



INSTALLATION INSTRUCTIONS

RIVAL

**Pillar-mounted System
Troughing System**





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1.0 System Description

The RIVVAL pillar-mounted troughing system is a system of pillar-mounted cable ducts made of glass fibre reinforced plastic (GRP), utilised without any separate mounting framework.

The system consists of an IPE 100 steel girder, two supporting angles, one connecting plate and two mounting plates made of steel, the trough profile and the lid profile made of GRP. All steel parts and mounting hardware are hot galvanized and electroplated.

The ducts are perfectly suitable for installation in topographically difficult terrain, at river crossings, on noise barriers and bridge railings. They are easily adapted to local conditions, e.g. at deviations around masts etc.

The specific mounting plates allow for the compensation of dimensional inaccuracies caused by ramming.

Please note the Type 1A installation process differs from that of the Type 1/2 process.

Note: The RIVVAL pillar-mounted system is not for use in tunnels.

The RIVVAL cable duct system may only be installed outside of safety zones (refuges) according to local guidelines. The minimum clearance between cable duct system and track centreline will have to be determined dependent on the respective track speed on the basis of the currently valid guidelines of the relevant Railway authority.



Type 1/2

Fig. 1 – GRP cable duct installed



Type 1A

Please take into account that lateral or top snow loads are to be expected if the cable duct system is installed in excavations or on slopes with snow flow, snowdrift and the deployment of a snow plough. In these cases the planner will have to verify and ultimately decide if utilisation of the pillar-mounted GRP cable duct system will be possible. In areas subject to falling rocks installation of the cable duct is not permissible. Please also note that the cable duct system may not be subject to any loads that result from railroad traffic.



2.0 Specifications

2.1 Sizes

The product shall be available in three different variants in the following sizes:-

Dimensions	Size 1	Size 1A	Size 2
Length	6,000 mm	6,000 mm	6,000mm
Width	100 mm	150 mm	250 mm
Height	150 mm	150 mm	150mm
Weight (1 piece)	32 kg	44 kg	52 kg
Cable trough :	approx. 6.2 kg/m		
Lid profile :	approx. 2.2 kg/m		
Material :	MR – mats and roving-reinforced glass-fibre profile		
		longitudinal	transverse
Tensile strength :		300 Mpa	100 Mpa
Flexural strength :		250 Mpa	140 Mpa
E-modulus tension :		20,000 Mpa	10,000Mpa
E-modulus flexure :		25,000 Mpa	11,000Mpa
Elongation at rupture			1.0 – 1.8 %
Pressure modulus :		10,000 Mpa	4,000 Mpa
Density :	1.8 kg/dm ³		
Impact resistance IZOD :	1,600 J/m Barcol hardness		
	: 45		
Thermal properties :	permanent dimensional stability from -30°C to +85°C		
Service load vertical :	1.2 kN/m + 0.75 kN man load		
Wind load horizontal :	1.45 kN/m ²		

3.0 Installation

3.1 Preparing the Installation

Installation of the cable ducts will generally have to be carried out on the basis of the approved planning or operational guidelines of the relevant rail operator. It is a requirement that all personnel are instructed in the installation guidelines for the area prior to commencing installation.

As a matter of principle, all components should be inspected for damages prior to their installation. Only GRP profiles and steel components without any defects may be installed. Any modifications (e.g. extension of the cable duct profile) and repairs of GRP profiles or components will immediately render the warranty void.

Unloading of the components at the construction site or storage facility will be on the pallets supplied only, using suitable lifting devices or individually by hand. No liability whatsoever is assumed for consequential damages that result from improper handling of individual components.

3.1.1 Tools required

The following tools are required for the installation:

- Piling rig with guide bush for IPE 100 (Where piling option is undertaken);
- 2 off 19 mm open-end spanners (or box-end spanner);
- Offset screwdriver TX40;
- Power drill;
- 5.5 mm and 8.5 mm drill bits;
- D 85 crown bit with centring drill (for cable outlet gland) Torque spanner
- Spirit level File;
- Angle grinder, cutting disk or saw;
- Zinc repair spray;
- Personal protective equipment (PPE) in line with local requirements.

3.2 Steel Props and Mounting Structure

3.2.1. Steel Props

The steel props IPE 100 are rammed, buried or imbedded in concrete, dependent on the local ground conditions encountered on site. The minimum distance between steel props (cable duct) and track centreline will have to be determined dependent on the respective track speed on the basis of the currently valid guidelines of the relevant Railway authority.

Adherence to a protruding length of 0.20 m is recommended.

The regular clamping depth is 1.30 m for standard ground of category 3. Adapt the clamping depth to the local conditions encountered on site in case of deviations (e.g. sandy ground).



Fig. 2 – Spacer gauge 6 m

Use a spacer gauge (fig. 2) to properly space the steel props (6 m) and use appropriate equipment for ramming the props. Make sure that the props are aligned properly, are at the same level (height) and installed vertically. The standard length of the steel props is 1,500 mm. Longer props are marked accordingly at the flange (e.g. 2,000 mm = 20 or 2,500 mm = 25).

The height difference between props should not exceed a value of 2 mm.

If the distance between props is shortened, the cable trough profile and possibly the lid profile will have to be shortened accordingly.

A pneumatic pile driver GR40 with guide bush is recommended for IPE100 (fig. 4) for ramming the props into the ground.

Please comply with the accident prevention stipulations for “Ramming” and the operating instructions of the equipment manufacturer when operating a pile driver.



Fig. 3 – Pile driver GR40 – positioned on pile

Position the pile driver on top of the pile to be rammed (fig. 3), align the pile to be rammed and slowly open the ball valve. Steady the pile until slightly rammed in and then continue without supporting the pile. On account of the strong vibrations encountered, do not hold on to the pile driver during operation.



Fig. 4 – Pneumatic pile driver GR40 with guide bush IPE 100

3.2.2 Mounting structure

First align the height of the preassembled mounting structure (consisting of: 2 ea. Connecting angles, 1 ea. connecting plate and 2 ea. mounting plates) and attach to the steel prop using M1 2x45 (ISO 4017) bolts (tighten to 90 Nm). Then bolt the mounting plates to the connecting angles, using M12x45 (ISO 8677) bolts (tighten to 90 Nm – fig. 5).

The slotted holes in the mounting structure allow for accurate adjustment in longitudinal and transverse direction and alignment of the height.

Use a hinged angle instead of a connecting angle (rigid) in case of vertical changes of slopes, e.g. at inclinations or downhill sections.



Fig. 5 – Mounting structure installed

3.3 Cable Duct Profile and Lid Profile

3.3.1 Cable Duct Profile

After the mounting structure has been adjusted properly and bolted to the steel props, insert the cable duct into the plate (floating installation). **Make sure to adhere to an air gap of 3 mm (fig. 6) at the butt joint.** Secure the installed cable troughs in intervals of 30 m (on both sides) using grooved pins (fig. 7). The hole in the mounting plate serves as a drilling jig. Mitring is not required for horizontal bends (typical railroad radii).

If obstacles such as e.g. overhead line masts or signal masts are detoured, the cable troughs and lid profiles will have to be cut to the required angle (mitred) at the butt joint with a diamond cutting disk equipped angle grinder. Ensure correct PPE is worn in line with the cutter operating instructions.

A lowering kit is required for vertical deviations in order to ensure stress-free installation of the cable ducts (mounting structure: hinged angle and upper plate Size 2).

If the pillar-mounted cable route is not connected to an underground cable duct or the like, an end cover will have to be installed at the end of the duct.



Fig. 6 – 3 mm air gap

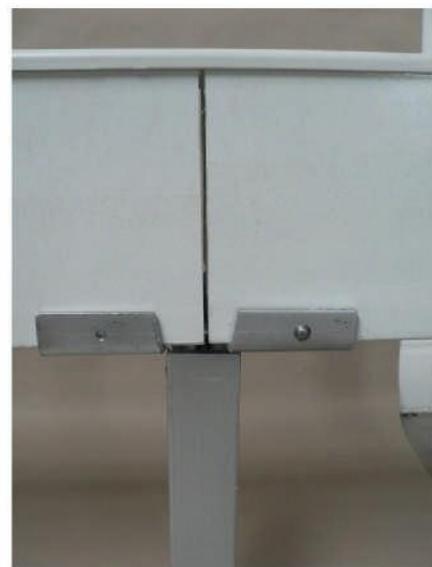


Fig. 7 – Cable profile secured with grooved pin

Stress-free installation of the cable ducts is essential.

No sharp edges are permissible at the inside or outside of the cable duct system.

Make sure and comply with the maximum permissible bending radii of the cables to be installed.

3.3.2 Lid Profile

Position and install the lid of 6 m length as follows:



Fig. 8 – Lid profile, locking bar, mushroom head bolt, offset screwdriver

Insert the mushroom head bolts (M8x16 4.8 DACROMET with flange, 5 ea. per 6 m of lid profile) into the bore in the lid from the top and thread 2 turns into the locking bar steadied from underneath (exploded view). Then rotate the locking bar in longitudinal direction of the lid (fig. 8). On straight cable troughs, position the first lid so that the lid centre is aligned with the joint of the cable troughs (one lid connects to troughs). Then tighten the mushroom head bolt to 30 – 40 Nm, using a TX40 offset screwdriver.

Turning the mushroom head bolt will rotate the locking bar to mesh with the lower part of the cable trough (fig. 9). The remaining lids are installed similar to the first one. Cut the last lid in two, using a diamond disc equipped angle grinder. The two lid halves are used to close the remaining open trough sections at the beginning and end of the cable route.

In bends (typical railroad radii), the lid may be positioned no further than 50 mm away from the joint of the cable troughs in order to ensure stress-free installation. The lid must be mitred in case of any change of direction of the cable duct system.

Make sure to adhere to an air gap of 3 mm between lids.



Fig. 9 – Locking bar installed
In Type 2

Do not store the lids loosely and unprotected next to the installed cable duct system.

In order to ensure the stability of the cable duct system, it may be necessary to close the cable ducts with the lids (also empty cable ducts) and latch them in accordance with the installation instructions in case of unfair weather conditions (high snow loads, high wind force, etc.).

NOTE:

The 1A type has a different fixing arrangement where the duct is bolted to the mounting base plates. Images below show this version. The appropriate PPE shall be worn in line with the relevant railway authority requirements.



3.4 Mounting Hardware Accessories

3.4.1 Lowering Kit

A specific mounting structure, also referred to as lowering kit (fig. 10), is required if the cable duct system is to be connected to an existing underground duct or if adaptations to the terrain are required.

The lowering kit is supplied loosely preassembled. The mounting structure consists of a connecting angle, a hinged angle, and the mounting plates (upper plates).

Bolt the angles to the steel props, using the bolts supplied (M1 2x45 ISO 4017, tightening torque 90 Nm). Position the angle with hinge pointing towards the underground duct / terrain protrusion, secure and bolt down. Then position the GRP duct loosely on the plate / push in and butt against the underground duct. Next, position the stop angle on the plate with the rigid connecting angle and use a pencil to scribe the cutting line for the mitre joint on the duct. The reference point is the centre of the steel prop. Mark the lines on both sides of the cable duct with a pencil.

The ducts are then cut, using appropriate equipment. Drill the two mounting holes – dia. = 6 mm – (on the sides of the trough profile), using the plate as a drilling jig. Mounting plate and the cable trough must lie flat when drilling the holes. Then attach the GRP trough to the mounting plate on both sides with the hinged angles and secure with grooved pins DIN 1476 – ISO 8746. Installation of the first horizontal GRP duct may now be started.

Make sure to adhere to the specified gap clearance also when lowering the ducts.



Fig. 10 – Lowering kit

3.4.2 Cable Outlet Gland (Connecting Pipes)

Place connecting pipes onto the cable trough floor at the desired position from above.

Mark the four mounting holes as well as the respective penetration on the cable trough floor with a pencil. Use a D 85 crown bit for cutting the penetration and an 8.5 mm drill bit for the mounting holes. Deburr the cable penetration with a file or sandpaper and then install the connecting pipe on the bottom of the cable trough from underneath, using the bolts supplied (M8x16 ISO7380 A2 – tightening torque 30-40 Nm - fig. 13). Insert the bolts through cable trough floor and base plate of the cable outlet gland from above to where the bolt's mushroom head is located inside the cable duct.



Fig. 13 – Cable outlet gland

Caution: Use only a flex hose with the same (or a higher) fire-protection rating than the GRP cable duct system

3.4.3 Special Components

Special consoles are used to run a cable route over engineering structures (bridges, overpasses, viaducts, etc.).

Prior to the installation work, determine the shape of the poles (round, square or rectangular tube, angled profile, etc.) and their dimension as well as spacing.



Fig. 11 – Special console on bridge railing

3.4.4 Coupler Kit

The coupler kit where required (fig. 14), is installed behind (as seen from the railroad track) the existing cable route.

Insert (push) the cable duct at the beginning and at the end onto one each prop with mounting plate and secure with grooved pins. Bolt the accompanying duct to the previously installed cable duct with a spacer plate (upstream and downstream of the cable inlet / outlet) in order to ensure proper installation of the lids. Manufacture the cut-outs as required on site, using appropriate tools (comply with the applicable accident prevention regulations !!!)

No sharp edges that could damage the cables are permitted on the cable ducts.

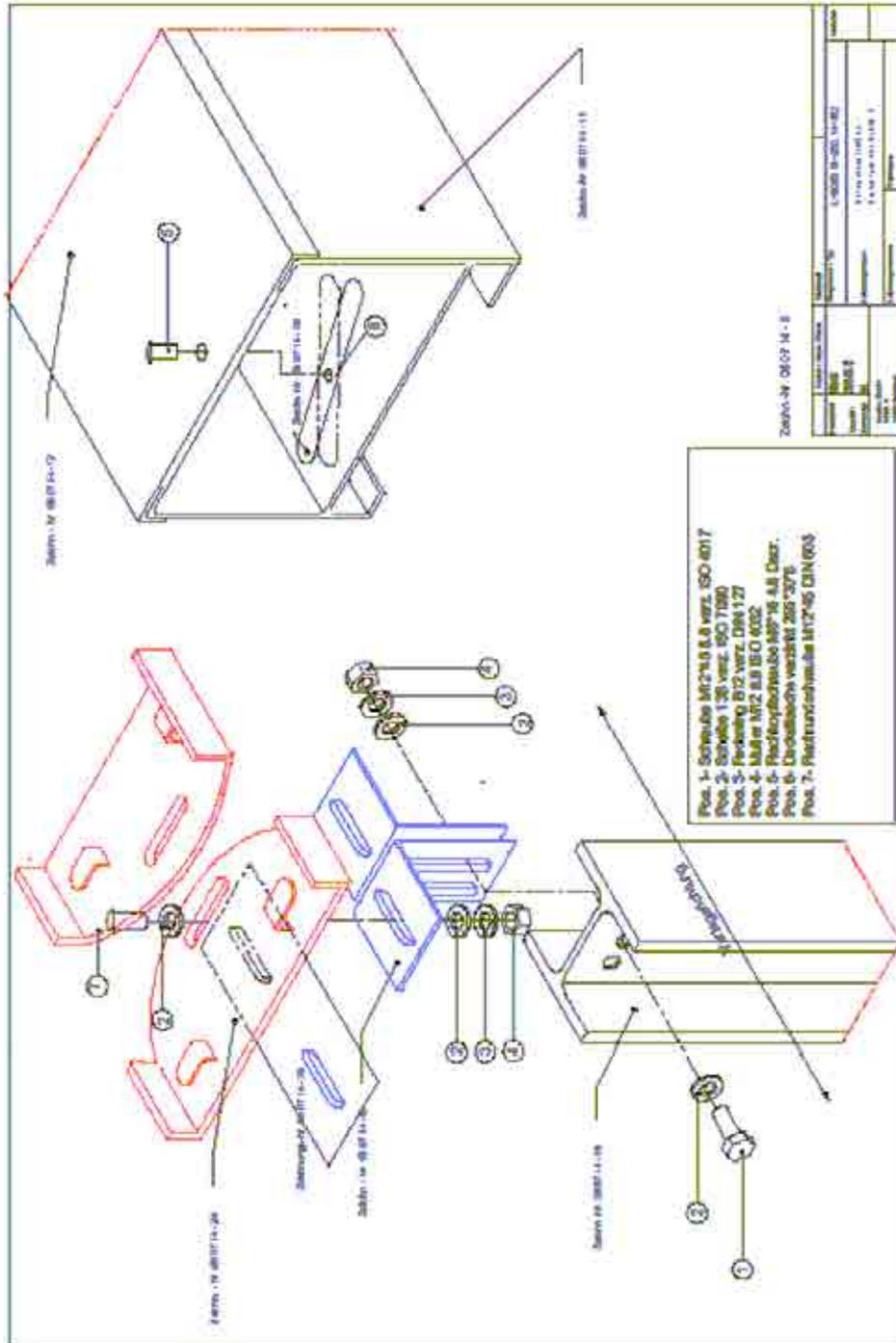
Use the bolts supplied to attach the end covers onto the openings at the beginning and end of the cable duct. After insertion of the cable coupler, position and close the lid (installation of the lid, cf. para. 4.3.2)



Fig. 14 – Coupler kit

4.0 Exploded View

4.1 Exploded View Size 2



- Item 1 – bolt M12x45 8.8 galvan sed ISO 4017
- Item 2 – washer 13B galvanised ISO 7090
- Item 3 – lock washer B12 galvanised DIN 127
- Item 4 – nut M12 8.8 ISO 4032
- Item 5 – pan head screw M6x16 4.8 Dact.



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