



Keeping you safer



Cable Management for Photovoltaics

Effective, safe
and long lasting

This document is a practical guide to the solutions that **Unex** provides for all photovoltaic installations.

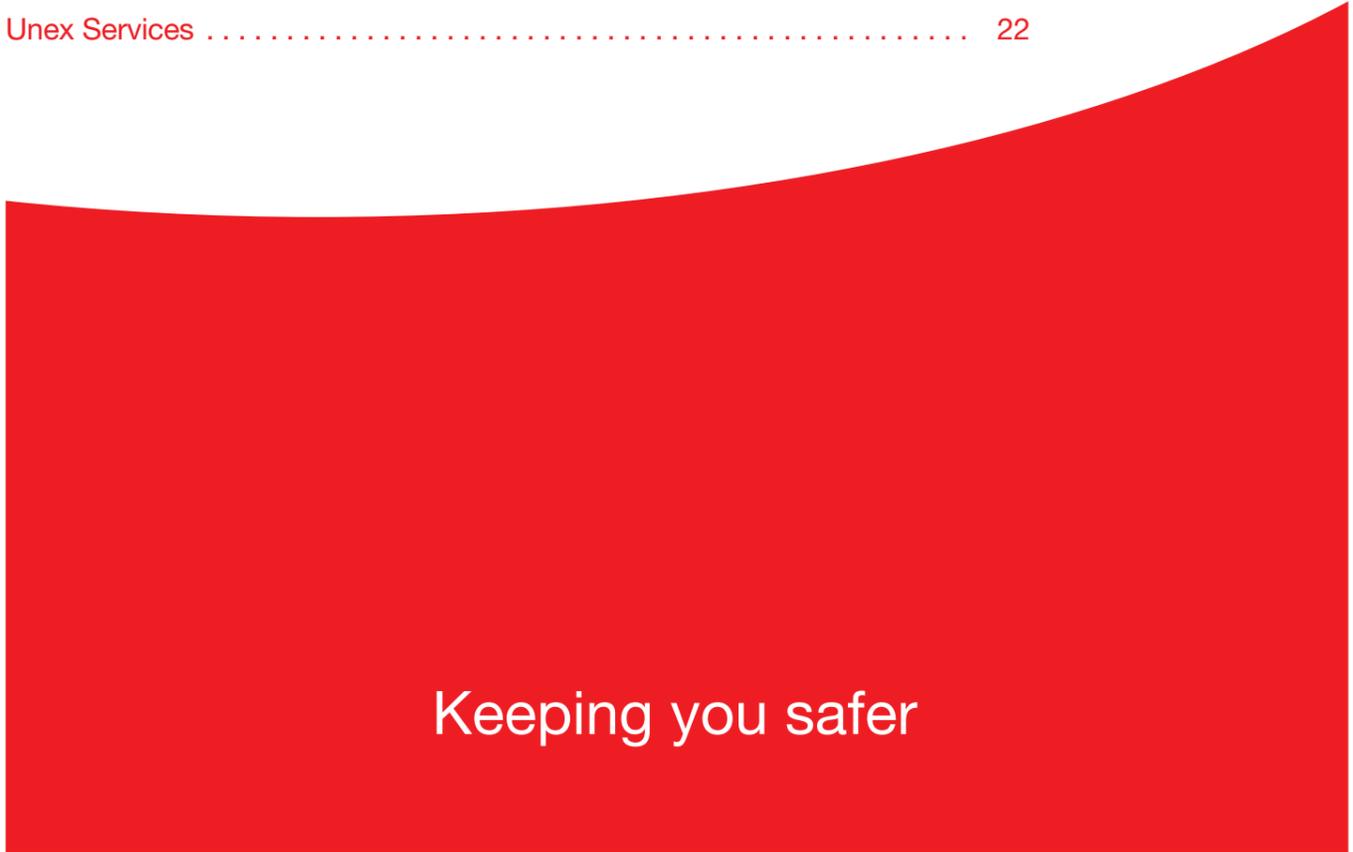


Go Solar: Scan and Explore!



Index

- Characteristics of photovoltaic installations 4
- What is the most cost-effective and safest cable protection and cable management system? 5
- Unex insulating products for cable protection and cable management ... 6
- The importance of the cable tying system 8
- Unex cable tying products 9
- Do all products have the same outdoor durability? 10
- Photovoltaic applications 11
- Technical details of the installation 17
- Some Unex references 18-19
- Unex Products 20
- U-Digital Services 21
- Unex Services 22



Keeping you safer

Characteristics of photovoltaic installations

The keys to a good photovoltaic installation are: profitability, durability and safety.

Therefore, for the proper functioning, performance and maintenance of these installations, in addition to the usual elements such as panels, inverters, structures, etc., the correct choice of protection, conduction and cable-tying systems is essential.

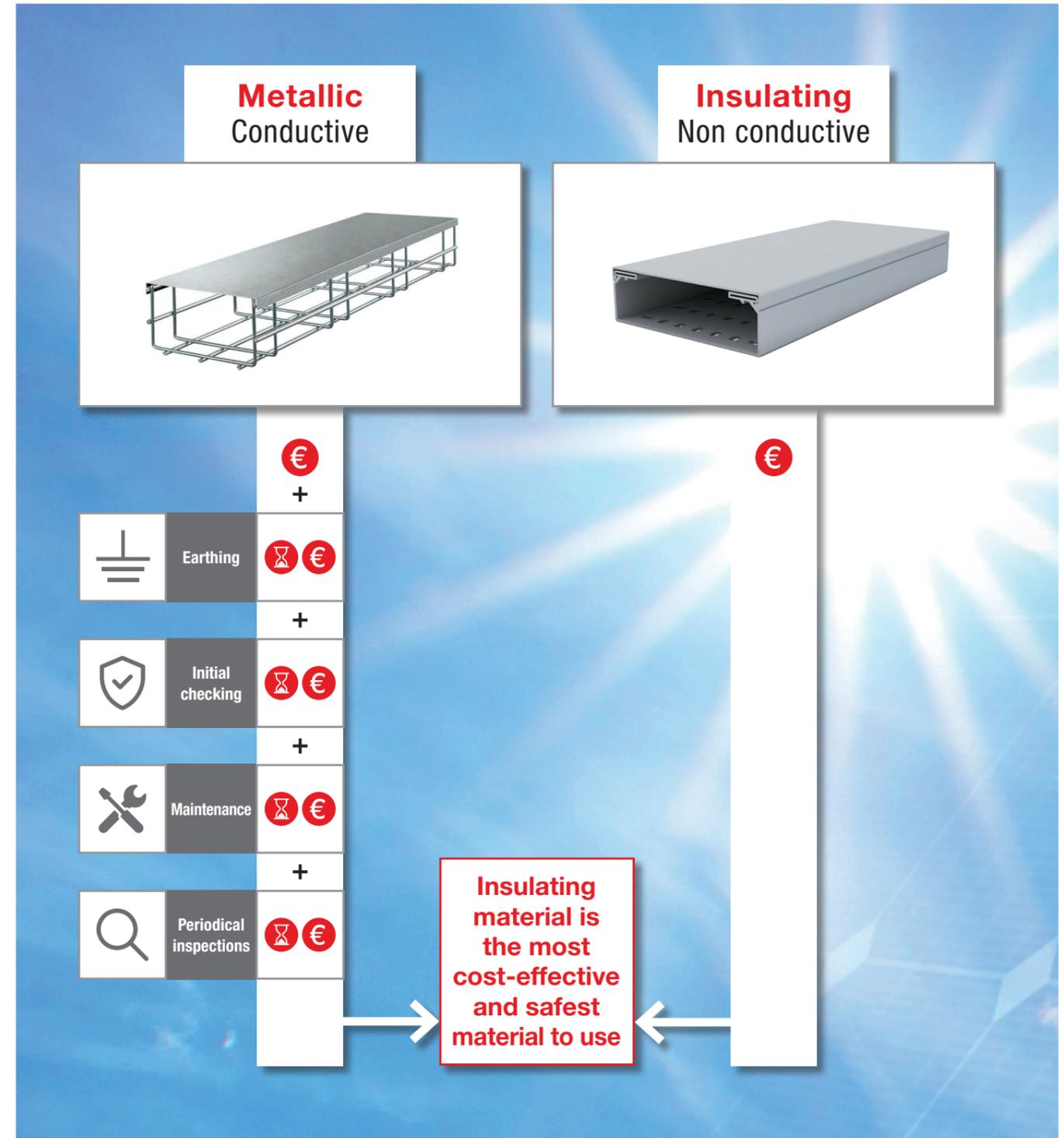
It is important to bear in mind that these installations are characterised by:

- Voltages that can reach up to 1500V DC.
- Absence of differential protection up to the inverters.
- Maintenance of the plant without shutdowns.



What is the most cost-effective and safest cable protection and cable management system?

Cost-effectiveness and safety start with the choice of material:



Unex insulating products for cable protection and cable management



Insulating cable tray 66

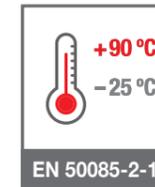
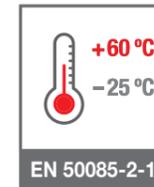
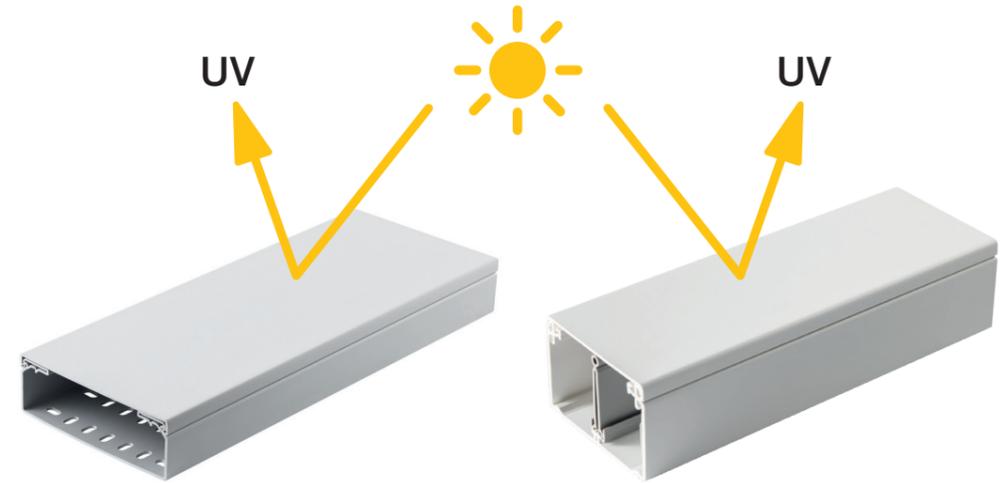


Trunking 73

INSULATING MATERIAL	
Advantage	Benefits
Maintenance free and no need for earthing.	→ Increased profitability. Reduced maintenance costs.
Cable protection.	→ Increases the service life of the cable.
Material resistant to corrosion.	→ Greater durability of the installation.
No possibility of leakage current towards the conducting element: Risks of indirect contacts are reduced.	→ Higher electrical safety. Reduced risk of electrical accidents.
Cutting the cable tray or trunking does not produce edges that damage the insulation of the cables.	→ Reduction of the risk of insulation failure.

Outdoor behaviour

Our solutions have **more than 45 years of experience** in outdoor installations under direct UV exposure.



100% recycled thermoplastic component

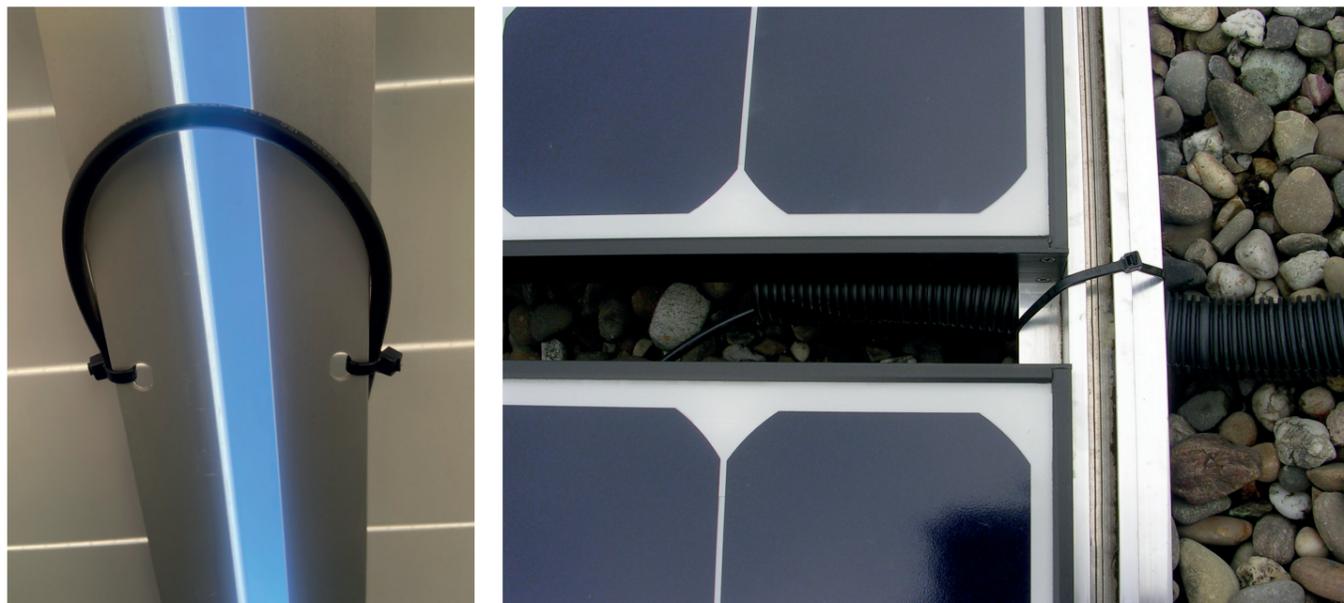


The importance of the cable tying system

The durability requirements of photovoltaic installations and the harsh climatic conditions make it necessary to use cable ties that are suitable for this type of installation.

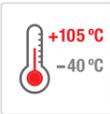
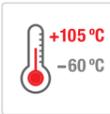
An incorrect choice of cable tie leads to premature cable breakage, which means:

- High replacement costs.
- Plant downtime and, consequently, lower profitability.
- Probable electrical arcs due to the possible disconnection of MC4 connectors.



Unex cable tying products

Unex has different ranges of cable ties for tying cables in photovoltaic installations, with a high resistance to UV rays.

Features of Unex cable ties		
	22-0	22HD
Raw materials	U61X	U71X
Use indoor/outdoor		
UV resistance (*)		
Service temperature		
Resistance to traction Width 4,8 and 7,6 mm		
Resistance to chemical environments (**)	Limited	
Dry environments	Hygroscopic	Non hygroscopic
Easy mounting		
Photovoltaic		
(*) Products certificated acc/IEC 62275 standard UV Resistant	  	

(**) Chemical environments depend on many factors and must be studied with a specific test.

Do all products have the same outdoor durability?

Cable protection, conduction and tying systems are subject to weather conditions (wind, frost, UV rays, etc.), as well as to the high temperatures they reach due to their proximity to the panel, the effects of the sun and the reflection of light.

For all these reasons, Unex develops its own raw materials to manufacture products that meet all the necessary requirements for photovoltaic installations, with technical characteristics that are superior to market standards in terms of:



Outdoor



Corrosion



Temperature



Fire



Load



Impact

Each Unex raw material is identified with a logo

U23X

U43X

Halogen free
100% recycled
thermoplastic component

U48X

Halogen free
100% recycled
thermoplastic component

U61X

Halogen free

U71X

Halogen free



Photovoltaic applications

Solar photovoltaic installations can be divided into two types:

- Grid-connected installations.
- Off-grid installations.

Grid-connected installations are mainly aimed at generating electricity for sale and/or self-consumption.

Isolated installations, on the other hand, are mainly intended for pumping, signalling, communications and rural electrification applications.

The most common photovoltaic applications are:

- Solar rooftop.
- Solar photovoltaic plant.
- Floating photovoltaic.
- Agrovoltaic.
- Solar canopies.



Solar rooftop

Rooftop solar photovoltaic installations are mainly intended for self-consumption in the industrial, tertiary and residential sectors.

In this type of installation, easily accessed by anyone, stable electrical safety over time is essential. The use of products in insulating material protects the cables and guarantees electrical safety for both people and the installation.

To improve the lifespan of the installation, it is important to protect the cables from the elements and from all types of birds and rodents, with electrically insulating products, making the installation twice as safe.



Unex supports depending on the type of the roof

There are different types of roofs. In all of them the cable distribution trunking is superficial. This will require different types of supports depending on the type of roof.

Corrugated sandwich panel roof

In this type of roof, the trunking is installed longitudinally to the water drainage line of the roof. As a support, Unex has two insulating strut channels, depending on the size of the trunking. This system allows the trunking to be spaced away from the roof, thus guaranteeing the support points.



Part no.: 60202-48 (25x20x2000 mm)
Part no.: 60204-48 (50x50x2000 mm)

Flat roof

To avoid perforations in this type of roof, Unex offers a roof support, ready to install and without the need for fixing to the ground.



Part no.: 60155-48 (150 mm)
Part no.: 60305-48 (300 mm)

Solar photovoltaic plant

Solar plants or solar parks are photovoltaic installations generally located on large plots of land, depending on the power installed.

The energy generated in these plants, in addition to being sold, can be used for other purposes such as obtaining green hydrogen, solar pumping, self-consumption by large industries, etc.

As these installations are located in remote areas, the durability of the products that compose them is very important in order to reduce plant downtime and maintenance costs.

The interconnection wiring of the photovoltaic modules is usually channelled and fixed to the structure. Unex has two types of weather stabilised photovoltaic cable ties with high resistance to UV rays for fixing the cable.

Depending on the harshness of the terrain, the string cabling can be run above ground in trunking or buried.

The use of Unex insulating trunking is highly recommended as it reduces the risk of indirect contacts, leakage currents and electrical arcs, protecting the wiring and improving plant performance.



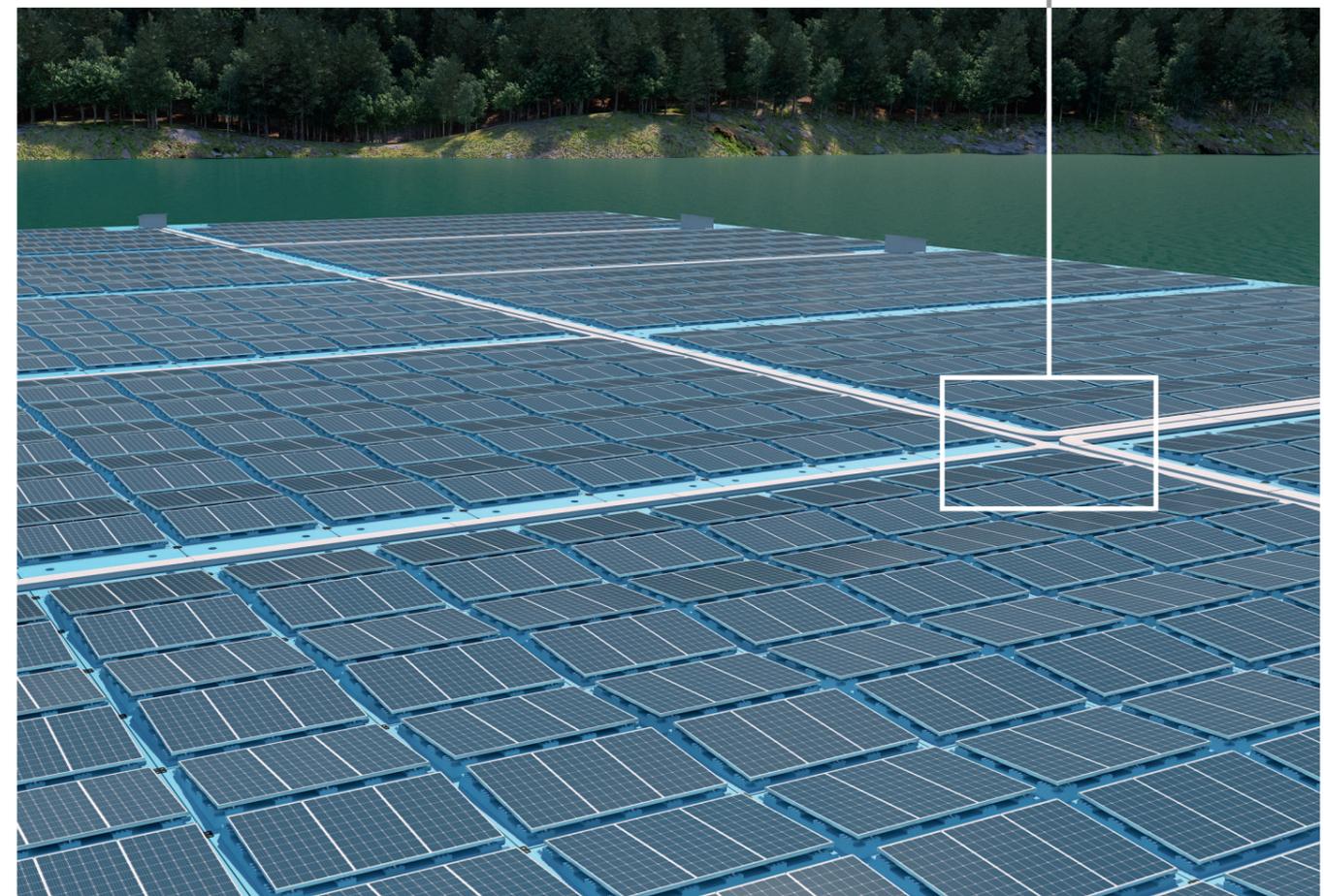
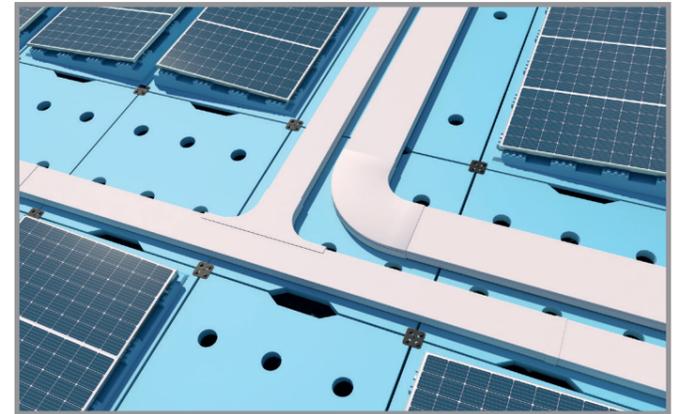
Floating photovoltaic

Photovoltaic systems placed on water, whether lakes, ponds, marshes, the sea, etc., that use specific technologies to be able to float.

The energy generated in these plants, in addition to being sold, can be used for other purposes such as solar pumping.

When dealing with installations in humid or saline environments, Unex insulating trunking offers the best performance against corrosion thanks to the raw material used, as it is not a coating applied to the final product.

For this reason, the corrosion protection remains unalterable over time or after cutting and handling the material on site, reducing the maintenance cost of the installation and increasing its durability and safety.



Agrovoltaic

Solar photovoltaic installations in agricultural or livestock farming areas.

Two of its main applications are:

- **Greenhouses:** These are installations similar to rooftop self-consumption, but using materials that withstand the conditions of temperature, humidity and chemical components present in the environment.
- **Open-air cultivation:** Requires elevating the layout of the panels to allow crops to grow, as well as access for agricultural machinery.



Solar canopies

The photovoltaic canopy has become an ally for the architectural integration of the installation's energy-generating elements with the protection of vehicles and people.

These canopies can be connected to an energy accumulator for various uses or directly include a charging point for electric cars.

Unex trunking and cable ties are particularly suitable for this application due to their good integration into these structures and their excellent weather resistance.

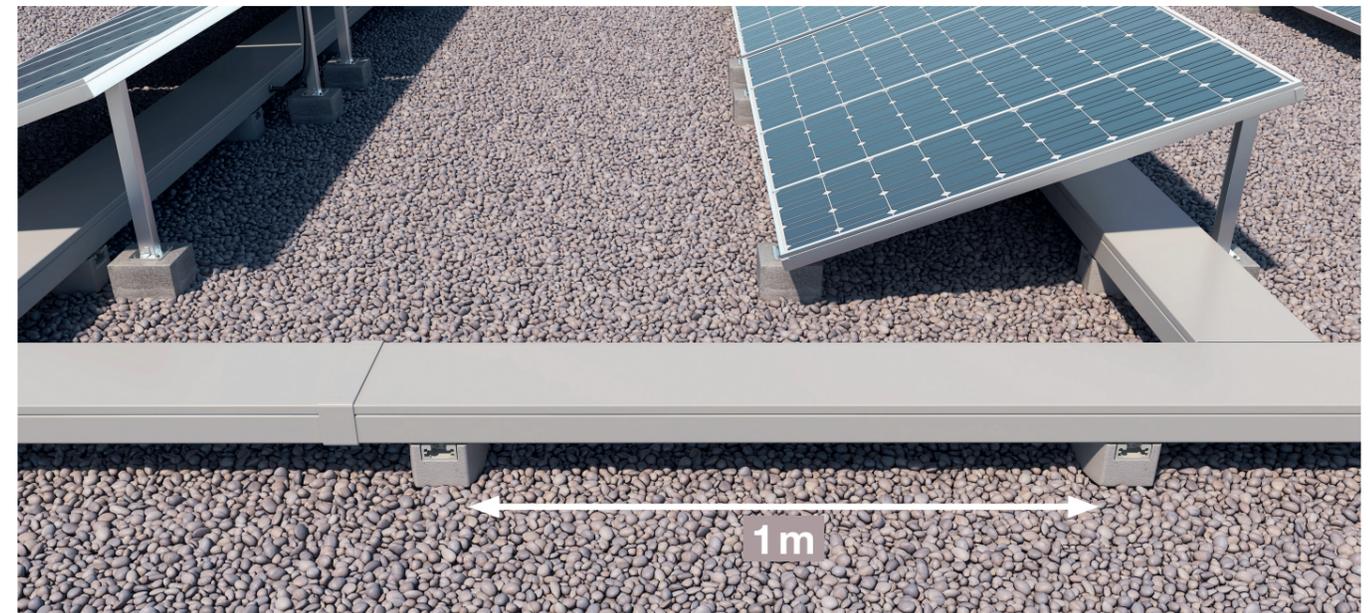


Technical details of the installation

How to install an insulating trunking in outdoor photovoltaic systems

1. Distance between supports:

In photovoltaic installations, the necessary distance for outdoor Unex trunking is 1 metre.

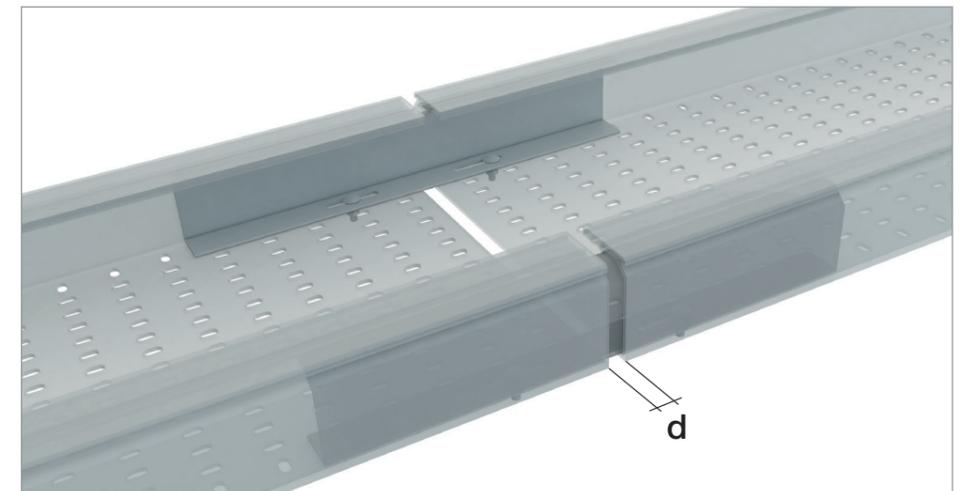


2. Expansions:

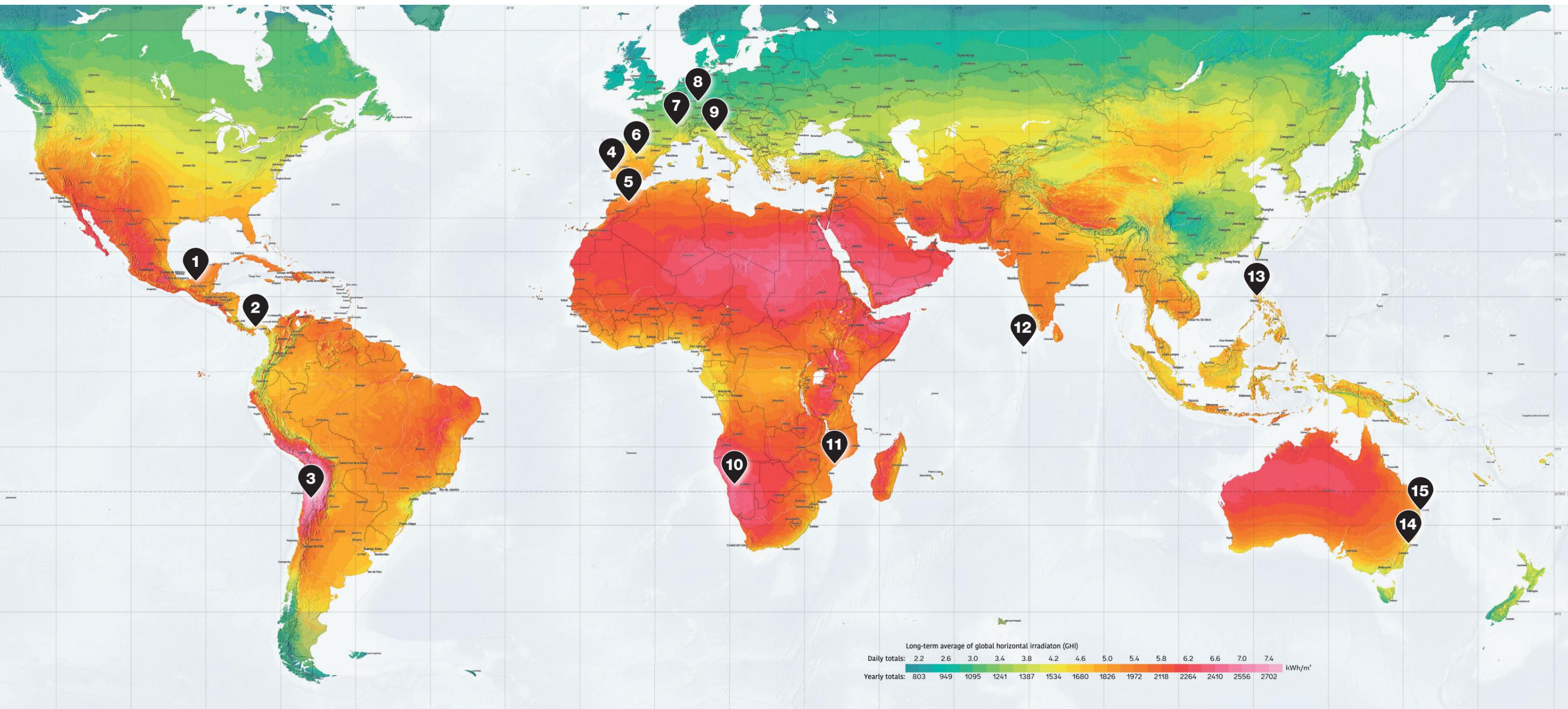
Due to the linear expansion coefficient of the bases and covers, the distance "d" between two sections of the bases and covers varies according to the difference between the maximum temperature and the installation temperature.

Separation between lengths	
ΔT (°C)	d (mm)
20	5
30	7
40	9
50	11

$\Delta T = T_{max} - T_{inst}$.



Some Unex references



- 1 **La Lucha.** Mexico, 2020
- 2 **Prudencia.** Panama, 2020
- 3 **Diego de Almagro.** Chile, 2013
- 4 **Olhão.** Portugal, 2012
- 5 **Rabat.** Morocco, 2012

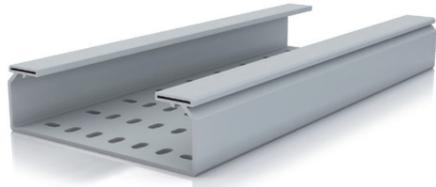
- 6 **San Pedro del Valle.** Spain, 2007
- 7 **Lyon.** France, 2007
- 8 **Muggensturm.** Germany, 2006
- 9 **Affi.** Italy, 2011
- 10 **Walvis Bay.** Namibia, 2019

- 11 **Mozambique,** 2012
- 12 **Maldives,** 2020
- 13 **Manila.** Philippines, 2017
- 14 **Sydney.** Australia, 1986
- 15 **Monaltrie.** Australia, 2018

GLOBAL HORIZONTAL IRRADIATION MAP
 Copyright © 2019 THE WORLD BANK
 Data provider: The world bank
 Source: ESMAP

Unex Products

Go Solar:
Scan and Explore!



Insulating cable tray 66

U23X

U48X

Halogen free
Thermoplastic component 100% recycled



Trunking 73

U23X

U43X

Halogen free
Thermoplastic component 100% recycled



Cable ties 22-0

U61X

Halogen free



Cable ties 22HD

U71X

Halogen free
For technically demanding solar installations



Rooftop support

U48X

Halogen free
Thermoplastic component 100% recycled



Insulating strut channel

U48X

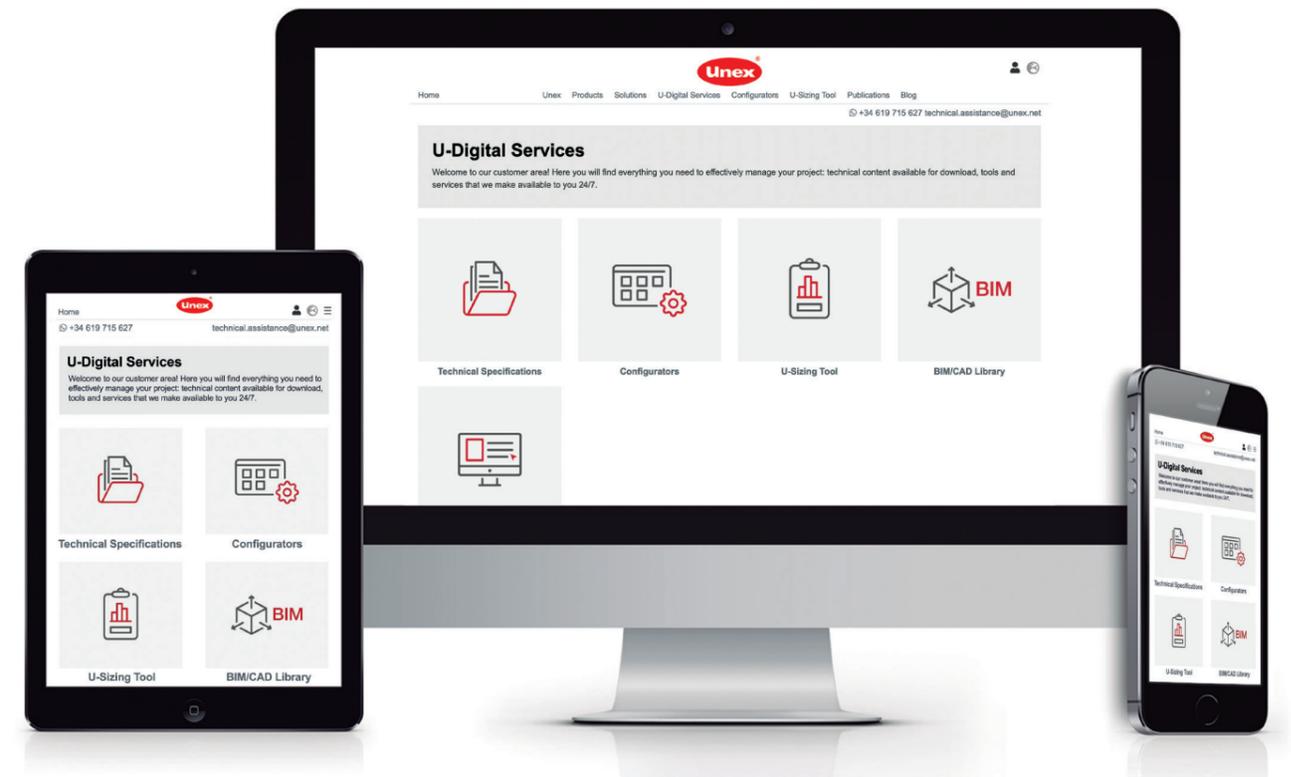
Halogen free
Thermoplastic component 100% recycled

U-Digital Services

Unex offers different tools for prescribing:

- UnexProject for dimensioning the size of the cable tray or trunking according to the number of cables.
- BIM-REVIT AND 3D-DWG object library for the entire Unex range.
- Configurator to find the best product to fit your project and get a complete list of all parts.
- Unex Price Bank integrated with Presto, Archimedes and other measurement tools, construction estimates and specifications.
- Videos.

Discover U-Digital:



Follow us:



Unex Services

Availability and logistics

Complete stock of all our references.
Material available through our extensive network of distributors.
Reliability of supply.

Technical Assistance

📞 +34 619 715 627
technical.assistance@unex.net
unex.net

Packaging

Design, coherence and protection. Maximum protection to assure the material's perfect condition during transport and handling and easy identification.

Spain

Unex aparellaje electrico, S.L.
Pallars, 172-174
08005 Barcelona
+34 93 333 87 00
unex@unex.net

France

Unex systèmes et éléments, S.A.S.
Parc Technologique
3 place Berthe Morisot
69791 Saint Priest Cedex
+33 4 78 43 69 55
unex@unex.fr

Italy

Unex sistemi ed elementi, S.R.L.
Via Valbrona 4
20125 Milano
+39 02 4953 9893
commerciale@unex.net

Germany

Unex Kabelsysteme und -elemente GmbH
Am Wallgraben 100
70565 Stuttgart
+49 711 78 19 35 30
vertrieb@unex.net

Portugal

Retrica Aparelhagem Eléctrica, Ltda.
Rua Soeiro Pereira Gomes,
Lote 1, 4º C
1600-198 Lisboa
+351 21 781 64 20
unex@unex.pt

Chile

Unex aparellaje eléctrico Chile, Ltda.
Centro Empresas "El Cortijo"
Av. Américo Vespucio
Norte 2680, Of 27
C.P. 8551378 - Conchalí
Santiago - Región Metropolitana
+56 2 2623 4981
unex@unex.cl

Mexico

Unex Solutions México S. de R.L. de C.V.
Avda. Santa Fé 170
Piso 6. Unidad 6-1-01
Col. Lomas de Santa Fé
Delegación Álvaro Obregón
001219 Ciudad de México
ventas@unex.com.mxUnex

Unex aparellaje eléctrico, S.L., as a policy, patents its products.
Own design and production. **Unex aparellaje eléctrico, S.L.**, does not manufacture for other trademarks.
Unex is a registered trademark of **Unex aparellaje eléctrico, S.L.**
© **Unex aparellaje eléctrico, S.L.**, 2024

Unex aparellaje eléctrico, S.L. Pallars, 172-174, 08005 Barcelona (Spain)
Tel: +34 93 333 87 00 / e-mail: unex@unex.net
R.M. de Barcelona, T. 32709, F.81, H. B214578 VAT. ES B62204011

Unex aparellaje eléctrico, S.L. reserves the right to modify any of the characteristics of the products that it manufactures. It is the responsibility of the person in charge of product selection for a specific application to look for the right product, according to the standards applicable in every country. **Unex aparellaje eléctrico, S.L.** disclaims all responsibility due to incorrect use of the product or to unforeseen circumstances.



Keeping you safer



Keeping you safer

Personalized Technical Assistance

technical.assistance@unex.net

Customer Service

 +34 619 715 627

international@unex.net

unex.net



Unex aparellaje eléctrico, S.L., as a policy, patents its products.
Own design and production. **Unex aparellaje eléctrico, S.L.**, does not
manufacture for other trademarks.

Unex is a registered trademark of **Unex aparellaje eléctrico, S.L.**

© Unex aparellaje eléctrico, S.L., 2024

KMA73EN0.7 October 2024