





**Insulating Cable Trays:  
increase safety;  
defeat corrosion**




[www.unex.net](http://www.unex.net)




**UNEX**

UNEX, SPECIALIST MANUFACTURER IN FLEXIBLE SOLUTIONS FOR INSTALLATIONS






Research as standard

Specialist manufacturer since 1964



Own design and manufacture

2 manufacturing plants. Controlling the full process, from raw material formulation to 3rd party testing.




Immediate availability

21.000 square meters central warehouse (Barcelona, Spain) capable of deliver big orders without the need to manufacture.

Global Presence

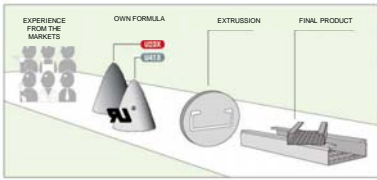
25 branches + distributors able to deliver to most of the countries




## Unex raw materials



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**Own formula**




 Unex raw materials are certified by the UL American Certifier. ([www.ul.com](http://www.ul.com))

**Own naming for the raw materials**

Unex logo for raw material	Base material
<b>U23X</b>	PVC 
<b>U41X</b>	PC+ABS  Halogen free

**Benefits**



8

## Insulating Cable Management Systems

# 66 Cable Tray



Advantage No 1:  
Higher **safety** for the installation

### Insulating Cable Management Systems

#### 1) Introduction

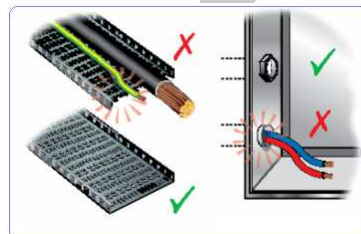
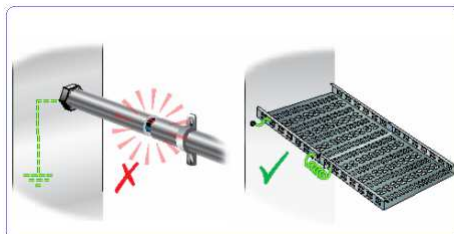
#### 1.2. The importance of a safe and reliable installation

#### 1.2.2. Electrical safety

Many cables connected  
to electric power

Safe?

Is there any cable  
management solution  
safer than the metallic  
one?



**Unex**

### Upgrading safety with Unex insulating cable trays

Electrical installations. Electrical risks

**How can an electrical default compromise safety?**

- Cable safety:
  - ↳ A damaged cable can affect other cables with poor insulation. Ex: Power cable vs. data cable in electrical contact.
- Workers safety
  - ↳ Indirect contacts
  - ↳ Direct contacts
  - ↳ Different surfaces with different potential
- Plant safety
  - ↳ Arcs and sparks
  - ↳ Safety circuits

**Unex**

### Upgrading safety with Unex insulating cable trays

Electrical installations. Electrical risks

- Worker/user risks:

Indirect contacts through metallic enclosure

Direct contacts

Upgrading safety with Unex insulating cable trays



Advantage No 2:  
Higher **durability** of the installation

Insulating Cable Management Systems

Durability / Maintenance



Corrosion will mainly affect :

- Grounding system → electrical safety
- Thickness decrease → mechanical safety



**MAINTENANCE**

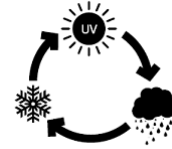
## Insulating Cable Management Systems

### 2) Cable Management Systems

#### 2.2. Features & performance

##### 2.2.3. Results with exposure to climatology (weathering)

Weathering = UV exposure, temperature changes (thermal expansion), service temperature; wind, frost, snow, sand abrasion, etc.



Outdoor installation frequently implies exposure to:

- In urban areas: acid rain due to pollution
- Next to the coast: saline rain or mist
- Sunny environments: UVs

More than 35 years supplying cable trays for outdoor installations, many of them still in operation



## Insulating Cable Management Systems

#### Features & performance

##### - Results with exposure to climatology

**METALLIC:** coating cracks, coating thickness decrease or coating disappearance

**NON-METALLIC:**

• **Thermoplastic:** the whole material is resistant, no change in chemical resistance, independently of a possible thickness loss.

• **Thermoset:** extreme temperature changes or exposition to sun or abrasion can cause cracks, thickness decrease or coating disappearance.

**Important:** homogeneous behaviour (all elements composed of the same material, with no layers) IS A PLUS.



*Own-formulated raw materials might achieve better performance than standard ones*

## Insulating Cable Management Systems

### Base raw materials

- Nonmetallic thermoplastic materials (such as U23X)

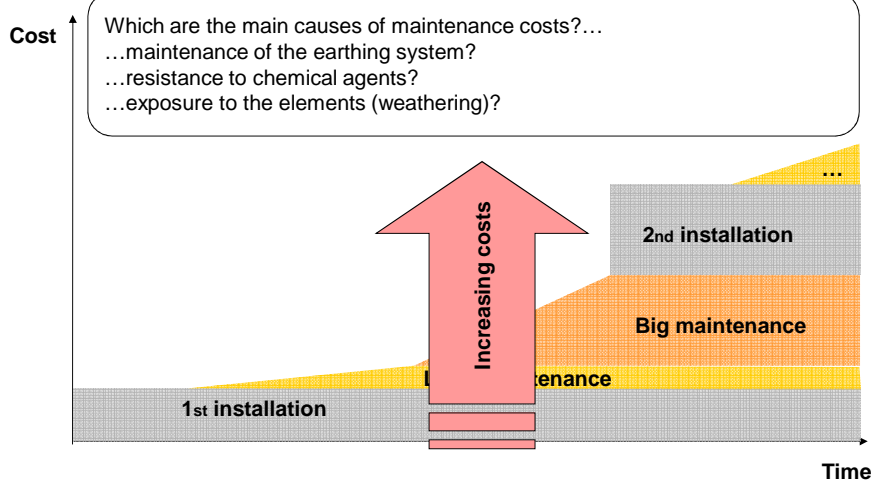
• DIN 8061 → good resistance against gases with:

- Hydrogen Fluoride
- Hydrochloric acid
- Sulphuric acid
- Ammonia
- Chlorine & saline env.
- Sodium carbonate
- Nitric acid
- Zinc chloride
- etc.



### Electrical installations. Electrical risks

▪ Maintenance costs



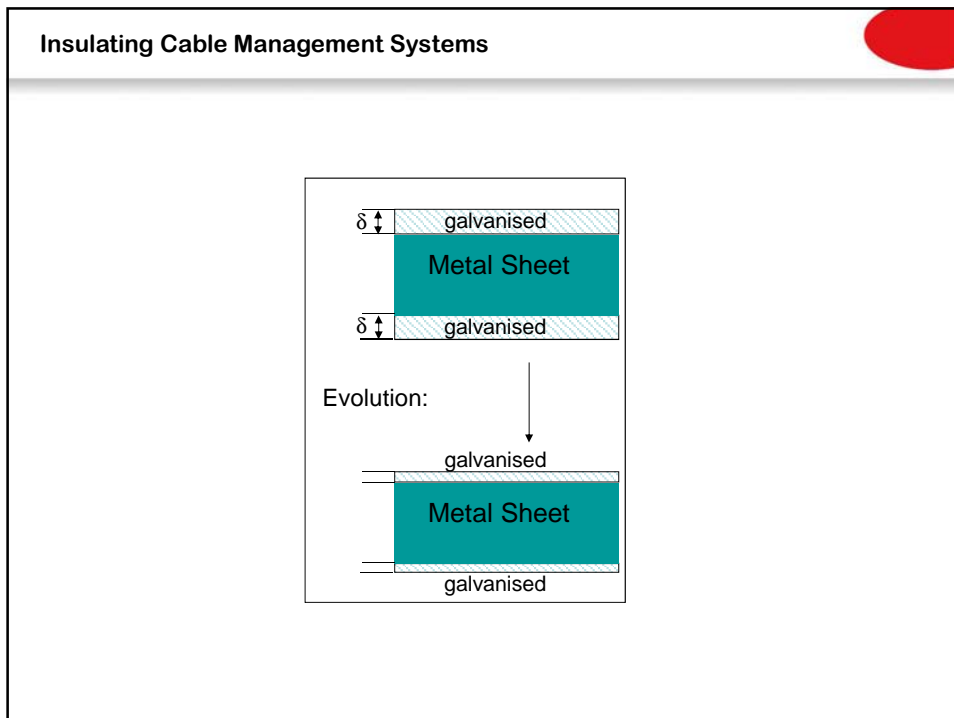
**Insulating Cable Management Systems**

**2) Cable Management Systems**

**2.1. Base raw materials**

**2.1.1 Metallic**

<i>Material</i>	<i>Protected against corrosion in its whole mass?</i>	<i>Manipulation</i>	<i>Limitations</i>
<b>Stainless steel</b> (304, 316, etc.)	Yes	Critical points at cutting, welding or grounding.	Higher cost Limited resistance to some chemicals (Cl <sub>2</sub> , HCl, H <sub>2</sub> S, H <sub>2</sub> SO <sub>4</sub> )
<b>Steel + coating</b>	No. Protected by metallic or organic coating. Zn, Zn-Al, Zn-Cr, Cr, epoxy, polyester, etc.	Abrasion limits the effectiveness.  Difficult to manipulate	Performance related to the coating's thickness and adherence.
<b>Aluminium alloys</b>	Yes	Abrasion limits the effectiveness.  Difficult to weld on site	Limited resistance to some chemicals (Cl <sub>2</sub> , salts, etc.)



## Insulating Cable Management Systems

### Annex K of IEC/EN BS 61537

#### Environmental categories and corrosion rates for zinc only galvanising

Environment	Corrosion rate in $\mu\text{m}$ per year of coating degradation
Interior: dry	< 0.1
Interior: occasional condensation Exterior: rural	0.1 → 0.7
Interior: high humidity, some air pollution Exterior: urban, inland or mild coastal	0.7 → 2
Interior: swimming pools, chemical plants Exterior: industrial inland or urban coastal	2 → 4
Exterior: industrial with high humidity or high salinity coastal	4 → 8



## Insulating Cable Management Systems

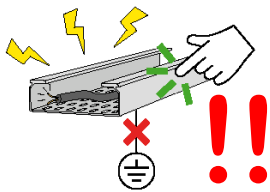

Metallic materials					Years to reach steel if $6\mu\text{m}/\text{year}$
Class	Material and coating	Coating standard	Min. zinc coating thickness ( $\mu\text{m}$ )	Hours in Saline Mist Test (ISO 9227)	
3	Grade Z275 pregalvanized	EN 10327 EN 10326	15	155	2.5
4	Grade Z350 pregalvanized		19	195	3.1
5	Hot dip galvanized	ISO 1461	45	450	7.5
6	Hot dip galvanized		55	550	9.1
7	Hot dip galvanized		70	700	11.6
8	Hot dip galvanized		85	850	14.1
9	Inox	EN 10088	-	-	-






### Insulating Cable Management Systems

Corrosion also affects the earthing system



Shows how can the grounding system be affected by corrosion.

+ corrosion → + resistance R → - safety



The complex block contains a title 'Insulating Cable Management Systems' and a sub-heading 'Corrosion also affects the earthing system'. On the left is a photograph of a metal component, likely part of an earthing system, that is heavily corroded with large rust spots. On the right is a diagram showing a hand reaching towards a cable tray. Yellow lightning bolts are shown above the tray, and a ground symbol with a red 'X' over it is below. Two red exclamation marks are also present. A speech bubble points from the photograph to the text: 'Shows how can the grounding system be affected by corrosion.' and '+ corrosion → + resistance R → - safety'. At the bottom right is a yellow warning sign with Arabic text 'خطر الموت' and English text 'ELECTRICITY 230 / 400 DANGER OF DEATH'.

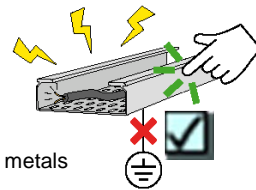
### Advantage No 3: Protection for the cables

#### Insulating Cable Management Systems

##### Features & performance Electrical safety – Non-metallic materials

Non-metallic, insulating material:

- Protection against indirect contacts: Cable will not be in contact with metals
- Protection against direct contacts: Given by the design of the product:
  - ✓ Cover removable **with the aid of a tool**.
  - ✓ IP protection degree 2X/3X



## Insulating Cable Management Systems

### Features & performance

#### - Handling


- Coated metallic materials → storage and on-site handling can affect corrosion protection: cutting and drilling, friction, welding, scratches, earth connection vulnerability. Proper execution depends on the installer.
- Insulating materials which are corrosion-resistant through their whole mass → cutting and drilling do not cause a protection decrease.



- U23X-made insulating cable trays will also PROTECT cables:
  - Against impacts
  - From access to dangerous parts
  - To outdoor exposure and severe climatology
  - To chemically aggressive environments
  - From high temperatures of metals exposed to sunrays



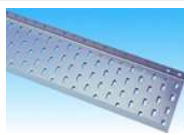
Even if the cables are suitable for the required working conditions, inside Unex insulating cable trays they will be less damaged, therefore increasing their durability.

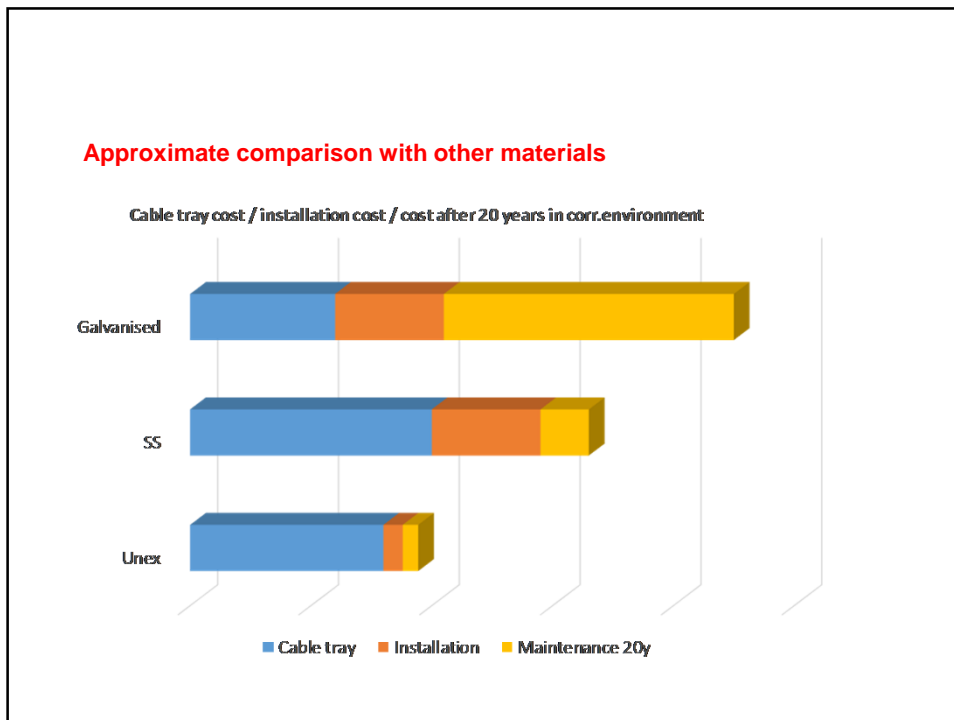




**Comparison Unex to other systems and materials**

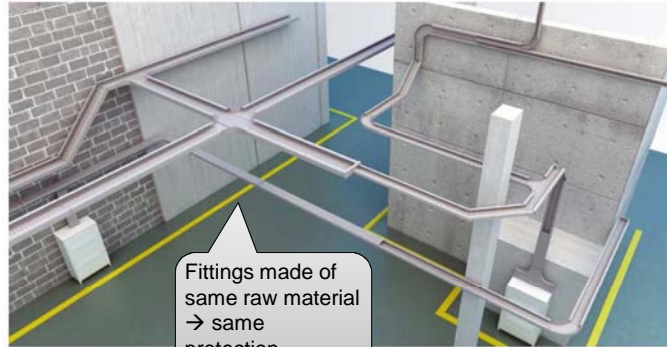
➔ GALVANIZED STEEL, STAINLESS STEEL, GRP

<p>Mesh tray, cable tray and cable ladder in galvanized steel</p>		<ul style="list-style-type: none"> <li>➤ It is only a cable supporting system, not protecting</li> <li>➤ It is conductive → need to earth</li> <li>➤ Difficult to handle and mount</li> <li>➤ Burrs when cutting → Need to polish</li> <li>➤ High installation costs</li> </ul>
<p>GRP</p>		<ul style="list-style-type: none"> <li>➤ Better flame propagator (Polyester)</li> <li>➤ Difficult to handle and mount (Difficult to cut, need for gloves and mask)</li> <li>➤ Fibers deteriorate outdoors (loss of strength)</li> <li>➤ Non recyclable</li> </ul>
<p>Mesh tray, cable tray and cable ladder in stainless steel</p>		<ul style="list-style-type: none"> <li>➤ It is conductive → need to earth</li> <li>➤ Higher investment</li> <li>➤ Difficult to handle and mount</li> <li>➤ Burrs when cutting → Needs polishment</li> </ul>

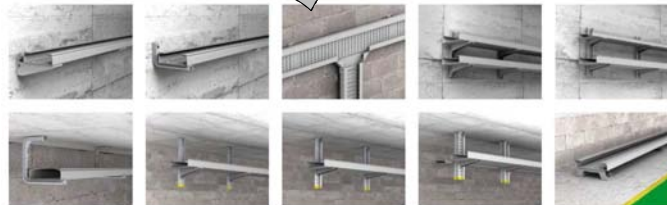


## Insulating Cable Management Systems

Elements for cable conduction



Supporting elements



## Insulating Cable Management Systems

### 3) Case Studies

3.1 Chemical

3.2 Maritime

3.3 Petrochemical

3.4 Water treatment

3.5 Power plants

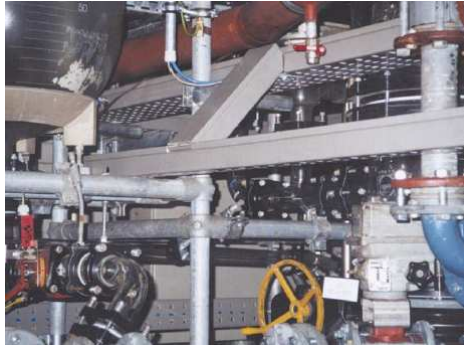
3.6 Paper mills

## Insulating Cable Management Systems

### 3) Case Studies

#### 3.1 Chemical

Corrosion, outdoor behaviour, maintenance.



## Insulating Cable Management Systems

### 3) Case Studies

#### 3.2 Maritime

High salinity → corrosion

Outdoor behaviour,  
extreme temperatures.



## Insulating Cable Management Systems

### 3) Case Studies

#### 3.3 Petrochemical

Corrosion, aggressive environments, maintenance.



## Insulating Cable Management Systems

### 3) Case Studies

#### 3.3 Petrochemical



## Insulating Cable Management Systems

### 3) Case Studies

#### 3.4 Water treatment (wastewater, sewage, pumping stations)

Corrosion, mechanical resistance, outdoor behaviour, maintenance.



## Insulating Cable Management Systems

### 3) Case Studies

#### 3.4 Water treatment (drinkable water, desalination)

Corrosion, mechanical resistance,  
outdoor behaviour, maintenance.



### Insulating Cable Management Systems

3) Case Studies : Al Dur IWPP - RO (Bahrain)



### Insulating Cable Management Systems

3) Case Studies : Al Dur RO (Bahrain)



### Insulating Cable Management Systems

#### 3) Case Studies : Barcelona SWRO Desalination - Llobregat basin

1 Headworks  
 2 Flotation  
 3 Gravity filtration  
 4 Closed filtration  
 5 Osmosis building  
 6 Post-treatment  
 7 Drinking water pumping reservoir  
 8 Treatment of effluents  
 9 Electrical substation  
 10 Control building

Flotation 1      Gravity filtration 2  
 Closed filtration 3      Osmosis building 4  
 Post-treatment 5      Drinking water pumping reservoir 6

### Insulating Cable Management Systems

#### 3) Case Studies

##### 3.5 Power plants. Cooling towers



## Photovoltaic plants

CABLE TRAY 



## Insulating Cable Management Systems

### 4) Regulations

#### 4.1. Product regulations:

##### 4.1.1 IEC 61537:2006 / EN 61537:2007 / BS EN 61537:2007 for cable trays

All manufacturers can comply with the standard, but the difference among products lies in their *classification* with regards to the standard.

**Advantage: all product data can be compared against a common pattern.**

##### 4.1.2 Local / particular standards

USA Nonmetallic cable trays: UL 568 and NEMA FG1

USA Metallic cable trays: NEMA VE1

Russian Federation: GOST R 52868 Standard for Cable tray




**4.1.3 Quality Marks:** Best way to ensure that cable trays comply with IEC/BS/EN 61537. An independent control agency checks the product's features and functionalities

#### 4.2. Sectorial regulations:
















#### 4.3 Manufacturer's information related to corrosion (own/standard):

- DIN 8061 (General quality requirements and testing), or
- ISO TR 10358 (combined chemical-resistance classification table).



**Product ranges**

<b>INDUSTRY</b>	Cable trays		Cable trays	66
	Trunkings for distribution and machinery supply		Trunking	07
	Trunkings for power and telecommunications cabinets		77 Trunking	88
	Tying and fixing systems		Cable tie	22
<b>BUILDING / HOUSING</b>	Trunkings for switches and socket outlets		Trunking	93
			Trunking in aluminium	93
	Trunkings for distribution and adaptation of switches and socket outlets		Trunking	73
			Mini trunking	78
			Skirting trunking	80
	Surface boxes		Modular boxes	85
	Equipment supply in open-plan rooms		Service posts and poles	50
			Furniture supply	51
		Trunking	30	

**Insulating Cable Management Systems**



*Thank you!*

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