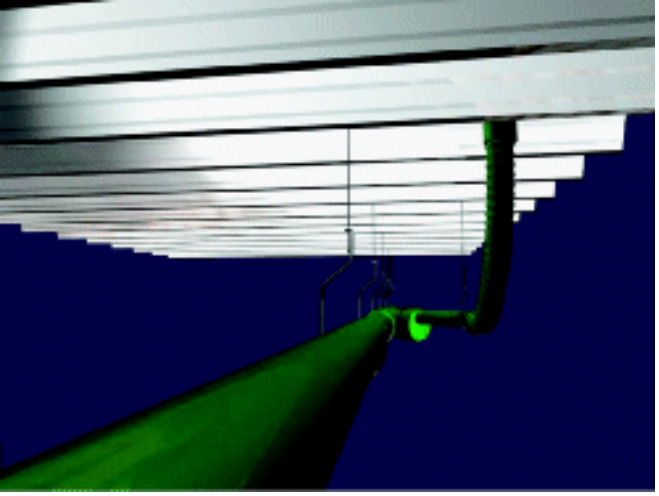
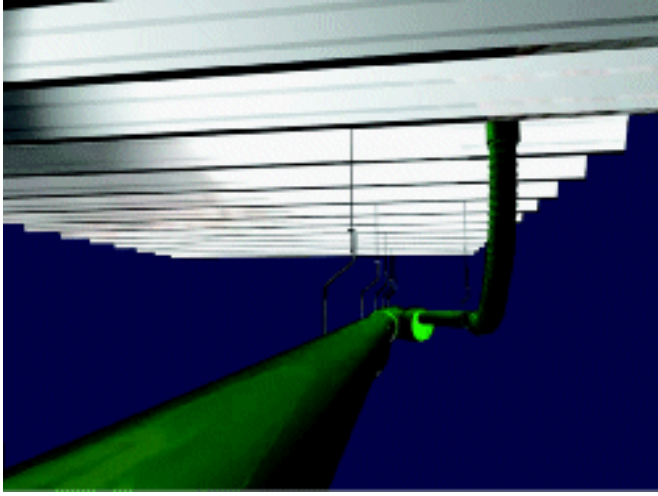
Technical Documentation

Vacurain® UV – system



A WATERTIGHT SYSTEM



In response to the need for a quick, efficient and cost effective way to drain rainwater from larger roofs DYKA has developed the VACURAIN® roof rainwater drainage system.
A high-quality solution using a system that is discreetly integrated into the building, Vacurain is ideal for rainwater discharge in utility projects with special architectonic or architectural requirements.

DYKA VACURAIN® is a Self-Priming Syphonic System. This Self-Priming system uses small pipe diameters that facilitate a syphonic effect resulting in swifter rainwater drainage. Until the nineties syphonic systems were made out of PE. Dyka made a further improvement of this system in PVC.

Compared to the original PE-system, DYKA VACURAIN®-system offers important advantages:
A small coefficient of expansion, a cheap jointing and anchoring method and a low materials price. Moreover, DYKA VACURAIN® is easy to install and has fire resistant properties.

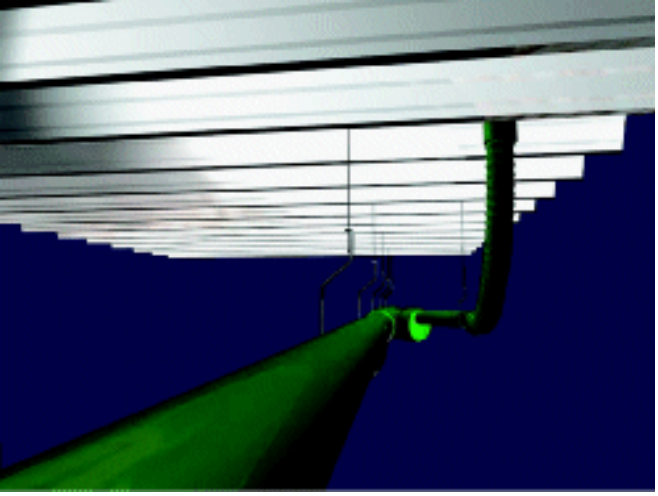
Once installed DYKA VACURAIN® fully utilizes the advantages of a closed system:

- The reduced pipe diameters result in an aesthetic system, and make it easy to mount the discharge pipes out of view.
- Increased architectural possibilities for the designer.
- A higher return on investment for the principal.

DYKA VACURAIN® is designed with major, prestigious developments in mind where Quality Assurance is vital. Functionality of the system is warranted and it is manufactured according to a patented technique.

In a nutshell: a system that fully meets present-day requirements.

VACURAIN



GENERAL

Conventional rainwater drainage systems rely solely on gravity to remove the water from the roof. The pipes at any time have at most 50% of their capacity full of water. DYKA VACURAIN® is designed to 100% fill the pipes with water. The effect of gravity is then enhanced by a "syphonic action", by which the roof is sucked dry. A counter air current no longer occurs.

Computer aided calculation of the pipe dimensions and number and positioning of the outlets is needed to create the conditions for full capacity flow. With this in place, provided there is sufficient water to be drained, the system will operate in syphonic mode. Once water levels subside below the critical threshold the system will operate by conventional gravity drainage.

What is important is the restriction of air entering the system when rainwater is flowing in. The ingenious VACURAIN® outlet sees to that.

By way of comparison: a drainage rate of 3 litres of rainwater per second is achieved by a conventional system with a Ø125 mm pipe diameter and a 50% fill factor. This can be achieved with only a Ø40 mm pipe diameter in the VACURAIN® system, giving cost savings, installation savings and the ability to easily conceal the drainage inside the building.

FUNCTIONING

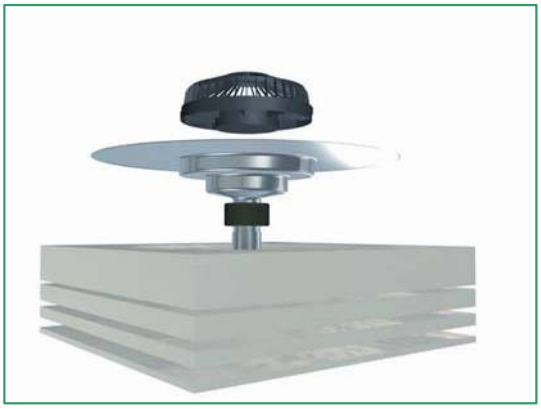
THE IMPORTANCE OF THE OUTLET

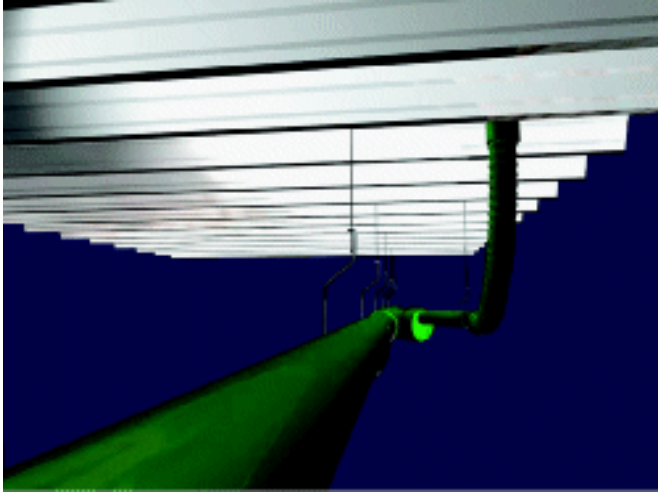
On account of its ingenious construction, a minimum quantity of air is sucked into the pipes of the VACURAIN® outlet resulting in higher discharge performance. But a funnel-shaped construction also leads to a higher resistance during inflow. The challenge is to find an exact equilibrium, minimising both resistance and the tendency to take in air with the water.

DYKA has succeeded in developing an outlet that ensures a maximum discharge capacity at a minimum standing water level without creating extra acoustic effects or excessive vibration. At a 30 mm high water level on the roof the VACURAIN® outlet has a maximum capacity of 12 litres of rainwater per second, which means that one single DYKA VACURAIN® outlet is able to drain a flat roof area of more than 500m².

DYKA design also maintains convenient installation, often out of sight. A range of outlets, applicable for any type of roofing, ensure simplicity of installation and reliability during use.

DYKA outlets include insulation which can be specified in layer thicknesses of 7cm to 13 cm.





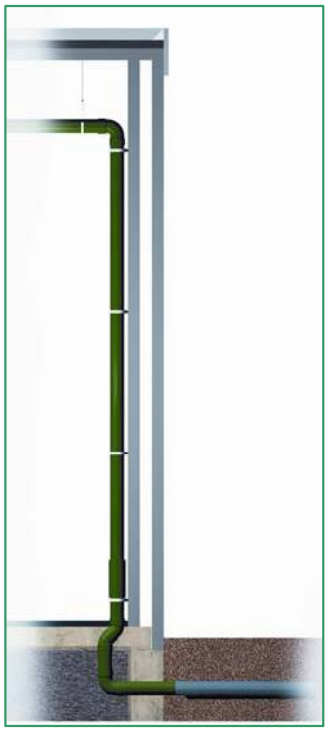
DESIGN ASPECTS

GENERAL

There are various reasons to opt for DYKA VACURAIN®. If the architect prefers to keep pipes hidden, DYKA VACURAIN® offers unlimited possibilities. As the system is based on very small diameter pipes within the building, the pipework can be easily hidden above a false ceiling or in chases.

DYKA VACURAIN® advantages will be quickly apparent in larger flat and slightly pitched roofs normally drained with extensive gutters and downpipes. Due to the larger water discharge per outlet, there are a reduced number of discharges compared to conventional rainwater drainage systems.
Moreover, pipe diameters are considerably smaller, hence the lower cost price of the VACURAIN® system. And finally, the system is very easy to assemble not requiring the electrofusion couplings of PE systems.

Critical for the final design are roof area and slope, height of the building, roof construction and pipe zones. It is also important to know whether gravel will be applied on the roof.
This data determines the location of the roof outlets and the capacity of the pipes. Locations and capacity of secondary systems can also be derived.



The quantity of precipitation is a fixed calculation value equalling a heavy shower (300 to 500 litres per second per hectare, depending and in accordance with the national applicable standards – BS EN 12056 part3).
Extremely heavy and rare downpours call for a larger capacity. Therefore, secondary systems or overflows are necessary (in accordance with the national applicable standards – BS EN 12056 part3). In the case of roofs closed in by other buildings, special precautions should be taken.

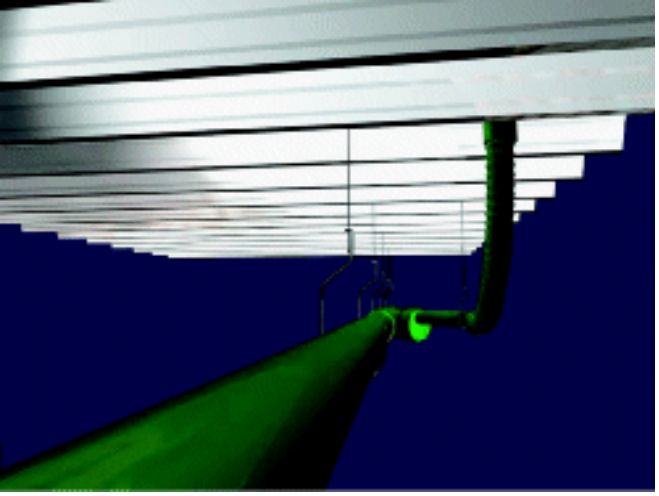
Usually the outlets are positioned in flat areas of the roof. The flat area is, so to speak, the collection reservoir for the all rainwater. Roofs should also be provided with a slope.

The constructor shall determine the slope, while taking into consideration:
- The weight of the roof.
- The variable load placed on the roof.
- The minimum inclination in operational mode for water discharge.

As a rule the gradient of the slope is 15 mm/m. Outlets are, obviously, always mounted in the lowest part. Installation in a gutter is also possible, in some circumstances.

If so desired, each outlet can be equipped with a down pipe. From a point of view of cost, however, it is more advantageous to connect a number of outlets to one single down pipe.

VACURAIN® pipes and fittings should not be used in situations where extreme soil settlement may occur.



DESIGN ASPECTS

CONNECTION TO OPEN PIPING (SYPHON BREAK)

Connection to the open piping (gravity) system can, in principle, be done at any place, although it is preferable to connect at half a metre outside of the façade.

The gravity pipe capacity should correspond with the calculated VACURAIN® down pipe capacity or VACURAIN® subsoil pipe. These values are included in DYKA's calculation results.

VACURAIN® pipes and fittings can be easily connected to the DYKA yard drainage series. In order to determine the non-pressure outlet dimensions, see "subsoil pipes" in chapter "assembly instructions".

In order to relieve the gravity sewerage system, at least one street inlet or manhole with open cover must be connected to the open piping, which will serve as a discharge pit.

An optimally functioning VACURAIN® system can be designed and calculated on the basis of construction drawings. DYKA offers advice, designs and provides the accompanying calculations. That is your guarantee of an optimally functioning VACURAIN®-system.

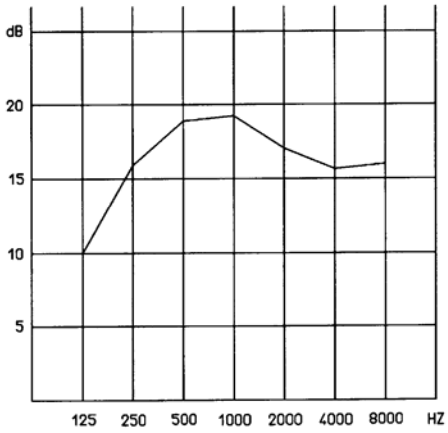
INSULATION

THERMAL INSULATION

In many situations it is advisable to apply thermal insulation. If the combination of internal temperature and a high degree of humidity causes the formation of condensation, we recommend applying DYKASOL thermal insulation. The insulating value (0.05 W/m°K) prevents the formation of condensation. This material, however, offers poor acoustic insulation.

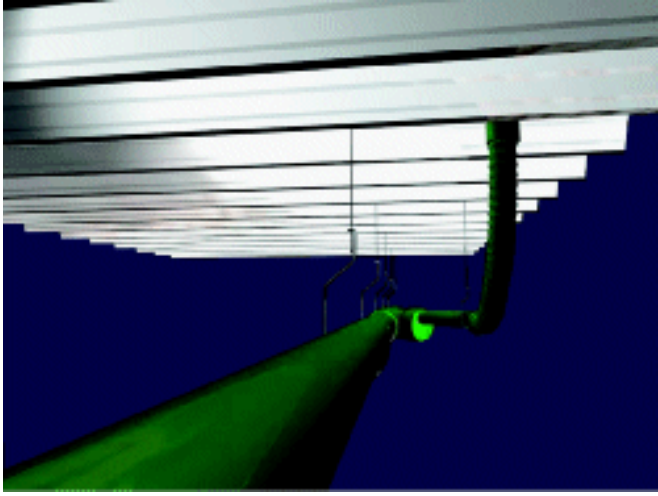
ACOUSTIC INSULATION

If sound level has to be reduced, you can insulate the VACURAIN® system with DYKASOL acoustic insulation. This product has high soundproofing qualities. A noise reduction of approx. 9 dB (A) can be achieved.



ENVIRONMEMENT

VACUAIN® pipes and fittings are fully recyclable since they are made out of PVC. The Vacurain system is not composed out of different incompatible plastics.



CALCULATION DETAILS

A UV system will only operate optimally when the pipe components are correctly dimensioned. This means that, at the national applicable maximum rainfall intensity, all pipe components should be fully filled using the smallest possible diameter pipe.

Rainwater falling on or against an adjoining façade increases water supply and this should be considered in the calculation.

Computer aided calculation
In order to design a system that will function optimally, DYKA uses a computer program calculating all possible combinations of diameters.
Calculations for a VACURAIN®-system also consider the requirements of the national standards. DYKA will do the calculations for you. All we need are the correct parameters which are-:

- Length of the building;
- Width of the building;
- Height of the building;
- Pitch slope direction;
- Gradient;
- Desired place(s) of down pipe(s);
- Roofing material (bitumen, synthetic material...)

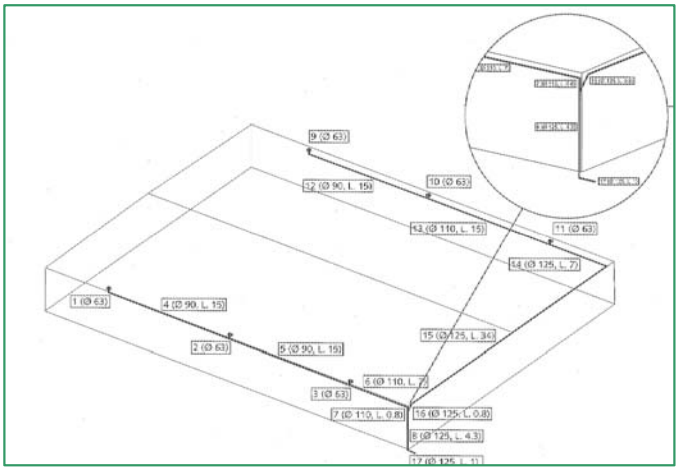
List of materials
A list of materials is added to the calculation by way of supplementary information.

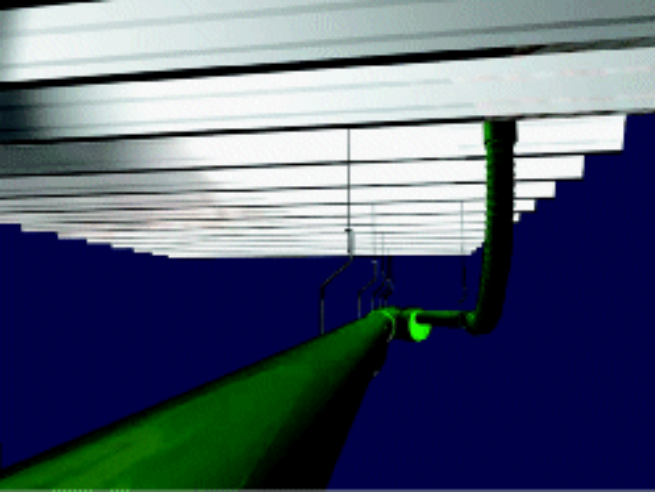
The reference in column "Post" (item) matches the position numbers on the calculation results sheet and the position numbers on the isometric drawing.

The capacity per roof segment in connection with the secondary system is also indicated in the list of materials.

Isometric projection
The isometric projection shows the pipe components as well as building contours in perspective.

The position numbers indicated on the isometric drawing correspond to the numbers mentioned in the columns "Tek#" (see calculation results) and "Post" (list of materials).
Pipe diameters and length of the pipe components are also indicated.





ASSEMBLY DETAILS

DYKA VACURAIN® is easy to assemble.

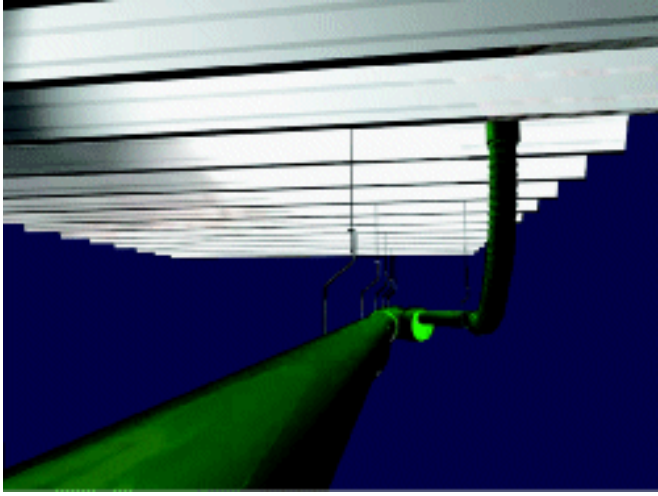
The following steps are important for the assembly sequence (in general):

- Location of outlets on the roof;
- Mounting funnels on the roof;
- Location of the horizontal collector pipe;
- Determination of stud length for suspension;
- Determination of pipe components' length between outlets;
- Attaching and aligning studs to roof or roof construction;
- Attaching brackets to studs;
- Aligning brackets;
- Snap lock connection of flexible outlet jointing hoses (with correct diameter) to outlets, using a locking bush at outlet side;
- Fitting collector pipe components into brackets;
- Gluing (solvent weld) pipe components and accompanying fittings;
- Fitting adapters and bends between outlet jointing hose and tee-element of collector pipe;
- Snap lock connection of outlet jointing hose to parallel pipe.

The pipes can be prefabricated to give workable lengths on site and then the tipped over into the brackets from the rolling scaffold. Only the pipe elements have to be glued from the scaffold.

In general, exact dimensioning is not required; a 10 to 20 cm deviation is no problem.

Errors in dimensions can be compensated for near the outlet jointing by elongation of branches (parallel to main pipe) for example.



INSTALLATION INSTRUCTIONS

GENERAL

In accordance with requirements of the VACURAIN® warranty, only products from the DYKA series or those that comply with the quality requirements indicated below may be used.

Couplers with rubber washers may not be used or expansion elements in collector pipes except where indicated by DYKA

CONSTRUCTION DISPOSITIONS

The roof construction should be calculated in accordance with current standards and regulations. Overflows (emergency spillways) with sufficient capacity should be provided (in accordance with national standards – BS EN 12056 part3)
If no overflow system is provided, water accumulation may occur due to the congestion of outlets or overload of the normal sewer system. This may lead to an overload of the roof construction to such an extent that there may be a risk of collapse.

Rail constructions may be used for fastening the studs. Attachment to roofing sheets, purlins, trusses, columns, walls, beams and/or other construction elements should be done in accordance with the supplier's / constructor's indications.

In general it is not allowed to carry out any welding and/or drilling activities on construction elements without prior permission.

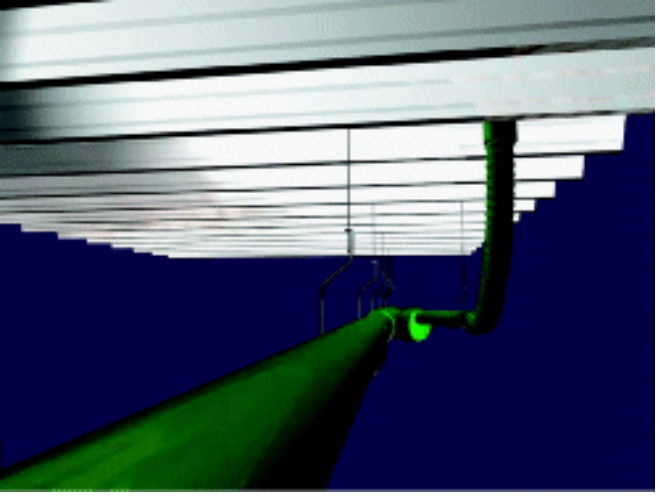
DYKA will only indicate pipe routing in its written advice, in as far it has been informed as such in drawings and specifications put at its disposal. Possible modifications in pipe routing – after new calculation by DYKA – must be carried out in accordance with the indicated sizes:

Each modification may have consequences on the calculations.

GLUED JOINTING (SOLVENT WELD)

Preparation

- Square off the pipe using a pipe cutter or a fine tooth panel saw and mitre box;
- Remove possible burrs and roughness using a knife, sandpaper or file;
- Chamfer the pipe to approximately 10 – 15 ° over at least 20 % of the wall thickness;
- Make sure that the surfaces to be glued are clean and dry;
- Verify whether the pipe fits into the fitting;
- Measure and mark the insertion depth on the pipe,
  preferably using adhesive tape, so that excess adhesive can be easily removed.



INSTALLATION INSTRUCTIONS

MOUNTING THE PIPES

Horizontal pipes

- The horizontal collector pipe is usually mounted parallel to the edge of the roof;
- Always install the horizontal pipe approx. 300 mm next to the roof outlets (see fig. 1 and 2);
- First connect the outlet jointing hoses to the outlets, mind the locking bush; insulate the aluminium outlet;
- Next determine size A in such a way that the outlet jointing hose doesn't sag underneath the collector pipe. Provide for sufficient mounting space (see fig. 4)
- Cut studs to correct length and attach to roof construction.
- Hang the VACURAIN® horizontal pipe brackets on the previously aligned M8 studs.
- Align the VACURAIN® brackets horizontally by placing the screws at the same height.
- Put the (prefabricated) pipe into the brackets.

The brackets should be mounted at a distance of 10 x D centre-to-centre, with a minimum of 100 cm. and a maximum of 160 cm.

It is not necessary to support the pipes with semi shells.

Pipe diameter	Maximum centre-to-centre distance of brackets
40 mm	100 cm
50 mm	100 cm
63 mm	100 cm
75 mm	100 cm
90 mm	100 cm
110 mm	110 cm
125 mm	125 cm
160 mm	160 cm
200 mm	160 cm

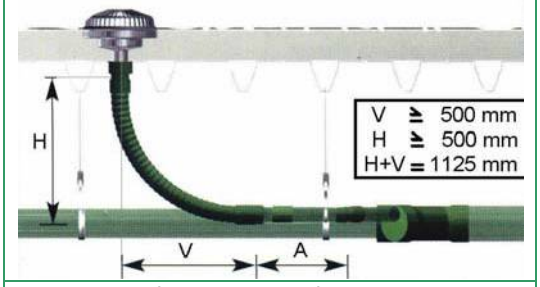


Fig 1: normal situation – side view

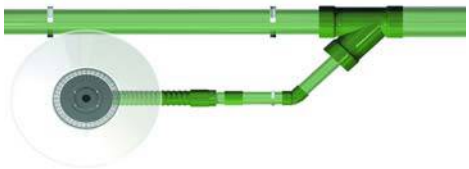


Fig 2: normal situation – top view

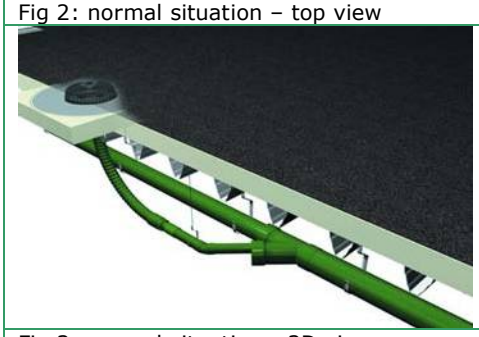
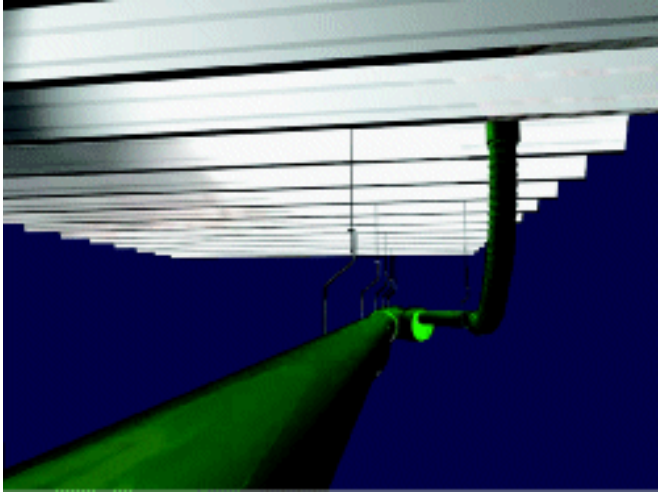


Fig 3: normal situation - 3D view

Fig 4: outlet connection may not sag underneath collector pipe



INSTALLATION INSTRUCTIONS

JOINTING

Outlet jointing

The outlet is connected to the collector pipe by means of a simple snap lock connection of the outlet-jointing hose to the outlet's spigot. Next a spigot pipe can be applied starting from the collector pipe or the collector pipe tee-element (and reducer) using a pipe, a 45° bend, pipe and double socket. This spigot pipe is glued in the double socket at one side and at the other side it is mounted to the already mounted flexible outlet hose by means of a snap lock connection (see figures 1, 2 and 3).

Outlet jointing hoses with two quick couplings are available in 3 sizes:

- 50 mm x 40 mm - funnel hose 40 mm
- 50 mm x 50 mm - funnel hose 50 mm
- 50 mm x 63 mm - funnel hose 63 mm

Sizes of the outlet hose to be applied, as well as other diameters to be applied, depend upon the calculation results of the project.

In the event that installation height is less than 500 mm, the "horizontal" hose jointing is applied. These are mounted (without tension) as indicated in figures 4, 5 and 6.

Fig 5: Low installation height

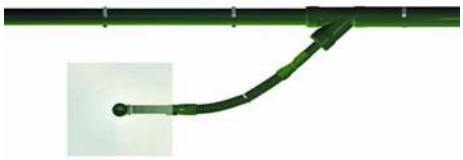


Fig 6: Low installation height: view from above

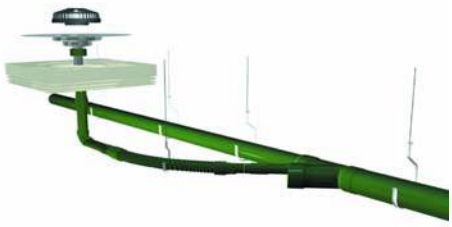
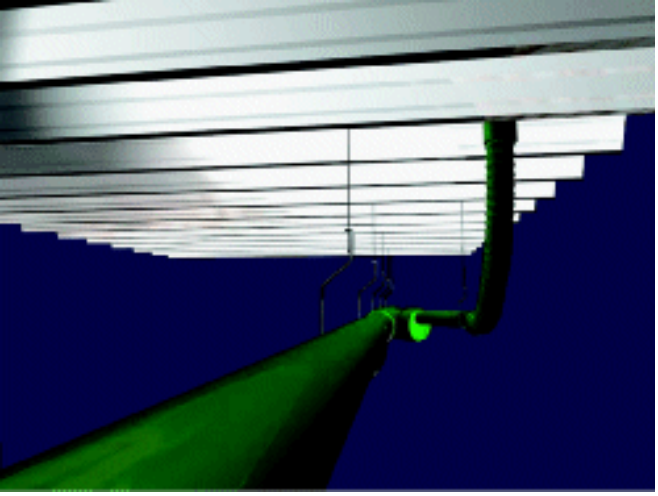


Fig 7: Low installation height: perspective



INSTALLATION INSTRUCTIONS

JOINTING

Collector pipes

The outlets are connected to the collector pipe by means of tee-elements. Tee-element dimension is equal to the diameter of the pipe in flow direction. Tee-elements have the same diameter on all three sides. If needed, reducers should be used. These may be applied for outlet connection as well as for connection of collector pipes, which become smaller upstream (see figure 5 and 6).

Inlet is always executed at the side of the pipe.
The last outlet on a hose is connected to a 45° bend instead of to a tee-element (see figure 8).

VACURAIN® eccentric reducers are mounted in such a way that the topside of the two tube sizes are at the same height.

Prefabricated pipe systems can be produced. Pipe lengths that are provided with a tee-element, incorporating possible glued reducers, may already be introduced into the brackets. Then the branch pipe with 45° bend is laid parallel to the collector pipe. We recommend using fitting pieces (made from the tube) here.

If pipes are integrated into a concrete floor, the outlet can be connected as shown in figure 10. The pipe is applied between the bottom and top reinforcement.
For a connection at the end of a pipe or in case of a branch, proceed as follows: make a vertical connection by means of two 50 mm 45° MS VACURAIN® glue bends and one 50 mm double socket. If a reducer is applied, put it between the bend and the horizontal pipe.

The outlet spigot is shortened 45 mm using a metal saw or an abrasive wheel and possible burrs are removed. After having applied insulation, the outlet can be introduced into the socket. In most cases, no outlet jointing hoses are mounted.

Figure 7: end pipe: side view

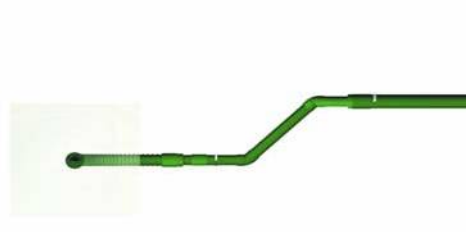


Figure 8: end tube: view from above

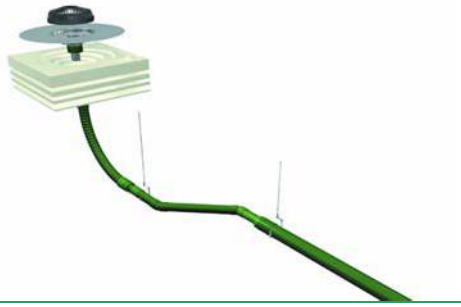


Figure 9: end tube: perspective

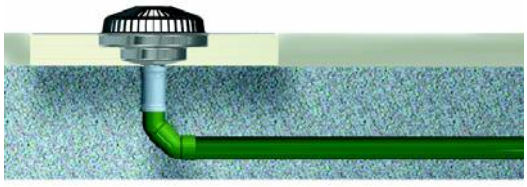
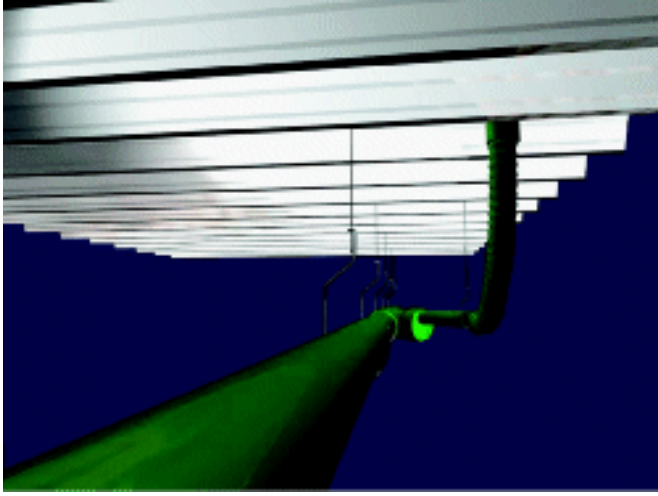


Figure 10: outlet situation in case of cast in pipes.
- double sockets Ø 50
- 2x bend 45° - M/S



INSTALLATION INSTRUCTIONS

JOINTING

Down pipes

The down pipe is fastened using universal steel brackets. One fixed point should be created, directly underneath the 90° bend in the top of the down pipe (see figure). This will prevent the down pipe from conveying forces to the last bracket of the (horizontal) collector pipe.
This fixed point is made using a universal bracket with inserted band. In most cases, creating a fixed point will need an auxiliary construction.
For applying brackets to the down pipe, the same centre-to-centre distance as for horizontal pipes is to be observed (see table).

In the event that two horizontal collector pipes are connected to one down pipe, one pipe will always have to flow in over a VACURAIN® tee-element, mounted in the down pipe.

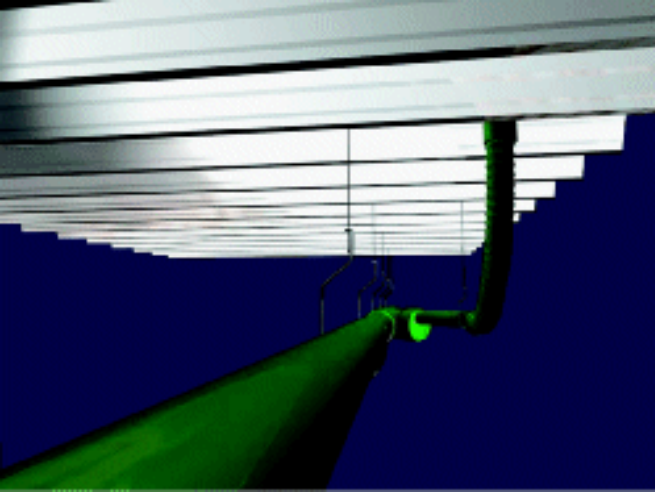
The down pipe is always mounted directly above the floor in a VACURAIN® SL expansion piece. The vertical pipe component underneath the expansion piece must also be fixed to the wall (see figure).

When fitting the down pipe into the expansion element, DYKA lubricant should be used.

The VACURAIN pipe runs as far as indicated in the calculation, and then a connection to the PVC outside pipe should be made.

Pipe diameter	Maximum centre-to-centre distance of brackets
40 mm	100 cm
50 mm	100 cm
63 mm	100 cm
75 mm	100 cm
90 mm	100 cm
110 mm	110 cm
125 mm	125 cm
160 mm	160 cm
200 mm	160 cm

Figure: - fixed point - expansion element



INSTALLATION INSTRUCTIONS

JOINTING

Subsoil piping

In principle, a VACURAIN® project is calculated in such a way that – behind the down pipe – the last part of the subsoil piping of a VACURAIN® system is 1 meter long. Then the VACURAIN® system should be connected to the normal outside sewer system
The diameter depends upon the required capacity and the available fall (gradient).
In the case of a VACURAIN® diameter of 200 mm, a 200mm VACURAIN® transition socket should be used.

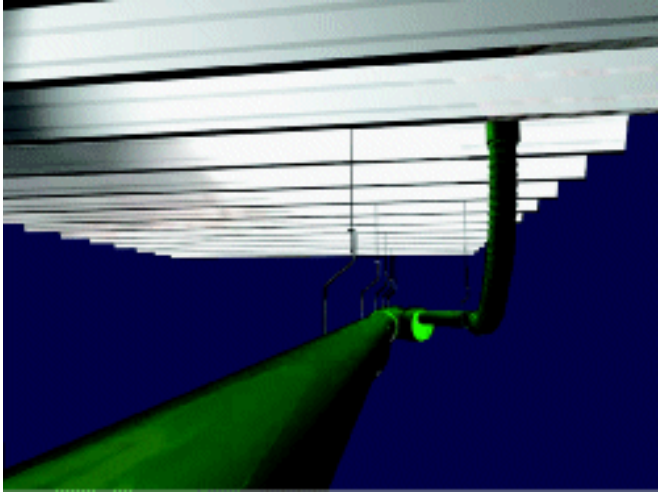
To determine the correct diameter of the outside pipe, consult table underneath:

Inclination in mm/m	10	5	4	3	2	1
110	6,2	4,4	3,9	3,4	2,8	2,0
125	8,7	6,2	5,5	4,8	3,9	2,8
160	16,8	11,9	10,6	9,2	7,5	5,3
200	30,4	21,5	19,2	16,7	13,6	9,6
250	55,0	38,9	34,8	30,1	24,6	17,4
315	101,0	71,7	64,1	55,5	45,3	32,1
400	191,0	135,0	121,0	104,0	85,2	60,2
500	343,0	242,0	217,0	188,0	153,0	109,0
630	629,0	444,0	397,0	344,0	281,0	198,0

Capacity in l/sec. For pressure less sewerage connection

Flow. height	Water on roof	Width of emergency spillway									
		100 mm	200 mm	300 mm	400 mm	500 mm	600 mm	700 mm	800 mm	900 mm	1000 mm
30 mm	60 mm	0,9	**1,8**	**2,7**	**3,5**	4,4	5,3	6,2	7,1	8,0	8,8
35 mm	65 mm	1,1	**2,2**	**3,3**	**4,5**	5,6	6,7	7,8	8,9	10,0	11,1
40 mm	70 mm	1,4	**2,7**	**4,1**	**5,4**	6,8	8,2	9,5	10,9	12,2	13,6
45 mm	75 mm	1,6	**3,2**	**4,9**	**6,5**	8,1	9,7	11,4	13,0	14,6	16,2
50 mm	80 mm	1,9	**3,8**	**5,7**	**7,6**	9,5	11,4	13,3	15,2	17,1	19,0
55 mm	85 mm	2,2	**4,4**	**6,6**	**8,8**	11,0	13,2	15,4	17,5	19,7	21,9
60 mm	90 mm	2,5	**5,0**	**7,5**	**10,0**	12,5	15,0	17,5	20,0	22,5	25,0
65 mm	95 mm	2,8	**5,6**	**8,5**	**11,3**	14,1	16,9	19,7	22,5	25,4	28,2
70 mm	100 mm	3,1	**6,3**	**9,4**	**12,6**	15,7	18,9	22,0	25,2	28,3	31,5
75 mm	105 mm	3,5	**7,0**	**10,5**	**14,0**	17,5	21,0	24,4	27,9	31,4	34,9
80 mm	110 mm	3,8	**7,7**	**11,5**	**15,4**	19,2	23,1	26,9	30,8	34,6	38,5
85 mm	115 mm	4,2	**8,4**	**12,6**	**16,9**	21,1	25,3	29,5	33,7	37,9	42,1
90 mm	120 mm	4,6	**9,2**	**13,8**	**18,4**	23,0	27,5	32,1	36,7	41,3	45,9
95 mm	125 mm	5,0	**10,0**	**14,9**	**19,9**	24,9	29,9	34,8	39,8	44,8	49,7
100 mm	130 mm	5,4	**10,8**	**16,1**	**21,5**	26,9	32,3	37,6	43,0	48,4	53,8

Capacity in l/sec for emergency spillways – weir overflows



VACURAIN® AS SECURITY SPILLWAY SYSTEM

VACURAIN® can also be applied as a secondary system. This will be necessary in designs where roof areas show such an inclination that water cannot be evacuated over the edge of the roof.

Outlets that are used for this purpose have to be glued at least 30 mm higher than the normal surface which is to be drained. See figure 1.

The secondary piping system uses down pipes that end at approx. 0.5 m + floor level through the wall construction and evacuate rainwater on ground level. See figure 2.

The down pipe should be mounted at a well-considered location.

When VACURAIN® is used as a secondary system, the roof construction should be able to support a water level of at least 60 mm. This should be determined by the constructor of the building.

Spillways (Weir Overflows)
If the roof inclination is designed such that water is collected at the edges of the roof, the secondary system can be composed of spillways (Weir Overflows).

The height of water on the roof will determine the discharge capacity of the spillways.
This water level is linked to a maximum, which will have to be determined by the constructor. A 30 mm upstand of the spillway should be taken into consideration. See figure 3.

For determining the spillway's capacity, it is critical to determine the maximum allowable water level on the roof. Rain intensity in accordance with the current national standards should be taken into account.

The number and size of the spillways can be determined using the table "subsoil pipes".
This table applies to the principle of "non-deformable roof".

Fig 1: when VACURAIN® is used as a secondary system, glue in outlet 30 mm higher.

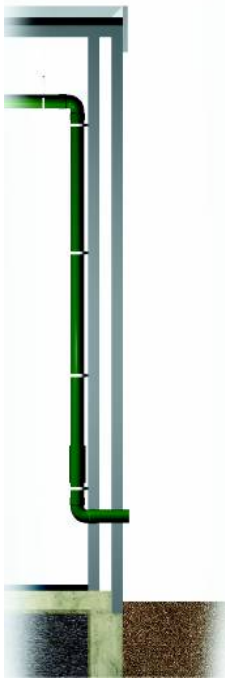
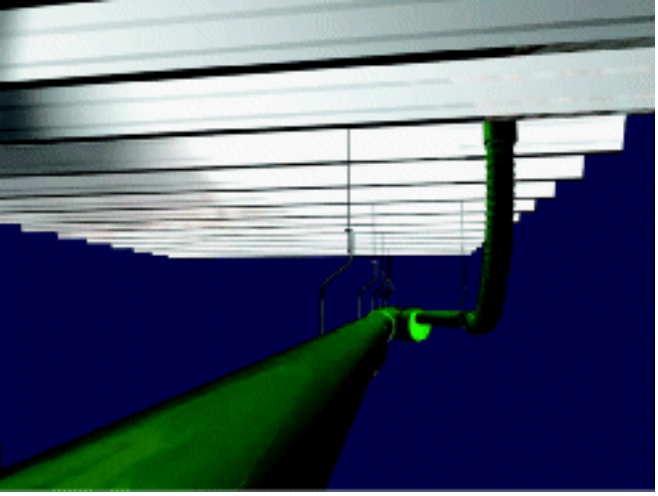


Fig 2: down pipe for VACURAIN® secondary system.

Fig 3: spillway (Weir Overflow)



OUTLET INSTALLATION

Bituminous roofing materials model

Components:

- Aluminium outlet
- Dish
- Leafed basket
- Cut cover
- Insulation 70-10-20-30 mm

1. Determine location where the VACURAIN® outlet should be mounted. If pipes are integrated into a concrete floor, the outlet and the delivered insulation are introduced into the integrated socket (if the outlet spigot is too long, cut off carefully; rubber gasket may not fall into the socket).

2. Cut a hole into the roof with a cross section of approx. 75 mm (see figure) for a Ø50 mm outlet and 100 mm for a Ø75 mm outlet. In case of a sheet-file profile roof plate, the hole should be applied in the upper side of the profile.

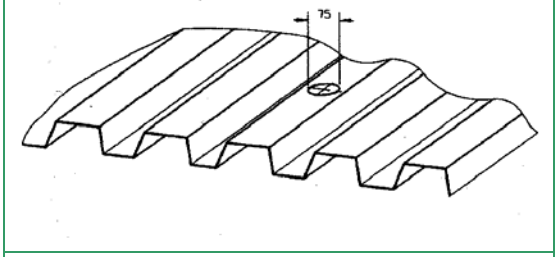


Fig 1: Figure 20 : hole in roof

3. Determine insulation layer thickness.

4. The insulation parts contained in the delivery (560 x 560 mm) allow a variation in insulation thickness of 70 mm up to a maximum of 130 mm, with 10 mm intervals.

5. Apply insulation parts on top of the hole.

6. Fit the outlet on the insulation parts, and introduce spigot into the hole.

7. Secure the aluminium outlet onto the roof by at least 6 points using self-tapping screws.

8. Next the outlet should be integrated into the roof layers in accordance with the instructions of the roof layer supplier.

9. Introduce the dish into the outlet. It is snapped into the aluminium outlet at 4 points.

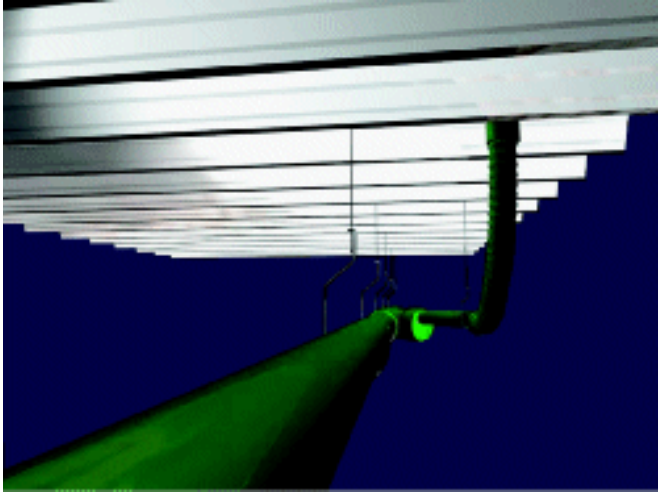
10. Put leafed basket onto dish. It is also snapped at 4 points. Note: Can only be snapped when in the correct mounting position!!

11. Slide locking bush over outlet spigot, with smallest diameter upward.

12. Then clamp VACURAIN® hose onto outlet at the 50 mm or 75 mm side.

13. Slide locking bush fully down until the lowest position possible has been reached, over the end of the hose.

14. Envelope the aluminium outlet with Dykasol Ø50 mm or Ø75 mm insulation material in order to prevent any condensation.



OUTLET INSTALLATION

SNAP-LOCK model for synthetic foil roofing material

Points 1 to 5 are the same as for the bituminous outlet models fitting instructions.

Figure A
Apply an outlet rubber (make sure the rubber surfaces and surrounds are fully clean).

Figure B
Unwind synthetic roofing material over the outlet. (Mark holes for studs). Punch (or perforate) the 8 holes for the studs. Put second outlet rubber over studs. (Make sure that rubber surfaces and surrounds are fully dry).

Figure C
Apply aluminium pressure ring (with text side upward). Cut the synthetic roofing at the inner side of this pressure ring using a sharp knife (Use inner side of pressure ring as mould).

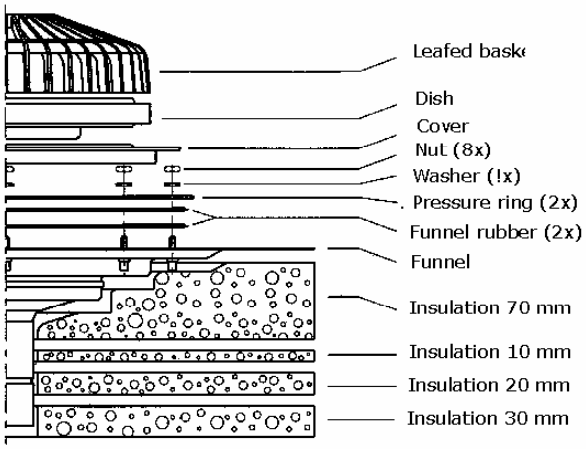
Figure D
Put the 8 washers with rubber side downward. (That is steel side upward). Equally fasten the 8 nuts.
The moment to be exercised may by no means be so high that the studs turn along with rivnuts.

We advise preparing actions A to D as prefab work on site.

Introduce the synthetic dish in the outlet. It is fastened at 4 points in the aluminium outlet.

Apply the leafed basket onto the dish.

While snap locking, mind the spaces at the bottom edge of the leafed basket.
(Points 9 up to and including 12 of bitumen outlet).
Also see securing bush plate.



Synthetic foil - funnel
N° Art. : 2736008

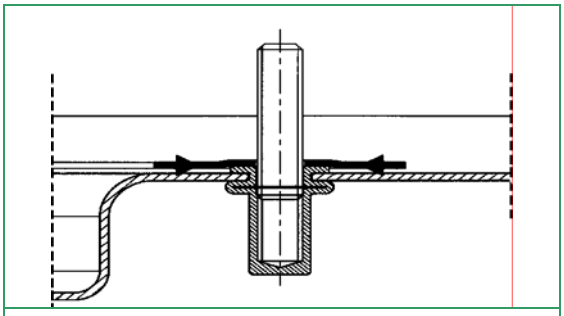


Fig A

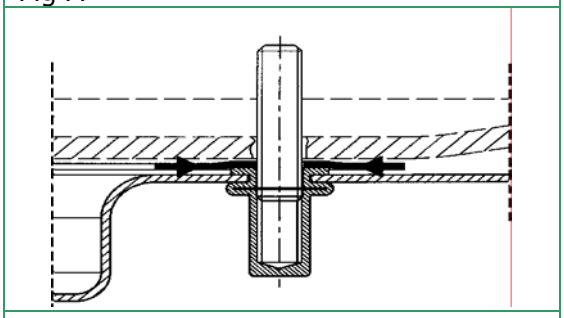


Fig B

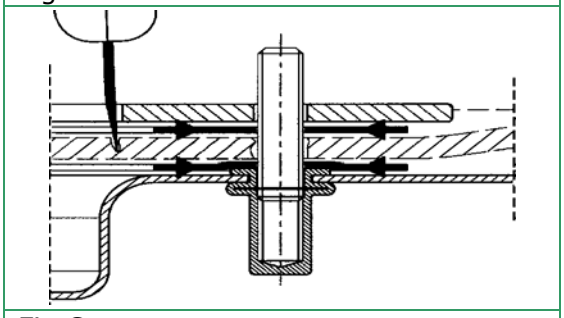


Fig C

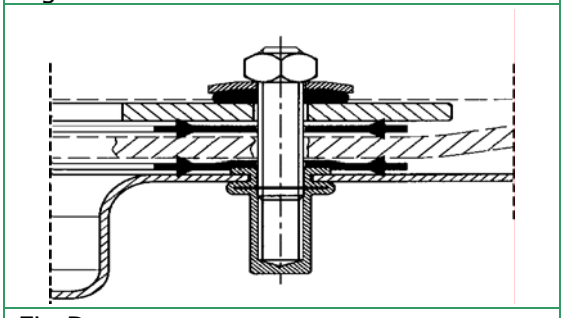
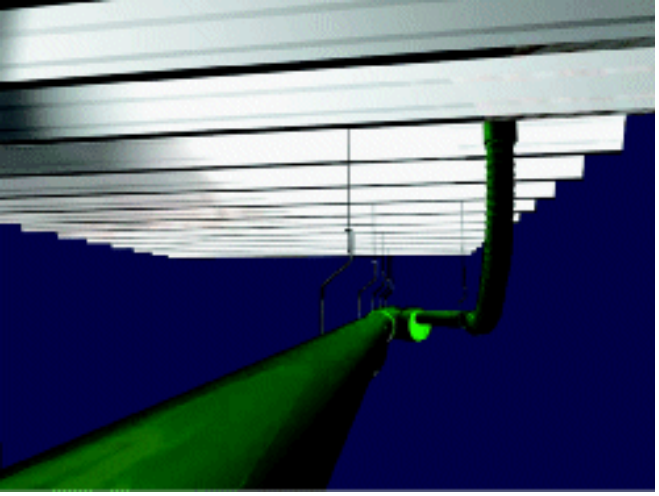


Fig D



MAINTENANCE

We recommend inspecting the horizontal pipe routing every two years.

Congestion due to blocked outlets should be prevented in order to prevent rainwater discharge over security spillways. Regular inspection of the outlets is necessary, once or more a year, depending upon the location of the building, in order to clear airborne debris, e.g. leaf accumulation.

Debris will decrease outlet capacity. As a result of this the system will not be able to sufficiently drain water in cases of extreme rain showers.

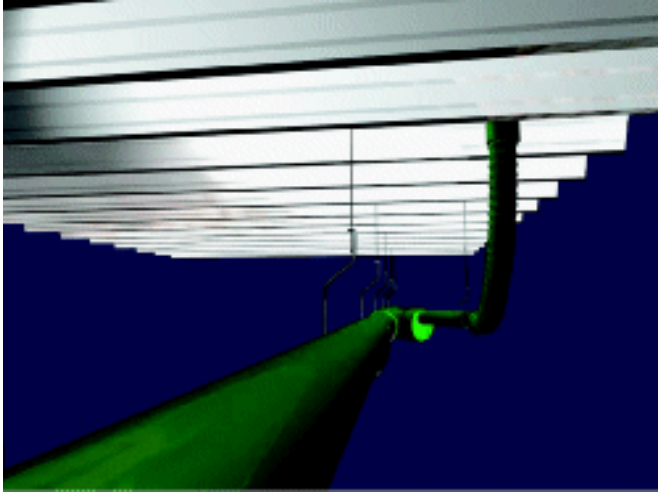
Since modified PVC pipes do not possess any adhesive characteristics, local pipe narrowing will not occur. Moreover, DYKA VACURAIN® is self-cleaning thanks to the high flow velocities: possible dirt or silt deposits are simply washed way.

Summary description

DYKA VACURAIN® is a rainwater drainage system, discharging water according to the UV system.
Piping is constituted of adhesive, impact-modified PVC pipes and fittings, which can be glued (solvent welded). These are connected without tension to the fixed roof outlets by means of flexible hoses.
In view of a good functioning, VACURAIN® systems are built strictly separate from conventional rainwater drainage systems.

VACURAIN® construction

DYKA VACURAIN® consists in impact-modified PVC pipes and fittings. Outlets are composed of weatherproof synthetics and aluminium housing, and are applied at previously indicated positions in the roof construction. Jointing of outlets to the VACURAIN® pipes is done by means of a specially designed outlet jointing hose with snap lock connections.



SPECIFICATIONS

Processing

DYKA VACURAIN® pipes and fittings must be glued in accordance with the processing instructions. Gluing can be done at temperatures between 0 and 40°C. The VACURAIN® system can be handled without specific knowledge or special tools. On request, DYKA will give instruction before start of the works.

Bracketing of horizontal pipes

Since the VACURAIN® rainwater drainage system possesses a relatively low coefficient of dilatation and by using flexible hoses for outlet jointing, expansion forces have no influence on the construction of the building. Vibrations and pressure impulses are compensated by the flexible assembly and suspension.

The horizontal pipes are suspended in special VACURAIN® brackets. The half opened brackets are fastened by M8 studs. The rigidity of the pipes makes semi shells superfluous.
Bracket spacing is 10 x pipe diameter, with a minimum of 100 cm and a maximum of 160 cm.

Bracketing of down pipes

The down pipe is fastened directly underneath the socket of the jointing bend of the horizontal pipe by means of a 1-point bracket.
Bracket spacing is 10 x pipe diameter, with a minimum of 100 cm and a maximum of 160 cm.

The down pipe brackets used are guide brackets, except for the upper most down pipe bracket. The upper most down pipe bracket should be executed as a 1- point bracket.

Execution

It is not allowed to change the already chosen pipe routing without previous consultation. This is due to the calculated pipe resistance.

We recommend verifying the water tightness of the VACURAIN® system by air testing the pipes before taking the system into service.

Dimensions and classification

The pipes are available in the following diameters: Ø40, 50, 63, 75, 90, 110, 125, 160 and 200 mm and the full range includes the necessary fittings, sockets, brackets, outlets and reducers.

Version 06-2005