TRENCHGUARD SYSTEM

TECHNICAL MANUAL

For the feeding cable protection

CONDUCTIX wampfler

DELACHAUX GROUP

The company Conductix-Wampfler

Company of the Conductix-Wampfler Division of the Delachaux Group, Conductix-Wampfler is involved in the field of feeding mobile systems.
Leader in the market of the ports cranes, it can offer a complete turnkey system for the feeding of mobile cranes that allows the correct performance of operations in complete safety assuring the practicability of the ways of movement of the cranes by heavy vehicles.

Three products for a complete service

The system includes the use of festoons for the orthogonal movement of the crane, of cable reels with magnetic coupler and/or at electronic integrated tuning of the couple for the movement to the dock and of an underground trench (TrenchGuard) with a practicable rubber covering for laying down the unwound cable.
TrenchGuard: the best solution for the protection of the cable laid on the ground, also is heavy vehicles are present.

Definitive solution of the problem

- With a customized design, considering all the problems involved;
- With a realization of a complete system cable reel/TrenchGuard integrated by a cable guide system with lifting device that allows the input and output of the trench;
- With an interlocutor specialized to discuss the marketing, technical, installation and maintenance sizes with.

Many strengths

- Total protection of the cable itself and safety of working, in compliance with the Safety Norms in force;
- Highest functionality in any atmospheric condition and without limits of speed of the mobile vehicle.
- Highest grip of the belt to the ground, designed and manufactured with a considerable flexibility and sturdiness in order to avoid permanent deformation on its free side;
- Reliable and suitable fixing system;
- Cheap installation and almost no maintenance.

Delna Yard - Ukraine

Civitavecchia Harbour - Italy

The Matter

In the past

Normally, the cables laying down on the forecourt of the ports, of the steel plants and similar, were protected by inserting the cables in an open passage. Then, in order to allow the passage of the vehicles on these tunnels, they started covering them with many metallic shutters. The lifting of the shutters was made by a guard that reversed the shutters on side hinges (see figure attached). This system had some weaknesses:

- It could be used only for low speed translating cranes;
- It was extremely noisy and caused many problems to the hinges: expensive maintenance charges.

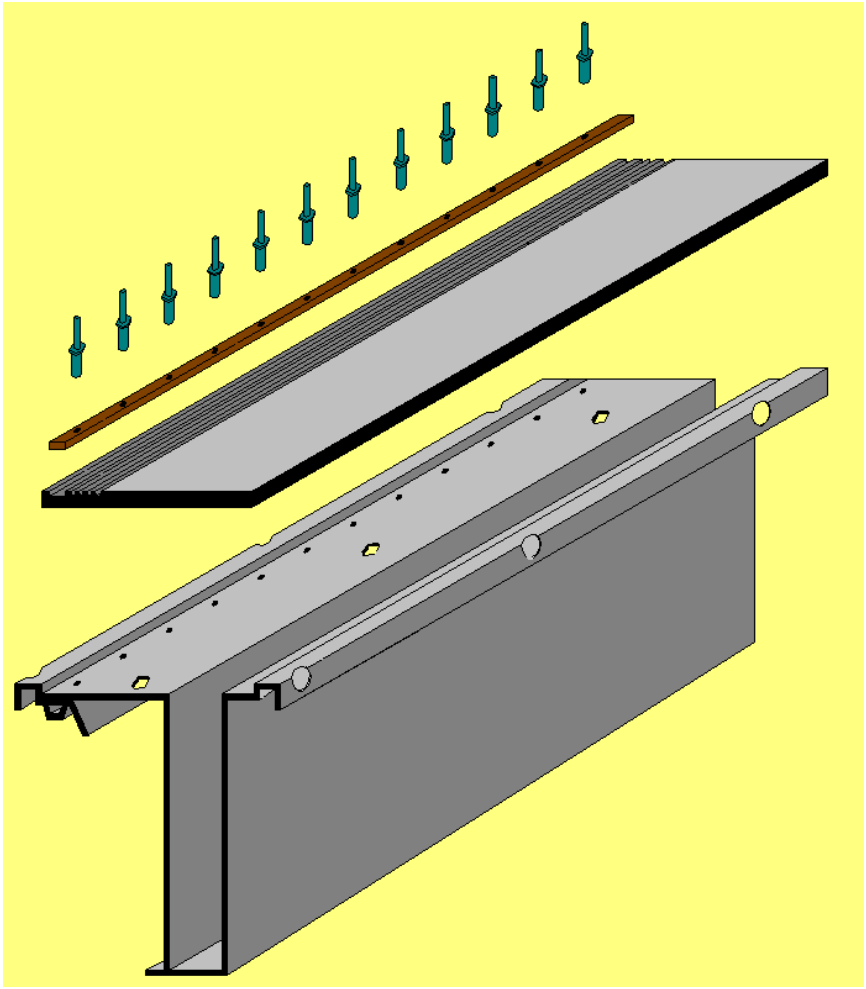
Now – the Trenchguard System

TrenchGuard system solves the problem of the cover of the cable tunnels, in order to allow at the same time the winding on the cable reel. TrenchGuard is a flexible and continuous system, that allows to mobile vehicles to operate on the forecourts without any danger of damage for the cables. It is installed, as a protection of low or medium voltage cables in ports or in environments where heavy vehicles , such as trucks, forklifts, have to cross the ways of running of the cranes.

TRENCHGUARD System

The system is composed by:

- **A trench:** it can be manufactured (within the limits given by the dimensions of the belts and by the load that they have to bear) accordingly to the technical specifications of the customer, both in galvanized and stainless steel.
- **A belt:** it protects the cable from the bad weather and has flexible features that warrant the best compromise between sturdiness (for practicable vehicles) and the flexibility that allows the handling of the crane by a fast return of the belt in its own position after the crane has passed;
- **A series of fittings** for the correct junction of different trenches of belt, for the correct lay down of the trench and lifting device for the laying down of the cable into the trench.



THE BELT

The construction

Sturdy, flexible and continuous, the rubber belt is the main element of the system, it assures:

- Safety
- Reliability
- Technical performances
- Durability

TrenchGuard belt is now a reality in the harbor overview, with many applications that work well after many years and for which you can ask for a list of references.

It has been designed by our R&D office using the most updated technologies such as the analysis of the finished product and it is manufactured starting from prime raw materials and tested in laboratory in order to assure a high quality of the product.

Fatigue test

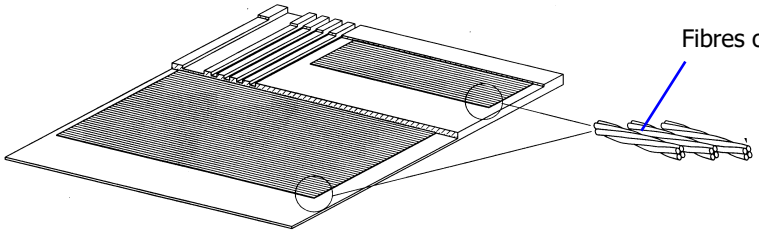
The tests

Each belt is manufactured in accordanc
highest quality standards and each prototype is submitted to the hardest tests such as:

- Resistance to saline corrosion
- Resistance to abrasion due to the contact with wheels
- The permanence of the flexible and resistance features in severe temperature conditions
- Durability tests by measuring the hysteresis

The belt is developing more and more on the basis of our customers' feed-backs and of the natural technical development of raw materials

Wearing tests



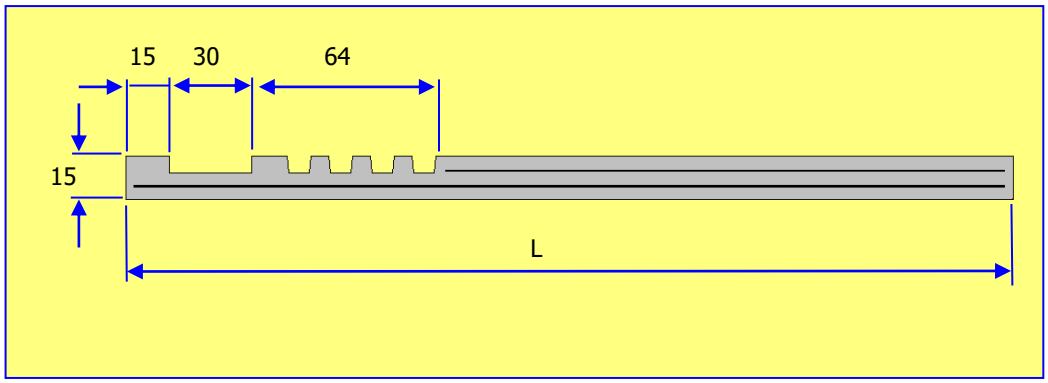
General Features Of The Belt

Temperature	- 30 ÷ 80 °C
Max. angular opening	90°
Minimum radius (horizontal)	60 m inner hinge of the belt
Max. load	400 N/cm^2 calculated on an impression 100 mm width
Elongation percent	2/1000 on a traction of 3000 N
Standard length of the rollers	50 m
Color	Black
Estimated lifetime	>300.000 cycles (open/close)

Belt Composition

Materials	80% Rubber SBR 15% Steel 5% Nylon
Steel Reinforcement	Composed by 2 metallic layers (upper and lower) Each layer is composed of twisted strands diam. 1,29 mm. Each strand is composed of 4 twisted wires diam. 1,52 mm
Ultimate tensile strength	Steel twisted with nylon Ultimate tensile strength transverse 720 kN Ultimate tensile strength longitudinal 30 kN
Rubber Hardness	65 Shore A ±5%

Belt dimensions



Type	Dimensions L (mm)	Weight (Kg/m)
TG 300	295	6.0
TG 400	395	7.5
TG 600	595	11.5

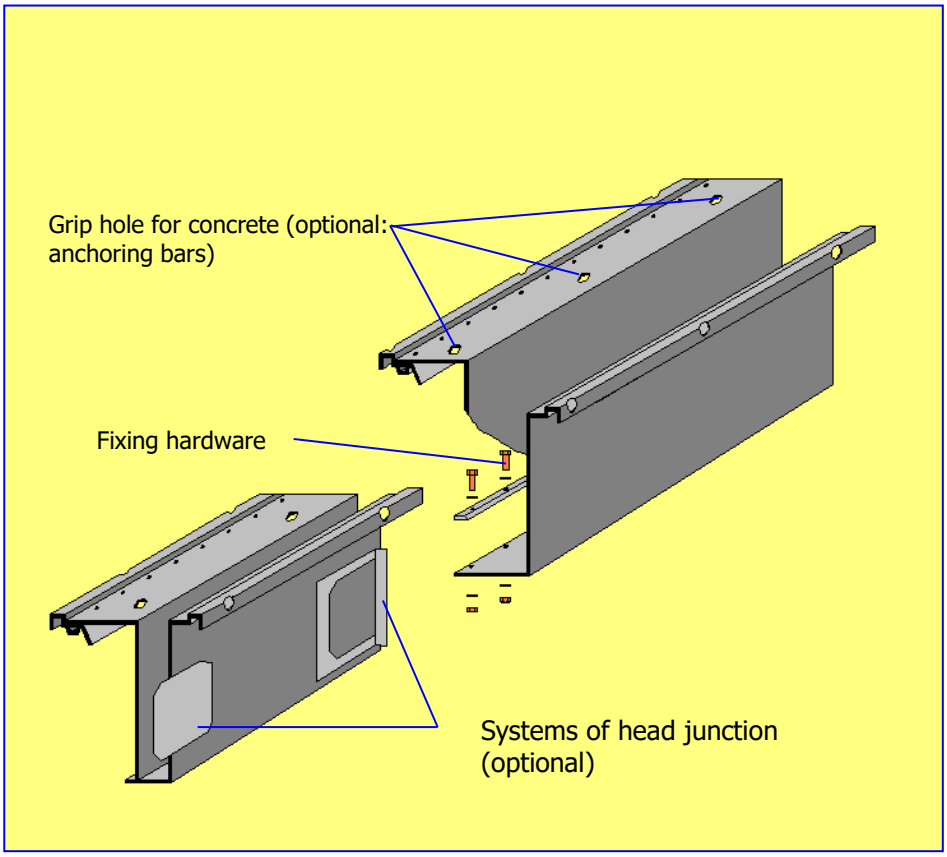
THE TRENCH

- It allows the seat of the cables by the creation of a niche where the belt can be placed allowing the passage. The trench is supplied fitted with:
  - **Grip hole for concrete** and/or, in option, **anchoring bars** for a safest anchoring of the trench during the casting
  - **System of head junction,** on demand. It allows an head housing of the different trenches in order to allow a perfect continuity to the tunnel where the cable lays.
  - **Fixing Bolts and Nuts** of the two parts of half trench for an easy assembly of it.

Features of the trench

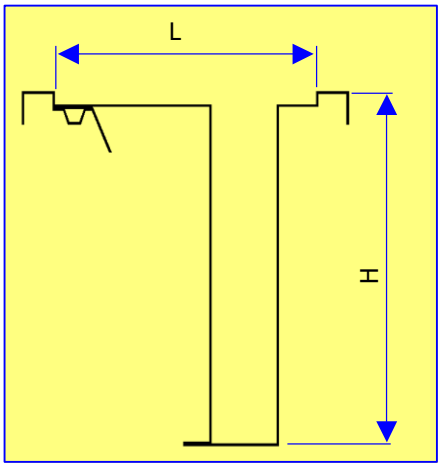
DEPTH: It depends on the maximum number of over-under cables (see table)
WIDTH: Standard : 1,5 mm. (stainless steel), 2 mm. (galvanized steel)
MATERIAL: Hot galvanized steel, AISI 304 or AISI 316 L stainless steel
LENGTH: Standard 3 m. (on demand different length)

The trench can be manufactured in accordance to the needs of the customer.



TRENCH DIMENSIONS

Type	Dimensions (mm) L	H	Max Number of overlapped cables
TG 300/220	300	220	2
TG 300/320	300	320	3
TG 300/420	300	420	4
TG 300/520	300	520	5
TG 400/220	400	220	2
TG 400/320	400	320	3
TG 400/420	400	420	4
TG 400/520	400	520	5
TG 600/220	600	220	2
TG 600/320	600	320	3
TG 600/420	600	420	4
TG 600/520	600	520	5

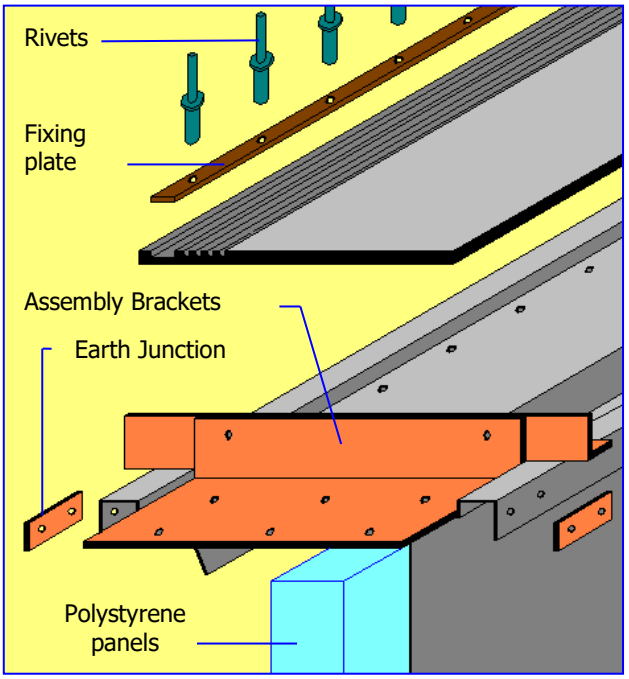


THE FITTINGS

❑ FIXING PLATE

WIDTH:	30 mm.
DEPTH:	8 mm
STANDARD LENGTH:	3 m.
MATERIAL:	Stainless Steel AISI 304 Stainless Steel AISI 316L

The plate is pre-drilled and it is used as template in the yard in order to drill the belt and the trench.



❑ RIVETS

Dimensions	5x25
Material	stainless steel AISI 304 or 306L

❑ EARTH JUNCTIONS

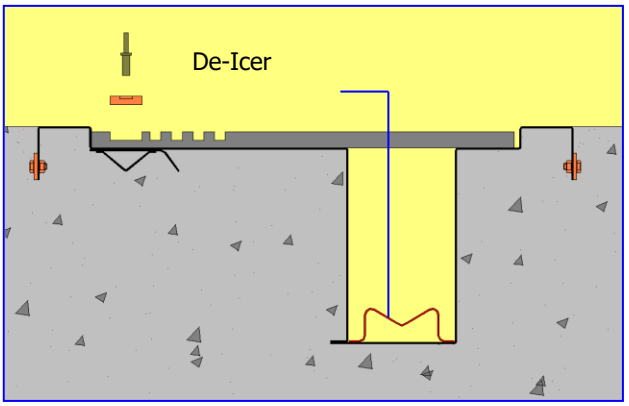
Series of copper plates for side junction of the heads of the trench, fitted with screws for the assembly. The copper construction allows a good earth of stray currents.

❑ PADDING OF THE TRENCH

In order to assure the preservation of the shape of the trench during the laying and the casting of the concrete, a series of polystyrene panels are supplied. The have the same section than the tunnel and a standard length of 1 m. the polystyrene avoids also the seepage of concrete in the tunnel of the trench.

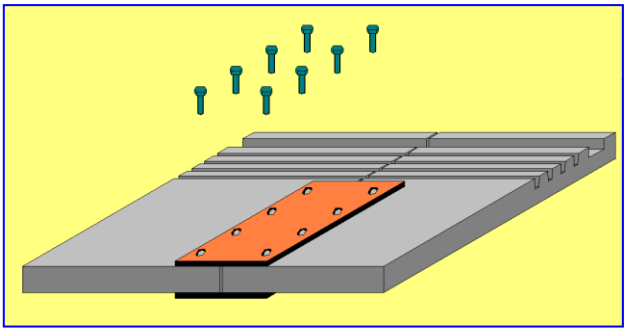
❑ ASSEMBLY BRACKETS

Series of junctions brackets for the assembly of the trench.
Series of lining brackets for the rigging of the trench.



❑ DE-ICER

On demand, we can supply some supports that, placed on the deep of the tunnel, keep the cable lifted where the trench is. This preserves the cable from a layer of ice that can be formed on the deep of the tunnel in the countries where the temperature is considerable below the zero.



❑ BELT JUNCTION

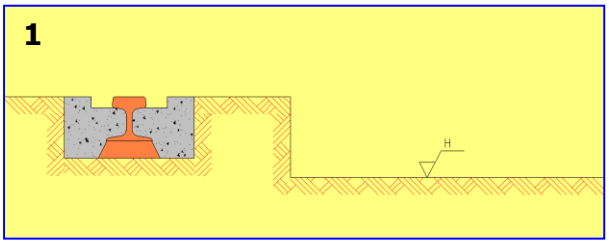
It is composed of two plates (upper and lower).
The junction of the belt is assured by 10 flush screws that are screwed up to the lower plate.
Material: AISI 304 or AISI 316 L stainless steel

INSTALLATION

We have an instruction manual for the correct assembly of TrenchGuard.
Here below the main phases of installation.
They refer to the standard product as shown on this catalogue .
For different application, our Engineering Dpt. is at your disposal.

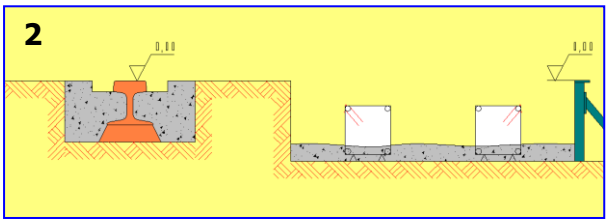
PHASE 1

See how is a typical dock of an harbour.
The rail, that is the referring point on level (0.00), is laid on a concrete dock. The ground work gets up to a laying quote of TrenchGuard system



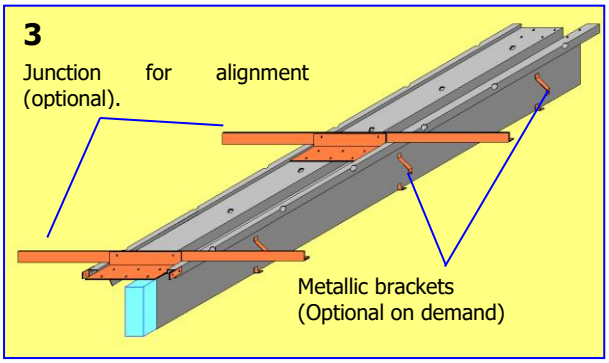
PHASE 2

Steel gaggers are placed, being careful to keep the axle base (X) between the rail and the tunnel. The gagger will be in right position, casting a layer of concrete of almost 10 cm on the base. A side form for concrete will be useful to house the casting



PHASE 3

The preparation of an element of trench to be installed is shown. Please, note the position of the lining brackets and of the polystyrene panel. Junction for alignment (optional).



PHASE 4

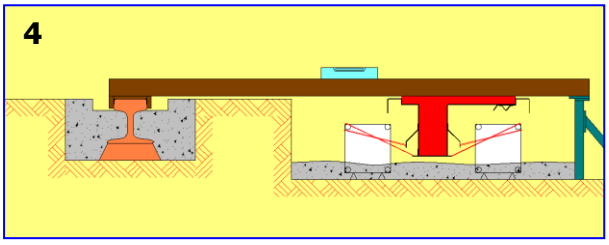
The element of trench is placed, fitted with the polystyrene panels. The lining and the level happens thanks to lining brackets, referring to the rails plane. The trench is anchored to the gaggers by rods directly or using metallic brackets if present.

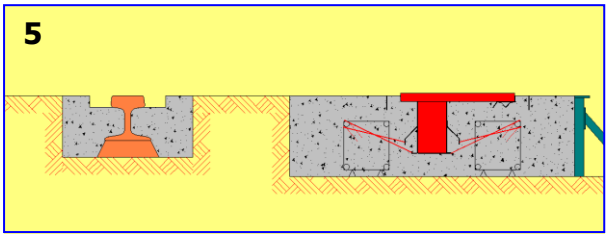
PHASE 5

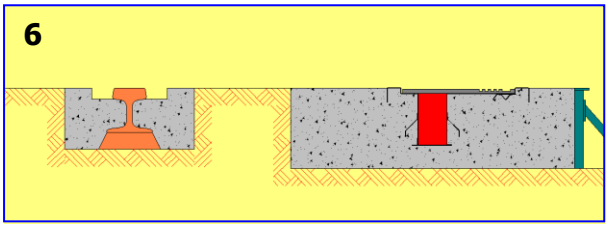
Last casting of concrete in the whole section of the drilling.

PHASE 6

Laying and fixing of the belt on the trench. Obviously, after that the concrete casting is wet.







TrenchGuard installation (Ancona Harbour - Italy)

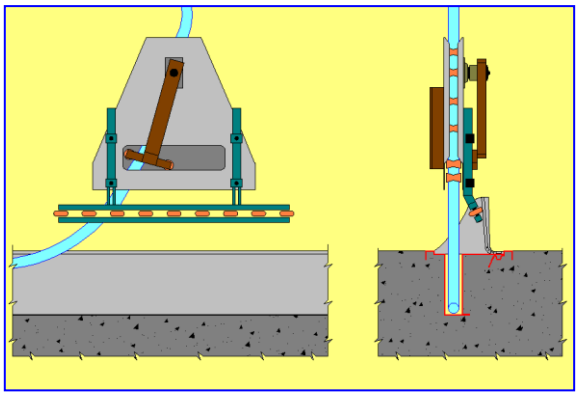
COMPLEMENTS OF THE TRENCHGUARD SYSTEM

❑ CABLE GUIDE WITH LIFTING DEVICE

This device guides the cable into the tunnel, during the unwinding and to keep it out, during its winding on the drum. This is mainly composed by two parts:

- **CABLE GUIDE**
  Traditional type, it is dimensioned following the cable diameter. It guides the cable during the winding/unwinding phase, avoiding throttling by suitable radius. It avoids the wear of the cable because of the dragging: it runs on loose rollers. Normally, the lyra is equipped with control devices that avoid over tension of the cable during the winding phase and under tension during the unwinding phase.

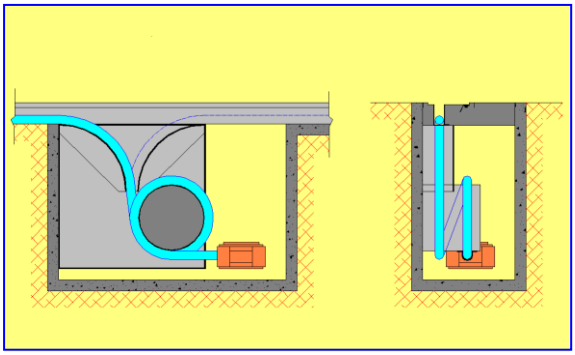
- **LIFTING DEVICE**
  Composed by a metallic structure with a jointed shape, both input and output that allows the lifting and the lowering of the belt, during the passage of the crane. It has a series of loose rollers that stop the dragging of the belt on the device, so that the belt is preserved from rupture. The whole device can be tuned in height for better adaptation.



cable guide with lifting device

❑ CABLE ANCHORING DEVICE

It is usually placed on the electric junction of the cable. It is usually underground so that the exit is on level on the base of the tunnel. It is perfect to release the tension on the cable when some discontinuous and/or high efforts of traction are expected. The cable anchoring device has a drum to wind the cable that avoids the tension of the electrical junction of the cable. The input of the cable can be both on left or right , being suitable also when the feeding point is on half of the run of the feeding mobile system. They are usually manufactured in painted steel. On demand, they can be supplied in stainless steel.



Cable anchoring device

REFERENCES

Conductix-Wampfler is a worldwide leader in supplying mobile feeding power systems. This allows a constant presence on the markets, both as a cooperation partner in designing with the customer and as after sales service.

This assures reliability and constant presence for our customers.

Conductix-Wampfler, that manufactures the Trenchguard System, is your perfect partner. The experience and the know-how gained in years of research and construction can solve all your problems connected with the protection of cables.

Trenchguard System is performing and cheap at the same time.

We are at your disposal, contact us.

Here below find some photos concerning the applications

Abu Dhabi harbour – Emirates

Civitavecchia port - Italy

Ancona port - Italy

Livorno port - Italy

Greenock port - England

Luisiana Terminal - USA

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