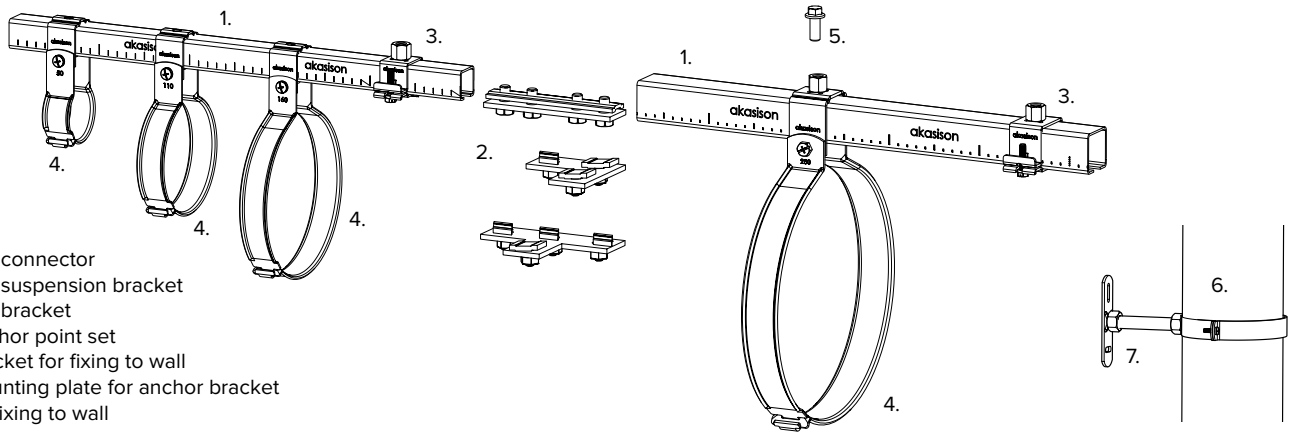
The heating element of the Akasison XL gutter outlet is delivered separately and needs to be attached under the outlet during installation.

6 MOUNTING SYSTEM

The Akasison XL system includes a unique fixing system. This system ensures the correct installation of the Akasison drainage system.

6.1 AKASISON FIXING SYSTEM

The Akasison XL system has to be fixed to the roof construction using the Akasison fixing system. The fixing system is a rigid installation with anchor points that will absorb any expansion and contraction of the HDPE as a result of temperature changes. It protects the integrity of the HDPE installation.



1. Rail
2. Rail connector
3. Rail suspension bracket
4. Rail bracket
5. Anchor point set
6. Bracket for fixing to wall
7. Mounting plate for anchor bracket for fixing to wall

Image 6.1

Rail

Type	Code	Application
30x30 mm x 5 m	700005	Rail bracket 40-200 mm
41x41 mm x 5 m	700007	Rail bracket 250 and 315 mm

Table 6.1

Rail connector

Type	Code	Application
Rail connector straight	700015	Rail 30x30 and 41x41 mm
Rail connector L	700016	Rail 30x30 and 41x41 mm
Rail connector T	700017	Rail 30x30 and 41x41 mm

Table 6.2

Rail suspension bracket

Type	Code	Application
30x30 mm	700025	Rail 30x30 mm
41x41 mm	700027	Rail 41x41 mm

Table 6.3

Rail bracket

Type	Code
40 mm	750435
50 mm	750535
56 mm	755635
63 mm	750635
75 mm	750735
90 mm	750935
110 mm	751135
125 mm	751235
160 mm	751635
200 mm	752035
250 mm	752535
315 mm	753135

Table 6.4

Anchor point

Type	Code	Application
M10x20 (Set of 2)	730025	Anchorpoint for d_1 = 200 mm
M10x45 (Set of 2)	730027	Anchorpoint for $d_1 \geq 250$ mm

Table 6.5

Bracket for fixing to wall

Diameter	Code	Thread
40 mm	700478	½”
50 mm	700578	½”
56 mm	705678	½”
63 mm	700678	½”
70 mm	700778	½”
90 mm	700978	½”
110 mm	701178	½”
125 mm	701278	½”
160 mm	701678	½”
200 mm	702080	1”
250 mm	702580	1”
315 mm	703180	1”

Table 6.6

Mounting plate for ½” and 1” anchor bracket

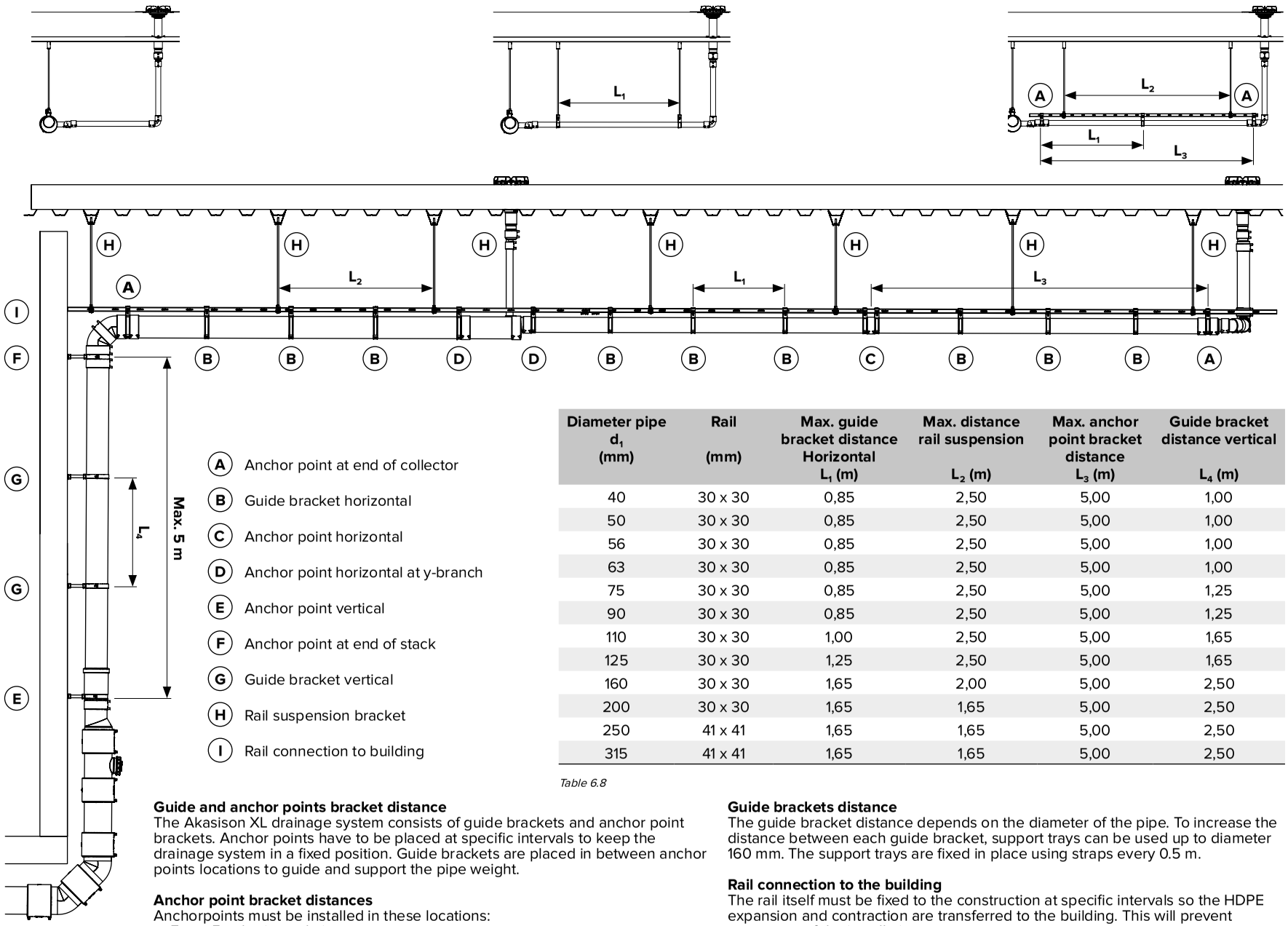
Thread	Code
½”	709478
1”	709480

Table 6.7

Roof outlet -collector pipe < 0.8m
Without bracketing and rail

Roof outlet -Collector pipe >0.8m, <3.0m
With bracketing, without rail

Roof outlet -Collector pipe >3.0m
With bracketing and rail



- (A) Anchor point at end of collector
- (B) Guide bracket horizontal
- (C) Anchor point horizontal
- (D) Anchor point horizontal at y-branch
- (E) Anchor point vertical
- (F) Anchor point at end of stack
- (G) Guide bracket vertical
- (H) Rail suspension bracket
- (I) Rail connection to building

Diameter pipe d_1 (mm)	Rail (mm)	Max. guide bracket distance Horizontal L_1 (m)	Max. distance rail suspension L_2 (m)	Max. anchor point bracket distance L_3 (m)	Guide bracket distance vertical L_4 (m)
40	30 x 30	0,85	2,50	5,00	1,00
50	30 x 30	0,85	2,50	5,00	1,00
56	30 x 30	0,85	2,50	5,00	1,00
63	30 x 30	0,85	2,50	5,00	1,00
75	30 x 30	0,85	2,50	5,00	1,25
90	30 x 30	0,85	2,50	5,00	1,25
110	30 x 30	1,00	2,50	5,00	1,65
125	30 x 30	1,25	2,50	5,00	1,65
160	30 x 30	1,65	2,00	5,00	2,50
200	30 x 30	1,65	1,65	5,00	2,50
250	41 x 41	1,65	1,65	5,00	2,50
315	41 x 41	1,65	1,65	5,00	2,50

Table 6.8

Guide and anchor points bracket distance
The Akasison XL drainage system consists of guide brackets and anchor point brackets. Anchor points have to be placed at specific intervals to keep the drainage system in a fixed position. Guide brackets are placed in between anchor points locations to guide and support the pipe weight.

Anchor point bracket distances
Anchorpoints must be installed in these locations:
- Every 5 m horizontal pipe
- At the beginning and the end of the collector
- At every 45° branch
- At every change of direction
- At the beginning and end of the pipe from roof outlet to collector (>3m)

Guide brackets distance
The guide bracket distance depends on the diameter of the pipe. To increase the distance between each guide bracket, support trays can be used up to diameter 160 mm. The support trays are fixed in place using straps every 0.5 m.

Rail connection to the building
The rail itself must be fixed to the construction at specific intervals so the HDPE expansion and contraction are transferred to the building. This will prevent movement of the installation.
The rail must be fixed to the building at:
- The beginning of each horizontal pipe section
- Every 12 m of each horizontal pipe section
- A horizontal direction change
- A wall-interruption at both sides of the wall
- A vertical direction change

6.3 GUIDELINES FOR THE PERFORMANCE OF HORIZONTAL ANCHOR POINT AND HORIZONTAL GUIDE BRACKET

6.3.1 OVERVIEW

The Akasison XL drainage system consists of guide brackets and anchor points brackets. Anchor points have to be placed at specific intervals to keep the drainage system in a fixed position. Guide brackets are placed in between anchor point locations to guide and support the pipe weight.

When installing an Akasison rail system, an anchor point needs to be applied:

- Every 5 metres of horizontal pipe section
- At the beginning and end of the collector
- At every 45° Y-branch
- At every bend and every change of direction
- At the beginning and end of the drain connection line > 3,0 m

Between anchor points, horizontal guide brackets need to be installed. The maximum distance between the brackets (guide-guide or guide-anchor point) are indicated as L_1 in the table of paragraph 6.2. A standard anchor point is installed with two rail brackets and an electrofusion coupler. The rail brackets are mounted on both sides of the electrofusion coupler. It is also possible to use two electrical couplers and one rail bracket. This is mainly used in combination with fittings. To prevent the brackets from sliding, the screws of the brackets need to be firmly tightened. Extra anchorpoint screws are also used for 200-315 mm brackets.

6.3.2 EXAMPLES OF ANCHOR POINTS AND GUIDE BRACKETS

Anchor point in the horizontal collector

Diameter 40-160 mm

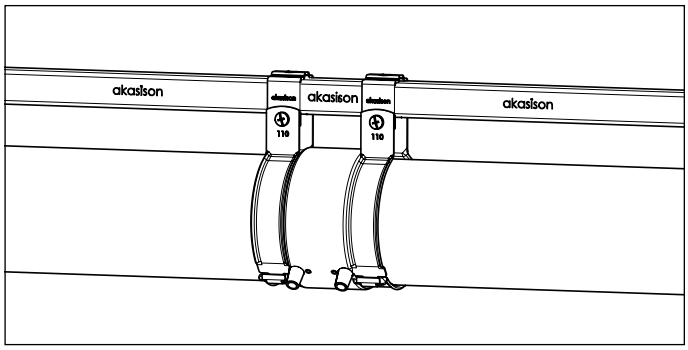


Illustration 6.1

1 x electrofusion coupler
2 x rail brackets

Diameter 200-315 mm

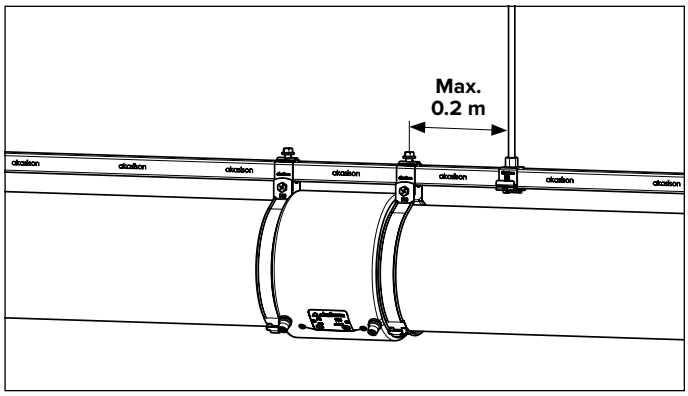


Illustration 6.2

1 x electrofusion coupler
2 x rail brackets
2 x anchor point sets

Anchor point at the beginning of the collector

Diameter 40-160 mm

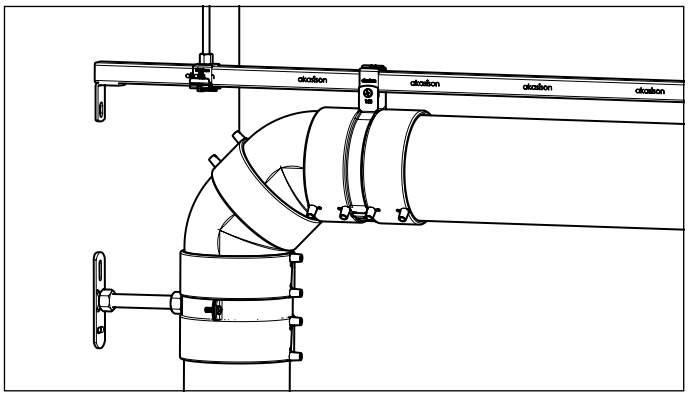


Illustration 6.3

2 x electrofusion couplers
1 x rail bracket

Diameter 200-315 mm

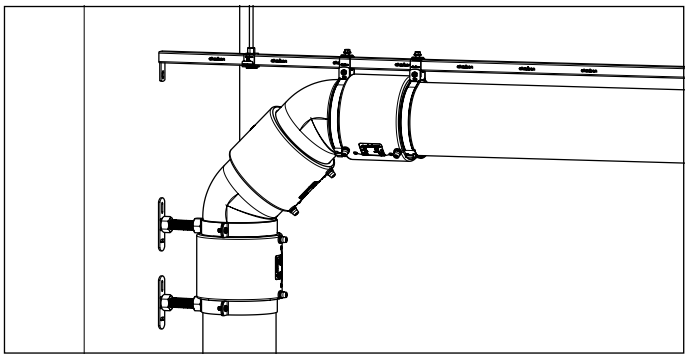


Illustration 6.4

1x electrofusion coupler
2 x rail brackets
2 x anchor point sets

Anchor point at the end of the end of the collector

Diameter 40-160 mm

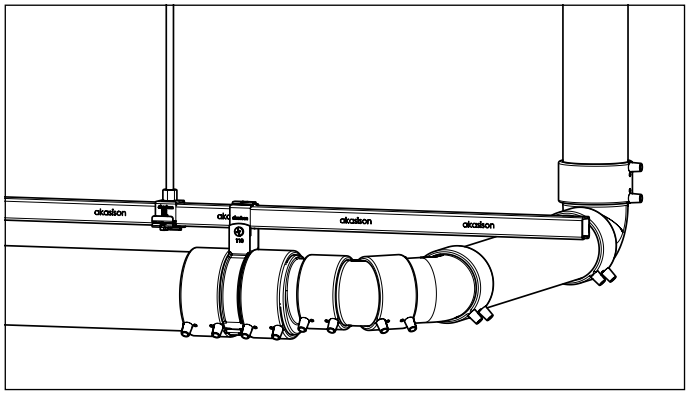


Illustration 6.5

2 x electrofusion couplers
1 x rail bracket

Anchor point 45° Y-branch

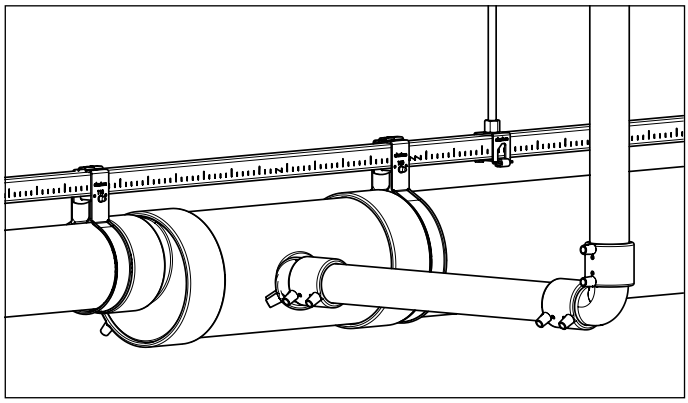


Illustration 6.6

2 x electrofusion couplers
2 x rail brackets

Anchor point by change of direction

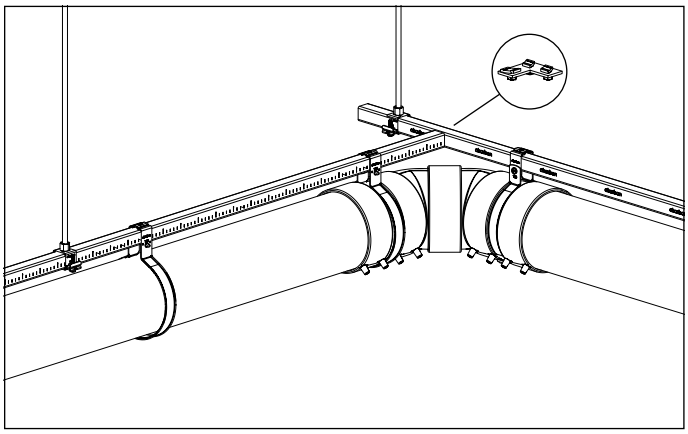


Illustration 6.7

2 x electrofusion couplers
1 x rail bracket

Guide bracket

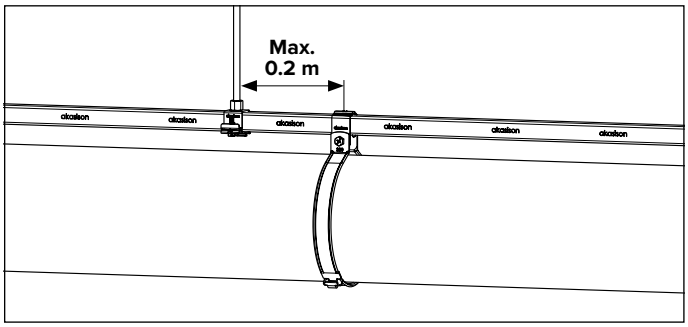


Illustration 6.8

1 x rail bracket

6.4 GUIDELINES FOR THE PERFORMANCE OF VERTICAL ANCHOR POINT AND GUIDE BRACKET

6.4.1 OVERVIEW

When installing an Akasison rail system, an anchor point needs to be applied:

- Every 5 metres in the vertical collector tube
- At the beginning (top) of the vertical collector tube

Between anchor points, vertical guide brackets need to be applied. The maximum distance between the brackets (guide-guide or guide-anchor point) are indicated as L4 in the table 6.8 of paragraph 6.2.

For the installation of the system to the wall, a mounting plate and a wall-bracket is used. For diameters up to 160 mm ½" is used. For diameters above 200 mm 1" is used. The required threaded rod is not included. For an anchor point, an electrofusion coupler and a expansion socket are also used.

6.4.2 EXAMPLES OF ANCHOR POINTS AND GUIDE BRACKETS

Anchor point

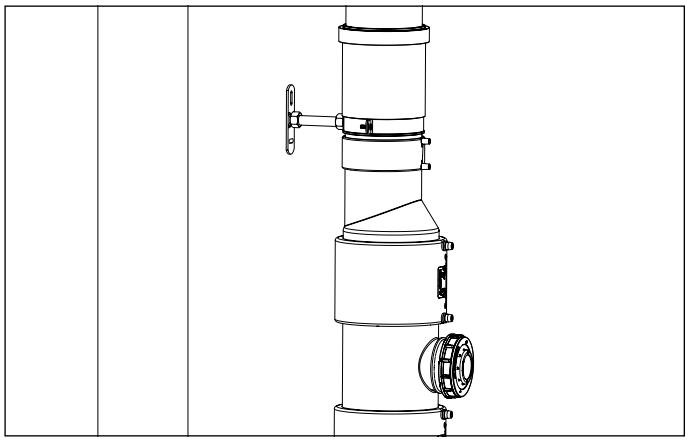


Illustration 6.9

1 x expansion socket
1 x electrofusion coupler
1 x rail bracket
1 x mounting plate

Anchor point at the beginning of the collector

Diameter 40-160 mm

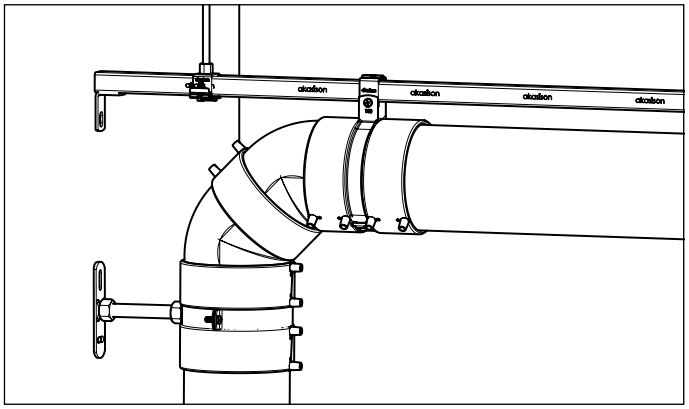


Illustration 6.10

2 x electrofusion couplers
1 x rail bracket
1 x mounting plate ½"

Diameter 200-315 mm

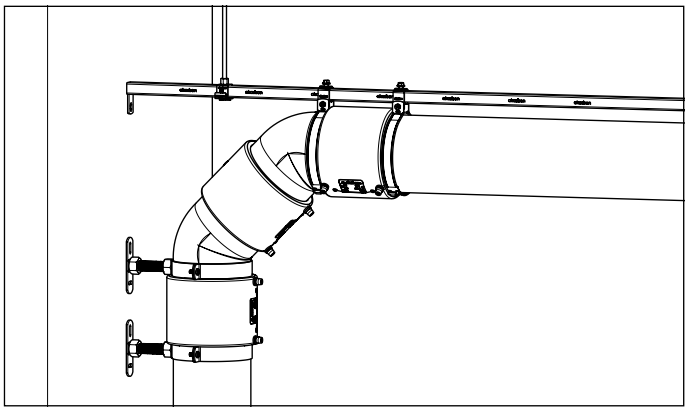


Illustration 6.11

1x electrofusion coupler
2 x rail brackets
2 x Mounting plates 1"

Anchor point at the beginning of the collector with reduction

Diameter reduction 200-300 mm

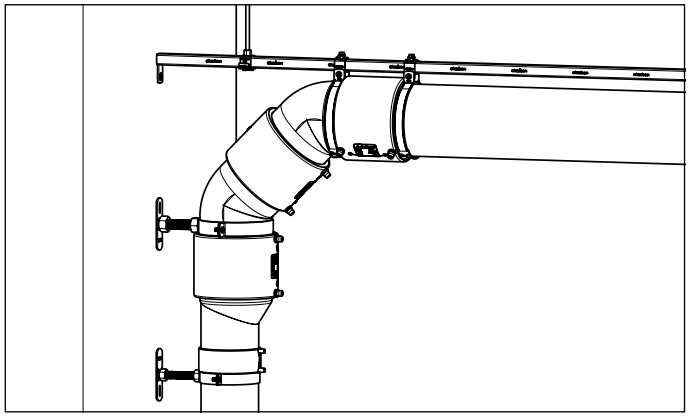


Illustration 6.12

2 x electrofusion couplers
2 x rail brackets
2 x mounting plates 1” (when diameter after reduction is > 160 mm)

or

2 x electrofusion couplers
2 x rail brackets
1 x mounting plate 1”
1 x mounting plate ½ “ (when diameter after reduction is ≤ 160 mm)

Diameter 40-160 mm

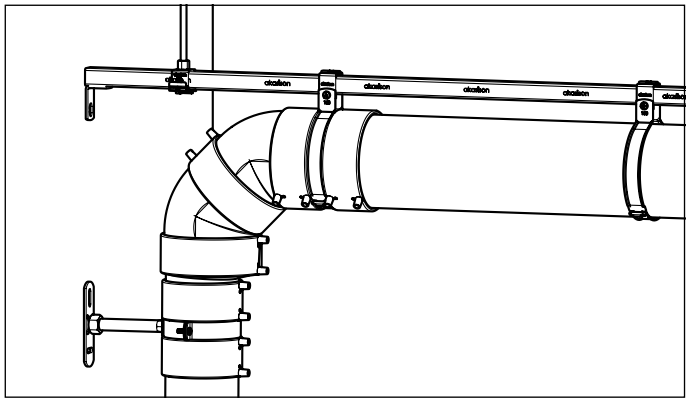


Illustration 6.13

2x electrofusion coupler
1 x rail bracket
2 x mounting plate ½”

Guide bracket

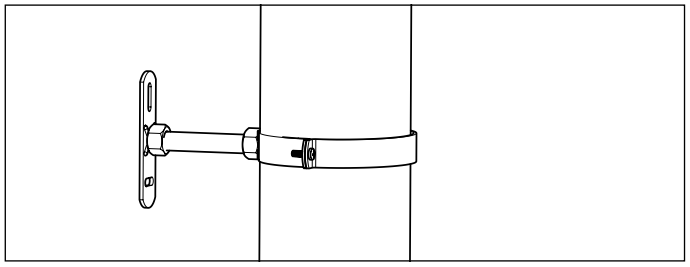


Illustration 6.14

1 x rail bracket
1 x mounting plate ½” (diameter ≤160) or 1 x mounting plate 1” (diameter > 160 mm)
70

6.4.3 MAXIMUM DISTANCE BETWEEN WALL AND DRAINAGE SYSTEM

The threaded rods for the fixation of the mounting plate to the bracket is limited.

For a distance up to 100 mm of 40-160 mm pipe, a ½” bracket and mounting plate is needed. For 200-315 mm pipe, a 1” mounting plate and bracket is required.

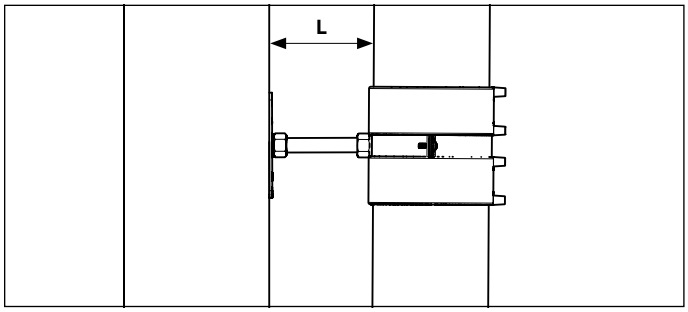


Illustration 6.15

6.5 ATTACHMENT OF THE MOUNTING SYSTEM TO THE BUILDING CONSTRUCTION

6.5.1 OVERVIEW

Akasison rails need to be attached the building:

- at the start and end of a horizontal collector tube
- at every 12 metres of the collector tube
- at every transit of the wall, at both sides of the wall
- at every vertical change of direction

6.5.2 EXAMPLES THE ATTACHMENT OF THE SYSTEM TO THE BUILDING

At the beginning of the horizontal collector tube

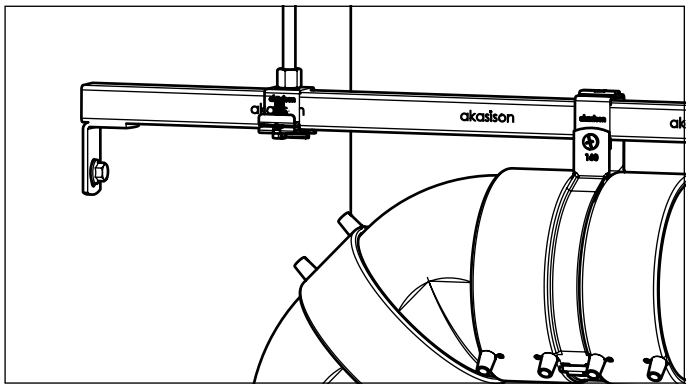


Illustration 6.16

Connection with a horizontal beam (both sides)

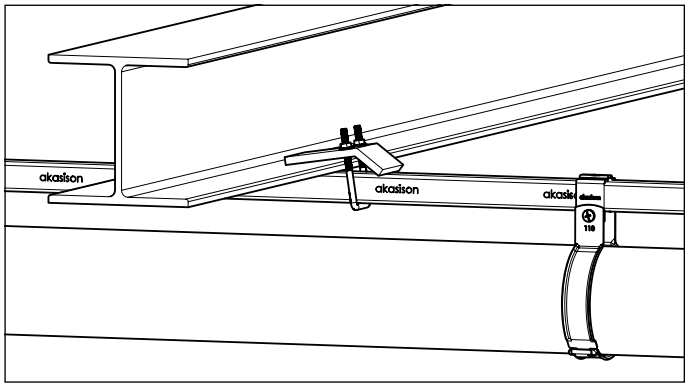


Illustration 6.17

Connection with a concrete beam (both sides)

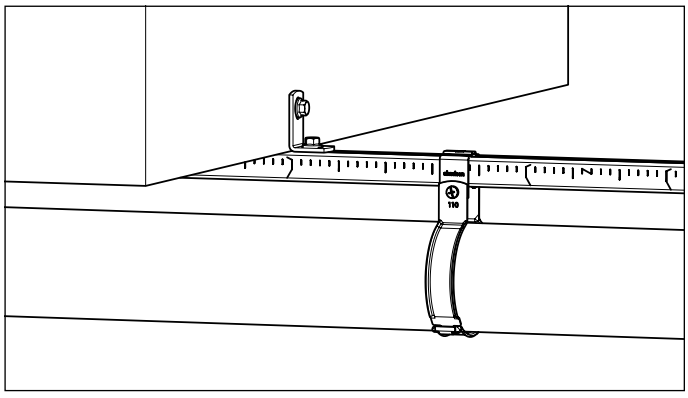


Illustration 6.18

Connection with the transit of a wall (both sides)

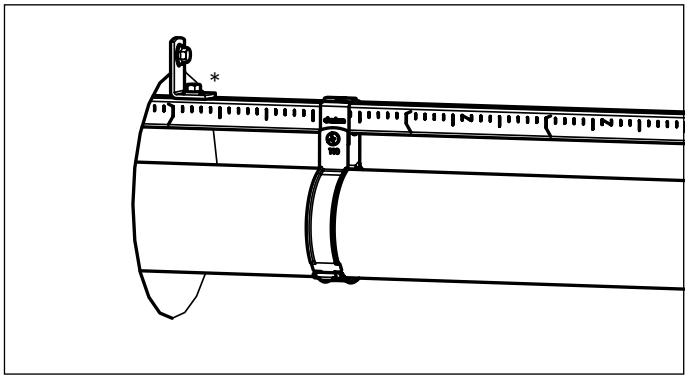


Illustration 6.19

* Rail can be used upside down.

6.6 ATTACHMENT OF THE RAIL SUSPENSION BRACKET TO THE TRAPEZOID ROOF PROFILE

6.6.1 OVERVIEW

The maximum distance of the rail suspension (as defined in the table f paragraph 6.2) must not be exceeded. The construction of the roof might limit this maximum distance. The impact on the construction of the drainage system needs to be approved by the constructor responsible before starting the installation the system.

In the table below the total weight and forces of the system are given, by the maximal distance of the suspension brackets.

Operational system (tube, mounting system, totally filled with water)

d_1 [mm]	40	50	56	63	75	90	110	125	160	200	250	315
G [kg/m]	2,9	3,7	4,2	4,8	6,2	8,1	11,2	14,0	21,8	33,3	51,9	81,0
F [kg/T]	7,4	9,1	10,4	12,1	15,4	20,3	28,1	35,0	43,7	55,0	85,7	133,7

Table 6.8

Non-operational system (tube, mounting system, no water)

d_1 [mm]	40	50	56	63	75	90	110	125	160	200	250	315
G [kg/m]	2,0	2,2	2,2	2,2	2,5	2,7	3,1	3,5	4,7	6,5	10,3	14,6
F [kg/T]	5,0	5,4	5,6	5,6	6,2	7,7	8,9	8,9	9,4	10,8	17,0	24,1

Table 6.9

G = weight of the system

F = resulting point load applying the maximum distance between the suspension brackets

In the table below maximum distances between the suspension brackets (L_2) are calculated based on a maximum point load.

d_1 [mm]	15 kg/m² L_2 [m]	20 kg/m² L_2 [m]	25 kg/m² L_2 [m]	30 kg/m² L_2 [m]	35 kg/m² L_2 [m]	40 kg/m² L_2 [m]	45 kg/m² L_2 [m]	50 kg/m² L_2 [m]
40	2,50	2,50	2,50	2,50	2,50	2,50	2,50	2,50
50	2,50	2,50	2,50	2,50	2,50	2,50	2,50	2,50
56	2,50	2,50	2,50	2,50	2,50	2,50	2,50	2,50
63	2,50	2,50	2,50	2,50	2,50	2,50	2,50	2,50
75	2,40	2,50	2,50	2,50	2,50	2,50	2,50	2,50
90	1,80	2,50	2,50	2,50	2,50	2,50	2,50	2,50
110	1,30	1,80	2,20	2,50	2,50	2,50	2,50	2,50
125	1,10	1,40	1,80	2,10	2,50	2,50	2,50	2,50
160	-	-	1,10	1,40	1,60	1,80	2,00	2,00
200	-	-	-	-	1,10	1,20	1,40	1,50
250	-	-	-	-	-	-	-	-
315	-	-	-	-	-	-	-	-

Table 6.10

Distances less than one metre, there is no standard connection possible. In that case a project solution needs to be derived. A possible solution is to divide the load, or mount the system to metal beams.

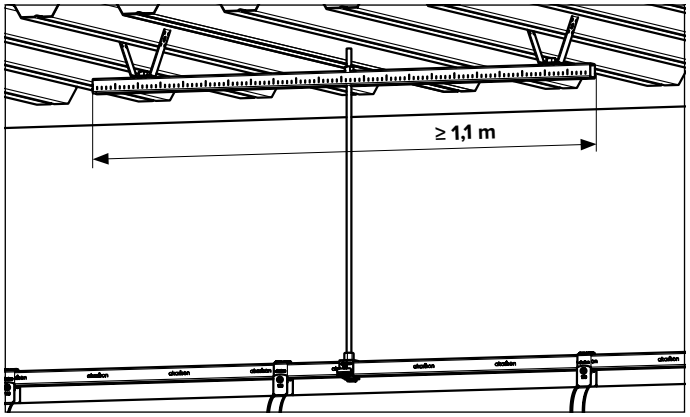


Illustration 6.20

7 PIPE SYSTEM

7.1 CONNECTION TO THE ROOF OUTLET

The connection of the roof outlet to the Akatherm PE pipe system depends on the roof outlet.

Roof outlet	Connection method	Art. Nr.
Roof outlet Akasison 75	Electrofusion coupler 75 mm	410795
Roof outlet Akasison 63 Gutter outlet Akasison 63	Screw coupler	749283 749283
Roof outlet Akasison 90 Gutter outlet Akasison 90	Screw coupler	749285 749285
Gutter outlet Akasison 110	Flange connection	741187

Table 7.1 Roof outlet connection to the pipe system

The isometric drawing will list the outlet and transition to the PE pipe as a separate pipe section (according to VDI 3608). The length of this pipe section is the height of the roof outlet. The parts list will separately specify the connection piece and the possible reduction to the diameter of the following pipe section.

The transition from the vertical to the horizontal pipe section under the roof outlet must be done under a 90° angle for optimal siphonic priming. A 90° bend can be used but requires a buttweld on one end. Use an 88.5° elbow for an installation that can be 100% electrofused.

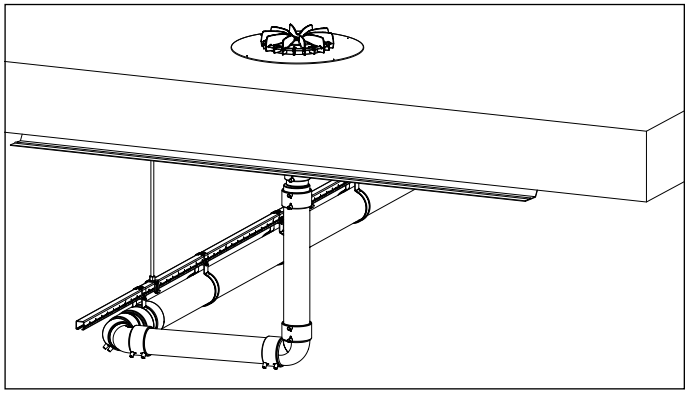


Illustration 7.1

7.2 CHANGE OF DIRECTION

Except for the transition underneath the roof outlet, the pipe system does not include any 90° bends. All changes of direction are made by using 45° elbows.

7.3 BRANCHES

Only branches of 45° are used in the PE pipe system. For the connection to the main collector a 45° branch and a 45° elbow are combined to make the angle of 90°. At a horizontal or vertical branch the rules for direction changes and branches are combined.

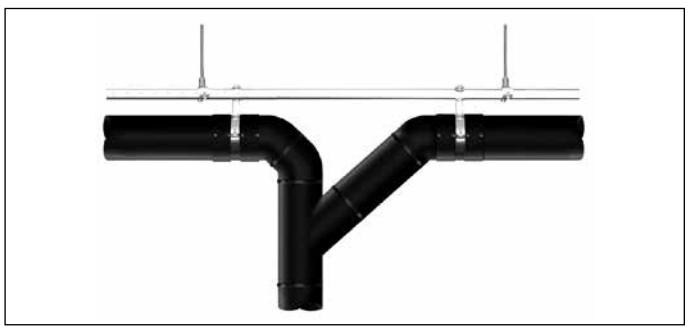


Illustration 7.1

7.4 REDUCTIONS

It is not permitted to reduce the pipe diameter in the direction of flow, except in the vertical pipe section directly underneath the roof outlet, and in the downpipe. Only ex-centric reducers are used. When a diameter change is needed directly underneath a roof outlet, a centric reducer can be used.

7.5 EMERGENCY OVERFLOW

Every roof should be equipped with an emergency overflow system. This system operates when the primary system cannot deal with the rainwater. This can be the case when the amount of rain exceeds the rainfall on which the system was dimensioned, or by a blocked sewer. For the dimensioning and design of the emergency overflows, the local standards prevail. The system can be designed as a siphonic system, a traditional system, or with spouts in the facade of the roof. In this case the emergency system works as an early warning that something is amiss.

The emergency overflow system cannot be connected to the main sewer but has to exit freely.

7.6 MAINTENANCE AND CLEANING WHEN IN USE

It is important that the roof is kept clean in spite of the self-cleaning of the Akasison siphonic roof drainage system.

Items such as leaves and plants that are on the roof should be removed regularly to prevent blocking pipes and obstructing water flow. The frequency of inspection and cleaning depends largely on the surroundings of the building. A location with large trees in the vicinity will need a more frequent inspection than a location in an open field. When cleaning the roof outlet, the air baffle can be easily removed to clean the roof outlet on the inside.

A roof covered with snow needs particular attention. The heating elements in the roof outlets will only melt the snow in the roof outlet and the siphonic system will only drain melted snow. Snow is a good insulator and so even with temperatures above 0°C the bottom layer of snow will not necessarily melt, and draining will be minimal. The outlets have to be cleared of snow. When the snow load exceeds the maximum load allowed on the roof it needs to be removed.

8 JOINTING METHODS

8.1 JOINT METHODS

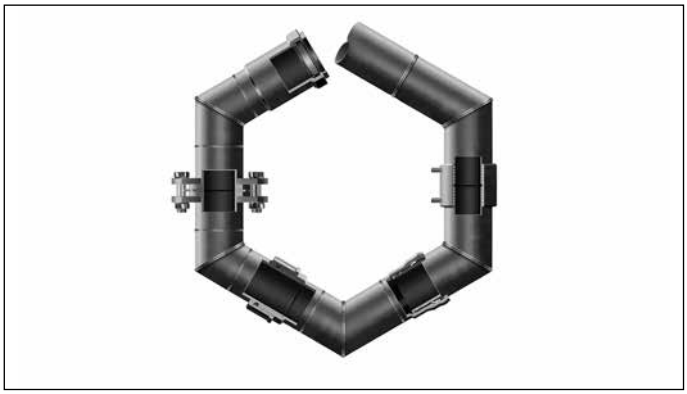


Illustration 8.1

Akatherm HDPE is made of High Density Polyethylene, a material with welded joints. These are secure and durable connections lasting 50 to 100 years. Welded joints are made without additional glue or rubber rings and are actually the strongest points of the pipe system. HDPE welded joints are both pull-tight and leak proof, so once tested there is very little risk of future failure because of the flexibility, impact resistance and overall toughness of the material.

Akatherm HDPE pipes and fittings can also be joined by other methods, depending on the application. Joints are divided in welded/mechanical and pull-tight/not pull-tight types. Pull-tight joints can't come apart under the influence of external forces.

Joint method	*Welded/mechanical*	*Pull-tight*
Electrofusion	Welded	Yes
Butt-weld	Welded	Yes
Plug-in socket	Mechanical	No
Snap socket	Mechanical	Yes
Screw-thread	Mechanical	No
Screw-thread with bushing	Mechanical	Yes
Flange	Mechanical	Yes
Contraction sleeve	Mechanical	No
Metal Coupling	Mechanical	No

8.2 BUTT-WELD JOINTS

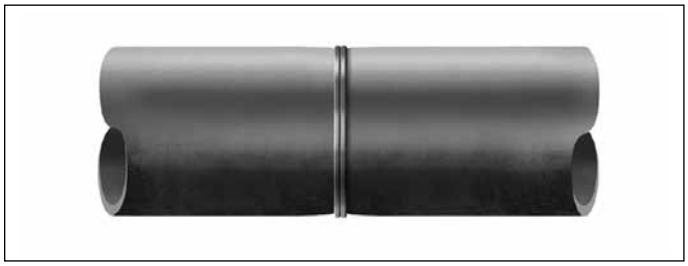


Illustration 8.2

Butt-welding is an economical and reliable way of jointing requiring only butt-welding equipment and without using additional components.

All Akatherm products can be welded using this jointing method. Fittings can be shortened by up to the k-dimension (when indicated in the catalogue), still allowing butt-welding. This jointing method is very suitable for prefabrication and producing special fittings.

Preparation
Establish a work space where the jointing can be done without being affected by adverse weather conditions. The use of wind shields is advised to keep the weld plate at a constant temperature. Working temperature -5°C/+40°C.

Without removing the oxygen layer, a weld cannot be guaranteed. The oxidation layer will form again within one hour. The butt-weld needs to be made immediately after machining the ends.

Used surface of heating element for welding diameter d_1	Δt_{tot}
d1 = 40-160	8°C
d1 = 200-315	10°C

Table 8.1 Maximum temperature variation heating element

Welding process
The butt-welding of Akatherm HDPE operates according to the following steps:

Machining the surface
Both sides should be machined until they run parallel. When the machining is completed, open the carriages (the plastic shavings must be continuous and uniform on both sides to weld). Take off the milling cutter.

Verify the alignment between the machined surfaces. Remove the plastic shaving. Do not dirty or touch the machined surfaces.

Without removing the oxygen layer a weld cannot be guaranteed.

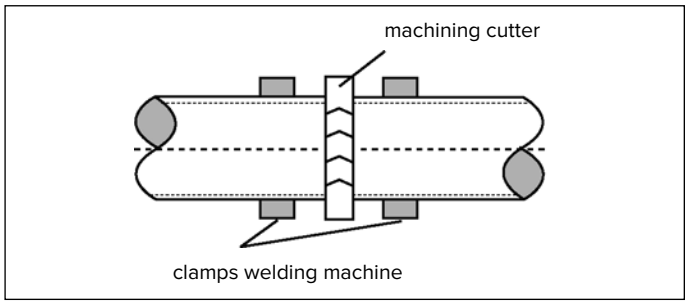


Illustration 8.3 Machining the surface

Preheating under pressure
Gradually press the two ends to be jointed to the heating element until a bead is created. The size of the bead is a good indication that the appropriate pressure and time is used. For pressure and bead size see table 8.2.

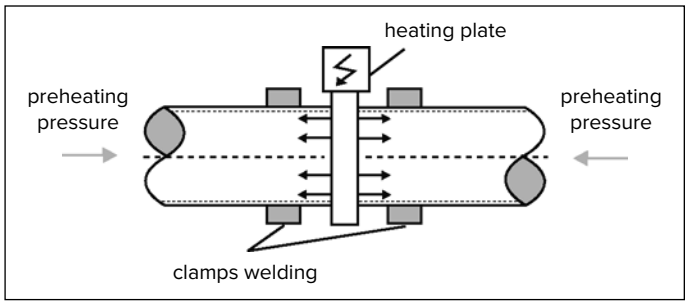


Illustration 8.4 Preheating under pressure

Heating up with less pressure
HDPE is a good insulator, therefore at this stage it is necessary that the correct heating depth of the pipe ends is obtained. Only a small amount of pressure (0,01 N/mm^2) is required to maintain the contact of the ends with the heating element. The heat will gradually spread through the pipe/fitting end. The size of the bead will increase a little. The time and pressure needed for this phase can be found in table 8.2.

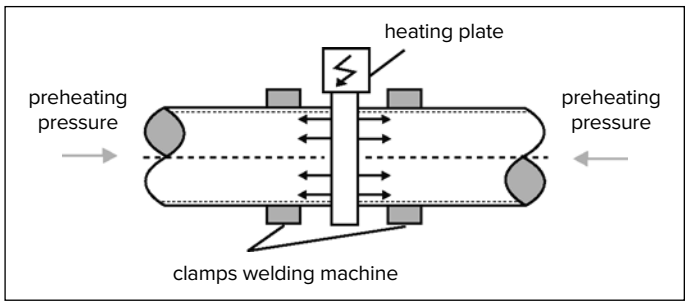


Illustration 8.5 Obtaining the correct heating depth

Change over
Remove the heating element from the jointing areas and immediately join the two ends. Do not push the ends abruptly onto each other.

The removal of the heating element needs to be done quickly to prevent the ends from cooling down. The times for changing over can be found in table 8.2.

Welding and cooling
After the jointing areas have made contact they should be joined with a gradual increase in pressure up to the specified value. The building-up of pressure should be linear and not differ more by than 0,01 N/mm^2. When the buildup occurs too fast the plastic material will be pushed away. If the pressure buildup is too slow, the material cools down. In both cases the quality of the weld will be questionable. Keep the specified welding pressure at a constant level during the complete cooling period. There must not be any load or strain at the joint. Do not cool artificially.

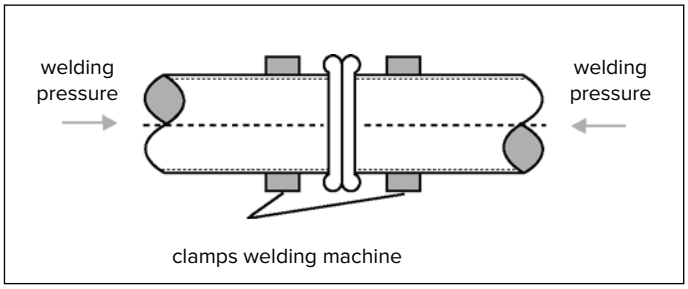
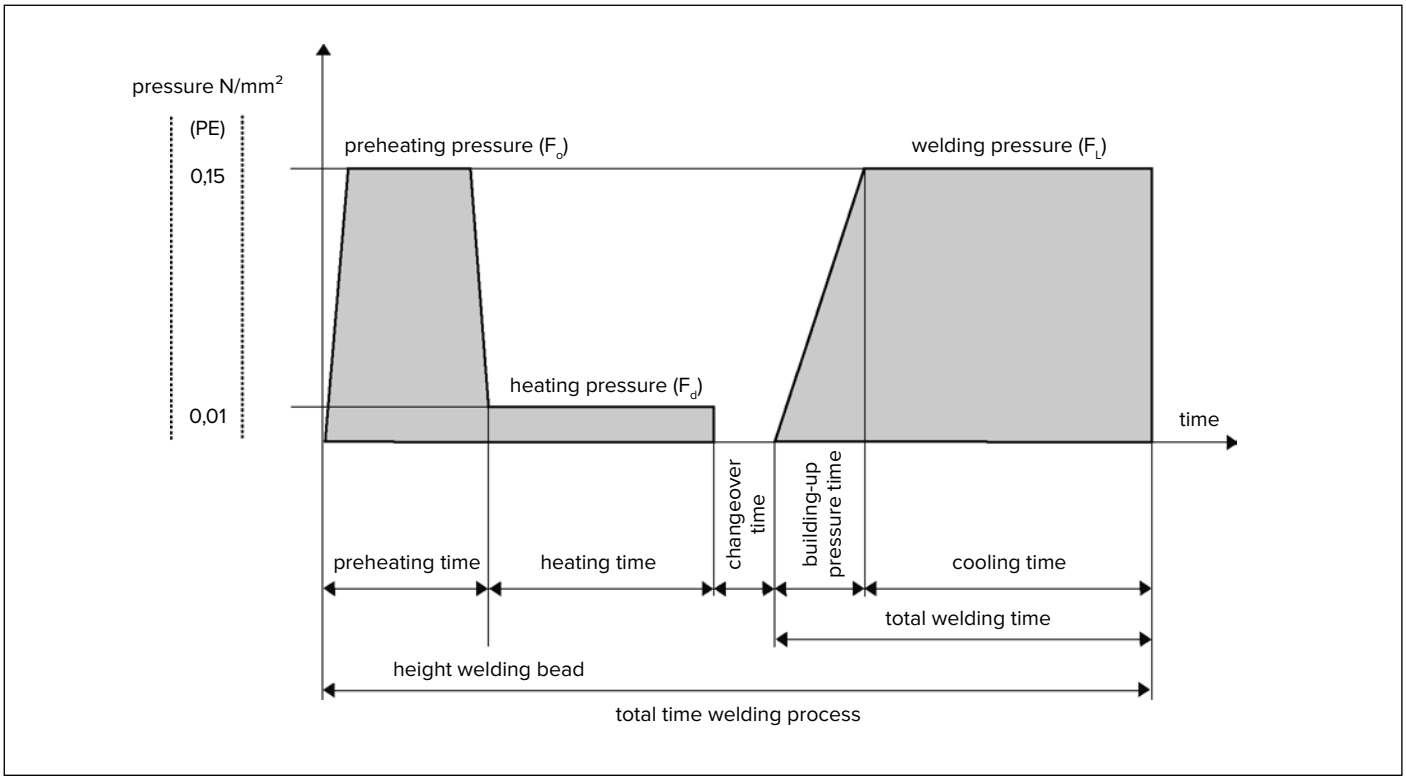


Illustration 8.6 Welding and cooling

The welded components can be removed from the machine when 50% of the cooling period has elapsed, providing that this is done carefully, with no load or strain being placed on the joint. The joint must then be left undisturbed for the remainder of the cooling period.



Graphic drawing 8.1

Diameter d_1 mm	Wall thickness e mm	Preheating pressure/welding pressure (0,15 N/mm²) F_o/F_L N	Heating pressure (0,01 N/mm²) F_d N	Height welding bead mm	Heating time sec.	Changeover time sec.	Building-up pressure time sec.	Cooling time min.
40	3,0	55	4	0,5	29	4	4	4
50	3,0	70	5	0,5	30	4	4	4
56	3,0	75	5	0,5	30	4	4	4
63	3,0	85	6	0,5	31	4	4	4
75	3,0	105	7	0,5	32	5	5	4
90	3,5	145	10	0,5	35	5	5	4
110	4,2	210	14	0,5	42	5	5	6
125	4,8	275	18	1,0	48	5	5	6
160	6,2	450	30	1,0	62	6	6	9
110	3,4	175	12	0,5	35	5	5	4
125	3,9	225	15	0,5	39	5	5	5
160	4,9	370	25	1,0	49	5	5	7
200	6,2	570	38	1,0	62	6	6	9
250	7,8	900	60	1,5	77	6	6	11
315	9,7	1400	93	1,5	77	6	6	11
200	7,7	700	47	1,5	77	6	6	11
250	9,6	1090	73	1,5	97	7	7	13
315	12,1	1730	115	2,0	121	6	8	16

Table 8.2 Welding parameters Akatherm HDPE drainage

In table 8.2 the welding parameters can be found for Akatherm HDPE. The exact regulation of the welding machine depends on its mechanical resistance. The tables provided with the machine are to be used for regulating the machine.

Evaluating the butt-weld joint
The butt-weld can be evaluated using destructive and nondestructive evaluation methods. For these evaluations, special equipment has to be used. Butt-welds can easily be judged by visual inspection, making this the recommended method for a first evaluation.

The shape of the welding bead is an indication for the proper operation of the welding process. Both welding beads should have the same shape and size. The width of the welding bead should approximately be 0.5 x the height. Differences between the beads can be caused by the difference in HDPE material used in the welded components. Despite the differences in welding bead the butt-weld can be of sufficient strength. A good weld with a uniform welding bead is shown in illustration 8.7. During a visual inspection this would be classified as an “acceptable” weld.

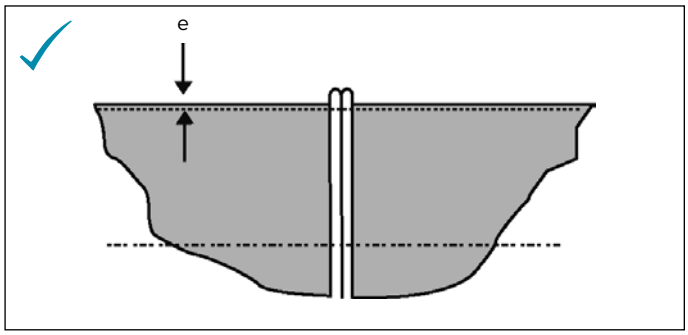


Illustration 8.7 Butt-weld with even welding beads (acceptable)

Misalignment between fittings and pipe can occur for several reasons. Oval pipe ends or irregular necking of the pipe can cause an incomplete fit. If this sagging is less than 10% of the wall thickness the weld can still be classified as “acceptable” (see illustration 8.8).

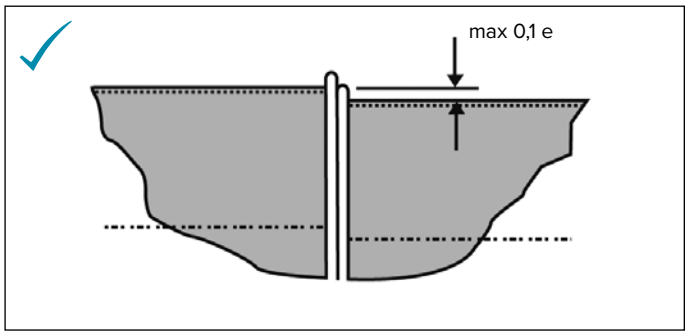


Illustration 8.8 Butt-weld with mis-alignment of pipe (acceptable)

Illustration 8.9 shows a joint with beads that are too big. The uniformity indicates a good joint preparation. However, heat supply and/or jointing pressure seem to be too high. A purely visual assessment would still classify the weld as “acceptable”.

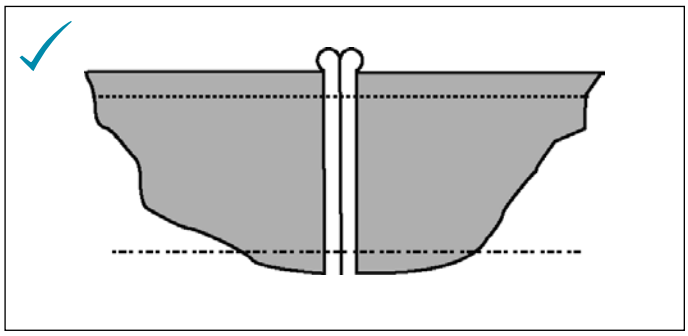


Illustration 8.9 Butt-weld with big welding beads (acceptable)

When there is either insufficient heat applied or not enough welding pressure there are hardly any beads. In cases like this, thick walled pipes often form shrinking cavities. The weld must be classified as “not acceptable” (see illustration 8.10).

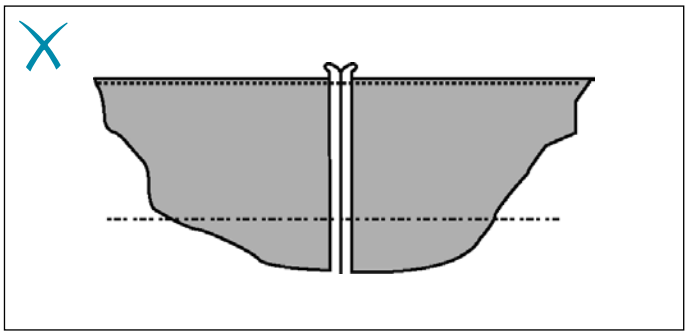


Illustration 8.10 Butt-weld (not acceptable)

Illustration 8.11 shows a cross-section of a regular, round fusion bead, free of notches or sagging. Special attention should be paid to the fact that the collar value ‘K’ is greater than 0.

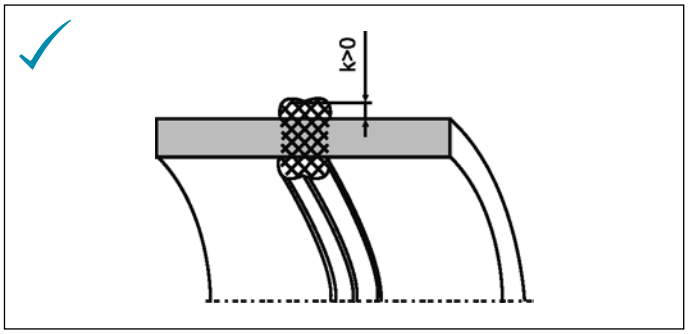


Illustration 8.11 Cross section of a good butt-weld

Welding by hand
In general, butt-welds are made using an Akatherm butt-welding machine. However up to the diameter d1 = 75 mm the weld can be made by hand. At 90 mm and above, the welding pressures are too great to make a good weld by hand. The welding process is identical to butt-welding with a machine:

Preheating
Push the pipe/fittings against the heating plate until the required welding bead has been formed (for height of welding bead see table 8.2).

Heating up
Hold the pipe/fittings against the heating plate with no pressure (for time see table 8.2).

Change over/welding/cooling
As the spigots are thoroughly heated up, both parts need to be joined as quickly as possible using a gently build up of pressure. The jointing has to be carried out accurately because moving the parts during and after jointing is not possible.

Keep the parts joined together under pressure as long as the welding bead is still plasticised (this can be checked by pressing your fingernail into the bead). The joint then needs to cool down without any additional load. The use of a support structure is recommended when jointing long pipe parts. Using a butt-welding machine gives a better result under all circumstances.

8.3 ELECTROFUSION JOINT

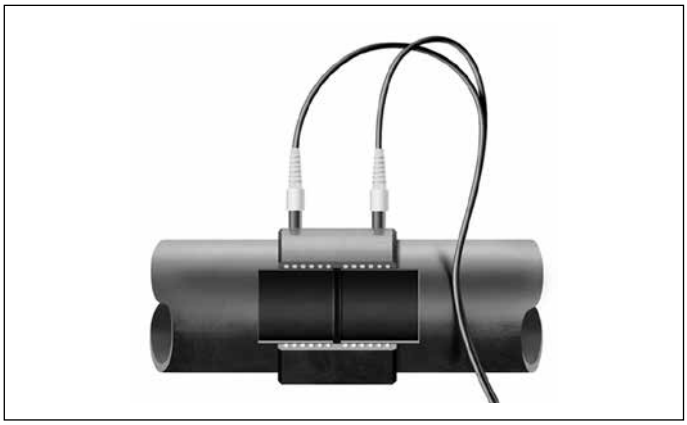


Illustration 8.12

Electrofusion is a rapid and simple way of permanent jointing. Pipes, fittings and prefabricated pipe sections can be efficiently assembled using electrofusion couplers and equipment. All Akasison products can be welded by electrofusion unless specifically stated in the product table.

Preparation
The following guidelines are important when making a proper electrofusion joint:

- Establish a work space where the welding can be done without being effected by major weather conditions. Operating temperature: -10°C to +40°C.
- Check that the equipment functions properly. Welding equipment used on site deserves special attention.
- Akafusion couplers have surface resistance wires to provide good heat exchange. The resistance wires need to be covered by the inserted pipe or fitting to work properly.
- Complete insertion is essential to utilise the fusion and cold zones in the coupler.
- Make sure both ends are inserted into the coupler have been properly scraped and cleaned. The Oxidation layer needs to be removed from both pipes and fittings.

The resistance wires are positioned in the fusion zone. On both sides of a fusion zone, a cold zone prevents the molten HDPE from leaking or spreading, thereby containing the fusion process.

During the fusion process the pipe/fitting expands and touches the inner coupler wall. The electrofusion joint is made with the pressure caused by the expanding HDPE and the heat from the resistance wires.

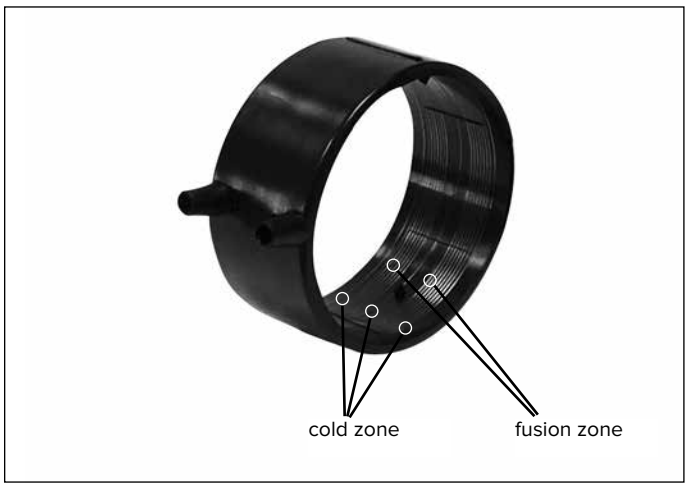


Illustration 8.13 Akafusion coupler with fusion and cold zones

Warning: Without removing the oxygen layer a weld cannot be guaranteed. The oxidation layer will form again within one hour. The butt-weld needs to be made right after machining the ends.

Welding process

Cut pipe square

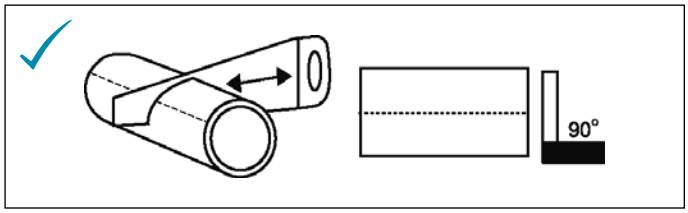


Illustration 8.14

The pipe ends must be cut square to ensure that the resistance wire in the coupler is completely covered by the pipe or fitting.

Mark surface for scraping
Mark insertion depth +10 mm to ensure that the oxidised layer will be removed across the complete welding zone.

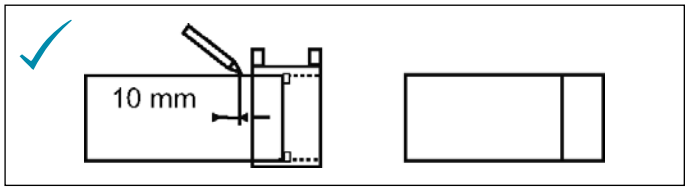


Illustration 8.15

Scrape pipe and mark insertion depth
The full outer surface of the pipe that will be covered by the coupler must be scraped (about 0,2 mm deep) to remove any surface 'oxidation'. The insertion depth should be marked again to ensure full insertion.

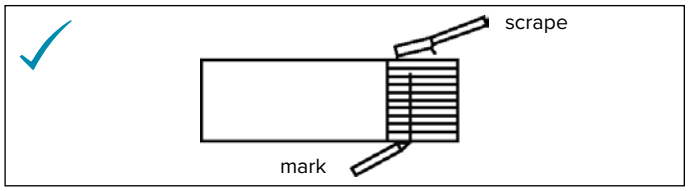


Illustration 8.16

Clean electrofusion coupler
Before assembling the pipes in the coupler ensure that all surfaces are clean and dry.

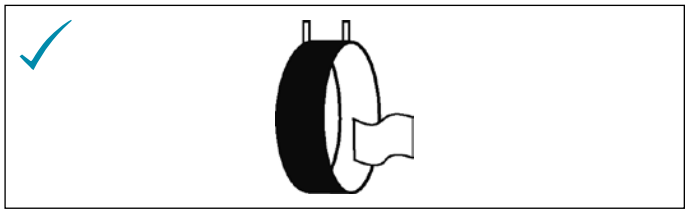


Illustration 8.17

Insert pipe/fitting until marked line

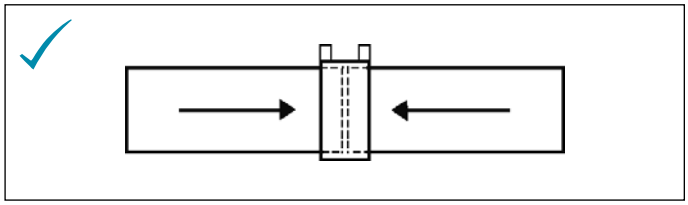


Illustration 8.18

Ensure that the pipe is pushed into the coupler as straight as possible and up to the marked insertion depth. This will ensure that all the wires are covered with HDPE during the fusion cycle.

Prevent misalignment

Misalignment will cause extra load on the fusion zone causing additional HDPE to melt, resulting in the leakage of HDPE or wire movement.

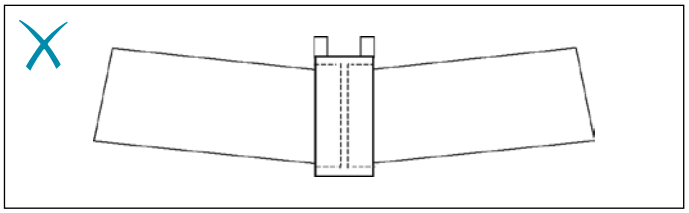


Illustration 8.19

Prevent joint movement during welding

The movement of the pipe can cause melted HDPE to flow out of the joint. This can result in wire movement, and possibly a short circuit. This causes a bad weld and potential fire hazard.

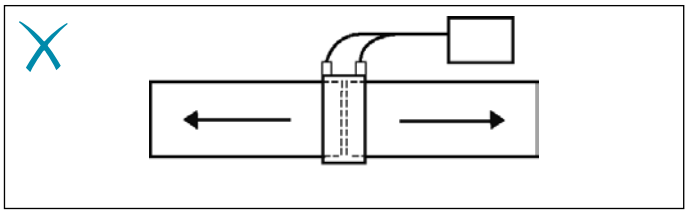


Illustration 8.20

Prevent coupler from sliding down when centre stop removed

An electrofusion coupler sliding down will cause movement of the wires and possibly a short circuit. This causes a bad weld and potential fire hazard.

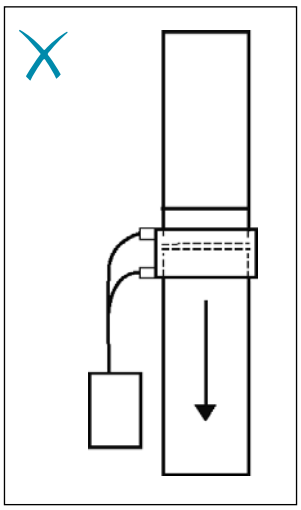
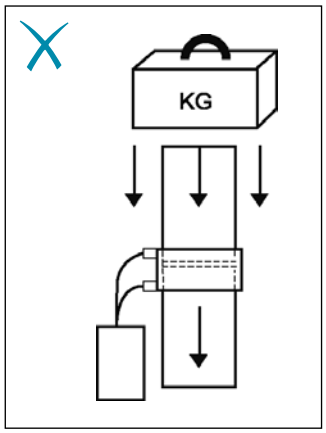


Illustration 8.21

ELECTROFUSION JOINT

Remove vertical loading during welding



An additional load on the vertical pipe will transfer extra HDPE material to the fusion zone. This will cause movement of the wires, possibly a short circuit, and thus a bad weld or fire hazard.

Illustration 8.22

Welding electrofusion coupler and cooling down

After connecting the cables of the control box, the fusion process can be begun by pushing the start button. Both the CB315 and CB160 control boxes adapt the welding time to the ambient temperature. When it is colder than 20°C the welding time is extended and when the ambient temperature exceeds 20°C the welding time is shortened. Welding below an ambient temperature of -10°C is not recommended. For welding times and cooling down times see table 8.3. For extensive instructions see the manual of CB315 and CB160. The joint assembly should not be disturbed during the fusion cycle and for the specified cooling time afterwards.

diameter d_1 mm	system	welding time sec	cooling time min
40-160	Constant current 5A	80	20
200-315	Constant power 220V	420	30

Table 8.3 Welding parameters Akafusion couplers

The full load can only be applied after the complete cooling time.

The cooling period can be reduced by 50% when there is no additional load or strain during cooling.

Never weld a coupler twice

During the fusion cycle the correct amount of energy is applied to the fusion zones to make a good electrofusion joint. A second fusion cycle would apply so much energy to the joint the HDPE would melt extensively. This will cause movement of the wires and possibly a short circuit. In an extreme case it can even cause fire.

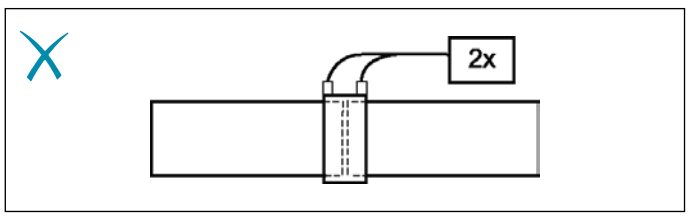


Illustration 8.23

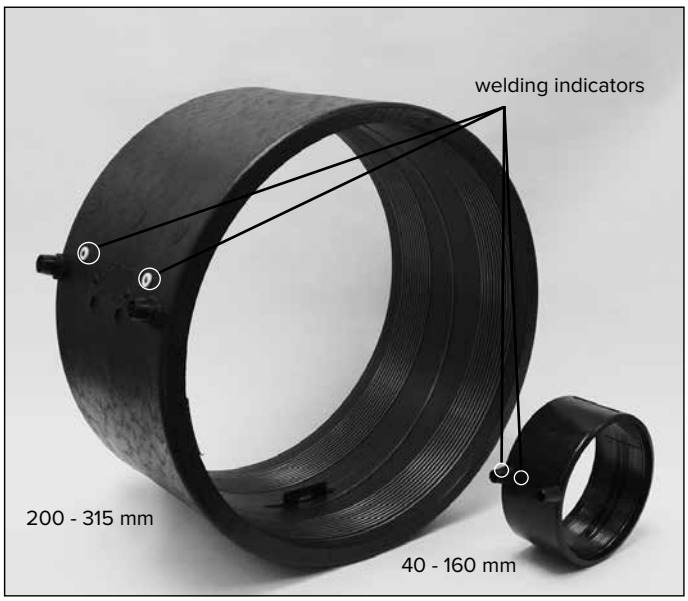


Illustration 8.24

Assessing an electrofusion weld

Compared to a butt-weld, it is more difficult to judge a good electrofusion weld. The welding indicators on the electrofusion coupler provide an indication if the weld has actually been executed. However, they do not guarantee the integrity of the joint. The amount of movement of the pop-out depends on several factors, including the size tolerances of the components and any ovality of the pipe or fitting.

A joint can be considered satisfactory when the welding indicators are protruded, and all welding preparations such as marking insertion depth, scraping, and avoiding additional load during welding and cooling have been executed successfully. If a significant quantity of melt flows from the fitting after welding, there may be a misalignment of the components, the tolerances may be excessive, or a second welding may have accidentally occurred. The integrity of such a joint is doubtful.

Please note that the fitting will become too hot to touch during the welding process. The temperature will continue to rise for some time after the fusion process has been completed.

Deformation

A too big deformation can cause problems during assembly and welding of the components. The maximum allowed deformation of pipe or fitting spigot is 0,02 x d_1. This results in a maximum difference between the largest and smallest diameter corresponding with table 8.4. When the deformation is larger, the pipe or fitting spigot needs to be “rounded” using clamps.

diameter d_1	d_1 max - d_1 min (mm)
40	1,0
50	1,0
56	1,0
63	1,0
75	1,5
90	2,0
110	2,0
125	2,5
160	3,0
200	4,0
250	5,0
315	6,0

Table 8.4 Deformation pipe

8.4 PLUG-IN JOINT

Illustration 8.25

A plug-in joint is an easy to make detachable and not pull-tight jointing method.

Jointing process:

Cut pipe square and remove burr

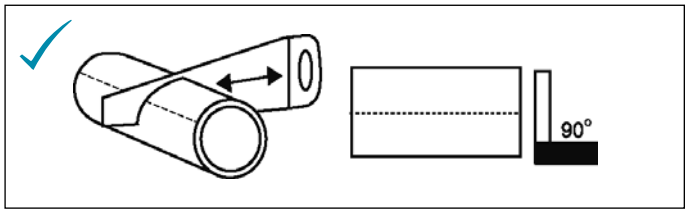
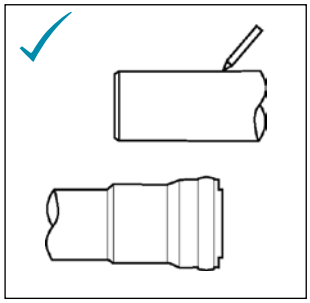


Illustration 8.26

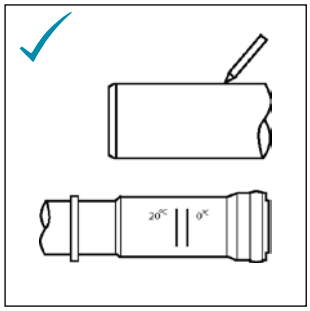
Mark insertion depth



Plug-in socket:
The pipe needs to be inserted in the plug-in socket using the full insertion depth.

A plug-in joint is not to be used to accommodate the expansion and contraction of a pipe system.

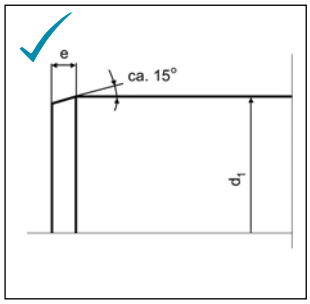
Illustration 8.27



Expansion socket:
A snap-expansion socket is used to accommodate the expansion and contraction in a pipe system.

The insertion depth is marked on the socket for both ambient temperatures of 0° and 20°C.

Illustration 8.28



Chamfer pipe end
The pipe-end needs to be chamfered at an angle of 15°. A chamfering tool should be used to get an even cut and chamfer.

Illustration 8.29

Make joint
Lubricate the pipe end and insert the pipe up to the marked insertion depth.

8.5 SNAP JOINT

Illustration 8.30

For making pull-tight connections, snap (expansion) sockets are available. These sockets are plug-in sockets with an extra snap ring which, in combination with a groove in the pipe, provides a pull-tight connection.

Jointing process:

Cut pipe square and remove burr

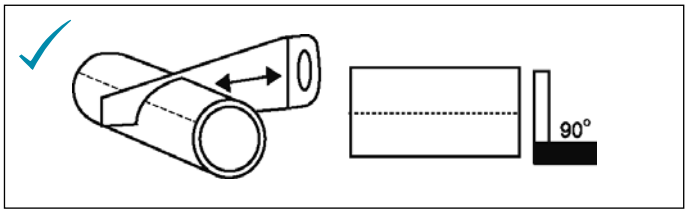
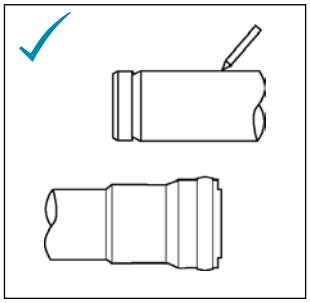


Illustration 8.31

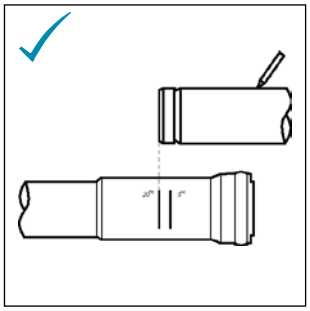
Mark insertion depth



Snap socket:
The pipe needs to be inserted in the snap socket using the full insertion depth.

A snap socket is not to be used to accommodate the expansion and contraction of a pipe system.

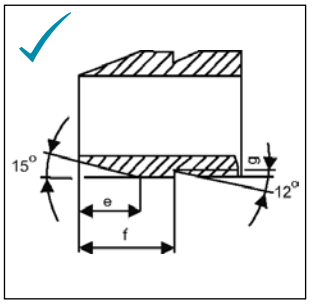
Illustration 8.32



Snap-expansion socket:
Snap-expansion sockets are available from d40 to 75 mm and are used to accommodate the expansion and contraction in a pipe system.

The insertion depth is marked on the socket for both ambient temperatures of 0° and 20°C.

Illustration 8.33



Chamfer pipe end and make snap groove
The pipe end needs to be chamfered at an angle of 15°. The groove needs to be cut at an angle of 12°.

The correct dimensions can be found in table 8.5. To get an even cut and chamfer it is recommended to use an Akatherm groove cutter.

Illustration 8.34

d_1	e	f	g
40	5	15	1
50	5	15	1
56	5	15	1
63	5	15	1
75	5	15	1
90	6	15	1
110	8	15	1
125	9	15	1
160	11	15	1
200	11	30	2
250	15	30	2
315	18	50	3

Table 8.5 Dimensions chamfer and groove

Make joint
Lubricate the pipe end and insert the pipe to the marked insertion depth. A distinct click can be heard when the snap ring is inserted in the groove.

Remark:
When the groove is omitted, the Akatherm snap and snap-expansion sockets are detachable like a not pull-tight joint.

8.6 SCREW-THREADED JOINT

Illustration 8.35

The Akatherm screw threaded joint can be used in both pull-tight and not pull-tight joints.

Not pull-tight joints
In this case the pipe or fitting is inserted directly into the joint.

Jointing process:
- Cut pipe square and remove burr
- Disassemble screw threaded joint
- Discard the yellow protection cap as it is no longer needed.
- Assemble joint and insert pipe
- Push the nut, washer and seal (in this order) over the pipe and insert the pipe end into the threaded piece completely. Tighten nut.
- The washer prevents damage to the seal and delivers an even pressure onto the joint.

Pull-tight joints
In combination with the flange bushing a pull-tight joint can be made.

Jointing process:
- Cut pipe square and remove burr
- Disassemble screw threaded joint
- Discard yellow protection cap and washer as no longer needed.
- Assemble joint and insert pipe
- Push the nut over the pipe before butt-welding the flange bushing onto the pipe. After welding, everything can be assembled.
- The flange bushing prevents damage to the seal and delivers an even pressure to the joint.

NOTES

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