

















Company Overview

About Hyperline

CABLING SYSTEMS MANUFACTURING AND DISTRIBUTION

Hyperline is a manufacturer and distributor of the most comprehensive range of products available for Structured Cabling Systems: copper cable, LAN cable, telephone cable, telecommunication cable, fiber optic cable, coaxial cable, interface cable, industrial cable, hybrid cable, AV cable, power cable, patch panels, patch cords, cable assemblies, modular plugs, keystone jacks, cross connect, optical connectors, work area outlets, fiber optic boxes, distribution boxes, cable managers, raised access floor, cabinets, racks and enclosures, control desks, hand tools, testing equipment, wiring accessories, fasteners, cable trays, cable ladders, plastic cable ducts, raceways, conduits.

MULTINATIONAL OPERATIONS

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WHAT WE STAND FOR

Our goal at Hyperline is our customers' satisfaction. We do our best to help you achieve success and make your life easier. We provide the most comprehensive selection of cost-effective cabling products in the industry with incomparable support and service.



COMPETITIVE ADVANTAGES

The main benefits and advantages Hyperline provides are:

- the broadest product range,
- the best prices,
- large inventory,
- free door-to-door shipment throughout the US and Canada,
- no minimum quantity requirement,
- fast response to Quote requests (1 hour),
- fast delivery (in-stock same day shipping/fast turnaround).

MORE BENEFITS AND ADVANTAGES

- exceptional quality,
- excellent service,
- highest level of customer support,
- we do our best to consult with you and help you solve your problem,
- we offer no-cost assistance and training by phone and email,
- we will provide you with free training on products and installation techniques in our offices,
- we can make your IT infrastructure more cost-effective and efficient,
- compatibility with other systems,
- custom orders are no problem,
- consistency,
- innovative technology,
- our systems are designed for the most demanding applications,
- our cabling solutions cover the widest range of applications for many industries,
- we can find the solution to every unique cabling problem,
- permanent development of the product range,
- performance,
- our products meet stringent standards and specifications,
- reliability,
- each product is inspected and tested twice with state-of-the-art testing equipment before shipment,
- many of our products are UL, ETL listed and have 3P certificates,
- many of our products are RoHS compliant,
- we offer long-term performance warranties that provide the peace of mind you require,
- we offer drop shipments.

NO MINIMUM QUANTITY

At Hyperline, we know that you might only need one patch cord to complete your job. That's why we have no minimum quantity requirement on any type of product. Whether you need one piece or millions of pieces, we are at your service.

IN-STOCK SAME DAY SHIPPING

Fast delivery is an essential part of business today. We pride ourselves on shipping almost all in-stock orders received by 4:00 E.S.T the same day.

DROP SHIPMENTS

Hyperline will drop-ship for preferred dealers at no additional charge. All drop shipments are handled in complete confidence.

STANDARDS

Each product is manufactured to the highest quality standards and then tested to ensure that it exceeds the application standards.

COMMITMENT TO CUSTOMER SERVICE

The greatest products and prices in the world would mean nothing without good service. We treat our customers as we want to be treated. We work hard to provide the best customer service and technical support available. Our customers are our partners. Our sales and support staff is thoroughly trained on all of our products as well as the latest technologies and applications. Whether you need help with designing a custom product, troubleshooting or simply need to check a price, our friendly and knowledgeable sales staff is standing by to serve you.

CONTINUOUS IMPROVEMENT. NEW PRODUCT DEVELOPMENT

We are dedicated to continuously finding new ways to improve our products and services that better meet our customers' needs. We are firmly committed to new product development. We monitor the industry closely to develop products that offer innovative solutions to problems and situations.

HYPERLINE® Product Line



HYPERLINE COPPER CABLES

LAN cable, telephone cable, telecommunication cable, coaxial cable, interface cable, industrial cable, hybrid cable, AV cable, power cable.



HYPERLINE LAN CABLES

Copper cable for indoor and outdoor applications of the following categories: 3, 5, 5e, 6, 6A, with frequency range up to 900 MHz, 1200 MHz; UTP (unshielded), FTP (foil shielded), STP (braid shielded); number of pairs available 1 to 100; solid and stranded; with PVC, PE, LSZH, Plenum outer jacket; compliant with CM, CMP, CMR standards; cable suitable for air-laying and for direct burial, armored, self-supported with messenger.



HYPERLINE FIBER OPTIC CABLES

Fiber optic cable for indoor and outdoor applications; number of fibers 1–144, zip-cord (simplex and duplex), single loose tube and multi loose tube, tight buffer, single mode (9/125) and multi mode (50/125, 62.5/125), armored (steel band, wire, dielectric aramid strength yarns) waterproof, self-supported.



HYPERLINE PATCH PANELS

10" and 19" patch panels of category 6 and 5e, shielded and unshielded, wall-mount and rack-mount, with front access, vertical and horizontal termination, for RJ-45 and RJ-12, modular; number of ports from 12 to 96.



HYPERLINE MODULAR PLUGS

Category 6, 5e, 3; RJ-45 (8p8c), RJ-12 (6p6c, 6p4c, 6p2c) and RJ-11 (4p4c, 4p2c); shielded and unshielded, for solid and patch cable, universal, with and without insert.



HYPERLINE OPTICAL CONNECTORS

Connectors: FC, ST, SC, LC, MTRJ for singlemode and multimode cable. Adapters: different combinations of SC, ST, FC, LC, MTRJ, simplex and duplex. Optical patch cords, optical pigtails, optical boxes (19" and wall-mount).



HYPERLINE KEYSTONE JACKS

Category 6, 5e; RJ-45 and RJ-12; shielded, half-shielded and unshielded, for horizontal and vertical termination, toolless and for termination with 110 type tool.



HYPERLINE CROSS CONNECT

Cross Connect Panels of type 110, 66 Krone, BIX, patch plugs, connection and disconnection modules, mounting frames, distribution boxes.



HYPERLINE CABLE MANAGERS

Horizontal and vertical, plastic and metal, with and without cover, single and doublesided, rear cable managers, wall-mount and 19", cable management rings.





HYPERLINE PLASTIC CABLE DUCTS

Trunking and multi-trunking systems for cables and outlet boxes, baseboard and skirting trunking systems, floor and underfloor trunking systems and pedestal service outlets, wiring duct systems and accessories.



HYPERLINE RAISED ACCESS FLOOR

Different types of panels: chipboard, gypsum, steel, glass, aluminum, metal encapsulated. Floor system with jointless surface "Floor and more". Floor coatings: parquet, stone, laminate, linoleum, PVC, carpeting. Pedestals of different height, stringers and profiles.



HYPERLINE HAND TOOLS

UTP/STP strip and cut tools, coaxial and fiber optic stripper tools, crimping tools, impact punch down tool, termination tools, cutters, cable tie installation tools, nippers, screw drivers, pliers, nut drivers, hammers.



HYPERLINE FASTENERS

Chipboard screws, self drilling screws, anchors, hooks, nuts, washers, bolts, screws, drive pins, nails, threads.



HYPERLINE WIRING ACCESSORIES

Cable ties, self-adhesive mounts, saddle type tie mounts, cable clamps and twist locks, cable glands, cable clips with nail, dowels, cable markers and labels, spiral wrapping bands.



HYPERLINE CONDUITS

Corrugated flexible pipes, double wall corrugated pipes, HDPE pipes, PVC cable ducts, rigid pipes, armored conduits.



HYPERLINE WORK AREA OUTLETS

Data, telephone, fiber optic outlets and outlets for TV cable are available. Data outlets: category 6 and 5e, telephone boxes, surface wall mount and flush mount, shielded and unshielded, with 1 to 12 ports; surface mount housings and faceplates, US, European and French standard.



HYPERLINE TESTING EQUIPMENT

Testers, tone generators, multimeters, detectors, interferometers, reflectometer, microscope, power meters.



WIRE MESH CABLE TRAYS AND BASKET TRAYS

Available in different variations: zinc-plated, galvanized and stainless steel. Different widths and lengths; sheet metal perforated; for outdoor and indoor applications.



HYPERLINE CABLE ASSEMBLIES

Fiber optic patch cords: multimode, singlemode, different length and types of connectors: SC, ST, FC, LC, MTRJ, etc; LAN copper patch cords: category 5e and 6, RJ-45 and RJ-12, type 110, crossover, solid and patch, shielded and unshielded, with snagless boot, with long and short plugs of different color and length; AV cables: HDMI & DVI, Component Video, S-Video, Composite Video, F-Type & BNC, RCA Audio, Digital Audio, Pro- Audio; Computer cables: Monitor/Projector, DVI, KVM, Keyboard/ Mouse, Parallel & Serial, USB, Power cords.



HYPERLINE CABINETS AND RACKS

19", 21", 23" data communication enclosures (including server cabinets, telecommunications cabinets, and EMC enclosures and others, floor-standing and wall-mount versions), power and industrial enclosures, customized enclosures, stainless and acid-resistant steel products, outdoor and low-voltage enclosures, dispatch and control desks, climatic control systems for server rooms, open racks, wall brackets etc. Unique CombiRacks and U-Bars system for building telecommunication and server rooms.



CABLE LADDERS

Available in the following types: electrogalvanized, pre-galvanized, hot dip galvanized Zinkpox coated white, stainless steel. Different lengths and widths available. For outdoor and indoor applications.

BICSI

Hyperline is a proud BICSI member (www.bicsi.org). Hyperline participates in the BICSI trade shows as an exhibitor and supports the cabling industry by being an Official Sponsor of the events.



GREAT VARIETY OF APPLICATIONS

Hyperline has the broadest range of solutions for a great variety of commercial, industrial, institutional, hospital, hotel and residential applications in telecommunications, data communications, structured cabling, data centers, equipment protection, data networking, industrial automation, professional audio and video, security and surveillance, broadcast, electronics, telephony, building and construction, electrical, lighting, consumer electronics.

WHOM IS THIS CATALOG DESIGNED FOR?

Communications distribution designers, information transport systems professionals, ITS design consultants, ITS contractors, facility owners and managers, outside plant engineers, communications resellers and VARs, corporate and government communications managers, network designers and administrators, cabling infrastructure installers and technicians, architects and consultants, business owners and managers, general contractors, electrical and lighting contractors, audio-video contractors, systems designers, builders and integrators, sales and marketing managers, project managers, builders, installers, manufacturers, distributors, retailers, channel resellers, computer VARs, IT professionals, mobile installers, custom installers, remodelers and retrofitters, home automation and networking professionals, home integrators, home theater specialists, HVAC specialists, satellite dealers, security and alarm dealers, telco and cable operators, industry rookies.

Hyperline is your total solutions provider in an ever-changing global marketplace

Hyperline will provide you with years of quality performance and satisfaction. Whether you are considering purchasing for the first time or have been with us for years, we appreciate your business and will always work hard to meet your needs.

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Content

About Hyperline	1 1 3
Problems	8 8
Solution	9
Unique features of the Defem system 1 Advantages of the Defem system 1	0 0
Brief technical characteristics of the system	2
Catalog of system components3Wire mesh cable trays.3G-Wire Tray3U-Bar3Mountings.3Fittings4Accessories4Tools.4	4 6 8 9 3 4 7
Fibre Management	8
CombiRack	9
Safe Cable Channelling4Self-Assembly.519" Mid-mount.5Accessories5Shelves 19"5U-bar5Accessories U-bar5Tools.5The Total concept for Tele-and Datacom Technical rooms5Step by step illustrated guide of CombiRack mounting5Examples of CombiRack mounting5	50 2 3 4 5 5 6 6 7 9
Safe Cable Channelling4Self-Assembly.519" Mid-mount.5Accessories5Shelves 19"5U-bar5Accessories U-bar5Accessories U-bar5Tools.5The Total concept for Tele-and Datacom Technical rooms5Step by step illustrated guide of CombiRack mounting5Examples of CombiRack mounting5Application6	0 2 3 4 5 5 6 6 7 9 2

Installation Guide
Standard elements constructed with fittings B1, B2, B376
Construction of standard elements using fitting B27
Application of elements B4, B9, B21 88
Application of Ceiling Fittings 89
Application of Threaded Fittings
Application of U-bars
Mounting accessories
Grounding bar
Case stories
Roval Institute of Technology, Stockholm
CombiRack in Server Room
Defem Wire Tray system in Dublin Port Tunnel
Corrosion classes
Surface treatments
Potential Dalancing
Installation summary
Cable ladders
Suspension components
Cantilever arms, Back plates, Mounting Rails, Profile clamps
Support bracket 3, HSO, -6
Threaded rod M10 W76, Vertical pieces
Pendant/Fixing rails
Ceiling brackets
Round bar fixings, Wall brackets, Ceiling plates 125
Angle/end brackets, Pendant joints/bar, Ceiling mesh tray 126
Joints, Couplings
Details for KHZV, KHZPV
Junction box plates, Installation plates, Cable dividers 129
Covers, Tele-conduit, Fixing tray N for casting-in 129
Cable clamps, Cable rollers
Covers and Accessories
Steel wire system HT
Screw sets
Expansion bolts, Concrete screws
Reference installations

Problems









The problem of "spaghetti"

The absence of three-dimensional cable organization results in cable "spaghetti" – huge bunch of cables, tangled with each other. When this occurs, new cable cannot be laid because it is impossible to pull out "dead" cable from the "spaghetti". Cable trays begin to sag under the load of cables, which results in faulty equipment operation.

Example:

Telephone communications node. Rack with data communication equipment. Cables, connecting cross panels and equipment, are laid on top.

From time to time contact breaks, and the connection between two points is lost. When this happens, it is impossible to find or remove the faulty cable because it is difficult to locate the defective cable within the mass of tangled cables. In such instances, new cable is often laid between the two points, but the old, defective cable is left inside. Over the course of time, this cable "spaghetti" results in 80% of "dead" cables being left in place, while the total quantity of cables increases.

Consequently, cable tray supports cannot carry the increasing load and additional supports must be added, sometimes in the form of something such as common boards. Finally, no space is left under the ceiling because cable bundles are laid on one level.

8

Solution

The Defem System makes it possible to organize cable in trays, which are mounted at different levels.

Multi-level cable tray organization allows you to sort and organize the cable bundles from the very beginning. If it becomes necessary to remove a "dead" cable, it can be easily changed for a new one, because it will not be tangled or buried in a huge cable mass, but conveniently located in a single small bundle.



An example of the Defem system in use at the TeliaSonera, Swedish telecommunication company



Diagram of three-dimensional cable system organization over telecommunication equipment



Diagram of three-dimensional cable system organization under the access floor





An example of three-dimensional cable organization based on the Defem system

The advantages of three-dimensional cable organization based on the Defem system:

1. Flexibility and limitless variations of the system configuration. In complicated mounting conditions, when cable needs to be routed around obstacles, it can ascend or descend from one level to another. The Defem system makes it possible to create different three-dimensional constructions in order to find the best solution.

2. Potential for full system modernization. Using the Defem system allows you to mount new racks, connect old trays with new ones, and make branches that stem from the trays.

3. Three-dimensional cable organization makes it easy to change cables that have become disconnected because they are laid on different levels, thus providing easy access to each cable and the system as a whole.

4. Easy access to the cables. Cables are laid on different levels so they will not cross and become tangled with each other.

Unique features of the Defem system

Defem is a cable organization system which utilizes wire mesh cable trays. Modern cabling systems should not only meet the requirements of today, but also be useful and remain relevant ten years into the future. But what can we expect the demands of the future to be when the world is ever changing...

In the future, equipment can change drastically, a company's activity can be expanded, and the company profile altered considerably. All these changes result in frequent modifications. Therefore it is important that the system be designed to accommodate such changes; that all construction elements, both new and old, be compatible and interchangeable; that the system be easily extended and transformed without any fundamental changes in the original system.

The Defem system meets high quality standards and special requirements for power and weak-current cabling. The Defem system saves materials and the amount of labor required for mounting.



Advantages of the Defem system

ABILITY TO ORGANIZE CABLE IN THREE-DIMENSIONS

The U-bar is used to organize cable in three-dimensions. The utilization of the U-Bar by the Defem system allows you to make complex constructions, mount large amounts of cable trays to the ceiling and the floor, and provides maximum stability and reliability. The construction makes it possible to create a future-compliant environment.

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U-Bar being used as the basic component for the construction of three – dimensional cable organization



Cable equal distribution on cable trays



Easy access to the cables made possible by using the three – dimensional cable tray system



Three – dimensional organization of cable trays allows the "dead" cable to be easily replaced (telecommunication company)



Room for expansion of the Defem system made possible by branching – off from already installed cable trays (industrial plant)





The advantages of three-dimensional cable organization.





UTILIZATION OF SYSTEM ELEMENTS INSTEAD OF RACKS FOR EQUIPMENT MOUNTING

The U-bar is very rigid and can be used even instead of data communication racks. It provides easy access to the equipment, and therefore extends the functional possibilities of the system.



Telecommunication equipment mounted to the U-Bars of the Defem system in the TeliaSonera company (Sweden)



Ingenious application of the U-Bars as supports for system units

CLIPPING AND MARKING

To simplify the running of cables, the Defem system includes a range of products that can be used with a bus system, and also for more traditional runs. These products include clips designed for securing cables, fixing plates for fitting directly to the frame, markers and AS-I clips. In addition to its organizational benefits, the Defem system also includes identification tags that make it easy to distinguish and follow the runs of various cable types through the installation.



Plates used for cable separation



Colored identification tags in use











Cable clips used to fasten round cable to the cable tray



Application of the colored identification tags B40, intended for fastening to 0.19" (5 mm) cable tray



An example of cable tray marking clip B44

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THE USES OF THE RADIUS LIMITER FOR CABLING

The Defem system makes it simple and safe to run coaxial and fiber optic cable with the help of a radius limiter. The radius limiter eliminates the risk of light leakage. Cables can be easily laid, even in filled cable trays, and also routed at any level and at any angle.



An example of cable installation using wire trays



An example of cable installation using a radius limiter- element B34



VERTICAL INSTALLATION OF CABLE TRAYS

In some cases (such as when it is necessary to minimize dust pollution) cable trays can be installed vertically. This helps to solve problems such as those involved in the organization of cable system space and routing the cable to the equipment. Additionally, the vertical installation of cable trays is often cost-effective and adds to the aesthetics of the room.



Vertical tray installation in a large industrial plant



Vertical installation of trays minimizes dust pollution





Vertically installed trays as design elements in an Internet Center



Bent trays



Vertically installed trays facilitate the routing of cable to hard-to-reach equipment

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Vertically installed trays (telecommunication node)



LIGHTING ORGANIZATION

Cable laid in trays provides fast and safe connection of lamps even in hard-to-reach places. The trays' zinc plating looks neat, thus they can be used in exposed mountings in offices. Moreover, they can compose a well-planned industrial design style. While the cable trays are made of wire which has a diameter of 0.19" and 0.23" (5 and 6 mm), it is able to carry a considerable load.



An example of lighting using cable trays



An example of Defem cable trays with lighting in a telecommunication company



Illumination at an industrial plant based on the Defem system



An example of installed lighting devices



An example of cable trays with lighting installed in an industrial plant



An example of Nortys booth design at the light exhibition in Finland





An example of Defem cable trays with lighting in a clothing store



APPLICATION UNDER ACCESS FLOOR

Cable system organization under access floors is used very often because it offers efficient space utilization. Defem cable trays are the ideal solution because they can be mounted to the pedestals of the access floor.

Because the cable trays are easily assembled, they offer fast mounting even under already-installed access floors. This provides additional strength to the construction of the cable path under the floor.







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EASY ASSEMBLY AND INSTALLATION

The main principles of the Defem system, its components, and methods of assembly and installation, are simplicity and safety.

The Defem system is easy to build and conform to the installation environment without the use of hot operations such as welding, or the risk of metal swarf during the installation. Smooth, elegant bends can be formed using just a bolt cutter and ring spanner.



Defem wire tray installation around a beam







Wire tray installation for laying cable over false ceilings in the office of a large telecommunication company







An example of cable trays installed in a conveyer workshop

UNIVERSAL FITTINGS

The universal fittings of the Defem system make it possible to organize a cabling system of any complexity. It offers easy mounting not only to the ceiling and walls, but also to uneven ceilings and metal constructions, such as a conveyor.



Fitting B1 of the Defem system



Combi fitting B21 of the Defem system – used for fastening to cable ladders



Cable trays' parallel installation using joining fitting B24 and fitting B3



Defem system installed to a cabinet roof





Cable tray installation to beam (on the left) and ceiling (on the right) over false ceiling



Oblique T-shape joined using the angled fitting B27



An example of cable trays mounted using bracket B9



Use of corner fitting B65 for U-bar mounting when rack construction is based on the Defem system





Two-level tray mounting over false ceiling



Cable tray mounted to ceiling in a telecommunication company



Tray mounting with the help of ceiling fitting B47

MOUNTING OF ADDITIONAL EQUIPMENT TO THE CABLE TRAY

Grounding telecommunication boxes, distribution boxes, power sockets, lamps and other equipment can be mounted to Defem cable trays because of the wide variety of accessories and fittings. It is especially important to have a wide variety of accessories and fittings when mounting equipment at a large industrial enterprise.





Installation of distribution boxes and industrial high-voltage waterproof sockets with the help of Defem trays at engineering plant



Signaling elements mounted to the cable trays

28



An example of distribution boxes installed using Defem trays at a large industrial plant







A large variety of different equipment that can be mounted to Defem cable trays



CUT COSTS – INCREASE QUALITY

1. Planning is simpler because the Defem system has only a few components, but is highly scalable even for the most difficult project.

2. Supports. Defem Cable trays need supports only every 2 meters. So it allows for using 25% less support materials.

3. With the Defem System, you only need to drill 25% of the time, which decreases the cost and intensity of labor when mounting.

4. Mounting straight sections is carried out faster, because most components can be assembled at floor level. The construction of the fittings and cable trays makes it possible to strengthen already mounted parts. It saves the time and costs of mounting work.

5. Additional costs. With the Defem system, you have the highest possible flexibility and the lowest number of compo-

nents without any additional costs.

6. It takes little time to mount accessories, because they are mounted to the tray without screw fixing but with latching or turning.

7. Lower risk of project delay, because all turns and bends are made on site and require few fixing accessories.

8. Safe Equipotential Bonding. The cable trays of the Defem system are equipotentialy bonded in itself.

9. Extremely low cost of fiber management. Safe bending radius is guaranteed with a radius limiter. The Radius limiter mounts from below. In addition, it is easy to install even after cables are in place.

10. Simple separation system. Makes it possible to separate cables in separate lanes. Adjustable separation plates do not take up space.



Variations of Defem system mounting in telecommunication company







Defem system usage in food industry















Wire trays installation in CBOSS Company



Brief technical characteristics of the system



There are three variations of wire mesh cable tray plating available:

- zinc coated trays for indoor installation

- galvanized trays (tray is put into melted zinc at 896°F (480°C), it means that tray is coated with pure zinc) – used for very humid conditions, mainly for outdoor installation.

- high-grade stainless steel trays are intended for the most aggressive environment, and are used at enterprises with high hygienic requirements.

All stages of manufacturing are automatically controlled. All-around quality control is carried out at the plant. This results in the accurate cutting and welding of wire mesh construction components, called spot welding. The processes





of surface finishing and covering the wires with protective coating are also automatically controlled. This manufacturing is environmentally-friendly.

Defem cable trays meet the special requirements and conditions in the field, have high standards of quality throughout, and are simple to use in new installations, maintenance and upgrading. Therefore, they are much more cost-effective than traditional systems.

Mounting of Defem system is very simple, since the only tools needed are a ring spanner and a bolt cutter.

Unnecessary parts of the tray are removed with the help of a bolt cutter. Then the tray can be easily formed by hand and fixed with special fittings.

Table. Resistance measurements of cable trays with different widths and length of 16.4 ft (5 m) (including fittings)

Width, in (mm)	Zinc plated m Ω /5 m	Hot Dip Galvanized m Ω /5 m	Stainless mΩ/5 m
16.6 (422)	3.63	3.35	16.67
12.6 (320)	4.84	4.46	22.17
8.7 (220)	4.68	5.52	26.20
4.7 (120)	7.22	6.58	34.79
3 (75)	11.43	9.98	50.98

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LOADING CHARTS FOR DEFEM WIRE TRAYS

For evenly loaded tray (maximum load). Free location of joints between supports.





	Material		A, in (mm)	B, in (mm)	C, in (mm)	D, in (mm)	Weight <i>,</i> Ibs (kg)	Pack	Profile
Mini Mesh Length 78.7" (2000 mm)	Zinc Plated Hot Dip Galvanized Stainless/Acid-proof*	11 491 12 11 492 12 11 493 12	1.18 (30) 1.18 (30) 1.18 (30)	0.94 (24) 0.94 (24) 0.94 (24)	0.12 (3) 0.12 (3) 0.12 (3)	0.12 (3) 0.12 (3) 0.12 (3)	0.1 (0.5) 1.2 (0.55) 1.14 (0.52)	1 1 1	0.6" (16)
Wire Tray 53/45	Zinc Plated Hot Dip Galvanized Stainless/Acid-proof*	11 491 13 11 492 13 11 493 13	2.09 (53) 2.09 (53) 2.09 (53)	1.77 (45) 1.77 (45) 1.77 (45)	0.16 (4) 0.16 (4) 0.16 (4)	0.16 (4) 0.16 (4) 0.16 (4)	3.86 (1.75) 4.08 (1.85) 3.92 (1.78)	1 1 1	1.5" (37)
Wire Tray 75 x 4/55	Zinc Plated Hot Dip Galvanized Stainless/Acid-proof*	11 491 00 11 492 00 11 493 00	2.95 (75) 2.95 (75) 2.95 (75)	2.16 (55) 2.16 (55) 2.16 (55)	0.16 (4) 0.16 (4) 0.16 (4)	0.16 (4) 0.16 (4) 0.16 (4)	4.12 (1.87) 4.50 (2.04) 4.19 (1.90)	1 1 1	2.3" (59)
Wire Tray 75 x 5/55	Zinc Plated Hot Dip Galvanized Stainless/Acid-proof*	11 491 10 11 492 10 11 493 10	2.95 (75) 2.95 (75) 2.95 (75)	2.16 (55) 2.16 (55) 2.16 (55)	0.19 (5) 0.19 (5) 0.19 (5)	0.19 (5) 0.19 (5) 0.19 (5)	6.40 (2.90) 6.75 (3.06) 6.55 (2.97)	1 1 1	2.2" (55)
Wire Tray 120/60	Zinc Plated Hot Dip Galvanized Stainless/Acid-proof*	11 491 01 11 492 01 11 493 01	4.72 (120) 4.72 (120) 4.72 (120)	2.36 (60) 2.36 (60) 2.36 (60)	0.19 (5) 0.19 (5) 0.19 (5)	0.19 (5) 0.19 (5) 0.19 (5)	6.86 (3.11) 7.49 (3.40) 7.01 (3.18)	1 1 1	3.9"(100)
Wire Tray 220/60	Zinc Plated Hot Dip Galvanized Stainless/Acid-proof*	11 491 02 11 492 02 11 493 02	8.66 (220) 8.66 (220)) 8.66 (220)	2.36 (60) 2.36 (60) 2.36 (60)	0.19 (5) 0.19 (5) 0.19 (5)	0.19 (5) 0.19 (5) 0.19 (5)	9.48 (4.30) 9.99 (4.53) 9.63 (4.37)	1 1 1	7.9" (200)
Wire Tray 320/60	Zinc Plated Hot Dip Galvanized Stainless/Acid-proof*	11 491 03 11 492 03 11 493 03	12.6 (320) 12.6 (320) 12.6 (320)	2.36 (60) 2.36 (60) 2.36 (60)	0.19 (5) 0.19 (5) 0.19 (5)	0.19 (5) 0.19 (5) 0.19 (5)	12.04 (5.46) 12.90 (5.85) 12.23 (5.55)	1 1 1	11.8" (300)
Wire Tray 422/60	Zinc Plated Hot Dip Galvanized Stainless/Acid-proof*	11 491 14 11 492 14 11 493 14	16.61 (422) 16.61 (422) 16.61 (422)	2.36 (60) 2.36 (60) 2.36 (60)	0.19 (5) 0.19 (5) 0.19 (5)	0.23 (6) 0.23 (6) 0.23 (6)	16.69 (7.57) 18.01 (8.17) 17.02 (7.72)	1 1 1	15.7" (400)
Wire Tray 522/60	Zinc Plated Hot Dip Galvanized Stainless/Acid-proof*	11 491 15 11 492 15 11 493 15	20.55 (522) 20.55 (522) 20.55 (522)	2.36 (60) 2.36 (60) 2.36 (60)	0.19 (5) 0.19 (5) 0.19 (5)	0.23 (6) 0.23 (6) 0.23 (6)	19.73 (8.95) 20.92 (9.49) 20.33 (9.22)	1 1 1	9.7" (500)
Wire Tray 622/60	Zinc Plated Hot Dip Galvanized Stainless/Acid-proof*	11 491 16 11 492 16 11 493 16	24.49 (622) 24.49 (622) 24.49 (622)	2.36 (60) 2.36 (60) 2.36 (60)	0.19 (5) 0.19 (5) 0.19 (5)	0.23 (6) 0.23 (6) 0.23 (6)	23.02 (10.44) 24.38 (11.06) 23.70 (10.75)	1 1 1	23.6"(600)

Hyperline


	Material	#	A, in (mm)	B, in (mm)	C, in (mm)	D, in (mm)	Weight, Ibs (kg)	Pack	Profile
Wire Tray 120/110	Zinc Plated Hot Dip Galvanized Stainless/Acid-proof*	11 491 04 11 492 04 11 493 04	4.72 (120) 4.72 (120) 4.72 (120)	4.33 (110) 4.33 (110) 4.33 (110)	0.19 (5) 0.19 (5) 0.19 (5)	0.19 (5) 0.19 (5) 0.19 (5)	9.48 (4.30) 9.99 (4.53) 9.77 (4.43)	1 1 1	3.9"(100)
Wire Tray 220/110	Zinc Plated Hot Dip Galvanized Stainless/Acid-proof*	11 491 05 11 492 05 11 493 05	8.66 (220) 8.66 (220) 8.66 (220)	4.33 (110) 4.33 (110) 4.33 (110)	0.19 (5) 0.19 (5) 0.19 (5)	0.19 (5) 0.19 (5) 0.19 (5)	12.04 (5.46) 12.88 (5.84) 12.39 (5.62)	1 1 1	7.9" (200)
Wire Tray 320/110	Zinc Plated Hot Dip Galvanized Stainless/Acid-proof*	11 491 06 11 492 06 11 493 06	12.6 (320) 12.6 (320) 12.6 (320)	4.33 (110) 4.33 (110) 4.33 (110)	0.19 (5) 0.19 (5) 0.19 (5)	0.19 (5) 0.19 (5) 0.19 (5)	14.62 (6.63) 15.63 (7.09) 15.06 (6.83)	1 1 1	11.8" (300)
Wire Tray 422/110	Zinc Plated Hot Dip Galvanized Stainless/Acid-proof*	11 491 07 11 492 07 11 493 07	16.61 (422) 16.61 (422) 16.61 (422)	4.33 (110) 4.33 (110) 4.33 (110)	0.19 (5) 0.19 (5) 0.19 (5)	0.23 (6) 0.23 (6) 0.23 (6)	19.73 (8.95) 20.92 (9.49) 20.33 (9.22)	1 1 1	15.7" (400)
Wire Tray 522/110	Zinc Plated Hot Dip Galvanized Stainless/Acid-proof*	11 491 08 11 492 08 11 493 08	20.55 (522) 20.55 (522) 20.55 (522)	4.33 (110) 4.33 (110) 4.33 (110)	0.19 (5) 0.19 (5) 0.19 (5)	0.23 (6) 0.23 (6) 0.23 (6)	23.02 (10.44) 24.38 (11.06) 23.70 (10.75)	1 1 1	19.7" (500)
Wire Tray 622/110	Zinc Plated Hot Dip Galvanized Stainless/Acid-proof*	11 491 09 11 492 09 11 493 09	24.49 (622) 24.49 (622) 24.49 (622)	4.33 (110) 4.33 (110) 4.33 (110)	0.19 (5) 0.19 (5) 0.19 (5)	0.23 (6) 0.23 (6) 0.23 (6)	23.88 (10.83) 25.30 (11.48) 24.60 (11.16)	1 1 1	23.6" (600)

The cable trays are supplied in sections of 8.2 ft (2.5 m) each and have different width: from 2.08" to 24.49" (from 53 to 622 mm). They are produced in three variations: zinc plated – for indoor application, hot dip galvanized – for outdoor application and stainless/acid proof – for application in corrosion environment and in conditions of high sanitary requirements. All cable trays, from 4.72" (120 mm) wide and more, are produced with the height of side 2.36" and 4.33" (60 and 110 mm). 2.95" (75 mm) wide trays are manufactured in 2 variations: with 0.16" and 0.20" (4 mm and 5 mm) wire diameter and with height of side – 2.16" (55 mm). 2.09" (53 mm) wide trays are very popular especially in food industry and produced with the height of side – 1.77" (45 mm).

*AISI 316L acid-proof/stainless steel

G-Wire Tray



For installation in ceilings, under desks and mounting on cable ladders.

- Simple mounting to ceiling or under desk.
- No cantilever arm needed mounted with standard B1 fitting.
- In exposed areas extra mechanical protection of cables.
- Support distance up to 3 meters see load chart.
- Standard B1/B2 fitting for joining of G-trays and of G-trays to other Defem wire trays.
- Can also be mounted with B4 Mini wall cantilever arm.

G-WIRE TRAY 2.95 x 3.74 (75 x 95)

Material	#	Dimensions, in (mm)	Weight, lbs (kg)	Pack
Zinc Plated	11 491 38	98.43 x 2.95 x 3.74 (2500 x 75 x 95)	5.64 (2.56)	1
Hot Dip Galvanized	11 492 88	98.43 x 2.95 x 3.74 (2500 x 75 x 95)	6.35 (2.88)	1
Stainless/ Acid-proof	11 493 38	98.43 x 2.95 x 3.74 (2500 x 75 x 95)	5.73 (2.60)	1

TECHNICAL DATA





MOUNTING



Under desk/ ceiling



Wall



Ladder



Joining

U-Bar

U-BAR B60

U-bar is used as a support structure. It may also be "boxed" in pairs to provide additional strength and stability. May also be used to accept B9 Brackets at 90°. Sheet thickness 0.12" (3 mm). Hole diameter 0.33" (8.5 mm). Distance between holes 1.57" (40 mm).



Zinc plated 11 494 00	13.89 (6.2)	1

All available variations of U-Bar length you can see on page 55

CORNER FITTING B65

Corner fitting makes it possible to join U-bars at any desired position in a "step-less" way. It gives a strong and distinct joining. It is also designed to give full use of the inner corner between two U-bars.



Material		Weight lbs (kg)	Pack
Zinc plated	11 494 07	0.44 (0.2)	6

ADJUSTABLE FOOT B63

Adjustable foot supports the U-bar on the floor. Provided with M8 threaded holes. The foot can be mounted at two height positions onto the U-bar. The foot ending is adjustable in height and swivels to compensate for uneven floors. Sheet thickness 0.16" (4 mm). Hole dia 0.31" (8.5 mm). Distance between holes cc 1.6" (40 mm).



	Material	#	weight lbs (kg)	Pack
Zinc plated 11 494 06 0.66 (0.3) 6	Zinc plated	11 494 06	0.66 (0.3)	6

FLANGE BOLT B66 (M8 X 20)



Self-locking bolt with flange. M8 x 20. Pack of 50.					
Material	#	Weight lbs (kg)	Pack		
Zinc plated	11 494 04	1.54 (0.7)	50		

JOINING FITTING B61

Joining Fitting is for joining U-bars. Four fixing points ensure strength and stability in multiple lengths. Provided with M8 threaded holes.

Sheet thickness 0.16'' (4 mm). Conical shape for tight joining. Hole diameter 0.31'' (8.5 mm). M8-thread in the back side. Distance between holes 1.6'' (40 mm).



Material	#	Weight Ibs (kg)	Pack
Zinc plated	11 494 01	1.32 (0.6)	1

ANGLE FITTING B62

The angle fitting is a universal fitting that can be used against the floor, wall or ceiling, as well as for T-junctions and other configurations.



Material	#	Weight lbs (kg)	Pack
Zinc plated	11 494 02	0.44 (0.2)	6

END CAP B64



End cap is used for protection and to give pleasing appearance on exposed ends of the U-bars.

Material	#	Weight Ibs (kg)	Pack
PE, grey	11 494 03	0.22 (0.1)	10

FLANGE NUT B43/M8



Flange Nut is self-locking. In many cases the flange will eliminate need for washers. M8 or M10. Pack of 50. Quality: Zinc-plated, Stainless A4.

Material	#	Weight lbs	Pack
	, iii	(kg)	
Zinc plated	11 494 05	0.75 (0.34)	50

Device that connects ground cable directly to a wire in the Cable Trav

EARTH CONNECTION CLAMP B18

	Device that connects gro	ullu cable ullec	tiy to a wire ili	the Cable Iray
D	Material	#	Weight Ibs (kg)	Pack
	Zinc plated	11 491 80	0.04 (0.02)	50

Mountings

BRACKETS

Combined bracket for wall and pendant bracket. Mounted on wall with M8/M10 bolt. M6 bolt for Pendant B12 or B12L.



0.51" x 0.79" (13 x 20 mm)

For wall mounting with M8/M10 bolts.



PENDANTS

Pendant is available in two variations: Normal (B12) and Light (B12L) with the lengths 9.8" (250 mm) or 19.7" (500 mm). For mounting on ceiling or floor with M10 bolt. Distance between holes 4.25" (108 mm). It can also be mounted on the Pendant, Bracket B9, Support Hook B39 and Bracket B4/B4 mini.

B9/75-120 Bracket

Material	#	Width in (mm)	Weight lbs (kg)	Pack
Zinc plated	11 491 21	7.09 (180)	0.88 (0.40)	10
Hot Dip Galvanized	11 492 21	7.09 (180)	0.92 (0.42)	10
Stainless/Acid proof	11 493 21	7.09 (180)	0.75 (0.34)	10

B9/220 Bracket

Material	#	Width in (mm)	Weight lbs (kg)	Pack
Zinc plated	11 491 22	11.02 (280)	1.15 (0.52)	10
Hot Dip Galvanized	11 492 22	11.02 (280)	1.21 (0.55)	10
Stainless/Acid proof	11 493 22	11.02 (280)	1.01 (0.46)	10

B9/320 Bracket

Material		Width in (mm)	Weight lbs (kg)	Pack
Zinc plated	11 491 23	14.96 (380)	1.41 (0.64)	10
Hot Dip Galvanized	11 492 23	14.96 (380)	1.50 (0.68)	10
Stainless/Acid proof	11 493 23	14.96 (380)	1.30 (0.59)	10

B9/422 Bracket

Material		Width in (mm)	Weight lbs (kg)	Pack
Zinc plated	11 491 24	18.9 (480)	1.83 (0.83)	10
Hot Dip Galvanized	11 492 24	18.9 (480)	1.90 (0.86)	10
Stainless/Acid proof	11 493 24	18.9 (480)	1.67 (0.76)	10

B9/522 Bracket

Material	#	Width in (mm)	Weight lbs (kg)	Pack
Zinc plated	11 491 95	22.8 (580)	3.5 (1.6)	5
Hot Dip Galvanized	11 492 95	22.8 (580)	3.5 (1.6)	5
Stainless/Acid proof	11 493 95	22.8 (580)	3.5 (1.6)	5

B9/622 Bracket

Material	#	Width in (mm)	Weight lbs (kg)	Pack
Zinc plated	11 491 96	26.8 (680)	4.4 (2)	5
Hot Dip Galvanized	11 492 96	26.8 (680)	4.4 (2)	5
Stainless/Acid proof	11 493 96	26.8 (680)	4.4 (2)	5

B12L/250 Pendant

Material	#	Length in (mm)	Weight lbs (kg)	Pack
Zinc plated	11 491 36	9.84 (250)	1.43 (0.65)	6
Hot Dip Galvanized	11 492 36	9.84 (250)	1.52 (0.69)	6
Stainless/Acid proof	11 493 36	9.84 (250)	1.34 (0.61)	6

B12L/500 Pendant

Material	#	Length in (mm)	Weight lbs (kg)	Pack
Zinc plated	11 491 46	19.70 (500)	2.20 (1.00)	6
Hot Dip Galvanized	11 492 46	19.70 (500)	2.31 (1.05)	6
Stainless/Acid proof	11 493 46	19.70 (500)	2.14 (0.97)	6



B12/500 Pendant

Material	#	Length in (mm)	Weight lbs (kg)	Pack
Zinc plated	11 491 50	19.70 (500)	4.14 (1.88)	6
Hot Dip Galvanized	11 492 50	19.70 (500)	4.36 (1.98)	6
Stainless/Acid proof	11 493 50	19.70 (500)	4.56 (2.07)	6

B12/250 Pendant

Material	#	Length in (mm)	Weight lbs (kg)	Pack
Zinc plated	11 491 48	9.84 (250)	2.53 (1.15)	6
Hot Dip Galvanized	11 492 48	9.84 (250)	2.98 (1.35)	6
Stainless/Acid proof	11 493 48	9.84 (250)	2.82 (1.28)	6

SIDE SUPPORT B10

0.51" x 0.79" (13 x 20 mm)

Increases the stability of pendants subject to assymetrical load.



Material	#	Weight lbs (kg)	Pack
Zinc plated	11 491 49	2.05 (0.93)	1
Hot Dip Galvanized	11 492 49	2.05 (0.93)	1
Stainless/Acid proof	11 493 49	2.05 (0.93)	1

JOINING FITTING B24

Joining fitting to join Extension B19 to another B19. Can also be used as extension to Ceiling fitting B23.



Material		Weight lbs (kg)	Pack
Zinc plated	11 491 65	0.62 (0.28)	6
Hot Dip Galvanized	11 492 65	0.64 (0.29)	6
Stainless/Acid proof	11 493 65	0.62 (0.28)	6

COMBI FITTING B21 90°

For connection parallel to traditional cable ladders.



Material	#	Weight lbs (kg)	Pack
Zinc plated	11 491 91	0.97 (0.44)	5
Hot Dip Galvanized	11 492 91	1.01 (0.46)	5
Stainless/Acid proof	11 493 91	0.99 (0.45)	5

EXTENSION B19

For Pendant B12/B12L and Ceiling fitting B23. Gives telescopic action together with B12/B12L; min 39.8" (1010 mm), max 47" (1195 mm) or 56.9" (1445 mm). Extended with Joining fitting B24.



Material	#	Weight lbs (kg)	Pack
Zinc plated	11 491 61	3.75 (1.70)	6
Hot Dip Galvanized	11 492 61	4.01 (1.82)	6
Stainless/Acid proof	11 493 61	3.77 (1.71)	6

CEILING FITTING B23

Ceiling fitting for straight and sloping ceilings 0 - 30°. Adjustable positioning 90°. 4.3" (108 mm) hole spacing.

5.9" (150 mm)



Material	#	Weight lbs (kg)	Pack
Zinc plated	11 491 64	0.92 (0.42)	6
Hot Dip Galvanized	11 492 64	0.97 (0.44)	6
Stainless/Acid proof	11 493 64	0.95 (0.43)	6

COMBI FITTING B21

For connection above or below traditional cable ladders.



9.84" (250 mm)

Material	#	Weight lbs (kg)	Pack
Zinc plated	11 491 59	0.97 (0.44)	5
Hot Dip Galvanized	11 492 59	1.06 (0.48)	5
Stainless/Acid proof	11 493 59	0.99 (0.45)	5

SUPPORT HOOK B35

Support hook can be adjusted in height about 3.3" (85 mm) together with pendant B12 or B12L as well as with Extension B19.



B35/120-220 Support hook

Material	#	Weight lbs (kg)	Pack
Zinc plated	11 491 19	0.66 (0.30)	6
Hot Dip Galvanized	11 492 19	0.66 (0.30)	6
Stainless/Acid proof	11 493 19	0.57 (0.26)	6



B35/320-422 Support hook

Material	#	Weight lbs (kg)	Pack
Zinc plated	11 491 20	1.15 (0.52)	6
Hot Dip Galvanized	11 492 20	1.19 (0.54)	6
Stainless/Acid proof	11 493 20	1.06 (0.48)	6

BRACKETS B4

Universal bracket to which the trays can be mounted vertically 4.7'' - 16.6'' (120 - 422 mm), horizon-tally 4.7'' (120 mm) and diagonally 4.7'' - 8.7'' (120 - 220 mm). Used together with Combi Fitting B21 and B21 90°.



Material		Weight lbs (kg)	Pack
Zinc plated	11 491 57	0.31 (0.14)	10
Hot Dip Galvanized	11 492 57	0.33 (0.15)	10
Stainless/Acid proof	11 493 57	0.33 (0.15)	10

SUPPORT HOOK B39

Support hook for center hanging of tray with threaded rod. Locked with 2 pcs of flange nut (not included).



B39/120-220 Support hook

Material	#	Weight lbs (kg)	Pack
Zinc plated	11 491 17	0.18 (0.08)	6
Hot Dip Galvanized	11 492 17	0.18 (0.08)	6
Stainless/Acid proof	11 493 17	0.18 (0.08)	6



B39/320-422 Support hook

Material	#	Weight lbs (kg)	Pack
Zinc plated	11 491 18	0.66 (0.30)	6
Hot Dip Galvanized	11 492 18	0.70 (0.32)	6
Stainless/Acid proof	11 493 18	0.66 (0.30)	6

BRACKETS B4 MINI

Universal bracket to which the trays can be mounted vertically, horizontally and diagonally. Used together with Combi Fittings B21 and B21 90'. B4 mini – for cabletrays 53/45, 75 x 4/55 and 75 x 5/55.



Material	#	Weight lbs (kg)	Pack
Zinc plated	11 491 98	0.13 (0.06)	10
Hot Dip Galvanized	11 492 98	0.13 (0.06)	10
Stainless/Acid proof	11 493 98	0.11 (0.05)	10

CEILING FITTING UNIVERSAL B46

Ceiling fitting for threaded rod. For horizontal ceilings. Fits to both M8 and M10. Rod is tightened with 2 pcs of flange nut (not included).

2.95" (75 mm)

Material	#	Weight Ibs (kg)	Pack
Zinc plated	11 494 74	0.20 (0.09)	6
Stainless/Acid proof	11 495 74	0.20 (0.09)	6

CEILING FITTING FLEXIBLE B47

Ceiling fitting for threaded rod for both straight and sloping ceilings. Precise adjustment to slope of ceiling. Delivered as complete set with locking nut.



B47/M8 Ceiling fitting Flexible

Material		Weight lbs (kg)	Pack
Zinc plated	11 494 75	0.26 (0.12)	6
Stainless/Acid proof	11 495 75	0.29 (0.13)	6

B47/M10 Ceiling fitting Flexible

Material	#	Weight lbs (kg)	Pack
Zinc plated	11 494 76	0.29 (0.13)	6
Stainless/Acid proof	11 495 76	0.29 (0.13)	6

SUPPORT B33

Adjustable support 8.5" - 14.6" (215-370 mm), for access floors and etc. Can be repositioned in 90°.



Material		Weight lbs (kg)	Pack
Zinc plated	11 491 35	3.72 (1.69)	4
Hot Dip Galvanized	11 492 35	3.84 (1.74)	4
Stainless/Acid proof	11 493 35	3.46 (1.57)	4

BEAM CLAMP B49

Clamp to mount threaded rod to beam. Delivered as complete set with bolt and locking nut. Rod is locked with 2 pcs flange nut (not included). Beam thickness max. 0.8" (20 mm).



CEILING CLAMP B48

Ceiling Clamp for threaded rod on to metal sheet ceiling. Can also be mounted to other materials where a 0.9" (22 mm) hole can be drilled. Delivered as complete set with locking nut and washers (iron + rubber).



B48/M8 Ceiling clamp

Material		Weight lbs (kg)	Pack
Zinc plated	11 494 72	0.13 (0.06)	6
Stainless/Acid proof	11 495 72	0.13 (0.06)	6

B48/M10 Ceiling clamp

Material	#	Weight lbs (kg)	Pack
Zinc plated	11 494 73	0.15 (0.07)	6
Stainless/Acid proof	11 495 73	0.15 (0.07)	6

CONVEYOR BRACKET B17

Universal fitting for fixing cable trays onto conveyor system.



Material	#	Weight lbs (kg)	Pack
Zinc plated	11 491 92	1.15 (0.52)	10
Hot Dip Galvanized	11 492 92	1.23 (0.56)	10
Stainless/Acid proof	11 493 92	1.21 (0.55)	10

THREADED ROD

Threaded Rod, M8, M10. Length 39.37" (1000 mm) / 78.74" (2000 mm). Metrical standard 6G. Quality: Zinc-plated 8.8, Stainless A4.



Threaded rod M8

Material	#	Length in (mm)	Weight lbs (kg)	Pack
Zinc plated	11 494 51	39.37 (1000)	0.68 (0.31)	6
Zinc plated	11 494 52	78.74 (2000)	1.39 (0.63)	6
Stainless/Acid proof	11 495 51	39.37 (1000)	0.70 (0.32)	6
Stainless/Acid proof	11 495 52	78.74 (2000)	1.39 (0.63)	6

Threaded rod M10

Material	#	Length in (mm)	Weight Ibs (kg)	Pack
Zinc plated	11 494 61	39.37 (1000)	1.08 (0.49)	6
Zinc plated	11 494 62	78.74 (2000)	2.16 (0.98)	6
Stainless/Acid proof	11 495 61	39.37 (1000)	1.10 (0.50)	6
Stainless/Acid proof	11 495 62	78.74 (2000)	2.18 (0.99)	6

THREAD LOCK B50

Locking nut M10 to join threaded rods side by side. This means that it is not necessary to cut the rods to the right lengths. Very easy to mount without need of any tools, and also easy to adjust afterwards. For threaded rod metrical standard 6G. Quality: Zincplated.



Material	#	Weight Ibs (kg)	Pack
M8 Zinc plated	11 494 56	0.02 (0.01)	6
M10 Zinc plated	11 494 66	0.04 (0.02)	6

Fittings

FITTING B1

B1 (together with B2) is used to join the Cable Trays. B1 has two extra holes, diameter (10 mm) and (6.5 mm) that can be used for connection to ground. The Fitting can also be used to mount the tray to wall, ceiling and floor. Or to mount lighting fittings directly on the tray. Delivered without bolt and nut (M6).



Material	#	Weight Ibs (kg)	Pack
Zinc plated	11 491 54	0.13 (0.06)	50
Hot Dip Galvanized	11 492 54	0.15 (0.07)	50
Stainless/Acid proof	11 493 54	0.13 (0.06)	50

FLANGE NUT B43

The Flange Nut is self-locking. In many cases the flange will eliminate need for washers. M8 or M10. Pack of 50. Quality: Zinc-plated 8.8, Stainless A4.



Flange nut B43/M8

	Description	Material	Weight lbs (kg)	Pack
11 494 05	Flange nut B43/M8	Zinc plated	0.75 (0.34)	50
11 495 54	Flange nut B43/M8	Stainless/Acid proof	0.75 (0.34)	50

Flange nut B43/M10

#	Description	Material	Weight lbs (kg)	Pack
11 494 64	Flange nut B43/M10	Zinc plated	1.23 (0.56)	50
11 495 64	Flange nut B43/M10	Stainless/Acid proof	1.23 (0.56)	50

DISTANCE NUT B42

Nut for joining of rods. M8 or M10.

Quality: Zinc-plated 8.8, Stainless A4.



Distance nut B42/M8

#	Description	Material	Length in (mm)	Weight Ibs (kg)	Pack
11 494 55	Distance nut B42/M8	Zinc plated	1.18 (30)	0.02 (0.01)	6
11 495 55	Distance nut B42/M8	Stainless/Acid proof	1.18 (30)	0.02 (0.01)	6

Distance nut B42/M10

#	Description	Material	Length in (mm)	Weight lbs (kg)	Pack
11 494 65	Distance nut B42/M10	Zinc plated	1.57 (40)	0.04 (0.02)	6
11 495 65	Distance nut B42/M10	Stainless/Acid proof	1.57 (40)	0.04 (0.02)	6

ANGLED FITTING B27

B27 is used for T-junctions and for mounting trays to wall, floor or ceiling. It is also used for tees in any angles, as it can be bent to the right angle. In other words for both 90°- angles and for angles that are smaller or wider than 90°. Delivered without bolt/nut (M6).



Material		Weight lbs (kg)	Pack
Zinc plated	11 491 69	0.29 (0.13)	10
Hot Dip Galvanized	11 492 69	0.29 (0.13)	10
Stainless/Acid proof	11 493 69	0.29 (0.13)	10

FITTING B2

B2 is used (together with B1 or another B2) for joining of cable trays. It is also used for mounting the trays to the brackets B9 and B35/B39 as well as for different shapes and reinforcements. Delivered without bold/nut (M6).



Material	#	Weight Ibs (kg)	Pack
Zinc plated	11 491 55	0.04 (0.02)	50
Hot Dip Galvanized	11 492 55	0.04 (0.02)	50
Stainless/Acid proof	11 493 55	0.04 (0.02)	50

Accessories

RADIUS LIMITER B34

Used to limit the radius of fiber optic, coax and other sensitive cables.



B34/75 Radius limiter

Material	#	Length in (mm) , A	Weight Ibs (kg)	Pack
Pre-Galvanized	11 494 37	2.95 (75)	0.17 (0.08)	5
Stainless/Acid proof	11 495 37	2.95 (75)	0.2 (0.09)	5

B34/120 Radius limiter

Material	#	Length in (mm) , A	Weight lbs (kg)	Pack
Pre-Galvanized	11 494 31	4.53 (115)	0.22 (0.10)	5
Stainless/Acid proof	11 495 31	4.53 (115)	0.24 (0.11)	5

B34/220 Radius limiter

Material	#	Length in (mm) , A	Weight lbs (kg)	Pack
Pre-Galvanized	11 494 32	8.46 (215)	0.46 (0.21)	5
Stainless/Acid proof	11 495 32	8.46 (215)	0.48 (0.22)	5

B34/320 Radius limiter

Material	#	Length in (mm) , A	Weight lbs (kg)	Pack
Pre-Galvanized	11 494 33	12.4 (315)	0.70 (0.32)	5
Stainless/Acid proof	11 495 33	12.4 (315)	0.73 (0.33)	5

B34/422 Radius limiter

Material		Length in (mm) , A	Weight lbs (kg)	Pack
Pre-Galvanized	11 494 34	16.33 (415)	0.95 (0.43)	5
Stainless/Acid proof	11 495 34	16.33 (415)	1 (0.45)	5

B34/522 Radius limiter

Material		Length in (mm) , A	Weight Ibs (kg)	Pack
Pre-Galvanized	11 494 35	20.28 (515)	1.21 (0.55)	5
Stainless/Acid proof	11 495 35	20.28 (515)	1.28 (0.58)	5

B34/622 Radius limiter

Material	#	Length in (mm) , A	Weight lbs (kg)	Pack
Pre-Galvanized	11 494 36	24.21 (615)	1.43 (0.65)	5
Stainless/Acid proof	11 495 36	24.21 (615)	1.5 (0.68)	5

FITTING B3

Delivered with bolt/nut (M6)



Material		Weight lbs (kg)	Pack
Zinc plated	11 491 56	0.09 (0.04)	50
Hot Dip Galvanized	11 492 56	0.09 (0.04)	50
Stainless/Acid proof	11 493 56	0.09 (0.04)	50

RADIUS LIMITER B67

Pre-Galvanized. Can also be offered lacquered



B67/75 Radius limiter

Material	#	Length in (mm) , A	Weight Ibs (kg)	Pack
Radius Limiter	11 494 42	2.95 (75)	0.3 (0.13)	5
Cover	11 494 82	2.36 (60)	0.02 (0.01)	5

B67/120 Radius limiter

Material		Length in (mm) , A	Weight Ibs (kg)	Pack
Radius Limiter	11 494 43	4.53 (115)	0.4 (0.18)	5
Cover	11 494 83	4.01 (102)	0.04 (0.02)	5

B67/220 Radius limiter

Material	#	Length in (mm) , A	Weight lbs (kg)	Pack
Radius Limiter	11 494 44	8.46 (215)	0.66 (0.30)	5
Cover	11 494 84	7.95 (202)	0.09 (0.04)	5

B67/320 Radius limiter

Material	#	Length in (mm) , A	Weight lbs (kg)	Pack
Radius Limiter	11 494 45	12.4 (315)	0.92 (0.42)	5
Cover	11 494 85	11.89 (302)	0.13 (0.06)	5

B67/422 Radius limiter

Material		Length in (mm) , A	Weight lbs (kg)	Pack
Radius Limiter	11 494 46	16.33 (415)	1.17 (0.53)	5
Cover	11 494 86	15.83 (402)	0.17 (0.08)	5

B67/522 Radius limiter

Material		Length in (mm) , A	Weight lbs (kg)	Pack
Radius Limiter	11 494 47	20.28 (515)	1.43 (0.65)	5
Cover	11 494 87	19.76 (502)	0.22 (0.10)	5

B67/622 Radius limiter

Material	#	Length in (mm) , A	Weight lbs (kg)	Pack
Radius Limiter	11 494 48	24.21 (615)	1.7 (0.77)	5
Cover	11 494 88	23.7 (602)	0.26 (0.12)	5

HOLDER B5 WITHOUT HOLES

Accessories Holder without holes. For any Mesh Tray.



Material	#	Weight Ibs (kg)	Pack
Zinc plated	11 491 68	1.01 (0.46)	5
Hot Dip Galvanized	11 492 68	1.06 (0.48)	5
Stainless/Acid proof	11 493 68	1.01 (0.46)	5

HOLDER B5 (MINI)



Material	#	Weight lbs (kg)	Pack
Zinc plated	11 491 37	0.44 (0.20)	5
Hot Dip Galvanized	11 492 37	0.46 (0.21)	5
Stainless/Acid proof	11 493 37	0.44 (0.20)	5

SEPARATING PLATE B36

Plate to separate different types of cables. Takes very little space inside tray. Used together with Plate Holder B38. Metal thickness 0.03" (0.7 mm). Mounted and joined without tools or screw.



Material	#	Weight lbs (kg)	Pack
Hot Dip Galvanized	11 492 76	1.43 (0.65)	6

SEPARATING PLATE B26

Used for telecom cable. Mounted without bolts. Sheet thickness 0.03" (0.7 mm).



Material	#	Weight lbs (kg)	Pack
Hot Dip Galvanized	11 492 78	2.51 (1.14)	6
Stainless/Acid proof	11 493 78	2.49 (1.13)	6

HOLDER B5



Material	#	Weight lbs (kg)	Pack
Zinc plated	11 491 58	0.95 (0.43)	5
Hot Dip Galvanized	11 492 58	0.97 (0.44)	5
Stainless/Acid proof	11 493 58	0.95 (0.43)	5

CLIP B8

For securing Plate cover B7. 4 clips per cover.



Material		Weight lbs (kg)	Pack
Stainless/Acid proof	11 493 79	0.02 (0.01)	16

PLATE COVER B7

Metal cover to protect cables. Sheet thickness 0.03 $^{\prime\prime}$ (0.7 mm). Mounted with clips B8, 4 pcs/ cover.



Plate cover B7/75

Material	#	Width in (mm) , A	Weight lbs (kg)	Pack
Hot Dip Galvanized	11 492 70	3.15 (80)	1.76 (0.80)	4
Stainless/Acid proof	11 493 70	3.15 (80)	1.92 (0.87)	4

Plate cover B7/120

Material	#	Width in (mm) , A	Weight lbs (kg)	Pack
Hot Dip Galvanized	11 492 71	4.92 (125)	2.58 (1.17)	4
Stainless/Acid proof	11 493 71	4.92 (125)	2.73 (1.24)	4

Plate cover B7/220

Material		Width in (mm) , A	Weight lbs (kg)	Pack
Hot Dip Galvanized	11 492 72	8.56 (225)	3.84 (1.74)	4
Stainless/Acid proof	11 493 72	8.56 (225)	4.21 (1.91)	4

Plate cover B7/320

Material		Width in (mm) , A	Weight lbs (kg)	Pack
Hot Dip Galvanized	11 492 73	12.79 (325)	5.27 (2.39)	4
Stainless/Acid proof	11 493 73	12.79 (325)	5.58 (2.53)	4

Plate cover B7/422

Material	#	Width in (mm) , A	Weight lbs (kg)	Pack
Hot Dip Galvanized	11 492 74	16.73 (425)	6.68 (3.03)	4
Stainless/Acid proof	11 493 74	16.73 (425)	7.20 (3.27)	4

PLATE HOLDER B38



For mounting of Separating Plate B36. 5 pcs/plate. Mounted and joined without tools or screws.



TELE-CHANNEL B6/50

Used for telecom cable. Mounted without bolts. Sheet thickness 0" (0.7 mm).



Material		Weight lbs (kg)	Pack
Hot Dip Galvanized	11 492 47	4.30 (1.95)	6
Stainless/Acid proof	11 493 47	4.43 (2.01)	6

SECURITY CAPS B32

Security caps for wires cut "open". Flame resistant-grey. Pack of 100.



#	Description	Material	Diameter in (mm)	Weight Ibs (kg)	Pack
11 493 88	Security caps B32-4	Flame resis- tant-grey	0.16 (4)	0.09 (0.04)	100
11 493 66	Security caps B32-5	Flame resis- tant-grey	0.20 (5)	0.07 (0.03)	100
11 493 67	Security caps B32-6	Flame resis- tant-grey	0.24 (6)	0.07 (0.03)	100

VELCRO B51

For bundling of cables. Flexible to use and re-use.



#	Description	Material	Weight lbs (kg)	Pack
15 186 50	Velcro B51, 0.4" (10 mm)	Black	0.35 (0.16)	1
15 186 51	Velcro B51, 0.8″ (20 mm)	Black	0.70 (0.32)	1

BEND PLATE B31

For smooth cable curvatures at changes of level. Mounted without screw.



Material		Width in (mm)	Weight lbs (kg)	Pack
120/Aluminium	11 492 26	3.54 (90)	0.08 (0.04)	5
220/Aluminium	11 492 27	7.48 (190)	0.20 (0.09)	5
320/Aluminium	11 492 28	11,42 (290)	0.29 (0.13)	5
422/Aluminium	11 492 29	15.35 (390)	0.37 (0.17)	5

BOLT AND NUT B13

Pack of Bolt and Nut M6 x 25. 50 + 50 pcs/ pack, 250 + 250 pcs/ pack.



Bolt and nut B13-50

#	Description	Material	Weight lbs (kg)	Pack
11 491 84	Bolt and nut B13-50	Zinc plated	1.23 (0.56)	50/50
11 492 84	Bolt and nut B13-50	Hot Dip Galvanized	1.26 (0.57)	50/50
11 493 84	Bolt and nut B13-50	Stainless/Acid proof	1.30 (0.59)	50/50

Bolt and nut B13-250

	Description	Material	Weight lbs (kg)	Pack
11 491 85	Bolt and nut B13-250	Zinc plated	6.22 (2.82)	250/250
11 492 85	Bolt and nut B13-250	Hot Dip Galvanized	6.17 (2.80)	250/250
11 493 85	Bolt and nut B13-250	Stainless/Acid proof	6.39 (2.90)	250/250

FIXING PLATE B15

Fixing plate is an accessory for a machine that permits direct mounting of cables and hoses to the machine itself. Used together with AS-I Clips B14 for 0.2" (5 mm) or Cable Clips B16. Oil- and UV resistant plastics. Pack of 100.



IDENTIFICATION TAG B40

Tag exists in five versions: OPTO, COAX, PAIR, POW and Neutral. Neutral tag without text is used for own marking or (after offer) printed with your text. Tag is adapted for 0.2" (5 mm) wire and is produced in flame-proof plastic material.



Material		Weight lbs (kg)	Pack
«OPTO»	11 494 20	0.02 (0.01)	10
«COAX»	11 494 21	0.02 (0.01)	10
«PAIR»	11 494 22	0.02 (0.01)	10
Neutral	11 494 23	0.02 (0.01)	10
«POW»	11 494 24	0.02 (0.01)	10

CABLE CLIPS B16

For fixing of round cable or hose 0.2", 0.3" or 0.4" (6, 8 or 10 mm) diameter onto Defem trays of 0.2" (5 mm) wire, or onto Fixing plate B15. Oil- and UV resistant plastics. Pack of 100.



#	Description	Material	(kg)	Pack
11 495 25	Cable Clips B16-6, Ø 0.24" (6 mm), Grey	Oil- and UV resistant plastics	0.24 (0.11)	100
11 495 26	Cable Clips B16-8, Ø 0.31" (8 mm), Black	Oil- and UV resistant plastics	0.22 (0.10)	100
11 495 27	Cable Clips B16-10, Ø 0.39" (10 mm), White	Oil- and UV resistant plastics	0.20 (0.09)	100

Tools

BOLT CUTTER B28

Used to cut the trays. The angled edges make it possible to get close to the wires for straight cuts. Sharp edges are in that way avoided.



MARKING CLIP B44

Blank marking clip. In white flame-resistant plastic, to mount on the side of the tray.



Material		Weight lbs (kg)	Pack
Flame-resistant plastics	11 494 27	0.02 (0.01)	10

MARKING CLIP B44, EQUIPOTENTIAL BONDING

Flame-resistant plastic. To be mounted at each joining to the approval of Defem as conductor of equipotential bonding.



Material	#	Weight lbs (kg)	Pack
Flame-resistant plastics	11 494 29	0.02 (0.01)	10

AS-I CLIPS

Clip that mounts the AS-I cable directly to the wires of the Defem tray. Oil- and UV resistant plastics. Blue for Defem trays with 0.16" (4 mm) wire. Grey for Defem trays with 0.2" (5 mm) wire or Fixing plate B15. Pack of 100.



#	Description	Material	(kg)	Pack
11 495 20	AS-I Clips B14-4, Ø 0.16" (4 mm), Blue	Oil- and UV resistant plastics	0.22 (0.10)	100
11 495 21	AS-I Clips B14-5, Ø 0.20" (5 mm), Grey	Oil- and UV resistant plastics	0.22 (0.10)	100

SPANNER B45 0.4" (10 mm)

The only tool needed for joining the parts of the Defem-system is a 0.4" (10 mm) key. This key is designed to function well together with the other Defem components.



#	Description	Material	Weight lbs (kg)	Pack
16 222 00	Spanner B45 4" (10 mm)	Chrome Vanadium	0.15 (0.07)	1

1

Fibre Management



Radius limiter of the Defem system - 1.57" (40 mm) radius for the complete width of tray, in both directions and with side protection

Designed for distinct demands:

- Full protection
- Full overview
- Full access
- Full flexibility
- Simple maintenance
- Simple separation

And...

70-80% cost reduction compared to conventional fibre management systems



Installed from below - no interference with cables



Option: Cover accessory for protecting 0.039" (1 mm) patch cords

CombiRack

Safe Cable Channelling

The Total Concept for IT technical rooms

Flat pack delivery – the components are easy to transport and move. Especially in tight areas such as elevators, staircases and narrow doorways.

Simple build-up – with the mounting frame tool, it is possible for one person to make the complete installation.

Efficient cooling – no risk of "heat pockets". It is easy to direct cooling air to equipment in any direction you choose.

Full use of space – with CombiRack system, you use the available space in an optimal way. Racks are integrated into each other, thereby saving one rack side installation and corresponding floor space. You create the precise width. You use available height by extending the rack upwards. And you can increase flexibility of depth by using the Telescopic adapter, etc.

Full overview/Full control – with CombiRack system you are the master of the room. You get full access to all equipment, all connectors, all cabling. You will be able to move, add and change. Everything is within your reach. Nothing is hidden. You have created the IT room for full future flexibility.



Self-Assembly

COMBIRACK 19"



ADD-ON COMBIRACK 19"





19" Mid-mount

COMBIRACK 19" MID-MOUNT, SELF-ASSEMBLY KIT





#		Mid-Mount frame size, in (mm)	
		86.61x11.81 (2200x300)	78.74x11.81 (2000x300)
5002459	U-bar B60, 83.46" (2120 mm)	1 pcs.	
5002453	U-bar B60, 75.60" (1920 mm)		1 pcs.
5002460	Mounting profile 19", length 73.86" (1876 mm), for 78.74" (2000 mm) high racks	1 pcs.	1 pcs.
1149406	Adjustable foot B63	1 pcs.	1 pcs.
1149407	Corner fitting B65	1 pcs.	1 pcs.

		Mid-Mount frame size, in (mm)	
		86.61x11.81 (2200x300)	78.74x11.81 (2000x300)
1149404	Flange bolt B66 M8x20	10 pcs.	10 pcs.
1149405	Flange nut B43 M8	8 pcs.	8 pcs.
1149402	Angle fitting B62	3 pcs.	3 pcs.
5002581	Mounting net	1 pcs.	1 pcs.
1149155	Fitting B2, zinc plated	3 pcs.	3 pcs.
1149184	Bolt and nut B13 M6x25, zinc plated	3 pcs.	3 pcs.

Accessories

MOUNTING PROFILE 19"

Mounting profile for 19" racks. Fittings included.

Material	#	A in (mm)	Rack height in (mm)	Weight lbs (kg)	Pack
Zinc plated	50 024 60	73.86 (1876)	78.74 (2000)	5.5 (2.5)	1
Zinc plated	50 024 61	81.1 (2060)	86.61 (2200)	6 (2,7)	1

CABLE DUCT, VERTICAL, B2468/95

To collect vertical cables. Fittings included.



2.7 (1.2)

Weight lbs (kg)

0.22 (0.1)

1

CABLE DUCT 19", HORIZONTAL, B2469

50 024 68

To collect horizontal cables. Fittings included.

Zinc plated



Material	#	Weight lbs (kg)	Pack
Zinc plated	50 024 69	0.57 (0.26)	1

CAGE NUT SET, PACK OF 10, B2490

Torx-bolt and cage-nut.

Material

Zinc plated



50 024 90

|--|





Material		Weight lbs (kg)	Pack
Zinc plated	50 025 81	4 (1.8)	1

CABLE DUCT, VERTICAL, B2468/140

To collect vertical cables. Fittings included.



Material	#	Weight lbs (kg)	Pack
Zinc plated	50 024 67	3.1 (1.4)	1

TELESCOPIC ADAPTER 19", B2580

To make all equipment fit into CombiRack. Adjustable 0.6" – 8.66" (15 – 220 mm).



	Material	#	Weight lbs (kg)	Pack
2	Zinc plated	50 025 80	0.66 (0.3)	1

Pack

10

Shelves 19"

SHELF, 4-POINTS

Fixed Shelf mounted with/at 4 points for 19" racks. Load capacity 220.46 lbs (100 kg). Delivered complete with mounting components.



Material		Heigth	A in (mm)	Weight lbs (kg)	Pack
Black lacquered	50 025 10	10	18.9 (480)	7.5 (3.4)	1
Black lacquered	50 025 11	10	23.62 (600)	9.3 (4.2)	1
Black lacquered	50 025 12	10	31.49 (800)	12 (5.4)	1
Black lacquered	50 025 13	10	39.37 (1000)	14.5 (6.6)	1

TELESCOPIC SHELF, 2-POINTS

Sliding Shelf, mounted at 4 points, for 19" racks. Load capacity 66.14 lbs (30 kg) Delivered complete with mounting components.



ADJUSTABLE SHELF, 2-POINTS

Shelf with adjustable inclination. Front-mounted for 19" racks. Load capacity 66.14 lbs (30 kg). Delivered complete with mounting components.



Material	#	Heigth	A in (mm)	Weight lbs (kg)	Pack
Black lacquered	50 025 30	20	9.84 (250)	3.74 (1.7)	1
Black lacquered	50 025 31	3U	9.84 (400)	6.17 (2.8)	1

SHELF, 2-POINTS

Fixed Shelf front-mounted with 2 points for 19" racks. Load capacity 66.14 lbs (30 kg). Delivered complete with mounting components.



Material	#	Heigth	A in (mm)	Weight lbs (kg)	Pack
Black lacquered	50 025 20	20	9.84 (250)	3.75 (1.7)	1
Black lacquered	50 025 21	3U	15.75 (400)	6.17 (2.8)	1

TELESCOPIC SHELF, 4-POINTS

Sliding Shelf, front-mounted for 19" racks. Load capacity 220.46 lbs (100 kg). Delivered complete with mounting components.



Material	#	Heigth	A in (mm)	Weight lbs (kg)	Pack
Black lacquered	50 025 50	20	18.9 (480)	14.1 (6.4)	1
Black lacquered	50 025 51	20	23.62 (600)	17.63 (8.0)	1
Black lacquered	50 025 52	20	31.49 (800)	22.7 (10.3)	1
Black lacquered	50 025 53	20	39.37 (1000)	28.43 (12.9)	1

54

U-bar

U-BAR B60

0.12" (3 mm) thick sheet. Hole diameter 0.33" (8.5 mm). Distance between holes 1.57" (40 mm). For support of the Defem CombiRack and Wire Tray system.



Length, in (mm)	#	Weight lbs (kg)	Pack
113.23 (2876)	11 494 00	13.89 (6.2)	1
83.46 (2120)	50 024 59	10.6 (4.8)	1
75.6 (1920)	50 024 53	9.3 (4.2)	1
39.37 (1000)	50 024 58	4.9 (2.2)	1
36.22 (920)	50 024 57	4.4 (2.0)	1
31.5 (800)	50 024 56	3.97 (1.8)	1
28.35 (720)	50 024 52	3.5 (1.6)	1
23.62 (600)	50 024 55	3.1 (1.4)	1
20.47 (520)	50 024 54	2.6 (1.2)	1
18.9 (480)	50 024 51	2.4 (1.1)	1
15.75 (400)	50 024 50	1.98 (0.9)	1

JOINING FITTING B61

0.12" (3 mm) thick sheet. For mounting or joining of U-bars.



FLANGE BOLT B66 – PACK OF 50

M8 x 20. For gas tight connections.



	Раск
Zinc plated M8 x 20 11 494 04 1.54 (0.7) 5	50

Accessories U-bar

ANGLE FITTING B62

0.12" (3 mm) thick sheet. For mounting or joining of U-bars.



CORNER FITTING B65

mounting or joining of U-bars.

Material		Weight lbs (kg)	Pack
Zinc plated	11 494 07	0.44 (0.2)	6

ADJUSTABLE FOOT B63

1.81" 0.16" (4 mm) thick sheet. (30 mm) Hole diameter 0.33" 1.34" 0.98"-2.36" (34 mm) (8.5 mm). M8-thread in the U.30 60 mm) back side. Distance between holes 4.09" (104 mm) 1.57" (40 mm). Articulated foot that compensates for uneven floor. (AA MM) Adjustable height 2.75" (70 mm) depending on assembly.

Material		Weight lbs (kg)	Pack
Zinc plated	11 494 06	0.66 (0.3)	6
		7	

END CAP B64

Matorial

The End cap is used for protection of exposed ends of the U-bars.

(40 m (40 m (2) m	77" (2107)
Weight lbs (kg)	Pac

PE, grey	11 494 03	0.22 (0.1)	10

FLANGE NUT B43/M8 - PACK OF 50

M8. For gas tight connect	ions.	M8		
Material		Weight lbs (kg)	Pack	
Zinc plated M8	11 494 05	0.75 (0.34)	50	

Tools

MOUNTING FRAME B2590

Simplifies temporary mounting of CombiRacks. 19" as well as ETSI (535 mm).



SPANNER

Spanners adapted for Defem CombiRack, Mesh Trays and U-bar system.



Material	#	Width, in (mm)	Weight, lbs (kg)	Pack
Chrome Vanadium	16 222 00	0.4 (10)	0.15 (0.07)	1
Chrome Vanadium	16 222 21	0.51 (13)	0.18 (0.08)	1

The Total concept for Tele-and Datacom Technical rooms



CombiRack is designed as a mechanical system for both racking and cable channeling. By installing U-bars and Wire Trays onto the CombiRack, you design a complete and integrated structure.

By constructing the CombiRack with the Defem Multi-level concept, you avoid future cable congestion and you secure future manageability and control of the room. The concept is based on separate tray levels for cable dropping down into racks in the same row (rack tray). Cables going from one rack row to another (bridge tray) and a separate power tray level at safety distance.

The Multi-level concept allows you to move, add and change cables without a problem. As no cables will cross and lock each other, the future flexibility is assured.

Radius Limiters and separation system protects and separates cables in a very simple and flexible way.



Step by step illustrated guide of CombiRack mounting

1. Mount the first rack with the help of the Mounting Frame.

Note: Black knobs horizontally give ETSI distance and white knobs horizontally give 19" distance between the Mounting profiles.

2. Mount the U-bar above the racks for correct spacing and fixing of rack sides. (The U-bar also serves as equipotential bonding conductor between the equipment in the same row).

Mount, if necessary, U-bar to the wall for extra stability.
Adjust, and if necessary, fasten the foot to the floor

(bolt and foot are separated with an isolation washer).

5. If necessary, mark and cut out openings at the Cable Tray sides for simple cable insertion. Put B32 plastic knobs on the wire ends.

6. Install Radius Limiters for bend radius protection for fiber and other sensitive cables.

7. Create "cable lanes" in the tray with B36/B38 Separation plates + holder.

8. Mount Cable Ducts for cable protection. They also assure cable order and access.

9. Install the equipment and cables.



Example of first rack installation with the help of Mounting Frame



U-bar mounting above the racks for extra stability to the wall



Cable managers mounting provides protection, order of cables and easy access to them



Mounting of universal fittings for U-bars to provide stability of construction

















U-bar mounting above the rack



Openings in rack sides provide easy cable entry



Radius Limiter B34 mounting



Cable guiding to the equipment



1 orem

59













































The simple tool for securing the next rack side White knobs horizontally = 19" Black knobs horizontally = ETSI



Application

Telecommunications companies

The primary problems telecommunication companies face are frequent equipment changes, quickly increasing capacities, and voluminous cable routings. All these problems can be solved with the Defem system. This system makes it possible to create complex, three-dimensional structures which offer increased capacity and the ability to update the cabling systems without stopping the operation of the communication node.

Some telecommunication companies which use the Defem system as their main system for cable routing are: Ericsson (Sweden), TeliaSonera (Sweden), TeleDanmark (Denmark), KPN Nederland (Holland), Telia Mobitel (Sweden), Telenor Data (Norway), Telecom Austria (Austria), Lucent Technologies (Germany and Holland), Deutsche Telecom (Germany), NetCologne (Germany), NurnbergNet (Germany), DB Networks (Great Britain), Your Communication (Great Britain), Nortel (Great Britain), Soon Communications (Finland), Eesti Telecom (Estonia), Telkom (South Africa).





Defem system racks installed for mounting equipment in a Swedish telecommunication company

Example of the Defem system in the Swedish telecommunication company TeliaSonera

The Defem system allowed the telecommunication nodes in Sweden to be updated quickly and efficiently. Step by step old equipment was disconnected and utilized. Free space was used to install three-dimensional cable tray configurations.

Tore Rudolvsson invented the method of updating telecommunication nodes'. At the CeBIT exhibition his conception was introduced as a full modernization for telecommunication companies. His concept was based on the principle of a unified standard for cabinets and equipment, cable tray system, and proper work organization.

Results

Within three years, more than 20 telephone offices and zone centers were reconstructed with the help of this system. More than 4000 new local communication nodes were built, thousands of cabinets and hundreds of miles of cable trays were installed. TeliaSonera saved more than 20 million dollars. The greatest and most critical advantage of the Defem system is that, now, TeliaSonera can introduce new equipment and replace old equipment without traffic interruption.







The example of cable routings organization with cable trays of Defem system in telecommunicational company TeliaSonera



Retransmission towers

When building retransmission towers, the Defem system can be used both inside the towers and between the station and the tower. If necessary, the system can be dismounted, updated and new components can be added.

An example of the cable routing and organization

achieved with the use of Defem system cable trays in the telecommunication company, TeliaSonera.



MAIN ADVANTAGES OF DEFEM SYSTEM USAGE IN TELECOMMUNICATION COMPANIES

An original element of the Defem system is the Radius Limiter, which unloads cable. Initially the radius limiter was intended solely for fiber optic cable, because it provides an essential function by decreasing the loss of light from the fiber optic cable during transmission. However, this element also has a wide range of applications when laying different types of cable.











Power and weak-current cables can be laid in different trays. Alternately, they can be marked and separated with special separating plates allowing them to be laid in the same tray without resulting in "spaghetti". What makes the Defem system unique is that it provides easy access to damaged cables and at the same time eliminates cable congestion. Cable trays can also be used as a conductor of equipotential bonding. Some applications which are excluded are shown in the manual concerning equipotential bonding.

Using the Defem system as the base of cabling system organization lowers costs because it offers: simple mounting, a small amount of universal components, standard solution sets, as well as the ability to create the most complex, custom designs. Cable can be laid in trays and guided to telecommunication equipment; it can also be drawn onto another level and connected with cabinets or racks at any time.

HOW TO CONSTRUCT A TELECOMMUNICATION NODE AND SERVER ROOM WITHOUT CABINETS AND RACKS

At the present time, the Defem system of mounting racks for equipment installation is being successfully utilized in telecommunication and other companies throughout the world.



General view of rack mounted using Defem elements



An example of socket, 19" frame with 3U height and 19" shelf installation into a rack comprised of Defem U-Bars



An example of U-Bars installation with the Defem universal fitting



Cable laid using cable trays of the Defem system in a salesroom

U-Bars used to construct a telecommunication rack



Utilization of the universal fitting for U-Bars and tray mounting





EXAMPLES OF THE DEFEM SYSTEM IN APPLICATION



Overall view of cabinets and routed cable in the server room of a large internet provider in Russia



An example of the Defem cabling system and mounting of telecommunication equipment



Potential for easy access and cable replacement



Three-dimensional cable organization provides access to hard-to-reach telecommunication equipment



An example of the radius limiter B34 being used when laying cable in Defem cable trays





ILLUSTRATED GUIDE OF THE DEFEM SYSTEM BEING USED IN AN INTERNET CENTER













High quality and attractive appearance of the zinc-coated cable trays of the Defem system



Strong and reliable construction meets the high requirements of laying cable





Unique application – support for system units



VARIOUS TYPES OF TELECOMMUNICATION NODE MODERNIZATION



An exchange before rebuilding. Step-by-step modernization



Step 1: Disconnect and remove the old equipment and cabinets. Start with the second row



Step 2: Build up Defem system (cable channels and standardized miscellaneous racks) in three levels



Step 3: Develop with more Defem system cable trays and ETSI – standardized miscellaneous racks



Step 4: The last stage of modernization. Old cables and old cabinets are totally removed and replaced by cable trays and ETSI-standard cabinets without any interruption for the subsribers

OCTOPUS

Characteristics:

Long cable runs. The largest cable load on cable trays – the highest risk of cable congestion. The patches inside the breakout cables are not used to the full extent. Breakout cables are bulkier than a corresponding quantity of patch cords. Rolled patch cord must be placed at the ODF end.

STAR

Characteristics:

The lowest possible number of ODF contacts. Compared to Octopus, twice as many cable connections can be used. 50% less cable is needed compared to Octopus. Bunches of patch cords must be placed at the ODF end.

Limitations:

Patch cords are used to

STAR/SATELLITE

Characteristics:

Static cable network between different ODF units. Has large capacity and takes-up little space inside cable trays. Cable trays can be used more efficiently as compared to Star. Suitable design for rooms with double sets of equipment collocations. Patch cords in breakout cable must be placed in the ODF end. Patch cords are used to higher extent when compared to Star. Limitations:



Limitations:

The lowest possible number of ODF contacts.

Conclusion:

Octopus is very easy to install but should be avoided. The risk of cable congestion is very high.



a higher extent when compared to Octopus. Patch cords inside breakout cable are not used to the full extent. Breakout cables are bulkier than corresponding quantity of patch cords.



The static network takes contact capacity from all the ODF units. Patch cords in breakout cable are not used to the full extent. More optical contacts may increase the risk of crosstalk.

CABLING PATTERNS WHICH INCREASE CONNECTION POSSIBILITIES

The figures (pictured right) show different ways of placing cables in the wire trays. Variation 1: maximum number of cables at any section of tray is 500. With Variation 3 you are able to achieve short cable runs and thereby use the tray for 4 times as many cables than Variation 1. Cable tray capacity is a neglected component cost.





Cable channeling above cabinets:

- Large quantities of cables are connected between equipment,

- Short life cycle of equipment,
- Must be able to easily move, add and change cables,

- Must be easily expanded by installing more cable trays in the same room,

- Simple installation of cables in cabinets,
- Easy maintenance.





connections possible

Cable channeling under cabinets (access floor):

- Small quantities of cables between equipment,
- Long life cycle of equipment,
- Cables should not be visible,
- Simple and efficient cooling from below,
- Combined equipment with work room.

Cable channeling above and below cabinets at the same time:

- Large distances between power and signal cables,

- Static cable channeling below cabinets such as power cables/external cables (with few changes),

- Dynamic cable channeling above cabinets such as signal cables.

EXAMPLE OF CABLE CHANNELING BETWEEN BUILDINGS



The Defem system is suitable for all of the above applications; not suitable for underground use

TELECOM INSTALLATION MODELS

There are different types of installation models based on a MultiLevel Concept. They are designed to be used in:

- Telecom stations,
- Computer rooms,
- Communication centers,
- GSM-stations and other applications.

The model or combination of models to be used depends on the shape and conditions of the room, the equipment, the amount of cabling etc. Where cables used in the system require few changes and have long life cycles, it is preferable to use static cable channeling under cabinets. Where dynamic cabling is needed, channeling above the racks and cabinets would be more suitable.



ABOVE CABINET INSTALLATION MODELS





VARIATION 1

This model uses U-bars on levels 1 and 2; B4; B27. Installation above rack is generally used for rooms with high rates of cable turn-over. It is easier and safer to move, add and change cables frequently if you work above the racks.

Characteristics:

This construction based on U-bars is mounted directly to the ceiling or wall, and doesn't require floor support. The three-level model is also mounted without floor support. This model can be implemented where the walls and ceiling are strong, when the floor cannot carry heavy loads, or the floor is already occupied with equipment.

VARIATION 2

This model is similar to Variation 1, but the U-bar is mounted to the floor, not to the ceiling. Variation 2 is constructed from standard pendants. It provides more work space but less flexibility. This model can be used where it would be unsafe for the ceiling to carry heavy loads. Instead, the floor and walls are used as the support elements.




Floor installation models



VARIATION 3

Just like Variation 1, this model also uses U-bars, but only on one level, thus creating more work space (as compared with Variation 1). Construction is without floor and wall supports and is mounted only to the ceiling. The U-bars are fixed by the pendants B12. Attachment to wall is achieved by means of angle fittings B27.

VARIATION 1

This is one of the most economic models. It is built in two levels using the trays, connectors, a bolt cutter and the plastic end caps. This model is used for channeling of an average number of cables. It is more flexible and cost-effective than the third model. This two-level model is mounted only under the raised floor. A transport cable tray is fixed to the length of the cable tray by means of B4 and B27 elements.

VARIATION 2

In this model brackets B4 and support B33 are used. This model is similar to the first model, but in place of the trays, and angle fittings B27, supports B33 are used (height 9.8'' - 13'' (25 - 33 cm)). This configuration can carry heavier loads compared to the trays.

VARIATION 3

This is the single-level model. It is suitable for cables with a low turn-over rate. The figure shows Installation of this Model as viewed from above. It is built with 12.6" and 16.6" (320 and 422 mm) wide trays. It shows how the B4 support is placed in order to achieve the greatest stability, in both tees and four-way crossings.



Industry

Market conditions and production technology in the industry are constantly changing. Therefore, a cabling system for the industry must be flexible and easy to install, while also ensuring the safety of power cables as well as weak-current cables. Moreover, a cabling system must be able to withstand continuous operation and, if necessary, must be easily extended and modernized according to new production capacity.

PLANTS WITH CONVEYOR UNITS

The Defem system makes it possible to lay cable accurately, according to the complicated structure of the conveyor unit. The system can be mounted directly to a new conveyor unit as opposed to wall or ceiling mounting. This makes it possible to lay cables in the most efficient way, to save time and labor costs, and to provide a high level of safety and easy maintenance.

Such famous automobile factories as Volkswagen (Germany), Mercedes-Benz (Germany), Volvo (Sweden), Saab (Sweden) and Mazda (Japan) use the Defem system. Plants which produce household appliances, such as Scania (Sweden), Elecrtolux (Sweden, Hungary), and many others are also equipped with the Defem system.







FOOD AND PHARMACEUTICAL INDUSTRIES, PUBLIC HEALTH SERVICES

The demands placed on cabling systems by the food industry are very specific in many aspects. These demands are similar to the demands of the pharmaceutical industries and public health services.

These cabling systems must meet high data flow and organizational requirements, must control equipment operation, ensure an uninterrupted voltage supply, and also meet high hygienic standards. The Defem system meets the most stringent hygienic requirements. Notably, special fixing sets were designed for this specific purpose, for use in projects with high sanitary regulations.

Cable trays can be mounted vertically or covered with special leads to minimize dust pollution. Cable routing systems are constructed with Defem components at the following food industry enterprises: Nestle (Holland), Unilever (Sweden), Heineken (Holland)Carlsberg(Denmark),MasterFood(Poland), CocaCola (Germany), Arla (Sweden), Frigoscandia (Sweden), Nord Mills (Sweden).



CHEMICAL, OIL AND GAS INDUSTRY



The chemical, oil and gas industries have stringent requirements concerning the materials that the cable trays are made of. Not all materials are suitable for these fields of

production. This is why Defem elements are made of stainless steel (which meets AISI 316L Standard) for application in aggressive environments.



The application of the three-dimensional Defem system at a confectionary plant





Large offices & malls

The Defem system was designed to facilitate the cabling process. With the help of the Defem system, a number of problems, whether they appear in computer classes or in regular installation, can be easily solved.

At the present moment, a number of European offices and malls such as the KLM office (Amsterdam), World trade center (Bucharest), National bank of Chile (Santiago), IKEA (Prague), Vantaa airport (Helsinki), Curacao airport (Antilles), Lambeth Town Hall (London), ABB installation (Sweden and Switzerland), The Folksamhuset building (Stockholm) use Defem system.



Wire tray system application in a telecommunication company



Defem system mounted over a false ceiling in a bank



Defem cable system in the trade center





Off-shore regions

Even in off-shore regions, the Defem system is usually installed within the building living quarters. Very often, during extraction, the working conditions change. This is why the cabling system must be flexible so that it may be easily modified and modernized. In severe environments, many essential functional capabilities such as light, radio-communication, voltage, and fire alarm systems depend on the high quality of the cabling system. All these systems must be installed cooperatively, using a minimum of space. Moreover, it is necessary to lay cables in the most efficient way, by-passing obstacles. Therefore it is of the utmost importance to possess a system which can be easily maintained by the owner. The Defem system is ideal for installation in off-shore living quarters.

Defem's capabilities are not limited to applications with favorable conditions such as indoor installation on land. Defem has a proven advantage when laying cable on maintenance ships and seagoing trawlers. In such instances, galvanized extra-strong outdoor cable trays (in sites with highly humid conditions) or stainless steel trays for operation in severe conditions, in unfavorable or aggressive environments, are used.



Some examples of off-shore plants and dockyards which use the Defem system are: Maersk (Denmark), Dangas (Denmark), Emtuga (Sweden, for living quarters), Betrobas (Brazil); ships: Mill Dave (Canada, maintenance ships), Brattvaag (Norway, trawlers), Masa Shipyard (Finland).





Installation Guide

Standard elements constructed with fittings B1, B2, B3





JOINING TWO-SECTIONS OF CABLE TRAY







BEND CONSTRUCTION

























78

























CONSTRUCTION OF THE SINGLE-PLANE ANGLE

























CONSTRUCTION OF THE T-SHAPED JOINT













Hyperline









CUTTING-OFF CABLE TRAY SECTIONS





















CONSTRUCTING A ONE-SIDED NARROWING

8.6"+12.6" (220+320 mm)

























































CONSTRUCTING A SYMMETRICAL NARROWING

Æ





Cable tray 12.6" (320 mm)



















CONSTRUCTING INTERNAL AND EXTERNAL ANGLES





CONSTRUCTING AN EXTERNAL ANGLE































APPLICATION OF BRACKET B9 FOR WALL TRAY MOUNTING





Application of Ceiling Fittings





Hyperline

1-888-HYPER4U

www.hyperline.com

Application of Threaded Fittings



Application of U-bars



Mounting accessories



BEND PLATE B31









Grounding bar

Defem cable trays provide equipotential bonding.

In summer 2002 Defem cable trays were tested in accordance with standard 61 537:2001 (first edition), sub-clause 11.1.2.

These tests were performed by the Swedish National Testing and Research Institute (SP) in Boras, Sweden.

This location was chosen because the manufacturing and quality requirements for wire mesh cable trays in Sweden and Norway are considered to be the highest in the world. IEC 61537 demands low impedance per foot for each Cable Tray (max 1.52 mOhm/ft) and low impedance for jointing fittings (max 50 mOhm/jointing fitting).

TEST RESULTS

Cable trays of the Defem system can be used as a conductor of equipotential bonding without any additional separately installed copper cable, provided that the installation is performed in accordance with the instructions.

With the exception of cases where a copper cable must be installed in order to meet the conductivity demands. The length of the copper cable is determined on a case-by-case basis. Every jointing has to be marked with Defem Marking clip B44 made of fire resistant plastic and labeled "The cable tray constitutes conductor of equipotential bonding MAY NOT BE BROKEN".







Grounding bar (copper cable) installation on cable trays

EXAMPLES OF USES APPROVED ONLY IN COMBINATION WITH COPPER CABLE.

Example 1.

The use of zinc plated indoor and hot dip galvanized outdoor cable trays 4.72", 2.95" x 5, 2.95" x 4, 2.08" (120, 75×5 , 75×4 , 53 mm) wide is approved only in combination with copper cable.



Example 2.

The use of stainless steel cable trays 4.72", 2.95"x 5, 2.95"x 4, 2.08" (120, 75×5 , 75×4 , 53 mm) wide for the most aggressive environments and stringent hygienic requirements is approved only when used in combination with copper cable.

The use of stainless steel cable trays 8.66", 12.6", 16.61" (220, 320, 422 mm) wide for the most aggressive environments and strict hygienic requirements is approved only in combination with copper cable.





To meet the conductivity demands in these instances, a copper cable must be installed as shown in the picture. To avoid risk of corrosion, cable ends must be terminated with Grounding Clamp B18 made of brass and anodized nickel.



An example of Earth Connection Clamp B18 termination



Installation of copper cable which acts as a grounding bar, and special clamp B44

Case stories

Royal Institute of Technology, Stockholm

The Network Operations Center at KTH, the Royal Institute of Technology in Stockholm, is the academic IP traffic hub in Sweden. Mr. Per Olovson is responsible for the operation, maintenance and expansion of the center. Here is his story about the choice of racking and cable channeling for the room:



No more cable "graveyards"

We need total access to all cables, along the whole cable run. We want to be able to identify and follow each cable from end to end. We hate to capitulate by just cutting off the connectors from patch cables and just leave the patch in a cable "graveyard". That is why we chose the Defem system for multilevel cable channelling to avoid cable congestion.





Static Infrastructure for Changing Technology

"The critical feature of this center is the frequent changing of equipment. The center is constantly modernized and expanded. No equipment lasts longer than 18–24 months. This means changes, frequent changes. This means also that we must have a future-proof environment. We cannot change the racking every time we change equipment, nor can we build new cable pathways when the old ones are jammed"





Mid Mount and 4-point racking

We opted for the Open Mid Mount Racking. We had studied this concept in the U.S., and found it very convenient. With no "walls" around the equipment, it is easy to gain access to cables from all angles. We install the equipment with the side wing profile that fits to the 19" profile of the Mid Mount CombiRack. In this way, it is easy to reach the equipment from both sides. It is also easier to install equipment of any depth in a Mid Mount rack. In some cases 4- point racking is necessary, and therefore we have dedicated rows for both racking concepts.



Warm and cool aisles

We have four aisles in the room, two "warm" and two "cool". The equipment is mounted so that the hot air is directed in the same direction, to the "warm aisles". This means that the cable outlets may come at different sides of the row – which is another reason why we prefer open racking. When we use cabinets, we take away the side panels to ensure the best cooling effect.

Flexibility for cabinets or CombiRack

In some cases, we need to install cabinets that come with the equipment. Therefore, we do not use the "Add-On" concept with CombiRack – we sometimes have to take the whole Mid Mount rack away to make room for a 23.6" (600 mm) wide cabinet. The wire trays could have been installed on the top of the racks, but we preferred to mount the multi-level Defem Wire tray system from the ceiling. In this way, we have more flexibility to move cabinets and CombiRacks under the mechanical structure for the overhead wire tray structure.



CombiRack in Server Room

Taunton School, Somerset, England

Taunton School is an independent boarding and day school for boys and girls, aged 2 to 18, located in the heart of Somerset in the South West of England. There are nearly 1.000 pupils.

Maintenance

Malcolm MacKeith, Finance Bursar, points out three reasons for choosing CombiRack: "Low installation and maintenance costs, excellent security against server downtime and flexibility to expand capacity quickly and economically.

We once had a server go up in smoke due to overheating, so we decided on an open system where there is no risk of heat pockets developing.

Simple build-up

Tom Norton, Network Manager, informed us about the installation steps.

"We designed a three-rack row with CombiRack for the equipment, and Defem Wire Trays for the cabling. The row was assembled with one complete rack, and to that we mounted two Add On extension racks. It was very easy to carry the 44.09 lbs (20 kg) flatpacks through the corridors and into the old darkroom that was to be converted into server room. The CombiRacks were mounted to each other, then mounted to the wall with the U-bars. After that, the Defem wire trays were placed on top of the rack row and connected to four outlets in the room."

30% Floor Space Gain

"The old dark room gave the TS team limited space. With the three-rack row of one complete CombiRack + two Add On "extender" racks, it occupies 18.51 ft² (1.72 m²). Three standard enclosed cabinets would have occupied some 24.76 ft² (2.3 m²). So we created a floor space gain of about 30%".

Open racks best for secured rooms

"We do not need enclosed cabinets for security reasons. The server room is locked and only certified staff have access", Tom explains.

Beautiful for the technical eye

We ask Malcolm for his opinion about the "ugliness" of visible cables and visible equipment; "Would it not be nicer with everything hidden behind cabinet walls?" Malcolm: "A row of cabinets might look more clinical, but this open racking and cable channeling concept is certainly beautiful for people with a technical eye."

Cable Control

Tom joins in: "It was on our minds that we must prevent any cable mess in this room. It is a huge problem when the cables get tangled up with each other. With CombiRack, we can follow any cable from connector to connector without any problems. It is easy to see and reach the cables, and it is simple to remove and replace any of them.

Flexible Rack Depth

"As we do not know what kind of equipment we will use in the future, we need flexibility. At present, the servers are 31.5" (800 mm) deep, but we do not know what depth the next generation will be. Therefore, we installed the 39.4" (1000 mm) deep CombiRack together with an extra pair of mounting profiles at the 31.5" (800 mm) position (see picture). Together with the CombiRack Telescopic Adapter, we can install any equipment with a depth between 23.6" to 39.4" (600 to 1000 mm) in the future".





Defem Wire Tray system in Dublin Port Tunnel

Application – Tunnel Lighting

The heavy power cables are installed at ground level in special cable ducts. The Defem Wire trays were chosen as supports for the Light Boxes and for channeling the light cable. The Light Boxes weigh up to 57.3 lbs (26 kg), with asymmetrical loads, which led to the design of a special mounting plate for attaching to the wire tray. In total, 6.5 miles (10.5 km) of Defem Wire trays were installed.

Air Pressure

The Light Boxes must withstand frequent pressure changes of up to 4000 Pascal. The wire tray itself will be almost "immune" to these pressure changes because of its open construction, but the pressure on the Light Boxes will be transmitted to the wire tray and the supports. The Defem B23 Ceiling Fitting was equipped with special serrated nuts and the B19 Extension was stabilized with a diagonal bracket. The Light Box is fixed to the wire tray with a specially built mounting plate. Physical tests were performed to verify the strength of the Light Box mounting and the whole system.









Fire Test

In case of fire, the ventilators will turn into veritable "jet engines" – blowing smoke out from the tunnel. The Light Boxes and the wire tray system were tested and approved for this extreme horizontal air pressure. The approval from the German 30 and 90 minute fire tests convinced the engineers that the wire trays would continue to support the light cables even under open fire.

Complicated Made Simple

The tunnel has a slight bend to which, given the strength and simplicity of the standard Defem fitting, it was easy to adapt the wire tray system. To follow the bend of the tunnel, no cutting or shaping of trays was needed. Instead, the flexibility of the B1/B2 Fitting allowed for the adaptation of the trays to this smooth shape. In some cases a sharper bend was made, for example to allow for the exhaust fans, by cutting the trays and joining them with the B27 Angled Fitting. "In total, we needed only 11 different articles for the completion of the wire tray system", Joe McCarthy, the distributor in Ireland, concludes. "It was highly appreciated that any unexpected problem could be solved with the standard components. For this type of project, the lead time is extremely critical".

Reduced Lead Time

Mercury Engineering, one of the biggest electrical contractors in Europe, first considered a conventional work platform. Joe McCarthy again:

"Mercury noticed they would lose time with this conventional method. Therefore, they transformed a double-decker bus into a Defem installation platform. This greatly sped-up the process: the drilling and support mounting was made from the platform. After that the pallets with wire trays were lifted up with a forklift, the trays were joined in 16.4 ft (5 meter) sections and lifted onto the supports. With this method, two workers accomplished between 13.1 ft and 1640.4 ft (4 and 500 meters) of complete installation per week."

Safety and Cost

To keep costs down and to optimize the installation, different support distances were chosen. In the 16.6" (422 mm) wide wire tray line, the support distance is between 5.9 ft to 8.2 ft (1.8 to 2.5 meters) whereas with the 4.7" (120 mm) tray, the distance varies between 6.6 ft to 9.8 ft (2 to 3 meters). To avoid the risk of a detrimental wave effect, it was decided they would work with different support distances.





Visual Quality

"This is the biggest infrastructure project in Ireland's history, the media coverage is enormous and millions of users will look at it for the next 50-100 years. So Mercury made a special effort to make it look good", says Joe McCarthy.

Cable ladders overview

KHZSP-KHZSPZ

104



KHZPS





Length	9.8 ft (3 m), 13 ft (4 m), 19.7 ft (6 m)
Width	7.9" (200 mm) – 23.6" (600 mm)
Pre-galvanized	
Hot dip galvanized	
Zinkpox [®] coated white	
Stainless steel AISI 316L	



Length	19.7 ft (6 m)
Width	5.9" (150) – 39.4" (1000)
Pre-galvanized	
Hot dip galvanized	
Zinkpox [®] coated white	
Stainless steel AISI 316L	

KHZ





Longth	10.7 ft (6 m)
Length	19.7 It (0 III)
Width	5.9" (150) - 23.6" (600)
Pre-galvanized	
Hot dip galvanized	
Zinkpox [®] coated white	
Stainless steel AISI 316L	

KHZP





Stainless steel AISI 316L



▶ 0.6" (17)	
0.8" (21)	

Length	19.7 ft (6 m)
Width	7.9" (200) – 23.6" (600)
Pre-galvanized	
Hot dip galvanized	
Zinkpox [®] coated white	
Stainless steel AISI 316L	

KHZPV





Length	19.7 ft (6 m)
Width	7.9″ (200) – 39.4″ (1000)
Pre-galvanized	
Hot dip galvanized	
Zinkpox [®] coated white	
Stainless steel AISI 316L	

KHZV

Corrosion classes

106

Corrosion classes

The life expectancy of a cable support system is dependent on the environment in which it is placed. Therefore, it is important to establish the corrosive properties of an environment to ensure that the right treatment and the right materials are chosen.

To achieve this, several corrosion classes have been outlined up in accordance with BSK99. The table below shows various corrosion classes. As a guide, we have included the surface treatment recommended for the different classes.

On the next page, we briefly outline the various surface treatments and materials.

With regard to environmental corrosion, a steel design component can usually be assigned to one of the corrosion classes (C1-C5-M) as shown in table 1. Reference values for the average level of corrosion in steel and zinc are given in table 2 The corrosion classes comply with those stipulated in SS-EN ISO 12944-2.

Table 1

Corrosion classes as stipulated by SS-EN ISO 12944-2 with atmospheric corrosion levels and examples of the environment in which they are most suitable for use.

Corrosion Environmental class corrosion	Environmental	Examples of typical environments in temperate climates (informative)		Recommended min. surface treatment
	corrosion	Outdoors	Indoors	Designations
(1	Very low		Heated areas with arid atmospheres and insignifi- cant quantities of pollutant, e.g. offices, shops, schools and hotels.	Electro-galvanized
Q	Low	Atmospheres with low levels of airborne pollu- tion. Rural areas.	Non-heated areas with fluctuating levels of temperature and humidity. Few instances of con- densation and low levels of airborne pollution, e.g. sports halls and warehouses.	Pre-galvanized Z 275 In accordance with SS-EN 10327:2004
G	Average	Atmospheres containing some salt or average levels of airborne pollution. Urban and light industrial areas. Areas affected by coastal conditions.	Areas with average levels of humidity and some airborne pollution resulting from production processes, e.g. breweries, dairies, laundries.	Hot dip galvanized after manufacture in accordance with SS-EN ISO1461
C4	High	Atmospheres with average salt content or discernible levels of airborne pollution. Industrial and coastal areas.	Areas of high humidity and considerable airborne pollution experience as the result of production processes, e.g. chemical plants, swimming pools and dockyards.	Hot dip galvanized after manufacture in accordance with SS-EN ISO 1461
C5-I	Very high (industrial)	Industrial areas with high levels of humidity and aggressive atmospheres.	Areas with almost permanent condensation and large quantities of airborne pollution.	Zinkpox® Hot dip galv+powder coat- ing Stainless steel SS2333 AISI 304
C5-M	Very high (marine)	Coastal and offshore areas with high salt content.	Areas with almost permanent condensation and large quantities of airborne pollution.	Stainless steel SS2348 AISI 316L

Table 2

Mass losses for steel and zinc in various corrosion classes

Mass loss per surface unit and thickness reduction (1 year of exposure)¹

Corrosion class	Steel		Zinc	
	Mass loss, g/m² (oz/ft²)	Thickness reduction (um)	Mass loss, g/m² (oz/ft²)	Thickness reduction (um)
C1	<u>≤</u> 0.03 (10)	≤1.3	<u>≤</u> 0.0015 (0.7)	≤0.1
(2	> 0.03 (10) to 0.65 (200)	> 1.3to25	> 0.0015 (0.7) to 0.015 (5)	> 0.1to0.7
ß	> 0.65 (200) to 1.3 (400)	> 25 to 50	> 0.15 (5) to 0.049 (15)	> 0.7 to 2.1
C4	> 1.3 (400) to 2.1 (650)	> 50 to 80	> 0.049 (15) to 0.01 (30)	> 2.1 to 4.2
C5-I	> 2.1 (650) to 4.9 (1500)	> 80 to 0.65	> 0.01 (30) to 0.02 (60)	> 4.2 to 8.4
C5-M	> 2.1 (650) to 4.9 (1500)	> 80 to 0.65	> 0.01 (30) to 0.02 (60)	> 4.2 to 8.4

1 Corrosion is generally faster when the material Is first exposed
Surface treatments

Electro-galvanized Fzb

Some products are electro-galvanized in accordance with ISO 2081. Such products are intended for use only in warm, dry areas with negligible levels of pollution.

Pre-galvanized Fzs

Products are manufactured from Z 275 pre-galvanized sheet steel in accordance with SS-EN 10327:2004. Surface sections created during cutting and drilling will, under normal conditions, repair themselves, providing the plant with superb anti-corrosion protection.

Hot dip galvanized Fzv

Manufactured products are hot dip galvanized in accordance with SS-EN ISO 1461, and nuts and bolts are hot dip galvanized in accordance with SS-EN ISO 10684:2004. The hot dip process is continuous, guaranteeing a high and even quality. This form of galvanization offers cost-effective anti-corrosion protection in atmospheres with a pH level between 6 and 13. However, in acidic environments where pH levels fall below 6 and in alkaline environments where the pH level exceeds 13, the protective zinc layer breaks down relatively quickly.

Zinkpox

The Zinkpox method involves applying a homogenous poly-



The rate of dissolution is determined by the pH value of pure zinc in distilled oxygenated water that has been pH adjusted to various levels using HCl or NaOH.

NB: The curve only applies to conditions shown, and gives only an indication of the propensity for corrosion without consideration to time.

ester coating to the zinc layer.

Besides resisting light-degeneration and weathering, this powder coating offers excellent impact resistance and adhesion.

It is also resistant to most chemicals.

Compared to hot-dip galvanizing, applying a polyester coating to the zinc layer more than doubles the service life of treated components. The zinc layer prevents the development of filiform corrosion, which might otherwise degrade the coating. Consequently, only the polyester coating is subjected to the environment, thus protecting the zinc layer.

In addition to extremely good corrosion protection, the Zinkpox method also offers a choice of colors. Powder coating is a very environmentally-friendly way of achieving colored surfaces. Because the coating contains no solvents, it has largely replaced solvent-based liquid coatings.

Where installations are visible, cable ladders and fittings can be finished in a coating that matches the surrounding decor.

Modern coating plant

Before powder coating, the galvanized components undergo meticulous pre-treatment. This ensures superb adhesion.

The certified coating plant that treats the components uses

a modern and environment-friendly process. There are seven pretreatment stages; alkaline degreasing, rinsing, rinsing, phosphating, rinsing, passivation and rinsing with de-ionised water.

Immediately after pre-treatment, the components are dried in a tunnel oven. They are then powder coated in an automatic booth. This guarantees that all the components are correctly processed. The coating is cured in a tunnel oven. To achieve the perfect curing curve, temperature regulation in each section of the oven is stepless.

At no stage in the process are the components touched by human hands. An electronically controlled conveyor takes care of all the necessary handling. The end result of this certified, environmentally-friendly process is a weather-resistant surface that possesses high durability in the face of chemical and mechanical attrition.

Stainless steel

Stainless steel products, manufactured in accordance with

Erichsen cupping	DIN 53156	> 0.3"(7)
Impact resistance, ASTM	D2794 reverse	> 20 IP
Mandrel bend test	DIN 53152	< 1.6"(4)
Cross-cut test	DIN 53151	GT0
Film hardness	DIN 53153	< 90

SS 2333/AISI 304, or in accordance with SS 2348/AISI 316L, are designed for use in highly aggressive environments, either indoors or outdoors, on industrial sites where there are high levels of potent airborne pollution, such as in certain chemical industries, cellulose related industries, refineries or artificial fertilizer factories, high humidity tunnels, etc.

Stainless steel products are also ideal for use in environments where special hygiene requirements are in force, such as dairies, abattoirs, other food industries, and pharmaceuticals factories.

Stainless steel AISI 304 or AISI 316L?

The deciding factor in choosing between stainless steel AISI 304 or AISI 316L is the aggressiveness of the environment in which it is to be used. For this, atmospheric chlorine content plays a significant role. Environments with a high chlorine content – coastal areas being a prime example – are aggressive, and usually require the use of AISI 316L materials.

When assessing the needs of factories, consideration should be given to the materials previously used to suspend equipment such as pipe tubing, and from this determine whether stainless steel

AISI 304 or AISI 316L material is required.

Factors to consider when installing Stainless Steel Cable Ladder Systems

1. Transport/handling

Make sure that no iron objects come into contact with the stainless steel products.

2. Storing

Never store stainless steel products near places where iron products are machined, for example, close to cutting and grinding operations.

3. Welding

Welding during installation should be avoided where possible. If welding must be performed, make sure that only methods suitable for stainless steel are used.

4. Tools

When cutting or grinding, always use cutting wheels and grinding tools which are free from iron. Do not use tools that have been previously used for cutting or grinding products containing iron.

When drilling, use an HSS-drill. To maximize the useful life of the drill, employ a cooling fluid during drilling.

During installation, conventional assembly tools can be used. However, when tightening nuts ensure that the thread is first lubricated to prevent jamming.

Never mix untreated or galvanized products with stainless steel!

5. Measures

Installation regulations Installing cables on Ladder

The installation of cables on ladders falls within the IEE Regulations for Electrical Installations.

Because cable ladders have rungs which occupy less than 10% of the plan area under the cables, the installation is defined as cables in "free air" (Method 12 of Table 9A of the IEE Regulations).

Cable spaces in accordance with Method 12 do not require any derating factor for installation.

Cable touching must be derated in accordance with table 9B.

Extracted from table 9B

Method of installation	Correction Factor Cg Number of circuits of multicare cables							
	2	3	4	5	6	7	8	9
Single layer multicare touching on ladder supports	0.86	0.82	0.80	0.79	0.78	0.78	0.78	0.77

Installation of Cable Ladder

The installation of cable ladders is a question of structural steel support design, which is not regulated. Full design data is given in the data sheets in this catalogue showing all maximum and recommended loadings.

Any support system, which is supported at intervals and

Current load of cables Installation instructions

Installation

The ladders and trays shall be installed in such a way that, as often as possible the cables can be laid directly in place rather than being pulled through.

Ladders and trays for current carrying cables along the ceiling shall be installed in such a way that the distance from the top of the ladder or tray to the ceiling shall not be less than 11.8" (300 mm). The free vertical distance between parallel ladders and trays shall be at least 7.9" (200 mm).

Ladders and trays near walls shall be installed with a minimum free distance of 1.9" (50 mm) to the wall, so that cables can pass between the ladders and the wall.

Ladders and trays along partition walls shall be installed with minimum free distance of 3.9" (100 mm) to the wall. Sharp edges and screw ends on ladders or trays should be

removed before the cables are installed.

Expansion bolts for the installation of brackets/fixings shall be installed with such a distance between them, that the designated load for ladders and trays will not be exceeded. When If blue annealing appears when cutting, grinding or drilling, remove it with pickling paste, making sure that the paste is then carefully washed away with water.

If selective corrosion appears it can be removed by:

a) Washing it away with water (high pressure if possible),

b) Polishing with a cleaning cloth or a fine emery paper (wet or dry) and washing with water,

c) Grinding with a fine-grained wheel and washing with water,

d) Pickling with pickling paste, making sure that the pickling paste is then carefully washed away with water.

6. When using pickling paste or similar products, always read the safety instructions for the product prior to use.



loaded, will deflect between the support intervals. Graphs are given in this catalogue to show the deflection against loading for various support distances.

Extracted from table 9A

Sheathed, single-core cables in free air (any supporting metalwork under the cables occupying less than 10% of the plan area):

1. Two or three cables vertically, one above the other, distance between cables equal to the overall cable diameter (D_e):

Distance from the wall not less than 0.5 D_{e} .

2. Two or three cables horizontally, spaced as above.

3. Three cables in trefoil, distance between wall and surface of nearest cable 0.5 $\rm D_e$ or nearest cables 0.75 $\rm D_e.$

selecting the distance between cantilever arms or brackets/fixings, the bearing strength and designated load of the ladders and trays must be taken

into consideration.

Reinforced heavy duty cable ladders

Ladders shall be designed for a uniform load of at least 600 N per 39.4" (1.000 mm) ladder length with a distance of 236" (6.000 mm) between brackets/fixings. They shall also be able to carry an occasional point load as to the heavy duty ladders.

Heavy duty cable ladders, cable trays

Ladders and trays shall be designed for a uniform load of at least 200 N per 39.4" (1.000 mm) ladder length and 3.9" (100 mm) width with a distance of 78.7" (2.000 mm) between brackets/fixings. They shall also be able to carry an occasional point load of 1000 N with a double safety factor measured between supporting points 3 and 4 when using an installation with six supporting points.

Light duty cable ladders, cable trays

Ladders and trays shall be designed for a uniform load of at least 100 N per 39.4" (1.000 mm) ladder length and 3.9" (100 mm) width with a distance of 78.7" (2.000 mm) between brackets/fixings.

Potential balancing

Resistance testing of cable ladders has been performed by the Swedish National Testing & Research Institute in Boras. The tests have been carried out according to SS-EN 61537, IEC 61537 and EL-AMA SBD 2.



Product	Ohm/m
Cable Ladder KHZSP without joint, pre-galvanized	0.00089
Cable Ladder KHZSP with Joint 19, pre-galvanized	0.00100
Cable Ladder KHZSP with Coupling 22, pre-galvanized	0.00160
Cable Ladder KHZ/KHZP without joint, hot dip galvanized	0.00050
Cable Ladder KHZ/KHZP with Joint 21, hot dip galvanized	0.00040
Cable Ladder KHZ/KHZP with Coupling 22, hot dip galvanized	0.00073
Cable Ladder KHZV without joint, hot dip galvanized	0.00038
Cable Ladder KHZV joined with Screw set M12, hot dip galvanized	0.00039
Cable Ladder KHZV with Joint 45, against welded joint, hot dip galvanized	0.00057
Cable Ladder KHZV with Joint 45 (without welded joint), hot dip galvanized	0.00083
Cable Ladder KHZV with Coupling 44, hot dip galvanized	0.00043

Installation summary





Components

- 1 Cable ladder KHZSP, KHZSPZ
- 2 Cable ladder KHZ
- 3 Cable ladder KHZPS, KHZP
- 4 Cantilever arm 50i
- 5 Cantilever arm 50, 50L, 50F
- 6 Profile clamp 42 7 Back plate 40
- 8 Mounting rail 40
- 9 Support bracket 3, Support bracket 6 10 Vertical pieces
- 11 Pendant/Fixing rails
- Fixing rail 24/26x53 for casting-in
 Fixing rail JSA 24/26x40 for casting-in
- 14 Ceiling bracket 5 15 Pendant base plate 520
- 16 Round bar fixings (ceiling, wall, floor)
- 17 Rail fixing support 24/20F, 24/20FS
- 18 End bracket HT-11
- 19 Pendant joint 2J, 2FJ, 20J
- 20 Pendant bar 1
- 21 Joint 21
- 22 Joint 9
- 23 Intermediate connection bolt 29
- 24 Dropper joint 32
- 25 Reducer 31
- 26 Coupling 22 27 Fixed take-off hook 4
- 28 End connection 10 29 Profile clamp 41
- 30 Wall bracket 11/25, 11/75
- 31 Cross member plug 27 32 End plug 28, 28i
- 33 Profile protection 28P
- 34 End plug 28E, 28D, 28C, 28F
- 35 Angle plate 33/1, 33/2
- 36 90° bend 15
- 37 Junction coupling 14
- 38 T-junction 16
- 39 X-junction 17
- 40 Riser 18
- 41 Junction box plate 35P 42 Junction box plate 35S
- 43 Earth clamp W79
- 44 Ceiling bracket TF10 and TF16
- 45 Support bracket HSO
- 46 Installation plate 60 47 Installation plate 62
- 48 Installation plate 61
- 49 Dividing strip 39
- 50 Distance piece W39
- 52 Cover plate 65
- 53 Junction box cover
- 54 Tele-conduit 36
- 55 Clamp 12
- 56 Hook 8
- 57 Cable clamp A and R
- 58 Insert piece EM
- 59 Cable clamp ER 60 Lashing wire
- 61 Mounting rail WMS25 62 Cable roller S
- 63 Cable roller 38 Rig'n roll/Cable roller set 66
- 64 Marking plate 93 65 Threaded rod M10W76
- 66 Cover W5
- 67 Cover joint
- 68 Profile support piece 37
- 69 Cover clamp 70 Cover 90° bend
- 71 Cover T-junction
- 72 Protecting cover
- 73 Screw sets
- 74 Expansion bolts
- Fixings-concrete screws

Fixing tray N for casting-in





Components

- 1 Cable ladder KHZV 2 Cable ladder KHZPV 3 Cantilever arm 50F 4 Profile clamp 43 5 Dividing strip 39 6 Mounting rail 40 7 Support bracket 3 8 Vertical piece 20 9 Vertical piece 20 9 Vertical piece 20F 10 Vertical piece 20FS 12 Pendant/Fixing rail 24/48 13 Pendant/Fixing rail 24/20F 14 Pendant/Fixing rail 24/20F Pendant/Fixing rail 24/20FS
 Ceiling bracket 5 17 Pendant base plate 520 Peridant base place 320
 Round bar fixings (ceiling, wall, floor)
 Rail fixing support 24/20F, 24/20FS
 Pendant joint 2J, 2 FJ, 20J
 End connection 10
 Den file alrees 41 22 Profile clamp 41 23 Wall bracket 11/25, 11/75 24 Cross member plug 27 25 End plug 28E, 28D, 28C, 28F 26 Joint 45 27 Take-off hook 47 28 Profile support piece 46 29 Riser coupling 49 30 Marking plate 93 31 90° bend 55 32 T-junction 56 33 Screw set M12 34 Lighting bracket 200

 - 35 Coupling 44 36 Coupling 51
- 36 Coupling 51 37 Junction box plate 35P 38 Junction box plate 35S 39 Installation plate 60 40 Installation plate 61 41 Cover plate 65 42 Cable clamp A and B

- 42 Cable clamp A and R 43 Insert piece EM
- 44 Cover W5
- 45 Cover joint46 Profile support piece 37
- 47 Cover clamp
- 48 Screw sets
- 49 Expansion bolts
- 50 Profile protection 28P Fixings - concrete screws







Components

1 Cantilever arm 50i
3 Cantilever arm 50L, 50, 50F
4 Profile clamp 42 5 Back plate 40
6 Support bracket 3
 Support bracket 6 Support bracket HSO
9 Vertical piece 2FPK
10 Vertical piece 2 11 Vertical piece 2F
12 Vertical piece 20
13 Vertical piece 20F
15 Pendant/Fixing rail 24/34
16 Pendant/Fixing rail 24/48
18 Pendant/Fixing rail 24/20F
19 Pendant/Fixing rail 24/20FS
21 Pendant joint 2FJ
22 Pendant joint 20J 23 Threaded red M10W76
24 Ceiling bracket TF-10, TF-16
25 Ceiling bracket 5
27 Rail fixing support 24/20F, 24/20FS
28 Ceiling plate 20F, 20FS
30 Bracket 60/40
31 Beam clamp 5BK
33 Ceiling bracket 5TPA
34 Angle bracket 5L
36 Wall bracket 20, 20F
37 Wall bracket 11/25, 11/75
39 Screw sets
40 T-bolts

- 40 1-boits
 41 Round bar fixing for ceilings
 42 Round bar fixing for walls
 43 Round bar fixing for floors
 44 Clamp set M6
 Fixings expansion bolts, concrete screws

Cable ladders



	A in (mm)	B in (mm)	L=6 m Pre-galv. Part.No. C*	L=4 m Pre-galv. Part.No. C*	L=3 m Pre-galv. Part.No. C*	Weight lbs 100 ft (kg 100 m)
KHZSP-200	7.8 (198)	6.4 (164)	734488 8	718572 6	783155 5	161.7 (198)
KHZSP-300	11.7 (298)	10.4 (264)	734489 5	718573 3	783156 2	177.2 (217)
KHZSP-400	15.6 (398)	14.3 (364)	734490 1	718574 0	783157 9	193.5 (237)
KHZSP-500	19.6 (498)	18.2 (464)	734491 8	718575 7	783158 6	226.2 (277)
KHZSP-600	23,5 (598)	22,2 (564)	734492 5	718576 4	783159 3	226.2 (277)

*EAN-code=732167+Part.no+C (control figure) **The cable ladders must not be used as walkways.**

Applications

Hospitals, public buildings, schools, storage buildings, small industries, department stores, offices... wherever there are dry environments.

Going through a fire wall

When passing through a fire wall, the ladder must be cut on either side of the fire barrier.

Loadings

The ladders are tested according to IEC 61537, test model II – a joint in the intermediate span (position F2).

Guaranteed load

Guaranteed uniformly distributed load includes a minimum safety factor of 0.39" (1.7 mm) towards rupture. The diagram shows the deflection with Joint 0.8" (21 mm) for ladder widths up to 23.6" (600 mm).





	A in (mm)	B in (mm)	Hot dip galv. Part.No. C*	Weight lbs 100 ft (kg 100 m)
KHZSPZ-200	7.8 (198)	6.4 (164)	734494 9	163.3 (200)
KHZSPZ-300	11.7 (298)	10.4 (264)	734495 6	179.7 (220)
KHZSPZ-400	15.6 (398)	14.3 (364)	734496 3	196 (240)
KHZSPZ-500	19.6 (498)	18.2 (464)	734497 0	212.3 (260)
KHZSPZ-600	23.5 (598)	22.2 (564)	734498 7	228.6 (280)

*EAN-code = 732167 + Part.no + C (control figure) **The cable ladders must not be used as walkways**

Applications

Industrial installations both indoors and outdoors.

Going through a fire wall

When passing through a fire wall, the ladder must be cut on either side of the fire barrier.

Loadings

The ladders are tested according to IEC 61537, test model II – a joint in the intermediate span (position F2).

Guaranteed load

Guaranteed uniformly distributed load includes a minimum safety factor of 0.39" (1.7 mm) towards rupture. The diagram shows the deflection with Joint 0.8" (21 mm) for ladder widths up to 23.6" (600 mm).







	A in (mm)	B in (mm)	Pre-galv. Part.No. C*	Weight lbs 100 ft (kg 100 m)
KHZPS-150	5.8 (147)	4.37 (111)	725350 0	183.7 (225)
KHZPS-200	7.7 (197)	6.3 (161)	725351 7	191.9 (235)
KHZPS-300	11.7 (297)	10.3 (261)	725352 4	208.2 (255)
KHZPS-400	15.6 (397)	14.2 (361)	725353 1	224.6 (275)
KHZPS-500	19.5 (497)	18.1 (461)	7253548	245 (300)
KHZPS-600	23.5 (597)	22 (561)	725355 5	257.2 (315)
KHZPS-800	31.3 (797)	29.9 (761)	781099 4**	334.8 (410)
KHZPS-1000	39.2 (997)	37.8 (961)	725356 2	400.1 (490)

*EAN-code = 732167+ Part.no + C (control figure) **Made to order

The cable ladders must not be used as walkways

Applications

Hospitals, public buildings, schools, storage buildings, small industries, department stores, offices... wherever there are dry environments.

Going through a fire wall

When passing through a fire wall, the ladder must be cut on either side of the fire barrier.

Loadings

The ladders are tested according to IEC 61537, test model II – a joint in the intermediate span (position F2).

Guaranteed load

Guaranteed uniformly distributed load includes a minimum safety factor of 0.39" (1.7 mm) towards rupture. The diagram shows the deflection with Joint 0.8" (21 mm) for ladder widths up to 23.6" (600 mm). For widths greater than 23.6" (600 mm) contact the distributor.



CABLE LADDER KHZ





	A in (mm)	B in (mm)	Hot dip galv. Part. No. C*	Closed Hot dip galv. Part. No. C*	Closed Stainl. steel (AISI316L) Part. No. C*	ZINKPOX White Part. No. C*	Weight lbs 100 ft (kg 100 m)
KHZ-150	5.8 (147)	4.37 (111)	768001 6	726416 2**	727376 8**	714058 9	220.5 (270)
KHZ-200	7.7 (197)	6.3 (161)	768002 3	726417 9**	727377 5**	7140596	228.6 (280)
KHZ-300	11.7 (297)	10.3 (261)	768004 7	726419 3**	727378 2**	714061 9	245 (300)
KHZ-400	15.6 (397)	14.2 (361)	768005 4	726420 9**	727379 9**	714062 6	261.3 (320)
KHZ-500	19.5 (497)	18.1 (461)	768006 1	726421 6**	727380 5**	714063 3	277.7 (340)
KHZ-600	23.5 (597)	22 (561)	768007 8	726422 3**	727381 2**	714064 0	294 (360)

*EAN-code = 732167 + Part.no + C (control figure) **Made to order

The cable ladders must not be used as walkways.

Applications

Industrial installations both indoors and outdoors. KHZ (AISI 316L) for installations e.g. in food industries.

Going through a fire wall

When passing through a fire wall, the ladder must be cut on either side of the barrier.

Loadings

The ladders are tested according to IEC 61537, test model II – a joint in the intermediate span (position F2).

Guaranteed load

Guaranteed uniformly distributed load includes a minimum safety factor of 0.39" (1.7 mm) towards rupture. The diagram shows the deflection with Joint 0.8" (21 mm) for ladder widths up to 23.6" (600 mm).





	L in (mm)	A in (mm)	B in (mm)	Hot dip galv. Part. No. C*	Stainl. steel (AISI316L) Part.No. C*	ZINKPOX White Part.No. C*	Weight lbs 100 ft (kg 100 m)
KHZP-150	236 (6000)	5.8 (147)	4.37 (111)	718562 7	727382 9	718591 7	212.4 (260)
KHZP-200	236 (6000)	7.7 (197)	6.3 (161)	718563 4	727383 6	718592 4	220.5 (270)
KHZP-300	236 (6000)	11.7 (297)	10.3 (261)	718564 1	727384 3	718593 1	236.9 (290)
KHZP-400	236 (6000)	15.6 (397)	14.2 (361)	718565 8	727385 0	718594 8	244 (315)
KHZP-500	236 (6000)	19.5 (497)	18.1 (461)	718566 5	727386 7	718595 5	277.7 (340)
KHZP-600	236 (6000)	23.5 (597)	22 (561)	718567 2	727387 4	718596 2	294 (360)
KHZP-800	236 (6000)	31.3 (797)	29.9 (761)	721960 5	782128 0**	728033 9**	400.2 (490)
KHZP-1000	236 (6000)	39.2 (997)	37.8 (961)	718568 9	782129 7**	718597 9**	457.4 (560)
KHZP-150	118 (3000)	5.8 (147)	4.37 (111)	783516 4**		783524 9**	212.4 (260)
KHZP-200	118 (3000)	7.7 (197)	6.3 (161)	783517 1**		783525 6**	220.5 (270)
KHZP-300	118 (3000)	11.7 (297)	10.3 (261)	783518 8**		783526 3**	236.9 (290)
KHZP-400	118 (3000)	15.6 (397)	14.2 (361)	783519 5**		783527 0**	244 (315)
KHZP-500	118 (3000)	19.5 (497)	18.1 (461)	783520 1**		783528 7**	277.7 (340)
KHZP-600	118 (3000)	23.5 (597)	22′ (561)	783521 8**		783529 4**	294 (360)
KHZP-800	118 (3000)	31.3 (797)	29.9 (761)	783522 5**		783530 0**	400.2 (490)
KHZP-1000	118 (3000)	39.3 (997)	37.8 (961)	783523 2**		783531 7**	457.4 (560)

*EAN-code = 732167 + Part.no + C (control figure) **Made to order **The cable ladders must not be used as walkways**

Applications

Industrial installations both indoors and outdoors.

Going through a fire wall

When passing through a fire wall, the ladder must be cut on either side of the fire barrier.

Loadings

The ladders are tested according to IEC 61537, test model II – a joint in the intermediate span (F2).

Guaranteed load

Guaranteed uniformly distributed load includes a minimum safety factor of 0.4" (1.7 mm) towards rupture. The diagram shows the deflection with Joint 0.82" (21 mm) for ladder widths up to 23.6" (600 mm). For widths greater than 23.6" (600 mm) contact the distributor.





CABLE LADDER KHZV





	A in (mm)	B in (mm)	Hot dip galv. Part.No. C*	ZINKPOX White Part.No. C*	Weight lbs 100 ft (kg 100 m)
KHZV-200	7.75 (197)	6.3 (161)	712015 4	714198 2	359.3 (440)
KHZV-300	11.7 (297)	10.3 (261)	712017 8	714200 2	375.7 (460)
KHZV-400	15.6 (397)	14.2 (361)	712019 2	714202 6	392 (480)
KHZV-500	19.5 (497)	18.1 (461)	712018 5	714201 9	408.4 (500)
KHZV-600	23.5 (497)	22 (561)	712020 8	714203 3	432.8 (530)

*EAN-code = 732167 + Part.no + C (control figure) **The cable ladders must not be used as walkways**

Applications

The ladder is designed for extreme support distances and loadings.

Going through a fire wall

When passing through a fire wall, the ladder must be cut on either side on the fire barrier.

Loadings

The ladders are tested according to IEC 61537, test model II for bracket distance up to and including 13.1 ft (4m), test type V for bracket distance more than 13.1 ft (4m).

Guaranteed load

Guaranteed uniformly distributed load includes a minimum safety factor of 0.4" (1.7 mm) towards rupture. The diagram shows the deflection for ladder widths up to 23.6" (600 mm).



CABLE LADDER KHZPV





	A in (mm)	B in (mm)	Hot dip galv. Part.No. C*	ZINKPOX White Part.No. C*	Weight lbs 100 ft (kg 100 m)
KHZPV-200	7.75 (197)	6.3 (160)	717982 4	723390 8**	347.9 (426)
KHZPV-300	11.7 (297)	10.2 (260)	717983 1	723391 5**	365.9 (448)
KHZPV-400	15.6 (397)	14.1 (360)	717984 8	723392 2**	383.9 (470)
KHZPV-500	19.5 (497)	18.1 (460)	717985 5	723393 9**	402.7 (493)
KHZPV-600	23.5 (597)	22 (560)	717986 2	723394 6**	420.6 (515)
KHZPV-1000	39.3 (997)	37.8 (960)	716400 4	716401 1**	574.2 (703)

*EAN-code = 732167 + Part.no + C (control figure) **Produced to order

The cable ladders must not be used as walkways

Applications

The ladder is designed for extreme support distances and loadings.

Going through a fire wall

When passing through a fire wall, the ladder must be cut on either side on the fire barrier.

Loadings

The ladders are tested according to IEC 61537, test model II for bracket distance up to and including 13.1 ft (4m) test type V for bracket distance more than 13.1 ft (4m).

Guaranteed load

Guaranteed uniformly distributed load includes a minimum safety factor of 0.4" (1.7 mm) towards rupture. The diagram shows the deflection for ladder widths up to 23.6" (600 mm). For widths greater than 23.6" (600 mm) contact the distributor.



Suspension components

Cantilever arms, Back plates, Mounting Rails, Profile clamps

CANTILEVER ARM 50i

PROFILE CLAMP 42

arms, support brackets etc.

Used for lighter mountings on walls, vertical pieces or pendant/ fixing rails.



For installation inside cable ladder KHZSP

CANTILEVER ARM 30

PROFILE CLAMP 43

to cantilever arms, support brackets etc.



For mounting on walls, pendant/fixing rails or vertical pieces.



BACK PLATE 40

For installation behind Cantilever arm 50 to reduce the surface pressure on porous walls.



For installation where the cable ladder is to be fixed to cantilever

MOUNTING RAIL

The rail permits vertical adjustment of the cantilever arm.



Support bracket 3, HSO, -6

SUPPORT BRACKET 3

Used for center installation of cable ladders on pendant/fixing rails and vertical pieces.



WASHER HSO M16

Used for centered mounting with Support bracket HSO M16 and Threaded rod M16.



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SUPPORT BRACKET 6

For center installation of cable ladder KHZSP. Thickness of material 0.78" (2.5 mm).



Cantilever arm 80.

Rod bracket 82 is adapted to fit both on Cantilever arm 50 and on



SUPPORT BRACKET HSO

Support bracket HSO mounted with Threaded rod M10 or M16 is used for installation of cable ladders.



ROD BRACKET 82

For installation where cable ladder KHZV and KHZPV is to be fixed



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Threaded rod M10 W76, Vertical pieces

THREADED ROD M10 W76

Threaded rod M10 W76 is used for installations of cable ladders. Joint nut M10 is used for joining of Threaded rods M10 W76.





VERTICAL PIECE 2

Used for installation of Support bracket 3. Symmetrical loading. Not suitable for KHZV and KHZPV. Can be joined to Pendant/Fixing rail 24/34 with Pendant joint 2J.



VERTICAL PIECE 20F

Vertical piece 20F can be mounted from the ceiling or on the floor. Suitable for relatively heavy loadings.



Pendant/Fixing rails

PENDANT/FIXING RAIL 24/34

For mounting of support brackets, cantilever arms etc.



FIXING RAIL JSA 24/26X48 FOR CAST-ING-IN

For casting-in in walls and ceilings. Filled with cellular plastic to prevent concrete from piercing into the rail.



NUT M10

Threaded rod M10 W76 is used for installations of cable ladders. Joint nut M10 is used for joining of Threaded rods M10 W76.



VERTICAL PIECE 2FPK

For installations in ceilings close to wall.



VERTICAL PIECE 2F

Used for installation of Support bracket 3 or Cantilever arm 50. Can be joined to Pendant/Fixing rail 24/48 with Pendant joint 2FJ.



VERTICAL PIECE 20FS

Vertical piece 20FS can be mounted from the ceiling or on the floor. Suitable for very heavy loadings.



PENDANT/FIXING RAIL 24/48

For mounting of support brackets, cantilever arms etc.



PENDANT/FIXING RAIL 24/20

For mounting of support brackets, cantilever arms etc.



VERTICAL PIECE 20

Used for vertical installation with Cantilever arm 50 from a ceiling or on a floor. Can also be installed as a cantilever arm on a wall. Cable ladders are fixed with profile clamps.



FIXING RAIL 24/26X53 FOR CASTING-IN

For casting-in in walls and ceilings.



PENDANT/FIXING RAIL 24/20F

For mounting of support brackets, cantilever arms etc.



PENDANT/FIXING RAIL 24/20FS

For mounting of cantilever arm etc.



Ceiling brackets

CEILING BRACKET TF

For installation with Threaded rods.





CEILING BRACKET 5

For installation with Pendant/Fixing rails 24/34 and 24/48.



BEAM CLAMP 5BK

For installation of Vertical pieces 2, 2F or 20 on I-beams.



COMBI BRACKET 53

Used for mounting cable ladders and trays on seamed roofing sheet etc.



CEILING BRACKET 5TP

For installation of Vertical pieces 2, 2F and 20 in ceilings with a trapezoidal sheet profile.



PENDANT BASE PLATE 520

Used as a ceiling or floor base plate for Pendant/Fixing rail 24/20 in any desired length.



CEILING BRACKET 5TPA

Used for mounting in trapezoid plate.



Round bar fixings, Wall brackets, Ceiling plates

FOR CEILINGS

Fixing suitable for ribbed bars ø 0.59" – 0.98" (15 – 25 mm).







ROUND BAR FIXING FOR WALLS

Fixing suitable for ribbed bars ø 0.59" – 0.98" (15 – 25 mm).



RAIL FIXING SUPPORT

Used with Pendant/Fixing rails 24/20F and 24/20FS for mounting between floor and ceiling.



CEILING PLATE 20F

Ceiling plate 20F is used as a pre-drilled attachment for Vertical piece 20F to a steel member. The ceiling plate is welded in position.



WALL BRACKET 20

To be used in installation of Pendant/Fixing rail 24/20 to ceiling beam or wall.



CEILING PLATE 20FS

Ceiling plate 20FS is used as a pre-drilled attachment for Vertical piece 20FS to a steel member. The ceiling plate is welded in position.



WALL BRACKET 20F

To be used in installation of Pendant/Fixing rail 20F to ceiling beam or wall.



Angle/end brackets, Pendant joints/bar, Ceiling mesh tray

ANGLE BRACKET 5L AND 5LS

Used when assembling pendant/fixing rails to frames for switching cabinets and electrical control centers. For fixing an upright between floor and ceiling. Assembled with a T-bolt.

PENDANT BAR 1

Installed in order to

reduce the deflection

of long Vertical pieces 2F, 20 and 20F.



END BRACKET HT-11

Used for assembling pendant/fixing rails to frames for switching cabinets and electrical control centers. Also suitable for assembling pendant rails for crossing cable runs.



Ø0.43" BRACKET 60/40

To be used with Pendant/Fixing rail 24/48 to reduce deflection of long vertical pieces.



PENDANT JOINT 2J, 2FJ AND 20J

Used for joining pendant/ fixing rails and vertical pieces.



CEILING BRACKET WN16

For installation of Ceiling mesh tray WN2.



CEILING MESH TRAY WN2

For installation in ceilings. ø 0.17" (4.4 mm).



Joints, Couplings

JOINT 21

For straight, rigid joining of cable ladders, bends, junctions and risers. Plate thickness = 0.08'' (2 mm). See also values for potential balancing.



DROPPER JOINT 32

A dropper joint to form vertical branches in center position under/on top of cable ladders.



FIXED TAKE-OFF HOOK 4

Used for 90° horizontal branches.



WALL BRACKET 11/25 AND 11/75

For vertical or horizontal installation of cable ladders against a wall.



PROFILE PROTECTION 28P

Increases the contact surface of the cables, when pulled over the side profile of the ladder.



JOINT 9

For straight joining of KHZ, KHZP and KHZPS.



REDUCER 31

For transition joining from a wide to a narrower cable ladder.



END CONNECTION 10

Used for the connection of a ladder vertically to a floor, or horizontally to a wall.



CROSS MEMBER PLUG 27

Cross member plugs are installed in the ends of the rungs of KHZ and KHZV in premises with a high corrosion risk.



END PLUG 28C,D,E AND F

Used for mounting in pendant ends to prevent the risk of personal injury.



INTERMEDIATE CONNECTION BOLT 29

Used at the transition from a broad to a narrower KHZ.



COUPLING 22

Used for horizontal or vertical branches at any desired angle.



PROFILE CLAMP 41

Profile clamp 41 is used to install a pendant/fixing rail or mounting plate etc. on the cable ladder profile.



END PLUG 28/28i

Mount in ladder ends for sealing or protection.



ANGLE PLATE 33

Angle plates are always recommended with 90° horizontal T-junctions. Suitable for all cable ladders.



127

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90° BEND 15

The cable ladders are joined to the bend with Joint 21.



X-JUNCTION 17

The cable ladders are joined to the X-junction with Joint 21.



JUNCTION COUPLING 14

For T-and X-junctions. Suits cable ladder KHZ, KHZP, KHZSP, KHZSPZ and KHZPS all ladder widths.



RISER 18

The cable ladders are joined to the Riser with Joint 21.



Details for KHZV, KHZPV

JOINT 45

Fitted as a joining plate in a cut KHZV/KHZPV ladder.



RISER COUPLING 49

Fitted at a 90° vertical coupling.



SCREW SET M12

Used for all joints with KHZV and KHZPV.





Used on KHZV/KHZPV ladders to make 90° branches.



90° BEND 55 Fitted at a 90° horizontal coupling of KHZV and KHZPV.



LIGHTING BRACKET 200

Used for the installation of lighting fittings beneath KHZV/KHZPV 200.



T-JUNCTION 16

The cable ladders are joined to the T-junction with Joint 21.



S-BEND 67

To be used as a transition between cable ladders mounted on different levels.



PROFILE SUPPORT PIECE 46

Fitted between the ladder and the vault pipe when a support bracket is positioned between existing profile support pieces.



T-JUNCTION 56 Fitted at a T-junction of KHZV and KHZPV.



COUPLING 44

For horizontal coupling of KHZV/KHZPV. Also used for branches and as an end connection against a wall.



COUPLING 51

Used as self-supporting vertical coupling of KHZV/KHZPV.



Junction box plates, Installation plates, Cable dividers

JUNCTION BOX PLATE 35P





INSTALLATION PLATE 60

Large installation plate which can be mounted standing or hanging between the ladder rungs. Clamp set not included.



DIVIDING STRIP 39

Used to separate low-tension and high-tension cables. Thickness of plate 0.02" (0.6 mm).





Installed upright or hanging from the profile. Locked with locking tabs.



NSTALLATION PLATE 62

For installation on wall or floor. Used for mounting of outlets and junction boxes.



DISTANCE PIECE W39

Distance piece W39 is used for joining Dividing strips 39.



Covers, Tele-conduit, Fixing tray N for casting-in

COVER 64



COVER PLATE 65

Used on vertical cable ladder installations to protect cables near the floor.



JUNCTION BOX COVER

For mounting on cable ladder, hot dip galvanized. Not in stock, only on request.



INSTALLATION PLATE 61

EARTH CLAMP W79

tion box plate is required.

Used on vertical cable ladder installations for mounting of terminal boxes, contact breakers etc.

The earth clamp is used when protective grounding of the junc-



LASHING WIRE

For lashing of wires on cable ladders.



FIXING TRAY N FOR CASTING-IN

A tray for casting-in with a mesh tray mounted on the inside of the tray for quick and easy lashing of cables. Pieces of Polystyrene at both ends makes it possible to adjust the height of the tray. 2 fixing brackets and sealing strips are included.

KHZV.

Cable clamps, Cable rollers

For installation of cables on cable ladders with round or perfo-

A color marking system that is easy to use when you want to

YELLOW

indicate which type of cable is placed on the cable ladder.

CABLE CLAMP TYPE A

For fastening of cables on Pendant/Fixing rail 24/48, Cable ladders KHZSP, KHZSPZ, KHZPS, KHZP and KHZPV.

CABLE CLAMP ER

MARKING PLATE 93

5 different colors are available.

rated rungs.



CABLE CLAMP TYPE R

TELE-CONDUIT 36

permit the cable to pass through.

Tele-conduit is installed where a separate tray is required for

low-tension cables. Knock-out holes in the bottom of the channel



MOUNTING RAIL WMS25

For installation directly on wall for lashing of cables.



REPAIR PAINT

Galvafroid for repair of damaged places on pre-galvanized or hot dip galvanized ladders and accessories. Repair paint for minor damages of powder coated products.





CLAMP 12

Used on the Cable ladder side profile for installation of accessories.



HOOK 8

For installation of cables beneath Support bracket 3. Hooks can also be installed in perforated rungs.



INSERT PIECE EM

Insert pieces are to be used in order to prevent pressure on the cable. The insert piece is placed between the cable and the rung from the same side

as the clamp has been fastened to the rung.



CABLE ROLLER 38 RIG N ROLL

Used for mounting on cable ladders with attached junctions and branches.





CABLE ROLLERS

Cable rollers facilitate the pulling of cables and lines. Cable rollers are easily installed on all cable ladders. Also fits the external or internal profile of all 90° bends, T-junctions, X-junctions and risers. The cable roller has a height adjustment of 1.77" (45 mm) to leave room for cables to pass under the roller.



Covers and Accessories

COVER W5

Covers are installed to protect the cable runs from dust, dirt and liquids etc. Outdoors, the covers protect against rain and sun. All cable ladders and cable trays can be fitted with covers. Hot dip galvanized covers are painted on all sides.



COVER JOINT

132

Inserted between the covers. Plate thickness 0.019" (0.6 mm)



COVER 90° BEND

Fits 90° interior bends. Installed with a Profile support piece 37, Cover clamp and Cover joint.



Steel wire system HT

STEEL WIRE

The steel wire is available in several varieties. To be installed as a carrier of one or more cables.



WALL BRACKET HT-14

Bracket for wall installation.



CARRYING BRACKET HT-152

Carrying bracket for I-beam installation.



PROFILE SUPPORT PIECE 37

When installing covers, the profile support pieces are mounted approx. every 1.57 ft (0.5m) along both sides of the ladder.



COVER T-JUNCTION

Fits T-junctions. Installed with a Profile support piece 37, Cover clamp and Cover joint.



COVER CLAMP

Cover clamps are required when installing a cover on a Profile support piece 37.



PROTECTING COVER

To be used as protection against ice and snow. Meant for cable ladders width 11.8" - 15.7" (300 - 400 mm).



END BRACKET HT-11

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CARRYING BRACKET HT-31

Carrying bracket for ceiling installation.

CARRYING SLING HT-51

Carrying slings for cables.

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End bracket for ceiling beam installation.

ANGLE BRACKET 5L

ceilings.



CARRYING BRACKET HT-33/34

Carrying bracket for ceiling installation.



PIPE HT-68, HTR-68 Pipe for wire locking.



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TIGHTENING LOOP HT

To be installed at the ends of steel wires. Nut and washer included.



Screw sets

SCREW SET 2S

For fastening of Support bracket 3 on Pendant/Fixing rail 24/20F and Angle bracket 5L to the opening on Pendant rail 24/34 and 24/48.



SCREW SET 20S

For installation of Support bracket 3 on Pendant/Fixing rail 24/20 and Vertical piece 20, Angle bracket 5L to the opening on Pendant/Fixing rail 24/48 and 24/20.



SCREW M10 X 20

Used with Spring nut M10 (AISI 316) for installation of Cantilever arm 50 (AISI 316L) on Pendant/Fixing rail 24/48.

SCREW SET 22S

For installation of Support bracket 3 on Vertical piece 2 and 2F, Support bracket 3 and Ceiling bracket 5 on Pendant/fixing rails 24/34 and 24/48, Angle bracket 5L against the back of pendant/ fixing rail, Pendant/fixing rails back to back.



SPRING NUT M8/M10

T-BOLT 26F

For fastening of accessories (control panels etc.) on Pendant/ Fixing rail 24/48.



For fastening of dividing strips on KHZSP, KHZSPZ, KHZPS and

BACK NUT M8

SCREW SET W34

KHZP.

For fastening of vertical pieces etc. in the rungs of KHZSP, KHZSPZ, KHZP, KHZPS and KHZPV.

CLAMP SET M6

Used for installation of Support bracket 3 directly on roof bolt.





Used for mounting with Pendant/Fixing rail 24/48.

Expansion bolts, Concrete screws

EXPANSION BOLTS

Electro-galvanized, hot dip galvanized or stainless steel AISI316 For installation of all cantilever arms and vertical pieces.



CONCRETE SCREW MMS-S

Electro-galvanized



For installation with cantilever arms and vertical pieces.

Concrete screw with hexagonal head and special thread constructed for safe fixing in concrete or brickwork.

Suitable for fixing of tubes, electrical installations, rails, handrails, machines, ventilating ducts, wood constructions.

- Easy to install

- High extraction values are obtained due to the special thread. The drill diameter is the same as the root diameter of the screw which gives a solid fixing inside the hole.

- Can be dismounted and reinstalled without reduced extraction force. - A weaker drill can be used compared to using anchor, expansion bolt, screw and plug.

- Suitable in environments which are fire classified.

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CONCRETE SCREW MMS-S

Hot dip galvanized.



CONCRETE SCREW MMS-S FL

Hot dip galvanized. Concrete screw with flange.

Electro-galvanized.

safe fixing in concrete.



CONCRETE SCREW MMS-ST

For installation of eye nuts. The screw is specially developed for

Suitable for tube installations, electrical installations, rails, hand-

rails, machines, ventilating ducts, wood constructions.

CONCRETE SCREW MMS-S

Stainless steel AISI316. Concrete screw with soldered phosphatized carbon steel tip.



CONCRETE SCREW MMS-PAN

Electro-galvanized. For installation of Pendant strip W33. Panheaded concrete screw, electro-galvanized. Torx-recess.



CONCRETE SCREW MMS-I

Electro-galvanized. For installation of Pendant M8 or M10. High extraction values are obtained due to the special thread. The drill diameter is the same as the root diameter of the screw which gives a solid fixing inside the hole. Can be dismounted and reinstalled without diminished extraction force.

A weaker drill can be used compared to using anchor, expansion bolt, screw and plug.



LIGHT CONCRETE SCREW

Electro-galvanized. For installation in porous concrete. Torx-recess.



BITRO ADAPTER

Electro-galvanized + plastic. The Bitro adapter must be installed direct on Hammer drill SDS PLUS. Drilling machine can be used. Suitable for drilling only in C25 concrete.





MAGNETIC SOCKET FOR CONCRETE SCREW MMS-S

Untreated steel



CONCRETE SCREW MMS-S FL

Electro-galvanized. Concrete screw with flange.



CONCRETE SCREW MMS-PAN SH

Electro-galvanized. For installation of Ceiling attachment W31 or Tube pendant attachment W73. Concrete screw with extra wide panhead, electro-galvanized. Torx-recess.



EYE SCREW MMS-R

Electro-galvanized. For installation of wires in ceiling.



MOUNTING TOOL FOR EYE SCREW MMS-R

Electro-galvanized.



SOCKET FOR CONCRETE SCREW **MMS-S**

Untreated steel. To be used together with Square peg.



Hvperline

Suitable in environments which are fire classified.



EXPANSION NAIL

Electro-galvanized/ Aluminum. For fixing of light details in concrete.

BITS HOLDER

Stainless steel AISI304.



HAMMER DRILL SDS PLUS

Untreated steel.



SQUARE PEG

Untreated steel. To be used with Socket 16 and 18.



LOW DENSITY ANCHOR TLF

Hot dip galvanized.

For fixing in light concrete or clinker concrete. For medium or heavy installations.

Unique advantages:

Long expansion area and heavy expansion - very high loading values.

The expansion can be directed - superior loading values even at small edge distances.



TORXBITS

Untreated steel.

HAMMER TOOL TLF-S

To be used with Concrete screw MMS-PAN SH.

Untreated steel. For driving in and expansion of the Low density anchor TLF.



SLEEVE TLF-H12

Hot dip galvanized. To be used together with Low density anchor TLF 0.47" X 3.9" (12 X 100) or 0.47" X 5.7" (12 X 145) in order to raise the transverse force performance.

ADAPTER TLF-A12

Electro-galvanized. To be used together with Low density anchor TLF 0.47"X 3.9" (12 X 100) or 0.47"X 5.7" (12 X 145) in order to receive an interior M10 thread. Suits Pendant M10.

ANGLED BRACKET TLF-F12

Pre-galvanized. To be mounted with Low density anchor TLF 0.47" X 3.9" (12 X 100) or 0.47" X 5.7" (12 X 145) and can be used as fixing for band or wire installations.



EXPRESS HANGER SVH

Stainless steel AISI316. For fixing in concrete, natural stone, solid brick or plate.

Used for installation of armatures close to the ceiling (with locking block) as well as for hanging of integrated ceilings, armatures, electrical-, tube- or ventilating equipment. Mounting tool SVH-T, for mounting to the right installation depth, is included in the package. Cover plate is included only for SVH-E1.

FIXING STRIP TGB

Pre-galvanized. For pendant installation and clamping. Cold-rolled and galvanized sheet metal, perforated for easy installations. For fixing tools as Express hanger SVH or Low density anchor TLF with Angled bracket TLF-F12.



SECURING SPRING SVH-L

Stainless steel AISI304. For installation of armatures close to ceiling.



Electro-galvanized. For installation of Express hanger SVH.



FIXING STRIP TRB

Stainless steel AISI304. For pendant installation and clamping. Stainless steel band AISI304 for qualified installations in all type of environments. Express hanger SVH or Low density anchor TLF with Angled bracket TLF-F12 can be used as fixing tools.



Hvperline



Reference installations


































Hyperline







Hyperline Systems Inc. 700 Pinnacle Court, Building 1200, Suite 170 Norcross, GA 30071, USA Toll free: 1-888-HYPER4U (1-888-497-3748) E-mail: info@hyperline.com Hyperline Systems Canada Ltd. 2212 Gladwin Crescent, unit C7 Ottawa, Ontario, K1B 5N1, Canada Toll free: 1-866-63-HYPER (1-866-634-9737) Phone: 1-613-736-8500, fax: 1-613-736-9752 E-mail: info@hyperline.com

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