Insul-8 Mobile Electrification

Cable Reels ◆ Conductor Bar ◆ Festoon ◆ Radio Controls ◆ Slip Rings

Solutions From A Single Source

TrenchGuard

Cable Protection Systems for:

- Gantry Crains
- Container Cranes

INSUL 8
CONDUCTIC DIVISION
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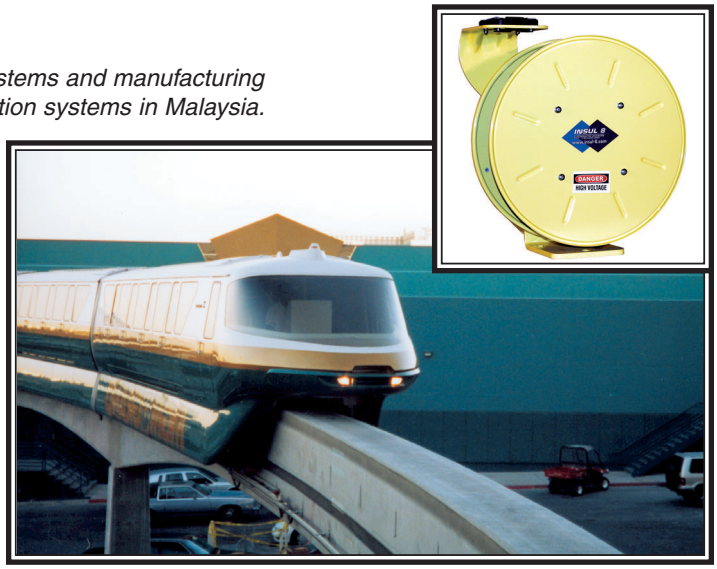
www.insul-8.com

Header Text

Sub Header Text

Since our inception in 1902, Insul-8 Corporation's parent company, Delachaux S.A., has been a leading international presence in the business of providing mobile electrification. As the Delachaux arm in North and South America, Insul-8 Corporation (formerly sister companies Insul-8 and Industrial Electric Reels, Inc. - *a.k.a. IER*) carries on this tradition of innovation and excellence. Insul-8 and IER became part of the Delachaux Group in 1975 and officially became one company on December 31, 1996. Each company has its own rich history.

You'll find Insul-8 products in use everywhere from irrigation systems and manufacturing plants in the heartland of the United States to public transportation systems in Malaysia.



Industrial Electric Reels, Inc., began in 1924 with the founding of Industrial Electric Works (IEW), an electrical contractor based in Omaha, Nebraska. After World War II, IEW began the manufacture of electric cable reeling equipment and started IER as an operating division in 1948. IER's first cable reel, the hand rewind Series 102 PORT-O-REEL, was quickly followed by light-duty spring retractable cable reels. IER pioneered the development of cable reeling devices and slip rings. Soon the business expanded to larger, custom built motor driven reels and custom engineered slip rings. IER's reputation spread as a quality manufacturer of reels running the gamut from small commercial duty reels to large custom built reels for the most demanding applications such as container cranes, stacker/reclaimers and bulk material ship loaders and unloaders.

Insul-8 products can electrify items from small industrial machinery to large amusement park rides and international public transit systems.

Insul-8 Corporation has been a pioneer in providing safety-covered metal conductor systems for the material handling industry since 1944. Insul-8 was the first company to design and produce a stainless steel capped aluminum conductor and the only manufacturer of such a product for almost 20 years. Today, there are over 20 million meters (nearly 12,500 miles) of Insul-8 contact conductors and tens of thousands of collecting devices throughout the world. Every major port in the United States currently uses Insul-8's aluminum/stainless steel contact conductors on container cranes due to the dependability of the bar under the most severe conditions. Insul-8's festoon systems range from the smallest box-track systems to our most rugged Heavy-Duty Festoon. Insul-8's festoons are known for their safe and efficient operation in which large numbers of conductors can be handled in minimum space.

Insul-8 has been in the business of supplying power from stationary sources to mobile systems for 60 years. Insul-8's cable reels, slip rings, conductor bar, festoon systems, pendants and radio controls are used in a wide variety of applications ranging from material handling and mass transit systems to water treatment plants and performing arts theaters.
As it has been for the last 60 years and alway will be, "conducting" business will continue to be our only business.

In December 1997, after a nine month endeavor, Insul-8 Corporation became ISO 9001 certified for the design and manufacture of our entire line of mobile electrification products in both of our U.S.A. plants in Omaha, Nebraska, and Harlan, Iowa.

◆ cable and hose reels ◆ conductor bar systems ◆ cable festoon systems ◆
◆ slip rings ◆ pendant stations ◆ radio controls ◆
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Specifications may change without notice. All products F.O.B. Omaha, NE, or Harlan, IA, unless otherwise specified.

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Overview

System Overview

Insul-8 has a complete range of products for Port electrification including:

- **Heavy-Duty Festoon Systems:** For movement of the crane perpendicular to the pier
- **Magnetic Coupler and Electronically Controlled Cable Reels** to manage the main crane power cable
- **TrenchGuard™ Cable Protection System:** A system designed to protect expensive crane power cables from dirt, debris, and moving vehicles
- **Two-way Cable Guides with optional Belt Lifting Device:** that helps the cable across the center point, and lifts the cover belt to access the cable
- **Hevi-Bar I™** conductor rail as an option to cable reels for main crane power

TrenchGuard™: for Safety and Long Cable Life

- Complete protection of expensive power cables in a safe and secure environment
- Rugged cover belt to handle tough Port-side and mill environments
- Belt body and hinge area designed to withstand repeated open/close cycles without deformation or loss of belt flatness
- Reliable fixing plate attachment to keep the belt in place
- Able to handle all crane travel speeds
- Easy and inexpensive installation
- Virtually maintenance-free protection!

TrenchGuard™: The ideal Solution for the Protection of Crane Cables

- Standard and customized trench depths and widths to accommodate a variety of cables. Trench can be sub-divided to increase cable capacity.
- Trench configurations to handle every requirement: Formed concrete or lined with either galvanized steel or stainless steel (304 or 316L grades)
- Durable cover belt with steel reinforcement to withstand tens of thousands of open/close cycles, and to withstand vehicle traffic.
- Efficient belt lifting devices that raises/lowers the belt for cable access as the crane moves
- Available technical and engineering assistance for system specification, installation, and maintenance recommendations.

Problem & Solution

The Previous Solutions to Cable Protection

In the past power cables were laid in an open trench formed into the pier or mill crane areas, which became a collection point for dirt and debris, and created a maintenance headache. The next generations of trenches were covered with a series of hinged metal cover plates. The crane was equipped with a lifting device to open and close the metal plates. The plates did protect the cables, but not without drawbacks:

- The system could only be used for slower speed cranes
- The system was extremely noisy as the plates opened and closed
- The metal plates would become corroded and require expensive maintenance

There had to be a better way!

The "TrenchGuard"™ System

The new TrenchGuard™ system solves the problem of how to cover the cable trench with a noiseless and maintenance-free system, yet still allow the crane to access the power cable as it moves. The TrenchGuard™ system is a flexible, continuous cover belt solution. The crane can operate up and down the pier without the risk of damage to the cable. The TrenchGuard cover protects all medium and high voltage cables from damage, and is able to withstand vehicle traffic running over the belt.

System Components

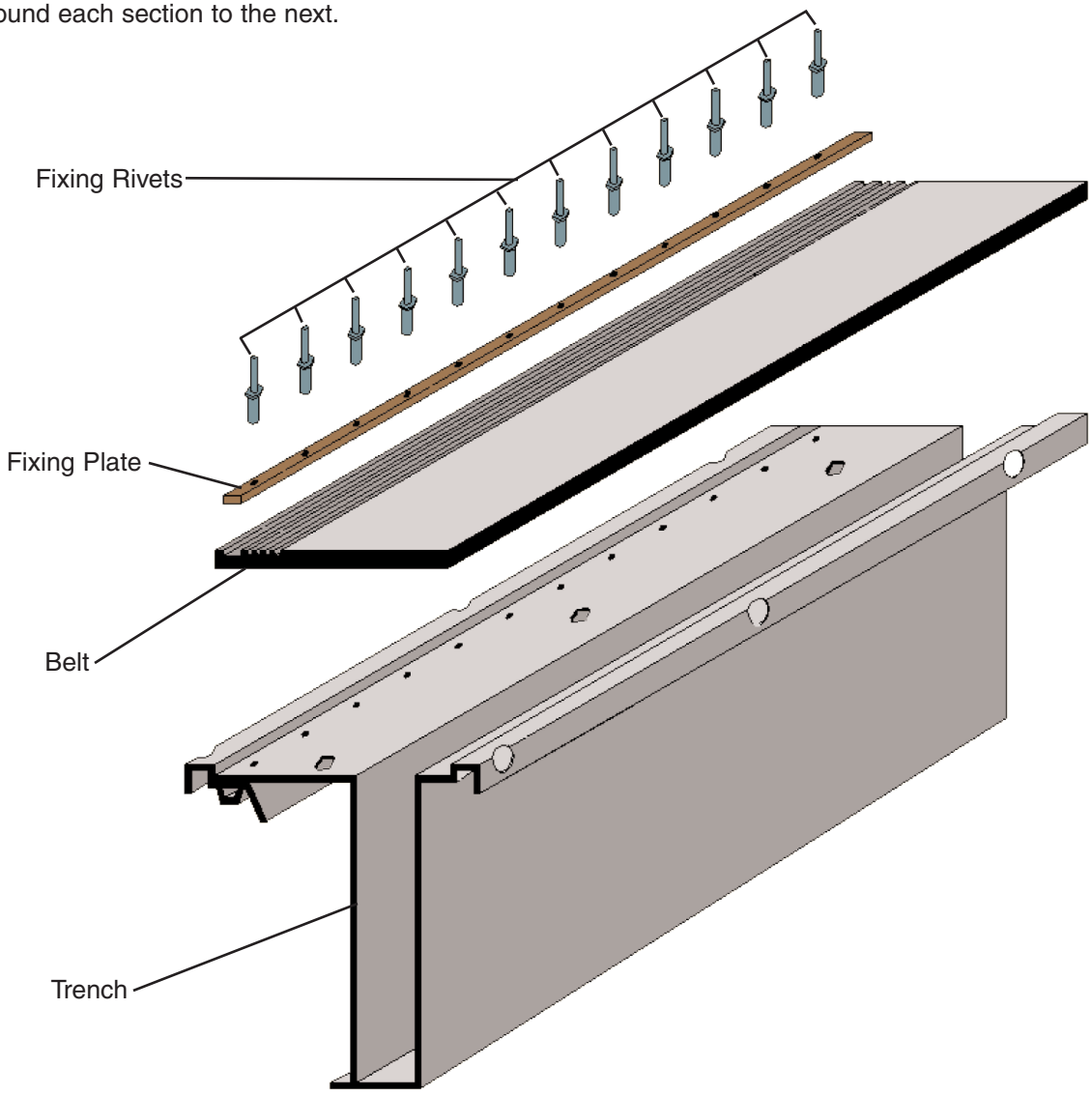
TrenchGuard System

The system is composed of:

Trench: Manufactured from 14 ga. galvanized steel, or 16 ga. stainless steel - either 304 or 316L grades. Standard trench width is 4" (100 mm); other widths are possible within the limits of available cover belt widths and the required load on the belt from cross-traffic. The trench sections are available in interlocking and non-interlocking versions, and in a variety of section lengths. Holes are provided along the trench length to allow air to escape as concrete is vibrated up around the exterior of the trench sections. The installer can readily see when the concrete is sufficiently vibrated up into the exterior cavities of the trench.

Cover Belt: Protects the cable from weather, debris, and damage. The belt provides the ideal combination of stiffness to maintain its shape and withstand traffic, and flexibility to allow repeated open/close cycles. The construction is flexible enough to allow the belt to quickly return to its closed and flat position after the crane has passed.

Attachment Hardware: The belt is held in place along the fixed edge by means of a hot-dipped galvanized or 304 stainless steel "fixing plate". The plate has a series of holes to accommodate fixing rivets that go through the plate, through the belt, and into the connection area of the trench section. Copper grounding strips are supplied to ground each section to the next.



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System Components

Belt Overview

The main element of the TrenchGuard™ system is the reinforced rubber cover belt. It has been designed by a partnership between Insul-8, its sister companies, and a conveyor/cover belt manufacturer with vast experience in durable rubber belts of all types. The belt features the latest rubber technologies and is constructed on world-class rubber vulcanizing machinery. The manufacturing process is strictly quality-controlled from beginning to end. Each component and ingredient is carefully lab-tested before use in the final product to assure the highest quality and consistency.

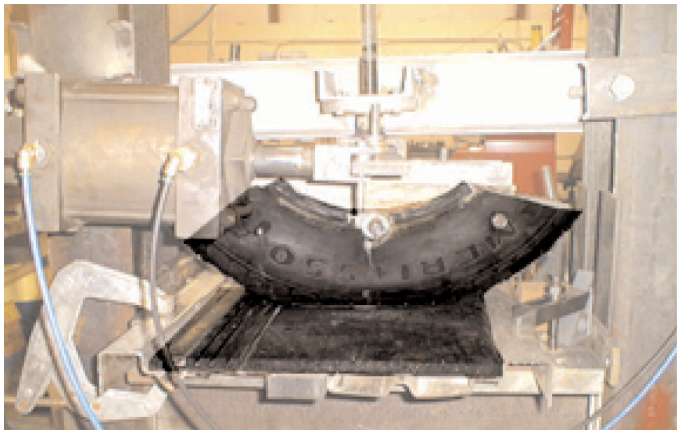
The belt is sturdy, yet flexible. It comes in standard 50 Meter continuous lengths. For longer lengths, the belt sections are spliced with a stainless steel splice kit. The belt design assures:

- Safety
- Reliability
- Durability
- Superior technical performance

The TrenchGuard™ belt has a long history of successful applications in Ports and mills. These installations have been in operation for many years. [Reference lists are available on request.]

Belt Testing

Wearing Test



Fatigue Test

Functional Testing

Each belt length is manufactured in accordance with the highest quality standards. To assure that the belt design is suitable for the harshest environments, several tests were conducted in our R&D facilities. These tests include:

- Repeated open/close tests - up to 300,000 cycles without any significant belt wear or failure (see test apparatus below)
- Resistance to abrasion due to turning traffic - up to 25,000 weighted truck tire turns directly on the belt surface (the worse case) without any significant belt fractures (see test apparatus at the left).
- Resistance to salt-spray
- Resistance to temperature variations

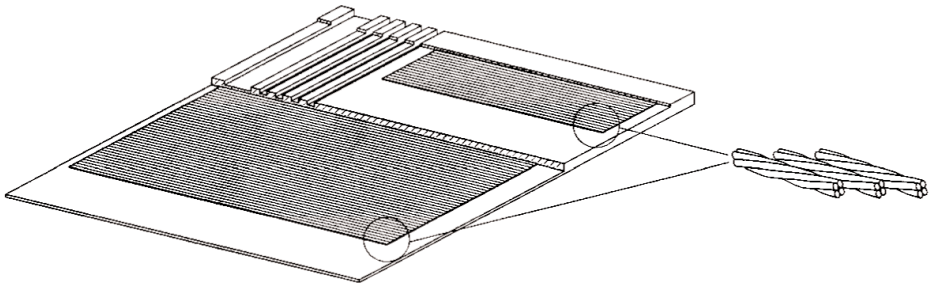
Insul-8 will continue to incorporate customer feedback and the latest in material technologies to provide end users with the best possible product for their investment.

System Components

General Features of the Belt

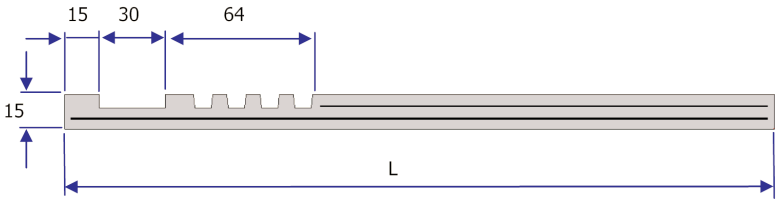
Temperature Range	- 30°C. to 80°C.
Angular Opening	90° Max.
Minimum horizontal radius	60mm. on the inner hinge of the belt
Maximum Load Rating	400 N/cm² (based on 4" - 100 mm. - trench opening)
Maximum deflection	2%, given a force of 3000 N
Standard roll length	50M.
Color	Black

Composition of the Belt



Materials	80% Rubber SBR 15% Steel 5% Nylon
Steel Reinforcement	Composed of 2 steel mesh layers (upper and lower) Each layer is composed of twisted strands diam. .53 mm. Each strand is composed of 4 twisted wires diam. .22 mm.
Strand Strength	Steel strands withstand 6,300 N/cm²
Reinforcement wrap	Steel strands are retained with nylon wraps; ultimate tensile strength is 12,000N.
Rubber Hardness	65 Shore A

Dimensions of the Belt



Type	Dimension L (mm)	Weight (Kg/m)
TG300	295	6.0
TG400	395	7.5
TG600	595	11.5

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The Trench

The metal trench section provides a "gap" into which several power cables can be stored, depending on the specified depth of the trench. The trench is supplied with:

Grip holes: To assure good anchoring of the trench to the surrounding concrete. It also provides a means for installers to make sure concrete is properly vibrated up into the recesses of the trench section. Or, as an option, **anchoring bars** can be added to hold the trench during the placement of concrete.

Optional Section Interlocking System: To assure good end-to-end trench alignment. This avoids the potential for cable damage that could occur if metal trench ends are not perfectly aligned.

Attachment Hardware: To connect the two trench halves together (these are ordinarily installed in the factory)

Features of the trench

DEPTH: Chose the trench depth that will accommodate the number of cables that need to be stacked in the trench (see table below). Special trench depths are also available - contact Insul-8 for details.

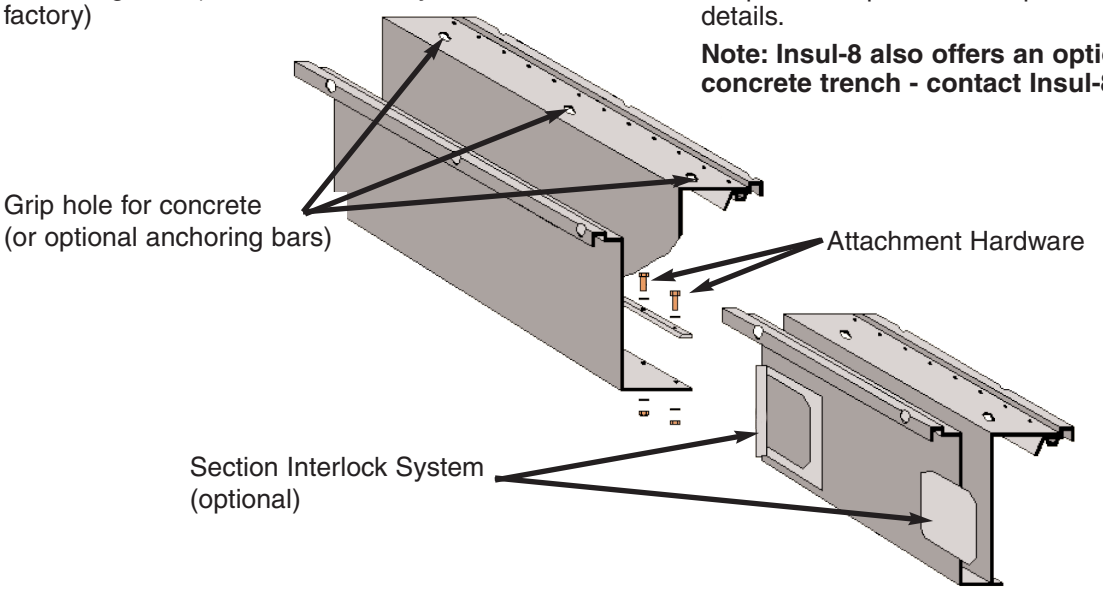
WIDTH: Standard trench width is 100 mm (about 4"); other widths are available - contact Insul-8 for details

MATERIAL: In North and South America, the standards are 14 ga. galvanized steel, or 16 ga. stainless steel (either 304 or 316L grades). In Europe the standards are 1.5 mm or 2 mm per customer request.

LENGTH: Standard is 3 Meters per section. Other lengths are also available - contact Insul-8 for details.

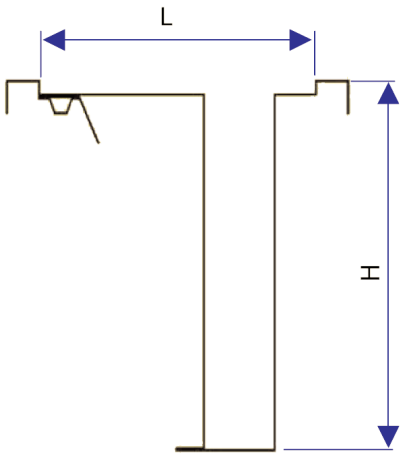
Specific special trench details, such as center divider, or special shapes, can be quoted - contact Insul-8 for details.

Note: Insul-8 also offers an optional formed concrete trench - contact Insul-8 for details.



Trench Dimensions

Type	Dimensions (mm)		Max Number of 3.0" O.D. Cables
	L	H	
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 500/220	600	220	2
TG 500/320	600	320	3
TG 500/420	600	420	4
TG 500/520	600	520	5



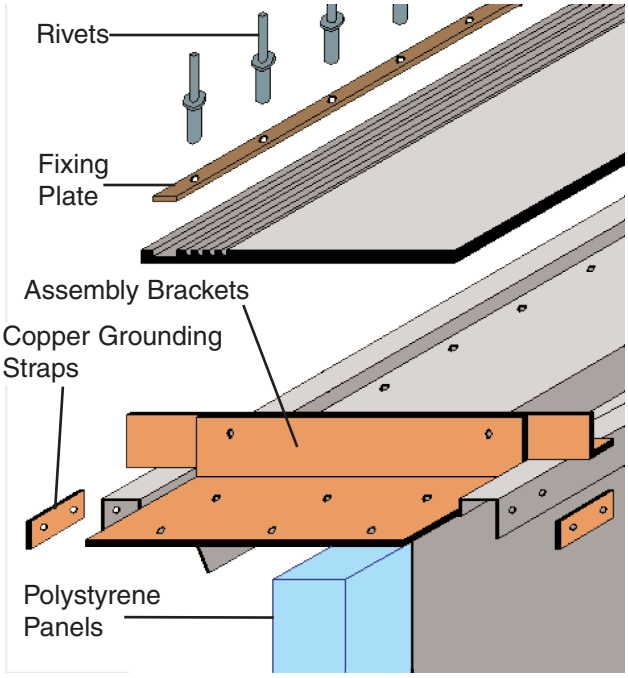
System Components

Hardware

Fixing Plate

Dimensions:	30mm. x 8mm. x 3m.
Material:	Hot dipped galvanized steel, or Stainless Steel AISI 304, or Stainless Steel AISI 316L

The fixing plate is pre-drilled at 80 mm intervals, and is used as a template on site to drill through the belt and into the trench holes.



Rivets

Dimensions:	25mm. x 5mm. dia.
Material:	AISI 304

Grounding Straps

A series of copper straps (with connecting hardware) electrically link the adjoining ends of the trench sections. This provides a good conductive ground path for any stray currents from the cables.

Polystyrene Panels

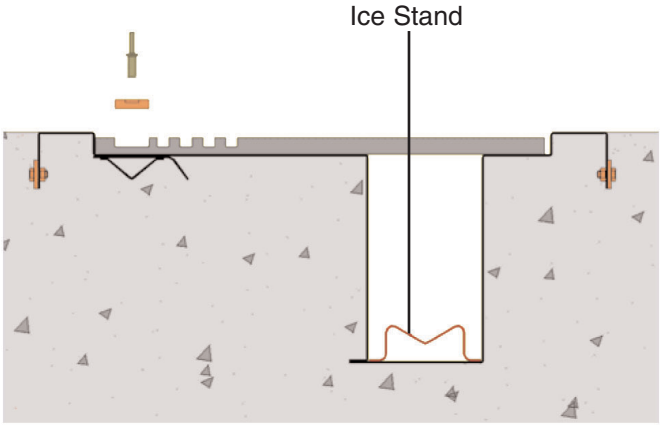
The polystyrene trench panels preserve the shape of the trench sections during transport, and during the casting of the surrounding concrete. The panels also prevent the seepage of concrete into the opening of the trench. Each panel is 1 Meter long, and roughly the same depth as the trench opening.

Assembly Brackets

A series of brackets are provided to assist in the installation of the trench sections.

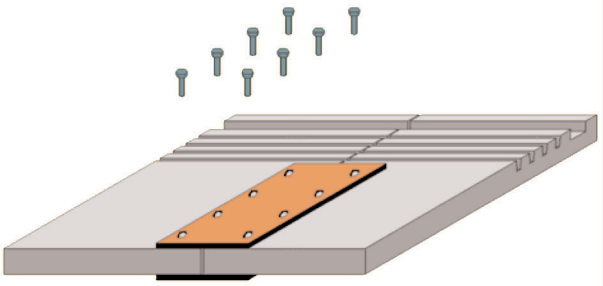
Optional Ice Stand

In colder climates a film of ice can form at the bottom of the trench and freeze the cables to the trench. To prevent this, we offer an optional Ice Stand that lifts the cables up, and prevents them from freezing to the bottom of the trench.



Belt Joint

The belt joint is used to connect two section of belt. It consists of an upper and a lower plate made from either 304 or 316L stainless (per specification) connected through each adjoining belt with 10 bolts.



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Installation Overview

Here are the main phases of the installation, which refer to the standard products shown in the catalog. For different applications, please inquire with Insul-8 Engineering. A full version of the installation manual is also available.

Phase 1
This is a typical harbor pier. The crane rail is laid in concrete at level 0.00. The ground work at level "H" is where the TrenchGuard installation starts.

Phase 2
A form at level 0.00 is placed at the far edge of the TrenchGuard cavity to contain the concrete pours. Reinforcement bars are placed, per instructions from the civil engineer, so as not to interfere with the placement of the trench sections. The "first pour is placed at the bottom of the trench cavity to secure the reinforcements.

Phase 3
The trench sections are laid in and held in place with included angles and transoms. The transoms are placed level with the crane rail and the outside form. The trench sections are secured by welded-in bars from the trench to the reinforcement bar.

Phase 4
All the trench components are placed as shown. Note that the polystyrene panels are placed inside the trench to support the walls during the pour, and to aid in aligning the trench sections.

Phase 5
The remaining layer of concrete is placed, and vibrated into the upper recesses of the trench sections. After the pour any excess concrete is removed from the belt seat area and bottom of the trench.

Phase 6
After the concrete is sufficiently cured, the belt is stretched, then relaxed, then stretched again before being fastened with the fixing plate.

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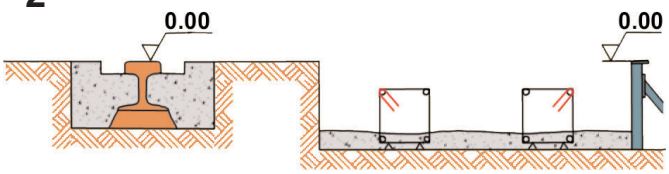

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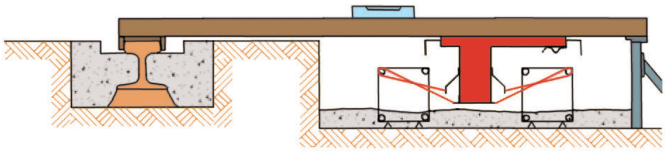

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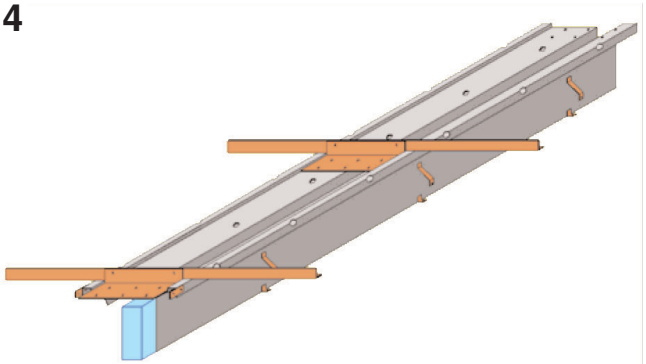

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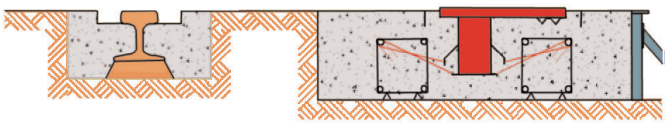

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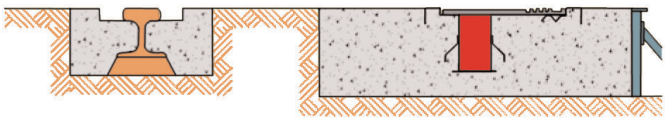
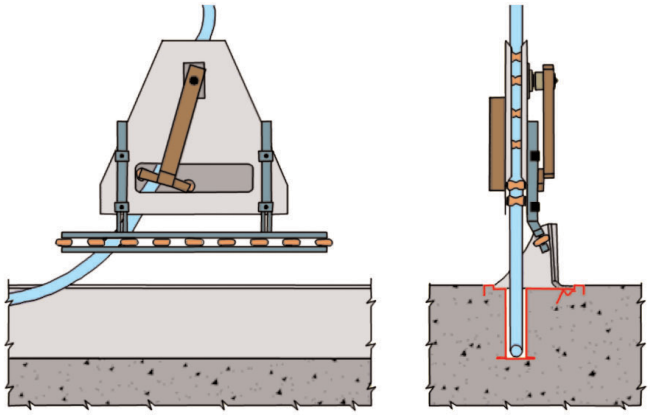


Accessories for the TrenchGuard System

Cable Guide with Lifting Device

The combination of the two-way cable guide and the lifting device has the dual purpose of controlling the two-way payout of the cable, and lifting the belt so the cable can be accessed.



Cable Guide

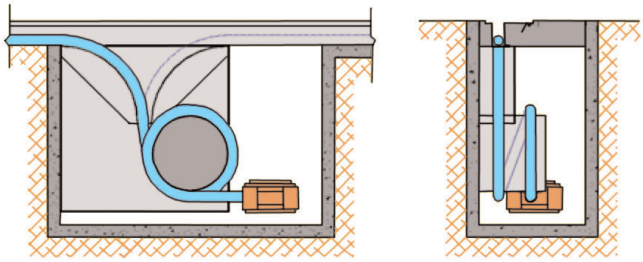
This traditional-style two-way guide is dimensioned based on the cable diameter and minimum cable bend radius. As the crane moves over the center anchor point, the device guides the cable as it comes down from the crane into the trench. Rollers are incorporated to minimize the drag on the cable. The cable pendulum includes "slack cable indicators", and the lower guide arms include over-tension indicators.

Cable Belt Lifter

The belt lifter, or "cable plow", lifts the belt as the crane moves to allow access to the cable beneath the cover belt. It includes a series of rollers to reduce the drag on the belt and to ease the belt into the open position, then back to the closed positions. The belt lifter can be adjusted to the proper height.

Cable Anchor *(Cable Horn)*

To minimize the amount of cable needed for a given travel distance, the cable is usually terminated at the center point of the travel. At the center anchor point, a "cable horn" is placed inside a formed concrete vault. The entrance and exit to the vault is level with the bottom of the cable trench. The horn itself is designed to accommodate the minimum bend radius of the cable and acts as both a strain relief for the electrical junction of the cable and a cable bend control device. The walls of the vault can be made with a suitable material: painted steel, galvanized steel, or stainless steel.



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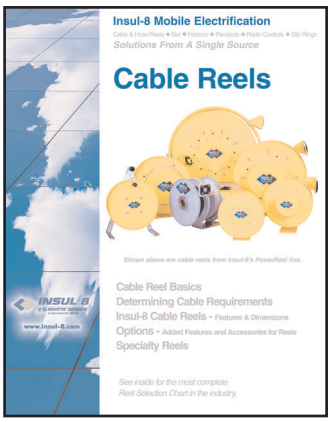
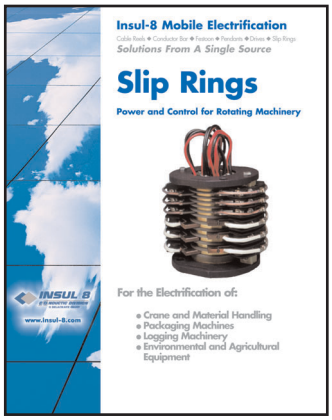


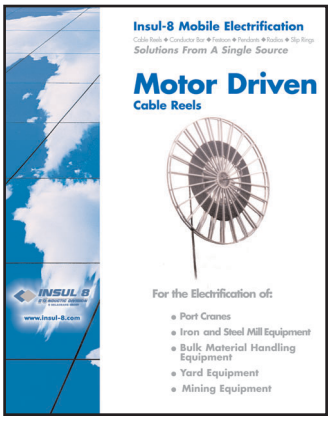
SPRING DRIVEN REELS



SLIP RINGS

FESTOON

CONDUCTOR BAR



MOTOR DRIVEN REELS

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CONDUCTOR BAR

Please visit our website at:
www.insul-8.com

CANADA
175 Boulevard J.F. Kennedy
St. Jerome, Quebec J7Y 4B5

Phone: (514) 565-9900
Toll Free: (800) 667-2487
Fax: (514) 432-6985
e-mail: contact@insul-8.com

USA
10102 F Street
Omaha, NE 68127

Phone: (402) 339-9300
Toll Free: (800) 521-4888
Fax: (402) 339-9627
e-mail: i8-info@insul-8.com

AUSTRALIA:
14 England Street
Dandenong, Victoria 3175

Phone: (3) 9706 88 44

Fax: (3) 794 92 98
e-mail: info@insul-8.com.au

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