Future reliability: Draka Datacom Solution

Modern networks face stiff demands. They must be fast and reliable, resist fire and not interfere with other equipment.

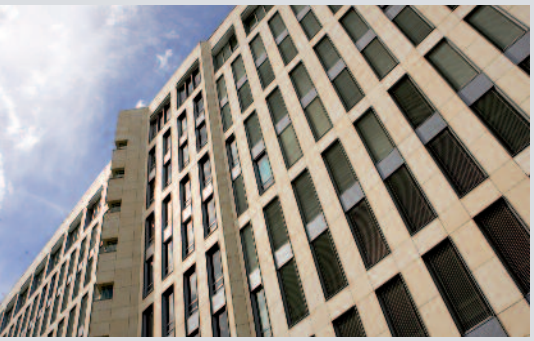
UC FUTURE – the solution for data centre cabling.
A dependable, fast and always available part of

Draka Datacom Solution

Draka

Who is Draka Communications?

Draka Communications – a member of Draka Holding N.V. located in Amsterdam – offers a versatile and reliable range of copper and optical fibre cables for the transmission in the data and telecommunication industry.



Our long-lasting expertise in cable and fibre business has been the basis for us holding a major market position today.
Draka Communications is located in more than 30 countries in Europe, Asia, North America and South America.

For many decades, we have been designing, developing, manufacturing and selling a variety of high-quality copper and optical fibre cables in order to offer you cable solutions for present and future challenges – Let it be standard product or tailor-made special cable.

In the communication infrastructure, our well proven products are always in use wherever it is a question of professional and undisturbed data, voice, audio and video transmission.

Data centre cabling topology

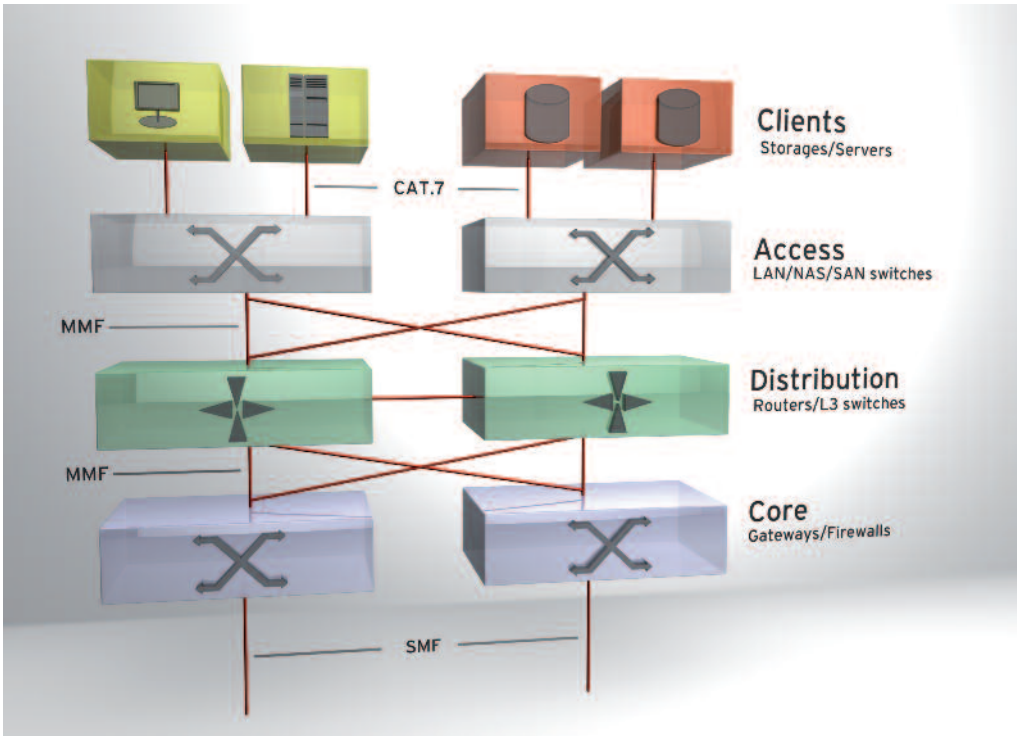
The need for high reliability, along with always required cost efficiency, has established a widly accepted cabling concept in recent years which today is well defined in international standards like EN50173-5 or TIA942. Data centres are split into four levels that help allocate the typical services and applications.

The Client level contains devices like a server – let it be desk top or rack format or even the modern blades – and all kind of storage devices and systems like SAN or NAS, including tape recording devices for backup purposes.

Access switches are situated at the next level, made to couple and connect all devices from client level.

The Distribution level is where routers and layer3 switches operate to make dynamic links between the access level with its aggregated data traffic and the customer applications driven from remote places.

The Core level in data centres forms the gateway with firewall functionality to the group of network service providers connecting the data centre to the outside world.



Data centre structures

Every data centre is a unique structure. There are various segments of different requirements which need to be understood before creating any solution. Here we look at the three main applications enterprises, hosts and carriers.

Enterprise data centres

Enterprise data centres are considered the power house of IT. It's where information streams are aggregated and processed in server's farms, where data are put to storage networks and routed through switches into various other parts of the networks - local and / or global. For some time, data centre operators started changing their facilities in order to create new structures which enable a set of properties with increasing relevance for the future:

- Establish defined redundancy
- Coping easier with volume applications (i.e. email)
- Server consolidation
- Outsourcing
- Efficiency improvements

This paradigm shift is supported by infrastructure standards, for example like the well established TIA942 or EN50173-5. Their generic model (figure 1) has been proven in practice and delivers flexible and reliable networks, which perfectly suit specific needs in data centres.

Data centre hosts

Data centre hosts are affected by these trends to the highest extent. It's because their business is to facilitate IT services for huge user communities rather than a single organisation. In many cases 500 enterprise clients share their services and in some larger data centre hosts even the number of 5000 clients is exceeded. This multiplies the relevance of the above mentioned performances.

Managed hosting facilities are attractive to businesses because they can rent IT infrastructure instead of investing in it themselves. Servers, networks, applications, bandwidth and other equipment are managed by employees of the facility.

Carriers

Carriers, for some time already, are faced with growing demands in added-value services based on content which has to be provided in the most efficient way. The data centre cabling standards from TIA and CENELEC can help here as well to deliver valuable planning support and create performing networks utilizing easily available interfaces from the Ethernet family.

Next Generation 40/100 Gigabit Ethernet ready infrastructures

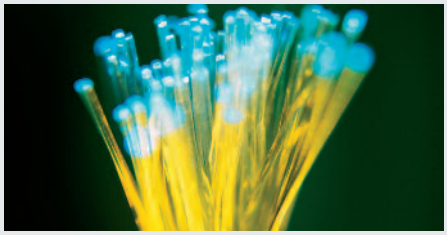
Many users are faced with the question how to design their data centre infrastructure in order to ensure continuous operation over the years to come, and when it arrives, upgrading the systems to 40 or even 100 Gigabit Ethernet.

This scenario is closer to some data centre operators than many might think. ISPs face already bottlenecks in their data centre backbones and desperately ask for the superior solution. Within the next 3 years first migrations will take place and the infrastructure design has to cope with it. Enterprise data centre operators recognized electronic mail as the key application in order to improve efficiency in their organization. The reported annual growth rate of email data traffic is in the range of 25%. Data centre hosts see all these trends raised to a higher power. Hence upgrading is a relevant option to all data centre operators, it's just a matter of time.

This means at the client level changing to 10 Gigabit Ethernet and consequently at access level changing to 40 Gigabit Ethernet. The fibre optic interface development of 10 Gigabit Ethernet in 2002 and the twisted pair interface in 2006 made this technology easily available and simple to integrate. Hence the data centre becomes the birthplace of the next generation of Ethernet, which continues a long lasting and sustainable trend, as figure xx proves.

10 Gigabit Ethernet Interface

Central question in infrastructure design: what distances have to be maintained? Statistical analyses of a number of representative data centres delivered at Client level a channel length of 20m in average and 95% of the channels within a reach of 70m with only a few to extend to 100m. At Distribution level and similar at Core level the average channel length is approx. 60m, 95% of the channels are shorter than 150m and a few to extend to 300m.



10GBASE- xyz Specifications

x = S (short, 850nm)
L (long, 1300nm)
E (extra long, 1550nm)
C (Twinax copper cable)
T (Cat6a copper cable)

y = W (WAN SONET STM- 192 encoding)
R (LAN serial txn & 64B/ 66B encoding)
X (LAN CWDM & 8B/ 10B encoding)

z = # (number of channels in wave-length division multiplex CWDM)

10GBASE- SR 850nm serial LAN
Full 300m reach over laser-optimized OM3 fibre, by use of serially operated efficient VCSEL at 850nm; today the standard in building backbones

10GBASE- LR 1310nm serial LAN
10km reach over serially operated FP-lasers at 1300nm; standard for Metro Ethernet

10GBASE- ER 1550nm serial LAN
40km reach over serially operated lasers at 1550nm; used in long haul applications of transport networks operators

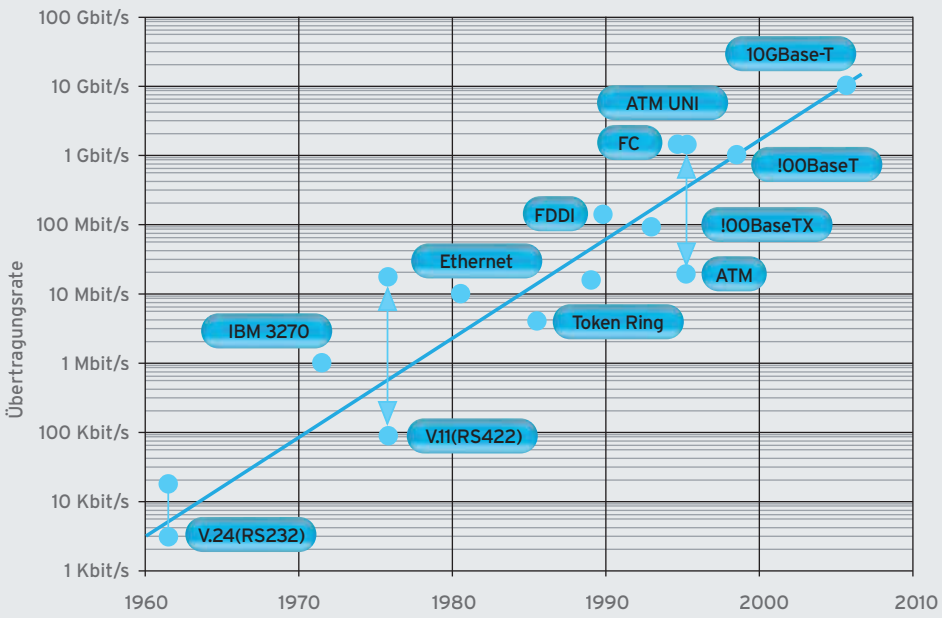
10GBASE- LX4 1310nm WDM LAN
Full 300m reach over existing MM fibre without laser specification, complex signal processing makes interface expensive; mainly used for refurbishment purposes

10GBASE- LRM (long reach multimode)
Restricted 220m reach over existing MM fibre without laser specification; mainly used for refurbishment purposes

10GBASE- CX4
Restricted 15m reach over Twinax copper cable; used for rack cabling only

10GBASE- T
Full 100m reach over standardized Cat6a copper cable with proven RJ45 connectivity

Ethernet interface speed over time of implementation



What's needed to meet future data centre requirements? Copper cabling

In highly concentrated data centre networks, at server level (Client), the key is to maximize utilization of available pathways, racks and spaces rather than to go for maximum permissible channel length. The required channels of 20m to 60m average distances give room for optimized designs in cable.

For this application Draka has developed the new UC^{Future} program which contains slim cable designs based on existing work area cable standards, which are perfect for zone cabling in data centres because of these characteristics:

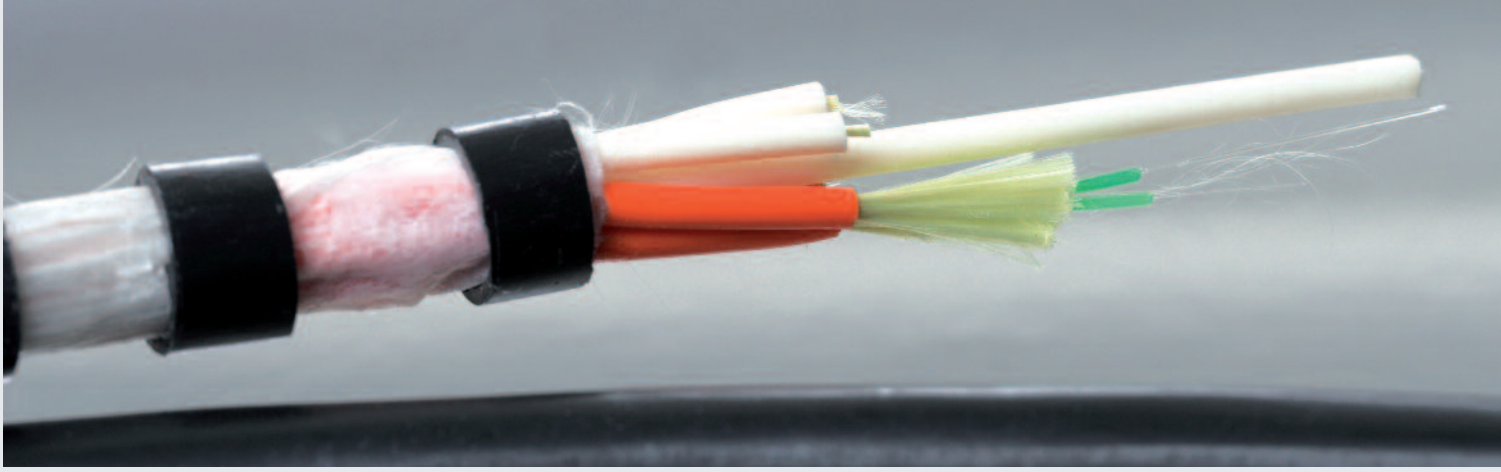
- Up to 100% higher packing density in cable trays
- Fully compliant with established cable standards
- PIMF design to eliminate any Alien-Xtalk interferences
- Full 10GBase-T performance over a channel distance of 70m

Especially at Client level bulky cabling forms a serious barrier to air ventilation, literally one of the hot topics in data centres due to growing packing density in server racks and the need to offload the high amount of heat dissipated by all the electronics.
Slim designs at server level like the blade technology should be consequently transferred to slim cabling.
The advantages of the new cable design can be leveraged to most suitable slim-design connectivity products which give new opportunities for extended customer specific service concepts.

Minimum required transmission performance of cable and cabling is Cat6$_A$ and/or Class EA. The rational is to ensure easy migration of services to 10GBase-T, for which cable standards based on various technologies were made. Using 10 Gigabit Ethernet in data centres puts the attention to additional aspects:

- Products have shorter life cycles than in enterprise networks
- The entire Infrastructure (building, electricity, access protection etc.) is much better defined than in office buildings
- The packing density of installations is by far higher

Each of these factors promote the choice for future proof PIMF cable design, users of which enjoy high transmission performance headroom along with its immunity against Alien-Xtalk. It's the perfect fit to all the other devices and systems in a data centre.



Fibre Infrastructure requirements

Data centre backbones are already equipped with optical fibre technology. It is state-of-the-art and offers lowest attenuation at highest data rates which is a prerequisite for backbone data links. With data centres it forms one of the most demanded components due to the highly aggregated data traffic there.

As soon as 10 Gigabit Ethernet comes to the agenda at Client level, a data centre backbone capable of 10GbE to link between Access and Distribution level turns into a real bottleneck. Despite the fact copper data cable is capable covering a distance of up to 100m at 10Gbit/s, the preference in this place should be laser optimized multimode fibre according to OM3 specification. Today's recommendation is clearly to take this future proof solution, which is the only short link technology that is also part of the 40 Gigabit Ethernet and likewise 100GbE development program, which will be based on multi lane structures of OM3 channel links. A data centre backbone in OM3 can therefore be easily expanded to the Next Generation Ethernet and secures investments a longer pack-off time.

Draka's patented PCVD fibre manufacturing technology enables high-precision refractive index profiles which are the key to laser launched high-speed links. This makes the difference between MaxCap300 exceeding by far OM3 specifications and traditional multimode fibres like OM1 and OM2.

This fibre technology is available in Draka cable designs to meet the specific needs of data centre infrastructures, be it be a single core cable or the popular shotgun cable design with figure-8 shape, the break-out cable for multiple fan outs or loose tube cable design with high fibre counts for trunk lines.

More and more in use is the MPO-style optical fibre connector, which requires small cables to fit the planar structure of its fibre management as well as its outer dimensions. Draka's specially designed MPO cable is made for interconnects of 40GBase-SR4 channels which is one of the next options into a data centre's infrastructure of the future.

Ethernet Applications at 850 nm

	OM4* MaxCap 550 50 μm 10G / 550m	OM3 MaxCap 300 50 μm 10G / 300m	OM2 50 μm 500 / 500 MHz.km	OM1 62.5 μm 200 / 500 MHz.km
40Gb/s (40GBASE-SR4)	300 m**	100 m	-	-
10Gb/s (10GBASE-SR)	550 m	300 m	86 m	33 m
1Gb/s (1000BASE-SX)	1100 m	900 m	550 m	275 m

Table 1: Ethernet applications and permissible channel lengths with MaxCap multimode fibre

***) = draft IEC standard**

****) = future IEEE work item**

Copper Cables

UC^{FUTURE} COMPACT^{ZD}26 Cat.7 S/FTP 4P

Mechanical properties

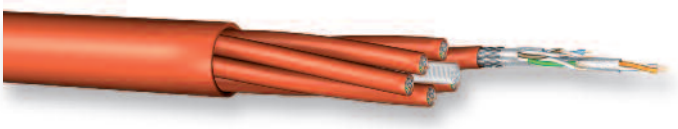
Cable diameter	mm	5.7
Weight	kg/km	37
Bending radius during installation	mm	8xD
during operation	mm	4xD
Tensile force	N	100

Applications

Data centre cabling 10Gbit solution. Pair screened 100 Ohms cable especially for Zone Distribution Area and Equipment Distribution Area. Fulfils the requirements of Channel EA to a minimum with conductor diameter of AWG26 for transmission lengths of maximum 70 metres.

Compliance

EN 50173-5, TIA-942, ISO/IEC 24764, EN 50288-4-2, IEC61156-6, ISO/IEC 11801 2nd edition



UC^{FUTURE} COMPACT^{ZD}26 Cat.7 S/FTP 6x4P

Mechanical properties

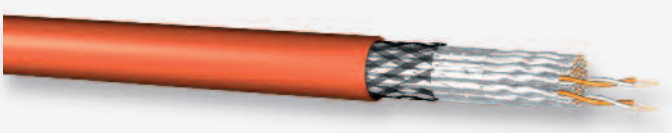
Cable diameter	mm	15.4
Weight	kg/km	210
Bending radius during installation	mm	8xD
during operation	mm	4xD
Tensile force	N	700

Applications

Data centre cabling 10Gbit solution. Pair screened 100 Ohms multiple cable especially for Zone Distribution Area and Equipment Distribution Area. Fulfils the requirements of Channel EA to a minimum with conductor diameter of AWG26 for transmission lengths of maximum 70 metres.

Compliance

EN 50173-5, TIA-942, ISO/IEC 24764, EN 50288-4-2, IEC61156-6, ISO/IEC 11801 2nd edition



UC^{FUTURE} COMPACT^{ZD}26 Cat.7 S/FTP 24P

Mechanical properties

Cable diameter	mm	14.5
Weight	kg/km	158
Bending radius during installation	mm	8xD
during operation	mm	4xD
Tensile force	N	700

Applications

Data centre cabling 10Gbit solution. Screened multipair 100 Ohms cables especially for Zone Distribution Area and Equipment Distribution Area. Fulfils the requirements of Channel EA to a minimum with conductor diameter of AWG26 for transmission lengths of maximum 70 metres.

Compliance

EN 50173-5, TIA-942, ISO/IEC 24764, EN 50288-4-2, IEC61156-6, ISO/IEC 11801 2nd edition

UC900 SS27 Cat.7 S/FTP Patch

Mechanical properties

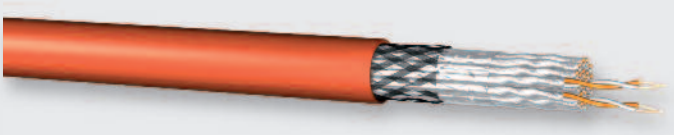
Cable diameter	mm	5.9
Weight	kg/km	39
Bending radius during installation	mm	8xD
during operation	mm	4xD
Tensile force	N	100

Applications

Data centre cabling 10Gbit solution. Pair screened 100 Ohms multiple cable especially for Zone Distribution Area and Equipment Distribution Area. Fulfils the requirements of Channel EA to a minimum with conductor diameter of AWG27 for transmission lengths of maximum 10 metres.

Compliance

EN 50173-5, TIA-942, ISO/IEC 24764, EN 50288-4-2, IEC61156-6, ISO/IEC 11801 2nd edition



UC^{FUTURE} COMPACT23 Cat.7 S/FTP 24P

Mechanical properties

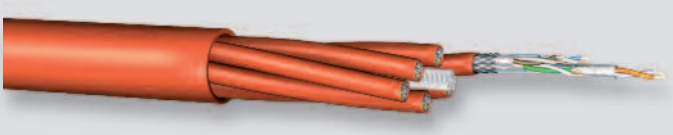
Cable diameter	mm	18.0
Weight	kg/km	270
Bending radius during installation	mm	8xD
during operation	mm	4xD
Tensile force	N	900

Applications

Data centre cabling 10Gbit solution. Pair screened 100 Ohms Multicable especially for Horizontal Distribution Area, Zone Distribution Area and Equipment Distribution Area. Fulfils the requirements of Channel EA to a minimum with conductor diameter of AWG23 for transmission lengths of maximum 100 metres.

Compliance

EN 50173-5, TIA-942, ISO/IEC 24764, EN 50288-4-2, IEC61156-5, ISO/IEC 11801 2nd edition



UC^{FUTURE} COMPACT23 Cat.7 S/FTP 6x4P

Mechanical properties

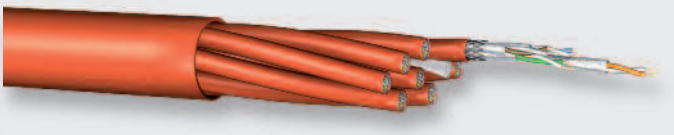
Cable diameter	mm	23.5
Weight	kg/km	365
Bending radius during installation	mm	8xD
during operation	mm	4xD
Tensile force	N	900

Applications

Data centre cabling 10Gbit solution. Pair screened 100 Ohms multiple cable especially for Horizontal Distribution Area, Zone Distribution Area and Equipment Distribution Area. Fulfils the requirements of Channel EA to a minimum with conductor diameter of AWG23 for transmission lengths of maximum 100 metres.

Compliance

EN 50173-5, TIA-942, ISO/IEC 24764, EN 50288-4-2, IEC61156-5, ISO/IEC 11801 2nd edition



UC^{FUTURE} COMPACT23 Cat.7 S/FTP 8x4P

Mechanical properties

Cable diameter	mm	25.2
Weight	kg/km	492
Bending radius during installation	mm	8xD
during operation	mm	4xD
Tensile force	N	1200

Applications

Data centre cabling 10Gbit solution. Pair screened 100 Ohms multiple cable especially for Horizontal Distribution Area, Zone Distribution Area and Equipment Distribution Area. Fulfils the requirements of Channel EA to a minimum with conductor diameter of AWG23 for transmission lengths of maximum 100 metres.

Compliance

EN 50173-5, TIA-942, ISO/IEC 24764, EN 50288-4-2, IEC61156-5, ISO/IEC 11801 2nd edition

UC^{FUTURE} LOOMED23 Cat.7 S/FTP 6x4P

Mechanical properties

Cable diameter	mm	22.5
Weight	kg/km	361
Bending radius during installation	mm	8xD
during operation	mm	4xD
Tensile force	N	600

Applications

Data centre cabling 10Gbit solution. Pair screened 100 Ohms multiple cable especially for Horizontal Distribution Area, Zone Distribution Area and Equipment Distribution Area. Fulfils the requirements of Channel EA to a minimum with conductor diameter of AWG23 for transmission lengths of maximum 100 metres.

Compliance

EN 50173-5, TIA-942, ISO/IEC 24764, EN 50288-4-2, IEC61156-5, ISO/IEC 11801 2nd edition

Fibre Cables

UC^{FIBRE} I T N DA LSHF 0.4kN

Mechanical properties		2G
Cable diameter	mm	3.0/6.2
Weight	kg/km	16
Bending radius during installation	mm	20 x D*
during operation	mm	15 x D*
Tensile force	N	400

D* = outer cable diameter

Applications

Data centre cabling 10-40Gbit solution acc. TIA942 in all areas, especially for the Equipment Distribution Area. The duplex fibre cable with aramide strength members with flame retardant, halogen free outer sheath (LSHF) can be mounted to all common connectors and therefore is suitable for pigtails or interconnections.

Compliance

Structured cabling acc. to ISO/IEC 11801 and EN 50173 2nd eddition, EN 50173-5, TIA-942

UC^{FIBRE} I F N DA LSHF 0.4kN

Mechanical properties		2G
Cable diameter	mm	3.8/6.8
Weight	kg/km	32
Bending radius during installation	mm	20 x D*
during operation	mm	15 x D*
Tensile force	N	400

D* = outer cable diameter

Applications

Data centre cabling 10-40Gbit solution acc. TIA942 in all areas, especially for the Equipment Distribution Area. The duplex fibre cable with Aramide strength members with flame retardant, halogen free outer sheath (LSHF) can be mounted to all common connectors and therefore is suitable for pigtails or interconnections.

Compliance

Structured cabling acc. to ISO/IEC 11801 and EN 50173 2nd eddition, EN 50173-5, TIA-942

UC^{FIBRE} I B N DA LSHF 0.8kN

Mechanical properties		4G	8G	12G	16G
Cable diameter	mm	7.2	9.9	12.5	12.9
Weight	kg/km	54	74	136	130
Bending radius during installation	mm	20 x D*			
during operation	mm	15 x D*			
Tensile force	N	800	1200	1600	2000

D* = outer cable diameter

Applications

Data centre cabling 10-40Gbit solution acc. TIA942 in all areas, especially for the Equipment Distribution Area and Zone Distribution Area. Due to the tensile relief of each core and to single sheaths, FO connectors can be connected right away. For rising and distribution purpose (plenum) the cables can be split individually by opening the outer sheath. The cables with LSHF material accord to the UL/NEC and IEC fire proofing requirements.

Compliance

Structured cabling acc. to ISO/IEC 11801 and EN 50173 2nd eddition, EN 50173-5, TIA-942

UC^{FIBRE} RIBBON / Micro cable

Mechanical properties		4G
Cable diameter	mm	3.2/3.9
Weight	kg/km	13
Bending radius during installation	mm	160
during operation	mm	160
Tensile force	N	1800

Applications

Data centre cabling 10-40Gbit solution acc. TIA942 in all areas. Patch cord style cable with up to 24 fibres for fitting with MPO or MT connectors. The application is to replace sets of single fibre or two fibre cables in data centres. The cable may be mounted on the backside of racks.

Compliance

Structured cabling acc. to ISO/IEC 11801 and EN 50173 2nd eddition, IEC 60794-2-10, EN 50173-5, TIA-942

UC^{FIBRE} I/O CT D DA LSHF 1kN

Mechanical properties		2G
Cable diameter	mm	6.5
Weight	kg/km	45
Bending radius during installation	mm	150
during operation	mm	100
Tensile force	N	1000

Applications

Data centre cabling 10-40Gbit solution acc. TIA942 in all areas. FO indoor/outdoor cables with central tubes are required for access networks. They are suitable for outdoor duct and indoor riser installation. The central loose tube design allows a thin and less expansive cable construction. The cable is UV resistant, non-metallic, rodent protected, halogen-free flame retardant, longitudinally watertight with tensile strengthening and therefore suitable for indoor riser installation as well as outdoor duct installation or direct burial.

Compliance

Structured cabling acc. to ISO/IEC 11801 and EN 50173 2nd eddition, IEC 60332-1, EN 50173-5, TIA-942

UC^{FIBRE} I/O ST D DA LSHF 1.8kN

Mechanical properties		2G
Cable diameter	mm	10.5
Weight	kg/km	120
Bending radius during installation	mm	300
during operation	mm	210
Tensile force	N	1800

Applications

Data centre cabling 10-40Gbit solution acc. TIA942 in all areas. FO indoor/outdoor cables with stranded tubes are required for access networks in case a high number of fibres is necessary. They are suitable for outdoor duct and indoor riser installation. The loose tube design allows a high concentration of fibres and therewith simplifies fibre management in distribution arrangements. The cable is UV resistant, non-metallic, rodent protected, halogen-free flame retardant, longitudinally watertight with high tensile strengthening and therefore suitable for indoor riser installation as well as outdoor duct installation or direct burial.

Compliance

Structured cabling acc. to ISO/IEC 11801 and EN 50173 2nd eddition, EN 187 000, IEC 60794-2, IEC 60794-2-20, IEC 60794-2-21, EN 50173-5, TIA-942

We make communication technology work, by serving you in every way to realize your leading edge network solution

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*) including: Ireland

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