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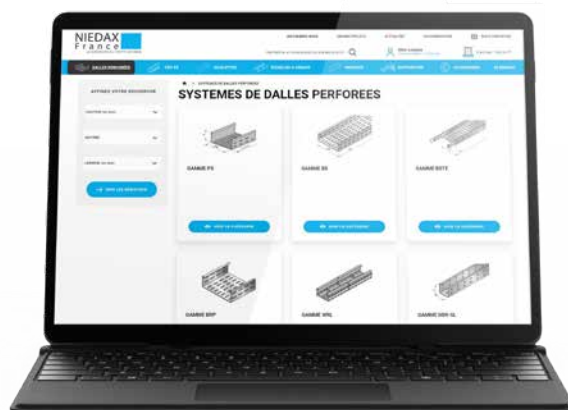
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- Choose your cable tray, insert the wished length, we will automatically suggest you the matching accessories

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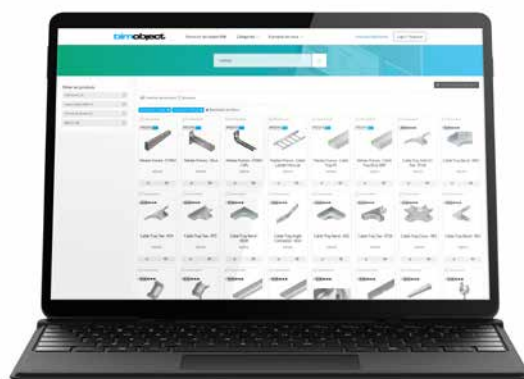
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EN 15085-2 accreditation:
welding of railway vehicles
and components



WELDING QUALITY REQUIREMENTS

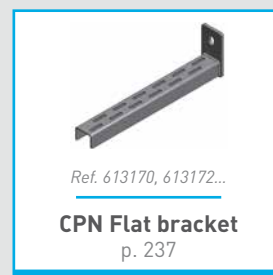
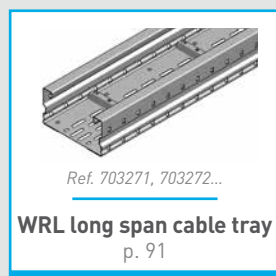
EN ISO 3834-2 accreditation:
Compliance with full quality
requirements in welding



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DISCOVER OUR NEW PRODUCTS...



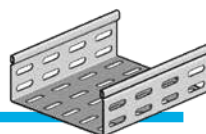
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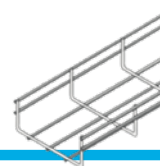
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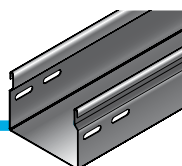
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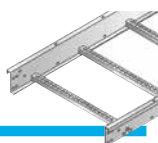
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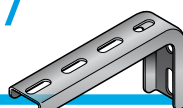
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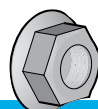
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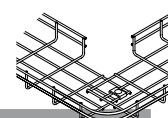
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A - TYPES OF CABLE TRAYS

The main function of cable trays and cable ladders is to support electric cables securely between two points. These are structural mechanical components in the electrical installation. They are compliant with the IEC 61537 standard, defining mainly:

- Load bearing
- Electrical continuity
- Earthing
- Electromagnetic compatibility.

There are 4 large groups of cable trays.

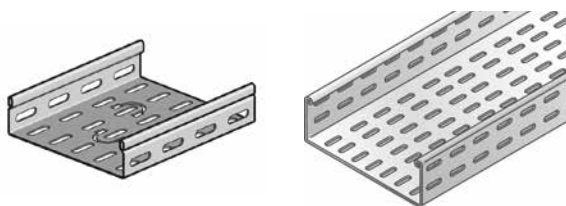
Each meets the requirements of one or more types of installation, according to its technical characteristics and specific environmental criteria.

1. PERFORATED CABLE TRAY

- Used in industrial installations and in interior or exterior environments
- Load capacity: medium to high
- Types of cables: communication and power

Advantages:

- Optimal engineering protection, limiting any electromagnetic disturbance

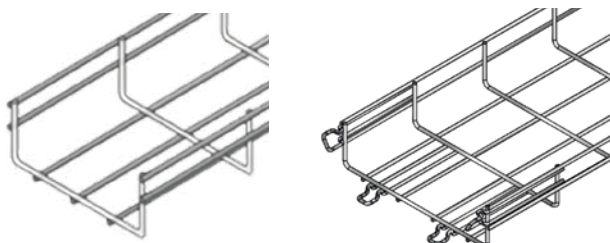


2. MESH TRAY

- Used in industrial or tertiary installations and in interior or exterior environments
- Load capacity: low to medium
- Types of cables: communication and power

Advantages:

- Excellent ventilation and cable visibility
- Quick and easy to install
- Recommended for dust/bacteria environments

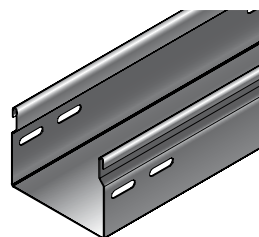


3. TRUNKING

- Used in industrial installations and in interior or exterior environments
- Load capacity: medium to high
- Types of cables: communication, including optical fibre
- Complete system with cover. Best protection against dust and liquids

Advantages:

- Reinforced mechanical protection, limiting electromagnetic disturbances
- Optimised installation: floor installation possible with anti-slip covering for walkable trays.

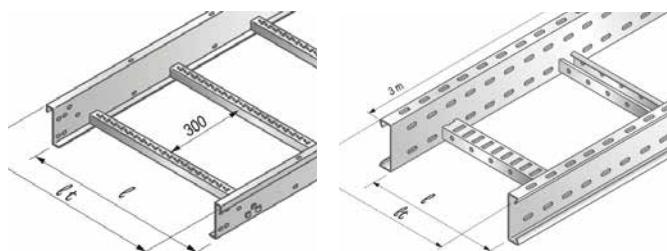


4. CABLE LADDER

- Used in industrial installations, interior or exterior environments
- Load capacity: high to extremely high
- Types of cables: high power

Advantages:

- High cable capacity
- For all types of installation and activities which require long spans (6 metres)
- Excellent ventilation and cable visibility



B - TECHNICAL CHARACTERISTICS

- Load bearing
 - SWL values (Safe Working Load) in kg/ml.
 - According to span (distance between supports)
- Electrical continuity
 - Value in mΩ of the lengths and the connectors
- Earthing of the installations:
 - Solutions for personal protection
- Electromagnetic compatibility
 - Circuit protection
 - Cable tray capacity according to cable type
- Corrosion protection
 - Materials and coatings according to environment installation constraints
- Shock resistance
 - Resistance to deformation based on the level of shock and the environment.
- Solutions in accordance with operating temperatures.
- Natural ventilation
 - Different types of cable trays provide different natural ventilation solutions, depending on the types of cables and the power level installed.
- Carbon footprint, eco design
 - Corresponds to the criteria of ISO 14001 certification

C - INSTALLATION ENVIRONMENT

- Interior, exterior
- Harshness of the environment:
 - Corrosion and chemical attacks
 - Seismic constraints
 - Usage constraints: vibrations...

The choice of materials, coatings or finish depends on the level of constraints *(refer to the table for the choice of materials and coatings)*.

Categories of corrosiveness (under EN ISO 12944-2)	TYPES OF ATMOSPHERE					
	Rural	Urban	Industrial	Marine	Pollution and humidity	Sea front
C1 – very low (no requirement)						
C2 – low						
C3 – moderate			Low SO ₂ pollution	Low salinity		
C4 – high			Mod. SO ₂ pollution	Mod. salinity		
C5 – I – very high			High SO ₂ pollution			
C5 – M – very high				High salinity		High salinity



A - DIRECTIVES

- **The Low Voltage Directive (DBT) 2014/35/UE (DBT) 2014/35/UE** (which modified Directive 2006/95/CE of 12/12/2006 and which replaced the 2 previous directives 73/23 and 93/68) is one of the oldest directives of the single market. It is characterised by a procedure of assessment applied to the equipment before placing it on the market, and by basic health and safety requirements with which that equipment must comply, either directly or by virtue of harmonised standards. The directive covers electrical equipment with a voltage between 50 and 1000 V (AC) and between 75 and 1500 V (DC).
- **The EMC Directive: 2014-30-EU** (which modified Directive 2004/108/EEC of 15/12/2004) governs issues related to EMC (electromagnetic compatibility), emission and immunity issues. All devices or electrical installations will influence each other if they are connected or close to one another. The goal of electromagnetic compatibility is to control these side effects in a reasonable way. Equipment (devices and fixed facilities) must conform to EMC requirements when placed on the market and/or in service. The application of good engineering practice is mandatory for fixed installations.

B – PRODUCT STANDARDS

- **IEC 61537 Standard – 2nd edition (2006.10)**
Cable tray and cable ladder systems for electrical installations.
This product standard defines in particular:
- Tests for cable trays, cable ladders, brackets and hangers.
- Marking and documentation
- **DIN 4102-12 (1998.11) Standard**
Fire resistance of cable tray systems, supports and cables.
- **NEMA VE 1-2017 Standard**
Metal cable tray systems.
- **NF EN 50085 (series 1-2)**
Profiled duct and trunking systems for electrical installations.
- **IEC 60695: Tests relative to fire risk.**

C - INSTALLATION AND GUIDE STANDARDS

STANDARDS

- **IEC 60364 (2005.11) Standard**
Low Voltage Electrical Facilities.
- **NF C 15-100 (2002.11) Standard**
Together with its various amendments
Low Voltage Electrical Facilities
- **NF C14-100 (2008.02) Standard**
Low Voltage connection facilities.
- **NF EN 50174 (2018.06) Standard**
Information technology. Installation of cabling:
1- planning and quality assurance (2009)
2- interior installation (2009)
3- exterior installation (2014)

GUIDES ISSUED BY NFC 15-100

- **UTE C 15-520 (2007.07) Guide**
Channelling, fitting methods, connections.
- **UTE C 15-900 (2006.03) Guide**
Implementation and coexistence of power networks and communication networks in installations in residential areas, tertiary areas and similar.
- **UTE C15-106 (2003.12) Guide**
Section on protective conductors, earth conductors and equipotential bonding.
- **UTE C15-103 (2004.03) Guide**
Choice of electrical material, depending on external influences.

D – NF C15-100 STANDARD AND CABLE TRAYS

(Low Voltage Electrical Installations 2002)

Definition of products:

262.3 Cable tray (or tablet)

Cable support consisting of a continuous base and edges, but without a cover.

NOTE – A cable tray may be perforated or not. If a cable tray is provided with a cover at the time of its installation, it is considered as trunking for the determination of admissible current.

262.8 Trunking

A closed envelope with a removable cover for full protection of insulated conductors or cables, as well as in the installation of other electric equipment. Trunking may include partitions or not. Depending on its size and location, trunking may be referred to as 'moulding', 'skirting' or 'rail'.

262.12 Cable ladder

Cable support consisting of a series of transverse components fixed rigidly to longitudinal elements.

Protection against electric shock (extract 4.41):

According to the precautionary principle, masses, and therefore cable trays, should be earthed. NF C15 100 states:

• 410.3.7 (General)

It is permitted to dispense with provisions for protection against indirect contacts for electrical devices and their supports in the following cases:

- Metal trunking or ducts, or other protective metallic envelopes provide double or reinforced insulation. (For example: cables similar to class II).
- Studs and metallic parts with electrical connection, where those parts are not accessible to the touch...

• 412.2 (Double or reinforced insulation)

Provisions for protection against both direct and indirect contacts.

• 413.3.6 (Electrical separation)

The masses of the separated circuit must not be connected to a protective conductor, nor to the masses of other circuits...

• 414.4.5 (SELV or PELV circuits)

The masses should not be connected intentionally to the ground, nor to protective conductors or to the masses of other circuits...

Protection against fire, burns and explosion (4-42) :

- **421.7** Cable trays and exposed trunking and ducts must fulfil flame suppression requirements.
- **422.1.4** In principle, the general rules relating to channelling are applicable. However, when channels are not embedded in non-combustible material such as plaster, concrete, or equivalent material, they must meet the characteristics of flame suppression as defined in the current standards

Conductors and cables, ducting systems, trunking and cable trays must satisfy flame suppression testing. (Category C2 for cables and conductors).

**NIEDAX France metallic products
do not propagate flames**

Protection against voltage disruptors and electromagnetic disruptors (extract 4.44)

• 444.3.5

Equipotential of metallic envelopes and barriers.

• 444.3.6

Appropriate separation (by distance or shielding) of power and communication cables, including changes in direction, across walls, and crossings at right angles.

• 444.3.6.1

In the parts between the dividers, the power and communication cables must travel on metallic supports or separate insulation. The minimum distance between the walls closest to the supports is 30 cm.

• 444.3.6.2

In the terminal sections between the dividers and the points of use, the power and communication cables can be routed on or in the common supports.

Separation distances are based on the installation method concerned:

- **exposed cables**, in raised floors or false ceilings: minimum separation of 5 cm.
- **installation in trunking or profiled ducts**: install the networks in the different compartments in descending order of sensitivity with respect to the ground plane (the most sensitive network is the one nearest to the ground plane).
- **built-in or visible conduits**: separate ducts, unless specifically stipulated by the supplier.

Choice of channelling (extract 521.2):

Only multi or non-conductive cables – including armoured cables – are admitted in the cable ducts, trunking or cable ladders.

Installation		No fixing	Direct fixing	Duct systems	Trunking	Cable trays, ladders, tablets, brackets	On isolators	Support cable
Conductors and cables								
Unprotected conductors		N	N	N	N	N	A	N
Insulated conductors		N	N	A*	A*	N	A	N
Cables (incl. armoured)	Multiconductors	A	A	A	A	A	O	A
	Monoconductor	O	A	A	A	A	O	A

A	Permitted
A*	Insulated conductors are only permitted if the duct, profiled duct, or trunking has the degree of protection required by IP4X or IPXXD and a tool is required to remove the covering of the duct.
N	Not permitted
O	Not applicable or not used in practice

Information: Communication cables

- The table at the top right shows the performance standards

- Principal types of communication cable are:

Fibre optic: Multimode (medium distances), Monomode (long distances)

Copper cables: Shielded coaxial (instrumentation and industry)
Twisted pair (Local IT/telephone networks)

Frequency	Category (performance of sole component)	Class (performance of several components)
100 kHz		A
1 MHz		B
16 MHz	cat 3	C
20 MHz	cat 4	
100 MHz	cat 5	D
250 MHz	cat 6	E
600 MHz	cat 7	F

Fire barriers (527.2):

Channelling such as ducts, profiles, trunking and prefabricated channels that enter into elements of construction which have a specified fire resistance, must be filled internally according to the degree of fire resistance prescribed for that construction element before penetration, and also covered externally as prescribed in 527.2.1.

However, there is no provision for interior filling of ducts and trunking which satisfy the flame suppression testing, where the inner section is less than or equal to 710 mm² and possesses the IP33 degree of protection.

If these ducts or trunking lead into a compartment separate from the construction element considered, that extremity must also possess the IP33 degree of protection.

Other neighbouring channels (extract 5.28):

• (528.2.1)

Electrical channels in the vicinity of heating or hot air pipes or smoke ducts must not be at risk of being heated to a dangerous temperature, and should therefore be kept at sufficient distance or be separated from these pipes by a heat insulated screen.

Electric channelling should not be routed through smoke ducts, ventilation pipes or smoke outlets.

• (528.2.2)

Electric channelling should not be placed in parallel below pipes that can cause condensation (such as water, steam or gas pipes, etc.) unless measures are taken to protect the electric channelling from the effects of that condensation.

• (528.2.4)

When electric channelling is placed in close proximity to non-electric lines, it must be properly protected against the hazards that may result from the presence of the other channels.

Protective conductors (extract 5.43):

The use of the following metallic elements as protective conductors or as equipotential conductors is not permitted:

- Cable trays and similar systems
- Any metallic channelling (water, gas, flammable liquid, heating, etc.)
- Conductive elements belonging to the building structure
- Load-bearing cables for self-supporting cables.

The Low Voltage Directive 2014/35/UE stipulates that electrical materials must be safe for persons, animals and property. The rules and conditions of security must be respected. (cf. A)

To observe the proper rules the manufacturer must:

- Establish manufacturing control,
- Issue a declaration of conformity for each product,
- Have technical documentation available to the relevant authorities
- Provide evidence of that conformity by affixing CE marking (cf. B)

To satisfy the provisions of the Directive, the materials must conform to the standard IEC 61537 relating to cable trays and cable ladders, which specifies:

- Marking, dimensions, properties (cf. B)
- Assembly instructions (cf. C)
- Load tests (cf. A)
- Conditions, classification, etc.

A - SAFETY CONDITIONS

1. PRODUCT SAFETY

- Product surfaces which may come in contact with the cables must not cause them damage.
- Other surfaces may be manipulated without risk.



SAFETY
Rounded edges

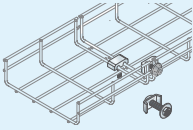


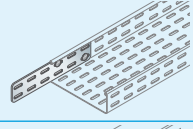
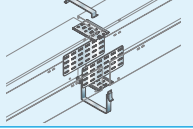
2. ELECTRICAL CONTINUITY

NIEDAX France products satisfy the tests for electrical continuity*. Resistance less than or equal to 5 milliOhm per metre without junction elements and resistance less than or equal to 50 milliOhm where there are attachments (IEC 61537). Electrical continuity is obtained by using the couplers indicated in the catalogue.

- Tests were carried out on samples with dimensions 50 x 150 mm. *Tests results are available on request.*
- Measurement parameter: voltage 5 V frequency 50 Hz

Results: All the attachments had a resistance of less than 50 milliohms, as required by the IEC 61537 standard.

As the average was less than 1 mOhm, these results are 50 times better than the value required by the standard.

MEASUREMENTS OF ELECTRICAL RESISTANCE		R joint (mOhm)
Connection of two mesh trays 200 mm long by bolts		0,90
Automatic connection of two mesh trays 200 mm long		0,33
Bolted telescopic connection 360 mm long (includes a bolt at the bottom)		0,83
Connection between two perforated cable trays 160 mm long by bolts		0,24
Connection between 2 filled trunking units 150 mm long by bolts		0,50

*Except for mesh trays made of SS304L & SS316L stainless steel

3. FIRE BEHAVIOUR

a. Reaction to fire

The products are metallic and not aggressive for the cables or for the installer, subject to following our specifications for installation without reaction to fire.

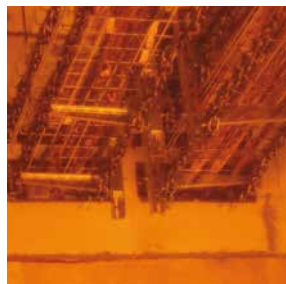
b. Fire resistance according to DIN 4102-12

In the absence of a European fire resistance standard, the use of this standard has become widespread. The tested configuration (trays, support and cables) is placed in a chamber heated to 1000 °C for 30, 60 or 90 minutes, to check that the electrical signals resist during the period considered. Laboratory: I.B.M.B – Braunschweig.

Configurations certified CITO MTC



Before heating



Around 20'/600 °C



Around 90'/1000 °C



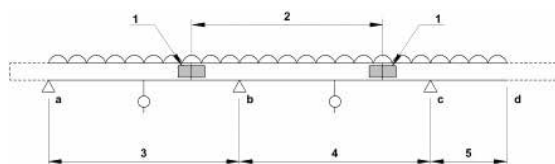
After cooling

4. LOAD TESTING UNDER IEC 61537

a. Cable trays and cable ladders:

All NIEDAX France products are tested for conformity with the IEC 61537 standard.

- Cable tray placed on supports
- Measured in mid-range point by 3 sensors placed in the middle (A) and on each side (B) of the cable tray.
- Evenly spread load.
- Apply the couplers indicated in the catalogue.
- Spacing E between the supports is presented in steps of 500 mm in the load diagrams.
- Safe working loads (SWL) are determined following the indications of the type III test.
- The results obtained are chosen within the theoretical limit of the maximum longitudinal range $<L/100$ and the safety coefficient 1.7 on the resistance to rupture.
- A supplementary criterion of the transverse range of $<l/20$ (l being the width of the product) is considered for mesh trays and cable trays.



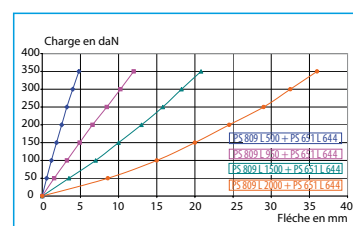
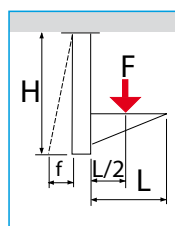
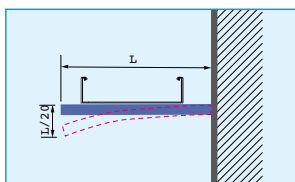
All the tests include a span at extremity L (or X), an intermediate span L and a cantilever 0.4L.



b. Supports

For supports the IEC 61537 standard specifies that the SWL is the load limited by a maximum range $L/20$ at the extremity and by a safety coefficient of 1.7 to rupture. The SWL is given in daN for the consoles and daN/m for the hangers.

Symbolised by 



B - THE CE MARK AND IEC 61537

Product standards and the Low Voltage Directive provide for the establishment of conditions rendering obligatory the marking on cables trays, trunking and cable ladders made in the European Union.

All NIEDAX France products carry CE marking as well as a reference to the country of manufacture and a product designation with dimensions.



1. LOW VOLTAGE DIRECTIVE

The CE conformity marking consists of the symbol defined in the appendix to this Decree; it is placed on the electrical equipment or, failing that on its packaging, its manual or its guarantee certificate...

2. IEC 61537 STANDARD (EXTRACT § 7.1)

Each component of the system must be durably and legibly marked as follows:

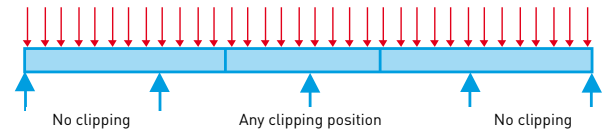
- With the name of the manufacturer or seller, or with a commercial or identifying mark.
- Marking to identify the product, which could be, for example: a catalogue reference, a symbol or similar method. When the components of the system other than the lengths of the cable trays and cable ladders are provided in the packaging, the identifying marking could be alternatively placed on the packaging alone.

Compliance with the marking requirements is verified by examination, and, for the marking on the product, by rubbing by hand for 15s with a damp cotton cloth and then for a further 15s with a cotton cloth imbibed with petrol.

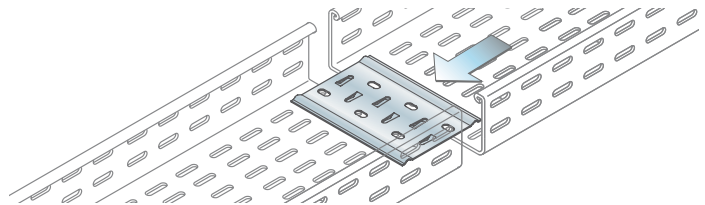
C - CONDITIONS FOR FITTING

1. LENGTHS

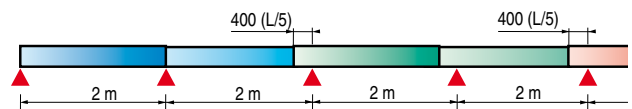
- No couplers in the end spans
- Other spans – bolting position not important



- For cable trays of a width >200 mm and loads > 40daN/m, we recommend installing a fish plate or a coupler at the base of the connections.

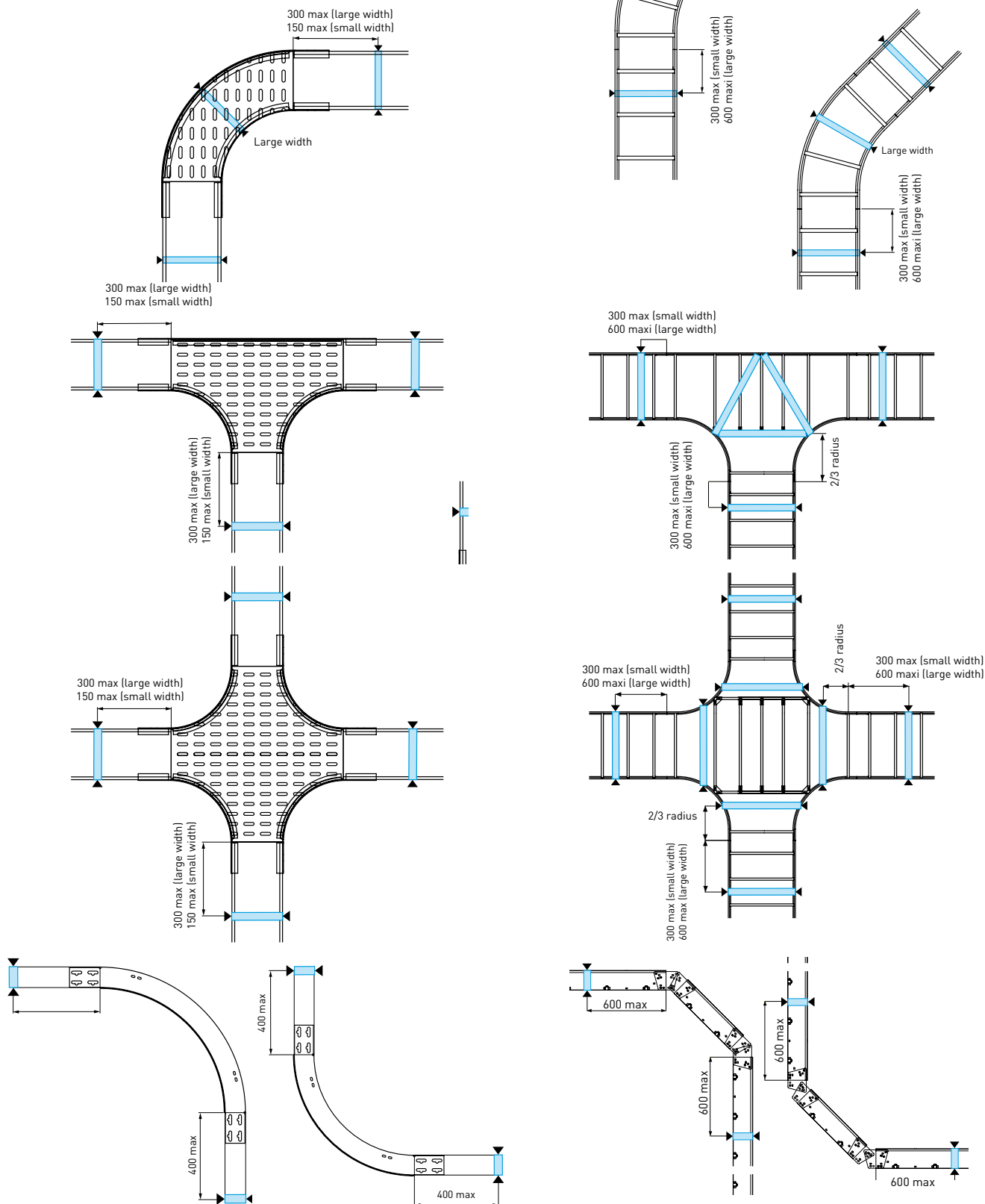


- For the spacing of multiple supports along the length of the product, which is the case for telescopic plates with 2 m spacing, we recommend a junction at L/5 of the supports, i.e. 400 mm.



2. SUPPORTS

- Small width <300: For changes in direction or level, provide support at the entrance and at the exit of the connecting element.
- Large width ≥ 300 : For changes in direction or level, provide a support at the entrance, at the exit, and in the centre of the connecting element.





D - UL CLASSIFICATION

SYSTEM	MATERIAL				
	SZ / G / S	GC / HDG / F	AL / ALU	I2 / SS304L / E3*	I3 / SS316L / E5*
PS/PSN					
GRS					
MTC CITO					

* for stainless steel products it is necessary to connect the products before and after the coupler with an earthing strap (UL certified) with 2 TRCC M6x12 + HE M6 nuts per strap.

No UL classification



E - RECYCLING AND ENVIRONMENT



















- All metallic NIEDAX France products are recyclable. They are not affected by European Directive 2002/96/EC (WEEE: Waste Electrical and Electronic Equipment).
- They do not contain any dangerous substance as defined in European Directive 2002/95/EC (ROHS: Restriction of Hazardous Substances).


















F - PRODUCT ENVIRONMENTAL PROFILE(PEP)

- **PEP conforme à ISO 14025-14040-14044**
A list of PEP/products is available on request.
Consult at www.pep-ecopassport.org.

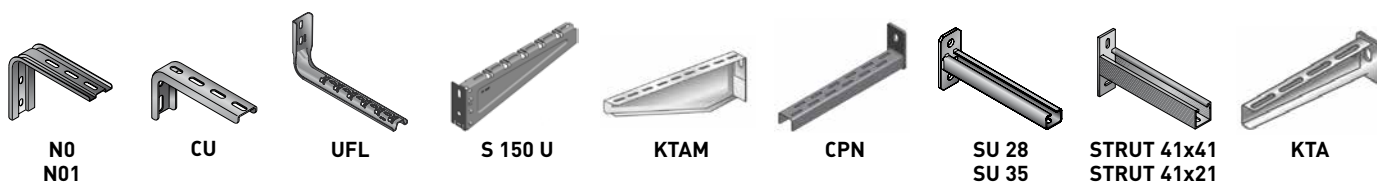









A - SELECTION GUIDE

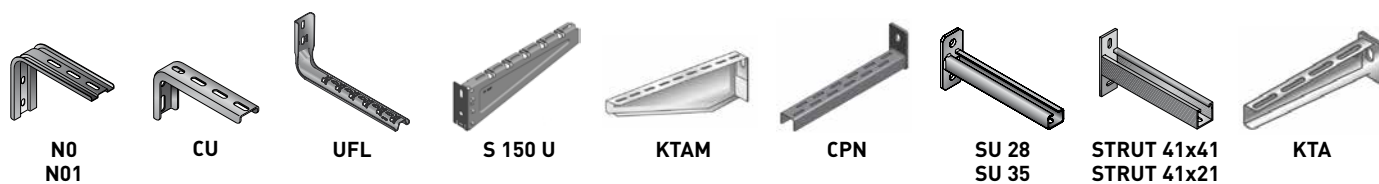
Type	Profile	Support type	Wall brackets	Multi-level brackets	Adjustable bracket	Horizontal or vertical skirting	Single suspension	Double suspension	Single hanger	Double hanger	Trapeze hanger
											
CU / N-0		Light duty	CU or N-0 brackets				CCU brackets	CCU brackets	CU + CU or N-0 + N-0	N-0 + N-0	
Perforated sections		Perforated sections				Omega or Z profiles					U profiles
UFL		Universal medium duty	UFL			S100U channel	UFCC hanging brackets	UFCC hanging brackets	UFL + UFL or UFLP	UFL + UFL or UFLP	trapeze hanger + threaded rod
S150U			C bracket	S150U channel + C brackets			S150U gusset + S150U + C brackets		S150U gusset + S150U + C brackets	S150U gusset + joining plate + S150U + C brackets	
C 28x20		Medium duty	SU 28	C35 + SU28		C28			Head plate + C35 + SU28	Head plate + C35 + SU28	C28
C 35x35			Head plate + C35 + SU35	C35 + SU35	C35 gusset + C35	C35	On request	On request	Head plate + C35 + SU or SU35 + SU35	Head plate + C35 + SU or SU35 + SU35	C35
STRUT 41		Heavy duty	PDT41 + 41x41	Strut 41x41 + SU		Strut 41x41			Head plate 41 + 41x41 + SU	Head plate 41 + Dble 41x41 + SU	41x21 or 41x41
U 90x45				U90x45 + J bracket					G50D gusset + U90x45 + J	G50D gusset + U90x45 + J	G50D gusset + U90x45
I Beam 80			KTA bracket	I beam + KTT + Wall fixing					Hanger + KTT	Hanger + KTT	Hanger + Channel + access.
									or head plate + Channel + KTT	or head plate + Channel + KTT	









Type	Profile	Support type	Adjustable hanger	Central hanger	Floor-Ceiling	Omega distance support - Z	Transversal bar	Single floor support	Double floor support	Horizontal I Beam
										
CU / N-0		Light duty								
Perforated sections		Perforated sections				Omega or Z profiles	U and L profiles			
UFL		Universal medium duty				S100U channel				S100U + S100U clamp
S150U			G10B gusset + S150U + C bracket		G10B gusset + S150U + C bracket					
C 28x20		Medium duty					SU 28+ C28 + SU angle bracket	SU35 + SU28	SU35 + SU28	C28 + SU28 clamp
C 35x35			C35 gusset + C35	On request		C35	Head plate + C35 + Acc. or SU35 + C35 + Acc.	Head plate + C35 + SU or SU35 + SU35	Head plate + C35 + SU or SU35 + SU35	C35 + Clamps
STRUT 41		Heavy duty		On request	Dble head plate 41 + Dble 41 + SU	Strut 41x41	Head plate 41x41 + Strut 41x41 + Acc.	UP40 head plate + Strut 41x41 + SU	Dble head plate 41 + Dble 41 + SU	Strut 41 + clamps
U 90x45			On request		G50D gusset + U90x45 + J		G50D gusset + U90x45	G50D gusset + U90x45 + J	G50D gusset + U90x45 + J	
I Beam 80			Adjustable head plate + I Beam + KTT		Head plate + I Beam + KTT		Head plate + I Beam + KTT	Head plate + I beam + VBIQ80 + KTT	Head plate + I beam + VBIQ80 + KTT	
								Hanger + I beam + VBIQ80 + KTT	Hanger + I beam + VBIQ80 + KTT	

B - WALL BRACKETS FOR LIGHT TO MEDIUM LOADS


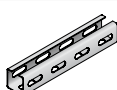
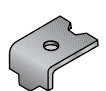
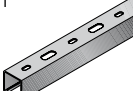
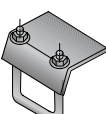




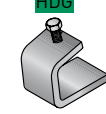




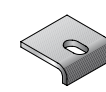
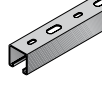
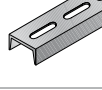
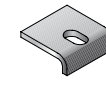
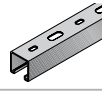
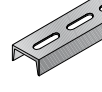


Load daN	0 50 100 150 200											
width w mm	Type	 daN	 L	Type	 daN	L mm	Type	 daN	 L	Type	 daN	 L
50 -	N0	25	150	S 150 U	70	100	CU 80 CU 120 UFL 10 KTAM 100	120 120 130 120	86 126 100 100			
150 -	N01	16	225	CU 240 UFL 20 S150U S150U S 28	60 86 75 55 90	246 200 150 200 250	KTAM 200 KTAM 150 CU 160 UFL 15 SU 28 SU 28	120 120 120 108 100 150	200 150 160 150 200 150	CPN 200	200	225
250 -	CU 320	40	326	UFL 25 UFL 30	75 64	250 300	S150U SU 35 STRUT 4121	130 110 120	300 350 344	KTAM 300 CPN 300	150 150	320 325
350 -				STRUT 4121	70	444				KTAM 400	150	400
450 -				SU 35 CPN 500	95 95	500 525	CPN 400 S150U KTAM 500	105 150 120	425 500 500			
550 -				CPN 600	70	625	S150U	115	600			
650 -												


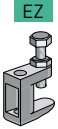
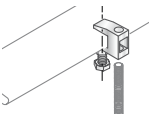
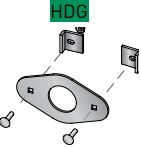
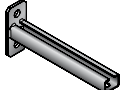
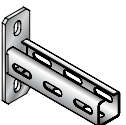
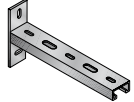
C - WALL BRACKETS FOR MEDIUM TO HEAVY LOADS


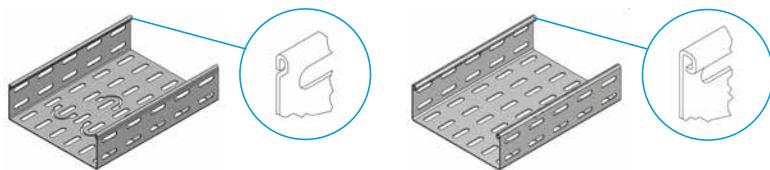
Load daN	200			250			300			350			400	
width w mm	Type	 daN	 L	Type	 daN	 L	Type	 daN	 L	Type	 daN	 L		
50	SU28	200	150	KTA CPN	250 300	100 125								
150	STRUT 4121 SU 35	240 210	244 250	STRUT 4121 KTA	260 250	194 200				STRUT 4141 STRUT 4141	900 500	194 244		
250				KTA	250	300	STRUT 4141	350	344					
350	S150 U	110	400	KTA	250	408	STRUT 4141	300	444					
450				KTA STRUT 4141	245 250	510 544								
550	STRUT 4141	250	644				KTA	350	700					
650														

D - CHOICE OF TYPE OF FIXINGS ON I BEAM

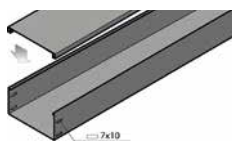
	Thickness to be fixed (mm)	Section or product to be fixed	Type	Fastenings
		Sections on metal frame		
	5>20	C35 	Type B clamp	Provided: Screws THE M8x50 + square nut M8
	5>10 10>15	STRUT 41 	STRUT 41 H10 or H20 Clamp bags (x10)	Provided: Fastening kit M10
	5>15		Clamp STRUT 41 H10	Not provided: THE M12x25 screws + diamond nut M12
	15>25		Clamp STRUT 41 H20	Not provided: THE M12x25 screws + diamond nut M12
	25>35		Clamp STRUT 41 H30	Not provided: THE M12x50 screws + diamond nut M12
	5>20	DOUBLE STRUT 41x41  DOUBLE STRUT 41x21  C35  C28 	Beam Clamp 41 H 110 Beam Clamp 41 H 70 Beam Clamp 41 H 40	Provided: Mounting bolts M8
	5>20	STRUT 41x41 	Clamp I BEAM H20 + screws	Provided: Grub screw
	5>20	UPN 40-60  STRUT 41 	I BEAM HOOK CLAMP 5/20 mm	Not provided: • For UPN: screws TH 10x50 + nuts HU 10 + washer AZ10 • For STRUT 41x41: screws TH 10x50 + diamond nut M10 or screws TH M12 + diamond nut M12
	5>9 10>14 15>19 20>24 25>29 30>34 35>39	STRUT 41  UPN 40 U.5050* 	Clamp HSK-10 Clamp HSK-15 Clamp HSK-20 Clamp HSK-25 Clamp HSK-30 Clamp HSK-35 Clamp HSK-40	Not provided: Bolts M10x30 + nut H or diamond M10 Not provided: Bolts M10x50 + nut H or diamond M10 Not provided: Bolts M10x60 + nut H or diamond M10
	5>9 10>14 15>19 20>24 25>29 30>34 35>39	STRUT 41  UPN 40 U.5050* 	Clamp HSKS-10 Clamp HSKS-15 Clamp HSKS-20 Clamp HSKS-25 Clamp HSKS-30 Clamp HSKS-35 Clamp HSKS-40	Not provided: Bolts M12x35 + nut H or diamond M12 Not provided: Bolts M12x50 + nut H or diamond M12

*For U.5050 accessories: HK diamond bolts not provided

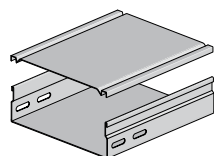
	Thickness to be fixed (mm)	Section or product to be fixed	Type	Fastenings
		Sections on metal frame		
	18		Beam clamp PP 8	Allow: threaded rod 8
	20		Beam clamp PP 10	Allow: threaded rod 10
	26		Beam clamp PP 12	Allow: threaded rod 12
		Bracket on metal frame		
	5>15	SU 28 	Flange SU 28	Provided: 2 TRCC M10x40 bolts and brackets
		SU 35 	Flange SU 35-45	
		STRUT 41x21 		

CABLE TRAY


PS/PSN/BS/BRP CABLE TRAY	G	HDG	SS304L	SS316L	AL - ALU
6.1 Material	metallic	metallic	metallic	metallic	metallic
6.2 Flame propagation	no	no	no	no	no
6.3 Electrical continuity	continuity	continuity	continuity	continuity	continuity
6.4 Electrical conductivity	conductivity	conductivity	conductivity	conductivity	conductivity
6.5 Coating material	metallic	metallic	metallic	metallic	metallic
6.6 Temperature					
6.6.1 mini tr, st, inst, utilisation	-20° C	-20° C	-20° C	-20° C	-20° C
6.6.2 maxi tr, st, inst, utilisation	+60°C	+60°C	+60°C	+60°C	+60°C
6.7 % perforated surface used (trays)	C	C	C	C	C
6.9 Shock resistance	20 J	20 J	20 J	20 J	20 J

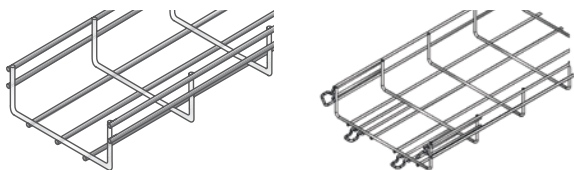
TRUNKING (Base & Cover)


GBRS/GP TRUNKING	G	HDG	SS304L	SS316L	AL - ALU
6.1 Material	metallic	metallic	metallic	metallic	metallic
6.2 Shock resistance	very strong	very strong	very strong	very strong	very strong
6.3 Temperature					
mini transport, stocking	-20° C	-20° C	-20° C	-20° C	-20° C
mini installation, usage	-20° C	-20° C	-20° C	-20° C	-20° C
maximum usage	+60°C	+60°C	+60°C	+60°C	+60°C
6.4 Flame propagation	no	no	no	no	no
6.5 Electrical properties	conductor	conductor	conductor	conductor	conductor
6.7 Degree of protection (IP)	IP20	IP20	IP20	IP20	IP20
6.8 Protection against corrosion					
6.9 Opening the cover	after fixing	after fixing	after fixing	after fixing	after fixing
6.101.1 Installed position (Length)	with accessories	with accessories	with accessories	with accessories	with accessories



GRS TRUNKING	G	HDG	SS304L	SS316L	AL - ALU
6.1 Material	metallic	metallic	metallic	metallic	metallic
6.2 Shock resistance	very strong	very strong	very strong	very strong	very strong
6.3 Temperature					
mini transport, stocking	-20° C	-20° C	-20° C	-20° C	-20° C
mini installation, usage	-20° C	-20° C	-20° C	-20° C	-20° C
maximum usage	+60°C	+60°C	+60°C	+60°C	+60°C
6.4 Flame propagation	no	no	no	no	no
6.5 Electrical properties	conductor	conductor	conductor	conductor	conductor
6.7 Degree of protection (IP)	IP40	IP40	IP40	IP40	IP40
6.8 Protection against corrosion					
6.9 Opening the cover	after fixing	after fixing	after fixing	after fixing	after fixing
6.101.1 Installed position (Length)	with accessories	with accessories	with accessories	with accessories	with accessories

MESH TRAY

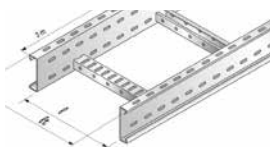


UF/MTC MESH TRAY	EZ	HDG	SS304L	SS316L
6.1 Material	metallic	metallic	metallic	metallic
6.2 Flame propagation	no	no	no	no
6.3 Electrical continuity	continuity	continuity	continuity	continuity
6.4 Electrical conductivity	conductive	conductive	conductive	conductive
6.5 Coating material	metallic	metallic	not coated	not coated
6.6 Temperature				
6.6.1 mini tr, st, inst, utilisation	-20° C	-20° C	-20° C	-20° C
6.6.2 maxi tr, st, inst, utilisation	+60°C	+60°C	+60°C	+60°C
6.7 % perforated surface used (trays)	D	D	D	D
6.9 Shock resistance	20 J	20 J	20 J	20 J

CABLE LADDER



HERCULE CABLE LADDER	G	HDG	SS304L	SS316L	AL - ALU
6.1 Material	metallic	metallic	metallic	metallic	metallic
6.2 Flame propagation	no	no	no	no	no
6.3 Electrical continuity	continuity	continuity	continuity	continuity	continuity
6.4 Electrical conductivity	conductive	conductive	conductive	conductive	conductive
6.5 Coating material	metallic coating	metallic coating	not coated	not coated	not coated
6.6 Temperature					
6.6.1 mini tr, st, inst, utilisation	-20° C	-20° C	-20° C	-20° C	-20° C
6.6.2 maxi tr, st, inst, utilisation	+60°C	+60°C	+60°C	+60°C	+60°C
6.8 % open surface	Z	Z	Z	Z	Z
6.9 Shock resistance	50 J	50 J	50 J	50 J	50 J



ATLAS CABLE LADDER	HDG	SS304L	SS316L	AL - ALU
6.1 Material	metallic	metallic	metallic	metallic
6.2 Flame propagation	no	no	no	no
6.3 Electrical continuity	continuity	continuity	continuity	continuity
6.4 Electrical conductivity	conductive	conductive	conductive	conductive
6.5 Coating material	metallic coating	not coated	not coated	not coated
6.6 Temperature				
6.6.1 mini tr, st, inst, utilisation	-20° C	-20° C	-20° C	-20° C
6.6.2 maxi tr, st, inst, utilisation	+60°C	+60°C	+60°C	+60°C
6.8 % open surface	Z	Z	Z	Z
6.9 Shock resistance	50 J	50 J	50 J	50 J

A - CABLING TO MAINTAIN EMC PERFORMANCE

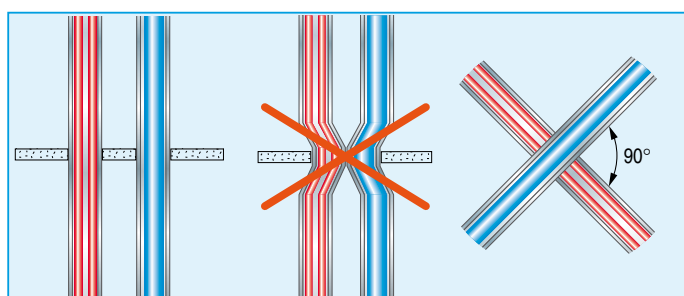
Today no building can be designed without communication cabling. The equipment must be reliable, efficient and evolving.

The quality of the cables and the channels that support them is therefore paramount for all category 5 and category 6 applications.

To achieve this objective, NIEDAX France offers advice on the cabling and product solutions which maintain EMC performance.

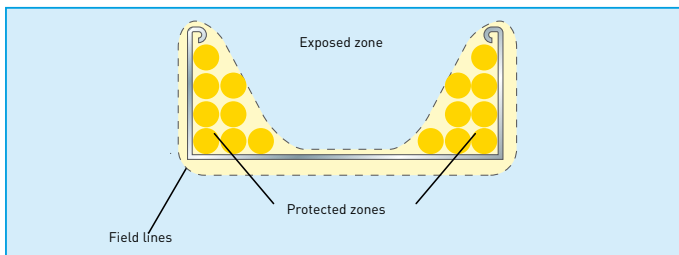
- Separate the power cables from the communication cables, ideally in different channels, but if in the same channel use NIEDAX France dividers.

[Source NF EN 50174-2, 6.5 and NF C15-100, 444].



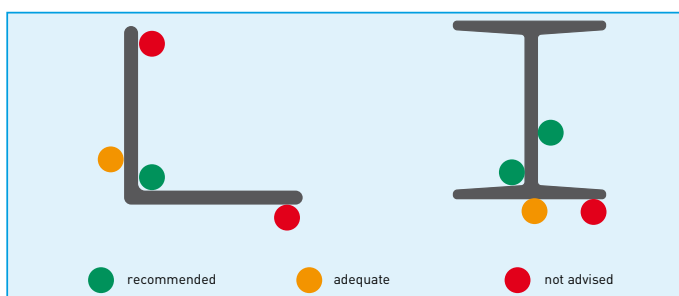
- In the event of external electromagnetic pollution, give preference to cable trays where the height of the side exceeds the cable cluster, to take account of protected zones

[Sources NF EN 50174-2, 6.6].



- Metallic elements of the building may serve for EMC objectives.

NIEDAX France offers both fixing on frames and adapted products.



- Communication cables must be correctly arranged and fixed without constraining their outer shell (UTE C 15-900- 3.1.2).

- Communication cables must be unwound and not pulled,
- Keep to a curvature radius of 25.4 mm minimum,
- Do not twist the cable,
- Do not put anything on the cable or walk on it.

- The most important criteria for EMC is the correct earthing of the elements of the installation (channelling, frame...) to evacuate the interference currents.

Separation distances between circuits

NF C15-100 § 444.3.6.1

In the parts between the splitters, power and communication cables must travel on metal supports or separate insulation. The minimum distance between the closest sides of the supports is 30 cm.

EN 50174-2 (2000) § 6.5.2

For vertical installations, the separation distances on the table apply from one extremity to the other (see table 1).

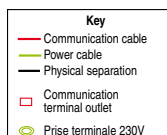
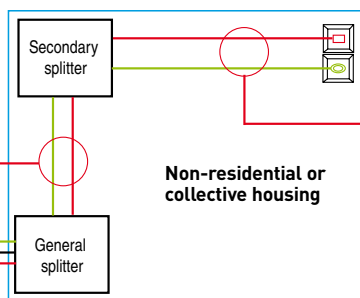
NF C14-100 § 7.2.4, § 8

Obligation of physical separation between circuits.

UTE C15-900 § 6.7.2.2

Minimum distance of 20 cm between communication cables and electric channels of any kind.

- If in the same trunking, use separate compartments with independent covers that can be opened with the help of a tool.



UTE C15-900 § 6.7.3.1 Separation distances:

Power and communication network cables can travel on or in the same supports. In trunking systems, the compartments must be reserved exclusively for them.

In the case of screened communication cables:

- If the length is <35 m, no separation distance is required.
- If the length is <35 m, the distances on the table below apply, except for the last 15 metres connected to the outlet.

Table 1: Separation distances for unscreened communication cables.

Type of installation	Metallic support
Power cable without screen	50 mm
Communication cable without screen	
Power cable without screen	5 mm
Screened communication cable*	
Screened power cable	2 mm
Communication cable without screen	
Screened power cable	0 mm
Screened communication cable	

* Screened communication cables must conform to series EN50288.

B - FIXING THE CABLES

- All NIEDAX France cable trays provide continuous cable support (IEC 61537).

Concerning mesh cable trays:

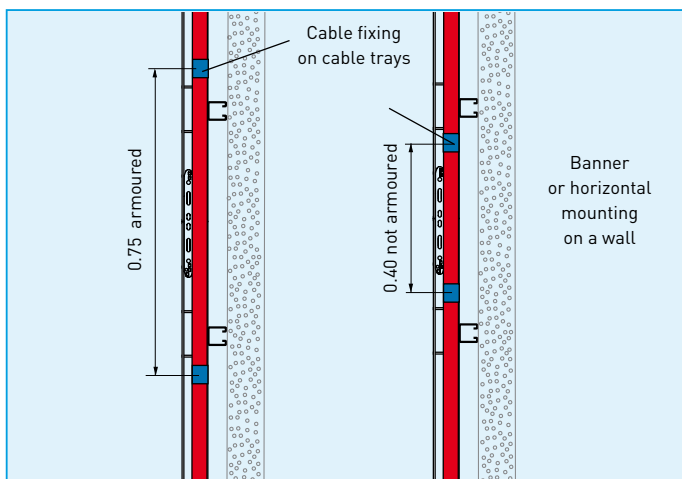
If the strands of the communication cable are not correctly installed, deformation across each transverse wire could occur with time, i.e. every 100 mm.

This deformation will impede the quality of the signal carried by the cables.

That is why it is recommended (UTE 15-520) to unwind the cables and not to pull them or twist them, not to add any additional loading to them, and not to walk on them.

- In banner or horizontal mounting on a wall, the cables should not be damaged by their own weight.

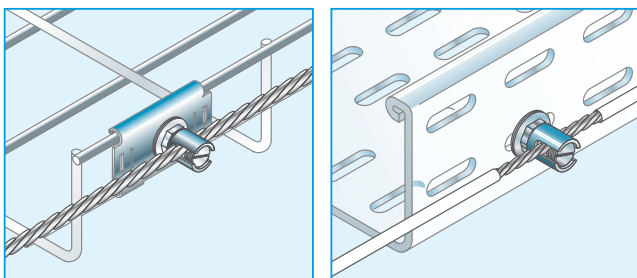
The distance between two fixing points in the cable tray must not be more than 0.4 m for unarmoured cables and 0.75 m for armoured cables.



- In horizontal mounting, fixings are obligatory for power cables in order to avoid being ejected in the event of a short circuit.
- Insulated or bare conductors are not allowed in cable trays (sources: NF C15-100 table 52 B).

C - EQUIPOTENTIALITY

- Connect the tray to the installation frame circuits with care so as to increase the entire network and improve the equipotentiality.

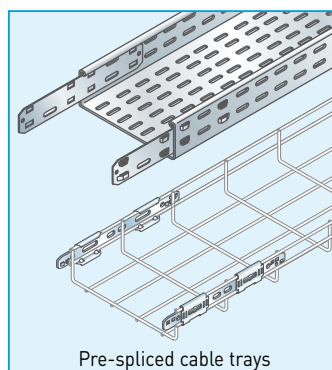
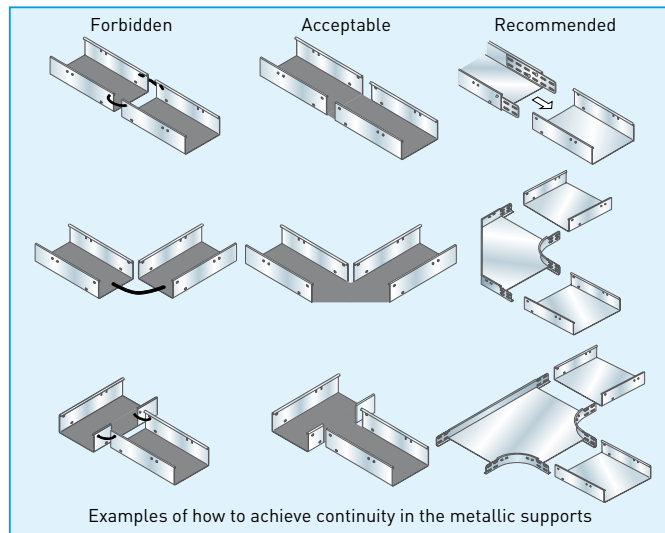


In practice reconnect the tray to the installation frame every 15 to 20 m, or at the extremities of the tray if the length is less than 15 m. (UTE C 15-900 § 6).

This is achieved easily with the 25 à 50 mm² bimetallic terminal from NIEDAX France.

D - ELECTRICAL CONTINUITY

- In France, the metallic cable tray cannot function as a protective conductor or as equipotential bonding (NF C 15100). However, it is recommended in most cases to link this to the installation network.

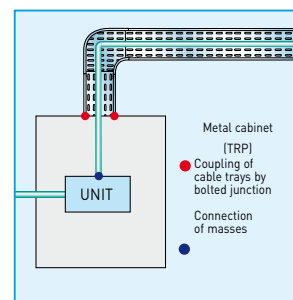


Pre-spliced cable trays

This is achieved by the NIEDAX France connecting elements, whether by bolting or quick clamping in a non-corrosive atmosphere, and which conform to the IEC 61537 standard.

Test results available on request.

When the cables used are shielded, screened or shielded pairs, carefully connect the extremities of the pathway to the cabinets with bolts, as well as connecting the earthing of the cables to the mass of the equipment.



E - EARTHING

Guide UTE C15-520 (§.3)

Following the precautionary principle, it is recommended to provide an earth connection for metallic channelling.

Protection in the event of failure could be:

- Automatic power cut-off
 - Electrical separation
 - By very low SELV or PELV voltage.
- (Sources NF C 15-100 § 4.41).

A - DEFINITION

Electromagnetic compatibility:

The ability of a facility, a device or a system to function in its electromagnetic environment in a satisfactory way, and without itself producing electromagnetic disturbances likely to cause serious problems in the operation of other devices or systems in its environment.

Earth and masses:

- Earth: refers to 0 V potential, formed by the planet surface.
- Earth connection: conductor in direct contact with the earth.
- To achieve an ideal system of earthing and masses, separation of these two networks is recommended:
 - The earth network is connected to the electrical mass, where its role is to ensure protection of individuals.
 - The mass network has a role in countering electromagnetic disturbances and a functional role in the transmission of information.

In practice, as these two networks are generally closely connected, there is a need to find almost total equipotential bonding, strongly augmenting the network.

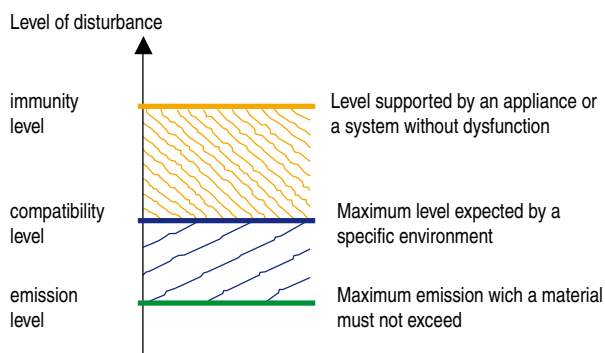
This multiplication of connections compensates the problem of high impedance of the earth conductors, which is connected to the length and the topology of distribution (star tree).

B - LEVELS OF DISTURBANCE IN ECM

Standard IEC 61537 systems of cable trays and cable ladders (§15):

In normal use, the products covered by this standard are passive in relation to electromagnetic influences (emission and immunity).

To help understanding, the different levels of disturbance are defined below, specifically emission and immunity.



C - REDUCING EFFECTS OF CABLE TRAYS

The reducing effects of the metallic cable trays are of two types:

- By contributing to the networking of the masses the cable trays ensure a better equipotentiality of the site. This allows removal of the current induced by the influences of the fields in the cable trays.
- The connection to the mass creates a reductive effect by generating a reactive field in phase opposition, which weakens the original disturbance.

D - CHARACTERISATION OF PRODUCTS IN EMC

There are two very different ways of characterising the products:

- The mitigation of electromagnetic rays in dB, depending on the frequency.
 - The impedance of transfer Ohm, depending on the frequency.
- a) The first characterisation is less pertinent, even though it has the advantage of being easily understood by the client:
- No validated experimental protocol has yet been established for cable trays.
 - Mitigation is the function of a reference, yet there are multiple EMC references (in function of the type of connection, the installation conditions of types of cables, environmental variability, etc.)

• Thus, the results are not repetitive, and are very dependent on the protocol used and on the environment. It would be dangerous to extrapolate the mitigation measurements obtained in an isolated anechoic* chamber to a construction site.

b) Characterisation by transfer impedance is the method used by researchers and cable manufacturers, because, even if it appears less comprehensible, it is more practical.

- Transfer impedance is a parameter which is intrinsic to cable trays, and is not dependant on usage conditions.
- The measurement protocol is known and therefore repetitive and reliable. NIEDAX France uses this method.

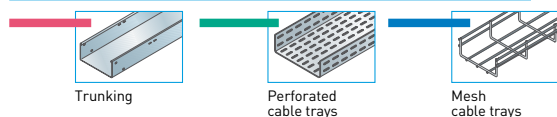
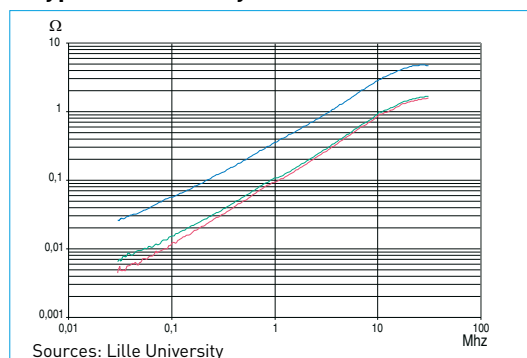
Transfer impedance is the ratio between the voltage that appears between the extremities of the conductor 1 m in length and placed at its centre at a certain support height, and the total current flowing through the support.

Transfer impedance takes account of the advantages presented by the products from an EMC viewpoint. The lower the impedance, the higher the reductive effect of the cable tray.

* anechoic: without echo. In particular, isolation in electromagnetic areas.

E - RESULTS OF MEASUREMENTS

1. Comparison of the transfer impedance of different types of cable trays



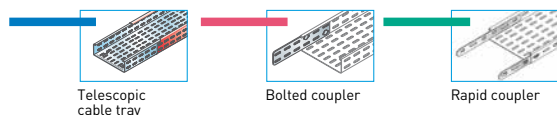
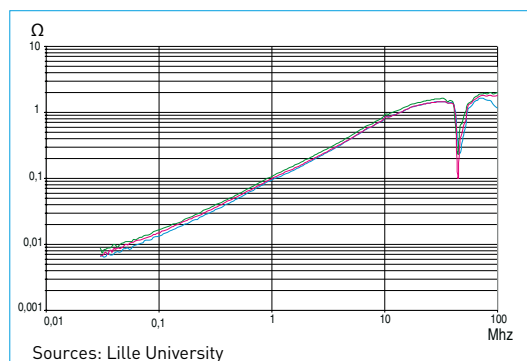
Trunking and perforated cable trays are in first position. There is little difference between them.

In second position are the mesh cable trays, which also provide a degree of protection. The difference between them and a perforated cable tray is the same as the difference between a cable tray with a cover and one without.

Note: By saturating the disruptive signal on a very sensitive cable the performance of mesh and perforated cable trays could be closer. According to widespread belief, if mesh cable trays were to perform just as well as perforated cable trays, it would mean that the braids of shielded cable are just as effective in 50x100 mm meshes as in full screen and very tight mesh.

So there is logically a difference between mesh and cable trays.

2. Comparison of connection modes



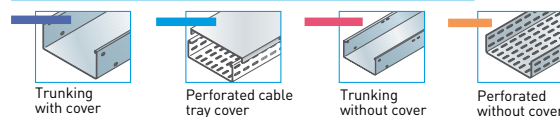
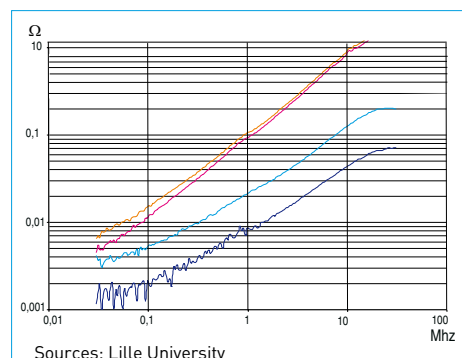
Thanks to its interlocking connection, the telescopic cable tray is slightly better.

If the assembly is carried out correctly, there is very little difference between a bolted couplers and rapid couplers.

Note: If the connections of a type without bolts are placed in a corrosive atmosphere, in the long term there will be a higher risk of a drop in performance compared to a correctly assembled bolted junction.

In this case, we recommend securing the connection with the addition of one bolt (for telescopic trays) or two.

3. Importance of the cover



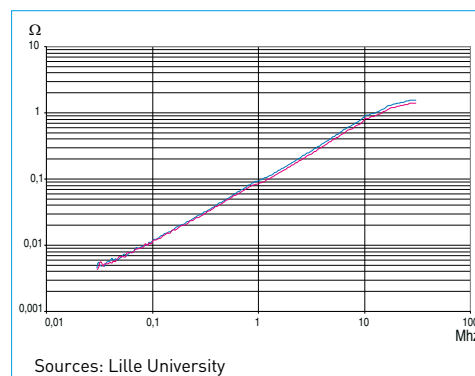
The addition of a cover improves performance, especially for cable trays when trays are at full capacity.

The improvement increases with frequency.

Note: The addition of a cover allows the reduction of transfer impedance by 50% at low frequency and by up to 700% at 30 MHz.

The quality of the assembly is important. There could be a difference of up to 6 dB between a cover which has simply been placed and one which is attached.

4. Effect of thickness



Thickness 1.25 Thickness 0.75

Contrary to widespread misconception, there is no appreciable difference in performance due to the thickness of the cable tray in the range of thickness currently used for these products.

A - SELECTION TABLE

	G Hot-dip continuous galvanised steel	EZ Electrolytic zinc plating and chromating	HDG Hot-dip galvanised steel after fabrication	GM Zinc flake coating	ZM Zinc high corrosion resistance	AL/AG3 Aluminium alloy 5754	SS304L 304 L I.4307 (V2A) Stainless steel X2CrNi 18-9	SS316L 316 L I.4404 (V4A) Stainless steel X2CrNiMo 17-12-2
STANDARDS	NF EN 10 346 BS 2989 ASTM A 653	NF EN ISO 2081 NF EN ISO 2082 NFA 91-472 ASTM B633	NF EN ISO 1461 BS 729 ASTM A 123			NF EN 573 NF EN 485 ASTM B 275 ASTM B 209	NF EN 10088 AISI 304L ASTM A240 DIN 17440	NF EN 10088 AISI 316L ASTM A240 DIN 17440
ATMOSPHERES								
INTERIOR	●	●						
EXTERIOR - URBAN	■	■	●	●	●			
EXTERIOR - INDUSTRIAL			■	●	●	■	■	●
EXTERIOR - MARINE			■	■	■	●	■	●
MINERAL ACIDS			■	■	■	■	■	●
ORGANIC ACIDS			■	■	■	■	■	●
BASES			■	■	■	■	●	■
HALOGENS						■	■	■
HYDROCARBONS			■			●	●	●
ALIMENTARY						●	■	■

● ADVISED ■ POSSIBLE

B - DESCRIPTION
1. Zinc coatings on steel
• SZ : ACIER GALVANISE A CHAUD EN CONTINU :

(under NF EN 10 346 - BS 2989 - ASTM A653)

The galvanised steel plate is obtained by immersing a S220GD or DX51D pre-treated steel plate in a bath of molten zinc at 450-460 °C for a Z100 à Z275 finish.

Contrary to widespread belief, there is no possible corrosion from pieces of metal from trimming or punching a galvanised sheet of usual thickness. IRON protection is ensured by the pile phenomenon which is constituted by the IRON-ZINC ELECTROLYTIC system.

• EZ: ELECTROLYTIC ZINC PLATING AND CHROMATING:

(under NF EN ISO 2081 - NF EN ISO 2082 - NFA 91-472 - I ASTM B633)

A zinc coating is deposited on the steel by an electrolytic method. The baths used consist of acidic or alkaline zinc solutions, the anodes being zinc (generally 99.99% pure) and the parts to be covered, having been previously degreased and stripped, makes contact with the cathode.

After zinc plating the parts are chromated in order to increase their protective capacity.

• GC: HOT-DIP POST GALVANISED STEEL (AFTER MANUFACTURE):

(under NF EN ISO 1461 - BS 729 - ASTM A123)

After surface treatment, the steel is plunged into a bath of molten zinc. This corresponds to a zinc thickness of 49 to 70 µ depending on the thickness of the plate.

Zinc thickness under ISO 1461 (GC)		
thickness mm	min zinc thickness µ	average zinc thickness µ
3 < t < 6	55	70
1,5 < t < 3	45	55
t < 1,5	35	45

• GM: ZINC FLAKE COATING:

Chrome-free coating, equivalent to DACROMET, which it replaces in order to conform to European Directive ROHS (2002/95/GC).

This metallic and non-electrolytic coating ensures the functionality of the parts with a low thickness level. Therefore, it is particularly recommended for bolting hardware. It consists of lamellar zinc and aluminium in a binding mineral, or lamellar zinc and nickel.

It is this intrinsic passivation that gives corrosion resistance superior to that obtained by hot-dip galvanizing - 1000 h with salt spray test.

• ZM: ZINC HIGH CORROSION RESISTANCE

ZM is an electrolytic galvanisation process with a high corrosion-resistant finish, followed by a post-finish filmogenic treatment with nanoparticles of polysilicates, giving a clear, slightly bluish final appearance. Non-chrome coating conforms to the ROHS European Directive (2002/95/GC).

It is suitable for smaller pieces of a length up to 3 m, characterised by hollow sections where the use would be incompatible (due to blockage) with a hot-dip galvanisation treatment after fabrication.

It provides corrosion protection at least identical to GC, for which it could be a substitute. Resistance to salt spray > 1000h without starting red corrosion under 10 µm. The technical sheet and test reports on salt spray are available on request.

2. Other materials

• AL/AG3: ALUMINIUM ALLOY EN AW 5754:

(under NF EN 573 - NF EN 485 - ASTM B275 - ASTM B209)

As with stainless steel, AG3 is protected from external attack by a passive layer of aluminium which forms naturally in the air.

Its corrosion resistance is very good in neutral environments ($4 < \text{pH} < 10$), including a marine atmosphere. Conversely, it is very sensitive to electrolytic corrosion. Complementary anodising treatment reinforces the thickness of the passive alumina layer. This treatment can be carried out on request.

• SS304-304 L STAINLESS STEEL X2CrNi 18-9:

(under NF EN 10088 - AISI 304L - ASTM A240)

Offers good corrosion resistance in natural and food industry atmospheres

• SS316-316 L STAINLESS STEEL X2CrNiMo 17-12-2 :

(under NF EN 10088 - AISI 316L - ASTM A240)

Surface treatments particularly intended for chemical and alimentary atmospheres.

All supplies made by NIEDAX France for materials made in stainless steel are always supplied without deburring, degreasing, stripping, decontamination or passivation.

Supplementary decontamination treatment may be carried out on request.

ZINC LOSSES FROM CORROSION (ISO 14713):

Industrial atmosphere: 0.7 - 2 µ / yr

Urban atmosphere: 0.7 - 2 µ / yr

Marine atmosphere: 4 - 8 µ / yr

Rural atmosphere: 0.1 - 0.7 µ / yr

WHITE RUST AND ZINC COATINGS

Under what conditions do white spots appear?

There needs to be fast oxidation whether under a heterogeneous film of water or under permanent condensation (e.g. from differential aeration).

This oxidation could be local or generalised.

It is the result of precipitation of basic zinc salts [OH]

These basic salts are powdery, not very adherent and non-protective.

However, they combine rapidly with the compounds in the air to form a protective layer of basic zinc carbonate.

The basic salts formed are not very soluble in water and they accumulate in the patina on the surface until a state of equilibrium is reached between their elimination in the form of soluble salts and their generation by metal oxidation.

Thus, white rust has no effect on the lifespan of zinc protection.

3. Other coatings

• EPOXY OR POLYESTER COATINGS

(under ASTM B633)

These coatings are generally applied on continuously galvanised steel sheet (SZ)

- For better protection, a hot-dip galvanised steel after fabrication (GC) could be chosen.

- For requirements which are essentially aesthetic and in the interior of buildings, an epoxy coating on mild steel XC (usually called "black plate") or on SZ could be applied.

Exterior use: Polyester

Interior use: Epoxy

These coatings:

- Differentiate the electrical circuits by their colour, which saves time in the event of intervention.

- Provide supplementary recommended protection in many cases of aggressive chemical atmospheres.

This added double protection on zinc galvanised steel sheets + powder is the only anti-corrosion procedure that gives more than double the protection than if applied separately.

Characteristics: the coating is carried out by electrostatic spray, then baking. Thermosetting powders provide good resistance to abrasion and impact, excellent durability and require little maintenance.

Colours: specify the RAL reference.

Electrolytic corrosion is defined as a process of corrosion that is accelerated as a result of the passage of current between two metals coupled in an environment of electrolysis.

Above the blue line, the coupled metal undergoes no galvanic corrosion and on the contrary, benefits from the effect of galvanic protection.

The most important thing in electrolytic corrosion is the choice of assembly bolting and of certain support accessories different to the cable trays.

* This is sometimes used with galvanised or stainless steel bolts. Galvanised bolts will be subject to electrolytic corrosion in the medium term. In stainless steel, the cable trays will be subject to electrolytic corrosion and so the capability of being disassembled should be ensured. GM lamellar zinc is always recommended.



D - SALINE SPRAY TESTS UNDER ISO 9227

- Tests carried out on BS 48/147-type perforated cable trays
- White rust has no influence for the duration of the life of the coating
- Red rust characterises the type of active corrosion.

	Corrosion	APPEARANCE AT							
		24 H	168 H	240 H	504 H	744 H	984 H	1224 H	1512 H
STRIPPED, PASSIVE 316 L STAINLESS STEEL (SS316)	White	NO	NO	NO	NO	NO	NO	NO	NO
	Red	NO	NO	NO	NO	NO	NO	NO	NO
NON-STRIPPED, NON-PASSIVE 316 L STAINLESS STEEL (SS316)	White	NO	NO	NO	NO	NO	NO	NO	NO
	Red	NO	NO	NO	NO	appearance (1) → stabilisation			
ALUMINIUM (AL)	White	NO	NO	NO	NO	NO	NO	NO	NO
	Red	NO	NO	NO	NO	NO	NO	NO	NO
HOT DIP GALVANISED STEEL (GC)	White	10% of the surface → 70%							
	Red	NO	NO	NO	appearance (1) → 30%				
CONTINUOUS GALVANISED STEEL (G)	White	10% of the surface → 50%							
	Red	NO	NO	appearance (1)	10% → 50%				
CONTINUOUS GALVANISED STEEL + EPOXY 60 at 80 µm (G)	White	NO	NO	appearance → slight					
	Red	NO	NO	NO	appearance (1) → slight (2)				
HOT DIP GALVANISED STEEL + EPOXY 60 at 80 µm (HDG)	White	NO	appearance → slight						
	Red	NO	NO	NO	NO	NO	NO	appearance ⁽¹⁾	stabilisation
HIGH CORROSION RESISTANT ZINC (ZM)	White	NO	appearance → 20%						
	Red	NO	NO	NO	NO	NO	NO	NO	appearance

(1) – appearance at the level of cuts

(2) – at the level of oblong holes due to acidic cleaning before application of epoxy

E - IEC 61537 CLASSIFICATION FOR CORROSION RESISTANCE

Class	Reference - Material and Finish
0 ^a	None
1	Electrolytic plating, minimum thickness 5 µm
2	Electrolytic plating, minimum thickness 12 µm
3	Pre-galvanised with grade 275 of EN 10327 and EN 10326
4	Pre-galvanised with grade 350 of EN 10327 and EN 10326
5	Post-galvanised with zinc plating average (minimum) thickness of 45 µm under ISO 1461 only for zinc thickness
6	Post-galvanised with zinc plating average (minimum) thickness of 55 µm under ISO 1461 only for zinc thickness
7	Post-galvanised with zinc plating average (minimum) thickness of 70 µm under ISO 1461 only for zinc thickness
8	Post-galvanised with zinc plating average (minimum) thickness of 85 µm under ISO 1461 only for zinc thickness (generally steel with high silicone content)
9A	Stainless steel manufactured to ASTM: A 240 / A 240 M - 95a with designation S30400 or grade 1-4301 of EN 10088 subsequent treatment ^b
9B	Stainless steel manufactured to ASTM: A 240 / A 240 M - 95a with designation S31603 or grade 1-4404 of EN 10088 subsequent treatment ^b
9C	Stainless steel manufactured to ASTM: A 240 / A 240 M - 95a with designation S30400 or grade 1-4301 of EN 10088 subsequent treatment ^b
9D	Stainless steel manufactured to ASTM: A 240 / A 240 M - 95a with designation S30400 or grade 1-4301 of EN 10088 subsequent treatment ^b

^a For materials not possessing a declared classification for corrosion resistance..

^b The subsequent treatment process is used to improve protection against corrosion due to the presence of cracking and against contamination by other steels.

F - ALUMINIUM AND STAINLESS STEEL DATA SHEETS
1. ALUMINIUM ALLOY NF EN 573 - NF EN 485
a. Properties

- NIEDAX France designation "AL" (previously AG3). Aluminium alloy 5754 with magnesium

- Analysis %

Si	Fe	Cu	Mn*	Mg	Cr*	Zn	Ti
0,40 max.	0,40	0,10	0,50	3,6	0,10	0,20	0,15

- Physical properties

Specific mass (g/cm³): 2.66.

- Mechanical characteristics and ambient temperature

Index of resistance	Base treatment	Diameter D mm Thickness e mm Section S mm ²	Tensile properties				Metallic state	Bend
			Rm* mini	maxi	Rp 0,2* mini	A5,65 % mini		
Laminate -	recuit	0,4 ≤ e ≤ 1,6	190	240	80	20	O (H111)	0
		1,6 < e < 6	190	240	80	18	O (H111)	1
		1 < e < 12	190	240	70	17	O (H111)	2
		12 < e < 80	190	240	70	17	O (H111)	-
R22	1/4 dur	0,4 < e < 1,6	220	270	130	11	H22-H32	2
		1,6 < e < 3,2	220	270	130	11	H22	3
R24	1/2 dur	0,4 ≤ e ≤ 3,2	240	290	160	8	H24-H34	3
R26	3/4 dur	0,4 ≤ e ≤ 3,2	260	310	190	7	H26-H36	5

* En N/mm²

b. General advantages of aluminium and its alloys

- **Robustness**

There is a tendency to consider aluminium to be a soft metal but some aluminium alloys present mechanical characteristics at least equal to medium-hard steel.

- **Resistance to atmospheric agents**

Aluminium is auto-protected by a thin continuous layer of natural oxide (alumina). As a result, in many applications, it needs practically no supplementary protection, and resists equally well in marine, industrial, or tropical atmospheres, in normal use.

- **Non-toxic**

It is used in the packaging of food products.

- **Decorative aspect**

Ease of implementation and specific surface treatment make it a material of choice for the planner and decorator. It can be given a satin, matt, glossy or even coloured surface.

- **Mechanical characteristics at low temperatures**

Unlike other metals, there is no embrittlement of aluminium or its alloys at low temperatures. The mechanical characteristics remain at least equal to those corresponding to ambient temperatures, and are even improved at temperatures of up to -250°.

- **Non-magnetic**

This quality helps mitigate losses of current and any disruptions of magnetic origin.

- **Thermal and electrical conductivity**

For the same weight, aluminium has a conductivity practically double that of copper. For an equivalent part, the conductivity of hardened aluminium is slightly more than 60% of that of annealed copper.

- **Reflective capacity**

Without any special surface preparation, an aluminium sheet of normal quality reflects 75 to 80% of solar radiation and only allows 10% of received heat to pass through.

As a comparison, a sheet of galvanised steel reflects only 50% of light radiation and lets 40 to 50% of the heat pass through. High purity aluminium, (refined aluminium) and its alloys can be mirror-polished, capable of reflecting 96% of light rays received, even if the surface is protected by hard and transparent anodising.

- **Economic advantages**

- **Easy maintenance**

Aluminium and its alloys have a good resistance to atmospheric agents; no additional protection through painting is necessary in normal use.

- **Light weight**

Some aluminium alloys display the same characteristics as steel, which allows a very significant gain in weight.

2. STAINLESS STEEL X2CRNI 18-9

a. Properties

- NIEDAX France "I2" designation assimilated to SS304L.

- Austenitic type 18-9 with very low carbon content:

SS304L steel is characterised by:

- Its very good resistance to intergranular corrosion which is maintained without subsequent heat treatment after welding or subsequent heat conformation;
- Ease of welding;
- High ductility properties.

It can also acquire a good polish.

- Analysis %

C	Cr	Ni	Mo
0,025 max.	18 - 19	8 mini.	0,2 max.

- Physical properties

Specific mass (kg/dm³): 7.9.

- Mechanical characteristics as delivered
Annealed

Presentation	R N/mm ²	R 0,002 N/mm ² min.	A % min.*	
			e > 3 mm	3 ≤ e ≤ 8
Cold rolled and hot rolled	500-600	205	40	45

* Extension of the rupture is measured on a tensile specimen between two markers of the length l.

l mm = 80 for e < 3 mm

= 5,65 √So for 3 ≤ e ≤ 8 mm

Average value of the Erichsen test on 1 mm plate: 11.5 mm.

b. Characteristics of stainless steel X2CrNi 18-9

- Corrosion resistance

SS304L steel is used in environments where intercrystallite corrosion is not a risk.

In fact, SS304L steel resists intergranular corrosion and satisfies the following sulphuric acid – copper sulphate corrosion tests: standard AFNOR A 05159 sensitivity treatments T1, T2 and T3, ASTM A 262-81 E, EURONORM 114-72, instruction 47 of the INDRET short (R) and normal (N) sensitivity treatments.

SS304L steel is recommended in the following environments:

- Oxidising acids: nitric, phosphoric, sulphuric and nitric acid mixtures, sulphuric acid with copper salts;
- Diluted and cold solutions of most organic acids; NSMC steel is recommended for concentrated and hot solutions;
- Diluted and cold alkaline solutions;
- Alkaline or neutral solutions other than those containing halides (chlorides, fluorides, bromides, iodides).

The indications above are only of a general nature regarding the behaviour of the substance in environments most often free of impurities.

Consequently, they can only serve to guide users for an initial approximation.

- Welding

Low-thickness SS304L steel can be welded by resistance welding, spot welding or by seam welding, arc welding under argon without TIG filler metal or plasma.

In automatic TIG or plasma welding the use of argon containing 5% hydrogen, or argon + helium mixture, will allow a significant increase in welding speed.

3. STAINLESS STEEL X2CRNIMO 17-12-2

a. Properties

- NIEDAX France "I3" designation assimilated to SS316L
- **SS316L steel is characterised for its use in resisting cold corrosion:**
 - Its molybdenum content, which improves corrosion resistance in most acidic environments and in solutions which generate pitting;
 - It's very good resistance to intergranular corrosion, which is maintained without subsequent heat treatment after welding or hot conformation, with respect to its low carbon content
 - Ease of welding;
 - High ductility.
- **For uses at high temperatures it is characterised by:**
 - High creep resistance
 - High resistance to oxidation.

• Analysis %

C	Cr	Ni	Mo	Ti/C+N
0,03 max.	16,75 - 17,50	11 - 11,40	2 - 2,20	0

• Physical properties

Specific mass (kg/dm³): 7.95.

• Mechanical characteristics as delivered

Annealed

Presentation	R N/mm ²	R 0,002 N/mm ² min.	A % min.*	
			e>3 mm	3≤e≤8
Cold rolled and hot rolled	570-720	270	35	40

* Extension of the rupture is measured on a tensile specimen between two markers of the length l.

l mm = 80 for e < 3 mm

= 5,65 √So for 3 ≤ e ≤ 8 mm

Average value of the Erichsen test on 1 mm plate: 11 mm.

b. Characteristics of stainless steel X2CrNiMo 17-12-2

• Corrosion resistance

SS316L steel covers all uses of steel 304 except hot concentrated nitric acid. The addition of molybdenum increases the scope of use. SS316L steel is guaranteed resistant to intergranular corrosion and also satisfies the following corrosion tests in a sulphuric acid – copper sulphate environment: standard AFNOR A 05159 sensitivity tests T1, T2 and T3, ASTM A 262-81 E, EURONORM 114-72, instruction 47 of INDRET short (R) and normal (N) sensitivity treatments.

SS316L Steel is recommended in the following environments:

- Oxidising acids: nitric (304 L is preferred), phosphoric, sulphonitric mixtures;
- "Reductive" acids: sulfuric;
- Organic acids;
- Most organic and pharmaceutical products;
- Food products, including hot: vinegar, mustard, salted products, all fruit juices, white wines, fruit preserves and jam, etc.; to which no taste or colour is transferred;
- Alkaline solutions;
- Saline solutions, even lightly acid, other than those containing halides (chlorides, fluorides, bromides, iodides);

- Hot halogenated alkaline solutions with low concentration and cold brines with ph 8;
- Marine atmospheres: periodic cleaning of the exterior surfaces will maintain the original appearance;
- Cold sea water.

The indications above are only of a general nature regarding the behaviour of the substance in environments that are most often free of impurities.

Consequently, they can only serve to guide users.

• Welding

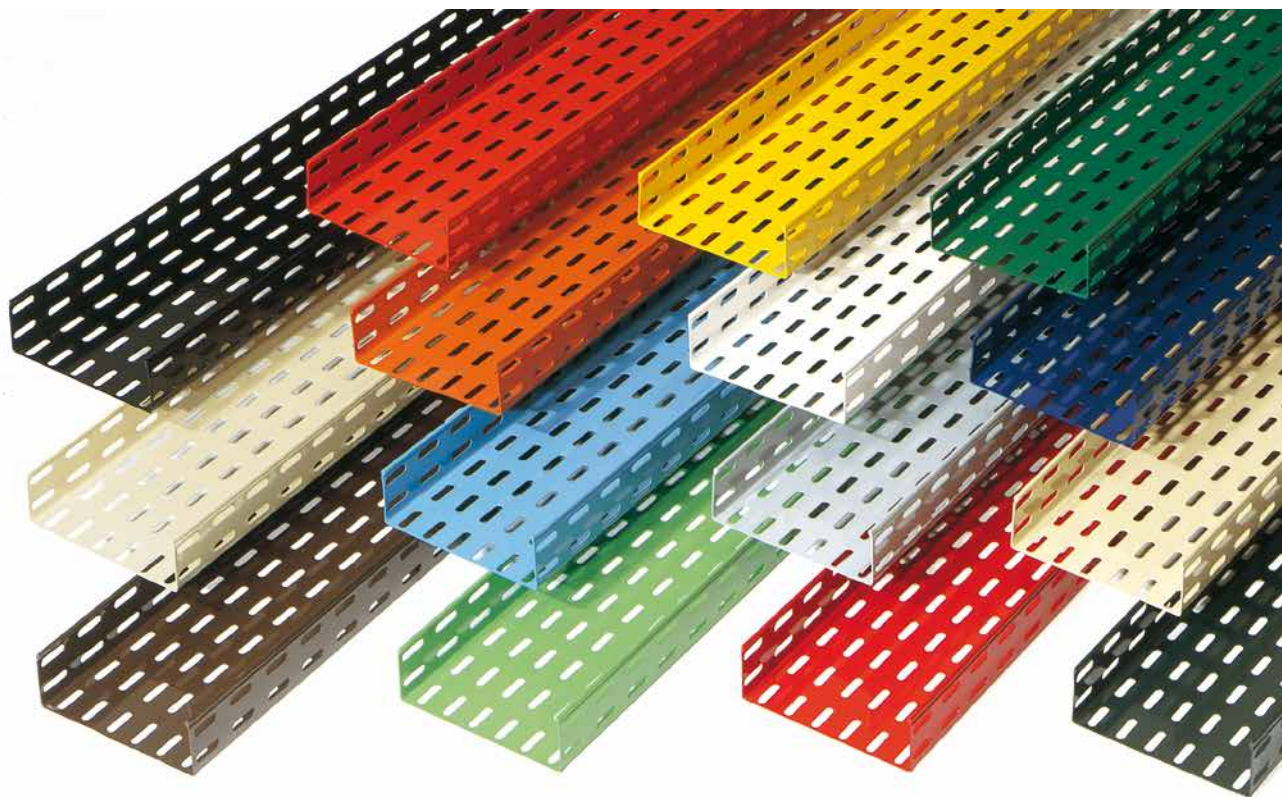
Low-thickness SS316L steel can be welded by resistance welding, spot welding or by seam welding, arc welding under argon without TIG filler metal or plasma.

In automatic TIG or plasma welding the use of argon containing 5% hydrogen, or argon + helium mixture, will allow a significant increase in welding speed.

In MIG welding, a protective atmosphere with argon + 3% carbon gas + 1% hydrogen is advised.

G - THERMOSETTING EPOXY OR POLYESTER RESIN












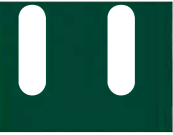
- Epoxy: interior usage. Polyester: exterior usage
- 12 shades available


1. ADVANTAGES

- **An easy way of differentiating electrical circuits in an installation**
- Significant **time saving** in all cases.
- **Guaranteed effective protection against chemical attack:** every cable tray in galvanised sheet metal is covered with a thermosetting epoxy or polyester resin applied by electrostatic powder coating and polymerised by baking.

2. COLOUR CHART

- Non-polluting aerosols available according to the colour chart below:

						
NIEDAX France COLOURS	Ivory N° 1	Yellow N° 7	Orange	Red N° 1	Brown UG 50	White N° 4
RAL COLOURS	RAL 1013	RAL 1003	RAL 2009	RAL 3020	RAL 8014	RAL 9003
RAL COLOURS	RAL 9005	RAL 7004	RAL 5015	RAL 5013	RAL 6024	RAL 6005
NIEDAX France COLOURS	Black 19 satin	Grey N° 1	Blue N° 24	Blue N° 49	Green N° 49	Green N° 6005
						

On all your orders, please specify the reference of the colour chosen.