

BIRCOsolid | Installation Instructions

A number of details must be observed when installing BIRCOsolid box and slot channels. Here is a general description.

To guarantee smooth operation and compliance with the requirements in accordance with DIN EN 1433, the following general valid installation instructions must be observed:

1. Prior to installation, the correct load class in accordance with DIN EN 1433 must be selected.
2. **Thanks to the high level of stability, laying the BIRCOsolid channels is conducted on an earth-moist C 25/30 / C 30/37 concrete strip (with grid channels at least 15 cm high; with slot channels at least 70 cm high) which must be tapered in a conical shape on both sides. No encasing or reinforcement on the sides is necessary.**
3. The channel parts may only be positioned or transported on the laying sleeves/laying spades designed for this purpose. The corresponding special hangers/laying spades can be purchased from BIRCO. A cross-beam is to be used when moving in order to avoid a diagonal pull of the steel cable.
4. **All adjoining pavement surfaces must run permanently at a level of some 3 to 5 mm higher than the upper edge of the channel.** A 10 mm joint must be provided with pavement or plate coverings to avoid flaking in the edge area. In order to achieve this, we recommend laying the first two to three rows of pavement surfacing in the mortar bed.
5. For installation in concrete surfaces or reinforced concrete constructions, running joints must be provided on both sides to compensate horizontal forces that emerge. In sealing the adjacent areas it must be ensured that there is no mechanical damage to the channel units. Joints running diagonally to the channel line must be arranged every 4 – 6 metres in the adjacent concrete surfaces (in-situ concrete) so that they run through a channel end.
6. BIRCOsolid drainage units are to be fitted with a sealing joint at the channel joint. The sealing joint must be

grouted with jointing material (such as BIRCOplast) in accordance with the official water legislation-related approval certification (see also page 79).

7. Proceed analogously when installing the outfall units.
8. Local particularities can require special installation methods that have to be examined and taken into account by the planner(s). The installation must comply with the latest regulations and guidelines such as ZTVT, ZTV concrete, ZTV bit and RStO. In addition, the requirements according to the official building authority approval regarding installation, verification and maintenance additionally apply.

Additional requirements:

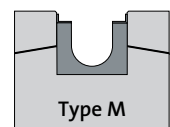
- + The laying and sealing work must be conducted by an authorised company specialising in such work (in accordance with regulation on facilities for handling water-hazardous substances §3). In addition to these installation instructions, also observe the technical details (jointing) and the usage instructions on the BIRCO-Primer and BIRCOplast containers.
- + Construction in accordance with the Construction Tendering and Contract Regulations (VOB) Part C, DIN 18318 "Transport Route Construction".
- + Additional technical regulations and guidelines for pavement surfaces in road construction (ZTVT-StB) and ZTV Asphalt.
- + Addition technical regulations and guidelines for ground work in road construction (ZTVE-StB).
- + Guidelines for the standardisation of the pavement of public thoroughfares (RStO).
- + Preparation of the ATV DIN 18299 performance description "General Regulations for Construction Work of all Types".

i Distinction between 2 types

- + **Type I:** Requires no load-bearing foundation and/or no encasing: for example BIRCOsolid grid channel.
- + **Type M:** Requires a load-bearing foundation and/or encasing: for example BIRCOprotect.



Type I



Type M

Installation instructions in accordance with DIBt certification

Installation instructions for traffic areas where substances accrue that are hazardous to water. Fuel depots | Extinguishing-water collection points | Chemical companies | Storage, filling and transferring facilities for water-hazardous substances

General information

1. The installation of BIRCOsolid may in Germany only be conducted by companies that specialise in such activities in accordance with Regulation on facilities for handling water-hazardous substances §3. These companies, including their personnel, must have been trained to do such work by an authorised institution. Specific national requirements must be verified locally.
2. The installation of BIRCOsolid requires compliance with BIRCO's installation and processing instructions. The requirements specified in the general WHG certification regarding installation, maintenance and verification must be observed to the letter.
3. The installation of the channel systems must be conducted from on the basis of engineering considerations. Construction documentation must be prepared. The design of any facilities for storing, filling and transferring liquids hazardous to water must take the respectively applicable water legislation provisions governing drainage and the control of precipitation water into account.
The requirements from other legal sectors (e.g., work safety, hazardous materials legislation, the German Ordinance on Industrial Safety and Health) remain unaffected and in full effect.
4. Liquids hazardous to water that have escaped must be recognised as quickly as possible, in any case no later than within 72 hours, and removed from the channel systems. Transferring and filling procedures must always be visually monitored for leakages. Should leakages be discovered, measures to eliminate them must be undertaken.
5. The channel systems must be cleaned of dirt and collected mixtures of dirt and liquids hazardous to water. Cleaning of the channel systems also includes cleaning of the outfall units or silt buckets.
3. The joints between pre-fabricated parts of the channel systems and between pre-fabricated parts and the surfaces to be sealed must be grouted using a joint sealing system that has general official certification or which is technically certified in Europe for the intended purpose.
4. Prior to laying the pre-fabricated parts, it must be established that the documentation corresponds with the requirements.
5. The pre-fabricated parts must be laid flush onto the concrete base layer.
6. Damaged concrete pre-fabricated parts may not be used.
7. When applying joint sealant, it must be ensured that there is a sealant connection between diagonal joints and longitudinal joints.
8. When laying pre-fabricated parts, drawings verifying the correct assembly are to be prepared by the construction supervisor or his/her representative.

Regulations for use, upkeep and maintenance

1. We refer expressly here to the necessity for operators of facilities for the storage, filling and transfer of substances that can be hazardous to water to conduct constant monitoring of the seal tightness, respectively, the functionality of the pre-fabricated parts in accordance with Regulation on facilities for handling water-hazardous substances §1.
2. After each contact with hazardous agents, the channel systems must first be visually inspected in regard to their functionality. If necessary, additional measures must be undertaken.
3. The operator of the facility is obligated to appoint only such companies to conduct maintenance, repair and cleaning of the pre-fabricated parts as are specialist businesses as defined by Regulation on facilities for handling water-hazardous substances §3 and which are referred for such work by the manufacturer, unless the required work is exempted from this obligation in accordance with applicable state legislative provisions.
4. The general maintenance instructions contained in the BIRCOsolid grid channels/slot channels installation instructions continue to apply.

Installation

1. The installation instructions contained in the general DIBt certification, respectively, in the installation instructions prepared by BIRCO, must be complied with. System components may not be replaced with components that are not part of the system.
2. Installation must be conducted in accordance with the construction drawings, respectively, with the installation instructions. Particularities of the location can require special types of installation which must be examined and taken into account by the planner(s).

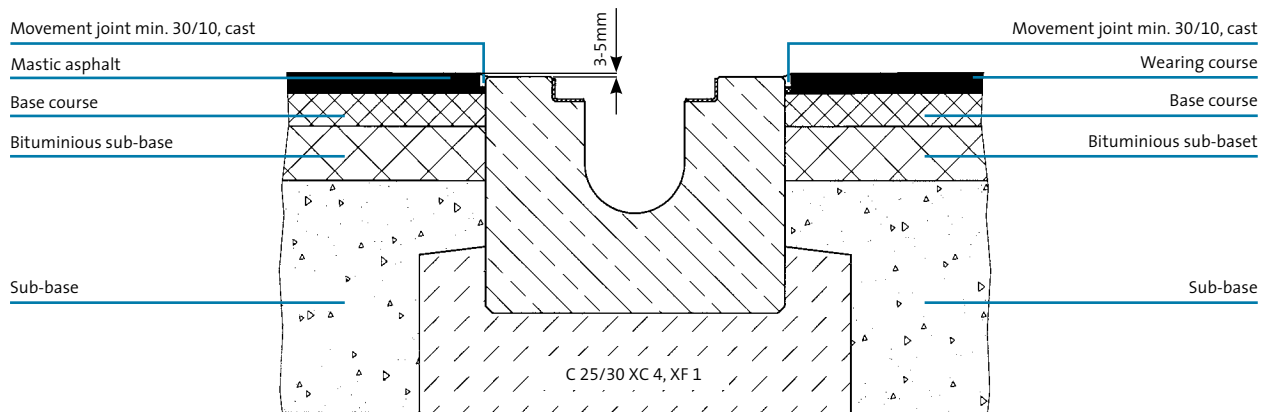


BIRCOsolid grid channels – Installation Examples

Installation instructions for heavy-duty transport areas with frequent traffic.
 Logistics centres | Transport hubs | Vehicle manoeuvring | Aircraft pavements

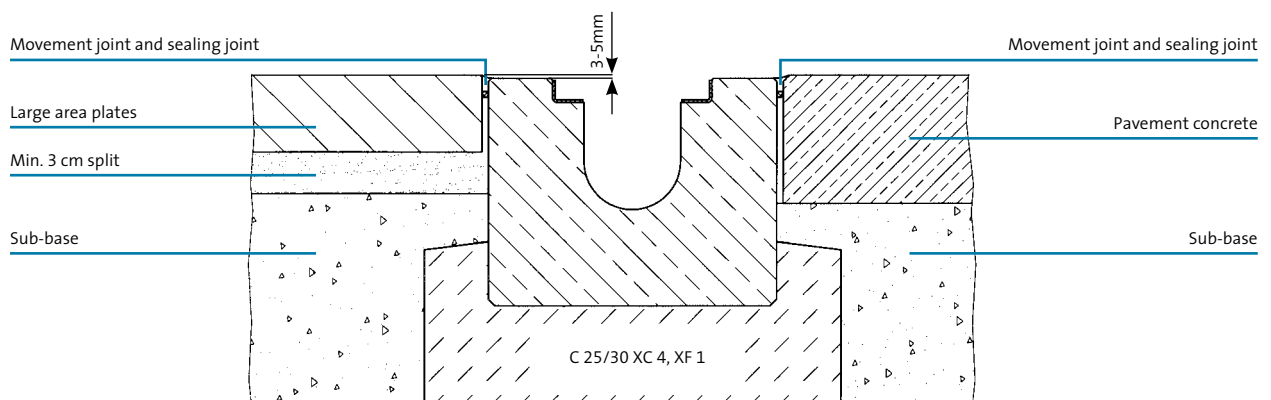
Up to class F 900, Type I, NW 150 - 300

Drawing No. 6687



Up to class F 900, Type I, NW 150 - 300

Drawing No. 6687



When pavement surfaces are being laid and pressed, it must be ensured that the pavement material is not forced against the concrete units.

BIRCOsolid must be embedded on a concrete bed (min. C 25/30 XC 4, XF 1) at least 15 cm thick. Overhang on the side must be at least 10 cm. The subgrade must be sealed with an EV_2 of > 45 N/mm if the concrete bed maintains an overhang of > 50 cm at the end of the channel. Otherwise, an EV_2 of > 180 N/mm must be maintained or it must be ensured that a distance of > 50 cm to the end of the channel is maintained when lorries drive over the channel.

Bolting instructions:

Torque moments for fastening of the gratings are to be set at M12 = 60 Nm, M16 = 100 Nm. The bolts on the gratings must be retightened at regular intervals.

Constructed in accordance with RSTO using non-settling frost-free sub-bases. See Page 76 for installation dimensions.

Exception starting with D 400: not for installation diagonally to the road for motorways and expressways.

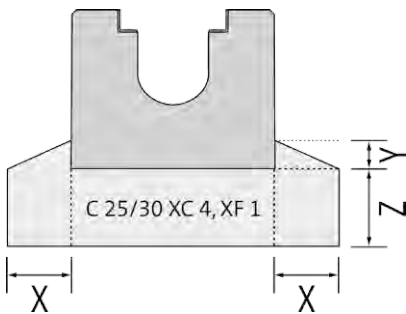


BIRCOsolid overview

The manufacturer’s installation instructions must be followed in order to comply with the requirements stipulated by DIN EN 1433. The requirements according to the official certification by DIBt apply in regard to installation, verification and maintenance.

BIRCOsolid

NW	Type	Load class	X	Y/Y 1	Y 2	Z	Drawing No-	Page
BIRCOsolid 150	I	D 400 – F 900	≥ 100	≥ 150	-	≥ 150	6687	74
BIRCOsolid 200	I	D 400 – F 900	≥ 100	≥ 150	-	≥ 150	6687	74
BIRCOsolid 300	I	D 400 – F 900	≥ 100	≥ 150	-	≥ 150	6687	74
BIRCOsolid slot channel	I	D 400 – F 900	≥ 125	≥ 100	-	≥ 700	8742	75



Installation without concrete surround

BIRCOsolid Drainage capacities

BIRCO channel systems provide outstanding drainage performance. BIRCO offers a calculation service in addition to this diagram.

BIRCOsolid NW 150

	Drainage capacity at the channel end	Cross-sectional area at the channel end
No. 0/0	12.66 l/sec*	227.86 cm ²

BIRCOsolid NW 200

	Drainage capacity at the channel end	Cross-sectional area at the channel end
No. 0/0	22.39 l/sec*	403.08 cm ²

BIRCOsolid NW 300

	Drainage capacity at the channel end	Cross-sectional area at the channel end
Construction height 1	55.5 l/sec*	999.34 cm ²
Construction height 2	83.2 l/sec*	1479.38 cm ²

BIRCOsolid slot channel

	Drainage capacity at the channel end	Cross-sectional area at the channel end
Profile 200/300	31.3 l/sec*	563.0 cm ²

*Safety factor $\nu = 1.2$

The tables can only give guidelines for the dimensioning. On-site conditions such as position of the manholes already installed, number of channel lines etc. cannot and have not been taken into account. We therefore recommend making use of our hydraulic calculation service which provides you with a draft proposal.



Hole drilling horizontal and vertical

We can fit BIRCOsolid channels with horizontal or vertical bore holes for directly fitting feed and drainage lines according to your plans. The connections available differ according to the nominal widths, ranging from DN 150 to DN 300. The diameters are matched with channel base pipes;

different pipes are available upon request. Upon request the design of the pipe connection can also be supplied with double walls. Standard components from specialist retailers are also available for the junction between the sealed PE pipe and stoneware or PVC pipe.

BIRCOsolid

NW	Bore hole horizontal, maximal	Bore hole, vertical, maximal
Grid channel 150 mm	DN 150	DN 150
Grid channel 200 mm	DN 150	DN 200
Grid channel 300 mm	DN 300	DN 300
Slot channel Profile 200/300	DN 150	DN 200

Bore holes must be a distance of at least 100 mm away from the end of the channel.

Everything for jointing – Information

Look here to find a comprehensive description of jointing the channel joints and of cleaning and maintenance.

Sealants, tools

We supply everything you need to guarantee seal tightness and system safety for BIRCOsolid. This also includes a complete program with filler cord, special primers, jointing

materials and a preparation set. BIRCO customers profit from complete solutions that are genuinely complete.

Sealants

- + **BIRCO-Primer K1** for non-absorbent surfaces such as glass, enamel, stainless steel, galvanised steel, ceramic tiles, etc.
- + **BIRCO-Primer K2** for absorbent surfaces such as concrete, autoclaved aerated concrete, stone, plaster, etc.
- + **BIRCOplast**, is a dual-component, permanently elastic polysulfide-based sealant mass that is resistant to mineral oil and fuels
- + **PE-cord**

Tools

- + Tool cleaner
- + Hand mixer
- + Grouting gun
- + Spiral stirrer
- + **Work Set** includes a grouting gun with 3 nozzles, hand mixer (stand pipe and foot), spiral stirrer

Material requirements diagram

For the channel joint

NW	Construction length	Cord length	BIRCOplast	BIRCO-Primer K2
150	1 m	723 mm	133.0 ml	15 ml
150	1.5 m	723 mm	133.0 ml	15 ml
150	4 m	723 mm	133.0 ml	15 ml
200	1 m	920 mm	169.0 ml	19 ml
200	1.5 m	920 mm	169.0 ml	19 ml
200	4 m	920 mm	169.0 ml	19 ml
300 Ch 1	1 m	1305 mm	294.0 ml	39 ml
300 Ch 1	2 m	1305 mm	294.0 ml	39 ml
300 Ch 2	1 m	1645 mm	371.0 ml	49 ml
300 Ch 2	2 m	1645 mm	371.0 ml	49 ml
Slot channel	4 m	1269 mm	286.0 ml	39 ml

For the one-sided channel longitudinal joint* per metre

NW	Construction length/ Cord length	BIRCOplast	BIRCO-Primer K1/K2
150	1 m	256.0 ml	20 ml
150	1.5 m	384.0 ml	30 ml
150	4 m	1024.0 ml	80 ml
200	1 m	256.0 ml	20 ml
200	1.5 m	384.0 ml	30 ml
200	4 m	1024.0 ml	80 ml
300 Ch 1	1 m	537.0 ml	30 ml
300 Ch 1	2 m	1074.0 ml	60 ml
300 Ch 2	1 m	537.0 ml	30 ml
300 Ch 2	2 m	1074.0 ml	60 ml
Slot channel	4 m	1748.0 ml	80 ml

* With NW 100, 150: groove width 10 mm, groove depth 55 mm, sealant depth 40 mm, with NW 200: groove width 10 mm, groove depth 60 mm, sealant depth 45 mm and with NW 300, 400: groove width 10 mm, groove depth 70 mm, sealant depth 55 mm

Jointing with BIRCOplast

Jointing the channel joints | Two-flank adhesion

A secure seal

BIRCOsolid is manufactured from Class C 40/50 / C 30/37 concrete. The system panels are produced already fitted with a channel joint that has to be filled with sealant in accordance with the official DIBt certification. This ensures that no liquids contaminate the ground and groundwater. The sealing joint's special shape and the execution of the jointing work as described below allow for a better completed seal that complies with the jointing requirements of Data Sheet No. 6 from the IVD ('German Industrial Sealant Association'): two-flank adhesion.

The connecting joint between two channels is preferably back-filled with a PE cord. The back-filling material has to provide sufficient resistance once it has been installed and

the sealant is applied. This is why its diameter should be approximately 1/3 larger than that of the joint width.

The PE filling cord is required for the following reasons:

- + Avoiding three-flank adhesion
- + Restricting the joint depth

This process and jointing method are known from other operations including petrol station construction. (Sealing ground joints with elastic sealants in areas subject to vehicle traffic at petrol station filling facilities – On this refer also to IVD Data Sheet No. 6.)

Jointing with BIRCOplast



1. Channel groove at the tongue – prior to jointing



2. Preliminary priming



3. Inserting the PE sealing cord



4. Mixing the joint sealant



5. Applying the joint sealant



6. Smoothing the surface of the sealed joint

Conducting Jointing Work

The first step is to inspect the moisture content of the concrete components. It must be ensured that the adhesive surfaces are sufficiently dry for the sealant to form a proper bond, so no jointing work may be conducted during rain or the day after a rainy day. The temperature of the adhesive surface may not be below + 5° C and may not exceed + 40° C.

Procedure:

- Tape off the joint edges
- Pre-treat the adhesive surfaces with BIRCO-Primer K1 or K2
- Insert the round PE cord to avoid three-flank adhesion

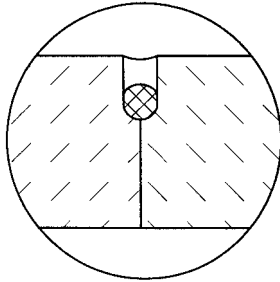
BIRCO-Primer K1 for non-absorbent surfaces (angles, metal, etc.), BIRCO-Primer K2 for absorbent surfaces (channel, concrete, etc.). BIRCOplast may only be used in combination with the appropriate primer. The primer must be applied onto the joint flanks in an even, equally distributed layer with no empty spaces. When using a brush to apply the primer, ensure that concrete pores are sufficiently treated and filled completely; the primer film cannot be allowed to tear over slightly raised areas. The primer may also be applied with suitable spraying devices.

Comparison of two-flank / three-flank adhesion

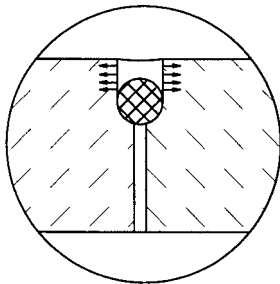
Work materials expand or contract due to temperature fluctuations, but the sealant only allows for maximum

expansion of 25%. If this value is exceeded, the material tears.

Two-flank adhesion

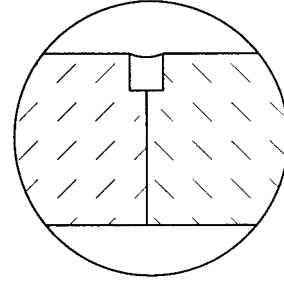


With two-flank adhesion, the jointing material is only connected with the concrete on two sides above the inserted round PE cord. This ensures the full elasticity of the sealant.

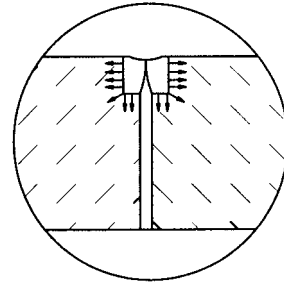


This means that local settling and temperature-related expansion can be compensated.

Three-flank adhesion



With three-flank adhesion, the jointing material is connected with the concrete on three sides. Movement of the channels toward each other cannot be compensated in this way.



The jointing material can tear away from the lower flank.

Sealing work qualifications

In accordance with the provisions of the WHG and the presiding authorities, jointing work must be conducted by a company specialising in such work in accordance with Regulation on facilities for handling water-hazardous substances, respectively, by a company authorised to conduct

such work by the sealant manufacturer. This applies for all situations where the work is subject to German law. (A list of authorised jointing companies is available from BIRCO.) Specific national requirements must be verified locally.

Seal along the length of the channel

It is necessary to seal the junction between the channel and the pavement below the edge angle. When sealing the length of the channel, it must be ensured that the connection of the joint to be sealed is deep enough. This joint

must be so deep that once the filling cord has been inserted the sealant sufficiently covers and subsequently seals the junction from the channel to the edge angle.

Jointing bore hole connections

In order to ensure a tight seal, the pipe connection and the channel joints have to be jointed with BIRCOplast:

- + Position the laminated PE pipe in the bore hole
- + Use the PE cord as a centring aid and insert it in a ring shape for sealing
- + Treat the channel with BIRCO-Primer K2
- + Treat the PE pipe with BIRCO-Primer K1
- + Allow the primed surfaces to air out
- + Mix BIRCOplast and fill the joint

Jointing channels that have already been installed is an ideal situation, but the drainage pipe should be positioned prior to installation of the channels. A PVC pipe where the surface has been roughened can be sealed in the same way.

Load capacity of the sealant

At 23° C, BIRCOplast's curing time is around 24 hours. After this period has elapsed, the joint seal is capable of bearing loads and can be subjected to rolling traffic. In this regard,

please also observe the instructions that come with the jointing material and in the Safety Data Sheet.

Maintenance and repair

Sealing in the traffic area at petrol stations is intended to prevent automobile-related substances that are hazardous to water from making their way into surface water, any wastewater facilities or the ground. Inspection and maintenance on a regular basis is necessary for ensuring the long service life of the seal system. It is therefore necessary to conclude a maintenance contract. According to Regulation on facilities for handling water-hazardous substances §62 and 63, such facilities that are located within the jurisdiction of German civil law may only be installed, constructed, maintained and repaired by companies specialising in such

work. The qualification parameters for such a specialist company are precisely defined in the WHG.

To the extent that German civil law has no jurisdiction, the customer must clarify whether identical or similar regulations must be complied with and observed regarding the qualifications of the company conducting the laying work. In any case, inspection and maintenance conducted on a regular basis and secured by a maintenance contract are necessary.

Filling-point concrete surfaces that must be sealed

A petrol station's filling-point is a separate area (operating area). The area contains the automobile-related substance filling facilities.

The separation of the filling point to the adjacent areas is created by:

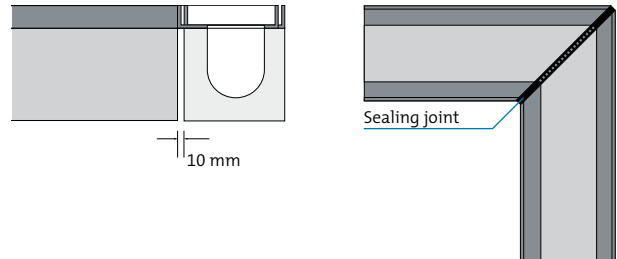
- + Channels (open or covered)
- + Upturn beams
- + Slope changes



Additional installation information: BIRCOsolid jointing possibilities

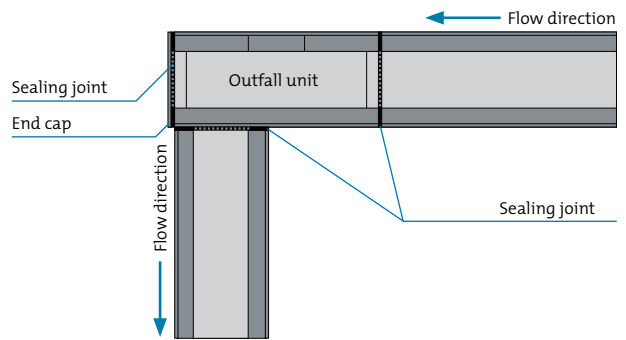
Corner solution using a mitre cut

This mitre cut is jointed in the accustomed procedure, so the mitre must have a gap of 10 - 14 mm held in place on a mitre piece by a spacer. The PE cord is pushed into this gap in such manner that a filling depth of approximately 10 mm is retained for the plastic.



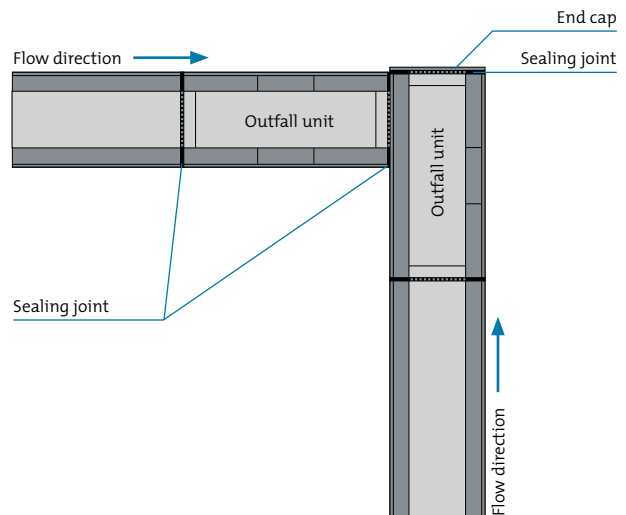
Corner solution with in-line outfall units

The drainage of a channel line is conducted here via an in-line outfall unit at the end of the channel. An additional line is pressed up against the side of the outfall unit. The gap that emerges is jointed in the accustomed procedure with sealant for BIRCOsolid. A connection to the in-line outfall unit from the side of the channel is inadvisable, since this would generate significant costs for special design production.



Drainage with two in-line outfall units as a corner solution

The outfall units are pressed up against one another with a gap of 7 mm. Jointing is conducted in the accustomed procedure.

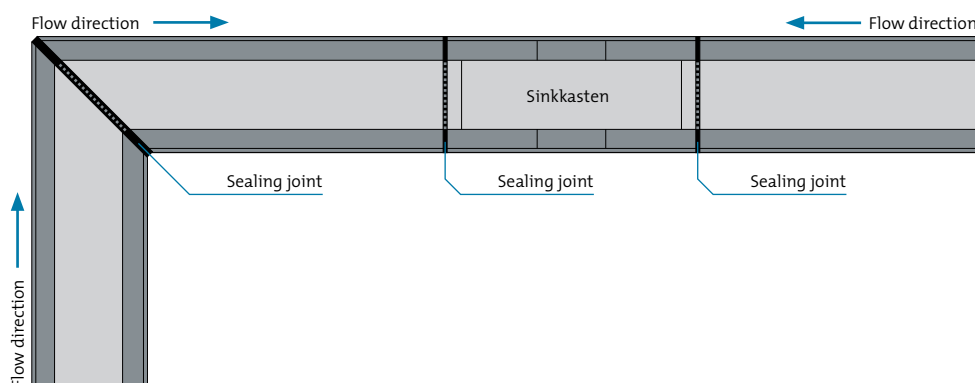


Additional installation information: BIRCOsolid

Drainage with two drainage lines in one outfall unit

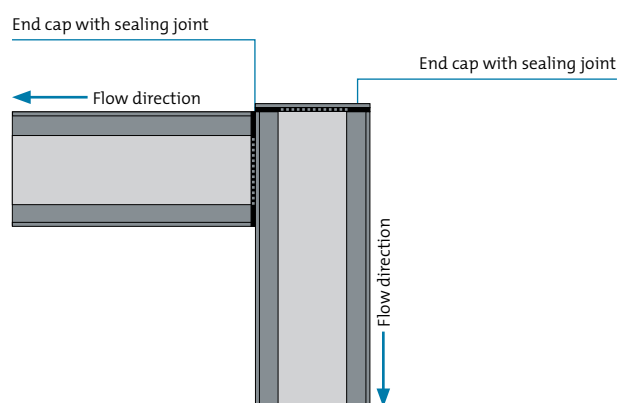
In-line outfall units are generally fitted with connection openings on two sides. BIRCOsolid in-line outfall units are available with connection heights of 0/0, 5/0 and 10/0.

For one-sided channel connection, the second connection opening can be closed with an end cap and sealed.



Attaching end caps

For proper sealing, the front sides of channels and outfall units must be cleaned and capable of bearing loads and the end caps must be cleaned of all oils and greases and roughened at the points of adhesion. BIRCO-Primer K1 must be applied to the end cap and BIRCO-Primer K2 must be applied to the concrete contact surface. Once this has dried, a layer of BIRCOplast that is approximately 5 mm thick must be applied with a putty knife to the concrete contact surface. The end cap is placed onto this and evenly pressed into it so that BIRCOplast comes out of the sides of the connection points. There must be a minimum adhesion thickness of 2 mm. The front walls must be fixed for 24 hours. The material squeezing out from the sides is then smoothed out with a putty knife on the external and internal surfaces.



Channel T-connections

For this, a bore hole is drilled into the side of a channel (diameter of the hole corresponds with the incoming channel profile). The incoming channel is placed at the drilled channel at a distance of 7 mm. With the 5 mm deep pre-shaped channel groove, a 10 mm wide gap emerges which is then jointed in the accustomed procedure.

