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Subject to technical modifications.
Roof drainage by means of Siphonic action

Roofs with a large surface can be drained on the basis of two different principles, either by means of gravity drainage or by means of Siphonic action. The drainage by means of open channels according to EN 12056 and DIN 1986-100 requires a maximum filling ratio of 0.7 (height/diameter = 0.7) for the necessary ventilation of the rainwater drainage system. In contrast to that, the siphonic drainage aims at a filling ratio of 1.0. This requirement is met by using specially developed roof and channel gullies which prevent the admission of air by a cap closed on the top. The gullies conform to EN 1253 "Gullies for buildings".

The siphonic drainage system has to be optimized by a hydraulic calculation in such a way that the pipelines fill up systematically in cases of heavy precipitation. The total height difference between the roof gully and the backflow level can then be used for the pipe dimensioning.

**Gravity drainage**

**Siphonic action drainage**

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**Advantages of Siphonic drainage compared with conventional drainage:**

- **A higher discharge rate** as a result of a closed flow circuit allows smaller dimensions
- **Space gained** due to horizontal piping without gradient below the ceiling
- **Lower expenditure of material** due to the use of smaller pipe dimensions and shorter pipe lengths
- **Less input for the construction** due to fewer downpipes, foundation outlet connections and penetrations as well as shafts and pipes in the ground
- **High self-purifying power** of the system due to high flow velocities
Standards and guidelines

Several standards and guidelines, such as DIN 1986-100:2002-03 (extract), will have to be observed when roof drainage systems are planned and installed, which applies especially to gullies with siphonic action.

DIN 1986-100:2002-03 (extract)

9.1 Each roof surface with a gully leading into the building or installed outside the building shall be installed with at least one gully and an emergency gully discharging the excess water freely via the building’s facade. The emergency overflow installations can be omitted in cases, where a rainwater retention tank is planned on the roof.

9.2 Special requirements concerning the piping, the fittings, and the fixing elements shall be taken into account for rainwater sewers with a higher positive or negative pressure. Pipelines with nonforce-closed connections in longitudinal direction, such as plug-in joints, which are regularly exposed to internal pressure or in which such pressure may occur, shall be secured by suitable measures so as to prevent the plug-in joints from drifting apart or from deviating from the piping axis, especially when directional changes occur.

9.3.1 Piping systems and the associated components of the rainwater drainage system shall be dimensioned for economical reasons on the basis of a medium-sized rain event, which is also to ensure their self-cleaning capability. Instances of overloading or overflowing shall be limited by suitable measures, such as the installation of emergency gullies, so as to prevent damage to the system.

9.3.3 The design depth of precipitation is a rain event defined on the basis of the rain duration and its occurrence during the year. It can be obtained from the local authorities or, alternatively, from the German Meteorological Service. The rain duration decisive for calculating the design depth of precipitation shall be 5 minutes.

The rainwater event to be included in the calculation for precipitation areas without retention systems shall occur at least once in two years.

9.3.6 Guideline VDI 3806 shall be observed for roof drainage systems with siphonic action.

DIN EN 12056-3:2002-01 (extract)

6.2.1 A rainwater sewer filled to the planned level shall be in a position to discharge the design depth of precipitation of a certain area calculated in accordance with section 4 of DIN EN 12056-3. If possible, this method should be used for statistic calculations of the design depth of precipitation.

6.2.3 The suction effect of the completely filled system shall start fast enough so as to prevent a surcharge (= flooding) from developing on the roof or in the eaves gutter.

6.2.4 The discharge capacity of the individual gullies shall be geared to each other, in order to ensure that the planned system functions.

6.2.7 The system’s minimum speed for calculating the design depth of precipitation shall be determined in such a way that sedimentation inside the piping system can be prevented and that the start of the suction effect can be ensured as fast as possible.

DIN EN 12056-3:2002-01 (extract)

6.2.11 The lowest possible pressure shall be used for the calculations, so as to prevent possible cavitations and the collapse of the piping system.

6.2.12 The nominal diameter may be reduced in full pipes in the flow of direction.

6.2.13 The rainwater drainage system shall be installed in accordance with the assumptions made in the planning documents. The effect of each and any deviation from the specifications and from the system actually installed shall be calculated, so that suitable measures for compensating these deviations can be taken.

7.3.1 When flat roofs with parapet walls are dewatered via eaves gutters, at least 2 gullies (or one gully and an emergency gully) shall be installed in each partial area.

7.4 Emergency gullies shall be installed on flat roofs with parapet walls or on roofs without eaves gutters.

Guidelines for flat roofs

1.1.1 This technical rule applies to the planning and construction of the sealing on:
- flat and inclined roof surfaces,
- unused or extensively vegetated roof surfaces,
- used surfaces (such as balconies, roof terraces and intensively vegetated roof surfaces).

2.4.1 The roof drainage shall be arranged in accordance with the design standards, so that the precipitation can be channelled off and discharged by using the shortest possible way.

2.4.2 Roof surfaces with an internally inclined drainage system shall have at least one emergency gully, irrespective of the size of the roof surface. Gullies and emergency gullies shall be dimensioned in accordance with DIN EN 12056-3 and DIN 1986-100:2002-03. Roof surfaces without any inclination require special measures, such as the installation of the gullies in places with the maximum deformation.

2.4.3 In cases of roof drainage systems with siphonic action, a temporary impoundage on the roof sealing must be assumed. Recommended are one-piece roof gullies with swivel/fixed flange. Please note: Two-piece LORO gullies can also be used, especially when a vapor barrier is to be connected (see sections 4.3.2 and 5.7.1.5).
2.4.5 In the case of roof surfaces being used, the draina-
ge of the surface itself and of the sealing level shall be
ensured.

4.3.2 Vapor barriers shall be installed at penetrations.

5.4.1.3 The spacing between the roof penetrations
themselves and between roof penetrations and other
components, such as wall connections, movement joints
or roof edges, shall amount to at least 0.30 m, so that the
relevant connections can be installed permanently and in
a workmanlike fashion, in which case the external outline
of the flange is decisive.

5.7 Roof drains/emergency drains

5.7.1.1 Roof gullies manufactured in factories shall con-
form to DIN EN 1253 (for the dimensioning of roof gullies
and emergency gullies, please refer to section 2.4).

5.7.1.2 Roof gullies shall be attached to the sub-structure.

5.7.1.3 Flanges of roof gullies at the sealing level shall be
sunk into the bedding.

5.7.1.4 Roof gullies can be connected with swivel, fixed or
bonded flanges, or integrated into roof sheets or liquid
sealing systems. The roof sheeting shall be geared to the
roof's sealing system.

5.7.1.5 Two-piece roof gullies are suitable for installing and
connecting the vapor barrier.

6.1 General

The care and maintenance of the roof sealing require
relevant measures.

6.3.1 The maintenance includes, but is not restricted to,
the following jobs:
– the removal of dirt, old leaves and undesired vegetation
– the cleaning of the roof gullies

**VDI guidelines VDI 3806 (extract)**

3. Design principles

3.1 Required information

For roof drainage with a siphon system, an object-spe ci-
fic hydraulic design must be implemented. The following
design underlays at least are necessary for this:

- ground floor plan
- cross-sections
- details of the roof structure and roof waterproofing
- view of roof giving drainage troughs
- position of the backflow level
- position of the connection points in the open
  system (ground or collecting pipes) and bores of joints
- position of the emergency overflows and effective
  drainage level taking into consideration the permitted
  static loads on the roof surface

3.2 Basic principles

- Rainwater pipes with a siphon can be laid without a
  sloping pipe
- Taking into consideration the anticipated rainfall at the
  site of the building, the construction and shape of the
roof, the roof lining and a structural analysis of the roof,
it must be ascertained whether emergency overflows are
necessary. In the case of inside gutter drainage,
emergency overflows should generally always be
planned.

- In connection with the emergency overflows, the drain-
age system must definitely be capable of draining at
least the anticipated occurrence every century of rainfall
lasting over five minutes (German meteorological ser-
vice) recorded at the site of the building.

- If emergency overflows are necessary for roofs with a
  shallow pitch, there must be a flow path on the roof
lining from every roof runoff to an emergency overflow
with sufficient drainage capacity.

- If the roof shape excludes the possibility of an open
  emergency overflow over the facade, this function must
  be covered by an additional pipeline system if neces sa-
  ry to ensure that there is an emergency overflow.

- Large roof surfaces (over approx. 5000 m²) must be
  drained by at least two independent siphon drainage
  systems (downpipes).

- A siphon drainage installation should be connected to
  an “open” pipeline, e.g. to pipes with shafts with open
gutters or with connected yard or road gullies.

- In the transition area from a siphon to an open drainage
  system, the high kinetic energy of the siphon pressure
  must be converted by reducing the velocity of flow
to \( v < 2.5 \) m/s.

- The combination of roofs areas with different discharge
time lags (coefficients of discharge), e.g. in the case of
intensively planted roofs, extensively planted roofs,
gravel-covered and non-gravel-covered roofs, in one
siphon drainage system is to be avoided.

- Roofs areas with extremely differing pitches or on very
  different levels should not be drained via a single
downpipe.
1. The diameter of the connecting pipes (3a, 3b, 3c) corresponds to the constant loss of pressure in all flow sections - from the edge of the roof (1) to the transfer point (10) between siphonic action and open channel drainage.

2. The diameter of the connecting pipe closest to the downpipe (c) is usually the smallest in the system so that the highest flow velocity is generated here. This diameter must be selected in such a way that the partial vacuum due to the dynamic pressure in the piping is not too high so that an excessive banked-up water level on the roof can be avoided, before the partial vacuum in the downpipe becomes effective.

3. The diameter of the connecting pipe farthest away from the downpipe (3a) is usually large when the flow of water is low, so that the slowest flow velocity of the system occurs here. The design must ensure that the flow velocity is not less than 1 m/sec in order to achieve a high self-cleaning effect.

4. The diameters of the collecting mains (5) are best dimensioned in accordance with the constant pressure loss per m of pipe length instead of on the basis of a constant pipe diameter or a constant flow velocity.

5. The diameter of the downpipe (7) is dimensioned in such a way that the partial vacuum of the downpipe is definitely ensured. The fundamental aim of the siphonic drainage system is to channel the rainwater into the horizontal collecting mains above the reversal points of the directional flow (6) and to drain it from there due to the geodetic height below the reversal point. This reversal will normally result in partial vacuums. The smaller the diameters of the connecting and collecting pipes are planned, the lower is the drain rate of the rainwater towards the downpipe, which is created by the geodetic height upstream of the reversal point. The diameter of the downpipe is therefore of great importance for securing the effect of the geodetic height of the downpipe.

6. The diameter of the smoothing section (9) must be dimensioned in such a way that the conversion of the high kinetic energy at the transfer point into the underground or collecting mains of the channel drainage is ensured by reducing the flow velocity to \( \leq 2.5 \text{ m/sec} \) in accordance with DIN EN 12056. In order to avoid any damage caused by a high flushing velocity, the smoothing section (9) before the transfer into the partially filled pipeline must be dimensioned so as to have a maximum flow rate of 2.5 m/sec.

7. Being a roof drainage with siphonic action, the diameters of the system must be dimensioned in such a way that the geodetic pressure height is located somewhere between the roof and the level of the built-up water in those cases where there is a danger of the water not being fully dischargeable into the sewer or where stricter safety requirements (no backpressure of water up to the roof level) must be observed, in order to channel the water discharge to the free outlet. A free outlet may either be a direct discharge of the rainwater into the ground at the level of the backflow or the free discharge into:
   - a pressure compensation shaft with sufficiently large openings in the lid,
   - a natural river or lake,
   - traffic space,
   - storage reservoir or canal for rain water,
   - a reservoir of a water recycling plant, or
   - an emergency water reserve.

The volume must be big enough to provide intermediate storage space for the water difference.
between the large quantities of water discharged from the roof drainage with siphonic action and the small quantities of rainwater absorbed by the sewer in the case of rising water level.

7.1 The diameters of the siphonic system can be dimensioned in such a way that the entire geodetic height between the roof level and the backflow level is used, in order to apply the smallest possible diameters for the system and to completely use the relevant geodetic pressure for the discharge of the water within drainage system. When keeping the diameters of the siphonic action system as small as possible, the free discharge of the rainwater at the end of a roof drainage with siphonic action must be ensured in form of an outlet into the open ground at the height of the backflow level. In this case, the free outlet of the rainwater discharge should be located immediately next to the downpipe (7).

7.2 If the free discharge of the rainwater at the end of the siphonic system is not possible in the form of an outlet into the open ground at the height of the backflow level, it must be ensured that the rainwater can be channeled into the drainage system downstream of the backflow level and from there to the free outlet. The diameters of the siphonic roof drainage system below the backflow level will have to be dimensioned with regard to the pressure losses, so that the hydrostatic head of water between the roof and the backflow level is sufficient to channel the rainwater to the free outlet if a backflow occurs.

System outline:

**LORO-DRAINJET® siphonic gullies, DN 70 and DN 100**

- according to EN 1253,
- made of stainless steel,
- with clamping flange,
- single-part or two-part design,
- with or without thermal insulation,
- with or without heating,
- see pages 12 - 17.

- to be used as standard gully
- to be used as emergency gully

Capacity (in liters):
- up to 24 l/sec (depending on the hydraulic calculation).

**LORO-RAINSTAR® Attika siphonic gullies, DN 70 and DN 100**

- according to EN 1253,
- with clamping flange, made of steel,
- hot-dip galvanized, with additional coating,
- to be used as overall drainage system in conjunction with LORO downpipes, bends and stand pipes.
- see pages 29 - 33.

- to be used as standard gully
- to be used as emergency gully

Capacity (in liters):
- up to 24 l/sec (depending on the hydraulic calculation).

**Special advantages through LORO system components:**

- Rapid and trouble-free assembly with LORO-X pipes and spigot-and-socket joints as well as anchor clips (if necessary).

- Little fastening work due to the high dimensional stability of the LORO-X steel drainage pipes up to a length of 6 m.

- No measures required to compensate the thermal expansion due to the almost identical coefficients of linear expansion of steel and concrete.

- Safe and permanent functional reliability of the drainage system due to specially designed gullies.
LORO-X steel drainage pipes, DN 40 - DN 300

- Made of steel, hot-dip galvanized, with additional coating.
- Pipe length from 0.25 m - 6 m.
- Fittings and connectors in all required designs, including sealing elements and anchor clips.

LORO-XC stainless steel drainage pipes, DN 50 - DN 200

- Made of steel, hot-dip galvanized, with additional internal coating.
- Made with PU-foam insulation and an external jacket made of hot-dip galvanized steel, DN 40 - DN 150.
- Pipe length between 0.15 m and 4 m.
- Fittings and connectors in all required designs, including sealing elements and anchor clips.

LORO compound pipes

- Made of steel, hot-dip galvanized, with additional internal coating.
- Made with PU-foam insulation and an external jacket made of hot-dip galvanized steel, DN 40 - DN 150.
- Pipe length between 0.15 m and 4 m.
- Fittings and connectors in all required designs, including sealing elements and anchor clips.

- The steel used for the pipes, bends, gullies and the fastening material meets all requirements as to fire protection, even in the case of "fire-sensitive" products.

- No condensation water and frost effects through LORO compound pipes.

- Optimal pressure equalization due to the finely graduated pipe dimensions from DN 40 - DN 300.

- Support of the planning and the assembly work by LORO’s PC-assisted hydraulic calculations, by the provision of bills of quantity and by the isometric presentation of the piping.

LORO-PC calculation service

- On request, LORO creates PC-assisted, clearly laid out and illustrative calculation documents on the basis of the drawings and the details of the site conditions made available by the planning engineer.
LORO-DRAINJET®
Siphonic Drainage Systems, 
DN 70 - DN 100,

• as main drainage system
• as emergency drainage system

with clamping flange, for bituminous and plastic sealing sheets

LORO-DRAINJET® siphonic drainage systems conform to DIN EN 1253. They are roof drainages with optimized fluid dynamics and a high discharge rate, improved flow characteristics and an enhanced sound behavior. Having a capacity of 27 l/s, they count among the gullies with the highest discharge capacity.

Together with LORO-DRAINJET® emergency gullies, the use of which is mandatory according to DIN 1986-100 in siphonic action operated drainage systems, these gullies in combination with a most diverse pipe and pipe fitting program represent a complete roof drainage system that satisfies the highest demands. LORO-DRAINJET® siphonic drainage systems made of stainless steel and so are UV resistant.

Special benefits:
* high discharge capacity
• LORO-DRAINJET® emergency gullies are installed at the same level as the main drainage systems

LORO-DRAINJET®
Siphonic gullies, 
DN 70 - DN 100

capacity DN 70: 16,0 l/s*  
DN 100: 27,0 l/s*

*according to EN 1253

LORO-DRAINJET®
Siphonic emergency gullies, 
DN 70 - DN 100

capacity DN 70: 17,0 l/s*  
DN 100: 38,0 l/s*
**LORO-DRAINJET® siphonic drainage systems.**
The system for the installation in light construction roofs*

**LORO DRAINJET® siphonic drainage systems made of stainless steel**
LORO DRAINJET® siphonic drainage systems are made of stainless steel and thus prove to be:
- dimensionally stable
- durable and
- UV-resistant

**LORO DRAINJET® main drains and emergency drains will be installed at the same level.**
The patented integrated impoundage element makes it superfluous to raise the emergency gully.

**A negligible additional ascent of the water level in an overload case.**
In an overload case, LORO emergency gullies drain the roof from the additional maximum precipitation with a slightly higher damming height of less than 20 mm.
This will ensure that the LORO emergency gullies keep the water level below the maximum flooding level* that is admissible for lightweight construction roofs, when their rated capacity is achieved.

**The problem:**
DIN 1986-100:2002-03 (Auszug)
9.1 Each roof surface with a gully leading into the building or installed outside the building shall be installed with at least one gully and an emergency gully discharging the excess water freely via the building’s facade.
The loads resulting from the retention level (impoundage level) shall be taken into account when the static calculations for the roof and support structure are made.

**The solution:**
LORO-DRAINJET® siphonic drainage systems and their emergency discharge systems dewater the roof at the same level. The required impoundage of the patented LORO-DRAINJET® emergency gullies will be accomplished by an integrated impoundage element (with a damming height of 55 mm).
By operating these elements at one level only, the water level on the roof will be restricted to a maximum 75 mm.
LORO-DRAINJET® siphonic drainage systems can be installed without any costly modifications to the roof structure and all the resultant problems.

* Admissible maximum flooding height for lightweight construction roofs with a load-bearing capacity of 0,75 kN/m²: 75 mm
Technical product data

Material:
Pot: Stainless Steel No. 1.4301
Drainjet Cover: Stainless Steel No. 1.4301
Loose Flange: G Al Si 10 Mg

Sealing elements:
SB (SBR) styrene-butadiene-polymer compound, trade names such as BUNA, DN 70 - 200.

Compression sealing
Perbunan P599 (unnessesary in case of waterproof bituminous roofing sheets).

Thermal insulation:
STYROPOR SE WLG 0,35, free of FCKW,
Thicknes: at least 20 mm on the walls with direct water impact.
Thermal conductivity coefficient: 0,035 W/m x K.
Water resistance factor: \( \mu = 40/100 \).
Water absorption rate: 0,5 - 1,5 Vol. %.
Class B 2, heavy inflammable.
Insulation with fire class R 90 on request.

Heating:
Surface heating element
protection class 1
Type of protection: splash water protection \( T_{\text{max}}: + 80 \, ^\circ\text{C} \)
Nominal voltage: 230 V / 50 Hz
Nominal wattage: 9 W an ambient temperature of +10 °C
Fuses: Automatic circuit breakers, type C

Fire resistance:
LORO-DRAINJET® siphonic gullies are classified as non combustible building materials, class A1 in accordance with DIN 4102 and classified as such according to DIN 1986, part 4.

External Supervision
LORO-DRAINJET® siphonic gullies according to DIN EN 1253. The Würzburg-based Material Testing Agency of the Landesgewerbeanstalt Bayern (Bavarian Trade Supervisory Authority) is responsible for the external inspection.
LORO-DRAINJET® siphonic gullies/emergency gullies with clamping flange, made of stainless steel, DN 70 and DN 100

Design diagram/System components

LORO-DRAINJET® Siphonic Drainage System

Outline of systems components

Complete two-part unit

Complete single-part unit

Drainjet cover
No. 21000X

Drainjet cover
No. 21009X

Loose flange*
No. 21905X

Loose flange with weir *
No. 21906X

Gully

Emergency Gully

Gully
without thermal insulation, No. 21981X

Gully
with thermal insulation, No. 21982X

Gully
with thermal insulation and heating, No. 21983X

Sealing element
No. 911X

Loose flange*
No. 21905X

Pot
without thermal insulation, No. 21971X

Pot
with thermal insulation, No. 21972X

Pot
with thermal insulation and heating, No. 21973X

* including Perbunan compression sealing (unnecessary in the case of waterproof bituminous roofing sheets)
**Examples of Application**

**LORO-DRAINJET® siphonic drainage gully, DN 70, installed in a concrete roof or in a roof with trapezoidal sheeting, insulated**

1. Sealing sheeting
2. Compression sealing* 
3. Reinforcement sheeting
4. Thermal insulation
5. LORO-DRAINJET® -cover
6. LORO-DRAINJET® -gully
7. LORO-DRAINJET® -basic unit with thermal insulation
8. Vapor seal 
9. Concrete slab or trapezoidal roof sheeting 
10. LORO-X anchor clip
11. LORO-DRAINJET® adjusting piece

* unnecessary in the case of waterproof bituminous roofing sheets

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**LORO-DRAINJET® siphonic drainage gully, DN 100, installed in a concrete roof or in a roof with trapezoidal sheeting, insulated**

1. Sealing sheeting
2. Compression sealing* 
3. Reinforcement sheeting
4. Thermal insulation
5. LORO-DRAINJET® -cover
6. LORO-DRAINJET® -gully
7. LORO-DRAINJET® -basic unit with thermal insulation
8. Vapor seal 
9. Concrete slab or trapezoidal roof sheeting 
10. Insulating piece
11. LORO-Compound Pipe

* unnecessary in the case of waterproof bituminous roofing sheets
Examples of Application

**LORO-DRAINJET® siphonic gully, DN 70, installed in a non-insulated channel**

1. Rectangular section channel
2. Compression sealing*
3. Singel-part LORO-DRAINJET® siphonic drainage gully with drainjet cover
4. LORO-X anchor clip
5. LORO-DRAINJET® adjusting piece

**LORO-DRAINJET® siphonic emergency gully, DN 70, in a concrete roof or in a roof with trapezoidal sheeting, insulated**

1. Sealing sheeting
2. Compression sealing*
3. Reinforcement sheeting
4. Thermal insulation
5. LORO-DRAINJET®-emergency cover
6. LORO-DRAINJET®-loose flange with weir
7. LORO-DRAINJET®-gully
8. LORO-DRAINJET®-basic unit with thermal insulation
9. Vapor seal
10. Concrete slab or trapezoidal roof sheeting
11. LORO-X anchor clip
12. LORO-DRAINJET® adjusting piece

* unnecessary in the case of waterproof bituminous roofing sheets
LORO-DRAINJET® Siphonic Drainage System

Dimensions and weights

LORO-DRAINJET® siphonic gullies, DN 70 and DN 100, made of stainless steel, with clamping flange, according to EN 1253, capacity:
DN 70 = 16,0 l/s, DN 100 = 27,0 l/s

Complete single-part units

Type a (without thermal insulation)
DN 70: Art.-No. 21111.070X Weight: 2,9 kg
DN 100: Art.-No. 21111.100X Weight: 3,7 kg
consisting of:
gully, compression sealing*, loose flange, drainjet cover

Type b (with thermal insulation)
DN 70: Art.-No. 21112.070X Weight: 3,0 kg
DN 100: Art.-No. 21112.100X Weight: 3,8 kg
consisting of:
gully with thermal insulation, compression sealing*, loose flange, drainjet cover

Type c (with thermal insulation and heating)
DN 70: Art.-No. 21113.070X Weight: 3,1 kg
DN 100: Art.-No. 21113.100X Weight: 3,9 kg
consisting of:
gully with thermal insulation and heating, compression sealing*, loose flange, drainjet cover

Complete two-part units

Type a (without thermal insulation)
DN 70: Art.-No. 21121.070X Weight: 4,7 kg
DN 100: Art.-No. 21121.100X Weight: 5,5 kg
consisting of:
gully, compression sealing*, loose flange, drainjet cover, pot with compression sealing*, loose flange and sealing element

Type b (with thermal insulation)
DN 70: Art.-No. 21122.070X Weight: 4,8 kg
DN 100: Art.-No. 21122.100X Weight: 5,6 kg
consisting of:
gully, compression sealing*, loose flange, drainjet cover, pot with thermal insulation, compression sealing*, loose flange and sealing element

Type c (with thermal insulation and heating)
DN 70: Art.-No. 21123.070X Weight: 5,2 kg
DN 100: Art.-No. 21123.100X Weight: 6,0 kg
consisting of:
gully, compression sealing*, loose flange, drainjet cover, pot with thermal insulation and heating, compression sealing*, loose flange and sealing element

<table>
<thead>
<tr>
<th>DN</th>
<th>d1</th>
<th>d2</th>
<th>d3</th>
<th>d4</th>
<th>d5</th>
<th>l2</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>73</td>
<td>125</td>
<td>245</td>
<td>120</td>
<td>150</td>
<td>260</td>
</tr>
<tr>
<td>100</td>
<td>102</td>
<td>145</td>
<td>300</td>
<td>160</td>
<td>190</td>
<td>270</td>
</tr>
</tbody>
</table>

* unnecessary in the case of waterproof bituminous roofing sheets
** Loreo Drainjet® Siphonic Drainage System**

### Dimensions and weights

**Loreo Drainjet® siphonic emergency gullies,**
**DN 70 and DN 100,**
**made of stainless steel,**
**with clamping flange,**
**according to EN 1253,**
**capacity:**

**DN 70 = 17,0 l/s, DN 100 = 38,0 l/s**

#### Complete single-part units

**Type a** (without thermal insulation)
- DN 70: Art.-No. 21311.070X  | Weight: 3.1 kg
- DN 100: Art.-No. 21311.100X | Weight: 3.9 kg
  **consisting of:**
  - gully, compression sealing*, loose flange with weir,
  - drainjet cover

**Type b** (with thermal insulation)
- DN 70: Art.-No. 21312.070X  | Weight: 3.2 kg
- DN 100: Art.-No. 21312.100X | Weight: 4.0 kg
  **consisting of:**
  - gully with thermal insulation, compression sealing*, loose flange with weir, drainjet cover

**Type c** (with thermal insulation and heating)
- DN 70: Art.-No. 21313.070X  | Weight: 3.3 kg
- DN 100: Art.-No. 21313.100X | Weight: 4.1 kg
  **consisting of:**
  - gully with thermal insulation and heating, compression sealing*, loose flange with weir, drainjet cover

#### Complete two-part units

**Type a** (without thermal insulation)
- DN 70: Art.-No. 21321.070X  | Weight: 5.1 kg
- DN 100: Art.-No. 21321.100X | Weight: 5.9 kg
  **consisting of:**
  - gully, compression sealing*, loose flange with weir,
  - drainjet cover, pot with compression sealing*, loose flange and sealing element

**Type b** (with thermal insulation)
- DN 70: Art.-No. 21322.070X  | Weight: 5.2 kg
- DN 100: Art.-No. 21322.100X | Weight: 6.0 kg
  **consisting of:**
  - gully, compression sealing*, loose flange with weir,
  - drainjet cover, pot with thermal insulation, compression sealing*, loose flange and sealing element

**Type c** (with thermal insulation and heating)
- DN 70: Art.-No. 21323.070X  | Weight: 5.3 kg
- DN 100: Art.-No. 21323.100X | Weight: 6.1 kg
  **consisting of:**
  - gully, compression sealing*, loose flange with weir,
  - drainjet cover, pot with thermal insulation and heating,
  - compression sealing*, loose flange and sealing element

<table>
<thead>
<tr>
<th>DN</th>
<th>d1</th>
<th>d2</th>
<th>d3</th>
<th>d4</th>
<th>d5</th>
<th>l2</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>73</td>
<td>125</td>
<td>245</td>
<td>120</td>
<td>150</td>
<td>260</td>
</tr>
<tr>
<td>100</td>
<td>102</td>
<td>145</td>
<td>300</td>
<td>160</td>
<td>190</td>
<td>270</td>
</tr>
</tbody>
</table>

* unnecessary in the case of waterproof bituminous roofing sheets
LORO-VERSAL® siphonic gully, for reverse roofs, DN 70, with clamping flange, made of steel, conform to EN 1253

Partial assemblies for completing the modularized system

LORO-VERSAL® siphonic gully basic unit
consisting of:
gully, air sieve and loose flange
Type a (without thermal insulation)
Art.-No. 19543.070X Weight: 6.8 kg
Type b (with thermal insulation)
Art.-No. 19544.070X Weight: 7.1 kg
Type c (with thermal insulation and heating)
Art.-No. 19545.070X Weight: 7.3 kg

Screen unit for LORO-VERSAL® siphonic gully for reverse roofs
consisting of:
screen basket and lid made of steel, hot-galvanized and plastic coated
Art.-No. 19941.070X Weight: 1.4 kg

For an example how to install it please refer to page 27.

LORO-VERSAL® siphonic gully, for traffic areas, DN 70, with clamping flange, made of steel, conform to EN 1253

Partial assemblies for completing the modularized system

LORO-VERSAL® siphonic gully basic unit
consisting of:
gully, air sieve and loose flange
Art.-No. 19543.070X Weight: 6.8 kg

Man-accessible screen unit, class L (1.5 t)
for installation heights of 40-75 mm, consisting of:
screen support hot-galvanized and coated, 199 mm
cast iron screen, asphalt coated, 187 mm
Art.-No. 18620.125X Weight: 4.6 kg

Passable screen unit, class M (12.5 t)
for installation heights of 40-75 mm, consisting of:
screen support hot-galvanized and coated, 182 mm
cast iron screen, asphalt coated, 170 mm
Art.-No. 18621.125X Weight: 6.4 kg

For an example how to install it please refer to page 27.
The dimensions and weights of the entire range of LORO-X discharge pipes are contained in the brochure "LORO-X discharge pipes", which can be obtained from the LOROWERK.

**Dimensions and weights**

### LORO-DRAINJET® connector bends
made of hot-dip galvanized steel, with additional internal coating

<table>
<thead>
<tr>
<th>Art.-No.</th>
<th>DN 1</th>
<th>DN 2</th>
<th>l₁</th>
<th>r</th>
<th>kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>05042.CA0X</td>
<td>70</td>
<td>40</td>
<td>85</td>
<td>55</td>
<td>26,0 70</td>
</tr>
<tr>
<td>05042.CB0X</td>
<td>70</td>
<td>50</td>
<td>85</td>
<td>55</td>
<td>36,5 70</td>
</tr>
<tr>
<td>05042.CC0X</td>
<td>70</td>
<td>70</td>
<td>85</td>
<td>55</td>
<td>50,0 70</td>
</tr>
<tr>
<td>05042.DC0X</td>
<td>100</td>
<td>70</td>
<td>75</td>
<td>70</td>
<td>50,0 100</td>
</tr>
<tr>
<td>05042.DM0X</td>
<td>100</td>
<td>80</td>
<td>75</td>
<td>70</td>
<td>60,0 100</td>
</tr>
<tr>
<td>05042.DD0X</td>
<td>100</td>
<td>100</td>
<td>85</td>
<td>70</td>
<td>70,0 100</td>
</tr>
</tbody>
</table>

### LORO-DRAINJET® connectors
made of hot-dip galvanized steel, with additional internal coating

<table>
<thead>
<tr>
<th>Art.-No.</th>
<th>DN 1</th>
<th>DN 2</th>
<th>l₁</th>
<th>f</th>
<th>kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>05043.CA0X</td>
<td>70</td>
<td>40</td>
<td>250</td>
<td>195</td>
<td>0,7</td>
</tr>
<tr>
<td>05043.CB0X</td>
<td>70</td>
<td>50</td>
<td>250</td>
<td>200</td>
<td>0,7</td>
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<tr>
<td>05043.DC0X</td>
<td>100</td>
<td>70</td>
<td>240</td>
<td>200</td>
<td>1,1</td>
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<tr>
<td>05043.DM0X</td>
<td>100</td>
<td>80</td>
<td>240</td>
<td>210</td>
<td>1,3</td>
</tr>
</tbody>
</table>

### LORO-DRAINJET® adjusting pieces
made of hot-dip galvanized steel, with additional internal coating

<table>
<thead>
<tr>
<th>Art.-No.</th>
<th>DN 1</th>
<th>DN 2</th>
<th>l₁</th>
<th>f</th>
<th>kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>19602.BA0X</td>
<td>50</td>
<td>40</td>
<td>94</td>
<td>75</td>
<td>0,2</td>
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<tr>
<td>19602.CB0X</td>
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<td>50</td>
<td>118</td>
<td>80</td>
<td>0,4</td>
</tr>
<tr>
<td>19602.MB0X</td>
<td>80</td>
<td>50</td>
<td>134</td>
<td>80</td>
<td>0,5</td>
</tr>
<tr>
<td>19602.MC0X</td>
<td>80</td>
<td>70</td>
<td>135</td>
<td>100</td>
<td>0,7</td>
</tr>
<tr>
<td>19602.DB0X</td>
<td>100</td>
<td>50</td>
<td>125</td>
<td>80</td>
<td>0,8</td>
</tr>
<tr>
<td>19602.DC0X</td>
<td>100</td>
<td>70</td>
<td>140</td>
<td>100</td>
<td>0,8</td>
</tr>
<tr>
<td>19602.DM0X</td>
<td>100</td>
<td>80</td>
<td>140</td>
<td>110</td>
<td>1,0</td>
</tr>
<tr>
<td>19602.ED0X</td>
<td>125</td>
<td>100</td>
<td>185</td>
<td>120</td>
<td>1,8</td>
</tr>
<tr>
<td>19602.FE0X</td>
<td>150</td>
<td>125</td>
<td>205</td>
<td>130</td>
<td>2,5</td>
</tr>
<tr>
<td>19602.GF0X</td>
<td>200</td>
<td>150</td>
<td>196</td>
<td>130</td>
<td>4,2</td>
</tr>
</tbody>
</table>
The dimensions and weights of the entire range of LORO-X discharge pipes are contained in the brochure "LORO compound pipes", which can be obtained from the LOROWERK.
**LORO-DRAINJET® Siphonic Drainage System**

**Dimensions and weights**

**Accessories**

**LORO-DRAINJET® reinforcement sheet for DN 70 and DN 100**
made of hot-dip galvanized steel, including 3 tapping screws and 3 fastening clips to be installed in trapezoidal roofs

Art.-No. 19975.000X  
Weight: 3.9 kg

**Gravel catching basket for LORO-DRAINJET® gullies**
made of stainless steel, material No. 1.4571

Art.-No. 19979.070C  
Weight: 0.5 kg

**Control shaft for LORO-DRAINJET® gullies**
made of hot-dip galvanized steel, with additional coating

Art.-No. 19973.000X  
Gewicht: 4.1 kg
Recess Dimensions

**LORO DRAINJET® siphonic gullies**
DN 70 and DN100 to be installed in flat concrete roofs

**Core drilling in one-step**

<table>
<thead>
<tr>
<th>DN</th>
<th>d₁</th>
<th>d₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>260</td>
<td>122 / 158*</td>
</tr>
<tr>
<td>100</td>
<td>320</td>
<td>142 / 200*</td>
</tr>
</tbody>
</table>

* Core drilling for the LORO-DRAINJET® drainage gully with thermal insulation or with thermal insulation and heating (two-part type).

In order to backfill the borehole, attach a form board, lift the gully briefly and fill in the hole. Replace and realign the gully after the backfilling.

**LORO DRAINJET® siphonic gullies to be installed on roofs with trapezoidal roofing sheets**

**LORO-DRAINJET® siphonic gullies, DN 70 and DN 100, to be installed in rectangular section channels**

Box gutter punch in accordance with hole pattern. Loose flange can be used as hole template.
Installation Instructions

for Installation in a concrete roof or in a roof with trapezoidal sheeting

1 DRAINJET® cover with 3 fastening screws

2 Loose flange with 6 hexagonal nuts M 10 and washers (to be tightened with 20 Nm)

3 Compression sealing*

4 DRAINJET® gully

5 Sealing element, DN 70

6 DRAINJET® base unit

7 Reinforcing metal sheet with 3 tapping screws and 3 fastening clips to be installed in trapezoidal roofs

* unnecessary in the case of waterproof bituminous roofing sheets

for Installation in Rectangular section channel

Recess
for trapezoidal roofs

for concrete roofs

Minimum width
300 mm

Channel-bottom

350 mm
Basic installation instructions for the LORO-DRAINJET siphonic

**Anchor Clips**
All socket connections are to be installed with anchor clips, which become partly unnecessary when using a fastening system. As a matter of principle, anchor clips must be installed.

**In the case of connecting pipes or mains:**
- after the LORO-DRAINJET® gullies
- after branches
- before bends
- before adjustment pieces

**In the case of downpipes:**
- at the transition point between downpipe and mains

**Fastening systems**
The piping system must be fastened in accordance with the requirements (such as fixed point, pipeclips etc.).

Basic requirements for connecting and collecting pipes:
- the fixed points should be spaced 12 m apart,
- the pendulum suspensions should be spaced as follows:

<table>
<thead>
<tr>
<th>DN</th>
<th>40</th>
<th>50</th>
<th>70</th>
<th>80</th>
<th>100</th>
<th>125</th>
<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>2,0 m</td>
<td>2,0 m</td>
<td>3,0 m</td>
<td>3,0 m</td>
<td>3,0 m</td>
<td>3,0 m</td>
<td>3,0 m</td>
<td>3,0 m</td>
<td>3,0 m</td>
<td>3,0 m</td>
</tr>
</tbody>
</table>

**For downpipes:**
- 3 m spacing
- downpipe supports with a spacing of approximately 12 m and at least once per downpipe
- fixed point at the transition between collecting pipe and downpipe Alignment of the fastening devices as regards forces. As regards the alignment of the fastening forces, the LORO piping system is considered to be a rigid installation. A prerequisite is in this respect that the piping system is securely fastened at all necessary points. The dynamic forces caused by the flow inside the pipes may therefore be disregarded. Impact forces occurring in supply systems with pressurized pipes in the case of sudden load changes, to name just one example, cannot occur in LORO siphonic drainage systems, so the fastening measures an be restricted to the static loads when the pipes are completely filled. The static forces occuring in completely filled pipes can be seen from the weight table below:

<table>
<thead>
<tr>
<th>DN</th>
<th>40</th>
<th>50</th>
<th>70</th>
<th>80</th>
<th>100</th>
<th>125</th>
<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>kg / m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LORO-X Stell Pipe</td>
<td>2,6</td>
<td>4,1</td>
<td>7,0</td>
<td>9,9</td>
<td>13,0</td>
<td>21,8</td>
<td>29,4</td>
<td>57,0</td>
<td>77,0</td>
<td>104,0</td>
</tr>
<tr>
<td>LORO-Compund Pipe</td>
<td>6,2</td>
<td>8,3</td>
<td>13,8</td>
<td>17,8</td>
<td>22,5</td>
<td>38,8</td>
<td>49,1</td>
<td>78,7</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Installation instructions

- Deviations from the planning specifications based on a hydraulic calculation are to be avoided. If modifications cannot be avoided, contact the planning engineer or LORO’s technical advisory service to have a re-calculation done.

- Special attention must be paid to:
  - the specified piping layout,
  - the length of the individual pipe sections,
  - the heights of the collecting an individual connecting pipes,
  - the specified pipe dimensions, and
  - the layout of the roof gullies (dimensions) in accordance with the planning.

- Please use the materials for the piping and the roof gullies as specified in the planning.

- The pipes can be laid without gradient, but the water must be able to drain off.

- See page 26 for the spacing between the upper edge of the roof gully or the raw ceiling on the one hand and the collecting pipe on the other.

- For branches, the 45° type is to be used.

- The pressure drainage system must end at the backflow level (transfer into the open channel drainage) at the least.

- The mains in the ground (open channel drainage) must be connected with system-compatible connecting pieces, so that no backflow occurs.

- The flanges of the roof gullies are to be sunk into the base and fixed there. Recesses in the ceiling are to be closed.

- The gullies and pipes are to be protected against soiling and contaminants (such as packaging and insulation material, gravel, planting substrate etc.) during the time of construction. Pollutants are to be removed from the drainage pot before mounting the strainer unit.

- Further details about the installation of LORO-X steel discharge pipes and LORO compound pipes are contained in separate instructions which may be obtained from the LOROWERK.
Examples of Installation
with minimal installation heights for LORO-DRAINJET® gullies

1. Connectors for vertical connections

2. Drainjet Connection Bends for vertical connections

3. Standard Bends for vertical connections
Examples of Installation

LORO-DRAINJET® siphonic gullies with heating

LORO-DRAINJET® siphonic gullies with flat cover

Wattage: 9 Watt
Power supply: 230 Volt

LORO rain water gullies for traffic areas, without stink traps
LORO-VERSAL® siphonic gullies in connection with cast strainers fit for pedestrian and vehicle traffic (Contact LOROWERK for details).

a = cast strainer, 187 mm, Cl. L (1,5 t) or Cl. M (12,5 t)
b = strainer unit
c = walkway or roadway paving
d = LORO-VERSAL® siphonic discharge gully

LORO-VERSAL® siphonic gullies for reverse roofs made of concrete/trapezoidal sheets, insulated

1 layer of gravel
2 parting layer
3 heat insulation
4 vapor barrier
5 reinforcement metal sheeting
6 concrete plate or trapezoidal roof sheeting
7 LORO-VERSAL® one-piece siphonic drainage system consisting of: base unit and screen unit
8 LORO-X securing clamp
9 LORO-X steel discharge pipe
The discharge capacity of LORO-DRAINJET® emergency gullies depends on the different falling heights

A = 1.00 m as a fixed dimension*
H = variable dimension

*Please note: If dimension A is changed, the discharge Q can be affected. Please contact LOROWERK in such cases.

Table:
Capacity Q in l/s at different falling heights

<table>
<thead>
<tr>
<th>Falling height H (m)</th>
<th>DN 70</th>
<th>DN 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>5.00</td>
<td>5.00</td>
</tr>
<tr>
<td>1.0</td>
<td>4.50</td>
<td>4.50</td>
</tr>
<tr>
<td>1.5</td>
<td>4.00</td>
<td>4.00</td>
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<tr>
<td>2.0</td>
<td>3.50</td>
<td>3.50</td>
</tr>
<tr>
<td>2.5</td>
<td>3.00</td>
<td>3.00</td>
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<td>3.0</td>
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<td>3.5</td>
<td>2.00</td>
<td>2.00</td>
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<tr>
<td>4.0</td>
<td>1.50</td>
<td>1.50</td>
</tr>
<tr>
<td>4.5</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>
LORO-RAINSTAR®
Attika Siphonic Drainage Systems,
DN 70 - DN 100,

• as main drainage system, series RC
• as emergency drainage system, series RD

Roof drainages for roofs with Attika (upward roof edge lip), with clamping flange, for bituminous and plastic sealing sheets

LORO-RAINSTAR® Attika roof drainage systems are an upgrade of LORO-DRAINJET® Attika drains. The discharge capacity of the new drains has been considerably enhanced by optimizing their fluid dynamics. The newly-patented gullies are built from hot-dip galvanized steel, are additionally coated on the inside and feature a screen basket made of stainless steel. They conform to DIN EN 1253 and DIN 18195.

LORO-RAINSTAR® Attika drainage systems are supplied as complex systems together with LORO down pipes and pipe fittings.

Special benefits:
• high discharge capacity
• LORO-RAINSTAR® Attika emergency gullies are installed at the same level as the main drainage systems

LORO-RAINSTAR®
Attika Siphonic gullies,
series RC,
DN 70 - DN 100

capacity: DN 70 = 16,0 l/s*
DN 100 = 17,5 l/s*

LORO-RAINSTAR®
Attika siphonic emergency gullies,
series RD,
DN 70 - DN 100

capacity: DN 70 = 18,0 l/s*
DN 100 = 24,0 l/s*

*according to EN 1253
LORO-RAINSTAR® Attika gullies, by siphonic action, DN 70 / DN 100, Type RC, with clamping flange, according to DIN EN 1253 and DIN 18195

Examples of Application

for bituminous and plastic roofing sheets

for bituminous roofing sheets

for plastic roofing sheets

1  LORO-RAINSTAR® Attika gully
2  LORO sliding flange
   (for integrating vapor seal)
3  bituminous sealing sheets
4  the thermal insulation
5  vapor seal
6  industrial roof with trapezoidal sheeting or concrete roof
7  LORO-insulation element
8  LORO-X branch
9  LORO-X rain water downpipe
10  LORO-X rain water raiser pipe
11  LORO-X pipe
12  LORO-X closing plug
13  Pipe in the ground
**LORO-RAINSTAR® Siphonic Drainage System**

**Application**

**Examples of Application**

1. **LORO-RAINSTAR®** Attika emergency gullies, by siphonic action
   DN 70 / DN 100, Type RD, with clamping flange, according to DIN EN 1253 and DIN 18195
   for bituminous and plastic roofing sheets

   ![Diagram of LORO-RAINSTAR® System](image)

   - 1 LORO-RAINSTAR® Attika emergency gully
   - 2 LORO-sliding flange (for integrating vapor seal)
   - 3 bituminous sealing sheets
   - 4 the thermal insulation
   - 5 vapor seal
   - 6 Industrial roof with trapezoidal sheeting or concrete roof
   - 7 LORO-insulation element
   - 8 LORO-X bend, 87° for plastic roofing sheets
   - 9 LORO-X rain water downpipe
   - 10 LORO-X bend, 45°
**LORO-RAINSTAR® Attika gullies, by siphonic action, DN 70 / DN 100, Type RC, with clamping flange, for bituminous roofing sheets**

made of steel, hot-dip galvanized and with additional coating, cover made of stainless steel consisting of: Drainjet cover, loose flange, gully

**Capacity:**

<table>
<thead>
<tr>
<th></th>
<th>DN 70</th>
<th>DN 100</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Art.-No.</strong></td>
<td>01382.070X</td>
<td>01382.100X</td>
</tr>
<tr>
<td><strong>Weight</strong>, kg</td>
<td>9,4</td>
<td>11,3</td>
</tr>
</tbody>
</table>

* Conform to DIN EN 1253
**LORO-RAINSTAR®**

Attika siphonic emergency gullies, by siphonic action, DN 70 / DN 100, Type RD, with clamping flange, for plastic roofing sheets

made of steel, hot-dip galvanized and with additional coating, cover made of stainless steel

consisting of:
- Drainjet cover, loose flange with weir, gully, loose flange for gully

**Capacity:**
- DN 70 = 18.0 l/s*
- DN 100 = 24.0 l/s*

<table>
<thead>
<tr>
<th></th>
<th>DN 70</th>
<th>DN 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>d₁</td>
<td>Ø 73</td>
<td>Ø 102</td>
</tr>
</tbody>
</table>

**LORO-RAINSTAR®**

Attika siphonic emergency gullies, by siphonic action, DN 70 / DN 100, Type RD, with clamping flange, for bituminous roofing sheets

made of steel, hot-dip galvanized and with additional coating, cover made of stainless steel

consisting of:
- Drainjet cover, loose flange with weir, compression sealing, gully, loose flange for gully

**Capacity:**
- DN 70 = 18.0 l/s*
- DN 100 = 24.0 l/s*

<table>
<thead>
<tr>
<th></th>
<th>DN 70</th>
<th>DN 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>d₁</td>
<td>Ø 73</td>
<td>Ø 102</td>
</tr>
</tbody>
</table>

* Conform to DIN EN 1253
**LORO-sliding flange, DN 70 with packing ring**

for integrating vapor seal

made of steel, hot-dip galvanized

vapor seal for bituminous sheets  
Art.-No. 13235.070X  Weight: 1,4 kg

vapor seal for plastic roofing sheets  
Art.-No. 13236.070X  Weight: 1,4 kg

---

**LORO-sliding flange, DN 100 with packing ring,**

for integrating vapor seal

made of steel, hot-dip galvanized

vapor seal for bituminous sheets  
Art.-No. 13235.100X  Weight: 1,7 kg

vapor seal for plastic roofing sheets  
Art.-No. 13236.100X  Weight: 1,7 kg
**Dimensions and weights**

**LORO-Collector**
for Attika gullies,
made of steel, hot-dip galvanized and with additional coating

<table>
<thead>
<tr>
<th>DN</th>
<th>Art.-No.</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>04379.070X</td>
<td>2.6 kg</td>
</tr>
<tr>
<td>100</td>
<td>04379.100X</td>
<td>2.7 kg</td>
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<table>
<thead>
<tr>
<th>DN</th>
<th>d₁</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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<tr>
<td>70</td>
<td>73</td>
<td>275</td>
<td>205</td>
<td>55</td>
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<td>70</td>
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<td>100</td>
<td>102</td>
<td>290</td>
<td>205</td>
<td>70</td>
<td>60</td>
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**LORO-Insulation Element**
Styropor SE WLG 0.35
for LORO-RAINSTAR-Attika Gullies
DN 70 - DN 100

Art.-No. 01384.000X Weight: 0.6 kg
## Questionnaire for LORO DRAINJET®- siphonic drainage systems

<table>
<thead>
<tr>
<th>Issued by</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Region</td>
<td></td>
</tr>
</tbody>
</table>

### Building project
- Building project:  
- Street/Road:  
- Zip code & place:  

### Planner’s/Designer’s address
- Design Company:  
- Street/Road:  
- Zip code & place:  
- Person in charge:  
- Phone No.:  
- Fax No.:  
- E-Mail:  

### Planning implementation
- DIN 1986-100:2002-03  
- DIN EN 12056-3  
- VDI 3806  
- EN 752 (Drainage system outside buildings)  

### Technical construction data
- Building dimensions / roof area to be drained  
  - Width: \( m \)  
  - Length: \( m \)  
- Upper edge of the roof inlet (roof sealing): \( m \)  
- Height of the collector: \( m \)  
- Connecting points for the drain spouts  
- Backflow level: ± 0.00 upper edge of the FFB or: \( m \)  
- Type of the drainage pipes (material and nominal diameter)  

### Building plans attached
- Floor plan - plan or sketch  
- Section or sketch  
- Detail of the roof structure or sketch  
- Drainage system - plan or sketch  

### Drainage coefficient acc. to DIN 1986-100:2002-03
- Roof surface: \( C = 1.0 \)  
- Gravel roofing: \( C = 0.5 \)  
- Roof vegetation extensive less than 10 cm: \( C = 0.5 \)  
- Roof vegetation extensive from 10 cm: \( C = 0.3 \)  
- Roof vegetation intensive: \( C = 0.3 \)  
- Reverse roof: \( C = 1.0 \)  
- Passenger deck, bituminous pavement: \( C = 1.0 \)  
- Wind effects EN 12056-3, section 4.3.4 (wall surfaces)  

### Rain event
- Local rain event \( r \) \((5/2)\): \( l/(s \times ha) \)  
- Heavy local rain event \( r \) \((5/100)\): \( l/(s \times ha) \)
## Questionnaire for LORO DRAINJET®- siphonic drainage systems

### Roof sealing

<table>
<thead>
<tr>
<th>Sealing sheet</th>
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<tr>
<td>bitumen</td>
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<tr>
<td>plastic sheet material</td>
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<tr>
<td>with fiber reinforcement</td>
<td></td>
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<tr>
<td>without fiber reinforcement</td>
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</table>

### Type of piping

<table>
<thead>
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<th>Piping system installed</th>
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<tbody>
<tr>
<td>LORO - X steel drainage pipe</td>
<td></td>
</tr>
<tr>
<td>LORO - compound pipe - standard design</td>
<td></td>
</tr>
<tr>
<td>LORO - compound pipe - silent design</td>
<td></td>
</tr>
</tbody>
</table>

### Drainage type

<table>
<thead>
<tr>
<th>LORO - DRAINJET® siphonic drainage system</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>single drainage</td>
<td></td>
</tr>
<tr>
<td>two-piece drainage</td>
<td></td>
</tr>
<tr>
<td>for flat roofs</td>
<td></td>
</tr>
<tr>
<td>for box gutters (trough gutter) (minimum gutter width 300 mm)</td>
<td></td>
</tr>
<tr>
<td>reverse roof (with VERSAL siphonic drainage only)</td>
<td></td>
</tr>
<tr>
<td>parking deck, passable</td>
<td></td>
</tr>
<tr>
<td>without thermal insulation</td>
<td></td>
</tr>
<tr>
<td>with thermal insulation</td>
<td></td>
</tr>
<tr>
<td>with thermal insulation and heating</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Accessories</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>inspection shaft to be installed in the roof vegetation</td>
<td></td>
</tr>
<tr>
<td>gravel catchment basket</td>
<td></td>
</tr>
</tbody>
</table>

| LORO - RAINSTAR® Attika siphonic drainage system |  |

### Emergency gully

| LORO - DRAINJET® emergency drainage system |  |
| LORO - RAINSTAR® Attika emergency drainage system |  |
| via Attika breakthrough                    |  |

### Roof structure

<table>
<thead>
<tr>
<th>Type of roof sheeting</th>
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<tbody>
<tr>
<td>Type of heat insulation</td>
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<tr>
<td>Thickness of the heat insulation</td>
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<tr>
<td>Vapor barrier n-design</td>
<td></td>
</tr>
<tr>
<td>Trapezoidal metal sheet</td>
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</tr>
<tr>
<td>Concrete roof</td>
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</table>

### Pipe fixing clamps

<table>
<thead>
<tr>
<th>Pipe clamp with insert</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe clamp without insert</td>
<td></td>
</tr>
</tbody>
</table>

### Preparation

<table>
<thead>
<tr>
<th>Drainage application</th>
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</thead>
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<tr>
<td>Draft invitation to bid</td>
<td></td>
</tr>
</tbody>
</table>

### Recorded by:

<table>
<thead>
<tr>
<th>Date:</th>
<th></th>
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</thead>
</table>
Example of a tender text:

**Roof drainage by siphonic action system**

Patented drainage system for rainwater drainage from all roof types.

The system works with a fullness degree of 1. All horizontal pipes can be laid without inclination.

The dimensions are based on the VDI guideline VDI 3806-2000-04, on DIN 1986-100:2002-03 and on DIN EN 12056.

To be installed in accordance with DIN EN 12056-3, section 6.2.13

The rainwater drainage system shall be installed in accordance with the planning assumptions. The effects of any deviations from the specifications and from the system as it is actually installed shall be calculated, and suitable measures for compensating these deviations shall be taken.

Please make sure after the LORO-DRAINJET® syphonic drainage systems have been installed that no insulation or packaging materials or any other loose materials remain on the roof surface, as they might soil and contaminate the drainage system. The system shall be maintained in accordance with DIN 1986, part 30.

Supplier: LOROWERK

K. H. Vahlbrauk GmbH & Co. KG
D-37581 Bad Gandersheim
Telefon +49 (0) 53 82 710
Telefax +49 (0) 53 82 712 03
e-mail: infocenter@lorowerk.de

System technology: LORO-DRAINJET® siphonic drainage system tested in accordance with DIN EN 1253

Only original LORO-DRAINJET® system components must be used.

Please refer to the relevant leaflets for the product segments of LORO-X steel drain pipes and LORO combination pipes.
Example of a tender text:

**LORO-DRAINJET® siphonic gullies, DN 70 and DN 100, with clamping flange**

LORO-DRAINJET® siphonic gully according to DIN EN 1253, with clamping flange, swivel or fixed flange assembly suitable for bituminous, plastic or unvulcanized rubber sheets or box gutters (trough gutter)

**Single-piece** design consisting of:
base unit made of stainless steel, pickled with swivel flange and compression sealing, DRAINJET® cover, stainless steel, pickled

**without thermal insulation**
Art. No. 21111.070X DN 70
Art. No. 21111.100X DN 100

**with thermal insulation**
Art. No. 21112.070X DN 70
Art. No. 21112.070X DN 100

**with thermal insulation and heating**
Art. No. 21113.070X DN 70
Art. No. 21113.070X DN 100

supply assembly

**LORO-DRAINJET® siphonic gullies, DN 70 and DN 100, with clamping flange**

LORO-DRAINJET® siphonic gully according to DIN EN 1253, with clamping flange, swivel or fixed flange assembly suitable for bituminous, plastic or unvulcanized rubber sheets or box gutters (trough gutter)

**Two-piece** design,
setting range 60-200 mm
consisting of:
base unit made of stainless steel, pickled with swivel flange and compression sealing, DRAINJET® cover, stainless steel, pickled, base unit made of stainless steel, pickled, with swivel flange and compression sealing

**without thermal insulation**
Art. No. 21121.070X DN 70
Art. No. 21121.100X DN 100

**with thermal insulation**
Art. No. 21122.070X DN 70
Art. No. 21122.070X DN 100

**with thermal insulation and heating**
Art. No. 21123.070X DN 70
Art. No. 21123.070X DN 100

supply assembly

Please refer to the relevant leaflets for the product segments of LORO-X steel drain pipes and LORO combination pipes.
Example of a tender text:

LORO-DRAINJET® siphonic gully, DN 70 and DN 100, with clamping flange, as emergency gully

LORO-DRAINJET® siphonic gully according to DIN EN 1253, with clamping flange, swivel or fixed flange assembly suitable for bituminous, plastic or unvulcanized rubber sheets or box gutters (trough gutter)

**Single-piece** design consisting of:
- base unit made of stainless steel, pickled with swivel flange and compression sealing,
- DRAINJET® cover, stainless steel, pickled

without thermal insulation
- Art. No. 21311.070X DN 70
- Art. No. 21311.100X DN 100

with thermal insulation
- Art. No. 21312.070X DN 70
- Art. No. 21312.100X DN 100

with thermal insulation and heating
- Art. No. 21313.070X DN 70
- Art. No. 21313.100X DN 100

supply assembly

LORO-DRAINJET® siphonic gully, DN 70 and DN 100, with clamping flange, as emergency gully

LORO-DRAINJET® siphonic gully according to DIN EN 1253, with clamping flange, swivel or fixed flange assembly suitable for bituminous, plastic or unvulcanized rubber sheets or box gutters (trough gutter)

**Two-piece** design, setting range 60-200 mm consisting of:
- base unit made of stainless steel, pickled with swivel flange and compression sealing,
- DRAINJET® cover, stainless steel, pickled, base unit made of stainless steel, pickled, with swivel flange and compression sealing

without thermal insulation
- Art. No. 21321.070X DN 70
- Art. No. 21321.100X DN 100

with thermal insulation
- Art. No. 21322.070X DN 70
- Art. No. 21322.100X DN 100

with thermal insulation and heating
- Art. No. 21323.070X DN 70
- Art. No. 21323.100X DN 100

supply assembly

Please refer to the relevant leaflets for the product segments of LORO-X steel drain pipes and LORO combination pipes.
**Example of a tender text:**

<table>
<thead>
<tr>
<th>LORO-RAINSTAR® Attika gully, DN 70 and DN 100, with clamping flange</th>
</tr>
</thead>
<tbody>
<tr>
<td>LORO-RAINSTAR® Attika gully according to DIN EN 1253, as loose and fixed flange construction, <strong>for bituminous roofing sheets</strong>, made of steel, hot-dip galvanized, with additional internal coating and DRAINJET® cover made of stainless steel,</td>
</tr>
<tr>
<td>Art. No. 01380.070X DN 70</td>
</tr>
<tr>
<td>Art. No. 01380.100X DN 100</td>
</tr>
<tr>
<td>supply assembly</td>
</tr>
</tbody>
</table>

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<tbody>
<tr>
<td>LORO-RAINSTAR® Attika gully according to DIN EN 1253, as loose and fixed flange construction, <strong>for plastic roofing sheets</strong>, made of steel, hot-dip galvanized, with additional internal coating and DRAINJET® cover made of stainless steel,</td>
</tr>
<tr>
<td>Art. No. 01382.070X DN 70</td>
</tr>
<tr>
<td>Art. No. 01382.100X DN 100</td>
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<tr>
<td>supply assembly</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LORO-RAINSTAR® Attika gully, DN 70 and DN 100, with clamping flange, as emergency gully</th>
</tr>
</thead>
<tbody>
<tr>
<td>LORO-RAINSTAR® Attika gully according to DIN EN 1253, as loose and fixed flange construction, <strong>for bituminous roofing sheets</strong>, made of steel, hot-dip galvanized, with additional internal coating and DRAINJET® cover made of stainless steel,</td>
</tr>
<tr>
<td>Art. No. 01381.070X DN 70</td>
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<tr>
<td>Art. No. 01381.100X DN 100</td>
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<tr>
<td>supply assembly</td>
</tr>
</tbody>
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<thead>
<tr>
<th>LORO-RAINSTAR® Attika gully, DN 70 and DN 100, with clamping flange, as emergency gully</th>
</tr>
</thead>
<tbody>
<tr>
<td>LORO-RAINSTAR® Attika gully according to DIN EN 1253, as loose and fixed flange construction, <strong>for plastic roofing sheets</strong>, made of steel, hot-dip galvanized, with additional internal coating and DRAINJET® cover made of stainless steel,</td>
</tr>
<tr>
<td>Art. No. 01383.070X DN 70</td>
</tr>
<tr>
<td>Art. No. 01383.100X DN 100</td>
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<tr>
<td>supply assembly</td>
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</table>

Please refer to the relevant leaflets for the product segments of LORO-X steel drain pipes and LORO combination pipes.
## References

**List of references (selection):**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Location/Description</th>
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<tbody>
<tr>
<td>Bremen airport</td>
<td>Extension</td>
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<tr>
<td>Arena &quot;Auf Schälke&quot;</td>
<td>New stadium</td>
</tr>
<tr>
<td>Audi</td>
<td>New building</td>
</tr>
<tr>
<td>BAYER UERDINGEN</td>
<td>New high-rack storage facility</td>
</tr>
<tr>
<td>BAYERISCHE VEREINSBANK</td>
<td>New building</td>
</tr>
<tr>
<td>Braun</td>
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<tr>
<td>CINEMAXX</td>
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<tr>
<td>Coca-Cola</td>
<td>New production facility</td>
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<td>DACHDECKEREINKAUF West</td>
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<tr>
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<tr>
<td>Deutsche Star</td>
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<tr>
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</tr>
<tr>
<td>EXPO arena</td>
<td>Extension</td>
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<tr>
<td>Mac West airport</td>
<td>New facility</td>
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<tr>
<td>Flyline</td>
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<td>International school</td>
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<td>KÄSSBOHMER</td>
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<td>New production facility</td>
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<td>MERCEDES-BENZ AG</td>
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<td>MERCEDES-BENZ AG</td>
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<td>MERCEDES-BENZ AG, NDL</td>
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<td>Museum of Ulm</td>
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<tr>
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<td>WESTMILCH</td>
<td>Extension</td>
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<tr>
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<tr>
<td>Zwischenlager Nord</td>
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