

MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding (MOU) shall be entered on March 1, 2023, by and between governing Authority Having Jurisdiction (AHJ) and Facilities and Infrastructure (F&I) for all facilities at Seattle-Tacoma International Airport (SEA). This memorandum is for the purpose of updating SEA Standards to include **direction and approval for 2-Hour (120-Min) Fire Survivable Communication Infrastructure**.

REVISION HISTORY

REV-0: Under first revision; 0. Future revisions shall be noted here with any section changes preceded by "REV-#:". Changes shall be reviewed and signed by all required parties.

BACKGROUND

The Airport Building Department (ABD) defers to the Port of Seattle Fire Department (POSFD) for Fire Life Safety Systems at SEA, making POSFD the Authority Having Jurisdiction (AHJ) for code compliance discussed herein. In the first quarter of 2022, POSFD submitted a communication cable and pathway infrastructure code compliance issue in need of resolution. The airport is Type 1B construction, meaning the building is 2-hour rated construction. The updates, as well as clarification to the National Fire Protection Association (NFPA) codes, directly affected our cable infrastructure for specific Fire Life Safety Communication systems. Facilities and Infrastructure (F&I) was tasked with the review, resolution, and ultimately updates to the SEA Standards. F&I worked with our communication infrastructure resource partners within the Information Communication Technology (ICT) and Electronic Technicians (ET) departments to assist with best possible solution to meet code; be it changes to cabling, pathways, or both. Throughout this process the team coordinated with POSFD to resolve and expedite clear communication to our many active Projects in planning or underway. Yet the need for one document to encapsulate all communications and decisions was deemed necessary. This MOU shall serve as the final cumulation of all discussions and email approval records to date.

ANALYSIS

In reviewing the NFPA 1225 Standard for Emergency Services Communications, 2022 edition¹ it was found that our fiber backbone infrastructure travels through many types of spaces as it goes from Main Distribution Rooms (MDR's) out to the many Equipment Rooms (ER's) in our large spread-out campus environment at SEA. Fire protection alone cannot be counted on to consistently protect this infrastructure. Our pathways are too numerous and diverse to implement upgrading the pathway itself to be fire protected. In our coordination with the POSSFD/AHJ, it was determined that meeting Fire Survivable Communication Infrastructure requirements with our existing route diversity was not sufficient and would require major modifications to the pathways entering and exiting our communication rooms. Also, utilizing diversity through any ICT or ET active networks, be it wired or wireless, was found to be problematic. Doing so would require integration of fire alarm systems on these Port Networks which would enact a new set of code requirements and thus hinder current network design architecture.

The Life Safety code clarifications also affects our horizontal copper cable infrastructure that is run to the elevator landing communication systems.² These elevator lobby areas of refuge required much of the same protections discussed above in backbone fiber runs. One major exception to the horizontal run from ER to the intercom device was clear language around redundancy.³ A single protected cable or pathway is found acceptable for the horizontal copper runs to the 2-way emergency elevator lobby comms.

Of final note in this analysis is the fact that 2-Hour (120-Min) Fire Survivable Communication Infrastructure applies to both Backbone and Horizontal Fiberoptic or Copper cable infrastructure when you look at the overall network architecture. The need to protect a signal from an end device such as an intercom to the receiving head end typically involves looking at both the fiber and copper media, and in turn, protecting the signal in a source to destination scenario.

DECISION

After a complete review of all cabling and pathways installed at SEA and the ease in which to comply with the code updates brought forth by POSSFD/AHJ, **the direction is for installation of 2-Hour (120-Min) Fire Survivable Communication Cable Infrastructure.** The Applicable Life Safety Systems noted below applies to where the SEA facilities shall install the 2-Hour (120-Min) Fire Survivable Communication Cable Infrastructure Products required to meet Code.

¹ 18.12.3.4* Backbone cables and backbone cable components installed in nonsprinklered buildings, in buildings that are partially protected by a sprinkler system, or in high-rise buildings shall be protected from attack by fire in accordance with one of the following: (1) Where the primary structural frame of a building is required to have a fire-resistance rating of 2 hours or more....the minimum fire-resistance rating shall be 2 hours

² NFPA 72, 24.10* Two-Way Emergency Communications Systems for Rescue Assistance

³ NFPA 72 12.3.8.1 The outgoing and return (redundant) circuit conductors shall be permitted in the same cable assembly (i.e., multiconductor cable), enclosure, or raceway only under the following conditions: Note (2) single drops installed in the raceway to individual devices or appliances.

(*) Indicates that explanatory material on paragraph resides in Annex A of NFPA-72

APPLICABLE LIFE SAFETY SYSTEMS REQUIRING APPROVED PRODUCTS

Modifications to SEA communication infrastructure Standards shall apply to the below Life Safety in building systems only:

- Distributed Antenna System (DAS) for Emergency Responder Radio Coverage Systems (ERRCS) as required by 2018 IBC Section 918 and 2018 IFC Section 510
- Elevator 2-way emergency communications as required by 2018 IBC Section 1009.8
- Future growth and/or existing system backup. Backbone cable reservation of 2 strands on 2-Hour (120-Min) rated fiber point-to-point runs, such as MDR (or ER) to ER cross connections

PRODUCTS APPROVED

Fiberoptic Cable Infrastructure*:

CommScope® TeraSPEED® Fiberoptic cable, No Equal.

- 96 Strands; #760245385 | C-096-LA-8W-M12BK/25G/GY/FS
- 24 Strands; #2-1716216-4 | C-024-L2-8W-M24BK/40G/GY/FS
- 12 Strands; #760248775 | C-012-L2-8W-M12RD/40G/GY/FS

(*) POSPD/AHJ Fiberoptic Cabling Infrastructure approval comments and mutual understanding:

- Fire testing method of CommScope cabling requires installation of all in building cable runs to be placed in an enclosed cable tray with solid lid and/or conduit- no breaks or free-aired runs allowed. Complies with exception 5.1 *Continuous noncombustible raceways or enclosures* of the *International Mechanical Code (IMC) 602.2.1 Materials within plenums*.
- SEA Standards call for maximizing fiber strand counts to conserve pathway space. POSFD/AHJ understands that remaining strands within a single fire survivable communication fiberoptic cable shall be open to other network connections once Life Safety Systems are patched. POSFD does not take ownership of fiber infrastructure, SEA Standards allow for allocation of strands as necessary to meet fire protected connectivity throughout SEA campus.
- Remote building connections shall require no further fiber protection through duct banks and maintenance holes when an approved fire survivable fiberoptic cable is specified.

Copper Cable Infrastructure*:

Category 6 Ethernet- BELDEN, Rath®, Or Equal.

- NH50106UFL DataTuff™ (BELDEN)
- RP6600100M4 or RP6600300M4 (Rath®)

Category 3 Ethernet- DuraLife®, Rath®, Or Equal.**

- CTS18A0108-CAT3 (DuraLife®)
- 66125 or RP66010004 (Rath®)

(*) POSPD/AHJ Copper Cabling Infrastructure approval comments and mutual understanding:

- Copper Cable Infrastructure approved applies only to the intercom devices for Two-Way Emergency Communications Systems for Rescue Assistance.

- (**) Category 3 may only be used upon written approval from the Telecom Design Review Team. Two (2) Capital Projects are the only approved facilities currently: International Arrivals Facility and NorthStar.

AUTHORIZATION AND EXECUTION

The signing of this Memorandum is acknowledgement and agreement by the AHJ and shall serve as direction to F&I to proceed with 2-Hour (120-Min) Fire Survivable infrastructure. It will provide for approved materials and the Life Safety systems requiring the necessary protection. F&I will utilize this approval for notice to Projects and interested Port of Seattle stakeholders via updated SEA Communication Standards. This memorandum shall be effective from the file date unto such a time Code requires a reevaluation.

Jeffrey Nelson

3/2/2023

AHJ: Jeffrey Nelson, Senior Fire Protection Eng. Port of Seattle Fire dept.

Date

Nicholas Vaccaro

3/2/2023

AHJ: Nicholas Vaccaro, Senior Fire Protection Eng. Port of Seattle Fire dept.

Date

Denise Dennis

3/2/2023

F&I Denise Dennis, AV F&I Manager Engineer

Date

Michael Schuman

3/2/2023

F&I Mike Schuman, AV F&I Engineer: Telecommunications

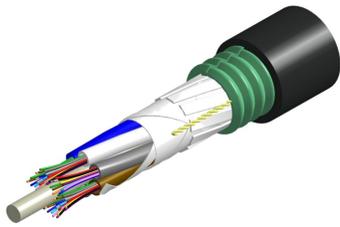
Date

ATTACHMENTS

Product submittals for 2-Hour (120-Min) Fire Survivable Communication Cable Infrastructure:

- 760245385
- 2-1716216-4
- 760248775
- NH50106UFL
- RP6600100M4_RP6600300M4
- CTS18A0108-CAT3**
- 66125_RP66010004**

(**) Category 3 may only be used upon written approval from the Telecom Design Review Team.



TeraSPEED® Indoor/Outdoor, Single Jacket/Single Armor, 120 min Fire Survival, Low Smoke Zero Halogen (LSZH), Gel-Filled, Stranded Loose Tube cable. Provides Rodent Resistance.

- Corrugated steel tape armor is strong yet flexible, providing additional crush and rodent protection

Product Classification

Regional Availability	Asia Australia/New Zealand EMEA
Portfolio	CommScope®
Product Type	Fiber indoor/outdoor cable
Product Series	C-LA

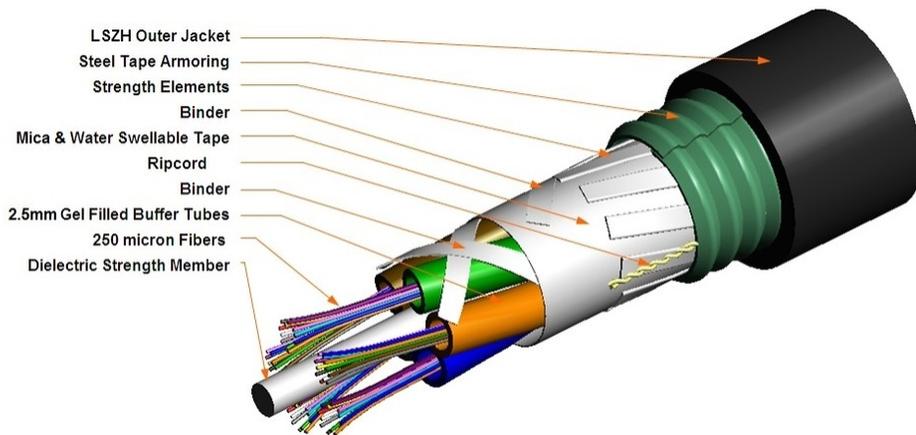
General Specifications

Armor Type	Corrugated steel
Cable Type	Stranded loose tube
Construction Type	Armored
Fiber Type, quantity	96
Fibers per Subunit, quantity	12
Jacket Color	Black
Jacket Marking	Meters
Subunit Type	Gel-filled
Subunit, quantity	8
Total Fiber Count	96

Dimensions

Buffer Tube/Subunit Diameter	2.5 mm 0.098 in
Diameter Over Jacket	16 mm 0.63 in

Representative Image



Mechanical Specifications

Minimum Bend Radius, loaded	330 mm 12.992 in
Minimum Bend Radius, unloaded	200 mm 7.874 in
Tensile Load, long term, maximum	2000 N 449.618 lbf
Tensile Load, short term, maximum	4000 N 899.236 lbf
Compression	40 N/mm 228.406 lb/in
Compression Test Method	IEC 60794-1 E3
Impact	5 N-m 44.254 in lb
Impact Test Method	IEC 60794-1 E4
Strain	See long and short term tensile loads
Strain Test Method	IEC 60794-1 E1
Twist	5 cycles
Twist Test Method	IEC 60794-1 E7

Optical Specifications

Fiber Type	G.652.D and G.657.A1 , TeraSPEED® OS2
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Environmental Specifications

Operating Temperature	-30 °C to +70 °C (-22 °F to +158 °F)
Storage Temperature	-40 °C to +75 °C (-40 °F to +167 °F)
Cable Qualification Standards	EN 187105 IEC 60794-1-2

760245385

C-096-LA-8W-M12BK/25G/GY/FS

Environmental Space	Aerial, lashed Buried Low Smoke Zero Halogen (LSZH)
Flame Test Method	IEC 60331-25 (120) Fire resistance: 120 minutes at 750 °C (no fiber break) IEC 60332-1 IEC 60332-3-24 IEC 60754-1 IEC 60754-2 IEC 61034-2 NES 713 (<=5-jacket material only)
Jacket UV Resistance	UV stabilized
Water Penetration	24 h
Water Penetration Test Method	IEC 60794-1 F5

Environmental Test Specifications

Low High Bend Test Method	IEC 60794-1 E11
Temperature Cycle	-30 °C to +70 °C (-22 °F to +158 °F)
Temperature Cycle Test Method	IEC 60794-1 F1

Packaging and Weights

Cable weight	304 kg/km 204.279 lb/kft
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Regulatory Compliance/Certifications

Agency	Classification
CHINA-ROHS	Below maximum concentration value
REACH-SVHC	Compliant as per SVHC revision on www.commscope.com/ProductCompliance
ROHS	Compliant



Included Products

CS-8W-IOLT - TeraSPEED® OS2 Singlemode Fiber

* Footnotes

Operating Temperature Specification applicable to non-terminated bulk fiber cable

TeraSPEED® OS2 Singlemode Fiber

TeraSPEED®

Product Classification

Portfolio	CommScope®
Product Type	Optical fiber

General Specifications

Cladding Diameter	125 µm
Cladding Diameter Tolerance	±0.7 µm
Cladding Non-Circularity, maximum	0.7 %
Coating Diameter (Colored)	249 µm
Coating Diameter (Uncolored)	242 µm
Coating Diameter Tolerance (Colored)	±13 µm
Coating Diameter Tolerance (Uncolored)	±5 µm
Coating/Cladding Concentricity Error, maximum	12 µm
Core Diameter	8.3 µm
Core/Clad Offset, maximum	0.5 µm
Proof Test	689.476 N/mm ² 100000 psi

Dimensions

Fiber Curl, minimum	4 m 13.123 ft
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Mechanical Specifications

Macrobending, 20 mm mandrel, 1 turn	0.75 dB @ 1,550 nm 1.50 dB @ 1,625 nm
Macrobending, 30 mm mandrel, 10 turns	0.25 dB @ 1,550 nm 1.00 dB @ 1,625 nm
Macrobending, 60 mm mandrel, 100 turns	0.05 dB @ 1,550 nm 0.05 dB @ 1,625 nm
Coating Strip Force, maximum	8.9 N 2.001 lbf

CS-8W-IOLT

Coating Strip Force, minimum	1.3 N 0.292 lbf
Dynamic Fatigue Parameter, minimum	20

Optical Specifications

Cabled Cutoff Wavelength, maximum	1260 nm
Point Defects, maximum	0.1 dB
Zero Dispersion Slope, maximum	0.092 ps/[km-nm-nm]
Zero Dispersion Wavelength, maximum	1324 nm
Zero Dispersion Wavelength, minimum	1300 nm

Optical Specifications, Wavelength Specific

Attenuation, maximum	0.22 dB/km @ 1,550 nm 0.23 dB/km @ 1,575 nm 0.25 dB/km @ 1,490 nm 0.25 dB/km @ 1,625 nm 0.31 dB/km @ 1,385 nm 0.34 dB/km @ 1,310 nm 0.35 dB/km @ 1,650 nm
Backscatter Coefficient	-79.6 dB @ 1,310 nm -82.1 dB @ 1,550 nm
Dispersion, maximum	18 ps(nm-km) at 1550 nm 3.5 ps(nm-km) from 1285 nm to 1330 nm at 1310 nm
Index of Refraction	1.467 @ 1,310 nm 1.467 @ 1,385 nm 1.468 @ 1,550 nm
Mode Field Diameter	10.4 μm @ 1,550 nm 9.2 μm @ 1,310 nm 9.6 μm @ 1,385 nm
Mode Field Diameter Tolerance	$\pm 0.4 \mu\text{m}$ @ 1310 nm $\pm 0.5 \mu\text{m}$ @ 1550 nm $\pm 0.6 \mu\text{m}$ @ 1385 nm
Polarization Mode Dispersion Link Design Value, maximum	0.04 ps/sqrt(km)
Standards Compliance	ITU-T G.652.D ITU-T G.657.A1 TIA-492CAAB (OS2)

Environmental Specifications

Heat Aging, maximum	0.05 dB/km @ 85 °C
Temperature Dependence, maximum	0.05 dB/km
Temperature Humidity Cycling, maximum	0.05 dB/km
Water Immersion, maximum	0.05 dB/km @ 23 °C

Regulatory Compliance/Certifications

Agency	Classification
ISO 9001:2015	Designed, manufactured and/or distributed under this quality management system

CS-8W-IOLT



* Footnotes

- Temperature Dependence, maximum** Temperature dependence is conducted at -60 °C to +85 °C (-76 °F to +185 °F)
- Temperature Humidity Cycling, maximum** Temperature humidity cycling is conducted at -10 °C to +85 °C (+14 °F to +185 °F) up to 95% relative humidity



TeraSPEED® Indoor/Outdoor, 120 min Fire Survival, Low Smoke Zero Halogen (LSZH), Gel-Filled, Central Loose Tube cable. Provides Rodent Resistance.

Product Classification

Regional Availability	Asia Australia/New Zealand EMEA
Portfolio	CommScope®
Product Type	Fiber indoor/outdoor cable
Product Series	C-L2

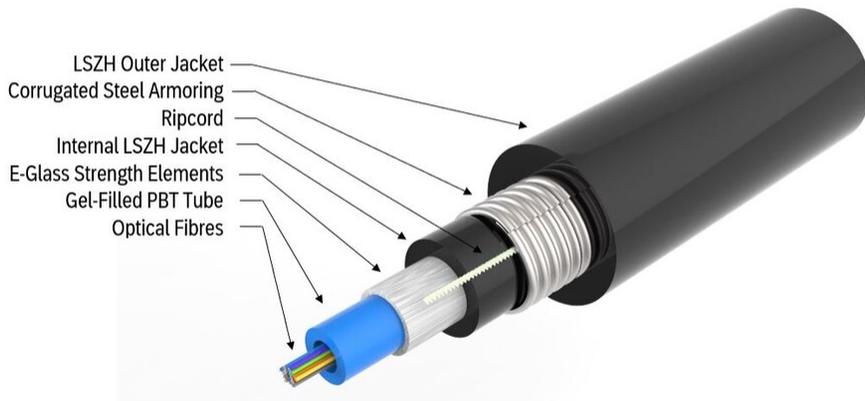
General Specifications

Armor Type	Corrugated steel
Cable Type	Central loose tube
Construction Type	Armored
Fiber Type, quantity	24
Fibers per Subunit, quantity	24
Jacket Color	Black
Jacket Marking	Meters
Subunit Type	Gel-filled
Subunit, quantity	1
Total Fiber Count	24

Dimensions

Buffer Tube/Subunit Diameter	4 mm 0.157 in
Diameter Over Jacket	12.7 mm 0.5 in

Representative Image



Mechanical Specifications

Minimum Bend Radius, loaded	330 mm 12.992 in
Minimum Bend Radius, unloaded	255 mm 10.039 in
Tensile Load, long term, maximum	400 N 89.924 lbf
Tensile Load, short term, maximum	1400 N 314.733 lbf
Compression	30 N/mm 171.304 lb/in
Compression Test Method	IEC 60794-1 E3
Impact	10 N-m 88.507 in lb
Impact Test Method	IEC 60794-1 E4
Strain	See long and short term tensile loads
Strain Test Method	IEC 60794-1 E1
Twist	5 cycles
Twist Test Method	IEC 60794-1 E7

Optical Specifications

Fiber Type	G.652.D and G.657.A1 , TeraSPEED® OS2
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Environmental Specifications

Operating Temperature	-20 °C to +70 °C (-4 °F to +158 °F)
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Storage Temperature	-40 °C to +70 °C (-40 °F to +158 °F)
Cable Qualification Standards	EN 187105 IEC 60794-1-2
Environmental Space	Aerial, lashed Buried Low Smoke Zero Halogen (LSZH)
Flame Test Method	IEC 60331-25 (120) Fire resistance: 120 minutes at 750 °C (no fiber break) IEC 60332-1 IEC 60754-1 IEC 60754-2 IEC 61034-2 NES 713 (<=5 - jacket material only)
Jacket UV Resistance	UV stabilized
Water Penetration	24 h
Water Penetration Test Method	IEC 60794-1 F5

Environmental Test Specifications

Low High Bend Test Method	IEC 60794-1 E11
Temperature Cycle	-20 °C to +70 °C (-4 °F to +158 °F)
Temperature Cycle Test Method	IEC 60794-1 F1

Packaging and Weights

Cable weight	216 kg/km 145.145 lb/kft
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Regulatory Compliance/Certifications

Agency	Classification
CHINA-ROHS	Below maximum concentration value
REACH-SVHC	Compliant as per SVHC revision on www.commscope.com/ProductCompliance
ROHS	Compliant



* Footnotes

Operating Temperature Specification applicable to non-terminated bulk fiber cable



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Product Series	C-L2

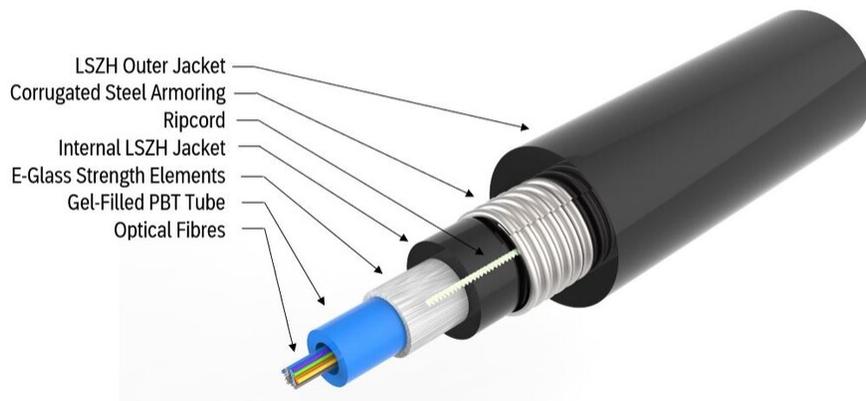
General Specifications

Armor Type	Corrugated steel
Cable Type	Central loose tube
Construction Type	Armored
Fiber Type, quantity	12
Fibers per Subunit, quantity	12
Jacket Color	Black
Jacket Marking	Meters
Subunit Type	Gel-filled
Subunit, quantity	1
Total Fiber Count	12

Dimensions

Buffer Tube/Subunit Diameter	4 mm 0.157 in
Diameter Over Jacket	12.7 mm 0.5 in

Representative Image



Mechanical Specifications

Minimum Bend Radius, loaded	330 mm 12.992 in
Minimum Bend Radius, unloaded	255 mm 10.039 in
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Impact	10 N-m 88.507 in lb
Impact Test Method	IEC 60794-1 E4
Strain	See long and short term tensile loads
Strain Test Method	IEC 60794-1 E1
Twist	5 cycles
Twist Test Method	IEC 60794-1 E7

Optical Specifications

Fiber Type	G.652.D and G.657.A1 , TeraSPEED® OS2
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Environmental Specifications

Operating Temperature	-20 °C to +70 °C (-4 °F to +158 °F)
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Storage Temperature	-40 °C to +70 °C (-40 °F to +158 °F)
Cable Qualification Standards	EN 187105 IEC 60794-1-2
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Jacket UV Resistance	UV stabilized
Water Penetration	24 h
Water Penetration Test Method	IEC 60794-1 F5

Environmental Test Specifications

Low High Bend Test Method	IEC 60794-1 E11
Temperature Cycle	-20 °C to +70 °C (-4 °F to +158 °F)
Temperature Cycle Test Method	IEC 60794-1 F1

Packaging and Weights

Cable weight	216 kg/km 145.145 lb/kft
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Included Products

CS-8W-LT - TeraSPEED® G652D/G657A1 Singlemode Fiber

* Footnotes

Operating Temperature Specification applicable to non-terminated bulk fiber cable

TeraSPEED®

Product Classification

Portfolio	CommScope®
Product Type	Optical fiber

General Specifications

Cladding Diameter	125 µm
Cladding Diameter Tolerance	±0.7 µm
Cladding Non-Circularity, maximum	0.7 %
Coating Diameter (Colored)	249 µm
Coating Diameter (Uncolored)	242 µm
Coating Diameter Tolerance (Colored)	±13 µm
Coating Diameter Tolerance (Uncolored)	±5 µm
Coating/Cladding Concentricity Error, maximum	12 µm
Core Diameter	8.3 µm
Core/Clad Offset, maximum	0.5 µm
Proof Test	689.476 N/mm ² 100000 psi

Dimensions

Fiber Curl, minimum	4 m 13.123 ft
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Mechanical Specifications

Macrobending, 20 mm mandrel, 1 turn	0.75 dB @ 1,550 nm 1.50 dB @ 1,625 nm
Macrobending, 30 mm mandrel, 10 turns	0.25 dB @ 1,550 nm 1.00 dB @ 1,625 nm
Macrobending, 60 mm mandrel, 100 turns	0.05 dB @ 1,550 nm 0.05 dB @ 1,625 nm
Coating Strip Force, maximum	8.9 N 2.001 lbf

CS-8W-LT

Coating Strip Force, minimum	1.3 N 0.292 lbf
Dynamic Fatigue Parameter, minimum	20

Optical Specifications

Cabled Cutoff Wavelength, maximum	1260 nm
Point Defects, maximum	0.1 dB
Zero Dispersion Slope, maximum	0.092 ps/[km-nm-nm]
Zero Dispersion Wavelength, maximum	1324 nm
Zero Dispersion Wavelength, minimum	1300 nm

Optical Specifications, Wavelength Specific

Attenuation, maximum	0.22 dB/km @ 1,550 nm 0.23 dB/km @ 1,575 nm 0.25 dB/km @ 1,490 nm 0.25 dB/km @ 1,625 nm 0.31 dB/km @ 1,385 nm 0.34 dB/km @ 1,310 nm 0.35 dB/km @ 1,650 nm
Backscatter Coefficient	-79.6 dB @ 1,310 nm -82.1 dB @ 1,550 nm
Dispersion, maximum	18 ps(nm-km) at 1550 nm 3.5 ps(nm-km) from 1285 nm to 1330 nm at 1310 nm
Index of Refraction	1.467 @ 1,310 nm 1.467 @ 1,385 nm 1.468 @ 1,550 nm
Mode Field Diameter	10.4 μm @ 1,550 nm 9.2 μm @ 1,310 nm 9.6 μm @ 1,385 nm
Mode Field Diameter Tolerance	$\pm 0.4 \mu\text{m}$ @ 1310 nm $\pm 0.5 \mu\text{m}$ @ 1550 nm $\pm 0.6 \mu\text{m}$ @ 1385 nm
Polarization Mode Dispersion Link Design Value, maximum	0.04 ps/sqrt(km)
Standards Compliance	ITU-T G.652.D ITU-T G.657.A1

Environmental Specifications

Heat Aging, maximum	0.05 dB/km @ 85 °C
Temperature Dependence, maximum	0.05 dB/km
Temperature Humidity Cycling, maximum	0.05 dB/km
Water Immersion, maximum	0.05 dB/km @ 23 °C

Regulatory Compliance/Certifications

Agency	Classification
ISO 9001:2015	Designed, manufactured and/or distributed under this quality management system

CS-8W-LT



* Footnotes

- Temperature Dependence, maximum** Temperature dependence is conducted at -60 °C to +85 °C (-76 °F to +185 °F)
- Temperature Humidity Cycling, maximum** Temperature humidity cycling is conducted at -10 °C to +85 °C (+14 °F to +185 °F) up to 95% relative humidity



Product: [NH50106UFL](#)

DataTuff™ Industrial Ethernet CAT6 4x2x23AWG/1 U/FTP Fire Resistant (PH120)

Product Description

DataTuff™ Industrial Ethernet CAT6 4x2x23AWG/1 U/FTP Fire Resistant (PH120)

Technical Specifications

Physical Characteristics (Overall)

Conductor

AWG	Stranding	Material	Construction n x D	No. of Pairs
23	Solid	BC - Bare Copper	1x0.6mm	4

Conductor Count: 8

Insulation

Material	Nominal Diameter	Min. Wall Thickness	Nominal Wall Thickness
PE - Polyethylene	1.58 mm	0.42 mm	0.49 mm

Color Chart

Color
Blue & White with Blue Strips
Orange & White with Orange Strips
Green & White with Green Strips
Brown & White with Brown Strips

Inner Shield

Type	Material
Tape	Bi-Laminate (Alum+Poly)

Cabling

Description	Lay Direction
2C	S

Outer Shield

Drainwire Material	Min. Coverage [%]
Solid tinned Copper	25%

Outer Jacket

Material	Nominal Diameter	Min. Wall Thickness	Nominal Wall Thickness	Separator Material
LSZH - Low Smoke Zero Halogen (Flame Retardant)	10.80 mm	0.53 mm	0.62 mm	Mica Glass

Construction and Dimensions

Min Elongation at Breakof Insulation:	300 %
Min Elongation at Breakof InsulAged:	60 %
Min Tensile Strength of Insulation Aged:	70 %
Min Elongation at Breakof Jacket:	100 MPa
Min Tensile Strength of Jacket:	10.3 lbs
Min Tensile Strength of Jacket Aged:	70 %

Min Elongation at Break of Jacket Aged:	65 %
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Electrical Characteristics

Conductor DCR

Max. Conductor DCR	Max. DCR Unbalance
73.2 Ohm/km	5 %

Capacitance

Nom. Mutual Capacitance
5.6 pF/100m

Impedance

Nominal Characteristic Impedance
100 Ohm

Delay

Max. Delay Skew
45 ns/100m
536 ns/100m

High Frequency

Frequency [MHz]	Max. Insertion Loss (Attenuation)	Min. NEXT [dB]	Min. PSNEXT [dB]	Min. ACRF (ELFEXT) [dB]	Min. PSACRF (PSELFEXT) [dB]	Min. RL (Return Loss) [dB]
1 MHz	2.03 dB/100m	74.3 dB	72.3 dB	67.8 dB	64.8 dB	20 dB
4 MHz	3.78 dB/100m	65.3 dB	63.3 dB	55.8 dB	52.8 dB	23 dB
8 MHz	5.32 dB/100m	60.8 dB	58.8 dB	49.7 dB	46.7 dB	24.5 dB
10 MHz	5.95 dB/100m	59.3 dB	57.3 dB	47.8 dB	44.8 dB	25 dB
16 MHz	7.55 dB/100m	56.2 dB	54.2 dB	43.7 dB	40.7 dB	25 dB
20 MHz	8.47 dB/100m	54.8 dB	52.8 dB	41.8 dB	38.8 dB	25 dB
25 MHz	9.51 dB/100m	53.3 dB	51.3 dB	39.8 dB	36.8 dB	24.32 dB
31.25 MHz	10.67 dB/100m	51.9 dB	49.9 dB	37.9 dB	34.9 dB	23.64 dB
62.5 MHz	15.38 dB/100m	47.4 dB	45.4 dB	31.9 dB	28.9 dB	21.54 dB
100 MHz	19.8 dB/100m	44.3 dB	42.3 dB	27.8 dB	24.8 dB	20.11 dB
200 MHz	28.98 dB/100m	39.8 dB	37.8 dB	21.8 dB	18.8 dB	18 dB
250 MHz	32.85 dB/100m	38.3 dB	36.3 dB	19.8 dB	16.8 dB	17.32 dB

Temperature Range

Operating Temperature Range:	-40°C to + 80°C
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Mechanical Characteristics

UV Resistance:	Yes
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Standards

UL AWM Style Compliance:	AWM 21130
TIA/EIA Compliance:	EIA/TIA 568
Other Standards:	BS EN 50289-4-16

Applicable Environmental and Other Programs

EU Directive 2002/95/EC (RoHS):	Yes
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Suitability

Suitability - Oil Resistance:	Yes
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Flammability, LS0H, Toxicity Testing

IEC Flammability:	IEC 60332-1-2, IEC 60332-3-22
Other Flammability:	IEC 60331-23, BS EN 50200 PH120
IEC 60754-1 - Halogen Amount:	0.5 %
IEC 60754-2 - Halogen Acid Gas Amount - Max. Conductivity:	10 µS/mm
IEC 60754-2 - Halogen Acid Gas Amount - Min. pH:	4.3
IEC 61034-2 - Smoke Density Min. Transmittance:	60%

Product Notes

Notes:	EN50200 Annex E
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History

Update and Revision:	Revision Number: 0.23 Revision Date: 10-31-2022
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Part #s	Length	# of Pairs	AWG	Outer Diameter	Weight
RP6600100M4	100m (328')	4	22	0.413"	39 lbs.
RP6600300M4	300m (984')	4	22	0.413"	105 lbs.



Description:

- CI 2 Hour Fire-Rated Shielded Communication Cable
- IE SF/UTP 4x2xAWG22/1 Cable with Circuit Integrity Behavior
- Rated for both horizontal and vertical runs

Applications:

- Campus Wiring, Riser Applications, Horizontal Backbone Wiring, Building Control Systems, Intelligent Fire Alarm Systems. Circuit integrity structured wiring alarm cable compatible with all known connection systems to EN 50173.
- IEEE 802.3: 10Base-T; (100Base-T <75m), IEEE 802.5 16 MB; ISDN; TPDDI; ATM RS485 (10Mbits)

Construction:

Conductor	Bare copper wire, Ø 0.65 mm (AWG 22) 0.332mm ²
Insulation	PE/Silicone Rubber ¹ , Ø PE 1.0mm and Silicone Rubber 1.7 mm
Twisting	2 cores to the pair
Cable Lay Up	4 pairs to the core
Fire Protection Wrapping	Glass tape
Screen	Aluminum Tape + Tinned Copper Braid + Drain Wire
Sheath	Halogen free, flame retardant thermoplastic sheathing compound acc. to EN 50290-2-27, Ø OD - 10.5 mm
Color	Red RAL 3000

Note¹- Silicone rubber insulation especially for circuit integrity cables

Compliance:

- Approved by LU (London Underground) – Independently tested by BRE Global
- Fire resistant BS5839-1 (clause 26.2e); BS8434-2; BSEN 50200
- Flame retardant BS4066 part 3; Smoke emission BSEN 20568
- LUL-Flammability, smoke and fume 2-01001-002
- LU STANDARD e4156 part 1 – Approval ref TLL-ENG-MATTS-0076 (dated 21/06/2007)
- Generally to ISO/IEC 11801: 95, EN 50173:95; EN 50288-1^{1,2,3,4,5})
- Generally categorized between Cat 3 and Cat 5 (see notes)
- Passes – ISO/IEC 11801 class D (95); TIA Cat 5 Ch (TSB67); ISO/IEC 11801 Class C

Mechanical Properties:

Bending Radius	Without load: ≥ 32.5 mm With load: ≥ 65 mm
Temperature Range	During operation: -20°C to + 60°C During installation: 0°C to + 50°C

Electrical Properties: at 20°C± 5°C

Loop Resistance		≤ 110 Ω /km
Resistance Unbalance		≤ 2%
Insulation Resistance	(500 V) 1 minute	≥ 2000 M Ω *km
Mutual Capacitance	At 800 Hz	Nom. nF/km
Capacitance Unbalance	(Pair/Ground)	≥ 1600 pF/km
Characteristic Impedance	(At 10) MHz	(100 ± 15) Ω
Nominal Velocity of Propagation		ca. 57%
Test Voltage	(DC, 1 min) core/core and core/screen	1000 V
Transfer Impedance	At 10 MHz	5 m Ω /m

Electrical Data (Nominal): acc. to Cat.5 (at 20°C)
Fire/Flame Resistance:

Low Smoke:	BSEN 20568, IEC 61034-2, BSEN 20568
Halogen Free:	IEC 60754-1&2
Flame Retardant:	IEC 60332-1, IEC 60332-3-24, BS4066 part 3, UL 1581 VW 1
Circuit Integrity:	BS5839-1 2002 (clause 26.2e); BS8434-2; BSEN 50200, IEC60331

BS5839 enhanced 3 in 1 test PASSED
 Continued data operation @ > 2 hours
 950°C PASSED
 BS6387 CWZ >3 hours

Conduit Fill:

Raceway/ Conduit Size	Max # of 22 AWG LU 4-Pair
1/2"	1
3/4"	1
1"	2
1-1/4"	2
1-1/2"	3
2"	4

Note² - Structured cabling Characteristic Impedance is normally within (100 ± 5) Ω, due to the insulation system this is not achievable all the time

Note³ - Structured cabling systems minimum for c=65%, due to the insulation (PE + Sil Rbr) system this is not achieved, that is nvp 0,57

Note⁴ - Cat 5 (95) specification: not the Cat5e of today i.e. gigabit ethernet

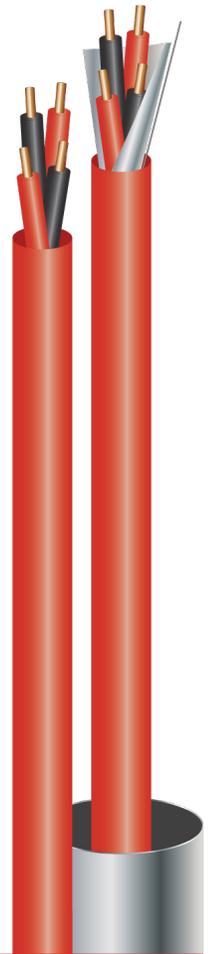
Note⁵ - When used in a 100m Channel, 90m + 10m patch cords, the Class D (95) is fit for some purposes: it is advisable to approve a 100m sample and perform a trial on the system before installation

SPECIFICATIONS

DuraLife® II Dual Rated Ethernet Multi-Conductor FPLR Shielded/Unshielded Fire Resistive Cables

Certified to the harsh requirements of the UL 2196 Test for Fire Resistive Cables, the DuraLife II Dual Rated CIC /CI Multi-conductor Ethernet FPLR cables ensure two-hour operation of critical data and communication systems in the event of a fire. The dual rating design offers the most versatility in meeting code survivability requirements in both in-conduit and free air installation scenarios while meeting Cat-3 channel requirements per TIA-568.C.2.

Description: Dual Rated Multi-Conductor CI/CIC Cable. UL 2196 Certified/UL 1424 Listed FHIT System No. 28D. Low smoke, zero halogen design (LSZH) FHIT7 System No. 28D (CSA Listed)
Sizes Available: 18 AWG unshielded; 18 AWG shielded. 2/PR through 4/PR constructions



CONSTRUCTION:

- **Conductor:** Oxygen-free bare copper (OFHC), solid and/or stranded
- **Insulation:** Proprietary ceramifiable silicone rubber
- **Assembly:** Numerically printed black/red paired leads
- **Jacket:** Red low smoke/zero halogen FRPE with sequential footage markers (custom colors available /special order mins apply)

APPLICATIONS:

- Hospitals & Healthcare Facilities
- High Rise & Mix use buildings
- Universities & College Campuses
- Stadiums, Casinos, places of assembly
- Government Facilities

CRITICAL SYSTEMS:

- Area of Refuge Systems
- Emergency VoIP communication
- Addressable Class N Fire Alarm systems
- BMS and Low Voltage Emergency Lighting

COMPLIANCE & PERFORMANCE FEATURES:

- UL 1424 Listed FPLR/FPLR-CI (dual-rated) for Power-Limited Fire Alarm Circuits. Riser Rated. 300V/105°C classified.
- UL/CAN (ULC formerly S-139) Certified to UL 2196 2 hour fire rating in FHIT/FHIT7 28D
- CSA Certified to CSA Std. C22.2 No. 208; Type FAS90, 300V/90C FT4-ST1
- UL Certified 2-hour fire rating as FPLR-CI for Free Air installed per NEC code
- Fire alarm circuit integrity, emergency systems, and healthcare facilities (NEC Articles 760, 700 & 517)
- Meets National Fire Protection Code (NFPA 70 & 72) fire alarm survivability circuit requirements
- Meets National Fire Protection Code (NFPA 130 & 502) fire alarm survivability circuit requirements
- Meets UL1685 and FT4/IEEE 1202 requirements
- Compliance tested to UL 1424 as suitable for use in applications requiring wet rating
- Tested for Sunlight Resistance in compliance with UL 2556 requirements
- Suitable for 2-hour certified fire-resistive applications in EMT or IMC conduit systems
- UL Listed File No. E-241484. UL Fire Directory R-21213.
- NYC certified and CAFM approved
- Meets Category 3 requirements per TIA-568-C.2 throughout UL2196 Flame and Hose Stream Testing



Scan here to access
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SPECIFICATIONS

DuraLife® II Dual Rated Ethernet Multi-Conductor FPLR Shielded/Unshielded Fire Resistive Cables

HARDWARE CERTIFIED: (Refer to DuraLife® II Multi-Conductor Installation Guide for additional details)

- **EMT/IMC Conduit:** Wheatland/Western Tube
- **EMT/IMC Conduit:** Allied/Columbia (EMT: E-Z Pull Brand)
- **EMT Compression Couplings:** Hubbell-Raco or Halex
- **NEMA 1 Splice Enclosure/Pull Box:** Eaton/Cooper
- **Pulling Lubricant:** Polywater LZ
- **Box Fitting Connectors:**
 - » *Compression* - Cooper Crouse-Hinds (EMT); Hubbell-Raco (EMT/IMC)
 - » *Set Screw* - Hubbell-Raco (EMT/IMC)
- **Splice Connector:** 3M Butt-Type Crimp Terminals
- **Splice Tapes - 1":** 3M Silicone; St. Gobain Fiberglass Tape

UNSHIELDED:

RADIX P/N	AWG/ COND.*	SOLID	NOMINAL O.D. (INCH)	COND. RESISTANCE (OHMS/MFT.)	NOM.CAP. (pF/FT) (per pair)	EMT/IMC UNSHIELDED MAX CABLE FILL ALLOWANCE (for in-conduit installations per FHIT 28D)				
						¾"	1"	1 ¼"	1 ½"	2"
CTU18A0104-CAT3	18/2P	Solid	.366"	6.48	14.4	1	2	4	6	10
CTU18A0106-CAT3	18/3P	Solid	.444"	6.48	14.4	1	1	3	4	7
CTU18A0108-CAT3	18/4P	Solid	.518"	6.48	14.4	X	1	2	3	5

* Numerically printed black/red paired leads

SHIELDED:

RADIX P/N	AWG/ COND.*	SOLID	NOMINAL O.D. (INCH)	COND. RESISTANCE (OHMS/MFT.)	NOM.CAP. (pF/FT) (per pair)	EMT/IMC SHIELDED MAX CABLE FILL ALLOWANCE (for in-conduit installations per FHIT 28D)				
						¾"	1"	1 ¼"	1 ½"	2"
CTS18A0104-CAT3	18/2P	Solid	.389"	6.48	18.4	1	2	4	5	5
CTS18A0106-CAT3	18/3P	Solid	.472"	6.48	18.4	1	1	2	3	3
CTS18A0108-CAT3	18/4P	Solid	.551"	6.48	18.4	X	1	1	2	2

* Numerically printed black/red paired leads

Part #s	Length	# of Pairs	AWG	Outer Diameter	Weight
66125	500'	4	18 8-Conductor	0.510"	78 lbs.
RP66010004	1,000'	4	18 8-Conductor	0.510"	147 lbs.



Description:

Ethernet circuit integrity cables are the first to be certified to UL 2196 while meeting Category 3 channel requirements. These shielded cables are available in 18 AWG 4 pair construction and are capable of transmitting signals at a speed of 10 Mbps. In the event of a fire, Ethernet cables will ensure critical voice applications remain operational.

Applications:

- Emergency VoIP communications (i.e. telephones, IP speakers, etc.)
- IP Area of Refuge communication devices
- Addressable Class N fire alarm devices
- Critical data communication circuits
- For use in wet locations

Benefits:

- Only UL 2196 listed Ethernet cable for 2 hour fire-rated circuits
- Unique solution for NFPA Level 2 or 3 requirements
- Supports all 10 Mbps critical data circuits

Construction:

- **Conductors:** 18 AWG Solid Bare Copper
- **Tape:** Flame Retardant Tape
- **Insulation:** Low Smoke, Zero Halogen Thermoset Fire-Roc™
- **Cable Assembly:** 4 Pairs, Red and Black Conductors
- **Drain:** 18 AWG Stranded Bare Copper
- **Shield:** Copper Shield
- **Jacket:** Red Non-Halogen Flame Retardant Polyolefin

Compliance:

- ANSI/UL 2196 2 Hour Fire-Rating for use in FHIT System 40A
- CAN/ULC-S139 2 Hour Fire-Rating with Hose Stream for use in FHIT7 System 40A
- c(UL)us Listed Type CMR-LS
- UL Listed Type FPLR-LS & CL3R-LS
- CSA Listed FAS105 ST1 FT4
- UL Subject 444 Communications Cable, 300V/105°C Classified
- UL Subject 1424 Power Limited Fire Alarm Circuits; 300V/105°C Classified
- UL Subject 13 Power Limited Circuit Cables; 300V/105°C Classified
- NFPA 70, 72, & 130
- California State Fire Marshal Approved
- RoHS Compliant
- NYC Electrical Advisory Board Approval # 54502, April 2017