ASSEMBLY INSTRUCTIONS

TECHNICAL DOCUMENTATION

RAIL SYSTEM

MUHR

Gesellschaft für Planung, Maschinen- und Mühlenbau
Erhard Muhr mbH

Grafenstr. 27
83098 Brannenburg
Germany

✆ +49 8034 9072 0
✉ info@muhr.com |
www.muhr.com

1 GENERAL

The operator is obliged to inform himself about the safety and accident prevention regulations applicable to his operation and to comply with them.

Statutory safety and accident prevention regulations take precedence over the information in these installation instructions. If information in the installation instructions contradicts statutory safety and accident prevention regulations, the manufacturer must be informed.

Every person commissioned by the operator to carry out the installation must have read and understood the installation instructions before starting work.

Proper installation requires appropriately trained specialist personnel. The obligation to train is the responsibility of the operator or the company commissioned with the installation.

Each person involved in the installation is responsible for complying with the occupational safety regulations.

Any defects and damage found must be repaired immediately in order to minimize the extent of the damage so as not to impair the operational safety of the machine.

The graphics shown are for illustrative purposes only, the actual product may differ.

1.1 Explanation of symbols and notes

In these installation instructions, the following designations or symbols are used for particularly important information:

1.1.1 Risk of personal injury

DANGER	
	Indicates a hazard with a high degree of risk. If these instructions are not followed, death or serious physical injury (invalidity) will result.

WARNING	
	Indicates a hazard with a medium level of risk. If these instructions are not followed, death or serious physical injury (invalidity) may result.

CAUTION	
	Indicates a hazard with a low level of risk. Failure to follow these instructions may result in minor or moderate bodily injury.

1.1.2 Risk of material damage

CAUTION	
	Indicates a potentially harmful situation. If these instructions are not followed, material damage may result.

1.1.3 Note

NOTE	
	Indicates general information. Highlights useful tips and recommendations as well as information for efficient and trouble-free operation, which have no influence on the health and safety of personnel.

1.1.4 Reference to applicable documents

APPLICABLE DOCUMENTS	
	Refers to applicable documents. The applicable documents include drawings, plans, pro duct do cumentation of purchased parts and other documents containing information on the product or overall system.

1.1.5 Environmental protection

ENVIRONMENTAL PROTECTION	
	Highlights useful tips and recommendations as well as information relating to environmental protection.

1.2 Structural changes

No modifications, additions or conversions may be made to the product itself or the associated components without the written consent of the manufacturer.

Welding work on load-bearing parts of the product is strictly prohibited. Product parts that are not in perfect condition must be replaced immediately by a specialist.

Only original spare and wear parts from the manufacturer may be used. The use of non-approved spare or wear parts invalidates the operating license.

The manufacturer reserves the right to make changes in the sense of technical improvements.

⚠ WARNING	
	Risk of accident In the case of externally sourced parts, there is no guarantee that they meet the manufacturer's stress and safety criteria. The operational safety of the machine is therefore no longer guaranteed.

1.3 Definition of terms

The following generally applicable terms, abbreviations and formulations are used in these installation instructions:

Building	Operator's structural equipment on/to which the product is mounted and/or used.
Operator	Natural or legal person who owns or rents the machine. The operator uses the product, operates the product himself or commissions third parties to operate it.
Specialist	A specialist has further specialist training and sufficient experience to carry out complicated or even dangerous work independently.
Hazard area	The area or around the product where a person may be exposed to a hazard.
Manufacturer/We	Manufacturer of the machine = Erhard Muhr GmbH
OW	Headwater (=area above the weir in the direction of water flow)
UW	Underwater (=area below the weir in the direction of water flow)

1.4 Documentation

The scope of delivery of a product from Erhard Muhr GmbH includes comprehensive, project-specific documentation. The operator of the product is responsible for allocating the required documentation components to the respective target group.

1.5 Copyright

The copyright for these installation instructions remains with the manufacturer.

These installation instructions may not be reproduced, distributed, modified or electronically processed in whole or in part (with the exception of reproduction and electronic processing for internal use by the operator).

All rights reserved in the event that a patent is granted or a utility model is registered.

Subject to technical changes.

Brannenburg (Germany), 28.11.2024

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2 SAFETY INSTRUCTIONS

The product was designed exclusively for the project specified on the cover sheet and may only be installed here.

The entire design of the product is in accordance with the prevailing and contractually agreed conditions at the time of commissioning.

Changes to the product itself or to the interfaces to the building or other systems are the sole responsibility of the operator unless they have been checked and expressly approved by the manufacturer.

The product may only be installed in a technically perfect condition, as intended and in compliance with the relevant regulations.

2.1 Organizational measures

Compliance with the regulations

The operator must take suitable organizational and instructional measures to ensure that the relevant safety regulations are observed by the persons entrusted with the installation of the product.

Hazard warnings

The operator must ensure that the safety and hazard information is observed.

Changes

No modifications, additions or conversions may be made to the product without the manufacturer's consent, as these may impair the safety of the product.

In addition, the warranty claim against the manufacturer expires.

Personnel selection and qualification

Personnel selection

The operator of the system is solely responsible for the selection of qualified personnel.

Work on or with the product may only be carried out by reliable personnel. The legal minimum age must be observed.

Work on the product may only be carried out by personnel with the appropriate technical qualifications (e.g. qualified installation personnel).

If workers who cannot read or write are employed, they must be made particularly aware of possible dangers and given special instructions.

Definition of a specialist for the purposes of these installation instructions

A specialist has advanced technical training and sufficient experience to carry out complicated or even dangerous work independently. This experience relates to a specific specialist area, such as mechanical maintenance, work on electrical systems, hydraulic systems, pneumatic systems, heavy-duty transportation or similar.

A specialist must be able to correctly assess upcoming work in advance with regard to feasibility, risks and hazards as well as the necessary tools.

A specialist is expected to understand complex, poorly prepared plans and descriptions and to obtain missing and necessary detailed information via suitable channels.

A specialist needs a supervisor who supports them in procuring the necessary technical aids and other resources as well as in putting together working groups and organizing processes.

A worker can be a specialist in several fields.

For skilled workers who are exposed to special hazards, additional national regulations may apply, which must be observed by the operator.

2.2 General warnings and precautions

Observe the following rules to avoid accidents:

- Never work alone.
- Never step under a suspended load.
- Check that lifting gear is in perfect condition.
- Always secure against falling when working above ground level.
- Wear personal protective equipment PPE (e.g. hard hat, safety goggles, safety shoes, hearing protection, etc.).
- A lifejacket must be worn when working on and near the water.
- Be aware of the particular danger of electrical accidents.
- The operator must ensure that unauthorized persons cannot enter the danger zone of the machine.
- Escape routes must be kept open at all times.
- Provide sufficient lighting when working in the dark or when visibility is poor.
- Grease or oil stains on floors greatly increase the risk of accidents. Cleanliness and care of machines and equipment increase the general level of safety.
- To avoid accidents, any objects lying around on platforms, access steps and in the entire work area must be removed immediately.
- Paths must be kept free of leaves, ice and snow
- Always pay attention when working with or on the machine.
- Do not work with or on the machine if you are unable to concentrate.
- Working under the influence of alcohol and/or drugs or other intoxicating substances is prohibited.
- A fully stocked first aid kit for first aid measures must always be available, accessible and labeled.

In addition, the health and safety regulations of the existing national accident prevention regulations and any internal work and safety regulations of the operator must be observed. Observe all safety instructions and regulations in these installation instructions and in the applicable documents.

If you have any uncertainties or questions, please contact your line manager or the manufacturer's support team directly.

2.2.1 Working outdoors

Extreme weather conditions

In extreme weather conditions (thunderstorms, rain, wind, storms, snow, ice, etc.), always observe the following instructions.

In the event of a thunderstorm, stop all outdoor work immediately and seek shelter to protect yourself from possible lightning strikes.

If wind speeds exceed 49 km/h (wind force 6), all outdoor work must be stopped and shelter must be sought. Any objects lying around must be secured accordingly.

The crane manufacturer's permissible operating conditions must be observed during crane work. The crane operator is responsible for complying with the crane manufacturer's instructions.

2.2.2 Working on and around the water

Using a safety harness

Danger of falling: Use a safety harness.

Using a lifejacket

Wear a life jacket when working on and near the water.

When working in and on the water, everyone involved must wear a life jacket and a safety harness in addition to the mandatory personal protective equipment (PPE).

Persons working in the water must always be secured to the safety harness on land using a safety rope and constantly supervised by a second person.

If possible, people working in the water should wear hip-length boots or waders.

Loads in the water must always be carried on the underwater side (UW side).

If work on and around the water is necessary, it should be carried out from a floating device (boat, pontoon or similar) if possible.

2.3 Personal protective equipment (PPE)

To minimize residual risks, personal protective equipment (PPE) must be worn for certain work with or on the machine.

The operator or his authorized representative is responsible for providing and monitoring the use of the required PPE.

The personal protective equipment (PPE) required for certain tasks includes at least:

- Safety helmet
- Safety goggles
- Protective gloves
- Safety shoes
- Hearing protection

2.4 Hazardous substances and emissions

The operating materials used in the product have been tested and approved by the manufacturer for their suitability in the specific application.

Please keep yourself constantly informed about the national, local and company-internal regulations relevant to your place of use.

When selecting lubricants, lubricating oils and cleaners, pay attention to environmental compatibility, health risks, disposal regulations and your local options for proper disposal.

2.5 Safety instructions for transportation

For transportation, all those involved must be familiar with the general safety instructions, occupational safety and hazard warnings and observe them.

Moving parts must be securely fixed for transportation.

Cranes, ropes, chains and hoists must have the required load-bearing capacity. These must be inspected by an expert in accordance with §14 BetrSichV and must not be damaged. The dimensions and weight of the components to be lifted can be found in the packing list or the relevant overview and/or assembly drawings.

Only attach lifting gear and transport safety devices at suitable points. Hazards that may arise from the transportation of heavy system components are not covered by these installation instructions. The operator must make separate arrangements for this on the basis of a suitable risk assessment.

2.6 Safety instructions for installation

When installing the product, all those involved must be familiar with the general safety instructions, occupational safety and hazard warnings described in the previous chapters and observe them.

The product may only be installed by trained personnel. Observe the safety instructions for transportation when lifting loads.

When using components from third-party manufacturers or when attaching the product to adjacent systems, follow the instructions of the respective manufacturer.

Any modification to the product requires the written approval of the manufacturer.

The product may only be installed when the construction site is completely dry.

In addition to the installation instructions, the local rules for accident prevention and environmental protection and any rules defined by the operator must be observed.

Warning of weather events

If wind speeds exceed 49 km/h (wind force 6), all outdoor assembly work must be stopped and shelter must be sought.

In the event of a thunderstorm, stop all outdoor installation work immediately and seek shelter to protect yourself from lightning.

Only use high-quality, industrial-grade tools for all work.

After completing the installation work, make sure that there are no tools or foreign objects on or in the product.

At the end of the assembly work, check all screw connections for correct tightening torque and sign.

Once the installation work has been completed, check that the system is in a proper and safe operating condition. The correct installation of all system components must be ensured.

3 PREPARATION

3.1 Basic information

The sequence of work steps specified in these instructions is a recommended sequence and is not mandatory. In order to maximize the efficiency of the installation time, the responsible supervisor can specify a different sequence.

Where necessary, eyelets are provided for attaching lifting gear. The weights of the main components are specified in the packing list.

Tighten all screws to the appropriate torque as indicated in the enclosed table!

Use the parts according to the packing list!

Regularly check that the assembly and dimensions match the relevant drawings.

CAUTION	
	Check the structure and the substrate thoroughly before installation. The structure must correspond to the specified dimensions. Inaccuracies with regard to flatness, dimensions and angularity jeopardize proper installation and can lead to subsequent malfunction of the entire system.

3.1.1 Tightening torque

Recommended tightening torque for bolts with nuts [in Nm]

Type	Lubrication	M10	M12	M16	M20	M24	M27	M30	M36
8.8	Gleitmo 800**	44	75	180	364	626	917	1247	2166
10.9	Gleitmo 800**	64	110	265	518	891	1305	1776	3085
A2-50* A4-50*	Gleitmo 800**	-	-	-	-	199	292	397	689
A2-70* A4-70*	Gleitmo 800**	31	53	127	248	-	-	-	-
A2-80* A4-80*	Gleitmo 800**	41	70	169	331	-	-	-	-
HV	Gleitmo 800**		100	250	450	800	1250	1650	2800

*- specified values apply to screws with a maximum length = screw diameter x8

** - Muhr article number 10003235

3.1.2 Lubricant list

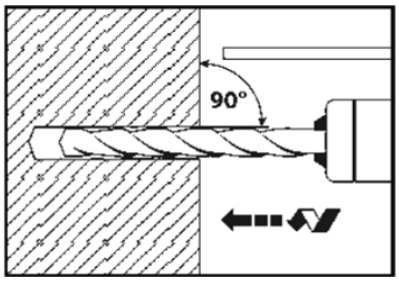
General	Slewing ring and steel cables
Fuchs-Lubritech STABYL ECO EP2 Water hazard class 1 Muhr article number: 10006066	Rivolta adhesive lubricant S.K.D. 3400 Water hazard class 1
Stainless steel and screw connections	**Screw jacks**
Fuchs-Lubritech Gleitmo 800 Water hazard class 2 Muhr article number: 10003235	Klüberplex AG 11-461 Water hazard class 1 Muhr article number: 10003389

CAUTION	
	Danger from property damage When using alternative lubricants that are not approved by Muhr or the manufacturer of the respective component, it must be ensured that these lubricants have equivalent lubricating properties! Damage caused by the use of non-approved lubricants is not covered by the warranty.

ENVIRONMENTAL PROTECTION	
	When using alternative lubricants, make sure that these lubricants are approved for use in bodies of water (water hazard class)!

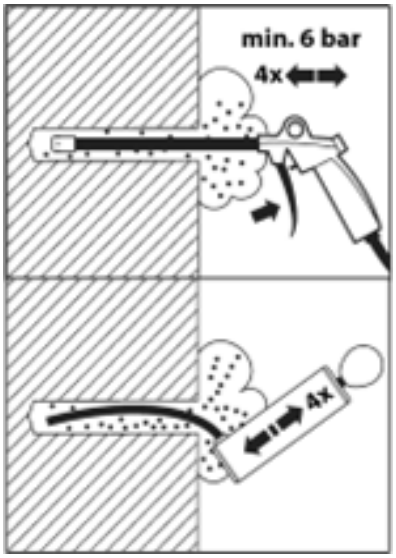
3.2 Anchoring - installation instructions

3.2.1 Assembly

1 

Use a hammer drill to drill a hole in the anchoring base in the size and anchoring depth (specified by the planner) required for the selected anchor size (see 3.2.2). In the event of drilling failure, fill the drill hole with mortar.

2a



Caution! Standing water in the drill hole must be removed before cleaning!

Cleaning with compressed air: Starting from the bottom or background of the borehole, blow out the borehole at least 4 times with compressed air (min. 6 bar). If the bottom of the borehole cannot be reached, an extension must be used.

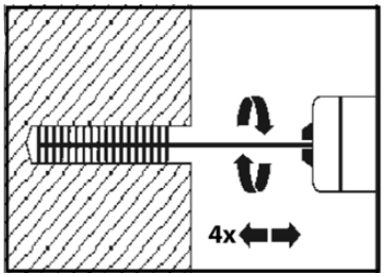
Manual cleaning:

Non-cracked concrete: drill diameter 20 mm and effective anchoring depth ≤ 240 mm

Cracked concrete: M12, M14, M16, Ø12, Ø14, Ø16 and effective anchoring depth240 mm

Starting from the bottom or the back of the borehole, blow out the hole at least 4 times. The blow-out pump can be used.

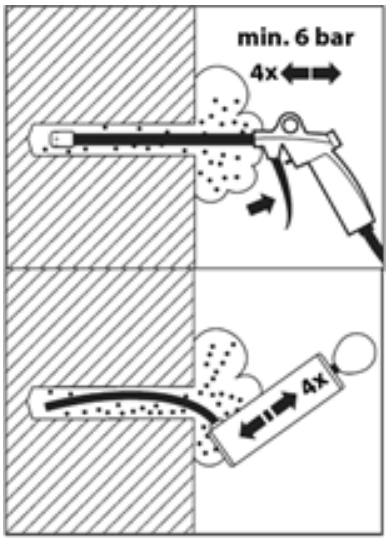
2b



Check the brush diameter (see 3.2.2) and attach the brush to a drill or cordless screwdriver. Brush the hole at least 4 times with a wire brush of a suitable size (> db, min).

If the bottom of the drill hole cannot be reached, use a brush extension.

2c



Cleaning with compressed air: Starting from the bottom or background of the borehole, blow out the borehole at least 4 times with compressed air (min. 6 bar).

If the bottom of the drill hole cannot be reached, an extension must be used.

Manual cleaning:

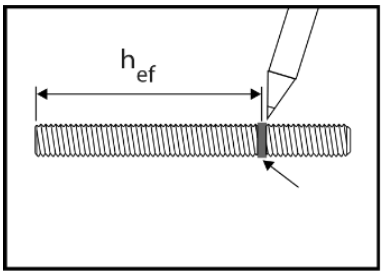
Non-cracked concrete: drill diameter 20 mm and effective anchoring depth 240 mm

Cracked concrete: M12, M14, M16, Ø12, Ø14, Ø16 and effective anchoring depth 240 mm

Starting from the bottom or the back of the borehole, blow out the hole at least 4 times. The blow-out pump can be used.

CAUTION	
	After cleaning, the drill hole must be protected against re-contamination until the special adhesive is applied. If necessary, cleaning must be repeated immediately before the special adhesive is applied. Penetrating water must not re-contaminate the drill hole.

3



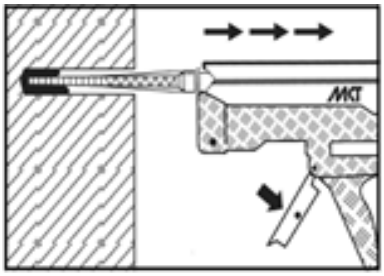
Before inserting the threaded rod into the drilled hole, mark the anchoring depth specified in the drawing on the threaded rods. Check the drill hole depth and the mobility of the threaded rod.

The threaded rod must be free of dirt, grease, oil or other foreign matter when installed.

4

Prepare the special adhesive as specified. Pay particular attention to the processing time and other information on the correct use of the special adhesive.

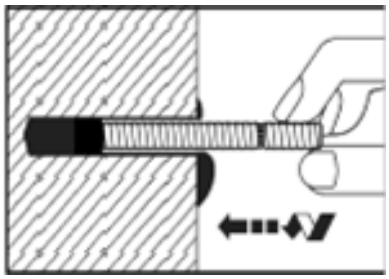
5



Start at the bottom or at the back of the cleaned anchor hole and fill the hole up to about one third with adhesive. Slowly pull back the nozzle as the hole fills to prevent air pockets from forming.

Use an extension for anchorages that are longer than the nozzle. Observe the processing times.

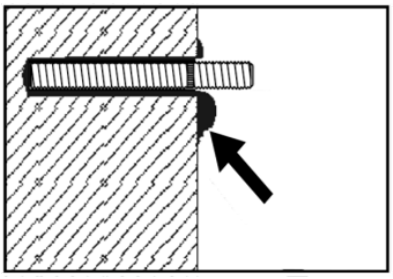
6



Push the threaded rod into the anchor hole while turning it slightly to ensure good distribution of the adhesive until the anchoring depth is reached.

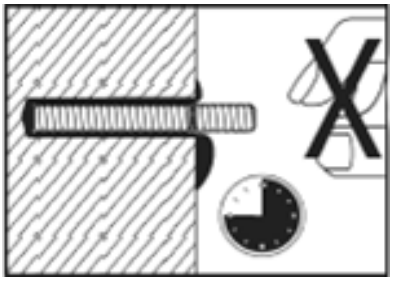
The threaded rod must be free of dirt, grease, oil or other foreign bodies.

7



Make sure that the threaded rod is properly seated and that excess special adhesive is visible at the edge of the hole. If these requirements are not met, the application must be repeated from step 5 before the curing time is complete.

8



Allow the adhesive to cure for the specified time before applying a load or torque. Do not move or load the threaded rod until the special adhesive has fully cured.

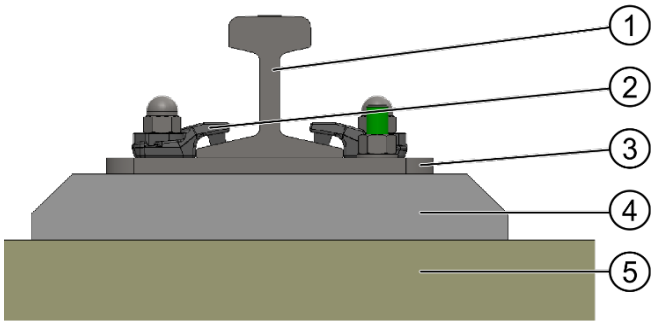
After complete curing, remove the excess special adhesive.

3.2.2 Mounting parameters for threaded rods

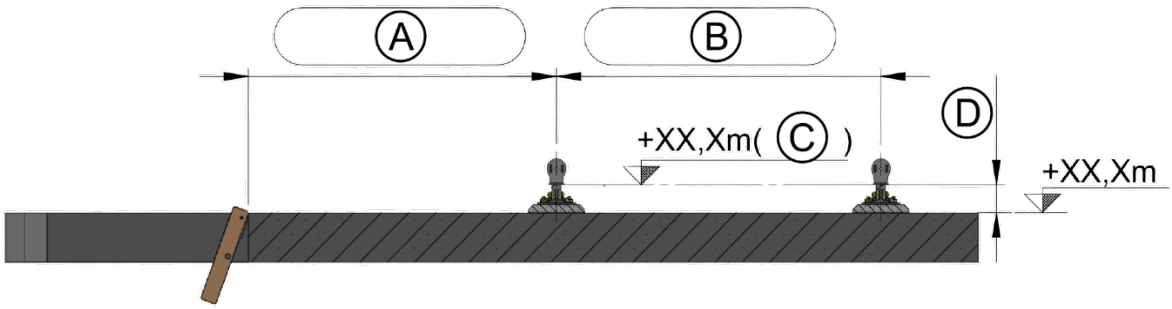
Thread size	M8	M10	M12	M16	M20	M24	M27	M30
Nominal diameter drill hole | d_0 [mm]	10	12	14	18	24	28	32	35
Drill hole depth and embedment depth $h_{ef,min}$ [mm]	60	60	70	80	90	96	108	120
Drill hole depth and embedment depth $h_{ef,max}$ [mm]	160	200	240	320	400	480	540	600
Diameter through hole in of the bracket | d_f [mm]	9	12	14	18	22	26	30	33
Cleaning brush diameter | d_b [mm]	12	14	16	20	26	30	34	37
Cleaning brush diameter | $d_{b,min}$ [mm]	10,5	12,5	14,5	18,5	24,5	28,5	32,5	35,5
Cleaning brush | RB-	10	12	14	18	24	28	32	35
Torque | T_{inst} [Nm]	10	20	40	80	120	160	80	200
Retaining disk | VM-	-	-	-	-	IA 24	IA 28	IA 32	IA 35

4 ASSEMBLY

4.1 Overview



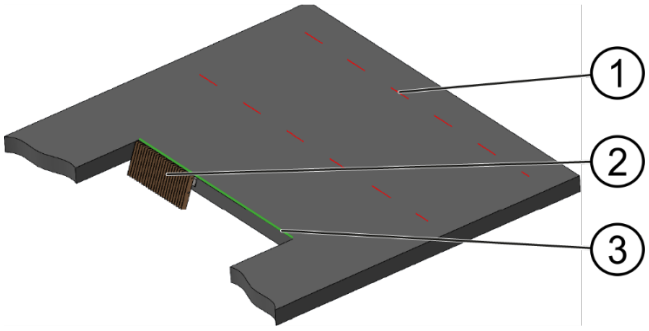
1) Rail
2) Clamp
3) Mounting plate
4) Secondary concrete
5) Initial concrete



The correct dimensions must be taken from the corresponding drawing

4.2 Assembly steps

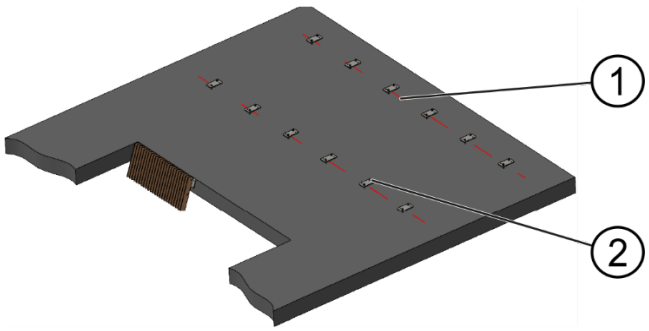
1. Mark the position of the rail on the concrete slab (red).



1) Marking center line rail
2) Rake example
3) Building edge of the inlet opening (green)

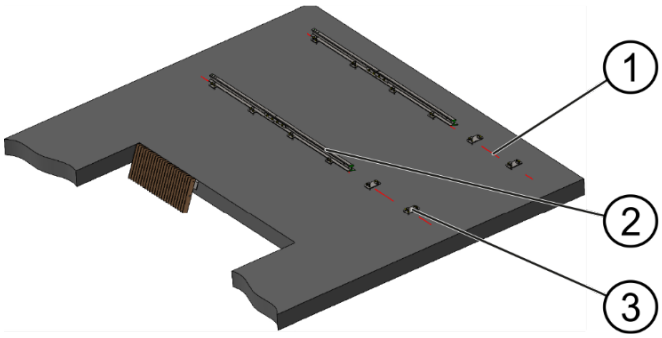
Measuring point for the position of the rail system

2. Position all mounting plates according to the drawing and mount them at the specified height. For more detailed information on mounting the mounting plates, see chapter 4.3



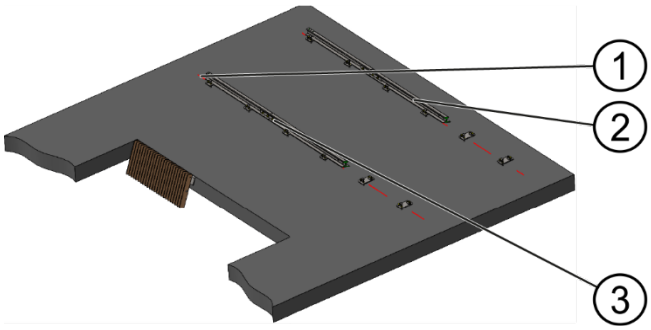
1) Marking center line rail
2) Mounting plates

3. Install the rails in the correct order. For more detailed information on mounting the rails, see chapter 4.4



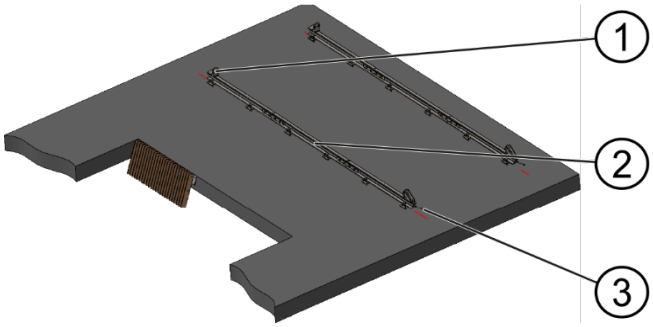
1) Marking center line rail
2) Rail parts
3) Mounting plates

4. Screw the rail connectors to the rail joints. Observe the corresponding tightening torque (chapter 3.1.1).



1) Marking center line rail
2) Rail connector
3) Rail parts

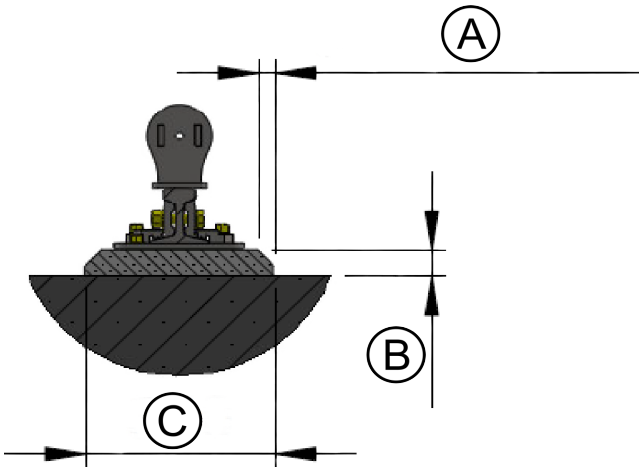
5. Screw the end stop onto the rail (4x) and connect the earthing strap (specialist personnel). Observe the corresponding tightening torque (chapter 3.1.1).



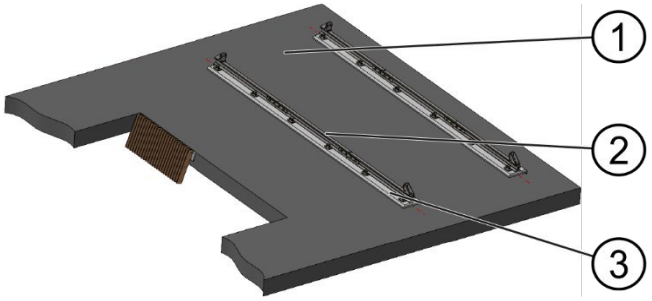
1) End stop
2) Rails
3) Earthing strap

6. Check the position of the rails using the test report - chapter 5. The secondary concrete may only be poured when the rail system is within the specified tolerances.

7. Install the formwork for the secondary concrete as shown in the drawing and pour the secondary concrete.



A) Approx. 30 mmx 45°
B) 50 mm
C) 350 mm



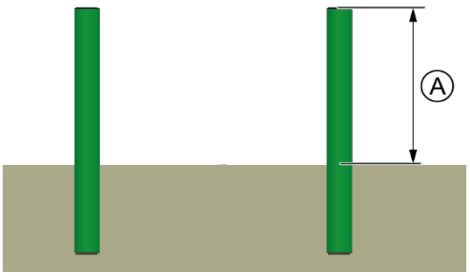
1) Initial concrete
2) Rail
3) Secondary concrete

4.3 Fitting mounting plates

1. Position the mounting plates according to the drawing. The mounting plate can be used as a drilling template. 2 drill holes are required per mounting plate.

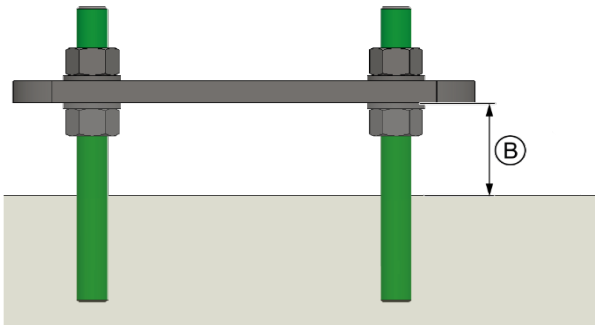
2. Prepare the drill holes for the threaded rods as described in section 3.2.

3. Glue the threaded rods into the initial concrete using the special adhesive. Pay attention to the installation depth of the threaded rods.



A) 100 mm

4. Attach the mounting plates to the specified mounting height using the nuts.



B) Approx. 50 mm

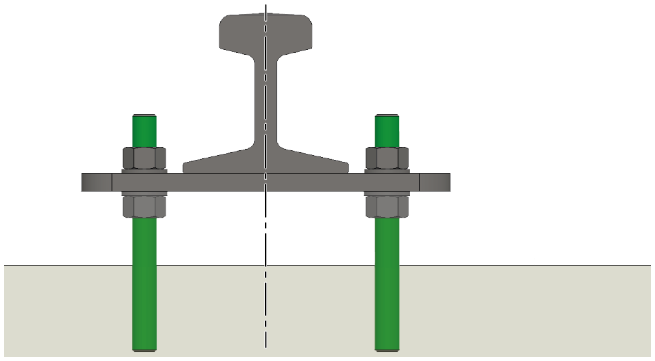
Attention reference value!

The final dimension may deviate from the specified value. Please note the required height code!

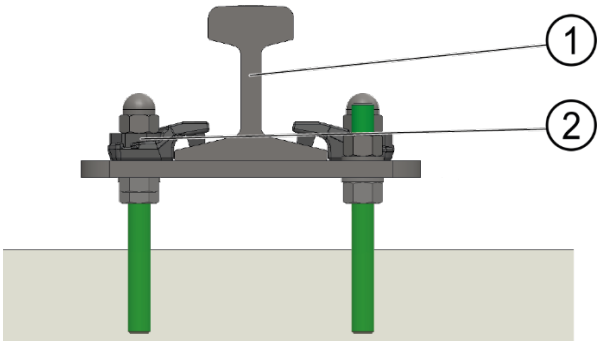
5. Tighten the nuts to the appropriate tightening torque (see chapter 3.1.1.)
6. Check the mounting height of the mounting plate again and adjust if necessary.

4.4 Installing rails

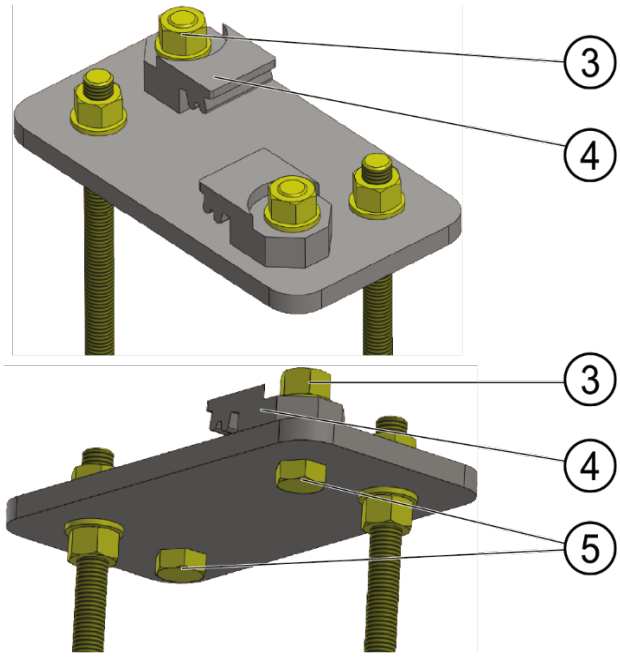
1. Place the rail in the center of the mounting plate. Pay attention to the correct sequence.



2. Place the clamps and mount the rail to the mounting plate using the clamping screws and clamping nuts.
   Tighten the clamping screws with the appropriate tightening torque (chapter 3.1.1).



1) Rail
2) Clamp with clamping screw and nut

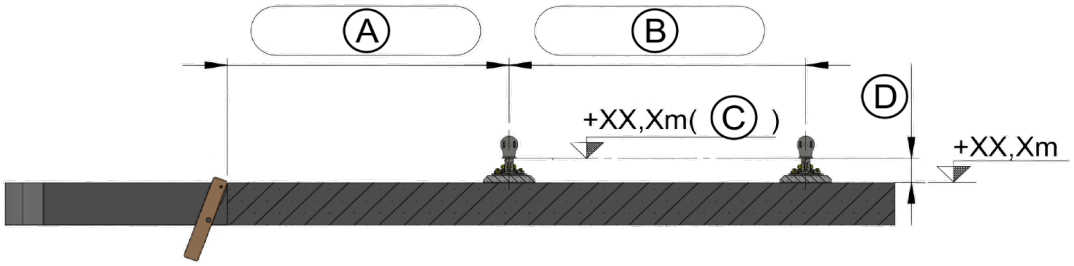


3) Clamping nut
4) Clamp
5) Clamping screw

5 TEST REPORT BEFORE SECONDARY CONCRETE

Component	Rail system
Test type	Dimensional check
Tolerances according to	VDI 3576
Distance measuring points	Approx. 2.0 m

Take the required dimensions from the drawing and enter them here:



A) B)

C) D)

Measuring point	Altitude UW (XX,xx m)	Light width (B)	Altitude OW (XX,xx m)	Distance OW edge (A)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
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14				
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32				
33				
34				
35				

	Yes	No
Fastenings tested		
Ready for grouting		

Remarks:

Height dimension related to local system		
Checked on:	Customer:	Muhr company