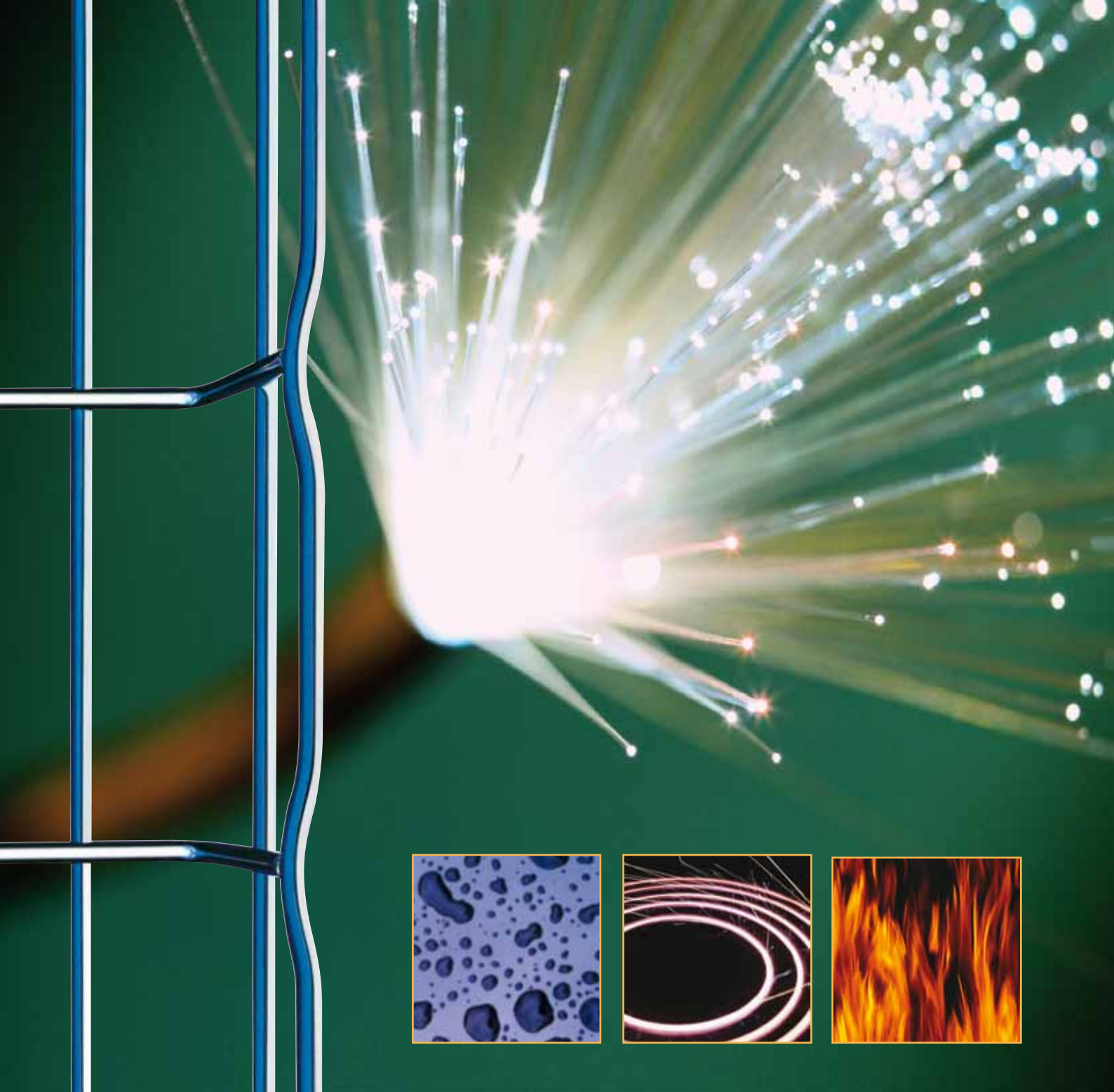


TECHNICAL GUIDE

CABLOFIL®

INNOVATORS IN CABLE MANAGEMENT

TECHNICAL GUIDE



Power



Data



Control Process

CABLOFIL® the global solution

High-quality steel wire cable supports

Unique safety edge

Fast install system

High level mechanical and electrical
performance



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Applications

■ BUILDING SERVICES



- Hospitals
- Shopping centres
- Offices / Hotels
- Data centres / Technology centres
- Museums
- Schools / Universities

■ INFRASTRUCTURE



- Airports
- Stations
- Tunnels
- Bridges
- Stadia
- Telecommunications

■ HEAVY INDUSTRY



- Mines / Quarries
- Steel
- Cement
- Petrochemicals
- Oil and gas
- Energy production

■ PROCESSING INDUSTRIES



- Chemicals / Pharmaceuticals
- Automotive / Equipment
- Glass / Wood / Textiles / Paper
- Food industry
- Water and waste treatment
- Ships / Platforms

Sustainable development

Sustainable development, once the preserve of legislators and governments, has become a fact of life for all stakeholders within society. Today's project managers, whether in an industrial, services or infrastructure context, need to respect the environment and consider the human impact of their actions.

CABLOFIL® is fully aware of these issues and behaves responsibly across all its sites and organisational structures. The company also extends this approach to its partners, with a view to developing a lasting commitment in this area.

■ PRODUCT DESIGN

Health and environment

- 100% recyclable steels
- Improving use of raw materials by 20%
- Reducing carbon footprint associated with manufacturing and transportation
- Ensuring surface treatments comply with the RoHS Directive

■ IMPROVED ENERGY EFFICIENCY

- Continuous improvement of manufacturing processes - ISO 9001
- Improving installation time and energy consumption on-site
- Reducing electricity consumption by improving cable ventilation

■ SITE MANAGEMENT: ISO 14001



- Raising awareness amongst personnel of environmental management at sites
- Reducing noise pollution through the use of sound-proof rooms
- Ensuring more than 50% of industrial waste is recycled, with no use of landfill
- Retaining, filtering and treating fumes
- Controlling water consumption - closed cooling system



Mechanical resistance

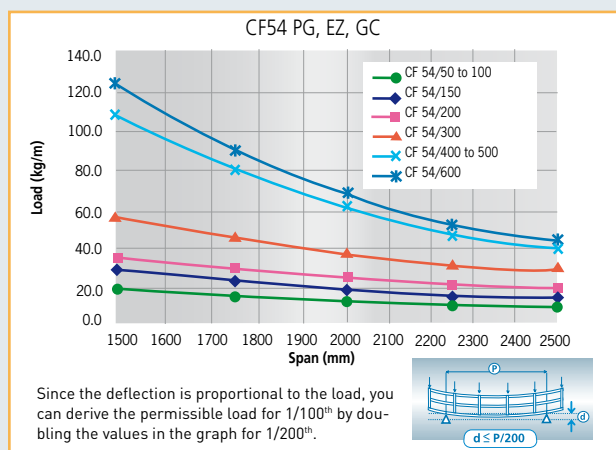
First and foremost, a cable tray must act as an effective, resistant and durable support for cables.

The mechanical performance of all products and accessories is tested against the very demanding requirements imposed by the international standard IEC 61537.

SAFE WORKING LOADS FOR CABLE TRAYS

The permissible load stated in the catalogues represents the load that CABLOFIL is guaranteed to be able to bear. It assumes loads are evenly spread and is given in daN/m.

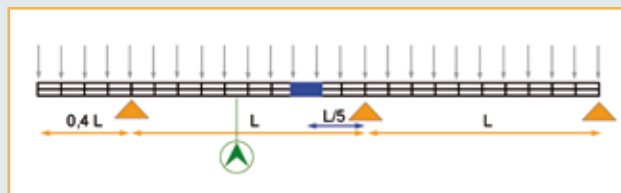
The standard permits a deflection equivalent to $1/100^{\text{th}}$ of the span. CABLOFIL imposes a stricter limit of $1/200^{\text{th}}$ for both safety and aesthetic reasons. For example, CABLOFIL voluntarily restricts deflection to 10 mm for a span of 2 m, whereas the standard would allow 20 mm.



LOAD TESTS: TEST CONFIGURATION ACCORDING TO STANDARD IEC 61537

Each CABLOFIL cable tray has been tested in the required configuration, with a coupling $1/5^{\text{th}}$ of the way along the span. Deflection is measured at the centre of the span. The Safe Working Load (SWL) is the lowest of:

- The load which creates a deflection equal to $1/200^{\text{th}}$ of the span
- The breaking load divided by 1.7 if a deflection of $1/200^{\text{th}}$ is not reached



SAFETY

In the event of critical overload, a mesh structure becomes like a hammock.



CABLOFIL is only designed to support cables. Under no circumstances should it be used as a walkway.



SAFE WORKING LOAD FOR SUPPORTS

Brackets are classified by their permissible load (in daN).

Hangers are classified by their permissible torque (in daN.m).

All CABLOFIL supports are tested and comply with the IEC 61537 standard.

"F" is the load (in daN) applied to the support.

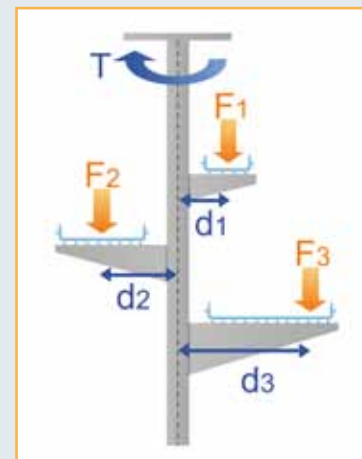
"d" is the distance between the hanger axis and the load.

"T" is the torque (in daN.m) applied to the hanger.

Calculation rules:

Total F = F₁ + F₂ + F₃ < permissible hanger load

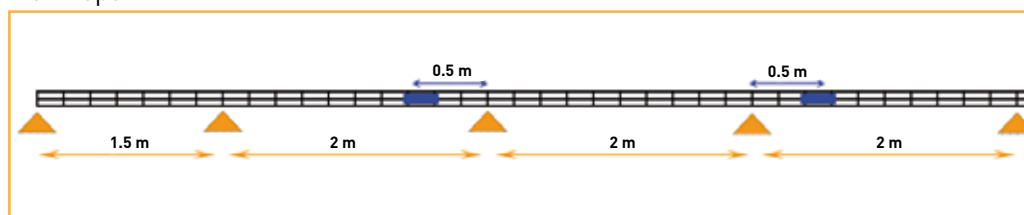
Total T = F₁.d₁ + F₃.d₃ - F₂.d₂ < permissible hanger torque



■ P2000

> **Exclusive to CABLOFIL®: 25% savings with the P2000 (span of 2 m at full capacity).**

By opting for CABLOFIL's 2 m span, up to 25% on material and labour can be saved compared to the conventional 1.5 m span.

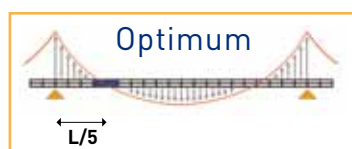


To obtain this result, the first span is deliberately limited to 1.5 metres, then the supports are placed every 2 metres. The couplers are therefore always 0.5 m from a support which is close to the optimum performance of 0.4 m.

The configuration, coupled with the quality and penetration of the welding of the wires, guarantees a span of 2 metres for the leading range of CABLOFIL (CF54 of 50 mm to 500 mm wide).

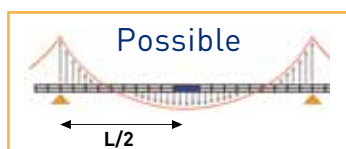
■ POSITIONING OF THE COUPLERS (general scenario applicable to all spans)

To get the best performance from tray, choosing the right couplers is just as important as their positioning. CABLOFIL couplers have been designed and tested to provide high levels of mechanical and electrical performance. To maximise performance, follow the recommendations below:



100% PERFORMANCE

For best results, place the couplers at 1/5th of the way along the span.



70% PERFORMANCE

If the coupling is at L/2, a coefficient of 0.7 should be applied to the permissible load.



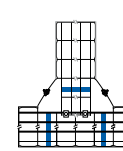
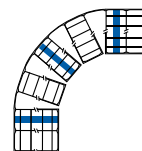
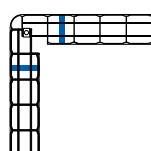
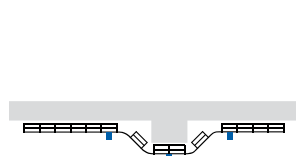
Never put the support under coupler.

■ POSITIONING OF THE SUPPORTS

Changes of level and direction:

Put supports in place before there is any deflection of the cable tray route.

It is recommended to place supports at the start and end of 90° bends. A support must be positioned in the middle of large-radius bends.



Metals and surface treatments

Uncontrolled corrosion is a recurrent problem with all applications involving metals, it may lead to a reduction in the performance and lifetime of the installation.

Cable trays are mainly exposed to atmospheric corrosion. The environment in which the cable trays are installed is therefore the main criteria in the choice of surface treatment, or type of steel.

Atmospheric corrosion affecting metals involves a chemical reaction between the iron found in steel and dioxygen in air or water (condensed moisture, rain or spray). The reaction produces the chemical compound $Fe(OH)_3$, more commonly known as rust.



■ GALVANIC CORROSION

Partner metal Metal involved	Stainless steel	Nickel	Copper	Brass	Tin	Steel	Aluminium	Chromium	Zinc
Stainless steel	0								
Nickel	180	0							
Copper	320	140	0						
Brass	400	220	80	0					
Tin	550	370	230	150	0				
Steel	750	570	430	350	200	0			
Aluminium	840	660	520	440	290	90	0		
Chromium	950	770	630	550	400	200	110	0	
Zinc	1150	970	830	750	600	400	310	200	0

Differences in potential are expressed in millivolts.
Beneath the red line, the metal involved is attacked.

Corrosion is the result of an electrochemical phenomenon caused by a difference in potential between different metals, or between a metal and the impurities within it when they are connected electrically.

It is important to remember this phenomenon if you want to be sure of selecting the best supports, fixings and earthing terminals. This will also ensure that surface treatments are compatible:

Wire cable trays	Accessories
EZ/PG	⇒ EZ/GS
GC	⇒ GC/DC
304L	⇒ 304L & 316L
316L	⇒ 316L

■ COATED STEELS

Galvanic protection of steel is a sacrificial process. Zinc, in contact with an oxidising agent, is converted into zinc hydrocarbonate (white) thus protecting the steel.

○ Recommended ◆ Possible	PG	GS	EZ	GC	DC	304L	316L
Internal installation, normal environment	○	○	○				
External installation, urban environment		◆	◆	○	○		
Chemical industries, nitrate explosives, photography, decoration				◆	◆		○
Marine, harsh, sulphurous (weak concentration) environment				◆	◆		○
Acid or alkaline environments				◆	◆	◆	○
Food production environment						○	○
Halogen environment						◆	○

PG

PG/GS: Continuous galvanisation before manufacture using the Sendzimir process

GS

EN 10244-2: PG standard (wire)

EN 10327: GS standard (accessories)

Before manufacture, a coating of zinc is deposited by continuous immersion on the steel sheets or wires. The appearance of the components is now smooth and grey.

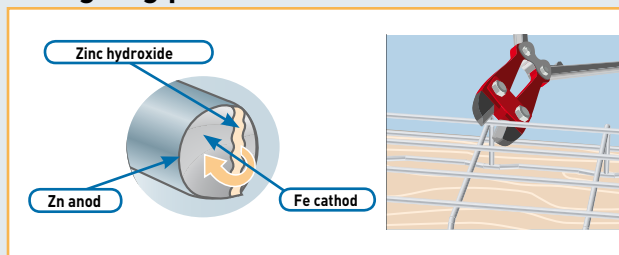
EZ

Electrogalvanising after manufacture

EN 12329 standard

The cable tray, manufactured using untreated steel wire, is pickled and then immersed in an electrolyte containing zinc. Zinc is then deposited on it by passing an electric current. A smooth bluish-grey, fairly glossy appearance is obtained to a greater or lesser extent depending on the pH value of the electrolytic bath used. The colour and level of gloss have no negative or positive effect on the corrosion resistance of the coating.

> Ongoing protection



When a wire cable tray is cut, the fact that a wire has been cut does not affect the level of protection. The jaws of the bolt cutter drags a layer of zinc across the cut end and forms a protective layer.

GC Hot dipped galvanised after manufacture EN ISO 14 61 standard

The cable trays or accessories, manufactured from untreated steel sheet or wire, are degreased and pickled before being immersed in a bath of molten zinc. The entire product is therefore covered with a thick layer of zinc.

A light grey, slightly rough appearance is obtained.

NOTE: Any white marks due to the formation of zinc hydroxycarbonate which might appear on the surface have no influence on the corrosion resistance. This is in fact the very principle on which galvanic protection is based.

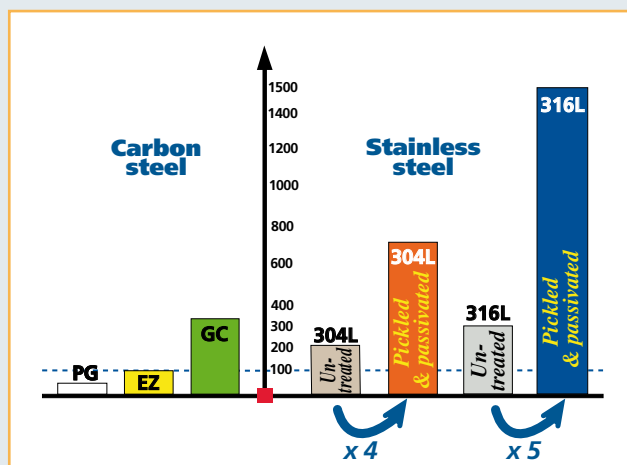
DC Geomet®

Geomet® is a treatment based on zinc and aluminium. As it does not contain any chromium VI (hexavalent), it complies with the RoHS Directive.

Offering protection equivalent to GC, it is used for small accessories and fixings which are difficult to hot dip galvanise.

Epoxy

Resin-based paint is applied to the cable tray using an electrostatic powder and then cured in an oven. The entire range of RAL colours can be obtained. Mainly used for aesthetic reasons and to help identify cable routes, it offers very good corrosion resistance.



Figures for salt spray tests, baseline 100: EZ

STAINLESS STEELS

In particularly harsh environments, selecting the right type of steel is more important than the coating. CABLOFIL uses two austenitic stainless steels, 304 L and 316 L, for their high level of corrosion resistance. This is partly the result of their very low carbon levels ("L" stands for "low carbon").

304L Stainless steel 304 L EN 10088-2 standard AISI 304L – X2CrNi18.09 – 1.4307

Offers good corrosion resistance against soft water, normal environments and food products (except mustard and white wine).

316L Stainless steel 316 L EN 10088-2 standard AISI 316L – X2CrNiMo17.12.2 – 1.4404

Since it contains molybdenum, stainless steel 316L is able to resist intergranular corrosion. This makes it particularly suitable for the chemical and food industries, the nitrate explosives industry and environments containing halogen (fluorine and chlorine).

> Decontamination of stainless steels

There are two key stages for prolonging the service life of the product and, by implication, the installation:

- **Pickling** in acid after degreasing eliminates pollutants.
 - **Passivation** artificially creates a film of chromium oxide on the surface of the steel.
- Corrosion-resistance tests involving salt spray and SO₂ (sulphur dioxide) highlight the importance of these two processes.



Pickling and passivation give CABLOFIL's stainless steel a very light grey colour and a distinctly matt finish.

All CABLOFIL stainless steel products are pickled and passivated.

Food industry safety

Safety in the food processing industry is critical. Production lines must be kept clean. Even the smallest risk of contamination can result in operational losses and have dramatic repercussions for public health and a company's image.

■ HACCP DIRECTIVES

HACCP (Hazard Analysis Critical Control Point) directives set out methods and principles for managing food safety. The entire production process is subjected to a program of detailed and continuous analysis. Each stage of the various processes involved is scrutinised to identify any critical points and eliminate any potential dangers.

■ COMPLETE FOOD SAFETY

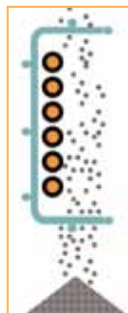
CABLOFIL's structure (90% is completely open), with its smooth rounded wires and T-welded safety edge, minimises the risk of dust and debris settling on surfaces.

Whether installed horizontally or sideways, CABLOFIL's transparency and excellent cable spacing make it easy to inspect the installation and check whether it is clean. Any animal matter or bacterial growth can be identified at an early stage.

Any pollution or unwanted proliferation can be eliminated by blowing, vacuuming or power cleaning. These steps can be taken on a regular basis or after inspections.

Similarly, all CABLOFIL accessories (brackets, spacers, couplers) have been designed with the aim of reducing dust and debris retention.

When installed sideways, Cablofil's structure further reduces the surface area on where dust and debris can settle.



Sideways



On conveyors



On vats and silos



Welded onto machine frames

■ AN ADAPTABLE SYSTEM

Thanks to its wide product range and numerous screwless accessories, CABLOFIL does not require any dedicated tools and quickly adapts to any installation method.

■ PREMIUM SERVICE

CABLOFIL is the world's leading wire cable tray and the preferred cable routing method of the major players in the food industry. It can be delivered quickly and is available either direct from the factory or from distributors.

Specialist engineers offer advice on which products and installation method to choose, and can even help end-users design a specific solution.



■ DURABILITY GUARANTEED

CABLOFIL has two low-carbon stainless steel ranges (304L and 316L). These are pickled and passivated after manufacture, and are easily identified by their ID Tags. These alloys are highly resistant to the corrosion associated with cleaning processes or agents. As a result, CABLOFIL's installations are designed to last longer.



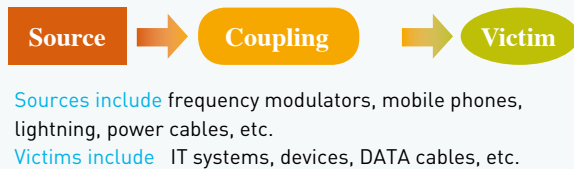
Electromagnetic compatibility

Understanding EMC involves the analysis of electromagnetic pollution between a source of disturbance and its victim.

■ PHENOMENON

Electromagnetic interference is emitted by a source polluting a victim. Electromagnetic interference is transmitted by a process known as coupling. An EMC problem only occurs when the three elements source, coupling and victim are evident. To obtain a good EMC we simply need to eliminate one of the three elements or reduce its effect.

Metallic cable trays with excellent electrical continuity which are integrated into an installation's equipotential earthing network reduce the effects of coupling and therefore improve an electrical installation's EMC.

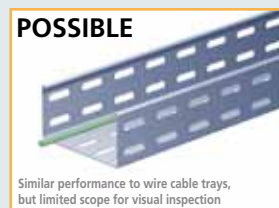


■ THE CABLOFIL® SOLUTION

- Its open structure makes it easy to ensure correct separation by visual inspection.
- Its easy installation and metal structure guarantee excellent electrical continuity in all cases: couplings, bends, level changes, crossing walls, etc.
- Its open structure can reduce crosstalk.

■ EMC TESTS

Tests conducted by the accredited and independent AEMC Mesures and CETIM laboratories demonstrate the performance of CABLOFIL in regard to the EMC of the electrical installation.



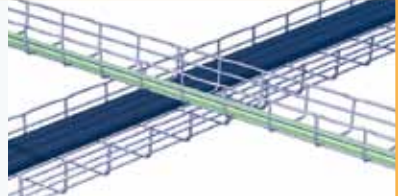
■ THE GOLDEN RULES!

Remember the importance of keeping power and data cables separate.*

(EN 50174-2 standard)



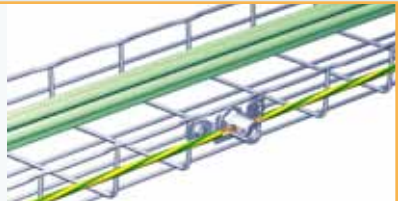
Make sure different cable types cross at right angles.



Make sure electrical continuity is preserved: Use metal cable tray and couplers.



Connect cable trays to the earthing network (every 15-20 m).



** The EN 50174-2 standard specifies how far cables must be kept apart. This depends on the type of data cable, the number of power cables and the type of cable tray. Otherwise, the distance of 20 cm provides a simple and sensible rule of thumb. For precise details, please contact our technical support service.*

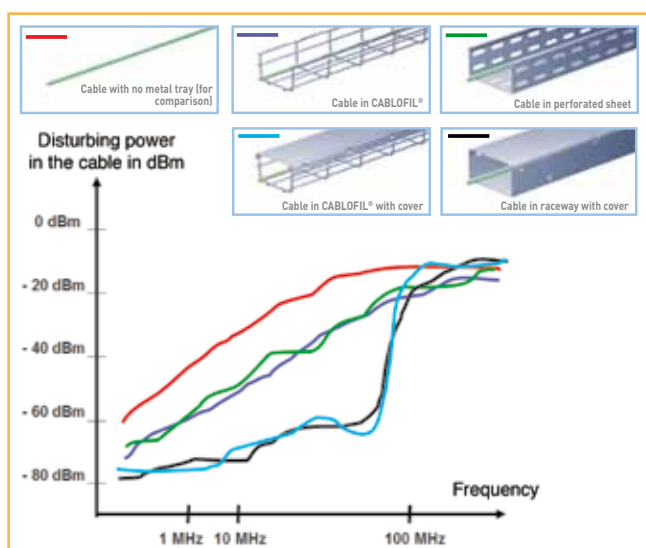
When integrated into the earthing network, CABLOFIL's metallic cable trays help electrical installations achieve excellent EMC levels.

■ CONFIGURATION OF THE 1ST TEST:



Data cable in an external electromagnetic field

A data cable (Category 5e UTP) is placed in an insulated anechoic chamber and subjected to a powerful artificially-generated electromagnetic field in order to simulate electromagnetic interference. Each tray is connected to earth and subjected to the test:



> Results and interpretations

A simple comparison of the measurements for the different cable tray configurations (wire mesh and perforated tray, with and without cover) makes it possible to quantify the role played by the tray in terms of EMC.

These tests show that there is no significant difference in "Faraday cage" effect offered by wire mesh or perforated cable tray.

These results show that it is vital:

- To use metal tray
- To earth the cable tray
- To use a cover if required



Non metallic cable trays (PVC, composite materials) are ineffective against electromagnetic interference.

■ CONFIGURATION OF THE 2ND TEST:

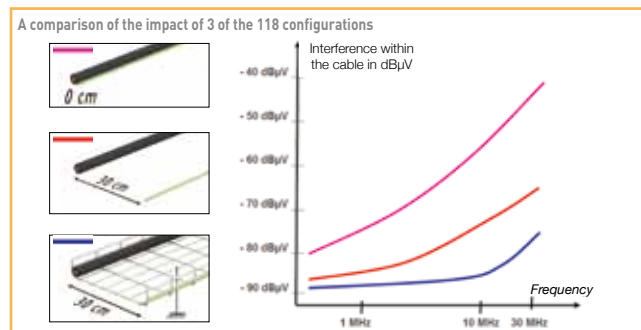
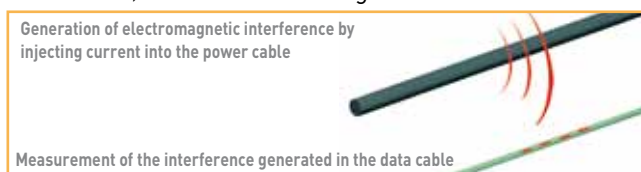


Data cable alongside a power cable

A Category 6 UTP data cable is placed inside an insulated anechoic chamber and subjected to an electromagnetic field generated by a power cable. The following parameters are studied:

- Cable-tray earthing
- Separation distances: 0, 10, 20, 30 cm
- Cable-tray type: wire mesh, perforated tray, trunking
- Separated cable trays
- One cable trays, with and without dividers

As a result, a total of 118 configurations are tested.



> Results and interpretations

This second configuration confirms that metal cable trays reduce interference (wire mesh or perforated tray).

To obtain a good EMC, these results show that it is vital:

- To use metal cable tray
- To earth the cable tray

These tests show the importance of the following criteria:

- To ensure maximum separation distances
- To use two separate cable trays for power and data
- To use a divider if sharing containment systems



Never put power cables and data cables in the same closed compartment.

Electrical continuity

Fundamental to providing safety to people and property, electrical continuity also plays an essential role in the EMC performance of an electrical installation.

■ DEFINITION

The electrical continuity of a system is its ability to conduct electric current. Each system is characterised by its resistance R .

If $R = 0 \Omega$, the system is a perfect conductor.

If R is infinite, the system is a perfect insulator.

The lower the system's resistance, the better its electrical continuity will be.

■ THE IMPORTANCE OF HAVING EXCELLENT ELECTRICAL CONTINUITY

Even at the same electrical potential each part of the cable tray helps dissipate any fault currents:

Guarantee the safety of people and property: avoiding any risk of electrocution.

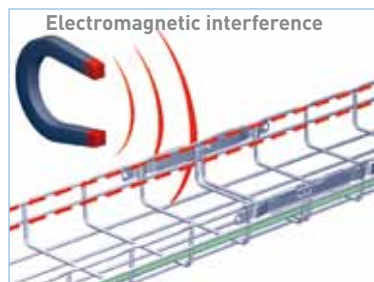
No couplers = DANGER



Couplers = SAFE



Promotes good EMC within an installation: by dissipating noise currents generated by interference.



The metal structure of the cable tray absorbs some of the electromagnetic disturbance and converts it into noise current.

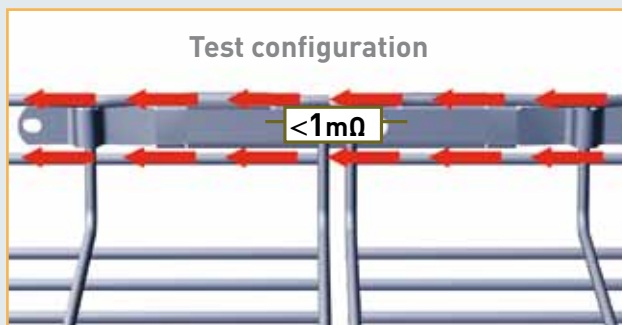
■ TESTED FOR ELECTRICAL CONTINUITY

CABLOFIL trays

Tests show that CABLOFIL more than meets the requirements of the standard IEC 61 537, which stipulates that cable tray resistance must not exceed $5 \text{ m}\Omega/\text{m}$.

CABLOFIL couplers

The standard IEC 61 537 states that coupler resistance must not exceed $50 \text{ m}\Omega$. The test involves running an electric current $\rightarrow$ through the system (cable trays + couplers) and measuring coupler resistance $\square$.



■ TEST RESULTS

An average of $0.82 \text{ m}\Omega$ for CABLOFIL couplers. This is between 50 and 80 times better than the requirements given in the standard.

All CABLOFIL couplers are tested and compliant.

Please contact our technical support service for the full results of these tests.



Please note that epoxy coated metallic cable trays do not conduct electric currents.

Earth network

Earthing⁽¹⁾ an installation is vital for the safety of people and property. Furthermore it plays an active role in EMC.

⁽¹⁾Also referred to as "grounding"

■ DEFINITION

The earth network is made up of all the metallic components of a building that are interconnected. These include beams, conduits, cable trays, the metal frames or devices. All such elements must be interconnected to ensure the earth network is equipotential.

■ BENEFITS OF AN EQUIPOTENTIAL EARTHING NETWORK

The equipotential earth network works like a system of conduits evacuating any fault currents and the parasite currents to earth. This provides a means of:

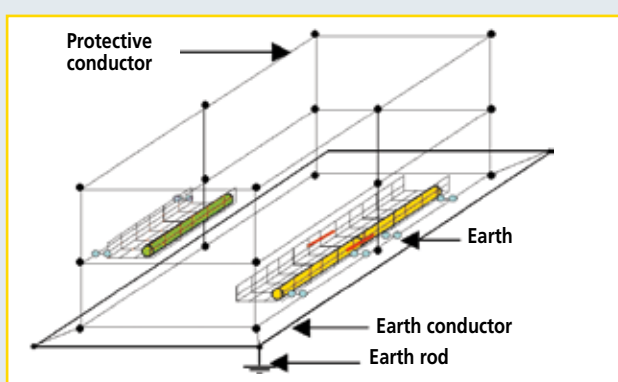
- Protecting people and property
- Obtaining a satisfactory EMC performance level

■ CABLOFIL® INTEGRATED IN THE EARTH NETWORK

In order to benefit from the advantages in terms of safety and EMC, metallic cable trays must be connected to the earth network every 15 m.

Where trays are shorter than 15 m, the ends of each metal cable tray must be connected to earth. Any electrical circuit thus formed by the cable tray must be closed to help remove any fault or noise currents which may arise.

Role of the protective conductor: The protective conductor provides a simple and effective means of connecting the cable tray to earth.



■ DEDICATED ACCESSORIES

First and foremost, the installer must establish the cross section for the protective conductor. CABLOFIL offers a wide range of dedicated accessories:



Grifequip: Simple and cost-effective earthing connector made of tin-plated aluminium. Used for protective conductors with a cross section of between 6 and 35 mm²



Grifequip 2: Easy to install and fitted with a double fastener for protective conductors with a cross section between 6 and 35 mm²



Bimetal terminal: Bimetal connector for safe earthing over a long cable run. Used for protective conductors with a cross section of 16, 35 and 50 mm²



Terminal support + bimetal terminal: For earthing in accordance with the most demanding specifications

Power cables

Electricity transfer generates energy losses in the form of heat. By improving the heat dissipation of power cables, substantial savings can be made. The open structure of CABLOFIL® maximises ventilation and therefore reduces installation and operational costs.

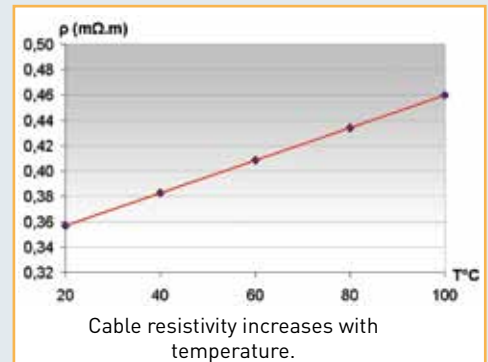
ASSESSMENT

When an electrical current is running, the copper or aluminium cable cores heat up. The heat given off, known as the Joule effect, is caused by the resistivity of the material (its ability to resist the passage of an electric current).

This resistivity increases with temperature. If confined, the heat given off will increase the ambient temperature, thereby increasing both resistivity and resistance. To enable the required current to flow, more power will have to be supplied, with more energy being wasted.

The resistance R of a conductor (cable) is proportional to the resistivity ρ of the material, based on cross section (S) and length (L). $R = \rho \times \frac{L}{S}$

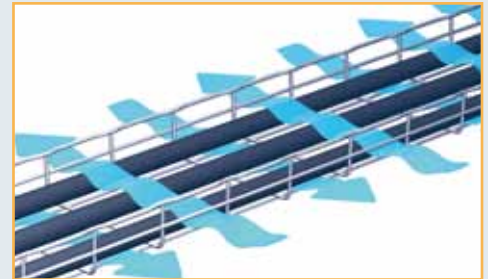
Power P dissipated by the Joule effect: $P = R \times I^2$, where I is the current's intensity.



SOLUTIONS

- Increase the cross section of cables to reduce resistance.
- Ventilate cables to reduce heating.

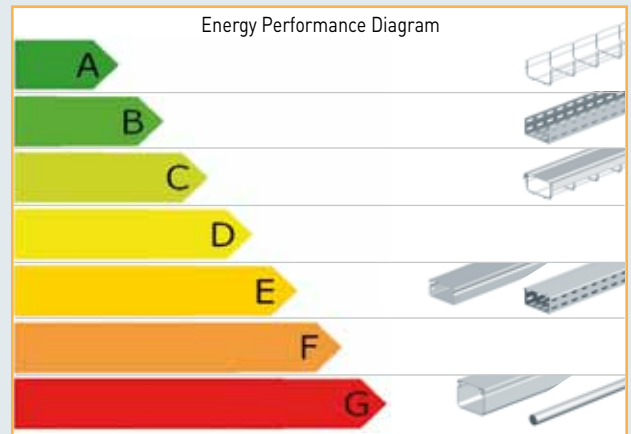
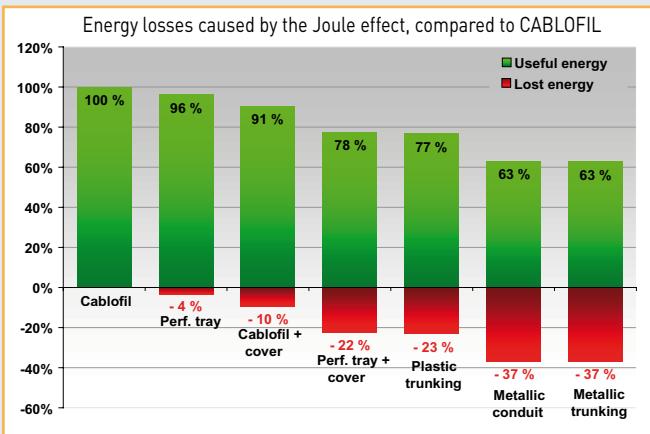
As 90% of its structure is open, CABLOFIL is the closest solution to running a cable in free air and, in many cases, the standards do not make a distinction between the two. The international standard IEC 60 364 offers practical advice on the cross section of the cables to be used, depending on how they are being installed.



ENERGY SAVING EVALUATIONS

The following tests were conducted at Bureau Veritas - LCIE to compare the affect on cable performance by different cable tray systems.

Power cables are fed a steady current. Energy consumption is compared for different configurations. The test results show that consumption differs significantly between open and closed systems. The graph below shows how the choice of system can affect overconsumption of electricity (by as much as 37%).



In spite of the electrical protection equipment of the network, energy transfer will always present risks to people and property. CABLOFIL® is able to manage these risks with its high performance cable supports.

■ SHORT CIRCUITS

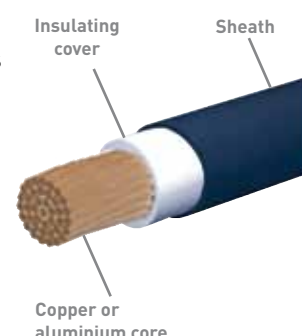
A short circuit occurs when a connection is accidentally established between two points in an electric circuit at different voltages.

It presents a risk to both property and people.

Depending on where it occurs, very large currents may be generated, which will often result in a fire.

The main causes of short circuits are as follows:

- Damage to insulating material as a result of wear and tear or mechanical impact
- Broken conductors
- Conducting elements falling onto or otherwise coming into contact with the circuit



■ SHORT CIRCUIT TESTS

Tests were performed at a recognised independent laboratory (DAMSTRA) and in accordance to standard EN 50 368 (2003) in order to validate CABLOFIL's mechanical resistance to the stress generated by a short circuit.

An initial short circuit is generated during the tests, creating mutual electromagnetic repulsion between the power cables.

The cable tray is then subjected to substantial mechanical stress for a very short time (approx. one second). The process is repeated in order to show that CABLOFIL is structurally intact and able to cope with another short circuit. As a final measure, additional tests are performed in a damp environment to check whether the cables are fully intact.

The various tests are run with 3 successive levels of short-circuit current:

- 70 kA, equivalent to a repulsive force of 1300 daN
- 100 kA, equivalent to a repulsive force of 2700 daN
- 130 kA, equivalent to a repulsive force of 4500 daN



Material used: 3 m of CF105/450, coupling 1/5th of the way along the span, 5 fast couplers and a support span of 1.5 metres.

System configuration: 3 single-conductor power cables, 38 mm in diameter, are attached every 600 mm using cleats.



Before test



During test



After test

■ CONCLUSION

The tests reveal that the wire cable tray shows no permanent deformation, its mesh structure is able to absorb the physical stress generated by a significant short-circuit current.

The cables remain intact in their original positions and network availability is maintained.

Class	Class 1	Class 2
Intensity		
70 kA	✓	✓
100 kA	✓	✓
130 kA	✓	✓

Available video at www.cablofil.com

Efficient DATA cabling

In order to manage data installations and master their complexity, it is necessary to have a high performance cabling system which has the capacity to evolve.

With the relevant standards in mind, CABLOFIL® helps design, organise and arrange a variety of cabling systems, whilst also ensuring system safety.

■ DATA SECURITY AND INTEGRITY

To preserve transmission integrity of a data cable, its sheath needs to be respected as well as the geometry of its section. Similarly, it must only be subjected to limited mechanical stress during installation work.

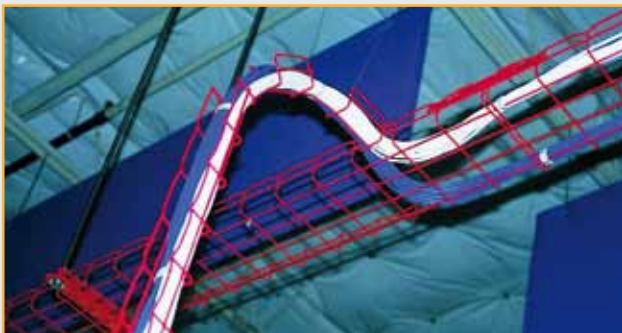


Cables should be placed in, rather than dragged into, the cable tray. Using dedicated accessories (e.g. FAS-ROLLER) combined with CABLOFIL's T-welded safety edge and rounded wires reduces the risk of kinking and tearing.

Whether bundled together or layed flat, the cables should not be tied too tightly, and tools should not be used. CABLOFIL recommends the FASTIE or CABLOGRIP products.

Due to its natural flexibility, CABLOFIL is able to support the bend radius specified by cable manufacturers. The DEV100, cable exit plate, ensures that the bend radius of the cable is respected.

The cable tray's metallic structure and perfect electrical continuity, combined with a high-quality earth network, provides effective defence against electromagnetic interference.



■ MAINTAINING AND DEVELOPING THE INSTALLATION

CABLOFIL's transparency makes it easier to identify, arrange and monitor networks. The available space for adding new cables is easy to see and reach.



The use of identification tags or epoxy coating the trays helps to identify cable routes and enables networks to be upgraded more quickly.

■ COST MANAGEMENT

CABLOFIL's cost effective solutions and quick to install products, can be used in any configuration (false floors, false ceilings and cabinets) and furthermore the adaptability of this open system reduces maintenance costs.



Fibre optic data cables

The development of fibre optics is a direct result of the growing demand for fast data transmission between different terminals. Given its immunity to electromagnetic interference and its characteristics in terms of signal transmission, fibre optics are the ideal support for high-speed data transmission.

■ DEFINITION

The optical fibre is a very thin glass cable transmitting light signals on which digital data is carried.

The transmission factor for fibre optics, expressed in decibels (dB), gives its data-transmission quality.

■ TYPES OF FIBRE OPTIC

> Single-mode fibre optic

The core is very thin and enables light to flow in what is practically a straight line. This type of fibre is frequently used for telecom services, connections over very long distances (several miles) and in backbones (a term used to refer to the "nerve centre" of a high-speed network).



Categories	OS1
Diameter	9/125 µm
Throughput	≥ 10 Gbits/s
Bandwidth	≥ 25 Gbits.km

> Multi-mode, step-index fibre optic



The core is thicker than the cladding. This type of fibre is very effective over short distances, but is not often used.

> Multi-mode, graded-index fibre optic

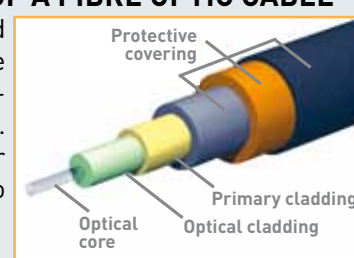


The core and the cladding form successive layers of glass. It is frequently used for medium distances, local networks and the main cable routes inside buildings.

Categories	OM1	OM2	OM3
Diameter	62.5/125 µm	62.5/125 µm, 50/125 µm	50/125 µm
Throughput	100 Mbits/s to 1 Gbit/s	≤ 1 Gbit/s	≤ 10 Gbits/s
Bandwidth for 850 nm	200 MHz.km	500 MHz.km	1500 MHz.km
Bandwidth for 1350 nm	500 MHz.km	500 MHz.km	500 MHz.km

■ COMPONENTS OF A FIBRE OPTIC CABLE

Optical waves spread along the optical core made of silica, melted quartz or plastic. The core diameter ranges from 50 µm to 200 µm.



The optical cladding ensures the optical waves remain in the core. The light ray spreads as it is repeatedly reflected against the barriers formed by the optical cladding.



The protective covering, usually a plastic layer with a thickness of between 25 and 1000 microns, gives the fibre excellent mechanical properties.

■ ADVANTAGES

- Most reliable and secure transmission method
- Very high data transmission speed, up to 100 Gb/s
- Low signal reduction: supports transmission over long distances (multi-mode fibre)
- Immunity against electromagnetic interference
- No electromagnetic radiation
- Discrete, 100% secure link
- Corrosion resistance

Copper data cables

The development of communications cable technology is rapidly changing and the use of high-speed networks is growing exponentially. CABLOFIL® has become accepted as the ideal support for copper communication cables (coaxial cables and twisted pairs).

NEW STANDARDS FOR NEW PERFORMANCE

The category characterises the performance level of a single component, such as a cable, connector or even a lead. For example, a cable will be stamped "Cat. 6" if it passes the tests required for Category 6 approval.

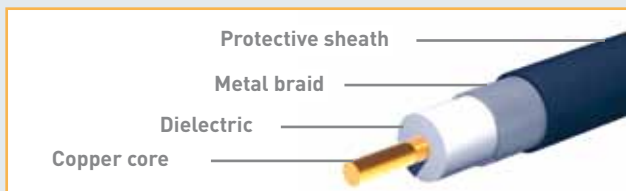
The class characterises the performance level of a combination involving more than one component (e.g. cable + connector). As such, the class defines the performance level of an installation rather than providing information on a component.

Category	Class	Throughput	Frequency
Cat. 5	D	≤ 100 Mbits/s	100 Mhz
Cat. 5e	D	≤ 100 Mbits/s	155 Mhz
Cat. 6	E	≤ 1 Gbit/s	250 Mhz
Cat. 6a	Ea	≤ 10 Gbits/s	500 Mhz
Cat. 7	F	≤ 10 Gbits/s	600 Mhz
Cat. 7a	Fa	≤ 10 Gbits/s	1000 Mhz

When compiling specifications, it is best to specify the desired application class as well as the category of the components to be installed.

COAXIAL CABLE

Low-cost and easy to manipulate, screened coaxial cables are used in data, industrial and instrumentation applications to transmit fast digital signals at low level.



TWISTED PAIR

This type of cable is most commonly used for telephony and data applications in local area networks. The pairs, two intertwined copper wires, are insulated from each other by plastic and enclosed in a sheath.

U/UTP Unshielded Twisted Pair:

Unshielded twisted pairs in an unscreened sheath.

The most widely used around the world and also the cheapest.

F/UTP Foiled Twisted Pair:

Twisted pairs in a screened sheath. Mostly used in France.

S/FTP or S-STP Screened

Shielded Twisted Pair:

Screened twisted pairs in a screened sheath. Mainly used in Germany.



The screening of FTP and SFTP cables will only be effective against electromagnetic interference if both ends are connected to earth.



■ RELIABILITY AND DURABILITY

The two major considerations for the network infrastructures are the reliability and durability of the installation. In order to measure the positive contribution made by CABLOFIL®, even when overloaded with cables, a series of independent tests were carried out.

> Independent tests

The aim is to develop a detailed understanding of the short-term or long-term benefits of using CABLOFIL, as opposed to conventional flat-bottomed supports, for Cat. 5e and Cat. 6 cables. CABLOFIL had its cable trays tested by Intertek Testing Services, a division of ETL, the world's leading provider of testing, inspection and certification services.

> Measurements

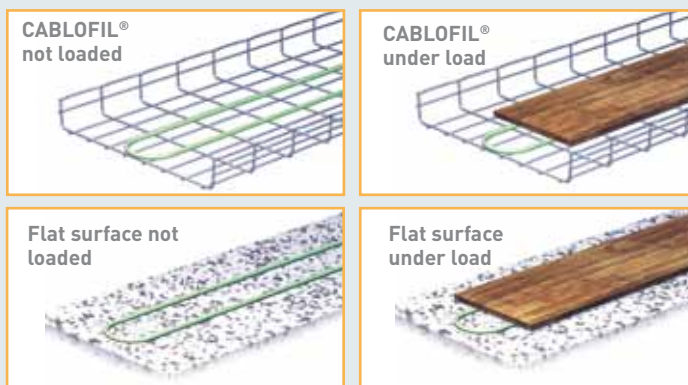
For the two tests described below, parameters relating to cable characteristics (NEXT, FEXT, Attenuation Return Loss, etc.) are measured in different configurations. The main parameter selected for comparison purposes is Return Loss. The aim is to define a cable's impedance regularity. Each irregularity causes the signal to return to its source.

> Test for reliability under load

90 metres of Cat. 5e and Cat. 6 cables are tested with no load, before being subjected to mechanical stress equivalent to the weight of 40 cables stacked together. Measuring and comparing the Return Loss for each configuration determines the effect of the support.

Results:

The tests show that, for a Category 5e or Category 6 cable subjected to a load of 40 cables, there is no significant difference in behaviour between CABLOFIL cable tray and a support with a flat base.



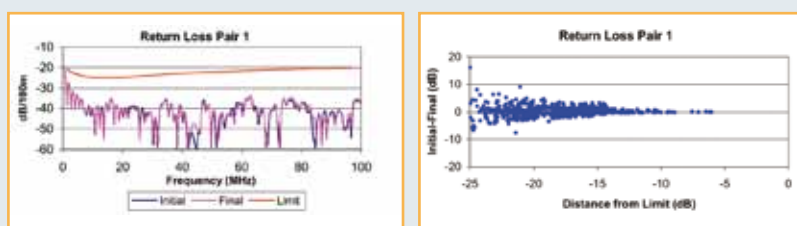
> Test of durability under load

In order to establish how data cable installations change over time, the equipment is subjected to a simulated 15-year aging process based on extremely stringent military standards and the same tests are performed. The cables and supports undergo 200 cycles over large temperature variations (-40°C to +85°C) over a period of 2 weeks.

Results:

The cable supported by CABLOFIL, an open and ventilated system, performs better than a closed system with a flat-bottom which does not allow heat to dissipate.

If you would like more details on these results, please contact our technical support service.



Standards and directives

The manufacture and use of cable trays are subject to strict and precise regulations. CABLOFIL® gives an update on the applicable texts and ensures its products are compliant.

Difference between a directive and a standard

A directive defines the requirements related to the effects of the products on property and people, but it does not explain in direct terms how to comply: this is the function of standards.

■ DIRECTIVES

The following directives apply directly to cable trays:

- The Low Voltage Directive 2006/95/EC, referred to as the "LVD", previously 73/23/EEC
- The 93/68/EEC Directive, referred to as "CE Marking"

> The "LVD" Directive

The Low Voltage Directive (LVD) 2006/95/EC harmonises legislation from individual Member States and covers goods and capital goods to be used within the following voltage ranges:

- 50 to 1000 V for alternating current
- 75 to 1500 V for direct current

> The "CE Marking" Directive

The 93/68/EEC Directive, known as the "CE Marking" Directive, modifies the Low Voltage Directive as far as procedures relating to assessment and conformity marking are concerned.

■ THE RoHS DIRECTIVE

The 2002/95/CE Directive (Restriction of Hazardous Substances), referred to as RoHS, aims to restrict the use of six hazardous substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE)). It came into effect on the 1st of July, 2006.

Although cable trays are exempt from the scope of this directive, CABLOFIL products contain none of the substances targeted by this directive.

> The EMC Directive 89/336/EEC, repealed by the 2004/108/EC Directive

The EMC Directive 2004/108/EC applies exclusively to active components (i.e. those carrying a current or subject to a voltage).

Cable trays, which are by definition passive components, are therefore unaffected by this directive. When correctly connected to the earth network, the metallic cable tray plays a positive role in terms of an installation's EMC.



■ STANDARDS

The IEC 61 537 standard, "Cable tray systems and cable ladder systems for electrotechnical installations", defines the characteristics of cable trays.

> The IEC 61 537 standard

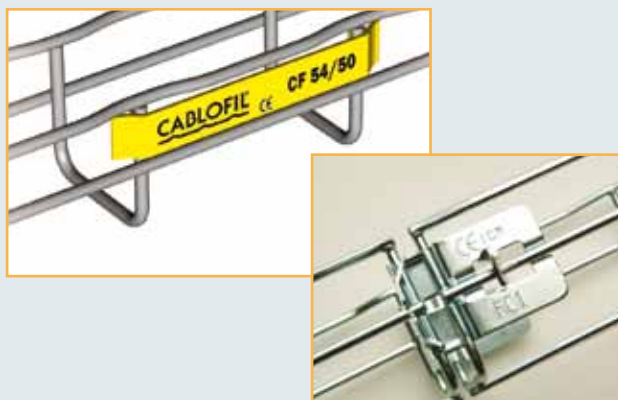
This standard defines configurations for the mechanical tests to be performed on cable trays, brackets, hangers and other accessories. It also specifies the requirements and methods for the electrical continuity tests which cable trays and couplers must meet.



All the mechanical and electrical performance levels of the CABLOFIL® range are tested according to the methods described by this standard.

■ CE MARKING

The IEC 61 537 standard for cable trays is the "product" standard which defines the requirements and tests for cable tray and cable ladder systems. As it is the only harmonised standard at a European level, it is the reference when marking CE on the products, as requested in the LVD.



Currently, all CABLOFIL cable trays and accessories comply with European standards. The products are therefore marked with the **CE** logo.

■ CERTIFICATIONS FOR CABLOFIL®



Fire resistance

Safety is a major concern for everyone, but can only be achieved with knowledge of how electrical equipment behaves in the event of a fire. CABLOFIL® has been successfully tested and proven to meet all fire-safety requirements.

■ STANDARD DIN 4102-12

The German standard serves as a reference. There is still no European standard on fire resistance specifically for cable trays. The German standard specifies that the entire system of cable trays, accessories and cables must be tested in an oven which is at least 3 m long for a period of 30, 60 or 90 minutes at temperatures of up to 1000°C.



Period	Certification
> 30 minutes	E 30
> 60 minutes	E 60
> 90 minutes	E 90

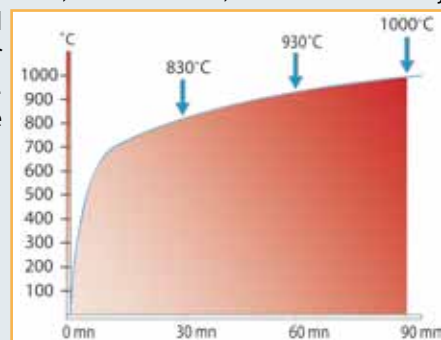
The test aims to verify whether the electrical system is working properly and make sure that sources of critical data (emergency lighting, ventilators, emergency exit, fire alarm, etc.) can resist long enough to provide assistance in the event of a fire.

■ RECOGNISED INDEPENDENT LABORATORIES

The IBMB (Institut für Baustoffe, Massivbau & Brandschutz) and FIRES laboratories are recognised centres for testing and issuing the associated certificates. They ensure that the test conditions described in the standard DIN 4102-12 are observed.

■ TEST CONFIGURATION

CABLOFIL standard products passed the tests without the need to develop an extensive or specific range. The configurations used by CABLOFIL involve wire cable trays with two different spans (1250 mm and 1500 mm) subject to a maximum permissible load of between 2 kg/m and 20 kg/m. The increase in temperature follows the temperature curve (ETK) defined by DIN 4102-12. The E90 test does not in itself validate a wire cable tray, but validates the combination of CABLOFIL with a specific type of cable. This underlines the complexity, as well as the relevance, of these tests, which have already been passed by a number of cable types. Cables are tested in pairs.



The surprising appearance of the cable tray after the test is quite normal. The mechanical properties of the cables and cable tray are impaired but they achieved their objective: to ensure the durability of the installation for a given period.



Before test



During test



After test

CABLOFIL® is certified to E90 for a number of configurations that meet the requirements of data transfer facilities designed to ensure the protection of property and people in the event of a fire. Below are 9 representative samples of the more than 20 configurations tested.

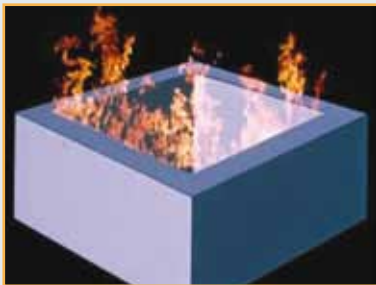
Light duty		
1200 mm 2 kg/m	1200 mm 5 kg/m	1200 mm 5 kg/m
CF54/50	CF54/50	CF30/100
Medium duty		
1250 mm 10 kg/m	1200 mm 1 kg/m to 20 kg/m	1250 mm 10 kg/m
CF54/100 → 200	CF54/50 → 400 CF30/200	CF54/100 → 300
Heavy duty		
1200 mm 1 kg/m to 20 kg/m	1250 mm 10 kg/m	1250 mm 10 kg/m
CF54/300 CF105/400	CF54/150 → 400	CF54/100 → 400

Fire protection

Preventing a fire from spreading not only saves lives but can significantly reduce further damage to property.

Fire prevention is a critical factor in an electrical installation. Specialist designers have the task of making these installations safe and flexible whilst respecting the rules relating to passive protection.

■ FIRE PROTECTION RULES



Compartmentation of different zones

By containing a fire, it prevents the fire from spreading to the rest of a building.



Stop fire from spreading

as a result of gaps in the wall and flammable cable sheaths. Because they extend throughout the entire building, fire can spread easily.



Restore the integrity of compartments

in different zones. After feeding electrical cables through a wall, it is vitally important to restore the integrity of firestop walls using a firestop product that offers at least the same level of protection as the original wall.

■ SOLUTIONS

> Conventional firestops

Made from foam, putty or mortar. The disadvantage of these products is that the caulk has to be destroyed in the event of adding cables. Without guaranteeing the integrity of the wall by rebuilding its compartmentation, it may no longer comply with fire protection requirements.

> EZ-Path firestop device

the innovative system from CABLOFIL.



EZ-Path®

The relentless development of electrical and datacom installations demands readily adaptable firestop solutions. EZ-Path®, the firestop solution from CABLOFIL®, is able to satisfy both the requirements associated with modern buildings and those imposed by fire protection regulations.

■ GUARANTEED FIRE PROTECTION



The EZ-Path firestop module contains pre-installed intumescent foam which reacts spontaneously at 177°C (350°F) or above or when in direct contact with flames. In less than a minute, the foam expands to 16 times its original size, fills any gaps and hardens, thereby sealing the pathway.

The firestop in the wall regains its impermeability and stops the fire from spreading. As a result, property is protected and the building can be safely evacuated.

■ PROTECTION OF PEOPLE



During normal, non-disaster scenarios, the convex shape of the intumescent foam ensures it remains in close contact with the cables, reducing the leakage rate and minimising the spread of cold fumes generated when fires start.

At 177°C and above, the intumescent foam expands rapidly to permanently block the pathway. Toxic gases are unable to pass and lives are saved.

■ MAINTENANCE AND DEVELOPMENT

As soon as EZ-Path is installed and even before the cables are pulled through, the pre-installed intumescent foam within the module guarantees firestop protection. The module remains functional, regardless of how many cables there are running through it.

At any stage of the project, the installer and then the operator can use this flexible cable routing facility to add or remove cables without altering the level of firestop protection at any point.

■ COMPLIANCE GUARANTEED

Tested by the major independent laboratories, the EZ-Path system complies with the applicable standards and has been awarded the relevant certificates.

The shape of the modules ensures there is just the right amount of intumescent material for the number of cables present.

As the system is modular, networks can be kept physically separate and circuits identified.

■ ADDITIONAL FEATURES AND BENEFITS

The modules' convex slats closely mirror the shape of the cables, leaving no visible gap, restrict the leakage rate to 0.5 m³/h and reduce noise pollution by 45 dB.

The particular design used, combined with the finishing plates, give the modules unrivalled aesthetic appeal. The colour used (RAL3001 red) is part of the colour-coded system associated with fire protection.



Convex slats



Attractive design

■ A FAST AND FLEXIBLE SYSTEM



The EZ-Path range offers 3 different sizes of module. Thanks to their innovative accessories, the modules can be installed quickly and easily without the need of any specialist tools or qualifications.

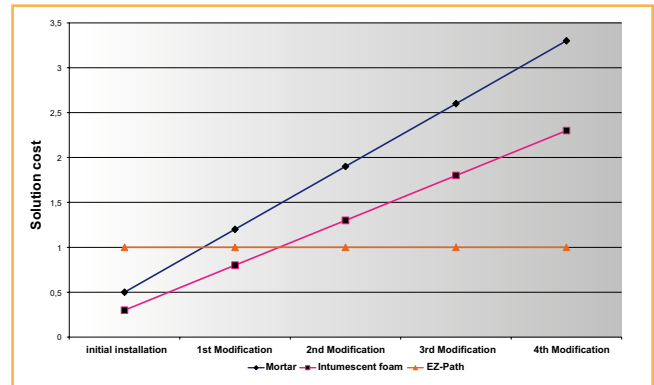


Its versatility means the system can adapt to any type of opening, including concrete walls and floors, or dry wall. Extensions are available for thicker walls.

Modules can be removed and opened up to facilitate installation around any cables already in place.



■ COST MANAGEMENT



The EZ-Path system is by far and away the most cost-effective investment you could ever make in terms of firestop solutions.

EZ-Path® is easy to install without the need for an expert. During maintenance work, cables can be added or removed as required without causing any damage or creating debris.

There is no need to restore the original level of firestop protection because it is never affected in the first place. From the moment the first maintenance work is carried out, the return on your investment is never in doubt.

STANDARDS AND CERTIFICATIONS

Tested by independent laboratories, the efficiency of EZ-Path firestop modules satisfies the requirements of the numerous standards.

> Standard applications

Definition

A product's firestop level is determined by the lower of the values relating to:

- Integrity (E), expressed in minutes, is how long it can prevent a flame from spreading
- Insulation (I), expressed in minutes, is how long it can limit the increase in temperature to 180°C

Aim

To establish the level of firestop protection for EZ-Path modules.



Procedure

- Build a test wall within an oven.
- Insert modules in accordance with the configurations required.
- Simulate a fire by increasing the temperature in line with a curve defined by the standard.
- Check the insulation (I) by measuring the temperature on the unexposed side.
- Visually inspect integrity (E).

Example: A product that is able to withstand a period of 2 hours will be classed as EI120.

> Results of each standard

Zone	Standard	Class
Europe	EN1366-3	EI120
United Kingdom	BS 476: Part 20	EI60
Germany	DIN 4102-9	S90 or EI90
Russia	NPB (НПБ) 237-97	IET90 or EI90
America	ASTM E814 (UL1479)	F rating – 4 h or E240

NB: Differences in class can be explained by the fact that different standards use different procedures.

> Specific marine applications



Metallic partitions in the WFR test wall

Aim

To determine, for shipbuilding applications and in accordance with the international standard IMO Resolution A754 (18), the level of firestop protection of EZ-Path modules installed on a metal partition in a ship.

Procedure

The steps are similar to those for the previous tests, but a metallic wall is used as the test wall. Class (A) defines in minutes the level of firestop protection offered by the partitions in shipbuilding applications as compared to integrity (I).

Results

The tests performed at the WFR (Warrington Fire Research Centre) and validated by Bureau Veritas classify EZ-Path as A60 (deck and bulkhead).

> Noise barrier and leakage rate

The STC rating (Sound Transmission Class) defines the acoustic impermeability of firestop products based on the ASTM E90 standard.

EZ-Path modules have an STC of 45 dB.

The L Rating defines the leakage rate of firestop products based on the ASTM E814 standard.

EZ-Path modules have a leakage rate of 0.5 m³/h.



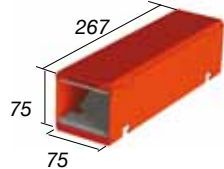
Implementing Ez-Path®

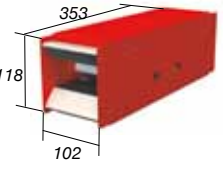
To ensure your firestop installation is a success, simply follow the steps below:

1. Define the type and number of modules in accordance with the number of cables (see table opposite).
2. Identify the type of installation: thin partition, concrete wall, concrete floor, etc.
 - 3.1. Check the existing framework.
 - 3.2. If there is none, select suitable tools for the material involved (saw, crown saw or a diamond coring system) and make an opening.
4. Select finishing plates with the help of the tables below.

HORIZONTAL INSTALLATION

Module 22	Cat. No.	Code	Kit	DRY PARTITIONS □ Sawn framework Ø Coring with crown saw	CONCRETE WALL □ Framework Ø Coring	Cables already in place
	EZDP 22 	250518	Only sold as a kit with a module + 2 plates	□ 45x45 mm Ø 52 mm	□ 45x45 mm	✗

Module 33	Number of modules	Installation	Plates* and accessories	Code	DRY PARTITIONS □ Sawn framework Ø Coring with crown saw	CONCRETE WALL □ Framework Ø Coring	Cables already in place
 EZD 33 Code: 250018 	1		 EZP133R	250210	□ 80x80 mm Ø 102 mm	□ 80x80 mm Ø 102 mm	✓
	1		 EZP133CW	250240	□ 80x80 mm Ø 102 mm	□ 80x80 mm Ø 102 mm	✗
	1		 EZP133W	250110	□ 80x80 mm	✗	✗
	2		 EZP233W	250120	□ 80x155 mm	✗	✗
	3		 EZP333W	250130	□ 80x230 mm	✗	✗
	4		 EZP433W	250140	□ 80x305 mm	✗	✗
	7		 EZP733W	250170	□ 80x535 mm	✗	✗
	1		 EZD33E	250078			
	1		 RCM33E	250206			

Module 44	Number of modules	Installation	Plates*	Code	DRY PARTITIONS □ Sawn framework Ø Coring with crown saw	CONCRETE WALL □ Framework Ø Coring	Cables already in place
 EZD 44 Code: 250058 	1		 EZP144W	250230	□ 120x105 mm Ø 152 mm	□ 120x105 mm Ø 152 mm	✗
	1 to 5		 EZP544W	250250	□ 120x105 mm □ 120x206 mm □ 120x308 mm □ 120x410 mm □ 120x511 mm	✗	✓

* Plates sold in pairs

■ MAXIMUM MODULE CAPACITY

	Ø of cables (mm)																		
	3.5	4.5	5.5	6	7.5	8	10	14	16	18	21	22	24	26	29	32	38	48	60
Modules	Maximum number of cables																		
EZDP22	58	30	20	17	11	10	6	3											
EZD33	280	140	99	75	51	45	29	12	10	6	5	5	4	3	1	1			
EZD44	654	331	224	178	127	107	73	33	23	19	13	11	9	7	6	4	3	2	1

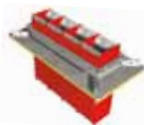
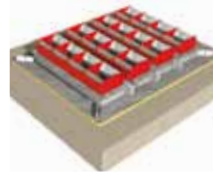
The table above provides an estimate of the maximum number of cables that each module can accommodate.

* Within the context of renovation work, if cables are already in place in the duct, modules can be caulked directly into the wall.

■ VERTICAL INSTALLATION

Module	Code	Installation	Number of modules	Plates*	Code	FLOOR □ Framework - Ø Coring
 EZD 33	250018		1	 EZP133K	250220	□ 80x80 mm Ø 102 mm

Module	Code	Installation	Number of modules	Plates*	Code	FLOOR □ Framework - Ø Coring
 EZD 44	250058		1	 EZP144F	250260	□ 120x105 mm Ø 152 mm

KIT	Code	Installation	Number of modules	Plates*	Code	FLOOR □ Framework
EZDG 444	250098			4 modules + 1 plate		□ 150x450 mm
 EZD 444 MB	250088		4 or 8	 EZG844	250280	□ 300x450 mm
			4, 8, 12 or 16	 EZG1644	250290	□ 610x450 mm

* Plates sold separately

Framework: A frame or structure for various types of opening (doors, windows, pipes, etc.). These are put in place as part of a building's main construction work and may take the form of polystyrene blocks or wooden frames.

Coring: A procedure for cutting out a test specimen from an area undergoing work. A diamond crown is generally used for this procedure.

References

■ SELECTED REFERENCES

> Service sector

Manchester Royal Infirmary – England
 IKEA, Auchan, HSBC, BNP Paribas
 World Trade Center, Brussels – Belgium
 Dell Call Center, Edmonton – Canada
 Sheraton Hotel, Burj Dubai Tower
 Saint Louis University – USA

> Heavy industry

Black Thunder coal mine – USA
 Wolverine Tubes factory – Canada
 Cemex factory, Italcementi
 Lukoil – Russia
 Noble Drilling Services – Singapore
 Meridien Solar Energy Park, Siemens Wind Power

■ IN CABLOFIL® THEY TRUST

Heathrow Airport, England, Terminal 5 (T5)

Terminal 5, which houses all of British Airways operations, has three satellites. These required more than 500 km of CABLOFIL cable trays to be installed from the public areas, technical areas, baggage conveyance areas and underground rail tunnels.

"Continuous improvements in quality can only be achieved if we are prepared to try new approaches. We will always use those products which create the most value for the customer", says Ron Haldane, who is responsible for quality assurance and continuous improvement at Amec Building and Facilities Services.



> Infrastructure

T2, Mexico DF Airport - Mexico
 Rome Train Station - Italy
 Underground rail tunnels, Sydney - Australia
 Zhivopisny Bridge, Moscow – Russia
 King's Dock Arena, Liverpool – England
 Deutsche Telekom, Telmex

> Processing industries

Bayer Healthcare, Sanofi Aventis
 Ford/Magna Corp, Bombardier Transportation
 Nestlé, Danone, Unilever, Masterfoods
 Chantiers de l'Atlantique – France
 Gdansk shipyard – Poland
 MT MembraTec – Denmark

Manufacturing and distribution centre, Nestlé Nespresso S.A.

Special coffee calls for special equipment! On the outskirts of the town of Avenches, Nestlé Nespresso (...) has built a completely new production centre with a logistics platform (...). CABLOFIL is involved in the venture.

"CABLOFIL won me over. It is quick and easy to install. Amongst other things, I particularly like the smaller installation accessories and the hangers. The ergonomics are great. As everything comes down to time, the product satisfies all concerned. Installers appreciate its simplicity and managers love the speed with which it can be implemented", explains Jacques Scharwatt, who is responsible for electrotechnical implementation at the Nespresso site.

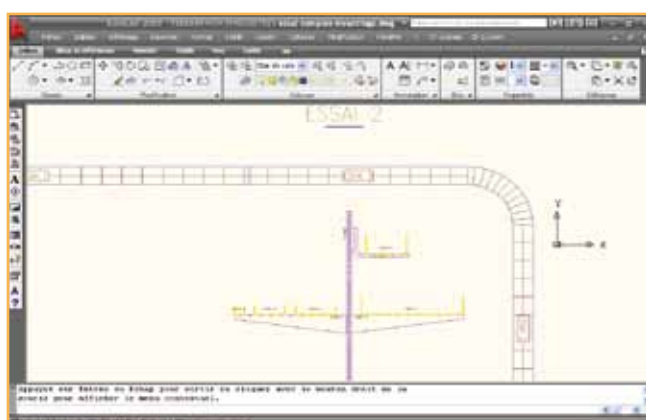
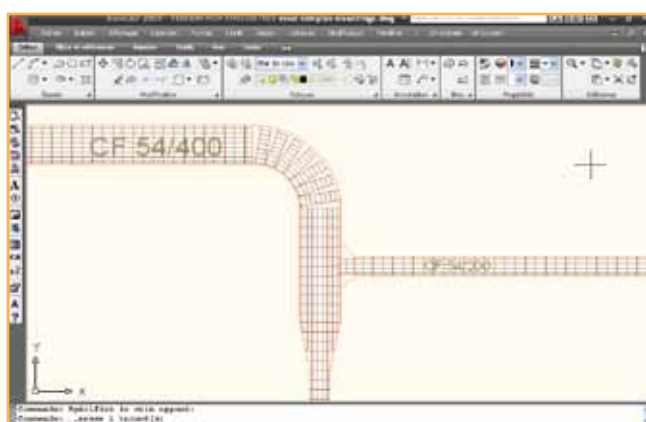


Decision-making software

CABLOFIL® has developed 3 types of decision-making software to guide users throughout every stage of the process, from design through the creation of the bills of material.

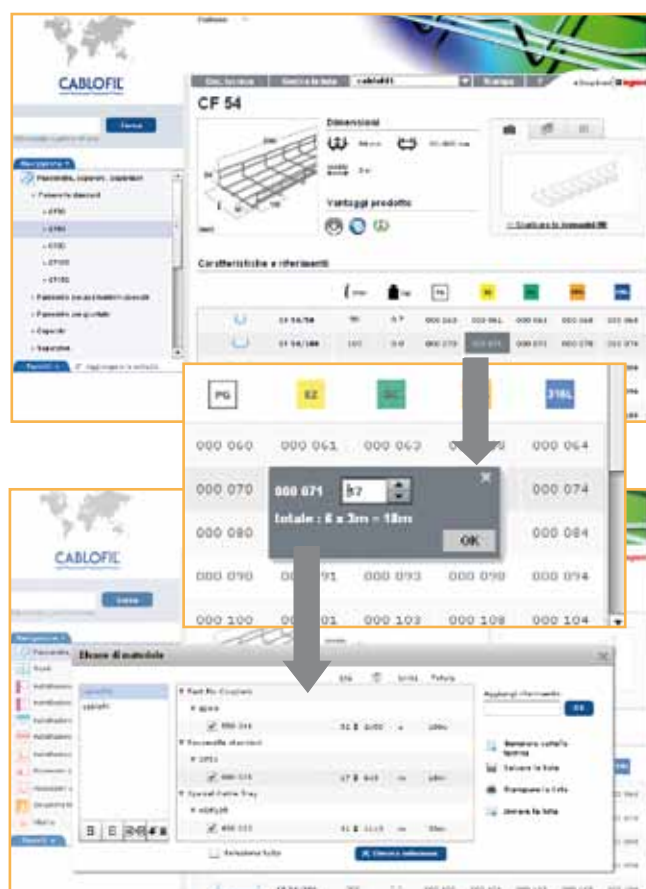
- **CABLOSOFT**: to recommend a solution
- **CABLOCAD**: to help design installations
- **E-CATALOGUE**: to put together a technical specification and generate a request for quotation

■ **CABLOCAD** is a plug-in for all versions of AUTOCAD®. It is a comprehensive resource containing all the CABLOFIL solutions and can be used to create a picture of the cable routing solution along with detailed information. It also has the facility to integrate this solution into the wider design of the building and generates a detailed list of the products required (including quantities).



■ **CABLOSOFT** software makes recommendations to help ensure the right products are chosen and get the most out of them in terms of the cable routes at hand and the associated technical demands. It generates a full list of products to be used for each section of the cable routes.

■ **E-CATALOGUE** brings together all the products and gives all the technical information required. Once the products have been selected and the quantities specified, a technical specification is automatically generated, along with a quantitative description, which can be sent off for quotation.



All of our softwares can be downloaded for free from www.cablofil.com

Please note! Not all steel wire cable trays are the same. The mechanical and electrical characteristics, tests, certifications, overall quality management aspects and recommendations referred to in this technical guide are relevant to CABLOFIL® only and cannot, under any circumstances, be applied to other similar or imitation products.

Specifications for power and data cable supports

Welded steel wire cable trays shall comply with the description and performance levels described below.

■ DESCRIPTION

- Cable trays shall be manufactured from steel wires, welded together and bent into final shape.
- All cable trays, except the 30x50, shall be manufactured with a longitudinal 'T-welded' safety edge.
- Trays shall be constructed with a 50 mm x 100 mm mesh configuration.
- The internal dimensions of the cable trays shall be:
 - Internal heights of 30 mm, 54 mm, 105 mm and 150 mm
 - Internal widths of 50 mm, 100 mm, 150 mm, 200 mm, 300 mm, 400mm, 450 mm, 500 mm and 600 mm for heights of 30 mm and 54 mm
 - Internal widths of 100 mm, 150 mm, 200 mm, 300 mm, 400 mm, 450 mm and 500 mm for heights of 105 mm and 150 mm

Surface treatments for wire cable trays and related accessories

The surface treatment chosen shall depend on the environment wherein the product will be installed.

The positive contribution made by each type of surface treatment and each type of stainless steel shall be demonstrated by means of salt spray tests (SST) performed in accordance with the standard EN 9227:

- Electro zinc plated after manufacture in accordance with the EN standard 12 329: at least 120 h of SST
- Hot dipped galvanised after manufacture in accordance with the standard EN ISO 14 61: at least 360 h of SST
- 304L stainless steel – standard EN 10088-2 – AISI 304L - X2CrNi18.09 - or 316L stainless steel – standard EN 10088-2 – AISI 316L - X2CrNiMo17.12.2 - degreased, pickled and passivated: at least 750 h of SST for 304L and 1000 h of SST for 316L
- In addition, stainless steels must be able to withstand at least 10 cycles (i.e. 10 days or 240 h) of Kesternich SO₂ tests in accordance with DIN 50018.

■ PERFORMANCE LEVELS

Wire cable trays:

- All trays shall be arranged and positioned on the site itself in accordance with the manufacturer's instructions.
- The deflection of the wire cable tray must be no more than 1/200th of the distance between two supports and tested in accordance with the standard IEC 61537.
- Wire cable trays must be designed with an optimum span of 2 m, taking into account the maximum carrying capacity authorised by the manufacturer.
- The positive contribution made by the wire cable tray in terms of reducing electromagnetic interference must be demonstrated by tests performed by COFRAC certified independent laboratories.
- The reliability of the wire cable tray for Category 5e and Category 6 communication cables must be demonstrated by tests performed by an independent laboratory.
- Assemblies with specific fire-resistant properties must have an E30-E90 certificate issued by an approved laboratory in accordance with the tests described in the standard DIN 4102-12.
- The wire cable tray short-circuit resistance must be tested by an independent laboratory.
- The positive contribution made by the wire cable tray in terms of energy consumption must be tested by an independent test laboratory.

Couplers:

- For the purpose of assembling the various wire cable tray, only fast coupling systems or screw-based (CE25/CE30) systems must be used. These must be designed, mechanically tested and supplied by the wire cable tray manufacturer.
- The electrical resistance of the joints must not exceed 50 mΩ and must be tested in accordance with the procedure described in the standard IEC 61537.

Supports:

- Only supports, brackets or hangers designed, mechanically tested and supplied by the wire cable tray manufacturer must be used. The loading capacities of the brackets and the hanger torques must be tested in accordance with the standard IEC 61537.

Earthing:

To enable earthing every 15 m, bimetal terminals or tin-plated aluminium connectors must be used. These must be recommended and tested by the manufacturer.

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Specifications for the firestop caulking of cable pathways

After feeding electrical cables through a wall, the integrity of firestop walls must, without exception, be restored using a firestop product that offers at least the same level of protection as the original walls. Firestop products will comply with the description and performance levels described below.

■ DESCRIPTION

- The firestop product must consist of a metal case, pre-installed intumescent foam and finishing plates. The intumescent part of the product must take the form of two convex foam slats positioned in such a way within the module as to apply constant pressure to the cables, however many there may be.
- The external dimensions of the firestop modules will be:
 - H x W x L: 114 mm x 102 mm x 353 mm
 - H x W x L: 75 mm x 75 mm x 267 mm
 - H x W x L: 37 mm x 37 mm x 267 mm
- It must be possible to open these modules so that they can be mounted on existing installations.
- They must be used on its own or side by side.
- It must be possible to route cables at a later time without affecting the integrity of the firestop installation.
- The module must ensure the electrical continuity of the installation. To this end, it must have a facility for connecting the earthing cable.

■ PERFORMANCE LEVELS

Firestop

- The intumescent part of the product must act as a barrier in the event of fire.
- The product must be certified as a firestop in accordance with the following standards:
 - European standard: EN1366-3
 - German standard: DIN 4102-9
 - British standard: BS 476: Part 20
 - American standard: ASTM E814 (UL1479)
 - Russian standard: NPB (НЛБ) 237-97

■ SPECIFICATION

In order to ensure consistency across firestop installations, the specified product is EZ-Path® sold by CABLOFIL®.

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