

MarkLED EXIT

Installation instructions



VERSION	MODIFICATIONS
1.0	First edition
1118	Add strands color
0319	Add self-sealing cable grommet (page 29)

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1 General information

1.1 Marking concept for hazards and hints

Hazard

Hazardous situation which will cause serious injury or even death if it is not prevented.

Caution

Hazardous situation which could cause slight to moderate injury if it is not prevented.

Hint

Indicates information which does not concern personal injury, e.g. hints in respect of material damage.

Protective measures

Increase safety by applying a protective measure.

1.2 Responsibilities of the operator

- Make sure that this document is always kept in a safe place in a legible form together with the product.
- Read these instructions carefully before first start-up of the product.
- This product has been developed and produced exclusively for the use indicated in these documents. Every other use, which is not mentioned explicitly, could affect the intactness of the product and/or could constitute a source of danger.
- The manufacturer rejects any liability for damage which has been caused by incorrect or non-intended use of the product.
- In countries, which do not belong to the European Community, the national legal reference regulations as well as the standards and regulations applicable in these countries have to be observed for warranty of a corresponding safety level.
- The installation has to be carried out according to the applicable regulations.
- The manufacturer assumes no liability for inexperienced execution of installation as well as deformations which may occur during operation.
- The electric power supply has to be switched off before executing any action on the installation.
- Exclusively original parts of the manufacturer shall be used for maintenance. Maintenance work may be carried out by qualified staff only.
- All procedures which are not explicitly mentioned by the manufacturer in the instructions are not permitted.
- The packing material must not be stored within the reach of children as it could be a potential source of danger.

2 Introduction

To ensure proper installation, the following steps and notes must be complied with under all circumstances. Only this way can it be ensured that the product will work to complete satisfaction.

Hint

Read all instructions before starting installation. Our sales department will be happy to answer any questions you may have.

2.1 Installation conditions MarkLED EXIT

The system installation of MarkLED EXIT also depends on a professional installation!

Improper work:

- Extensive warranty work due to improper works

We instruct you on each project site for the correct assembly, so that a proper function of the system MarkLED can be ensured!

The cable cross-section of the cable length must be adjusted to maintain the required operating voltage. Installation work in which adhesives or hot bitumen are used must not be carried out at carriageway temperatures below 5°C or above 30°C. For details on specifications, use and safety instructions, see the manufacturer's specifications.



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3 Required tools

3.1 Standard tool

Drill hammer



Concrete drill $\varnothing 9$ mm and $\varnothing 40$ mm
Item no. 191102



Pliers to cut off cables



Light barking pliers for system cables 2x2,5mm²



Hot-air gun



Compressed air for cleaning the groove and the bores



Hand press for 310ml cartridges

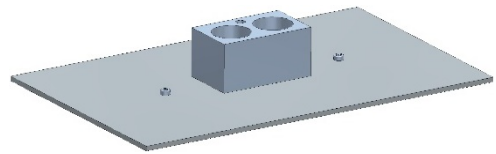


In order to ensure the correct polarity and thereby the function as early as the installation stage, we recommend using a supply voltage of 24VDC when connecting to the connection cables (if necessary, a 24V battery can also be used).

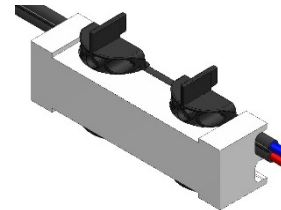


3.2 Auxiliary tool

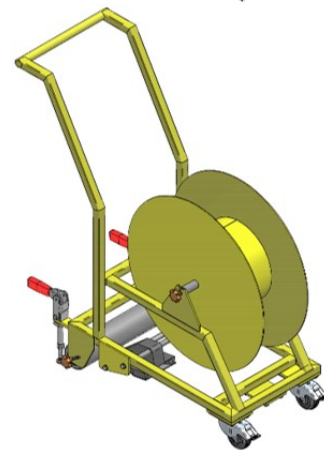
Drilling jig item no. 860600 for mounting bore $\varnothing 9$ mm and 2 installation bores current collector cone $\varnothing 40$ mm



Current collector holder item no. 860631 for an easy and precise connection of the two system cables to the MarkLED EXIT current collector



Trolley for sealing profile item no. 172211 (loan material GIFAS)



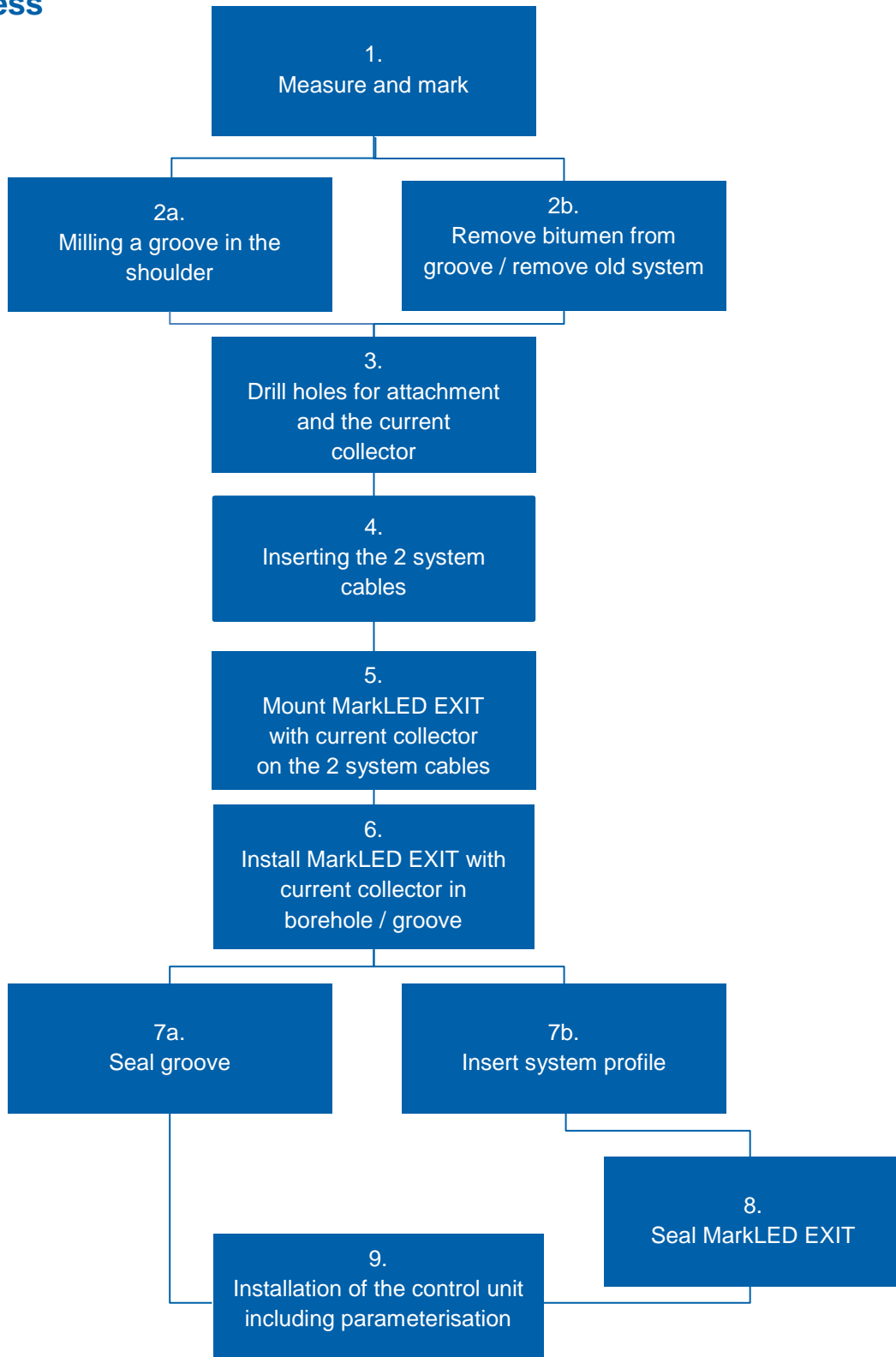
3.3 Consumables

Heat shrink tube with glue (6mm/2mm)
 Insulation tape 2 M Scotch no. 23, black
 Crimp connector 1.5-2.5 hot-shrinking Raychem, blue
 Solder connector 1.5-2.5 heat-shrinkable NSPA, transparent
 Device for unrolling cables
 Cable lug crimping pliers for press connector
 Head lamp, measuring tape, material/tool cart, etc.

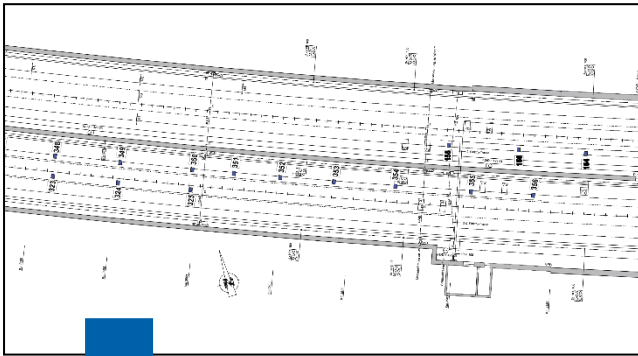
item no. 010300
 item no. 152743
 item no. 019875
 item no. 172745



4 Process

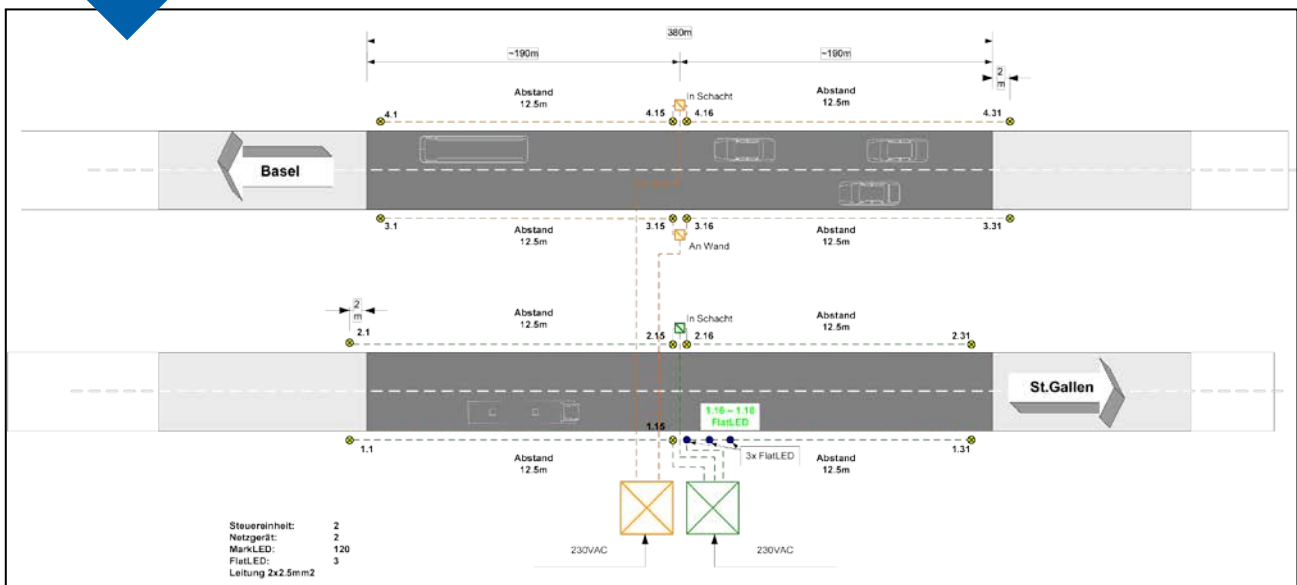


5 Installation



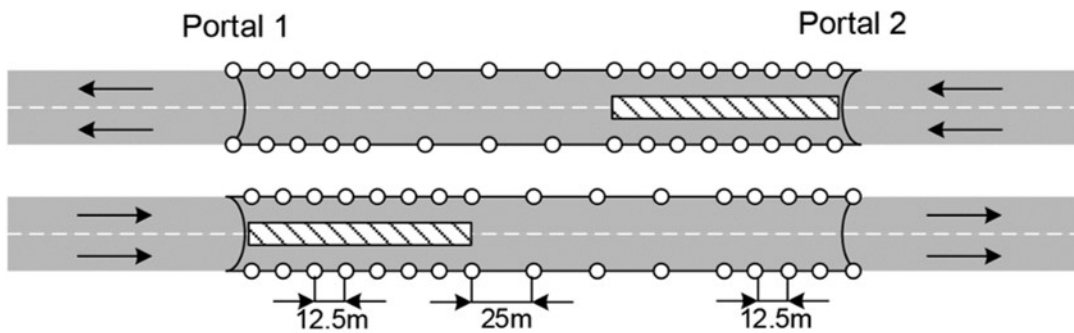
Example:

- Adaption area 12,5m
- Rest 25m

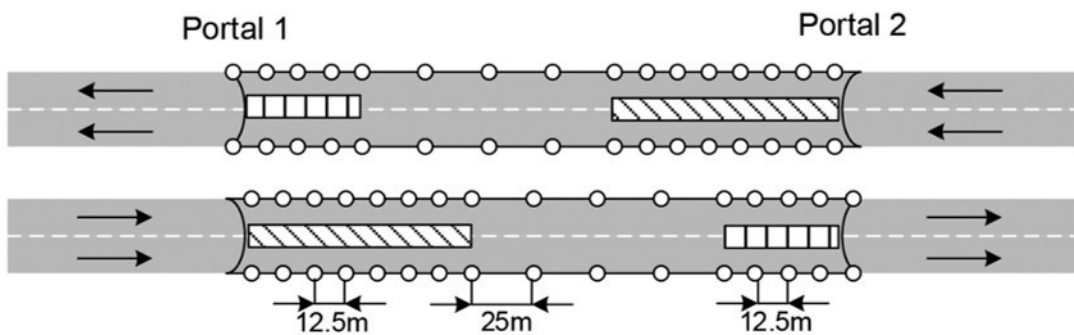


6 Electric power supply of the unit

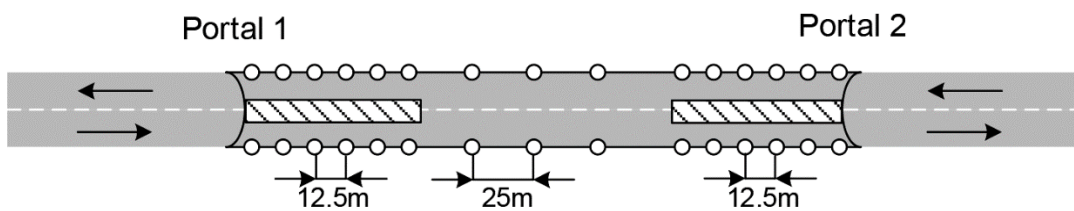
6.1 Two tubes without adaption zone in the opposite direction



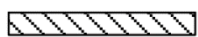
6.2 Two tubes with adaption zone in the opposite direction



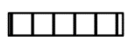
6.3 A tube with contraflow



Key:



Entry and crossover route

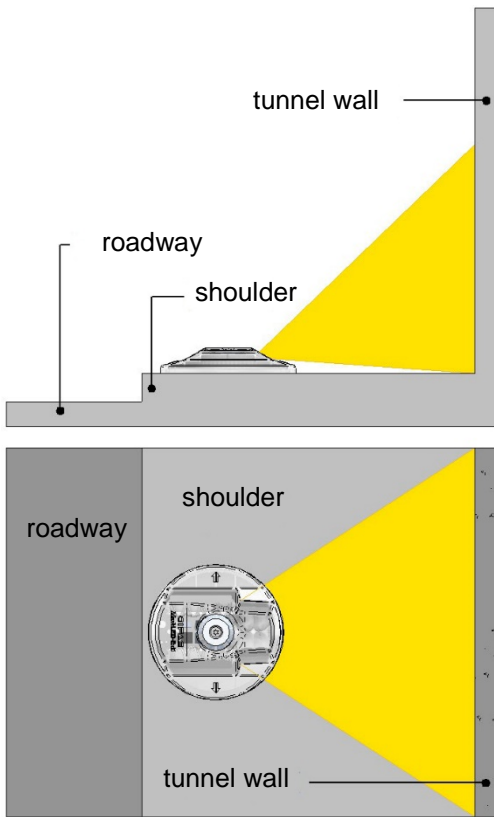


Entry and crossover route in the opposite direction



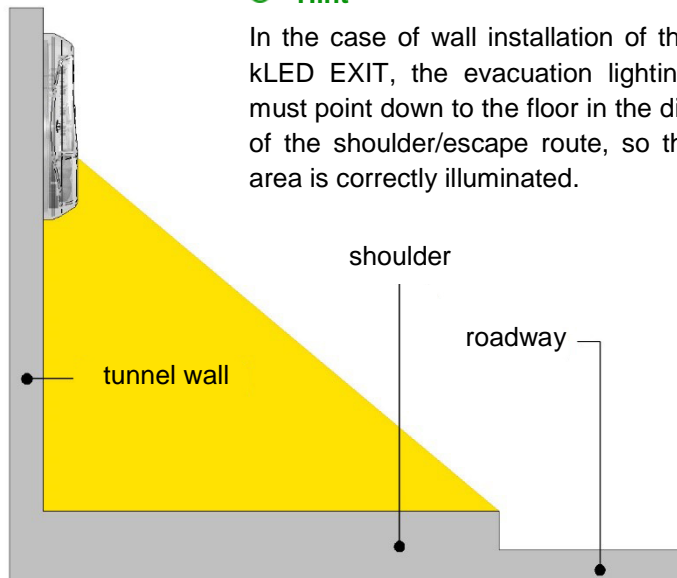
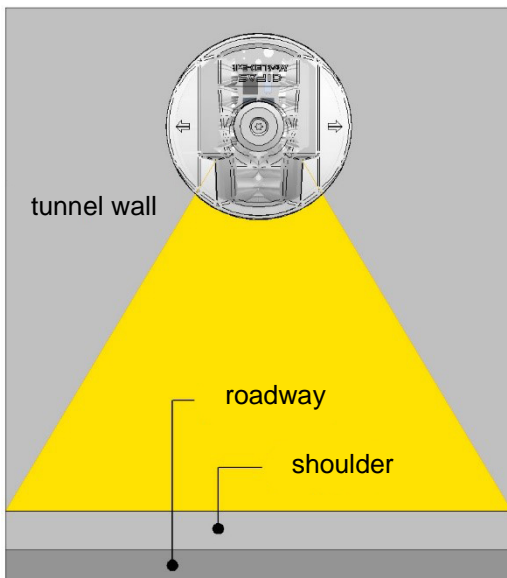
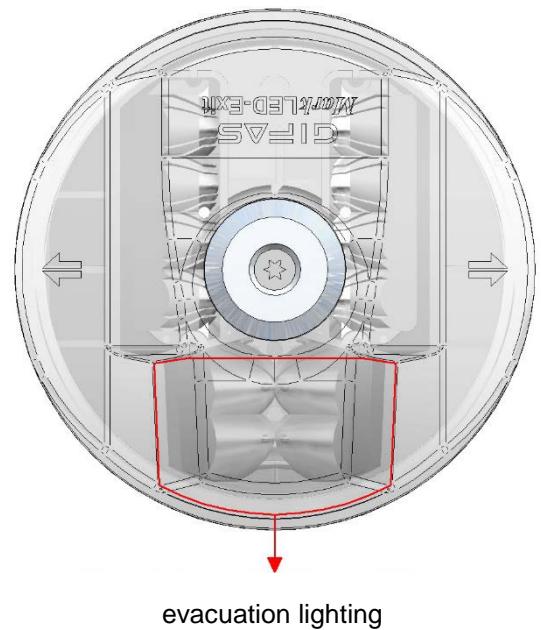
LED guidance system

7 Direction of beam evacuation lighting



Hint

In the case of shoulder installation of the MarkLED EXIT, the evacuation lighting area must point laterally in the direction of the tunnel wall, so that this area is correctly illuminated.



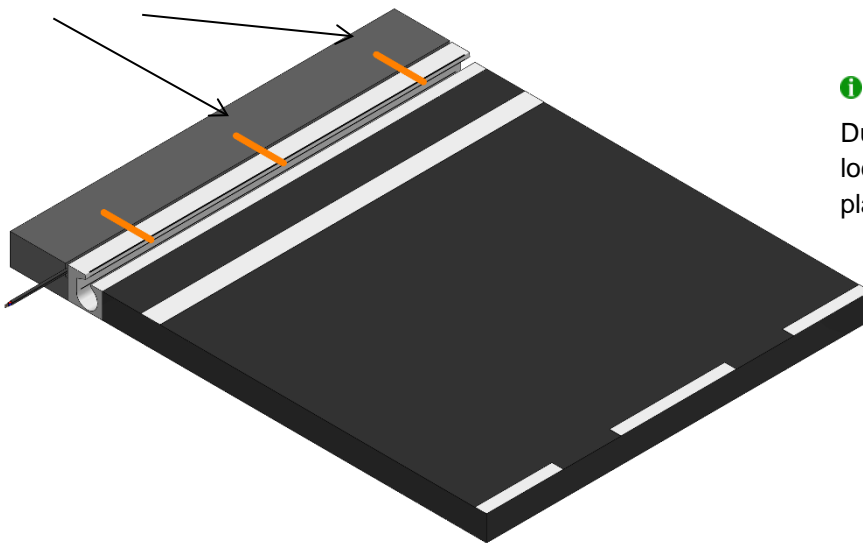
Hint

In the case of wall installation of the MarkLED EXIT, the evacuation lighting area must point down to the floor in the direction of the shoulder/escape route, so that this area is correctly illuminated.

8 Measuring of MarkLED EXIT placement with current collector

- Measuring of MarkLED EXIT placement with current collector
- The distance of the MarkLED EXIT (centre) to the tunnel wall must be between 0.5 m and 1 m.
- Recommendation:
 - Tunnel entrance (adaption): a MarkLED each 12.5 m (according to ASTRA/BAST regulations)
 - Middle of tunnel: a MarkLED each 25 m
 - Tunnel exit (adaption): a MarkLED each 12.5 m (according to ASTRA/BAST regulations)

colour markings



i Hint

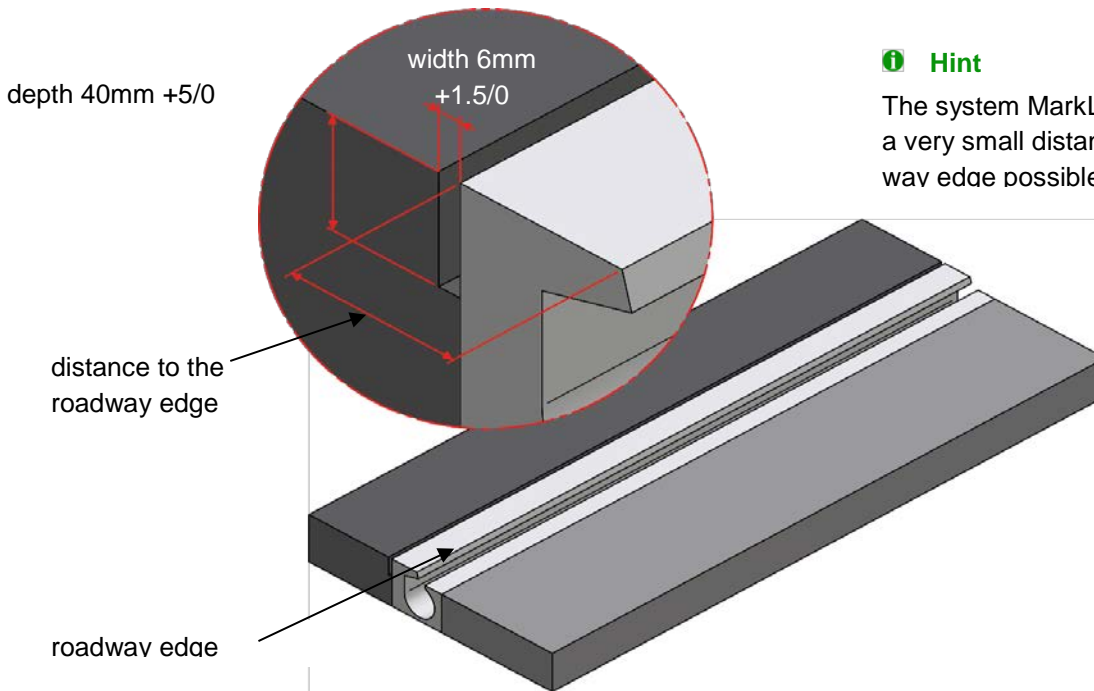
Due to obstacles (pit/joints etc.) the location of MarkLED has to be replaced as less as possible.



9 System cable and current collector

9.1 Milling a groove in the shoulder

- Milling of a continuous groove (width 6 mm/depth 40 mm)
- The groove at the line ending needs to be milled 10mm wide, for a complete bitumen casting of the cable ending
- Distance between groove and roadway edge project-specifically
- Milling around obstacles (pits etc.) after project default



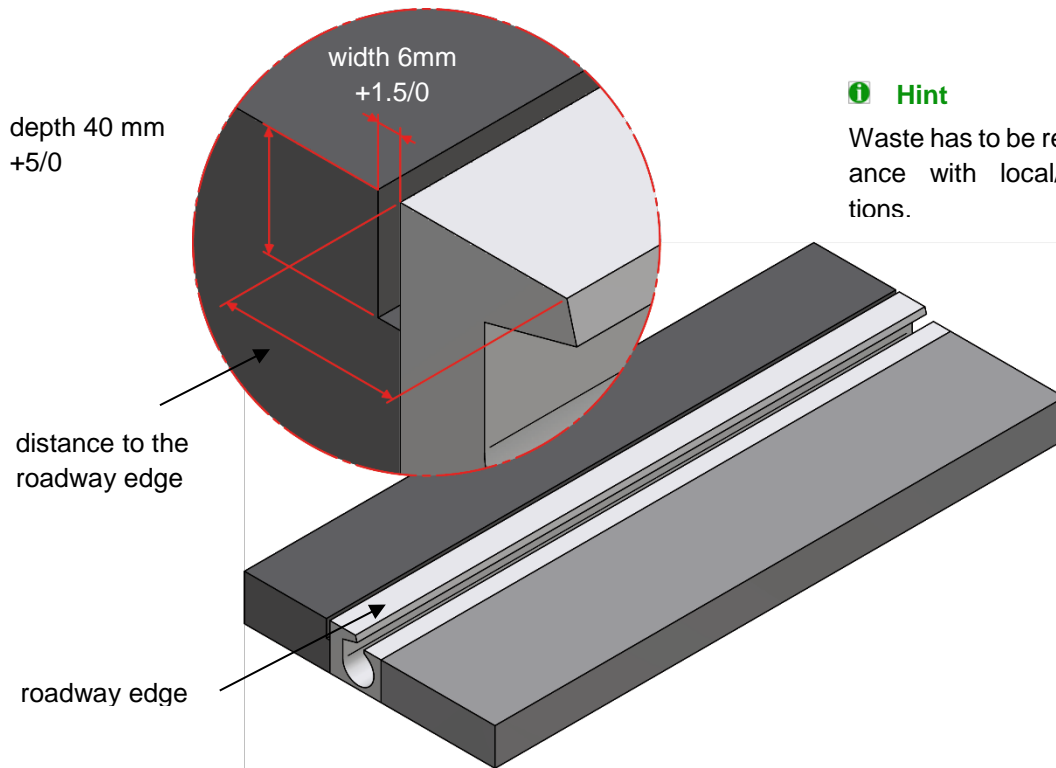
Hint

The system MarkLED EXIT makes a very small distance to the roadway edge possible.



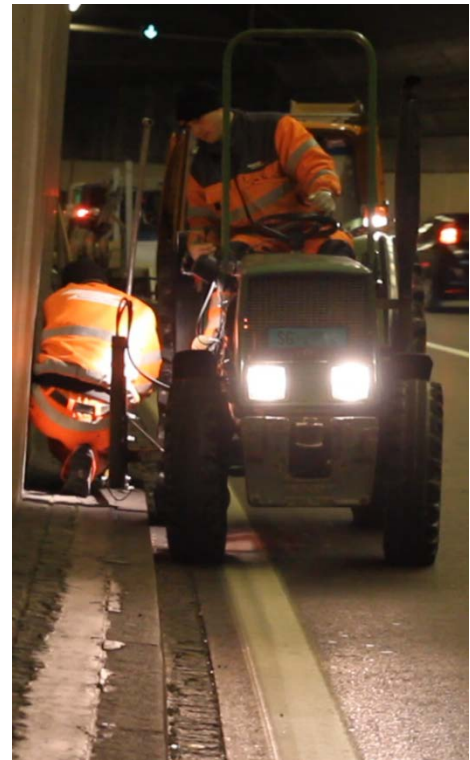
9.2 Remove bitumen from groove / remove old system

- Machine scratch-out of existing wiring (2 operations)
- Suction and blowing out of the groove



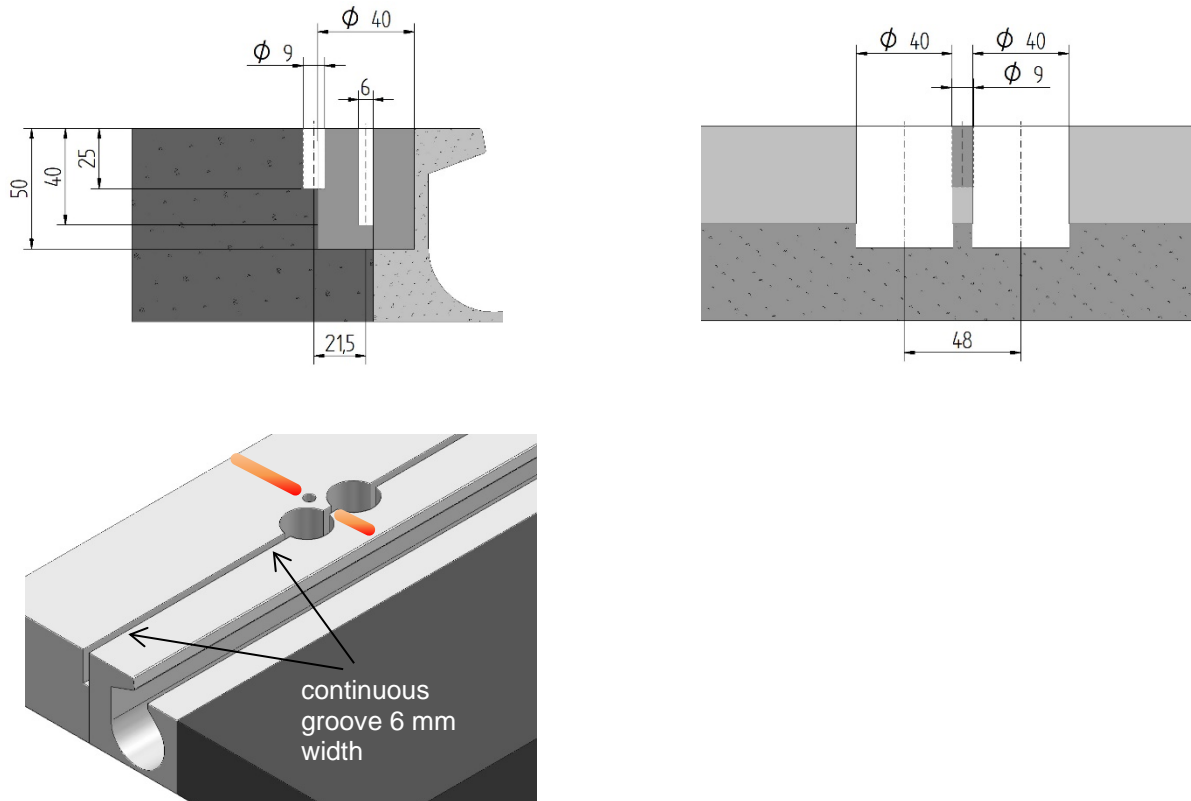
Hint

Waste has to be recycled in accordance with local/national regulations.



9.3 Create mounting and current collector bores

- Insert the drilling jig into the groove with the 2 lower guide pins.
- Move the drilling jig in the groove direction until it is centred on the previously marked light position
- Stand with both feet on the drilling jig and first, drill 2 bores $\phi 40$ mm, depth $50 \pm 5/0$ mm
- Make sure that the drilling jig stays in place and then drill a bore $\phi 9$ mm, depth $25 \pm 5/0$ mm
- Tolerances are to be kept: in the depth $\pm 5/0$ mm
- Then clean the entire groove and clean and dry all bores



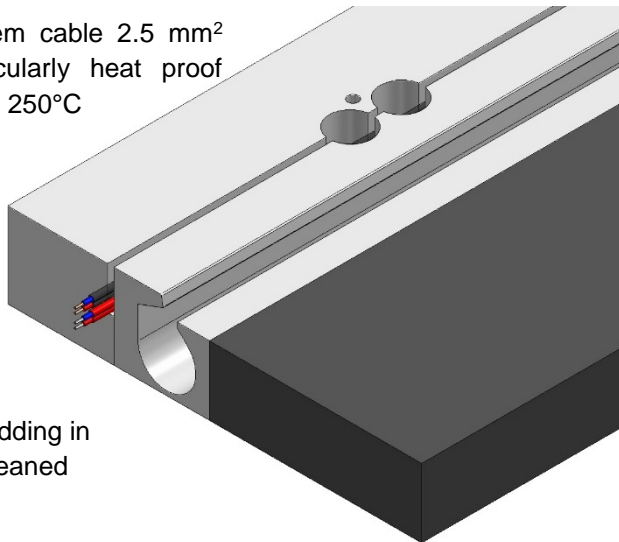
i Hint

The distance of the MarkLED EXIT (centre) from the tunnel wall or in case of wall mounting must be between 0.5 m and 1 m. This is the only way to obtain a relatively even luminance distribution on the tunnel wall and the shoulder.

9.4 Inserting the 2 connecting cables

- Unroll the 2 system cables in different colours and insert continuously into the groove (protect mechanically!)
- Cabling from control unit according to project specifications (observe channels / lines)
- Supply the line for the guidance lighting with 24VDC and the line for the escape route lighting with 48VDC.

system cable 2.5 mm²
particularly heat proof
up to 250°C



embedding in
the cleaned

Hint

The required high luminance of the MarkLED EXIT evacuation lighting and the resulting voltage drop result in a max. line length of 500m with a distance between luminaires of 25m.

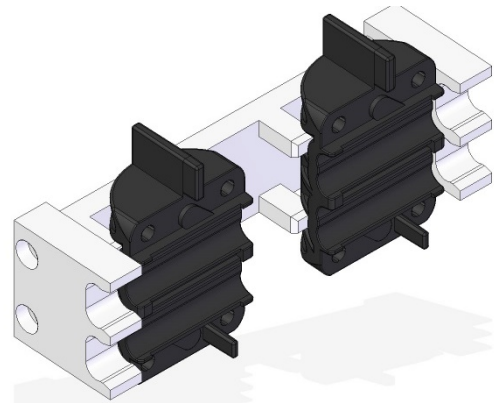
Hazard

Protect the cables against mechanical damage!

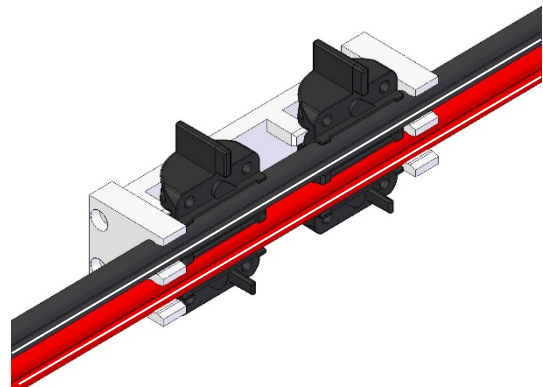


9.5 Connect two system cables to the current collector with the MarkLED EXIT

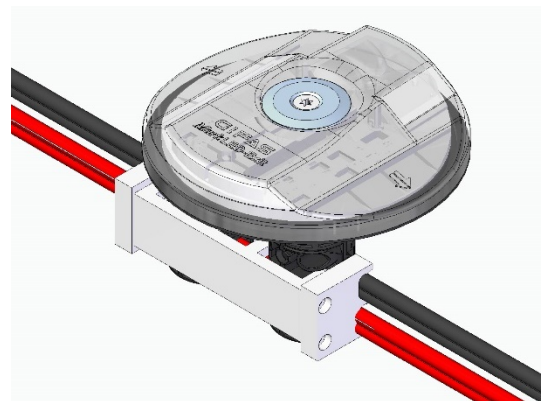
- Insert 2 current collector covers in the collector holder as illustrated



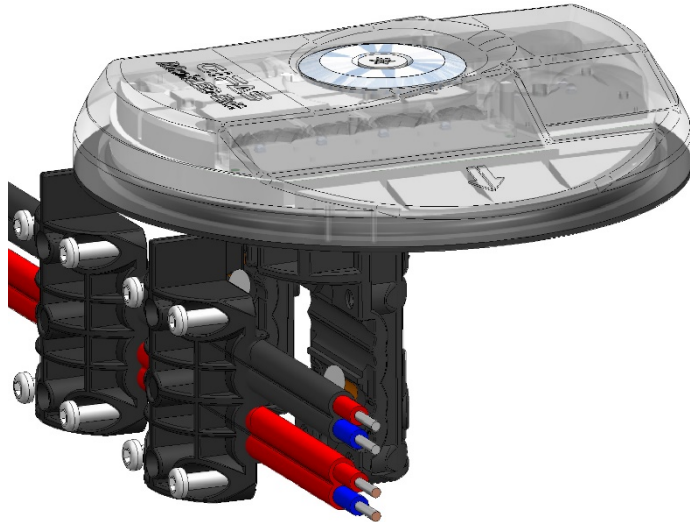
- Insert the top system cable in the collector holder and the current collector covers with the white marking on the cable pointing upwards.
- Insert the lower system cable in the collector holder and the current collector covers with the white marking on the cable pointing upwards.



- Screw the two current collector covers, inserted in the collector holder, with 4 screws item no. 165001 3x12 onto current collector with already applied sticking compound. $M = 1Nm$
- Tighten up the 4 screws in a 2nd step $M = 1Nm$



- Attention: Leave at least 50 cm on the system cable ends after the last current collector, separate both strands approx. 10cm from the final part and finalise each strand separately with shrink tubing with adhesive tightly over it.
- Finally, insert the sealed cable end into the groove and cast with liquid hot bitumen

**Hint**

By screwing the two current collector lids and the current collector with the 2x4 screws, the four contact pins encased in butyl sealant are inserted into the cable. This sophisticated construction produces tightness and permanent contact of the current collector.

Hazard

Do not open an isolation once it has been "pierced".

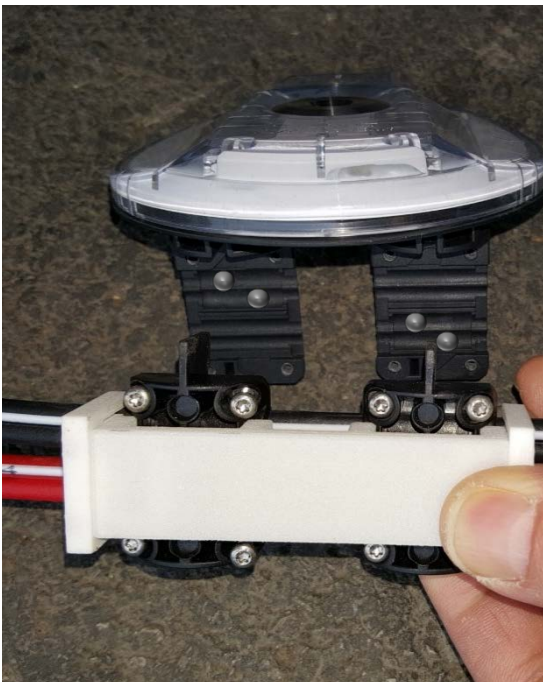
Hint

The function check can be carried out simultaneously when connecting the MarkLED EXIT on the system cable.

It must be ensured that the screws are tightened with suitable tools. $M = 1Nm$

Hazard

No other installation materials may be used!



9.6 Install current collector in groove

Installation location must be dry and clean before installing MarkLED EXIT current collector.

i Hint

Small unevenness (+/- approx. 1 mm) can be absorbed by using adhesives and sticking compound.

Apply Permafix to bottom of current collector.



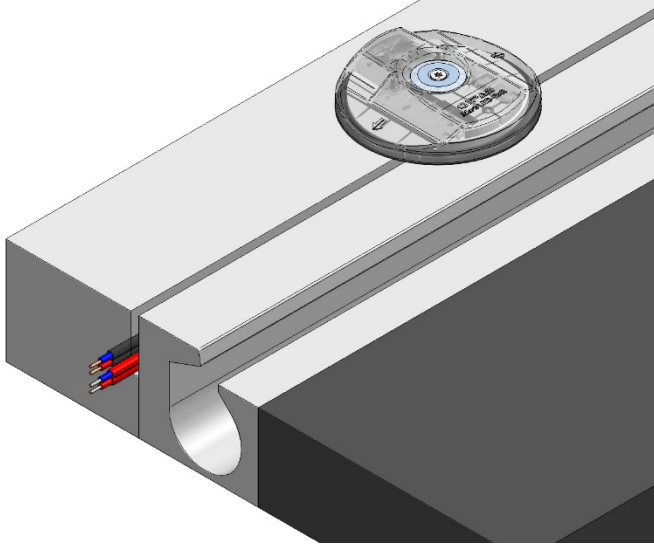
Insert MarkLED EXIT into bores and press down, weigh down if necessary.



9.7 Seal the groove (close)

Seal the groove either with sealing compound or joint profile (according to the owner's stipulations)

- Pre-treat groove (if necessary) with primer
- Seal the groove with filler (hot bitumen or epoxy glue)
- do not use cold bitumen
- primer/sealing compound (according to stipulation)



⚠ Hazard

An electrical function check must be performed before sealing!

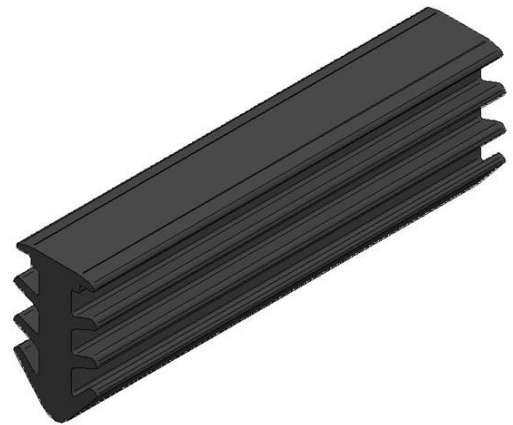
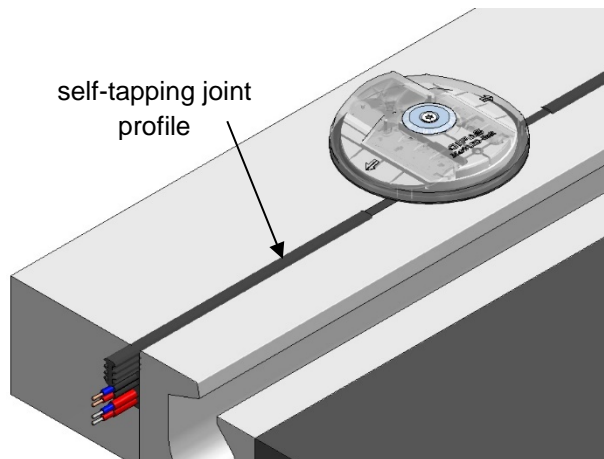


9.8 Insert system profile

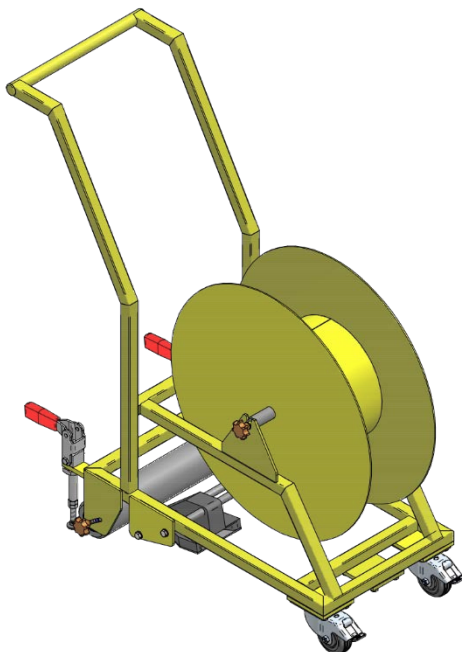
- Instead of the hot sealing compound, a self-tapping joint profile can be inserted over the system cable.
- Leave 5 cm free both in front of and behind the MarkLED EXIT
- Fix profile every 5m with Permafix in the groove and before/after every MarkLED.

⚠ Hazard

Always seal the groove in the passable area!



9.8.1 Installation with roll-off and profile-laying car (hire material)



Install joint profile at a distance of approx. 5cm from the MarkLED EXIT!



The area of the MarkLED EXIT must be cast with liquid hot bitumen.



9.9 Assembly of the control unit and connection of the system cables

- Install and connect ready-for-use-unit (according to project specifications)
- Install and connect power supply unit
- Up to 4 lines connectable
- Program the unit(s)

9.10 Assembly of power pack and connection of the evacuation lighting strands

Installation of power pack and connection of the evacuation lighting strands (according to project specifications)

i Hint

The assembly of the control unit and the power pack is to be implemented preferably before the shoulder assembly, for the reason that the operability control of the optical guidance system and the evacuation lighting can take place within the placement

The control unit and the associated power pack are preferably integrated into existing cabinets. The space requirement is relatively small.

Control unit 330x230x110mm

Power supply 39x124x117mm (WxHxD)

Power pack evacuation lighting 125x124x127 (WxHxD)



10 Installation of MarkLED recess-mounted adapter in drilling core hole

10.1 Mark bores and groove

Measure and mark the centres of the bores, mark the course of the groove through centres of the bores.



10.1.1 Mill groove

Mill groove, using a floor saw with the appropriate cutting width.

Mill groove over a small distance, check width and depth and correct if required.

Finish milling groove

Depth: 55mm (±5mm)

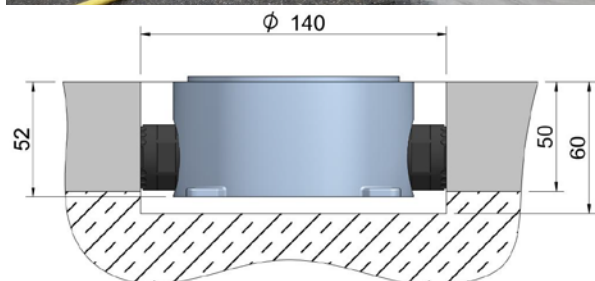
Width: 21mm for the installation conduit M21.2



10.1.2 Drill core holes

Drilling core hole with diameter 140mm (+10/0mm) and depth 60mm (+ 5/0mm).

Break out core and check depth.



10.2 Clean groove and boreholes

Completely clean groove and boreholes of drilling mud, dirt and dust.

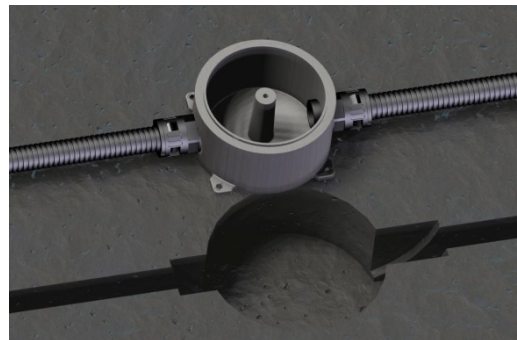
Rinse/blow out the groove and boreholes.



10.3 Mount installation conduit

Place recess-mounted boxes next to core drillings.

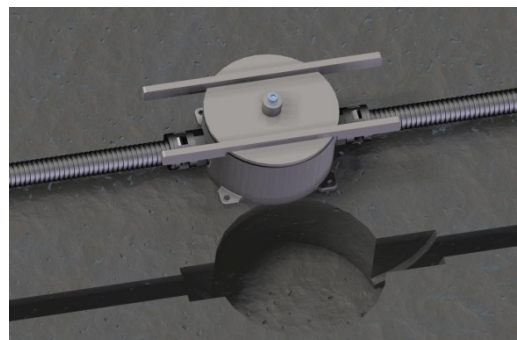
Measure the installation conduit, cut it off and insert into the hose connections.



10.4 Place levelling jig

Place levelling jig on recess-mounted adapter and tighten central cylinder with hexagon screw.

Align flat profiles of the levelling jig approximately parallel to the cable slot.



10.5 Set recess-mounted box

Approx. required quantity of mortar for a recess-mounted adapter:

0.24dl water to 2dl CTW HR mortar. (equivalent to about 440g)

First add the water and then the mortar to the mixing bowl and stir well for about 3 minutes until no more lumps are present.

If using other mortar, see manufacturer's instructions.



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10.5.1 Fill with mortar

Fill the bore with mortar up to 4.5 cm under carriageway level and moisten the bore wall up to the top.

i Hint

Mortar sets very quickly, especially at higher temperatures → mounting adapter must be set immediately.



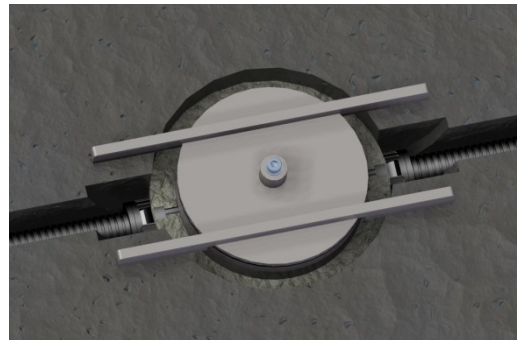
10.5.2 Installing the recess-mounted adapter first step

Press recess-mounted adapter with levelling jig into mortar until 4-edge bars lie flush on floor.

Press installation conduit down into groove on both sides. Adapter should only go about 1cm in the mortar.

i Hint

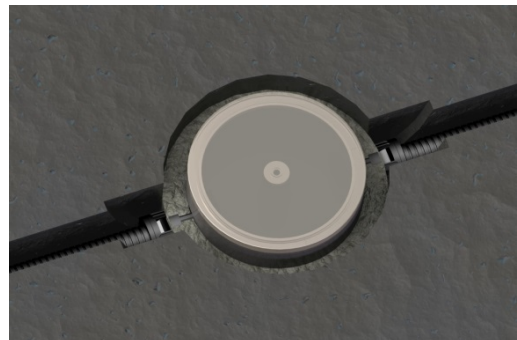
Weigh down cemented adapter for flush mounting with weight if necessary.



10.5.3 Remove levelling jig

After approx. 30 minutes of the mortar drying, unscrew the levelling jig and place the blind chart to prevent it from getting dirty.

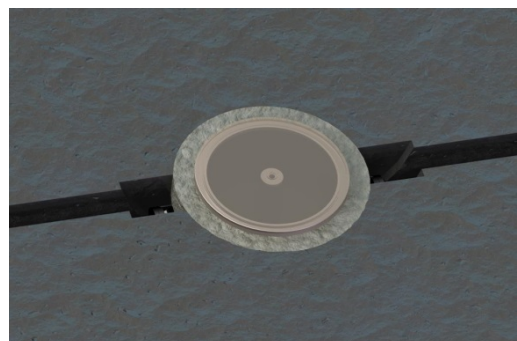
The blind chart protects the recess-mounted adapter from water and dirt.



10.5.4 Installing the recess-mounted adapter 2nd step

If necessary, temporarily seal the groove so that the topping mortar cannot flow away.

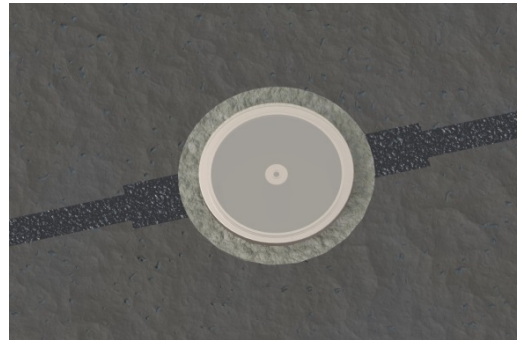
Reposition mortar and cement installation box with trowel or spatula to carriageway level.



10.6 Close groove

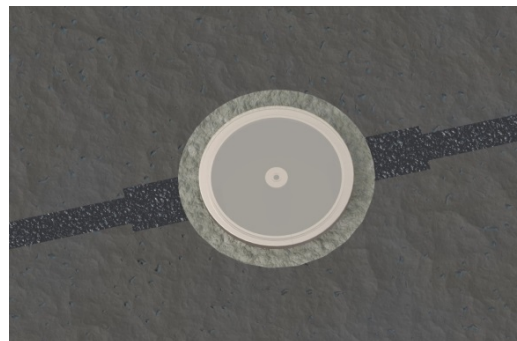
10.6.1 Close groove with mortar

Press installation conduit into dust-free and dry groove and seal flush or cover with mortar.



10.6.2 Close groove with hot bitumen

Press installation conduit into dust-free and dry groove and seal flush or cover with hot bitumen.

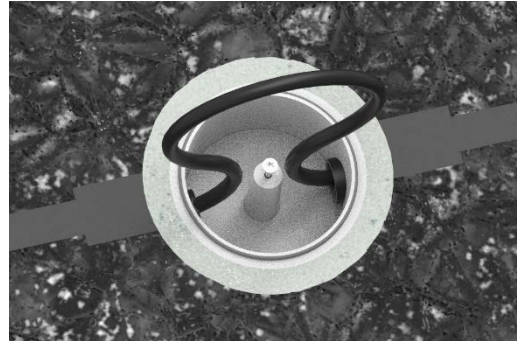


10.7 Connection MarkLED

Once the mortar has fully set, remove blind chart.

10.7.1 Pull in the cable

Insert cable from recess-mounted adapter to recess-mounted adapter and allow cable loop of 30 cm at each connection point.



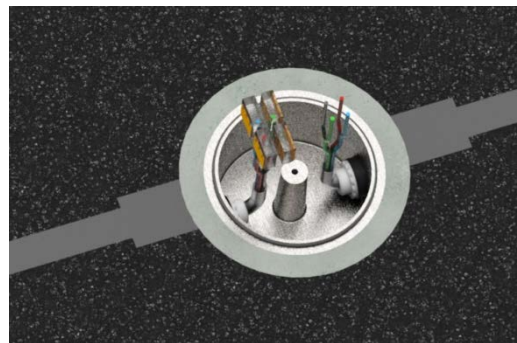
10.7.2 Preparation of cables/conductors

Cut the cable loop and cut both cable lengths to 15 cm (from hose connection).

Pierce both cables through a M20 self-sealing cable grommet and push the self-sealing cable grommet into the hose connection.

Then strip both cables up to approx. 5cm on the hose connection.

Strip approx. 11mm of insulation from the strands and connect to 4 Wago connection terminals item no. 162224



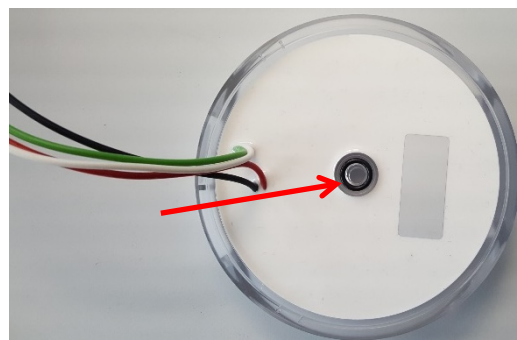
10.7.3 Connection MarkLED light module

Coat seal ring sealing with silicone grease.

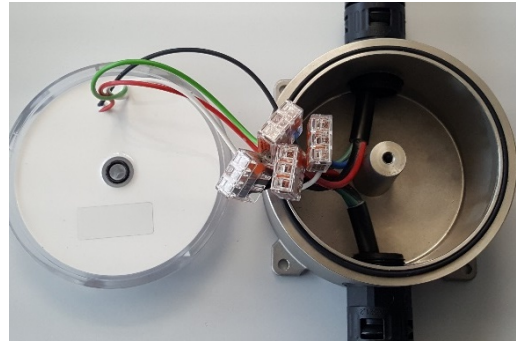
Position the seal ring on one side of the recess-mounted adapter, slightly overstretch it and slide it over the sealing surface on the opposite side.



Check if there is a small seal ring in the centre of the MarkLED EXIT and coated with silicone grease (missing seal rings must be refitted).



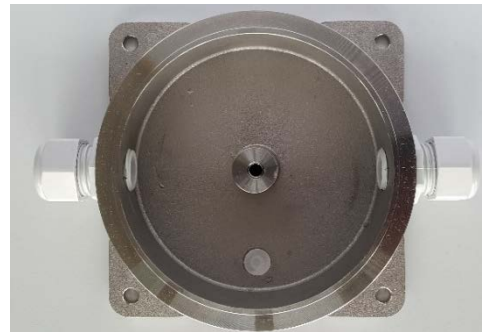
Strip cable conductors and the MarkLED EXIT to 11mm and connect to the WAGO connection terminals item no. 162224.



11 Installation MarkLED surface-mounted box

11.1 Attachment

The surface-mounted box must be permanently fixed.



11.2 Installation

For easy installation of the MarkLED, the large seal rings must be greased.

The small seal ring should already be fitted and greased on the MarkLED.

Place seal ring on surface-mounted housing.



We recommend using the following product for lubricating: item no. 017458.

One unit can be used for hundreds of lamps.



Place seal ring on surface-mounted housing.

Clean recess-mounted adapter inside and dry. Surface-mounted adapter must be completely dry on the inside.

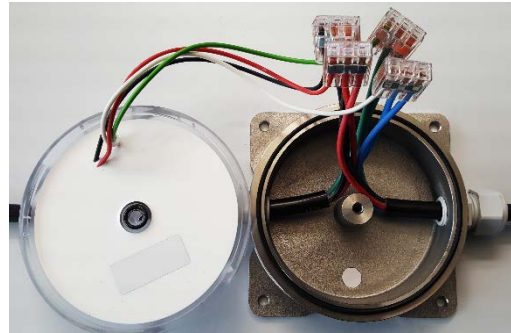
To check the installation and the connection, it is recommended that the supply voltage is applied at this point.



11.3 Connection

Strip cable conductors and the MarkLED EXIT to 11mm and connect to the WAGO connection terminals item no. 162224. (Wires: red + black MarkLED, white + blue EXIT)

Check if there is a small seal ring in the centre of the MarkLED (missing seal rings must be refitted).



11.4 Sealing compound

The box must be filled with removable sealing compound when not wall-mounted (first seal the tubes so that they are not blocked by the compound)! e.g. Bluegel. (Item no. 166534 1l container)

i Hint

To ensure a tight installation, the contact surfaces of the surface-mounted adapter must be absolutely clean.

i Hint

Make sure that the conductors are not pinched.

Place and align MarkLED on the surface-mounted housing.

Press MarkLED on recess-mounted housing by hand using lateral pressure and maintain pressure.

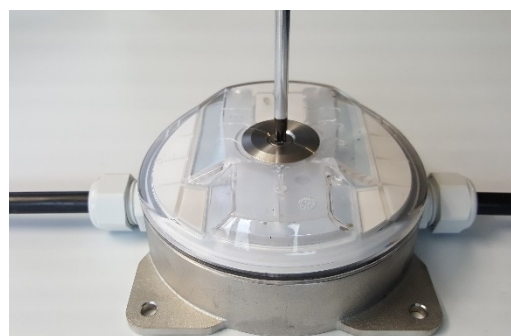


MarkLED EXIT must rest flush on the recess-mounted adapter.

Put on washer and tighten countersunk screw M5 with 2 Nm torque.

i Hint

Never try to tighten the MarkLED with excessive pressure. This may damage the screw, thread or MarkLED.



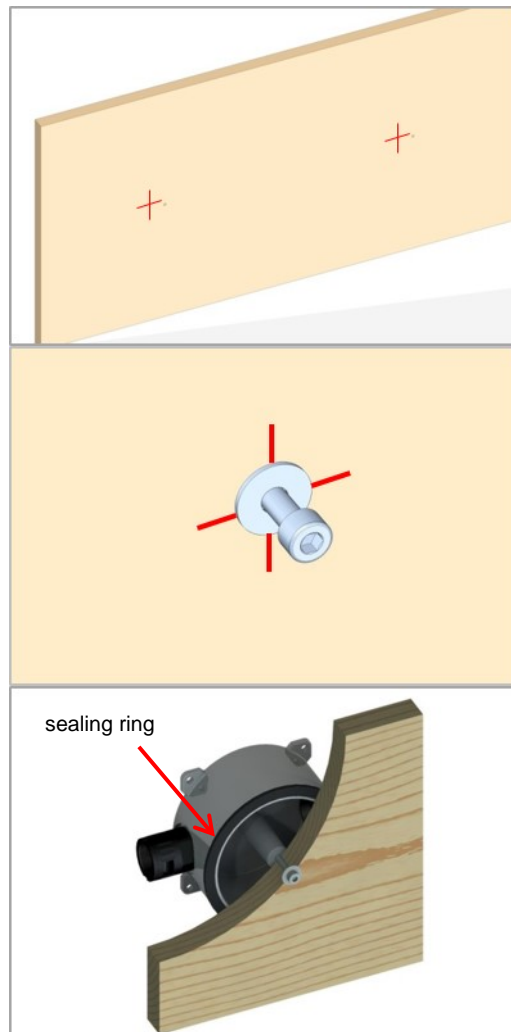
12 Installation of MarkLED recess-mounted adapter in formwork

12.1 Mark, drill and fasten

Measure and mark centres of light module locations on the formwork and drill with \varnothing 5 mm.

Insert M5 screw with washer from the front through the 5mm bore in the formwork. Length of M5 screw 15mm + formwork thickness.

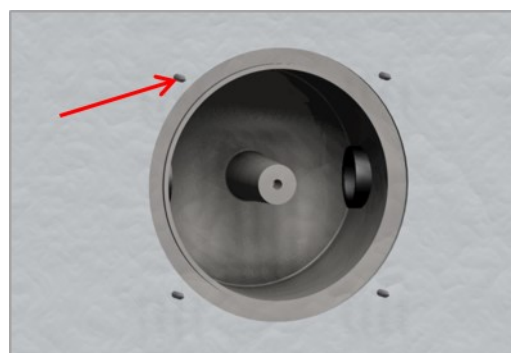
Put sealing ring item no. Set 154914 onto recess-mounted adapter. Screw the recess-mounted adapter to the back of the formwork with the previously inserted M5 screw. Determine alignment of hose connections.



12.1.1 Alternative attachment with 4 screws

The MarkLED recess-mounted adapter can alternatively be screwed onto the formwork from the back using 4 screws.

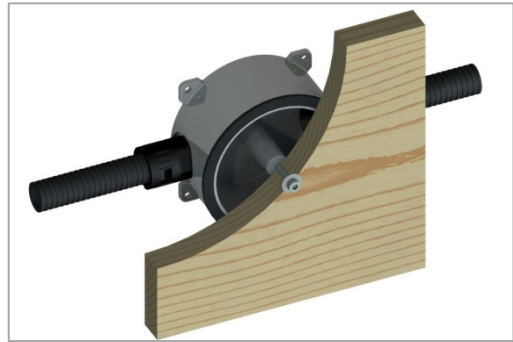
In this mounting variant, the screw tips projecting out of the concrete after stripping should be cut off.



12.2 Mount installation conduit

Cut the installation conduit to length and insert them into the hose connections until they noticeably lock.

Apply all installation conduit connections between the recess-mounted adapters.



12.3 Remove formwork

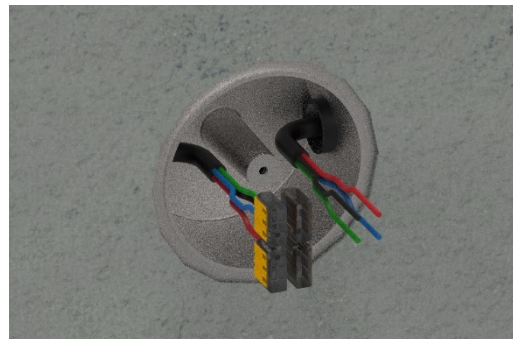
After the concrete has hardened, the M5 fixing screw in the centre of the recess-mounted adapter must be unscrewed before stripping.

Then stripping may begin. Remove the sealing rings after stripping.



12.4 Connection and installation of MarkLED EXIT

For connection and installation, proceed as described from Point 10.2 to Point 10.4.



13 Montage MarkLED wired

13.1 Mounting location

The MarkLED EXIT is attached to the floor without its base.

Cable routing is done either in the cable ducts or through a bore in the New Jersey profile.

The MarkLED EXIT is then connected to a suitable junction box/socket and connected to the power cable.

The underground must be flat and dry to ensure a solid and long-lasting installation.



13.2 Attachment

We recommend the use of the following product for gluing MarkLED EXIT: Hybrid adhesive and sealant Permafix 1153 grey, (item no. 020157).

Depending on the condition/porosity of the substrate, a 290ml cartridge will suffice for approx. 30 MarkLED's.

Only use water to clean MarkLED EXIT, without any chemical additions and without aggressive cleansing agents.



Accessories complete (item no.151253)

Nylon dowel hexagonal

Counter sunk screw 4.5x50mm Torx 20

MarkLED washer Ø 29.8mm



13.3 Driling

The central drilling determines the position on the bench of MarkLED EXIT.

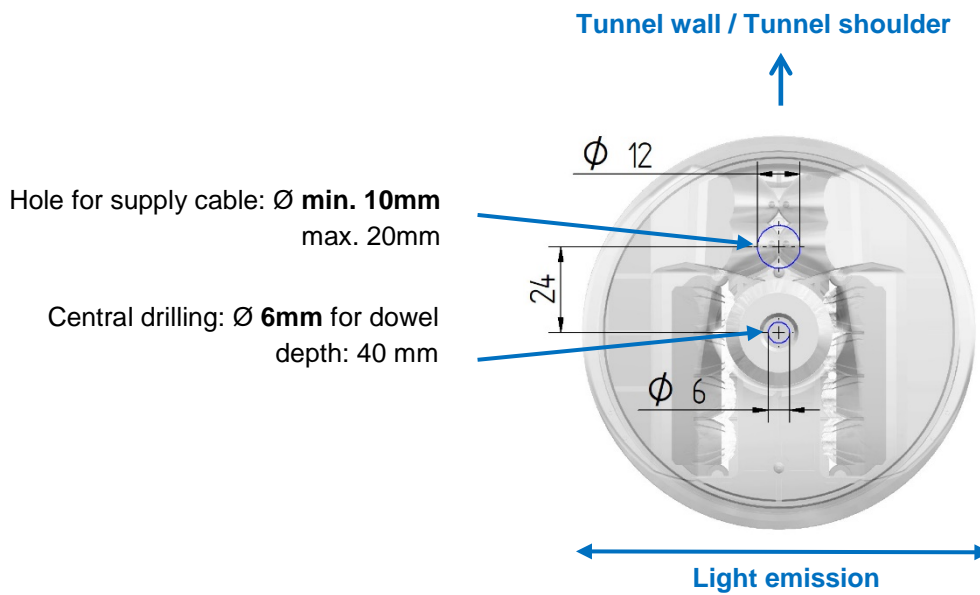
The bore through the cable duct base plate or the New Jersey profile for the cable passage determines the alignment of the MarkLED EXIT.

Drill the holes exactly, because the orientation can only be adjusted minimally.



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13.3.1 Dimensions for drilling holes



13.4 Installation and connection of MarkLED EXIT

Blow out drilling dust and clean the surface as dust-free as possible for gluing the MarkLED EXIT.

Lead the connection cable of the MarkLED EXIT through the cable drilling.
(Wires: red + black MarkLED, yellow + blue EXIT)

Connect cable to junction box or cable sleeve.

Insert nylon dowels into the mounting bore.

Apply Permafrix on the bottom of MarkLED EXIT.

Place MarkLED EXIT on the ground and align parallel to the carriageway.

Push down the MarkLED EXIT firmly with your hands. You must not hit the MarkLED EXIT or use a hammer.

Align centre onto mounting bore in the ground.



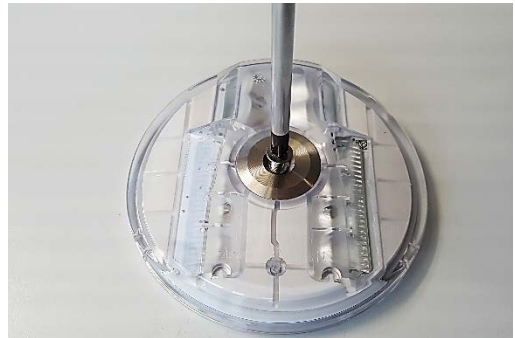
Place the washer.



Screw MarkLED EXIT with countersunk screw 4.5x50 item no. 17473 onto the ground.
M = 2.5Nm

i Hint

Never tighten the MarkLED EXIT mounting screws too tightly. This could lead to the MarkLED EXIT failing in later operation due to stress cracks.



13.5 Function check

Energise both circuits of the feed-in cable for function check. (GIFAS recommends putting the feed-in cable under 24V (optical guidance system) and 48V (evacuation lighting) at the beginning of the installation so that any failures can be detected prior to gluing.



i Hint

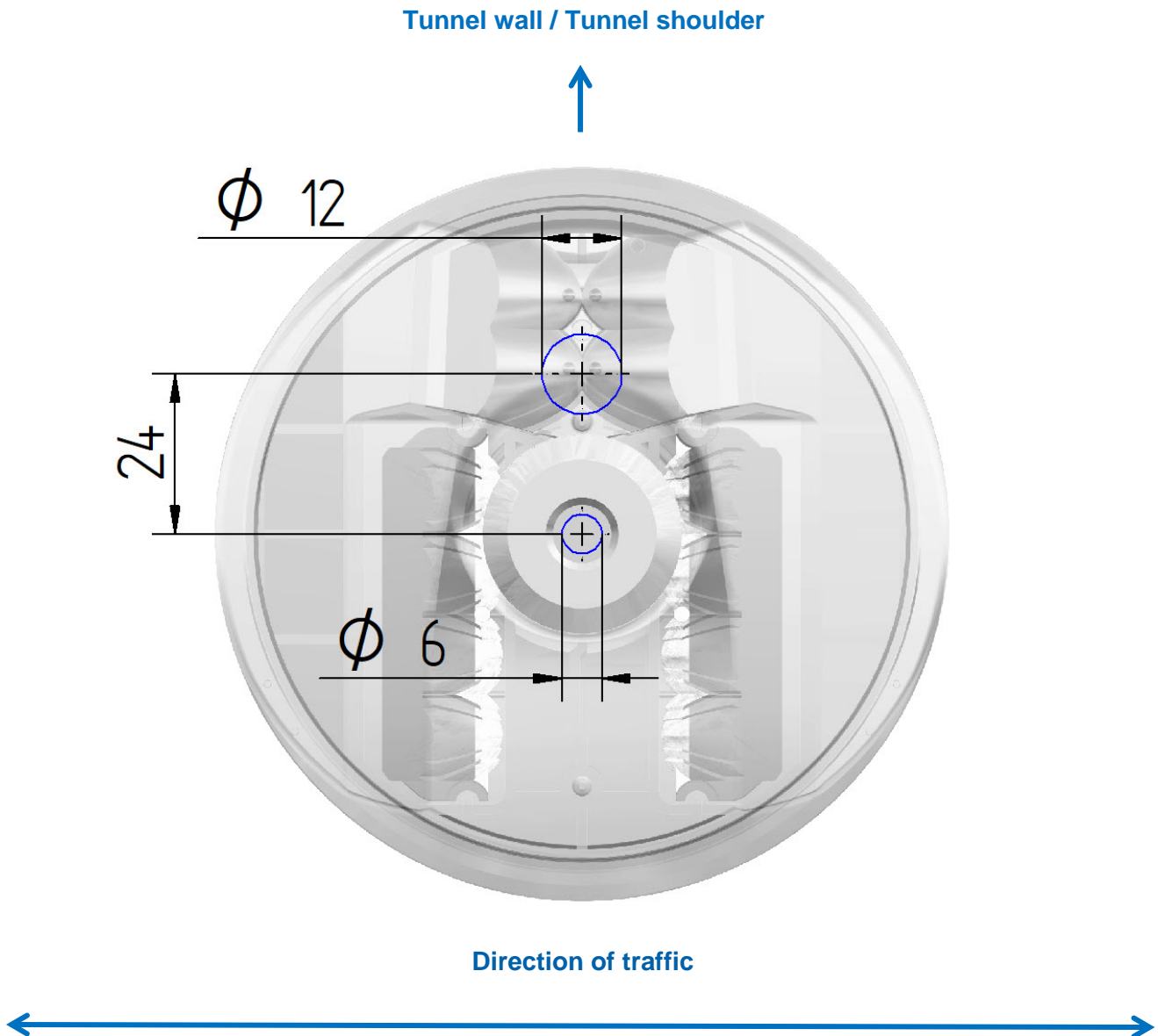
A clean bond:

- guarantees safe and permanent adhesion to the ground.
- prevents the underflow of meteor and surface water (and also freezing at low temperatures)

13.6 Drilling jig

Hint

We recommend using the following drilling jig for precise drilling of the two holes. It can be cut out and used on site for an exact determination of the drilling holes.



14 Service

14.1 Service addresses

GIFAS ELECTRIC GmbH Borsigstrasse 9 D-41469 Neuss	GIFAS-ELECTRIC S.r.l Via dei Filaracci 45 Piano del Quercione I-55054 Massarosa (LU)	GIFAS ELECTRIC GmbH Strass 2 A-5301 Eugendorf	GIFAS-ELECTRIC GmbH Dietrichstrasse 2 Postfach 275 CH-9424 Rheineck
☎ +49 2137 105-0 📠 +49 2137 105-230 🌐 www.gifas.de ✉ verkauf@gifas.de	☎ +39 58 497 82 11 📠 +39 58 493 99 24 🌐 www.gifas.it ✉ info@gifas.it	☎ +43 6225 7191-0 📠 +43 6225 7191-561 🌐 www.gifas.at ✉ verkauf@gifas.at	☎ +41 71 886 44 44 📠 +41 71 886 44 49 🌐 www.gifas.ch ✉ info@gifas.ch

14.2 Imprint

GIFAS-ELECTRIC GmbH
CH-9424 Rheineck
www.gifas.ch

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