FDT
FLACHDACH · TECHNOLOGIE

Flat Roof Drainage

September 2014

Technical Manual

...FDT won't leave any flat roof out in the rain

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The right decision

General remarks on flat roof drainage

Flat roof drainage systems need to be designed for direct and unimpeded run-off of precipitation water.
Sufficient slope is an essential prerequisite.
Drainage systems are designed according to DIN EN 12056-3 and DIN 1986-100.

There are two different types of roof drainage:

- external drainage to bracket-mounted gutters
- internal drainage to roof drains/water spouts

For roofs with a slope of less than 5°, internal drainage is recommended.

National standards and regulations must be observed.

General remarks on standards and design guidelines for rainwater and emergency drainage of flat roofs

As of July 2001, roof drains and emergency overflows have to be designed in accordance with DIN EN 12056-3.

The DIN EN 12056 series of standards represents the first generation of European standards for "Gravity drainage systems inside buildings". Compared to the previously applicable standard series DIN 1986 (DIN 1986-1:1988-06 and DIN 1986-2:1995-03) "Drainage systems on private ground", in part, significant changes have been made to the content:

1. The issue of roof drainage has now become a part of the standard to be dealt with separately.
2. The calculation method described - compared to DIN 1986-2 - requires considerably more calculation work.

The scope of this standard extends to the direct area of the building only. Additionally, DIN 1986-100 has been established. This standard, inter alia, contains complementary provisions to the standards DIN EN 12056-1 - 12056-5. Thus, the rainwater drainage system is now considered as an integrated system, from the roof drain to the piping to the discharge into the public sewage system.

In particular, DIN EN 12056, inter alia, includes information on rainwater discharge calculation, roof drainage system design and rainwater pipes.

For the "Planning and designing of rainwater drainage systems" according to DIN 1986-100, additional requirements (e. g. rainwater must not be discharged onto public areas, every roof area equipped with an internal or external drainage system must have at least one outlet or an emergency overflow allowing free discharge over the façade of the building) or design principles apply.

At first, according to the design method, the amount of rainwater to be discharged from the roof at constant conditions is to be identified.

The design rain yield factor within the scope of this standard is a rain event defined by rainfall duration and recurrence interval and has to be determined by way of statistical survey. The design rain yield factors are to be obtained from the local authorities.

The rainfall duration relevant for dimensioning is to be considered as D = 5 minutes.

For precipitation areas without planned rainwater retention, the recurrence interval of the design rain must be once in five years according to the current provisions of the DIN Standard Committee on Water Engineering and Management (NAW).

The number of roof drains or gutters is determined considering the type of roof area and the flow rate of the roof drain selected at a given ponding height (pressure head) at the roof drain.

The ponding heights (pressure heads) required for drainage at the drains must be proven by the manufacturer of the roof drain by way of a test according to DIN EN 1253.

Along with the required site-specific rainwater drainage calculation, emergency drainage is also stipulated.

General remarks on standards and design guidelines for rainwater and emergency drainage of flat roofs

If the roof geometry does not allow for a free emergency overflow over the façade, an additional piping system with unimpeded run-off to the ground must be in place to ensure emergency overflow.

The drainage and emergency overflow system together must be capable of discharging the 100-year rain event with a duration of five minutes to be expected at the location of the building. The minimum drainage rate of the emergency overflows results from the difference between the 100-year rain event and the design rain yield factor multiplied by the roof type correction factor.

The required quantity of emergency overflows is calculated analogously to the determination of the number of roof drains or gutters.

The ponding height (pressure head) of the emergency overflow is derived as follows:

- The lower edge of the emergency overflow must be above the required ponding height (pressure head) of the selected roof drain.
- Adding up the ponding heights (pressure heads) at the roof drain and at the emergency overflow produces the expected maximum flooding height on the roof.

It needs to be agreed with the structural designer. The distributed load resulting from the flooding height above the lowest point of the drainage (roof drain) must not exceed the admissible static load for the roof structure. If this is not possible, the roof structure has to be reinforced at least in the area of the lowest slope points.

As an alternative to the described calculation methods, for roof areas which can be drained without any emergency overflow elements the flooding heights to be expected on the roof area have to be determined by way of calculation and are to be taken into account in the static calculation of the building.

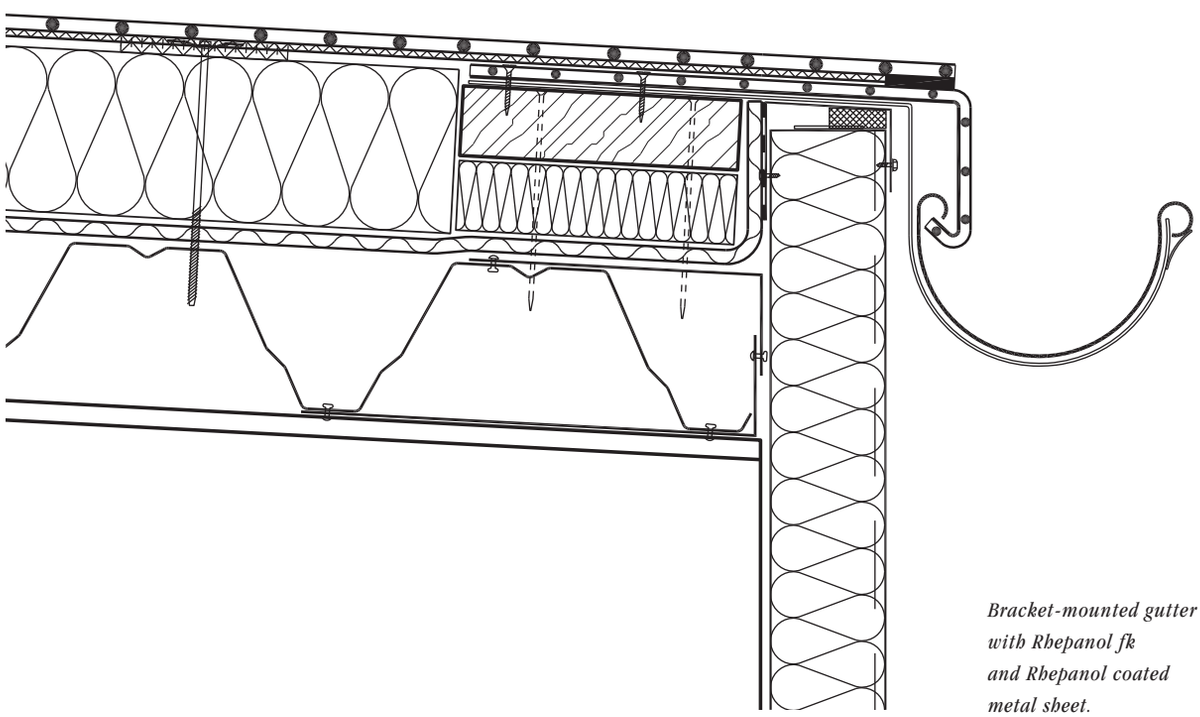
Besides the described design methods, further information on planning and implementation can be found in the Technical Rules for Roofs with Covering - Instructions for Flat Roofs - as well as in the "Guidelines for drainage design" (edited and published by the Central Association of German Roofers - Professional Association on Roofing, Wall and Waterproofing Technology).

- National standards and regulations must be observed.

External drainage

External drainage is carried out over bracket-mounted gutters. Connection with the roof area is carried out with metal drip angles.

With **Rhepanol** and **Rhenofol** roofing membranes, preferably coated metal sheets are installed. Edge boards should be 1 cm thinner than the insulation layer in order to ensure unimpeded water run-off. Gutter brackets must be sunk into the substrate or edge board.



Bracket-mounted gutter with Rhepanol fk and Rhepanol coated metal sheet.

Internal drainage
Planning

Notes on planning for internal drainage

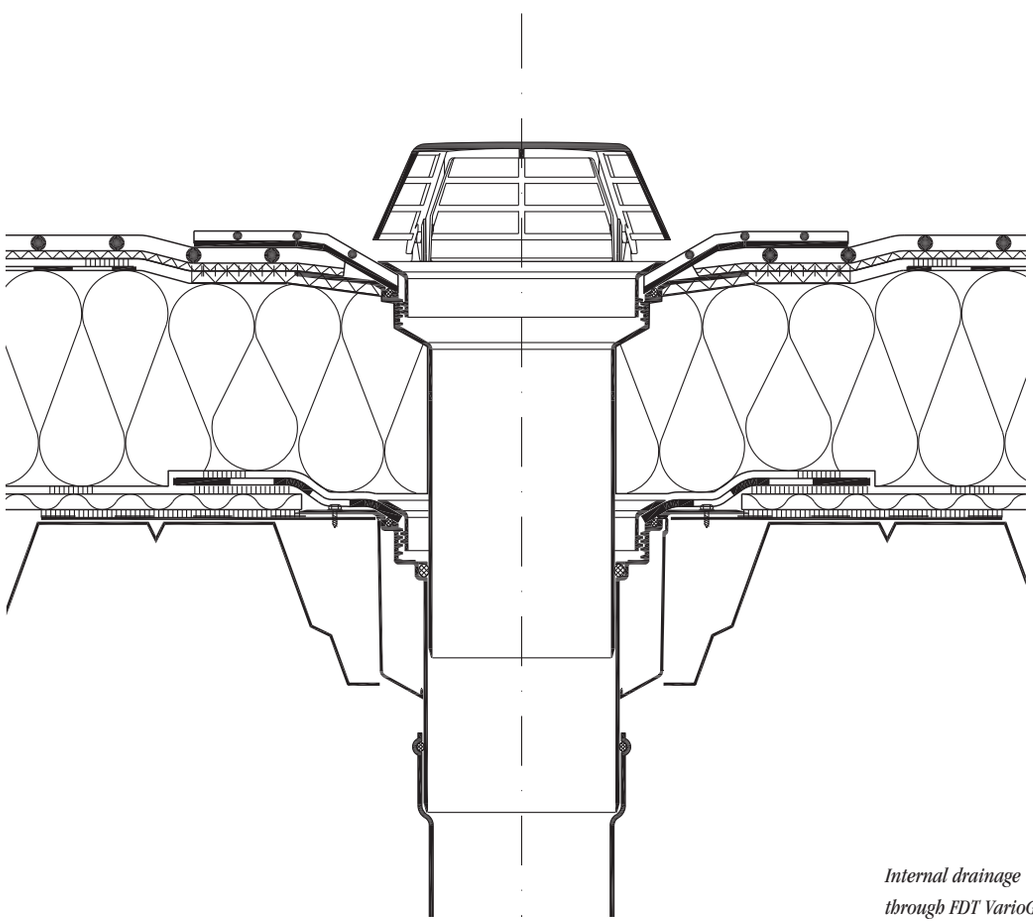
- Flat roofs with internal drainage must be equipped with at least one roof drain and at least one emergency overflow.
- Roof overflows must be installed at the lowest points.
- Generally, roof overflows must be installed at a minimum distance of 30 cm between the outer edge of the flange and cants, roof superstructures, joints, roof openings, etc.
- If the roof area is divided by fire walls, expansion joints, etc., the subareas are to be drained individually.
- Heatable rainwater outlets can prevent icing of roof drains.
- Possibly, water spouts for smaller roof areas.
- Emergency overflows / outlets are to be dimensioned and flashed according to DIN EN 12056-3 to ensure discharge of a 100-year rain event according to DIN 1986-100 Annex A.
- Emergency overflows are outlets with an extension ring and a discharge pipe leading to open ground. They are installed at valleys not allowing discharge through the parapet or at valleys longer than 20 m.
- Correspondingly dimensioned water spouts can also take the function of an emergency overflow if connected to an open gutter box.
- For roof structures according to DIN 18234 or the industrial building guideline, drains with a fire protection collar must be provided for.
- Ready-to-install roof drains (e. g. FDT rain-water outlet VarioGully) with factory-mounted flashing collars offer additional safety.
- National standards and regulations must be observed.

For flat roofs with internal gravity drainage system, the FDT flat roof specialists shall be glad to work out project-related solutions incl. emergency drainage (Please find our Service Form on page 37).

Internal drainage
Implementation

Notes on implementation of the internal drainage

- At non-ventilated flat roofs, two-stage roof drains are installed and flashed against the existing vapour control layer.
- Roof drains are to be installed without back-flow and at the proper height (must not project over the roof sealing). Therefore, the flanges of roof drains, if possible, should be sunk into the substrate.
- Fasten the roof drains to the substrate. If required in the installation instructions, the roofing membrane must be fixed in the area of roof drains with special Gripfix rings or by welding or bonding to the flange.
- Roof drains need regular cleaning to prevent blocking by leaves or the like.
- National standards and regulations must be observed.

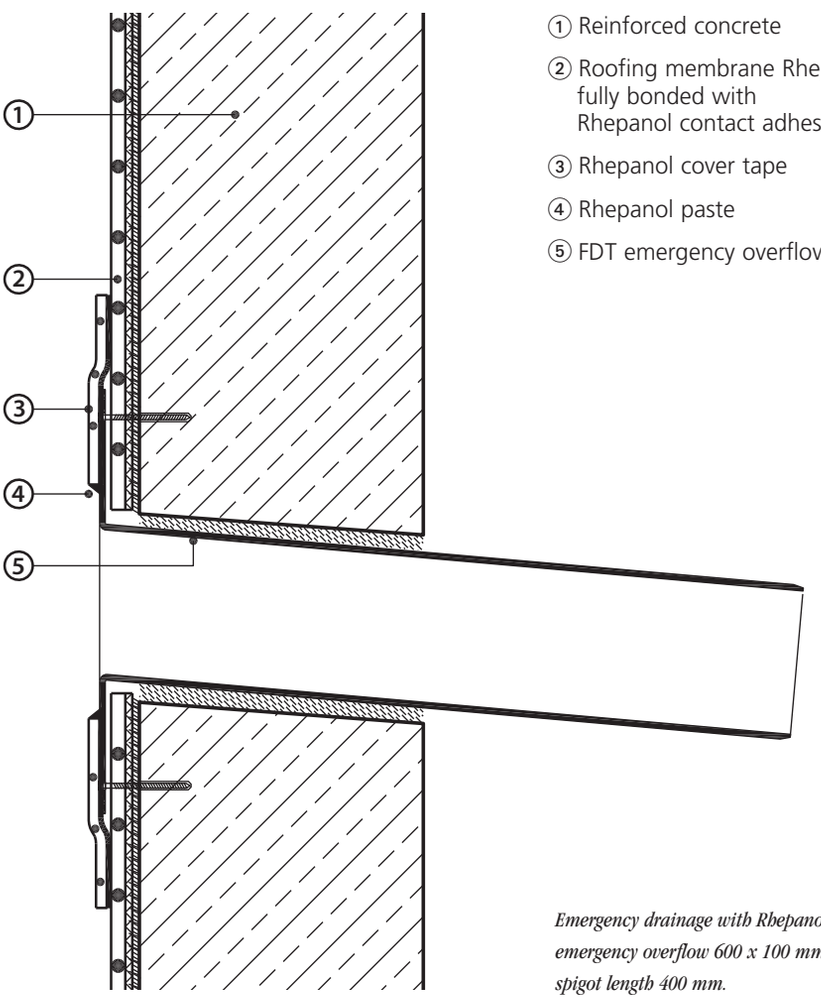


Internal drainage through FDT VarioGully.

Emergency drainage
Implementation

Notes on implementation of the emergency drainage

- Emergency overflows are installed for direct discharge of a 100-year rainfall through the parapet to open ground.
- The height of the overflow edge above the roof sealing is defined by the drainage calculation.
- At a height of more than 50 mm, emergency overflows with an angled base plate must be installed for reliable flashing of the roof sealing.
- At roofs with ballast, the upper edge of the ballast layer (gravel, green roof, etc.) is to be taken as overflow edge.
- The overflow spigot should project at least 20 cm over the parapet and have an incline of at least 2°.
- National standards and regulations must be observed.



① Reinforced concrete
② Roofing membrane Rhepanol fk, fully bonded with Rhepanol contact adhesive 50
③ Rhepanol cover tape
④ Rhepanol paste
⑤ FDT emergency overflow

Emergency drainage with Rhepanol emergency overflow 600 x 100 mm, spigot length 400 mm.

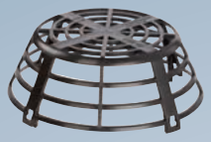
FDT draining system components

FDT VarioGully

- The FDT VarioGully is a thermally insulated flat roof rainwater outlet for gravity drainage, according to DIN EN 1253 and DIN 19599, which is regularly tested by the external testing institute LGA Bavaria.

- Made of rigid PP polypropylene with increased impact strength in a vertical or horizontal version, including gravel stop and leaf guard, for connection to downpipes DN 70 - DN 150. For warm roof structures extension elements are available, for terraces and balconies terrace extensions are available.
- In case of heatable FDT VarioGully versions, the splash-proof installed - not foamed-in - heater unit is doubly protected by the two integrated safety systems (heat monitoring relay and fuse). Connection via safety transformer 230/24 V (10 W per outlet) according to DIN VDE 0100-551, CE. Control options see installation examples on p. 22.
- National standards and regulations must be observed.

FDT VarioGully modular system

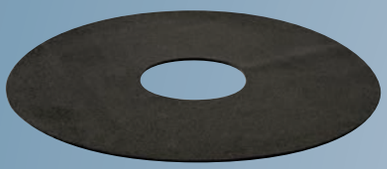


Gravel stop / leaf guard

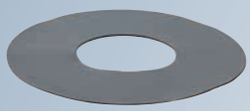
Emergency overflow socket 100 mm

Emergency overflow socket 50 mm

Collars for:



bitumen



Rhepanol fk grey

Rhepanol fk black

Warm roof attachment up to 200 mm thermal insulation thickness

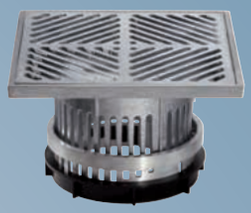
VarioGully vertical DN 125

VarioGully vertical DN 150

VarioGully angled DN 125

Reducer DN 125/DN 100

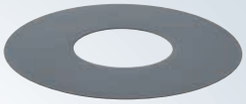
Reducer DN 125/DN 70



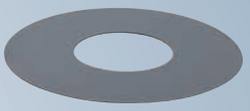
Terrace grate

Screw ring

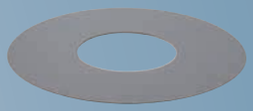
Lift ring



Rhepanol fk hot air weldable grey



Rhepanol hg



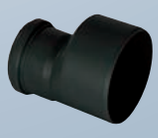
Rhenofol

Warm roof attachment up to 400 mm
thermal insulation thickness

VarioGully
angled DN 70

FDT refurbishment flange

All VarioGully models are
available with heating feature.



Transition piece
DN 70/DN 100

Range of application for FDT VarioGully components

- At warm and cold roof structures in vertical and angled version.
- Connection to downpipes DN 70, DN 100, DN 125 and DN 150 (OD 160).
- Flashing against roofing membranes Rhepanol fk, Rhepanol hg, Rhenofol and bituminous sheets with separate flashing collar. Other roofing membranes can be also flashed against with collars without fleece reinforcement.
- Corresponding warm roof extensions are available for insulation material thicknesses from 30 to 200 mm and 30 to 400 mm[1)]. Direct connection to all vapour control layers or roofing membranes, or with a separate preformed collar.
- If used as an emergency outlet/overflow for draining off 100-year rainfall, instead of the screw ring the emergency overflow socket is installed at the FDT VarioGully or the warm roof extension.
- National standards and regulations must be observed.

1) Other insulation material thicknesses on request.

Drainage calculation according to DIN EN 12056-3 and DIN 1986-100

Since DIN 1986-100, drainage systems have to be designed according to the individual object.

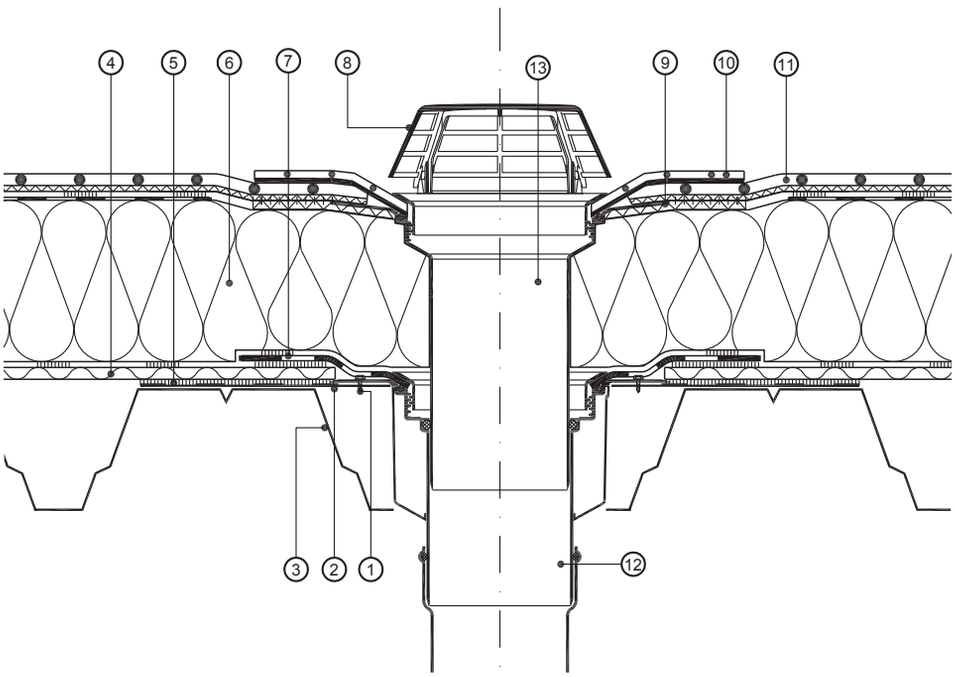
Upon request, calculations are carried out giving due consideration to design and 100-year rainfall as well as to the roof type and structure.

Please find our Service Form on page 37.

- National standards and regulations must be observed.

Installation example

FDT VarioGully vertical, DN 125 with warm roof extension



① Fastening (4 fasteners/FDT VarioGully)

② Metal stiffener

③ Profiled steel decking, corrosion protected

④ Vapour control layer

⑤ Cold bitumen pre-coating, according to specification

⑥ Thermal insulation layer, e. g. EPS, with bituminous felt backing

⑦ Vapour control collar

⑧ FDT gravel stop/leaf guard

⑨ Gripfix ring

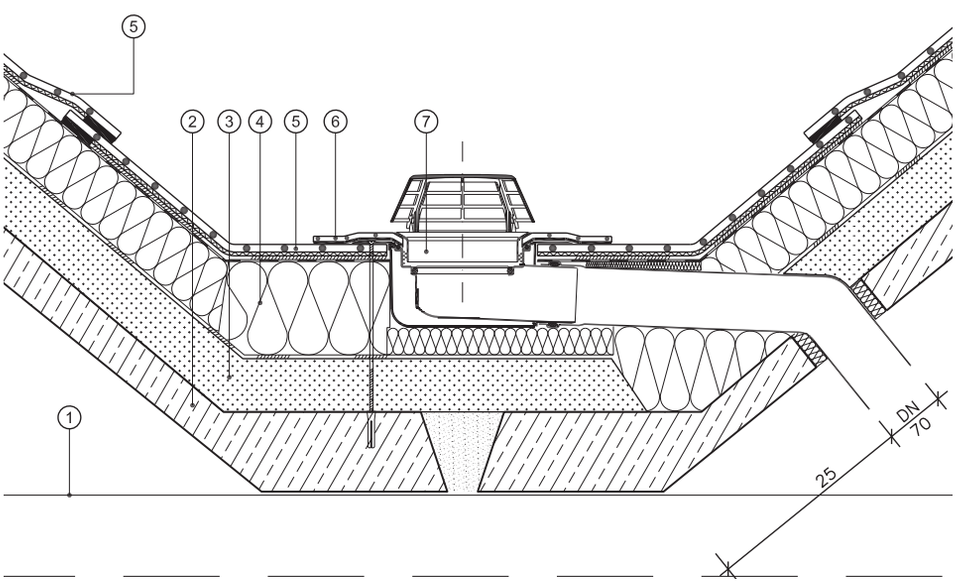
⑩ Rhepanol collar with self-sealing edge system

⑪ Roofing membrane Rhepanol fk, bonded with FDT roofing membrane adhesive

⑫ FDT VarioGully

⑬ FDT VarioGully warm roof extension

FDT VarioGully angled, DN 70 in a valley with Rhepanol fk



① Structure

② Precast concrete

③ Old roofing, e. g. consisting of a bituminous vapour control layer, 50 mm of thermal insulation layer and 3 layers of bituminous sheets

④ Additional EPS insulation, with bituminous felt backing V100

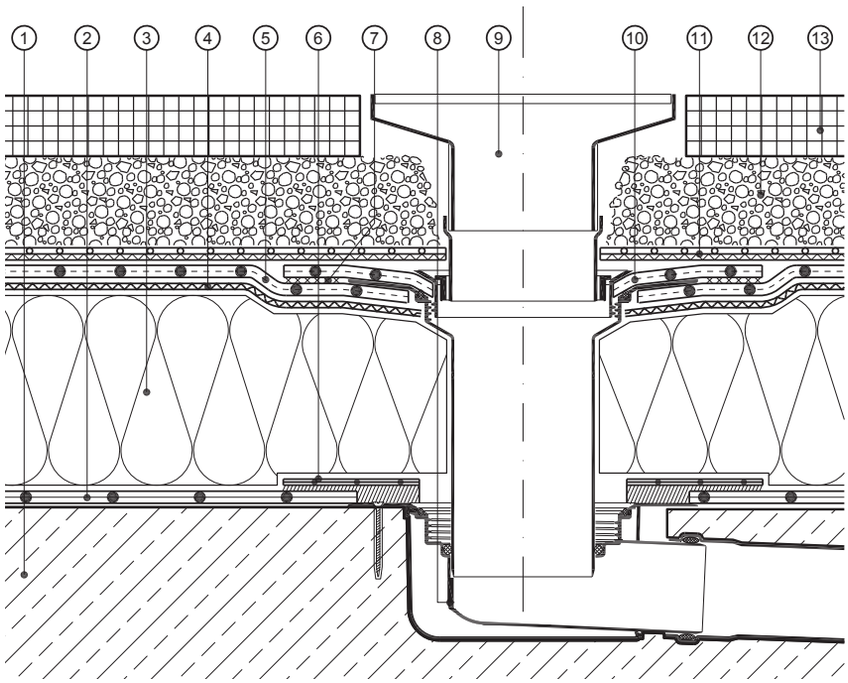
⑤ Roofing membrane Rhepanol fk, 1.05 m wide, bonded with FDT roofing membrane adhesive (horizontal) or Rhepanol contact adhesive 50 (sloped)

⑥ Rhepanol collar with self-sealing edge system

⑦ FDT VarioGully angled, DN 70

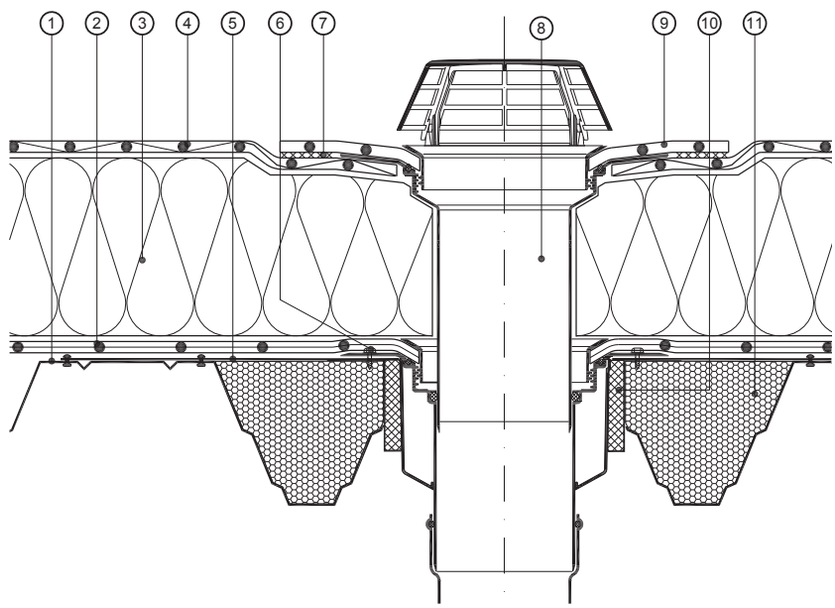
Installation example

FDT VarioGully angled, DN 70, with warm roof extension and terrace grate at a terrace with Rhenofol CG



① Reinforced concrete
② FDT vapour control layer PE
③ Insulation layer made of expanded polystyrene (EPS DAA dh), pressure-resistant
④ Separation layer FDT synthetic fleece 300 g/m²
⑤ Roofing membrane Rhenofol CG, 1.5 mm thick
⑥ FDT sealing tape for FDT vapour barrier PE
⑦ Welding
⑧ FDT VarioGully angled, DN 70 with FDT VarioGully warm roof extension
⑨ Terrace grate
⑩ Rhenofol collar
⑪ FDT protection layer
⑫ Fine gravel bed
⑬ Paving slabs

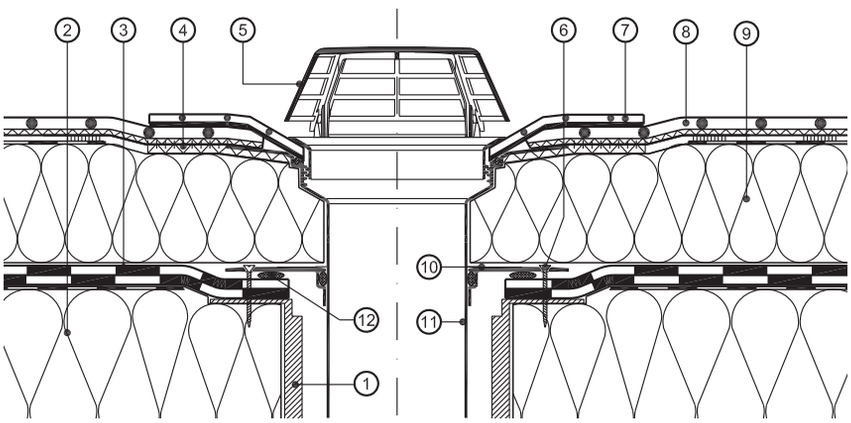
FDT VarioGully vertical, DN 100, with warm roof extension and fire protection collar (see VarioGully accessories) with Rhenofol CV



① Profiled steel decking, corrosion protected
② FDT vapour control layer PE
③ Mineral wool thermal insulation (MW)
④ Roofing membrane Rhenofol CV
⑤ Metal cover sheet (stiffening sheet) according to DIN 18807-3
⑥ Fastening (steel blind rivet) FDT fire protection collar FDT VarioGully
⑦ Welding
⑧ FDT VarioGully, DN 125, with FDT VarioGully warm roof extension
⑨ Rhenofol collar
⑩ FDT fire protection collar
⑪ Sealing, filler according to DIN 18234

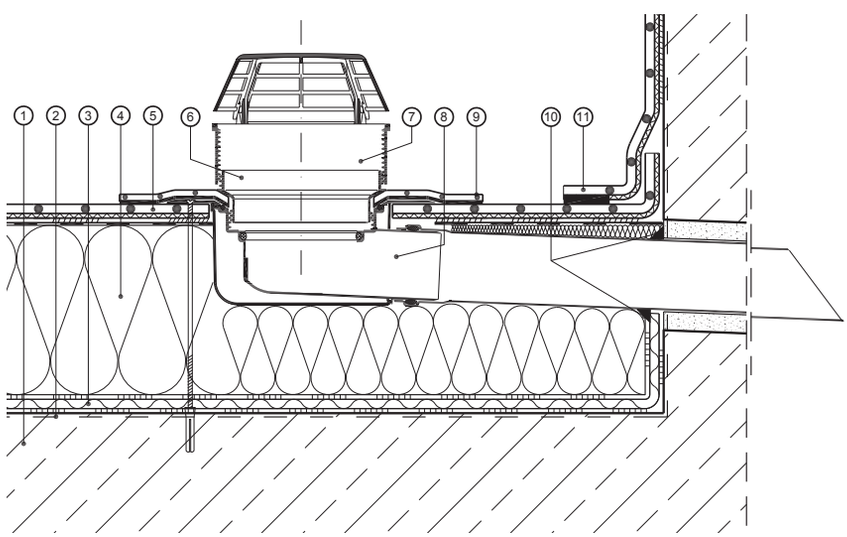
Installation example

FDT VarioGully refurbishment flange with Rhepanol fk



① Existing old roof rainwater outlet
② Existing thermal insulation
③ Old roof with bituminous sealing
④ Gripfix ring
⑤ FDT gravel stop/leaf guard
⑥ Fastening (6 fasteners) for FDT VarioGully refurbishment flange
⑦ Rhepanol fk collar with self-sealing edge system
⑧ Roofing membrane Rhepanol fk, bonded with FDT roofing membrane adhesive
⑨ New EPS thermal insulation layer bituminous felt backing
⑩ FDT VarioGully refurbishment flange
⑪ FDT VarioGully warm roof extension
⑫ Sealing cord

FDT VarioGully angled, DN 70,
with emergency overflow socket (see VarioGully accessories)
as emergency overflow in a valley with Rhepanol fk



① Reinforced concrete
② Cold bitumen pre-coating, as required
③ Vapour control layer
④ Thermal insulation layer, e. g. EPS, with bituminous felt backing
⑤ Roofing membrane Rhepanol fk, bonded with FDT roofing membrane adhesive
⑥ FDT emergency overflow socket bottom
⑦ FDT emergency overflow socket top
⑧ FDT VarioGully angled, DN 70
⑨ Rhepanol fk collar with self-sealing edge system
⑩ Sealant
⑪ Rhepanol fk flashing strip

Installation instruction
FDT VarioGully, one-stage outlet, or for body in case of two-stage outlet

Installation order

- Roof opening: Ø 200 mm (rainwater outlet angled, DN 125, 200x280 mm or rainwater outlet angled, DN 70/100, 200x250 mm).
- Fasten the FDT VarioGully to the supporting deck (4 fasteners/rainwater outlet vertical, 3 fasteners/rainwater outlet angled).
- For roof sealings with Rhepanol fk, place the Gripfix ring below the flange.
- Check the correct position of the oval gasket below the screw ring (backflow prevention).
- Flashing against roofing membranes and vapour control layers as follows:

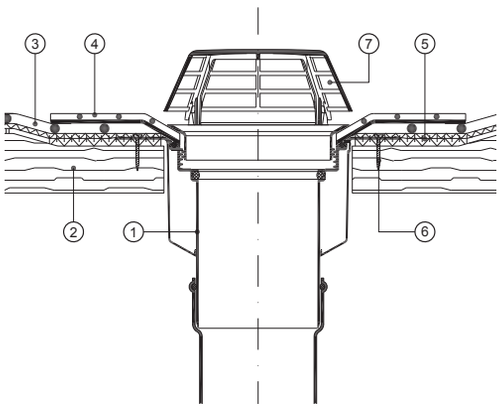
For roofing membranes Rhepanol fk and Rhepanol fk hot air weldable
The outlet body is installed together with the Gripfix ring, then the roofing membrane is rolled out over the FDT VarioGully; at the run-in area it is cut out by at least 10 mm wider than the screw ring. Then the collar (Rhepanol fk or Rhepanol fk hot air weldable) is put onto the screw ring, which is then screwed into the FDT VarioGully and tightened properly. Flashing against the roofing membrane is carried out with the corresponding flashing collar, with Rhepanol fk by self-sealing edge connection and with Rhepanol fk with welding edge by hot air welding.

For roofing membranes Rhepanol hg and Rhenofol CV/CG:
The roofing membrane is rolled out over the opening for the rainwater outlet and is cut out for placing the FDT VarioGully or the warm roof extension. Then the FDT VarioGully or the warm roof extension is installed. Afterwards, the collar (Rhepanol h or Rhepanol C) is put onto the screw ring, which is then screwed into the FDT VarioGully and tightened properly. Flashing against the roofing membrane is carried out with the corresponding flashing collar by hot air welding.

For bituminous sheets:
The outlet flange is placed on the underlying sheet heated with a torch and then pressed on. The collar is mounted to the FDT VarioGully with the screw ring and welded to the under lying sheet. Then the upper sheet is rolled out and cut out approximately 20 mm around the FDT screw ring. The sheet is rolled back and then welded on.

Flashing against vapour control layers:
Method 1:
The FDT VarioGully is placed on the vapour control layer through an approx. 190 mm wide cut-out, and the flange is connected with a butyl sealing tape.
Method 2:
The vapour control layer is rolled out over the FDT VarioGully, then the screw ring is put into place; the cut-out is marked along its inner edge. After cutting out, the vapour control layer is flashed with the screw ring.
Method 3:
The flashing against bituminous vapour control layers with a collar is carried out as described above at **"For bituminous sheets".**

- Place the FDT gravel stop/leaf guard on the retaining lugs and click into place.

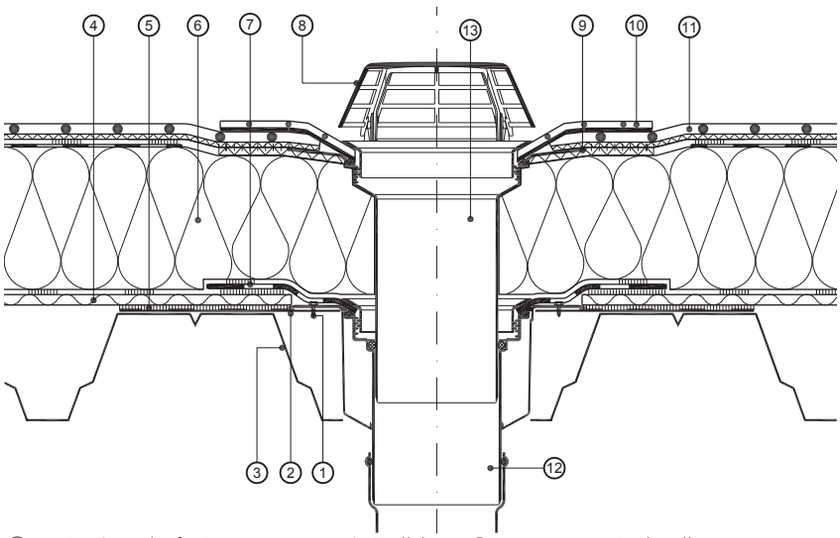


① FDT VarioGully
② Supporting deck
③ Roofing membrane Rhepanol fk
④ Rhepanol collar with self-sealing edge system with
⑤ Gripfix ring for fixing roofing membranes
⑥ Fastening (4 fasteners/ rainwater outlet)
⑦ FDT gravel stop/leaf guard

Installation instruction
FDT VarioGully warm roof extension for two-stage outlet
FDT VarioGully refurbishment flange

Installation order
FDT VarioGully warm roof extension for two-stage outlet

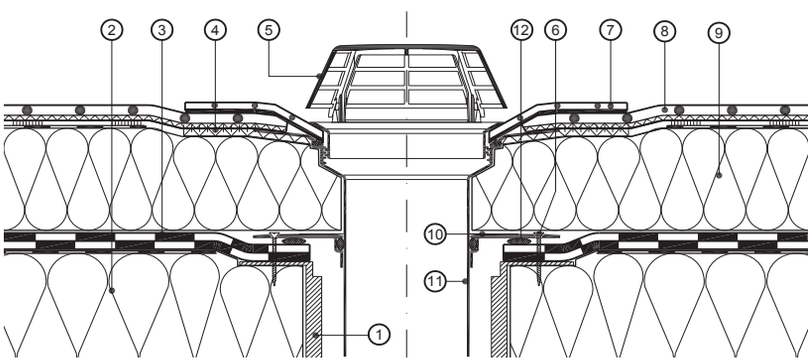
- Cut out the thermal insulation above the FDT VarioGully at a diameter of 120 mm and chamfer the run-in area in the thermal insulation.
- Apply lubricant (enclosed) to the FDT roll ring in the FDT VarioGully and insert the FDT VarioGully warm roof extension.
- Then flash the roofing membrane according to the one-stage version (see description at page 19).



① Fastening (4 fasteners/FDT VarioGully)
② Metal stiffener
③ Profiled steel decking, corrosion protected
④ Vapour control layer
⑤ Cold bitumen pre-coating, as required
⑥ Thermal insulation layer, e. g. EPS, with bituminous felt backing
⑦ Vapour control collar
⑧ FDT gravel stop/leaf guard
⑨ Gripfix ring
⑩ Rhepanol collar with self-sealing edge system
⑪ Roofing membrane Rhepanol fk, bonded with FDT roofing membrane adhesive
⑫ FDT VarioGully DN 125
⑬ FDT VarioGully warm roof extension

Installation order
FDT VarioGully refurbishment flange

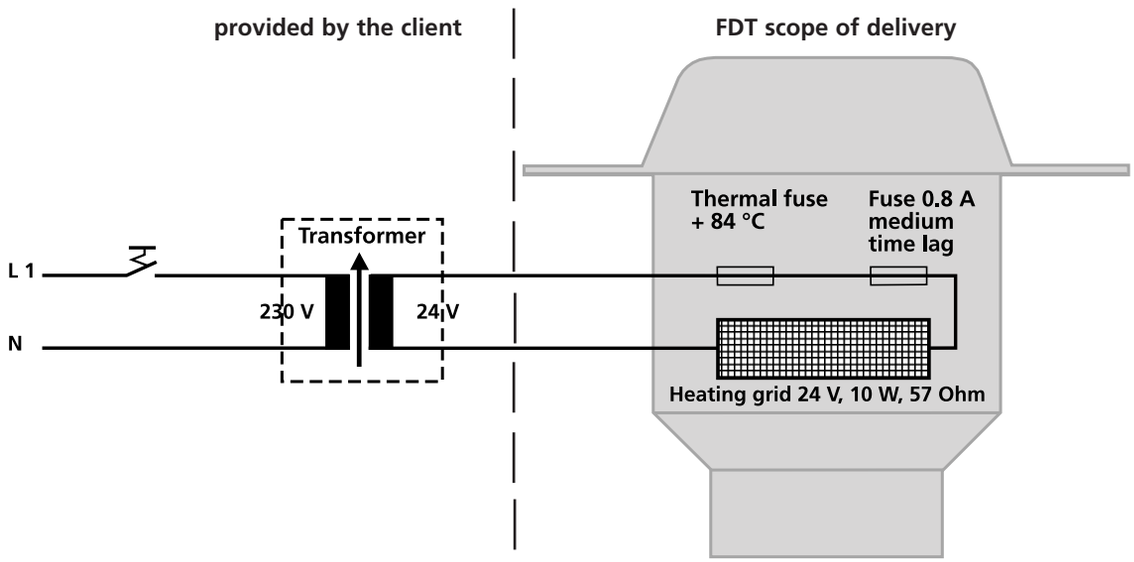
- The run-in area of the old rainwater outlet must have a diameter of min. 137 mm and max. 210 mm.
- The old roof sealing or collar must be securely connected with the old rainwater outlet allowing no water ingress.
- The upper side of the old rainwater outlet must be dry and free of dust or loose material.
- Apply the sealing cord on the lower side of the flange at FDT VarioGully refurbishment flange in the range of the mounting holes (Ø 220 mm).
- For roofing membrane Rhepanol fk, cut out the inner diameter of the Gripfix ring at Ø 240 mm.
- Fasten the FDT VarioGully refurbishment flange with the six screws to the flange of the old rainwater outlet.
- Installation and flashing against the FDT VarioGully warm roof extension as described above.



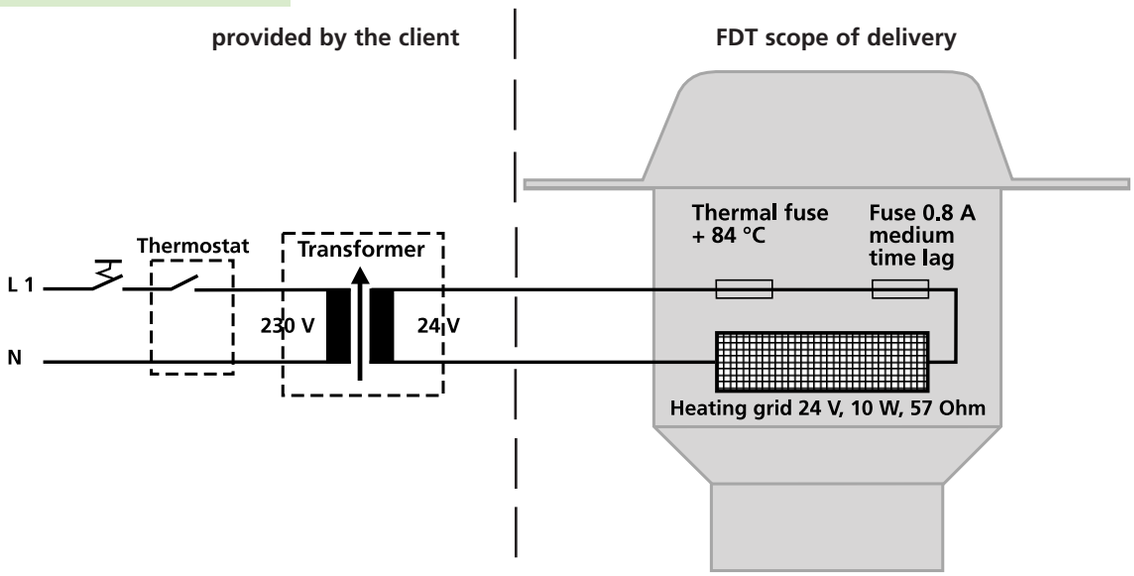
① Existing old roof rainwater outlet
② Existing thermal insulation
③ Old roof with bituminous sealing
④ Gripfix ring
⑤ FDT gravel stop/leaf guard
⑥ Fastening (6 fasteners)
⑦ Rhepanol fk collar with self-sealing edge system
⑧ Roofing membrane Rhepanol fk, bonded with FDT roofing membrane adhesive
⑨ New thermal insulation
⑩ FDT VarioGully refurbishment flange
⑪ FDT VarioGully warm roof extension
⑫ Sealing cord

Wiring diagrams for heatable FDT VarioGully
Installation suggestions

1. Simple on/off circuit



2. Thermostat controlled



Depending on the capacity of the transformer provided by the client, several FDT rainwater outlets VarioGully can be connected. The capacity of the transformer should be loaded only up to approx. 80%.

Example: With a transformer capacity of 100 VA max. 8 FDT rainwater outlets VarioGully can be connected.

Attention:

Any work on connections may only be performed by qualified electricians.

Product range FDT VarioGully

Product name	Design	Nominal width
FDT VarioGully vertical	With thermal insulation, with FDT gravel stop/leaf guard. Reducer DN 125/100 included as standard. Drainage rate is equivalent to DN 125 or DN 100 when using the included reducer (DN 125/100).	DN 125 and DN 100
FDT VarioGully vertical, heatable	With thermal insulation, with FDT gravel stop/leaf guard. Reducer DN 125/100 included as standard. Drainage rate is equivalent to DN 125 or DN 100 when using the included reducer (DN 125/100). Connection 24 V, 10 W.	DN 125 and DN 100
FDT VarioGully vertical, DN 150 (OD 160)	With thermal insulation, with FDT gravel stop/leaf guard. Drainage rate is equivalent to DN 150.	DN 150 (OD 160)
FDT VarioGully vertical, DN 150 (OD 160), heatable	With thermal insulation, with FDT gravel stop/leaf guard. Drainage rate is equivalent to DN 150. Connection 24 V, 10 W.	DN 150 (OD 160)
FDT VarioGully angled	With thermal insulation, with FDT gravel stop/leaf guard. Constructional height 110 mm, drainage rate is equivalent to DN 70 or DN 100 when using the included transition piece (DN 70/100).	DN 70 and DN 100
FDT VarioGully angled, heatable	With thermal insulation, with FDT gravel stop/leaf guard. Constructional height 110 mm, drainage rate is equivalent to DN 70 or DN 100 when using the included reducer (DN 70/100). Connection 24 V, 10 W.	DN 70 and DN 100
FDT VarioGully angled	With thermal insulation, with FDT gravel stop/leaf guard. Drainage rate is equivalent to DN 125.	DN 125
FDT VarioGully angled, heatable	With thermal insulation, with FDT gravel stop/leaf guard. Drainage rate is equivalent to DN 125. Connection 24 V, 10 W.	DN 125
FDT VarioGully warm roof extension	Fits all FDT VarioGully bodies. For snapping on at single-shell, non-ventilated roofs (warm roof). For insulation material thicknesses: from 30 mm to 200 mm, from 30 mm to 400 mm*).	
FDT VarioGully refurbishment flange	With sealing cord, 6 screws and FDT gravel stop/leaf guard for refurbishment with additional insulation in combination with FDT VarioGully warm roof extension.	up to DN 150

*) Special lengths for larger insulation material thicknesses on request.

Note:
As for application possibilities and handling, please see our manufacturer's application instructions.

Technical data
Drainage rate FDT VarioGully

Drainage rate FDT VarioGully vertical (l/s)

Ponding height (mm)	DN 70	DN 70 with WRE	DN 70 with WRE and EOS	DN 100	DN 100 with WRE	DN 100 with WRE and EOS	DN 125	DN 125 with WRE	DN 125 with WRE and EOS	DN 150	DN 150 with WRE	DN 150 with WRE and EOS
5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
15	2.3	2.5	2.6	2.3	2.3	2.6	2.2	2.2	2.5	2.3	2.5	2.6
25	4.1	4.5	4.5	4.0	4.3	4.4	3.9	3.9	4.4	3.9	4.5	4.8
35	6.9	7.5	7.0	6.9	7.2	7.2	6.9	7.0	7.2	6.9	7.3	7.3
45	9.2	10.2	9.1	9.2	9.6	9.6	9.2	9.6	9.6	9.3	10.0	9.6

Drainage rate FDT VarioGully angled (l/s)

Ponding height (mm)	DN 70	DN 70 with WRE	DN 70 with WRE and EOS	DN 100	DN 100 with WRE	DN 100 with WRE and EOS	DN 125	DN 125 with WRE	DN 125 with WRE and EOS
5	0.6	0.7	0.6	0.6	0.5	0.6	0.5	0.6	0.5
15	2.3	2.7	2.6	2.0	2.3	2.7	2.3	2.4	2.4
25	3.1	4.3	4.5	3.8	4.1	4.9	4.2	4.4	4.4
35	6.0	7.4	7.0	5.2	6.0	6.9	6.8	7.2	7.2
45	8.0	10.0	9.1	5.4	6.2	7.2	9.1	9.6	9.2

Abbreviations:
WRE = warm roof extension
EOS = emergency overflow socket

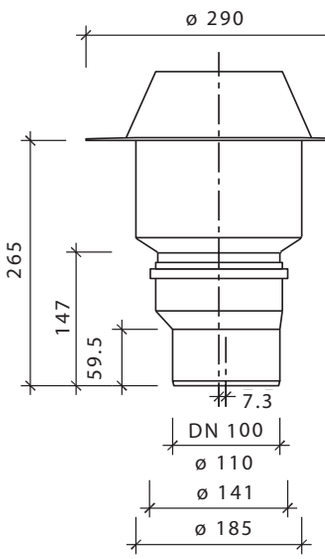
Drainage rate FDT VarioGully with terrace grate (l/s)

	vertical				angled		
Ponding height (mm)	DN 70	DN 100	DN 125	DN 150	DN 70	DN 100	DN 125
5	0.5	0.7	0.7	0.7	0.5	0,6	0,6
10	1.2	1.7	1.7	1.7	1.2	1.5	1.5
15	2.3	2.7	2.7	2.7	2.3	2.5	2.5
20	3.1	3.7	3.7	3.7	3.1	3.5	3.5
30	5.1	6.0	6.0	6.0	5.1	5.1	5.1
40	5.6	8.0	8.0	8.0	5.6	5.6	5.6

FDT VarioGully dimensions

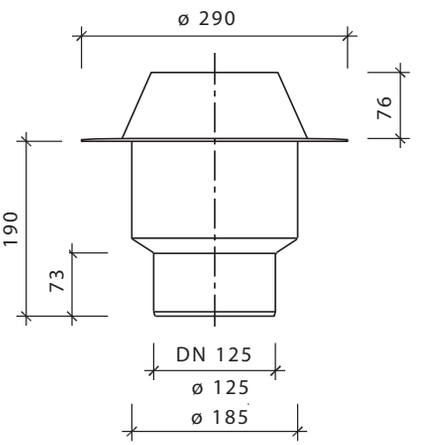
Dimensions in mm

FDT VarioGully vertical, DN 100



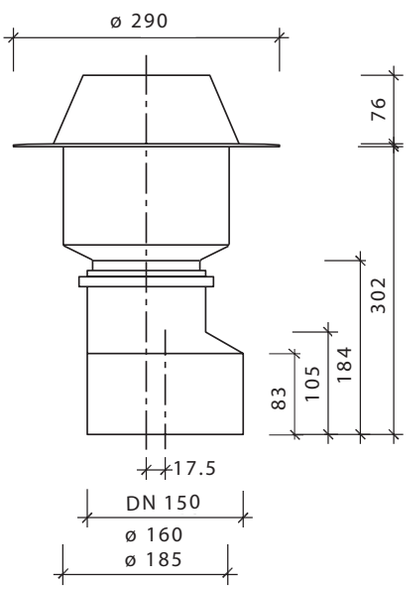
Roof opening
ø 200 mm

FDT VarioGully vertical, DN 125



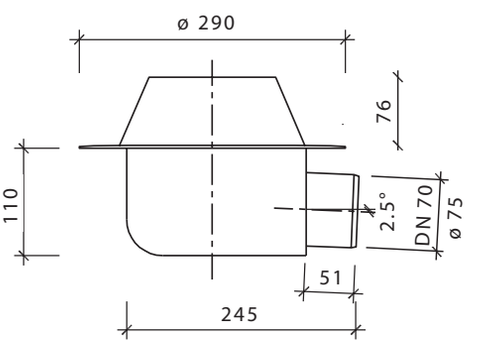
Roof opening
ø 200 mm

FDT VarioGully vertical, DN 150



Roof opening
ø 200 mm

FDT VarioGully angled, extremely flat, DN 70

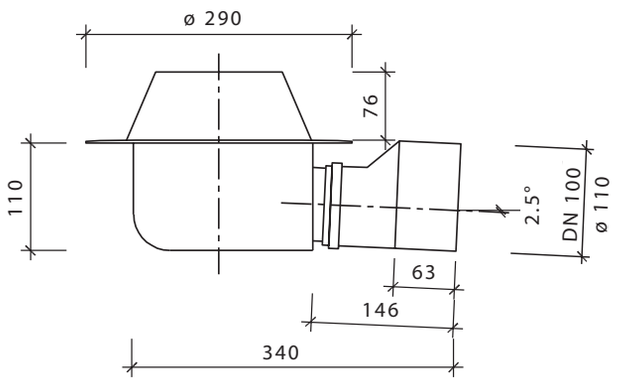


Roof opening
200 x 250 mm

FDT VarioGully dimensions

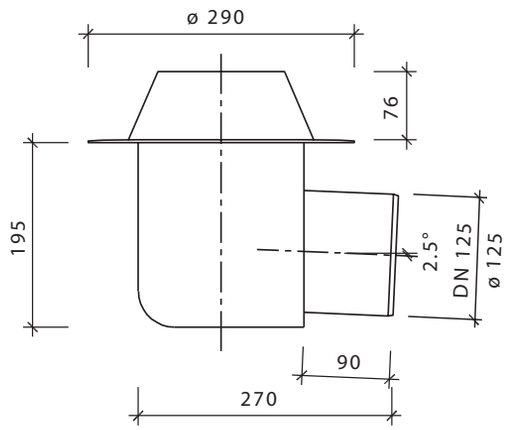
Dimensions in mm

FDT VarioGully angled, DN 100



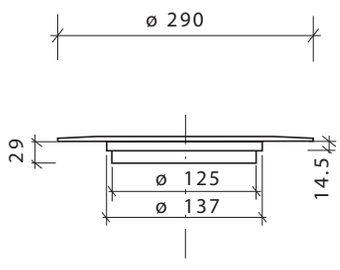
Roof opening
200 x 350 mm

FDT VarioGully angled, DN 125

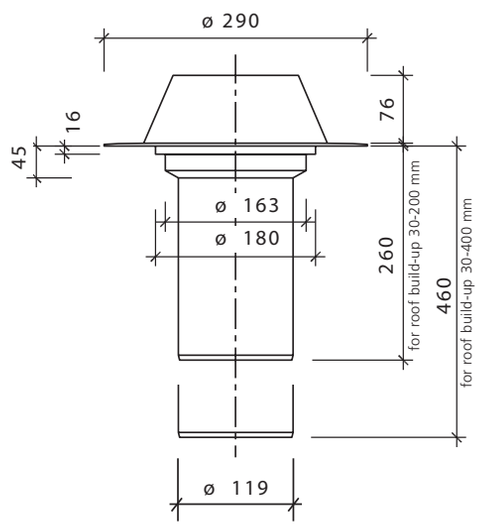


Roof opening
200 x 280 mm

FDT VarioGully refurbishment flange



FDT VarioGully warm roof extension



FDT VarioGully accessories

FDT collars for FDT VarioGully

- For flashing against Rhepanol fk roofing membranes grey or black with self-sealing edge system (outer diameter 350 mm), including Gripfix ring, Rhepanol hg (outer diameter 350 mm), Rhenofol (outer diameter 350 mm) and bitumen (outer diameter 500 mm).
  The inner diameter is 155 mm, adapted to the screw ring.

FDT reducer DN 125/70

- For connecting the FDT VarioGully vertical DN 125 to downpipes DN 70, including sealing ring.

FDT emergency overflow socket for FDT VarioGully

- Ensures simple modification of all FDT rainwater outlets VarioGully for use as emergency overflows.
  Drainage rate see Technical data, p. 24.
- As a standard, the ponding height is 50 or 110 mm respectively; the socket can be freely cut to the required ponding height.

FDT terrace grate

- Made of aluminium with lift ring. For application on flat roofs with paving slabs and on inverted roofs.
- The installation height of 67 to 90 mm can be adapted to the terrace structure in steps of 3 mm.
- With a slab height of 90 mm or more, additional lift rings will be necessary. Every additional lift ring gives 36 mm more height.
- External dimensions of the grate:
  approx. 200 x 200 mm.

FDT VarioGully accessories

FDT fire protection collar for FDT VarioGully

- As a fire-retarding sealing for supporting decks according to the industrial building guideline or DIN 18234.

FDT screwing tool

- Tool for easy and reliable installation of the screw ring at FDT VarioGully, warm roof extension and rainwater outlet for refurbishment.

Spare parts for FDT VarioGully

- FDT gravel stop/leaf guard.
- FDT screw ring (no fig.).
- FDT oval sealing ring (no fig.).
- FDT roll ring (no fig.).

FDT RWE (rainwater outlet)
FDT water spout
FDT emergency overflow

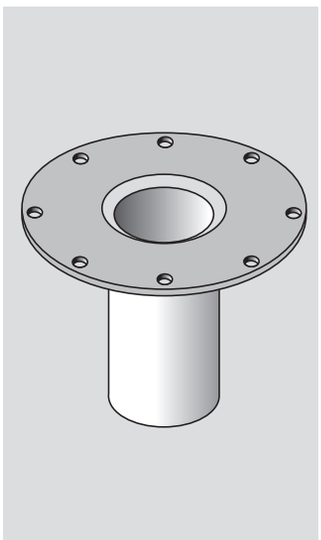
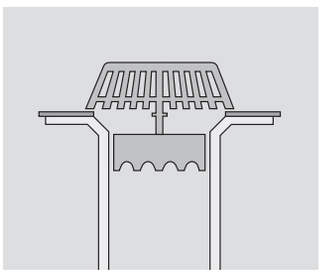
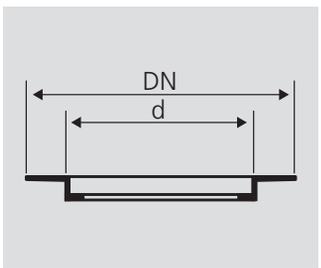
Important

The application of rainwater and emergency outlets is particularly recommended on small areas, for refurbishment and in special cases. FDT rainwater and emergency outlets can be directly flashed against Rhepanol fk with Rhepanol cover tape, against Rhepanol hg by hot air welding, against Rhenofol by hot air or solvent welding.

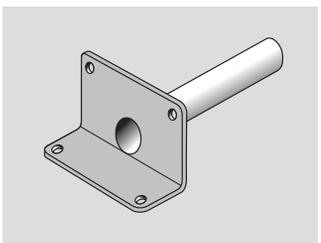
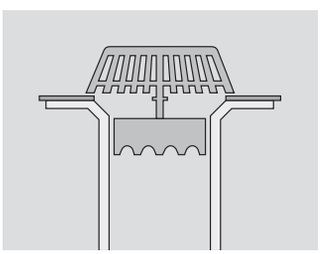
Attention

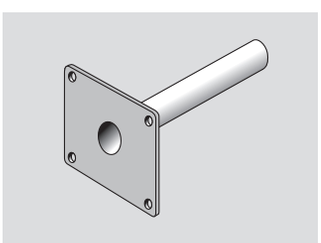
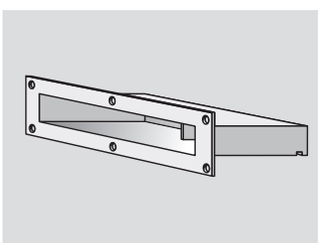
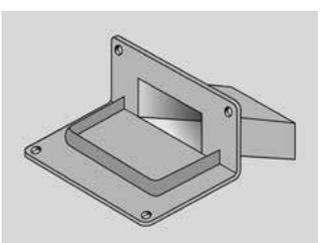
Prior to connecting, the flange surfaces must be cleaned using appropriate cleaning agents!

FDT RWE (rainwater outlet)

Product name	Dimension in mm	Colour		Properties/application
FDT rainwater outlet (RWE)	External diameter d			Built-in element for very simple installation. An ideal solution e. g. when it comes to upgrading a roof during refurbishment. The FDT rainwater outlet can be installed in the existing opening in no time at all.
Rhepanol RWE 50	50	beige		
Rhepanol RWE 56	56	beige		
Rhepanol RWE 63	63	beige		
Rhepanol RWE 75	75	beige		
Rhepanol RWE 95	95	beige		
Rhepanol RWE 110	110	beige		
Rhepanol RWE 125	125	beige		
Rhepanol RWE 140	140	beige		
Rhepanol RWE 160	160	beige		
Rhenofol RWE 50	50	light grey		
Rhenofol RWE 56	56	light grey		
Rhenofol RWE 63	63	light grey		
Rhenofol RWE 75	75	light grey		
Rhenofol RWE 95	95	light grey		
Rhenofol RWE 110	110	light grey		
Rhenofol RWE 125	125	light grey		
Rhenofol RWE 140	140	light grey		
FDT leaf guard				The leaf guard fits all RWE and can be cut to the corresponding diameter.
FDT lip seal for:	pipe diameter			The FDT lip seals are suitable for installation without back-flow with all RWE as well as for installation directly into the downpipe or old rain-water outlets.
Rhepanol RWE 95	DN 100			
Rhepanol RWE 95	DN 125			
Rhepanol RWE 125	DN 150			
Rhepanol RWE 160	DN 200			
Rhenofol RWE 95	DN 100			
Rhenofol RWE 95	DN 125			
Rhenofol RWE 125	DN 150			
Rhenofol RWE 160	DN 200			

FDT water spout
FDT emergency overflow

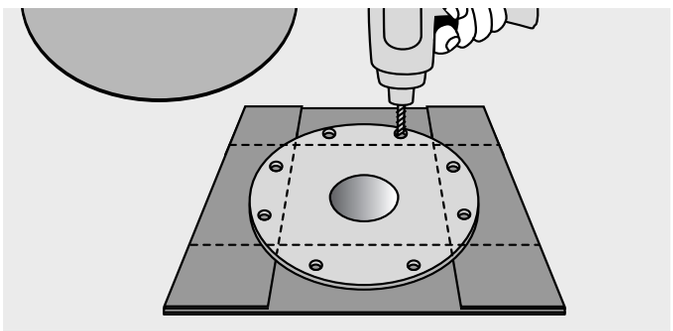
Product name	Dimensions in mm	Colour		Properties/application
FDT water spout	External diameter d			When waterproofing e. g. terraces, canopies and garages, the FDT water spout can be installed for collecting and draining heavy precipitation.
Rhepanol water spout 50	50	beige		
Rhepanol water spout 75	75	beige		
Rhepanol water spout 110	110	beige		
Rhenofol water spout 50	50	light grey		
Rhenofol water spout 75	75	light grey		
Rhenofol water spout 110	110	light grey		
FDT leaf guard		black		In addition to all FDT RWE, the leaf guard is also suitable for FDT water spouts and the spigot-type FDT emergency overflow: In this case, the leaf guard must be adapted individually.

Product name	Dimensions in mm	Colour		Properties/application
FDT emergency overflow	External diameter d			When installed in a sufficient number, FDT emergency overflows provide complete drainage of the rainwater from the whole roof or individual roof areas. Two types are available: spigot-type for smaller roof areas (no fig.) or a sink-type for larger roof areas (see lower fig.).
Rhepanol emergency overflow 75	75	beige		
Rhepanol emergency overflow 110	10	beige		
Rhepanol emergency overflow 600 x 100[1)]		beige		
Rhepanol emergency overflow, water spout, special type[1)]		beige		
Rhenofol emergency overflow 75	75	light grey		
Rhenofol emergency overflow 110	10	light grey		
Rhenofol emergency overflow, 600 x 100[1)]		dark grey		
Rhenofol emergency overflow, water spout, special type[1)]		dark grey		
FDT emergency overflow plus				FDT emergency overflow plus with extremely high drainage rate or narrow spigot width.
Rhepanol emergency overflow plus[1)]				
Rhenofol emergency overflow plus[1)]				

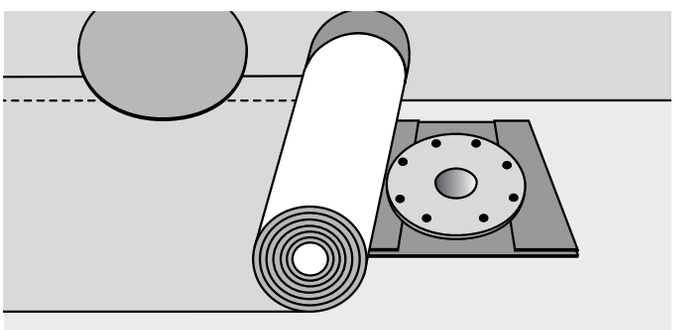
[1)] At sink-type emergency overflows: internal size + 10 mm = external size

Installation instruction for flashing against Rhepanol fk:
Rhepanol RWE (rainwater outlet)
Rhepanol water spout
Rhepanol emergency overflow

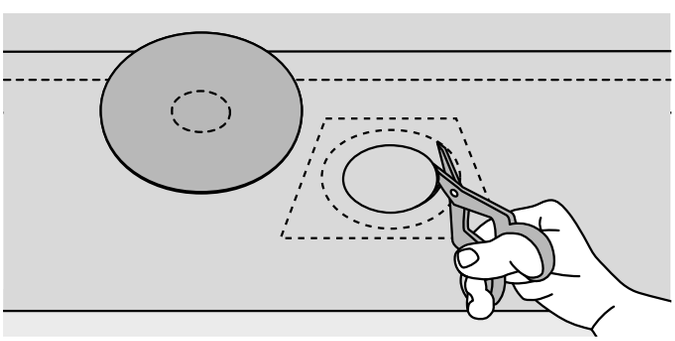
Put the FDT rainwater outlet in place and screw it to the substrate, with (4) Gripfix strips placed under the flange by half.
Alternatively:
Bond Rhepanol fk to the flange with Rhepanol contact adhesive 50.



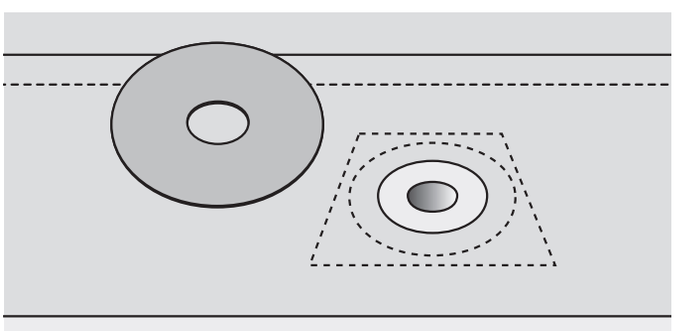
Align and unroll the roofing membrane.



Cut out Rhepanol fk 10 cm wider than the outlet diameter.

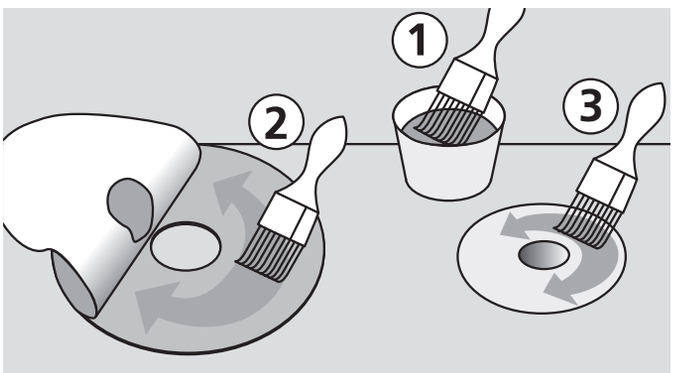


Cut to size the Rhepanol fk collar.

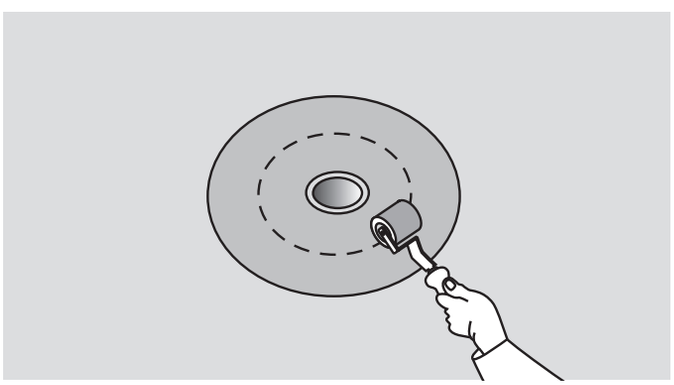


Installation instruction for flashing against Rhepanol fk:
Rhepanol RWE (rainwater outlet)
Rhepanol water spout
Rhepanol emergency overflow

First apply solvent welding agent to the self-sealing edge side of the Rhepanol fk collar Universal, then immediately to the flange of the Rhepanol RWE, using a brush.



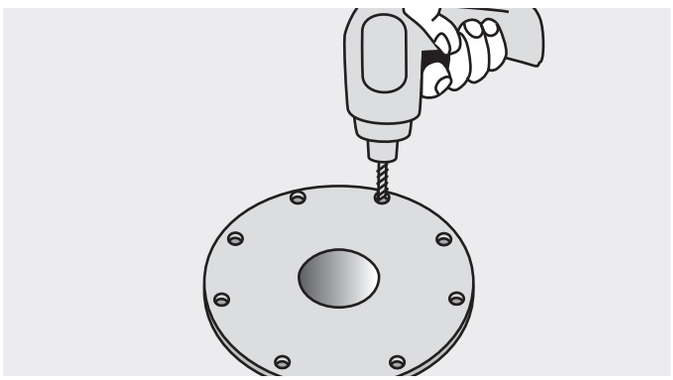
After airing (until the flange has become dry/ matt), place the collar and roll it on firmly.



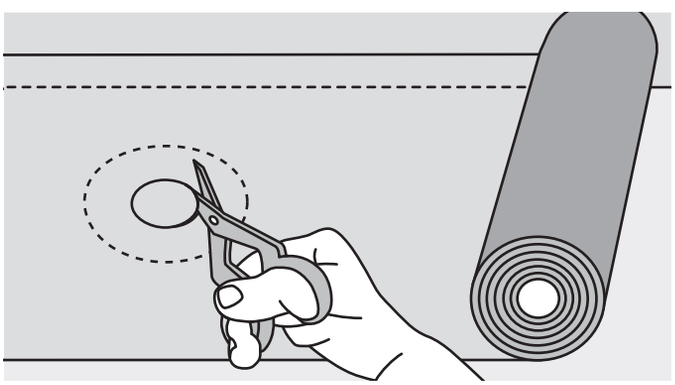
Flashing of **Rhepanol water spouts and Rhepanol emergency overflows** to Rhepanol fk is carried out the same way. Instead of the collar Universal, Rhepanol cover tape may be used as well.

Installation instruction for flashing against Rhepanol hg:
Rhepanol RWE (rainwater outlet)
Rhepanol water spout
Rhepanol emergency overflow

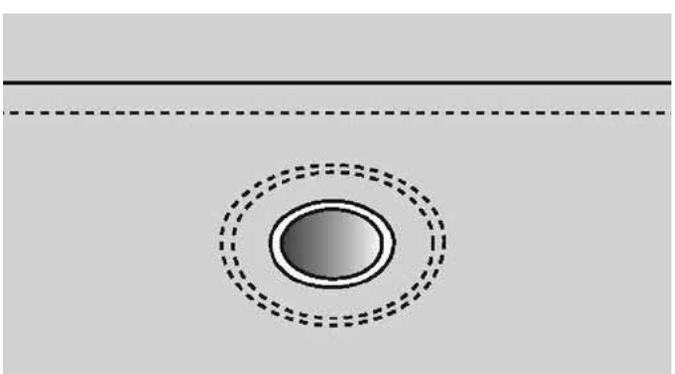
Install and fasten **Rhepanol RWE**.



Roll out the roofing membrane, mark and cut out the central opening Ø 200 mm. Clean the seam area with Rhepanol h seam cleaner.



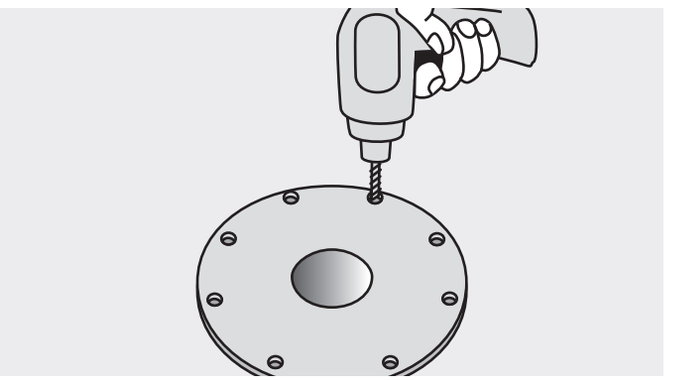
Hot-air weld the roofing membrane to the flange.



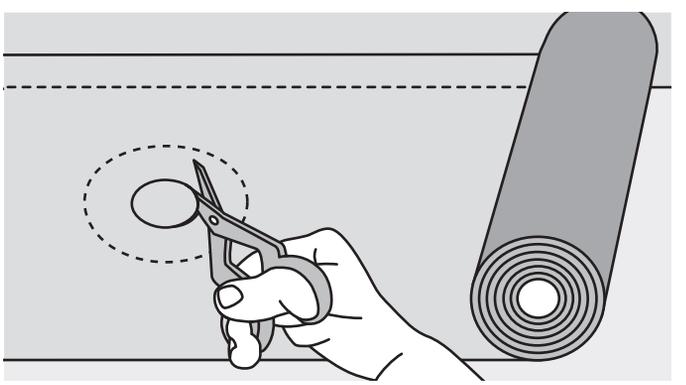
Flashing of **Rhepanol water spouts** and **Rhepanol emergency overflows** to Rhepanol hg is carried out the same way.

Installation instruction for flashing against Rhenofol:
Rhenofol RWE (rainwater outlet)
Rhenofol water spout
Rhenofol emergency overflow

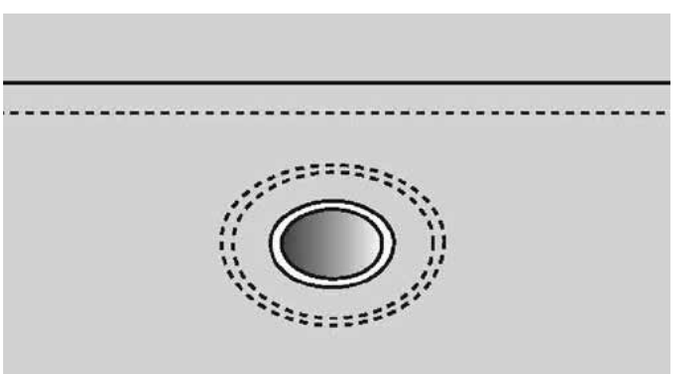
Install and fasten **Rhenofol RWE**.
Clean the flange with Rhenofol thinner D.



Roll out the roofing membrane, mark and cut out the central opening Ø 200 mm.



Weld the roofing membrane to the flange.



Flashing of **Rhenofol water spouts** and **Rhenofol emergency overflows** to Rhenofol is carried out the same way.


Service
Forms

Request for drainage equipment calculation for FDT VarioGully

(Please copy and fill in this form and send it by fax to FDT: +49 621-8504-445)

Drainage equipment calculation for buildings with international drainage according to DIN 1986-100:

Building project:

Project name: _____

Address: _____

City: _____

Intensity of rainfall:

Design rainfall: _____ l/s per ha (statistic 5-min. rain every 5 years)

Centennial rain: _____ l/s per ha (statistic 5-min. rain every 100 years)

Downpipes:

Building width: _____ m

Building length: _____ m

Number of valleys: _____ units

Roof slope: _____ ° or _____ %

Roof type:
- ☐ Without ballast
- ☐ With ballast/extensive green roof ≤100 mm
- ☐ Extensive/intensive green roof ≥100 mm

Valleys/gutters:

Valleys/gutters are irregularly distributed.

Roof area	Valley 1	Valley 2	Valley 3	Valley 4	Valley 5	Valley 6
Length [m]						
Width [m]						

Emergency drainage:

The emergency drainage system for centennial rain is to be designed with:
- ☐ Emergency outlets
- ☐ Parapet slots

The available load reserve for the water pressure _____ kN/m²

resp. maximum overflow height _____ mm

Please send the results to:

First name/Last name: _____ Company: _____

Street, No./P.O. Box: _____ Postal code/City: _____

Telephone/fax: _____ E-Mail: _____

Place/date Signature

Order form for FDT emergency overflow, FDT water spout and FDT emergency overflow plus as special types

(Please copy and fill in this form and send it by fax to FDT: +49 621-8504-445)

Orderer / client:

Company: _____

Mr / Mrs: _____

Address / P.O.Box: _____

Postal code / City: _____

Telephone: _____

Fax: _____

E-Mail: _____

Place / Date: _____

Signature: _____

Delivery to site:

Project name: _____

Address / P.O.Box: _____

Postal code / City: _____

Contact person Mr / Mrs: _____

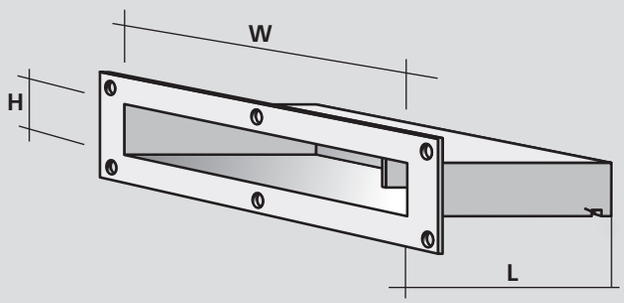
Telephone: _____

Fax: _____

E-Mail: _____

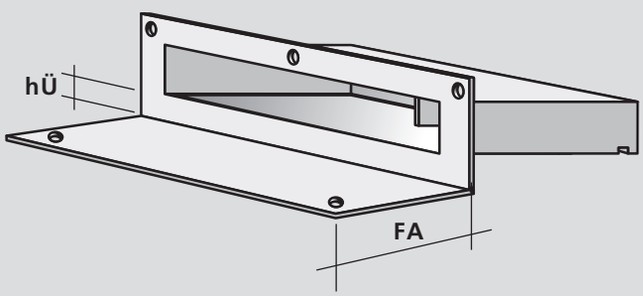
FDT emergency overflow, FDT water spout and FDT emergency overflow plus (special types)

FDT emergency overflow

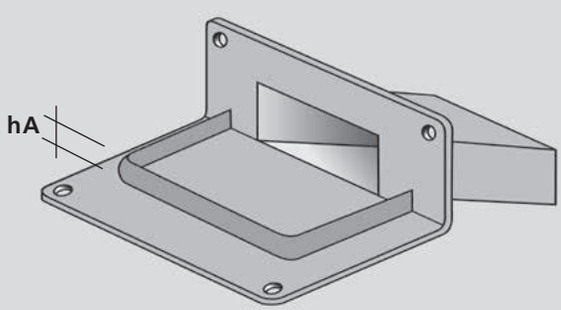


Intake opening **H**, **W**, spigot length **L**

FDT emergency overflow or FDT water spout



FDT emergency overflow plus



The following applies for all FDT emergency overflows listed here:
intake opening + 10 mm = external size of the rectangular outlet spigot.

Standard size:	**Required size:**
W = 600 mm	**W** = _____ mm
H = 100 mm	**H** = _____ mm
L = 400 mm	**L** = _____ mm
Spigot incline 2°	Spigot incline _____ °
Flange width:	Flange width:
right 80 mm	right _____ mm
left 80 mm	left _____ mm
top 80 mm	top _____ mm
bottom 50 mm	bottom _____ mm

For **FDT emergency overflow with angled flange or FDT water spout:**

Flange width: **FA** _____ mm

Height to overflow edge: **hÜ** _____ mm

For **FDT water spouts** please indicate 0 mm.

For **FDT emergency overflow plus**

Height of the ponding edge: **hA** _____ mm

☐ **FDT emergency overflow special type** for Rhepanol qty: _____

☐ **FDT water spout special type** for Rhepanol qty: _____

☐ **FDT emergency overflow plus** for Rhepanol qty: _____

☐ **FDT emergency overflow special type** for Rhenofol qty: _____

☐ **FDT water spout special type** for Rhenofol qty: _____

☐ **FDT emergency overflow plus** for Rhenofol qty: _____

Note on ordering:
Special type items cannot be taken back!

External quality control - Certificates

TÜV Rheinland LGA Products GmbH
Sanitär- und Abscheidetechnik

DAP-PL-1524.23 Durch die DAP Deutsches Akkreditierungssystem Prüfwesen GmbH akkreditiertes Prüflaboratorium
Zertifiziert nach DIN EN ISO 9001/14001

TÜVRheinland

LGA-Certificate No. 7381036
LGA-Certificate: Type tested and monitored

Holder of certificate and Manufacturer: FDT Flachdach Technologie GmbH & Co. KG
Eisenbahnstraße 6 - 8
68199 Mannheim

Manufacturing plants: 1) as above Mannheim Neckarau

2) Monier Roofing Components
Neustraße 10
65375 Oestrich-Winkel

Products: Roof outlets VARIO GULLY
DN 70 - DN 150
with extension and adapter made of PVC
gravel guard made of PP and grating made of Al

The above mentioned products have been tested according to the standard for approval and are regularly third party controlled. They are in accordance with the requirements of DIN EN 1253-1: 2003-09.

The detailed results of the regular inspection 2011 in the manufacturing plant are shown in the test report No. 7311036-02 of the TRLP.

This certif… 2013.

…e above mentioned products with the LGA-sign "Type-tested and moni-

…bscheider

LGA Type-tested and monitored guaranteed with tested quality

…13036-03.doc
…zburg •
…com •

Seite 2 von 2
Sitz und Registergericht Nürnberg HRB 26013
Geschäftsführer: Dipl.-Ing. Jörg Mähler, Sprecher
Dipl.-Kfm. Dr. Jörg Schlösser

VDE Prüf- und Zertifizierungsinstitut
VDE VERBAND DER ELEKTROTECHNIK ELEKTRONIK INFORMATIONSTECHNIK e.V.

ZERTIFIKAT
CERTIFICATE

für die überwachte Fertigungsstätte
for the approved Place of Manufacture

FDT Flachdach Technologie GmbH & Co. KG
Eisenbahnstrasse 6-8
68199 Mannheim

Die Überwachung erfolgt nach dem Harmonisierten Werksinspektions-Verfahren - Anforderungen ICIG 021 bis 024). Die Anforderungen wurden erfüllt:

This surveillance is performed according to the Harmonized Factory Inspection Procedure - Requirements ICIG 021 to 024). The requirements have been fulfilled:

Produkt-Kategorie: Begleitheizsystem

Product Category: Conduit heat tracing system

Datum der letzten Inspektion/ Date of last inspection: 2007-08-09

VDE Prüf- und Zertifizierungsinstitut/VDE Testing and Certification Institute
Werksinspektion und Konformitätsüberwachung/Factory Inspection and Conformity Control

ges. Thomas Bilz

Offenbach, 2007-08-15

Dieses Zertifikat ist gültig ohne Unterschrift und nicht übertragbar auf andere Fertigungsstätten.
This Certificate is valid without signature and not transferable to other places of manufacture.

Das VDE Prüf- und Zertifizierungsinstitut ist nach DIN EN ISO/IEC 17020 akkreditiert.
The VDE Testing and Certification Institute is accredited according to DIN EN ISO/IEC 17020.

VDE Prüf- und Zertifizierungsinstitut

ZEICHENGENEHMIGUNG
MARKS LICENCE

FDT Flachdach Technologie GmbH & Co. KG
Eisenbahnstrasse 6-8
68199 Mannheim

ist berechtigt, für ihr Produkt / is authorized to use for their product

Begleitheizsystem
Conduit heat tracing system
Beheizbarer Flachdach-Gully / Heatable flat roof drain

die hier abgebildeten markenrechtlich geschützten Zeichen für die ab Blatt 2 aufgeführten Typen zu benutzen / quality protected Marks as shown below for the types referred to on page 2 ff.

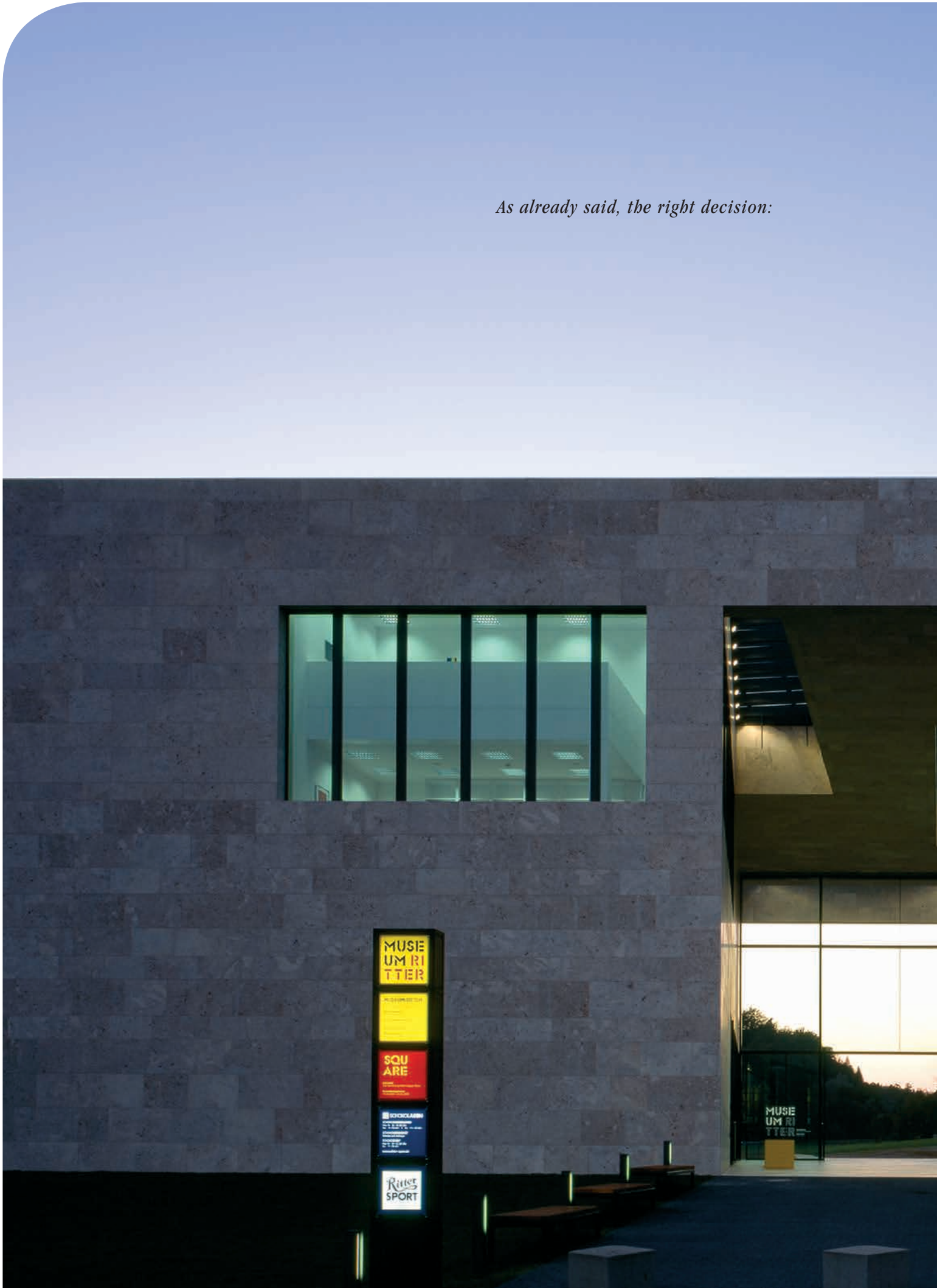
EMV

Geprüft und zertifiziert nach / Tested and certified according to

…Teil 14-1:2003-09; EN 55014-1:2000 + A1:2001 + A2:2002
…Teil 14-2:2002-05; EN 55014-2:1997 + A1:2001
…ments of category I

Aktenzeichen: 743200-2390-0001 / 45009
File ref.:
Auswies-Nr.: 115390 Blatt 1
Licence No.: Page
Offenbach, 1998-10-27
letzte Änderung/updated 2004-06-25

As already said, the right decision:



FDT Flat roof drainage.
Well thought out
to the very detail.

Do not hesitate to call our customer service.
Our specialists shall be glad to offer you their advice.

FDT legal notice

We refer emphatically to the fact, that all details mentioned, especially the application and utilisation recommendation for the products and their system accessories, have been developed under normal conditions, and based on our knowledge and experience. Appropriate storage and usage of the products are assumed. A warranty or reliability of a finished project cannot be deduced because of varying materials, substrates and differing work conditions, neither by any indications nor from verbal statements, irrespective of any legal positions. For the possible accusation that FDT acted intentionally or grossly negligent, the user has to supply evidence that they provided FDT with all information and details necessary for an appropriate and correct evaluation through FDT in written form, immediately available and complete. The user is responsible for ensuring that the products are suitable for the given application. It is FDT´s right to change product specifications without notice. Property rights of third parties are to be considered.
In addition our particular sales and delivery terms are valid. The latest version of our product data sheet is obligatory, which can be requested directly through FDT.

FDT FlachdachTechnologie GmbH & Co. KG,
Mannheim, Germany

FDT Flat Roof Drainage
Technical Manual

Editor:

FDT FlachdachTechnologie
GmbH & Co. KG
Eisenbahnstraße 6-8
D-68199 Mannheim
Tel 06 21-85 04-0
Fax 06 21-85 04-2 05
www.fdt.de

All information as well as all technical and drawing data comply with current technical standards and are based on our experience. National standards and regulations must be observed.

Technical changes reserved.
As of September 2014.

FDT
FLACHDACH ▪ TECHNOLOGIE

FDT FlachdachTechnologie
GmbH & Co. KG

Eisenbahnstraße 6-8
68199 Mannheim

Tel +49-6 21-85 04-0
Fax +49-6 21-85 04-2 05
www.fdt.de

Export department:

Phone +49 6 21-85 04-3 72

Fax +49 6 21-85 04-3 78

E-Mail export@fdt.de

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