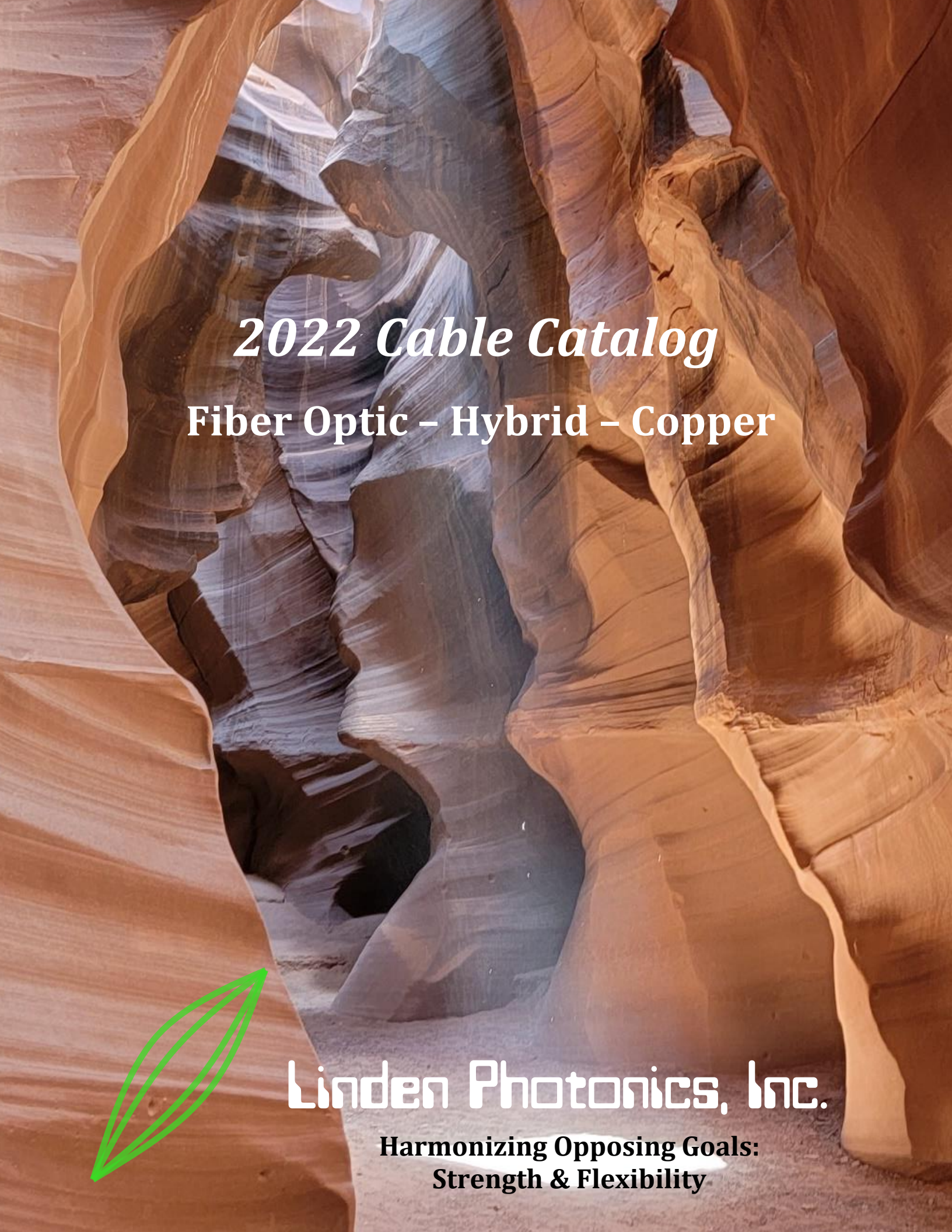


2022 Cable Catalog

Fiber Optic – Hybrid – Copper

Linden Photonics, Inc.

Harmonizing Opposing Goals:
Strength & Flexibility

Table of Contents

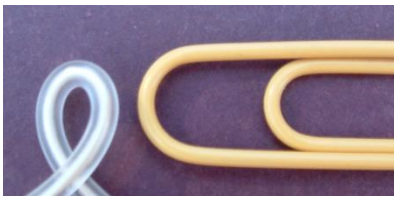
STFOC

Optical Cable

Non-Kink

Crush Proof

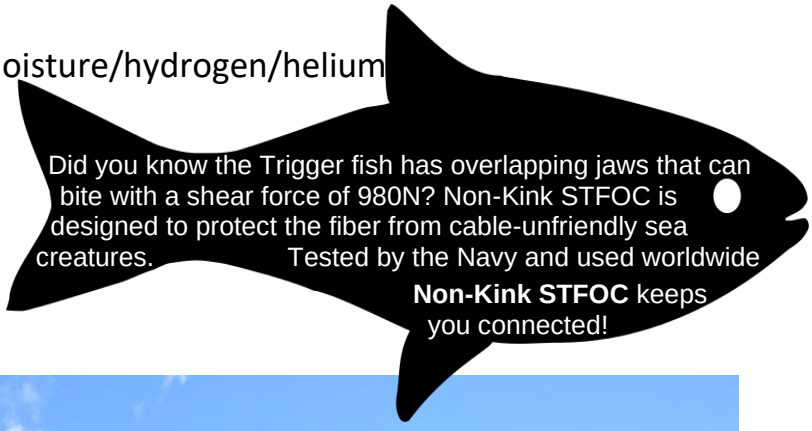
STFOC



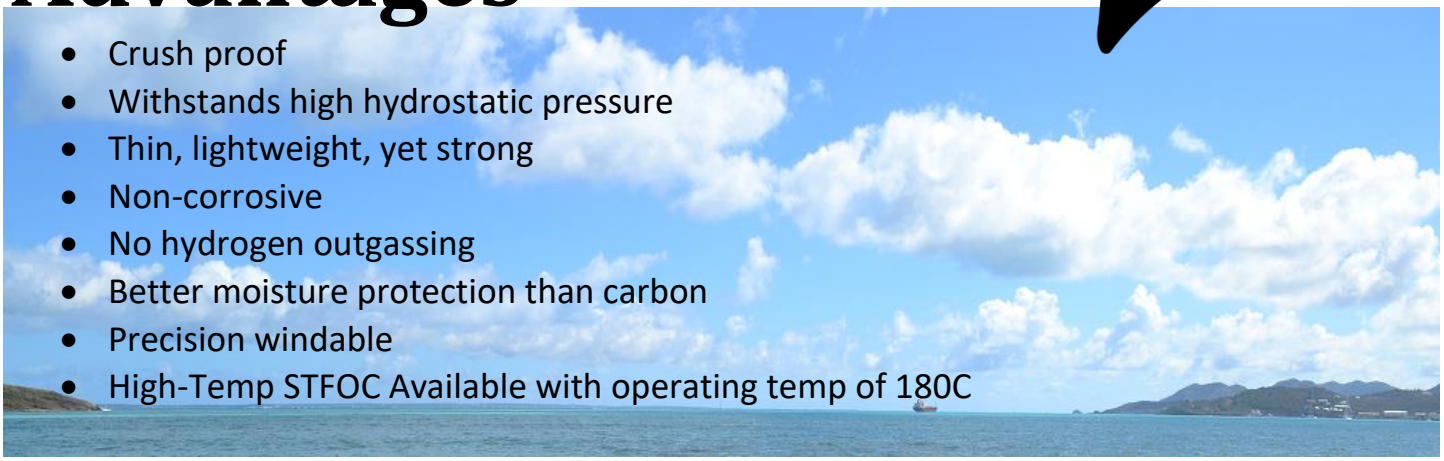
Linden's STFOC™ cables are available for a variety of underwater uses from munitions tethers to ROV controls to littoral water sensing. STFOC uses our patented cable jacket construction designed to protect the fiber in the harsh subsea environment. Non-Kink™ STFOC has a patented design to protect your fiber from the dangers of hockling. Compact and rugged; flexible and strong. Custom configurations available.

Features

- Patented Liquid Crystal Polymer (LCP) jacketing (US Patent No. 7,570,853)
- Patented Non-Kink construction (US Patent No. 8,842,956)
- 100% thermoplastic jacket eliminates need for metal & Kevlar
- Non-Kink™ design prevents hockling
- Lightweight – LCP density:1.4g/cm^3 compared to Inconel 625:8.4g/cm^3
- Long continuous lengths >25km
- Hermetic coating protects fiber from moisture/hydrogen/helium
- Tight diameter tolerance
- Abrasion resistant



Advantages



- Crush proof
- Withstands high hydrostatic pressure
- Thin, lightweight, yet strong
- Non-corrosive
- No hydrogen outgassing
- Better moisture protection than carbon
- Precision windable
- High-Temp STFOC Available with operating temp of 180C

Singlemode

Spec No.	Part No.	OD (mm)	Attenuation @ 1310nm (dB/km)	Attenuation @ 1550nm (dB/km)	Tensile Strength (lbs)	Weight (kg/km)
LINDEN-SPE-7273	1-SM-A-17-B-19	0.480	0.45	0.35	20	0.24
LINDEN-SPE-7090	1-SM-A-17-B-20	0.500	0.45	0.35	20	0.4
LINDEN-SPE-7053	1-SM-A-21-B-24	0.600	0.45	0.35	30	0.4
LINDEN-SPE-7063	1-SM-A-26-B-29	0.750	0.45	0.35	45	0.5
LINDEN-SPE-7034	1-SM-A-27-B-30	0.762	0.45	0.35	50	0.6
LINDEN-SPE-7309+	1-V-A-24-M-30	0.762	0.45	0.35	40	0.67
LINDEN-SPE-7092*	1-V-A-27-R-35	0.890	0.45	0.40	50	1.0
LINDEN-SPE-7035	3-SM-A-35-B-38	0.965	0.45	0.35	50	0.9
LINDEN-SPE-7394	3-SM-A-35-R-40	1.02	0.45	0.35	50	0.97
LINDEN-SPE-7331	1-RR-A-27-J-60	1.52	0.45	0.35	50	2.5
LINDEN-SPE-7043	1-SM-A-35-Q-65	1.65	0.45	0.35	70	2.6
LINDEN-SPE-7196	1-SM-A-35-Q-79	2.0	0.45	0.35	70	3.7
LINDEN-SPE-7057	3-SM-A-35-Q-87	2.2	0.45	0.35	70	3.9
LINDEN-SPE-7329t	1-SM-A-21-B-24-W-48-Q-95	2.4	0.45	0.35	300	9.0
LINDEN-SPE-7374	6-FO-P-106	2.7	0.50	0.50	100	6.2
LINDEN-SPE-7039	7-3-A-55-Q-125	3.2	0.45	0.35	60	9.0

*Mid-Temp (150C) STFOC / tStainless Steel Armored

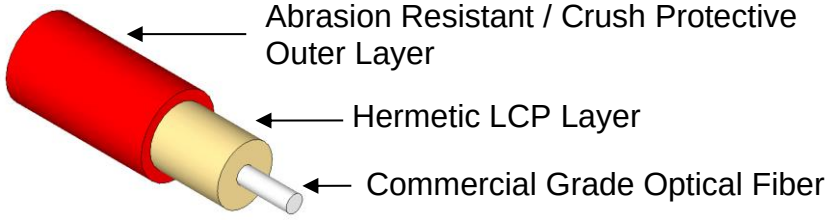
Multimode (50/125)

Spec No.	Part No.	OD (mm)	Attenuation @ 850nm (dB/km)	Attenuation @ 1300nm (dB/km)	Tensile Strength (lbs)	Weight (kg/km)
LINDEN-SPE-7069	1-F-A-21-B-24	0.600	4.5	3.5	30	0.4
LINDEN-SPE-7070	1-F-A-27-B-30	0.762	2.5	3.5	50	0.6
LINDEN-SPE-7310+	1-W-A-24-M-30	0.762	2.5	3.5	40	0.67
LINDEN-SPE-7182	1-W-A-27-J-35	0.890	2.5	3.5	50	0.9
LINDEN-SPE-7071	3-F-A-35-B-38	0.965	2.5	3.5	50	0.9
LINDEN-SPE-7044	1-F-A-35-Q-65	1.65	2.5	3.5	70	2.6
LINDEN-SPE-7197	1-F-A-35-Q-79	2.0	2.5	3.5	70	3.7

+High-Temp (180C) STFOC

Multimode (62.5/125)

Spec No.	Part No.	OD (mm)	Attenuation @ 850nm (dB/km)	Attenuation @ 1300nm (dB/km)	Tensile Strength (lbs)	Weight (kg/km)
LINDEN-SPE-7046	1-I-A-35-Q-65	1.65	2.5	3.5	70	2.6
LINDEN-SPE-7198	1-I-A-35-Q-79	2.0	2.5	3.5	70	3.7
LINDEN-SPE-7072	7-I-A-55-G-125	3.2	2.5	3.5	60	9.0



CONTACT LINDEN FOR MORE DETAILED SPECIFICATIONS OR CUSTOM REQUIREMENTS

Buoyant Cable

Floats

Strong

Neutrally Buoyant

Buoyant Cable

Linden's buoyant STFOC™ fiber optic cables are available for a variety of underwater uses from munitions tethers to ROV controls to mooring buoys.

Our lightweight, buoyant designs are customized to your needs. From neutrally buoyant designs to cable that will float on water, we can customize your size, buoyancy and strength. Using Linden's patented cable jacket construction designed to protect the fiber in the harsh subsea environment, our cables are compact and rugged; flexible and strong.

Features

- From the thinnest, lightest 290µm cable to 13mm+ cables with multi-ton break strength
- Precise density control for positive, neutral or negative buoyancy
- Designs with or without Kevlar
- Non-Kink™ design prevents hockling
- Continuous lengths >5km
- Hermetic coating protects fiber from moisture Hydrogen & Helium for increased operational life
- Abrasion resistant

GA Tech used a 3.5 mm Linden STFOC tether on a NASA funded project to deploy a 10 ft long ROV under the Ross Ice Shelf in Antarctica capturing never before seen footage.

Advantages

- Crush proof
- Non-corrosive
- No hydrogen outgassing
- Thin, lightweight, yet strong
- Stainless Steel Armoring Available

Singlemode

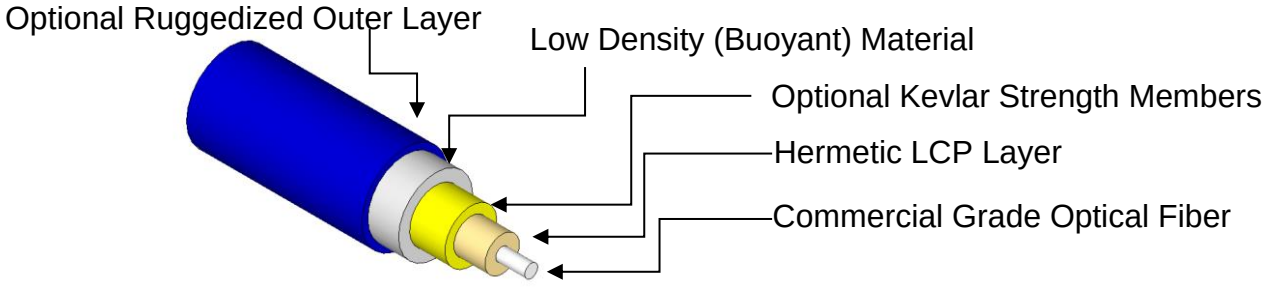
Spec No.	Part No.	OD (mm)	Attenuation @ 1310nm (dB/km)	Attenuation @ 1550nm (dB/km)	Tensile Strength (lbs)	Density (s.g.)
LINDEN-SPE-7089	1-FF-C-2-11-ORN	0.295	1.0	1.0	10	1.13
LINDEN-SPE-7263	1-JJ-C-13	0.333	0.45	0.35	10	1.12
LINDEN-SPE-7040	1-SM-C-20	0.500	0.35	0.25	10	0.95
LINDEN-SPE-7096	1-SM-A-21-R-36-YEL	0.900	0.45	0.35	40	1.03
LINDEN-SPE-7260	1-SM-A-21-R-33-B-36-YEL	0.915	0.45	0.30	45	1.045
LINDEN-SPE-7207	1-SM-A-27-R-46-YEL	1.1	0.45	0.35	50	1.027
LINDEN-SPE-7073	1-SM-A-27-L-67	1.7	0.45	0.35	50	1.02
LINDEN-SPE-7036	1-SM-A-27-O-47-L-75	1.9	0.45	0.35	250	1.01
LINDEN-SPE-7223	1-SM-A-27-B-30-O-47-L-108	2.75	0.45	0.35	250	1.00
LINDEN-SPE-7055	1-SM-A-27-O-67-L-137	3.5	0.45	0.35	450	0.99
LINDEN-SPE-7098	1-SM-A-27-O-55-X-137	3.5	0.45	0.35	750	0.99
LINDEN-SPE-7094	1-SM-A-27-R-46-O-101-X-169-YEL	4.3	0.45	0.35	1,200	0.97
LINDEN-SPE-7281	2-SM-V-63-O-134-FQ-174	4.4	0.50	0.50	1,350	1.03
LINDEN-SPE-7316*	1-SM-A-21-B-24-W-48-FQ-185	4.7	0.45	0.35	300	0.95
LINDEN-SPE-7229	1-SM-A-21-R-35-O-175-X-232	5.9	0.50	0.50	1,700	0.98
LINDEN-SPE-7305	1-SM-A-27-B-30-O-120-FQ-250	6.35	0.45	0.35	1,300	0.75
LINDEN-SPE-7137	4-FO-L-183-O-242-L-370	9.4	0.60	0.60	2,750	0.97
LINDEN-SPE-7059	1-SM-A-27-L-160-T-230-L-440-Q-520	13.2	0.60	0.40	2,750	1.03
LINDEN-SPE-7060	3-SM-A-41-L-174-T-244-L-454-Q-534	13.6	0.40	0.30	2,750	1.02

Multimode (50/125)

Spec No.	Part No.	OD (mm)	Attenuation @ 850nm (dB/km)	Attenuation @ 1300nm (dB/km)	Tensile Strength (lbs)	Density (s.g.)
LINDEN-SPE-7074	1-F-C-5-20	0.500	2.5	3.5	10	0.95
LINDEN-SPE-7075	1-F-A-27-L-67	1.7	2.5	3.5	50	1.02
LINDEN-SPE-7076	1-F-A-27-O-47-L-75	1.9	2.5	3.5	250	1.01
LINDEN-SPE-7077	1-F-A-27-O-67-L-137	3.5	2.5	3.5	450	0.99
LINDEN-SPE-7280	4-FO-O-170-L-300-GG-340	6.6	2.5	3.5	450	1.03
LINDEN-SPE-7078	1-F-A-27-L-160-T-230-L-440-Q-520	13.2	2.5	3.5	2,000	1.03

Multimode (62.5/125)

Spec No.	Part No.	OD (mm)	Attenuation @ 850nm (dB/km)	Attenuation @ 1300nm (dB/km)	Tensile Strength (lbs)	Density (s.g.)
LINDEN-SPE-7093	1-I-A-27-O-47-L-75	1.9	4.5	3.5	250	1.01
LINDEN-SPE-7091	1-I-A-A-27-O-67-L-137	3.5	2.5	3.5	450	0.99

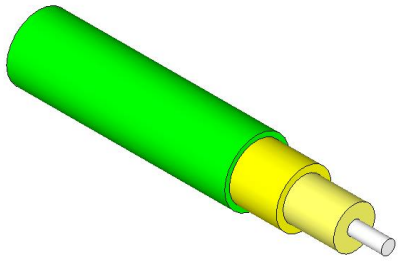


CONTACT LINDEN FOR MORE DETAILED SPECIFICATIONS OR CUSTOM REQUIREMENTS

*Stainless Steel Armored


High Strength Cable
Thin
Lightweight
Rugged

High Strength Cable

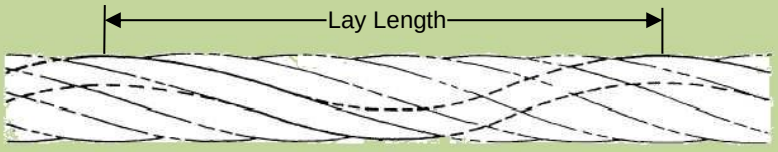


Linden's High Strength Non- Buoyant Cables are lightweight & flexible.

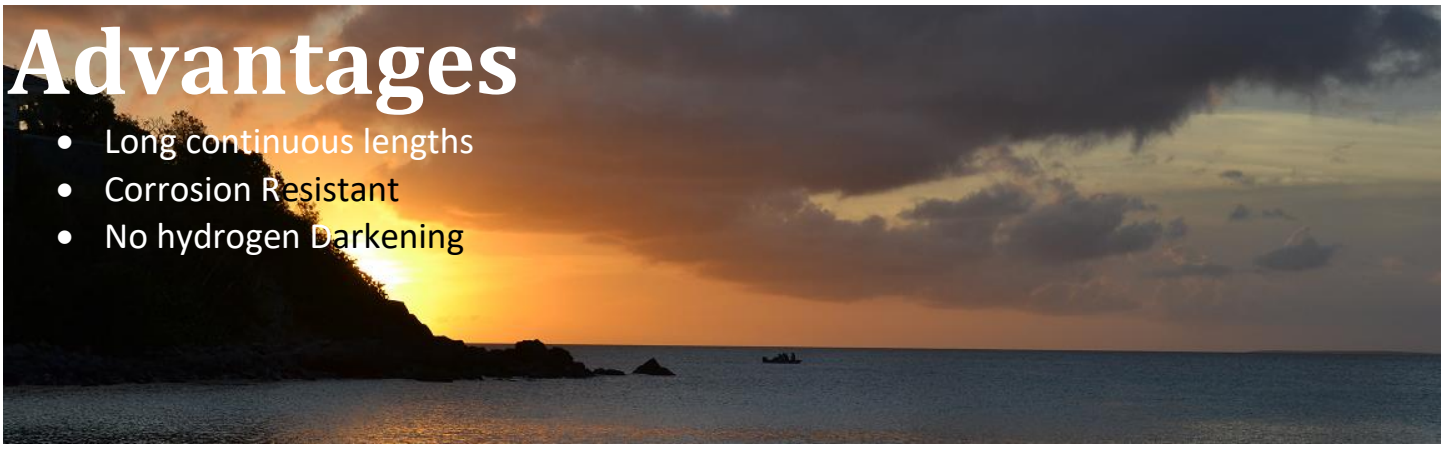
Rugged exterior, lightweight design and long continuous lengths give us an edge over competing cables. Using Linden's patented cable jacket construction designed to protect the fiber in the harsh subsea environment, our cables pull their weight.

Features

- Over 2,500lbs. breaking strength
- Lightweight – LCP density: 1.4g/cm^3 compared to inconel 625: 8.4g/cm^3
- Continuous lengths >5km
- Hermetic coating protects fiber from moisture/hydrogen/helium
- Abrasion resistant



Making a cable **strong** is more complex than it may seem. Things like strength member selection, denier, number of elements, picks per inch, **lay length**, to braid or contra-helically serve, are but some of the factors one must consider when designing a cable. Different uses may call for different designs. Putting an **optical fiber** in the middle of all those strength members only complicates things.
Talk with **Linden** about how to build a cable that works for you.



Singlemode

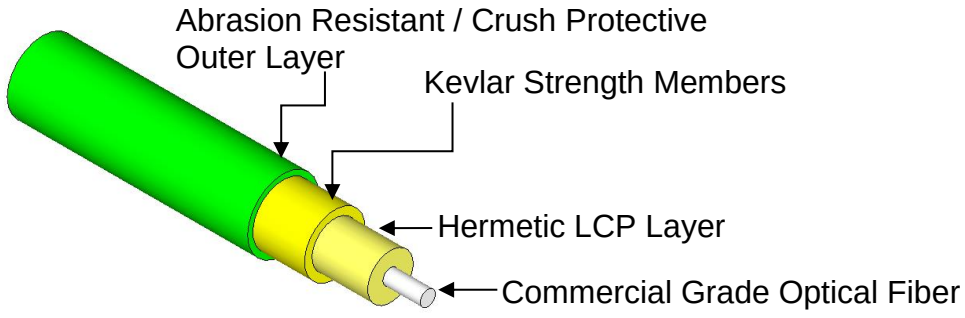
Spec No.	Part No.	OD (mm)	Attenuation @ 1310nm (dB/km)	Attenuation @ 1550nm (dB/km)	Tensile Strength (lbs)	Weight (kg/km)
LINDEN-SPE-7052	1-SM-A-27-O-45-Q-75	1.9	0.45	0.35	250	3.6
LINDEN-SPE-7050	1-SM-A-27-O-55-Q-95	2.4	0.45	0.35	450	5.5
LINDEN-SPE-7282	3-SM-A-35-B-38-T-95-Q-118	3.0	0.50	0.50	1,200	7.9
LINDEN-SPE-7171	1-SM-J-35-O-45-Q-145	3.7	0.45	0.35	250	11
LINDEN-SPE-7097	1-SM-A-27-O-82-Q-147	3.7	0.45	0.35	1,200	13
LINDEN-SPE-7114	1-SM-A-27-O-67-GG-147	3.7	0.45	0.35	1,100	13.4
LINDEN-SPE-7300	12-FO-U-114-O-134-Q-176	4.5	0.50	0.50	250	16
LINDEN-SPE-7334	1-SM-A-27-R-44-Z-146-Q-190	4.8	0.45	0.35	3,100	18.7
LINDEN-SPE-7398	4-FO-O-170-Q-210	5.3	0.50	0.50	2,200	34
LINDEN-SPE-7312	4-SM-V-102-T-142-Q-232	5.9	0.36	0.21	250	27
LINDEN-SPE-7322	16-SM-T-240-Q-255	6.5	0.36	0.21	250	28
LINDEN-SPE-7383	7098-T-236-Q-300	7.6	0.50	0.50	10,000	51
LINDEN-SPE-7082	1-SM-A-27-B-30-O-47-L-108-O-170-Q-236	7.9	0.45	0.35	2,000	41
LINDEN-SPE-7371	4-FO-P-136-O-236-Q-316	8.0	0.50	0.50	10,000	68
LINDEN-SPE-7312	24-FO-O-270-Q-334	8.5	0.50	0.50	-	33
LINDEN-SPE-7289	4-FO-X-140-O-308-OO-349	8.8	0.50	0.50	9,000	57
LINDEN-SPE-7256	4-FO-P-136-O-193-FQ-393	10.0	0.50	0.50	5,000	80
LINDEN-SPE-7399	24-SM-O-445-Q-475-NN-483-Q-523	13.3	0.45	0.35	3,200	120
LINDEN-SPE-7275	4-FO-P-169-O-216-P-246-FQ-393	15.0	0.50	0.50	8,000	176

Multimode (50/125)

Spec No.	Part No.	OD (mm)	Attenuation @ 850nm (dB/km)	Attenuation @ 1310nm (dB/km)	Tensile Strength (lbs)	Weight (kg/km)
LINDEN-SPE-7083	1-F-A-27-O-47-Q-75	1.9	5.5	3.5	250	3.6
LINDEN-SPE-7084	1-F-A-27-O-67-Q-95	2.4	5.5	3.5	450	5.5
LINDEN-SPE-7387	2-FO-V-63-O-134-FQ-174	4.4	3.0	1.0	1,350	15
LINDEN-SPE-7396	4-MM-V-102-T-142-Q-232	5.9	3.0	1.0	250	27
LINDEN-SPE-7388	4-FO-V-102-O-157-FQ-236	6.0	3.0	1.0	1,200	19.5
LINDEN-SPE-7400	24-MM-O-445-Q-475-NN-483-Q-523	13.3	3.0	1.0	3,200	120

Multimode (62.5/125)

Spec No.	Part No.	OD (mm)	Attenuation @ 850nm (dB/km)	Attenuation @ 1310nm (dB/km)	Tensile Strength (lbs)	Weight (kg/km)
LINDEN-SPE-7085	1-I-A-27-O-47-Q-75	1.9	5.5	3.5	250	3.6
LINDEN-SPE-7086	1-I-A-27-O-67-Q-95	2.4	5.5	3.5	450	5.5
LINDEN-SPE-7159	1-I-J-35-O-45-Q-137	3.5	5.5	3.5	250	11
LINDEN-SPE-7268	3-I-V-63-O-103-Q-190	4.8	2.9	0.6	1,200	20
LINDEN-SPE-7087	1-I-A-27-L-160-T-230-Q-310	7.9	5.5	3.5	2,000	41



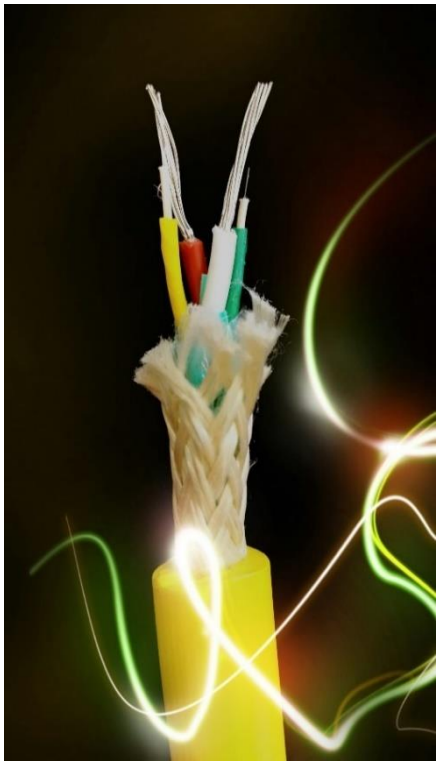
CONTACT LINDEN FOR MORE DETAILED SPECIFICATIONS OR CUSTOM REQUIREMENTS

Hybrid Cables

Rugged & Durable

Buoyant

Thin & Lightweight



Hybrid Cables

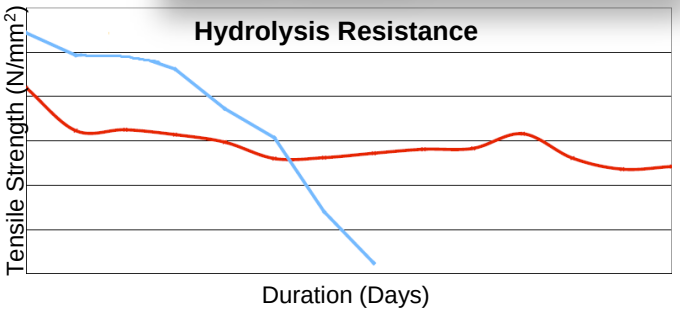
Linden Photonics **hybrid cables** combine copper and fiber elements in a **lightweight**, yet strong and robust tether cable. Linden can customize your size, buoyancy and strength; from **neutrally buoyant** designs to extremely thin cables with various conductor offerings and fiber types available. Linden's patented cable jacket construction is designed to protect delicate fibers in the harsh subsea environment. Linden's hybrid cables are compact and rugged; flexible and strong.

Features

- Rugged, durable patented STFOC fiber optic elements
- Hermetic coating protects fiber from moisture
- Buoyant designs
- Thin wall insulation = thinner/lighter cables
- Fiber strength members = lighter cables
- Vectran strength members available offering less self-abrasion and longer service life
- 300V, 600V & 1,000V standard ratings

Our standard TPU is an **Ether grade** providing better hydrolysis performance in moisture rich environments.

Ester grades are available non-humid environments requiring improved abrasion resistance.



Advantages

- Virtually crush proof
- Non-corrosive
- Thin, lightweight, yet strong
- Withstands high hydrostatic pressure
- Synthetic strength members for higher strength and lower weight

CONTACT LINDEN FOR DRAWINGS, SPECIFICATIONS OR CUSTOM REQUIREMENTS

Specifications

Spec No.	Part No.	OD (mm)	Fiber Type	Conductor	UTS (lbs)
1 x Singlemode (SM)					
LINDEN-SPE-7136	1-FO-2-CU-BB-120-22759	3	1 x SM	2 x #22	N/A
LINDEN-SPE-7373	1-FO-6-CU-O-11-Q-135	3.2	1 x SM	6 x #26	450
LINDEN-SPE-7148*	1-FO-2-CU-O-10-FQ-146-YEL	3.7	1 x SM	2 x #28	450
LINDEN-SPE-7149*	1-FO-2-CU-O-10-FQ-192-YEL	4.9	1 x SM	2 x #24	450
LINDEN-SPE-7218*	1-FO-2-CU-O-10-FQ-192-YEL-95A	4.9	1 x SM	2 x #24	450
LINDEN-SPE-7221*	1-FO-2-CU-O-10-FMM-192-YEL	4.9	1 x SM	2 x #24	450
LINDEN-SPE-7290	1-FO-2-CU-O-171-FQ-211	5.4	1 x SM	2 x #16	250
LINDEN-SPE-7170	1-FO-4-CU-S-138-O-168-L-228	5.8	1 x SM	4 x #22	450
LINDEN-SPE-7104	1-FO-2-CU-O-155-Q-250	6.4	1 x SM	2 x #20	880
LINDEN-SPE-7161*	1-FO-3-CU-O-150-FQ-250	6.35	1 x SM	1 x #20 (TP) + #28	1,600
LINDEN-SPE-7195*	1-FO-2-CU-O-150-FQ-250	6.35	1 x SM	2 x #20	1,600
LINDEN-SPE-7326	1-FO-3-CU-O-150-FQ-250-NN-295	7.5	1 x SM	2 x #20 & 1 x #28 DW	1,600
LINDEN-SPE-7141*	1-FO-8-CU-O-235-FQ-323	8.2	1 x SM	8 x #26	1,500
LINDEN-SPE-7248*	1-FO-6-CU-O-197-FQ-338	8.6	1 x SM	2 x #20, 2 x #24 TP	200
LINDEN-SPE-7153*	1-FO-2-CU-O-263-FQ-362	9.2	1 x SM	2 x #20 TP	1,600
LINDEN-SPE-7128*	1-FO-2-CU-O-312-FQ-412	10.5	1 x SM	2 TP x #22	5,000
LINDEN-SPE-7386*	1-FO-2-CU-X-288O-288-FQ-434	11.0	1 x SM	2 x #17 & 1 x #26 DW	1,200
LINDEN-SPE-7131*	1-FO-5-CU-O-260-FQ-460	11.7	1 x SM	5 x #18	1,100
LINDEN-SPE-7110*	1-FO-3-CU-Q-328-R-500	13	1 x SM	3 x #16	450
LINDEN-SPE-7194*	1-FO-2-CU-O-420-FQ-1036	26.3	1 x SM	2 x #8	1,250
2 x Singlemode (SM)					
LINDEN-SPE-7277	2-FO-2-CU-O-171-FQ-211	5.4	2 x SM	2 x #16	250
LINDEN-SPE-7152*	2-FO-2-CU-O-155-Q-215	5.5	2 x SM	2 x #24	2,100
LINDEN-SPE-7345	2-FO-2-CU-O-197-OO-260	5.5	2 x SM LT	2 x #16	2,400
LINDEN-SPE-7107*	2-FO-2-CU-O-155-Q-235	6	2 x SM	2 x #24	2,100
LINDEN-SPE-7311	2-FO-3-CU-O-173-Q-252	6.4	2 x SM	3 x #20	250
LINDEN-SPE-7189*	2-FO-2-CU-O-150-FQ-278	7.1	2 x SM	#20 TP + #28 DW	1,600
LINDEN-SPE-7327	2-FO-3-CUO-150-FQ-250-NN-295	7.9	2 x SM	1 x #20 TP & 1 x 28 DW	3,200
LINDEN-SPE-7120	2-FO-3-CU-O-280-Q-320	8.1	2 x SM	3 x #22	5,500
LINDEN-SPE-7138*	2-FO-2-CU-O-225-FQ-330	8.4	2 x SM	2 x #18	1,000
LINDEN-SPE-7164	2-FO-2-CU-O-207-Q-337	8.6	2 x SM	2 x #20	2,400
LINDEN-SPE-7177	2-FO-5-CU-O-246-Q-366	9.3	2 x SM LT	4 x #18 + #24STP	1,760
LINDEN-SPE-7122	2-FO-2-CU-O-155-Q-390	9.9	2 x SM	2 x #16	2,200
LINDEN-SPE-7355	2-FO-2-CU-Q-138-O-320-B-390	9.9	2 x SM LT	2 x #24	16,000
LINDEN-SPE-7123	2-FO-2-CU-T-320-Q-400	10.2	2 x SM	2 x #14	800
LINDEN-SPE-7103	2-FO-2-CU-O-155-Q-420	10.7	2 x SM	4 x #13	1,300
LINDEN-SPE-7293	2-FO-2-CU-O-388-Q-448	11.4	2 x SM	2 x #12	4,000
LINDEN-SPE-7227	2-FO-6-CU-X-297-O-327-DD-470-ORN	12	2 x SM	4 x #16, 2 x #24 TP	5,000
LINDEN-SPE-7313	2-FO-2-CU-Q-138-O-320-B-475	12.1	2 x SM	2 x #14	800
LINDEN-SPE-7178*	2-FO-5-CU-O-246-M-405-Q-484	12.3	2 x SM LT	4 x #18, #24STP	1,760
LINDEN-SPE-7100*	2-FO-2-CU-O-155-Q-500	12.7	2 x SM	2 x #14	2,100
LINDEN-SPE-7291	2-FO-2-CU-NN-216-Z-422-S-530	13.5	2 x SM	2 x #16	12,000
LINDEN-SPE-7241*	2-FO-4-CU-O-55-S-65-FQ-535-ORN	13.6	2 x SM	4 x #16	3,200
LINDEN-SPE-7106*	2-FO-4-CU-O-155-Q-550	13.9	2 x SM	4 x #20	1,573
LINDEN-SPE-7109	2-FO-5-CU-O-155-Q-550	13.9	2 x SM	5 x #16	15,400
LINDEN-SPE-7222	2-FO-4-CU-S-280-O-450-S-550	14	2 x SM	4 x #20	11,000
LINDEN-SPE-7292	2-FO-2-CU-JJ-415-Q-550	14	2 x SM	2 x #16	29,000
LINDEN-SPE-7125*	2-FO-2-CU-Q-557	14.1	2 x SM	2 x #16	1,200
LINDEN-SPE-7228*	2-FO-2-CU-365-FQ-585-YEL	14.9	2 x SM	2 x #16	2,200
LINDEN-SPE-7354	2-FO-5-CU-Q-322-T-500B-600	15.25	2 x SM LT	5 x #16	14,000

Spec No.	Part No.	OD (mm)	Fiber Type	Conductor	UTS (lbs)
LINDEN-SPE-7233*	2-FO-2-CU-O-397-FQ-617-YEL	15.7	2 x SM	2 x #16	2,600
LINDEN-SPE-7139	2-FO-4-CU-S-377-T-525-GG-620	15.7	2 x SM	4 x #16	12,320
LINDEN-SPE-7276*	2-FO-6-CU-X-358-O-398-FQ-628-YEL	16	2 x SM	4 x #18, 1 x #22 STP	3,200
LINDEN-SPE-7262*	2-FO-6-CU-O-155-FQ-638-ORN	16.2	2 x SM (LT)	4 x #16, 2 x #24TP	5,000
LINDEN-SPE-7249*	2-FO-5-CU-X-252-0282-FQ-674-ORN	17.11	2 x SM	4 x #16, 1 x #28 TP	3,200
LINDEN-SPE-7126	2-FO-12-CU-T-535-FQ-709	18	2 x SM	2 x #14, 10 x #23 TP	3,600
LINDEN-SPE-7111*	2-FO-3-CU-S-730	18.5	2 x SM(LT)	3 x #18	2,200
LINDEN-SPE-7252*	2-FO-4-CU-M-496-O-536-FQ-800-ORN	20.3	2 x SM (LT)	4 x #18	2,300
3 x Singlemode (SM)					
LINDEN-SPE-7162*	3-FO-1-CU-O-175-FQ-275	7	3 x SM	1 x #20 (TP)	1,600
LINDEN-SPE-7350	3-FO-2-CU-O-164-L-275	7	3 x SM	2 x #24	450
LINDEN-SPE-7142*	3-FO-2-CU-O-20-Q-367	9.3	3 x SM	2 x #14	1,500
LINDEN-SPE-7166	3-FO-2-CU-O-325-Q-415-YEL	10.5	3 x SM	2 x #12	1,200
LINDEN-SPE-7160*	3-FO-4-CU-O-322-FQ-475-Q-511-YEL	13	3 x SM	2 x #20	1,600
LINDEN-SPE-7395	3-FO-3-CU-S-289-O-413-NN-443-B-540	13.7	3 x SM	3 x #20	14,000
LINDEN-SPE-7251	3-FO-4-CU-O-585-Q-685	17.4	3 x SM	2 x #6, 2 x #9	3,500
LINDEN-SPE-7113	3-FO-3-CU-O-630-DD-770	19.6	3 x SM	3 x #16	35,200
LINDEN-SPE-7237	3-FO-7-CU-Q-590-O-760-Q-858-YEL	21.8	3 x SM	7 x #10	11,000
LINDEN-SPE-7231*	3-FO-4-CU-O-764-FQ-923-BLK	23.4	3 x SM	3 x #11, 1 x #20 TP	15,500
4 x Singlemode (SM)					
LINDEN-SPE-7391*	4-FO-2-CU-O-208-FQ-350	8.9	4 x SM (LT)	2 x #16	1,100
LINDEN-SPE-7167	4-FO-2-CU-O-327-Q-417-YEL	10.6	4 x SM	2 x #12	1,200
LINDEN-SPE-7206	4-SM-10-CU-Q-439	11.2	4 x SM	10 x #18	-
LINDEN-SPE-7392*	4-FO-2-CU-O-230-FQ-450	11.4	4 x SM (LT)	2 x #14	1,100
LINDEN-SPE-7124*	4-FO-4-CU-O-55-S-65-FQ-470	11.93	4 x SM (LT)	2 x #18, 2 x #22, 2 x #24	3,200
LINDEN-SPE-7163	4-FO-4-CU-O-55-FQ-457-ORN	11.6	4 x SM (LT)	2 x #18, 2 x #22, 2 x #24	3,200
LINDEN-SPE-7199*	4-FO-4-CU-O-55-S-65-FQ-470	11.93	4 x SM (LT)	2 x #18, 2 x #22, 1 x #24	3,200
LINDEN-SPE-7363	4-FO-4-CU-O-55-S-65-S-460	11.96	4 x SM (LT)	2 x #18, 2 x #22, 1 x #24	3,200
LINDEN-SPE-7102	4-FO-4-CU-O-155-DD-470	12.0	4 x SM	4 x #16	5,500
LINDEN-SPE-7261*	4-FO-6-CU-O-55-S-65-FQ-480-ORN	12.2	4 x SM (LT)	2 x #18, 2 x #22, 2 x #24	3,200
LINDEN-SPE-7151*	4-FO-4-CU-S-287-O-387-FQ-547	13.9	4 x SM	4 x #20	5,500
LINDEN-SPE-7143	4-FO-4-CU-S-280-O-450-S-550	14.0	4 x SM	4 x #20	11,000
LINDEN-SPE-7330*	4-FO-6-CU-O-55-S-70-FQ-600	15.25	4 x SM (2 x LT)	4 x #19, 1 x 24, 1 x #22	5,000
LINDEN-SPE-7325	4-FO-6-CU-O-55-S-75-MM-590	15.0	4 x SM (2 x LT)	4 x #19, 1 x #24, 1 x #22	6,000
LINDEN-SPE-7303	4-FO-7-CU-O-350-FQ-610-YEL	15.5	4 x SM (LT)	7 x #18	4,800
LINDEN-SPE-7219*	4-FO-6-CU-O-55-S-75-FQ-590-ORN	15.0	4 x SM(LT)	4 x #18, 1 x #22, 1 x #24	6,000
LINDEN-SPE-7101	4-FO-4-CU-O-175-Q-650	16.5	4 x SM	4 x #16	23,100
LINDEN-SPE-7108*	4-FO-8-CU-O-155-Q-910	23.1	4 x SM	8 x #18	15,400
5, 6, 8 & 12 x Singlemode (SM)					
LINDEN-SPE-7308	5-FO-2-CU-Q-248	6.3	5 x SM	2 x #18	-
LINDEN-SPE-7250	8-FO-4-CU-O-236-Q-332	8.43	8 x SM	4 x #16	450
LINDEN-SPE-7121	12-FO-8-CU-Q-350	8.9	12 x SM	8 x #18	-
LINDEN-SPE-7255	6-FO-6-CU-O-336-B-480-BLK	12.2	6 x SM	6 x #18	13,800
LINDEN-SPE-7348	8-FO-2-CU-Q-223-O-583-Q-710	18.0	8 x SM (LT)	2 x #18	30,000
LINDEN-SPE-7349	8-FO-2-CU-Z-786-S-930	23.6	8 x SM (LT)	2 x #6	21,500
Singlemode (SM) & Multimode (MM)					
LINDEN-SPE-7333	8-FO-4-CU-O-238-L-332	8.43	8 x MM	4 x #16	450
LINDEN-SPE-7295	2-FO-3-CU-O-266-Q-326-ORN	8.3	2 x MM	3 x #18	250
LINDEN-SPE-7332	8-FO-4-CU-Q-472-O-531-Q-610	15.5	4 x SM & 4 x MM	4 x #28	3,400
LINDEN-SPE-7127	4-FO-6-CU-Q-410-Q-760	19.3	3xSM & 1xMM	6 x #20	15,400
LINDEN-SPE-7112*	4-FO-4-CU-S-1210	30.7	2xSM + 2xMM	4 x #15	3,934

*Denotes Buoyant Design

AVNOC

Avionic Cable

Simple Design

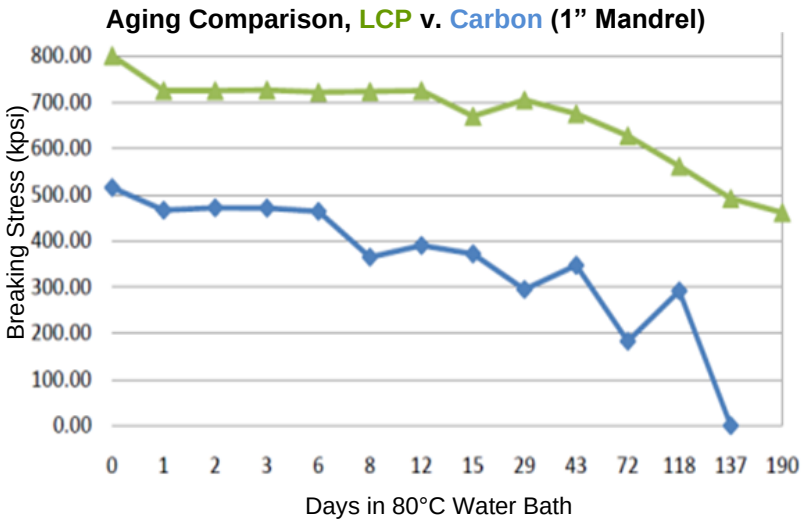
Improved Performance

AVNOC

Linden's avionic grade fiber optic cables are designed for the most rigorous avionic environment. AVNOC™ is built to survive the perils of aircraft confines such as high temperature, large temperature variations, high vibration and extreme flexing. Using our patented cable jacket construction designed to protect the fiber from harsh mechanical conditions; our cables are stronger, lighter and smaller than existing flight qualified cables.

Features

- Meets AS5382
- Simple 3-layer extruded construction
- High temperature
- Lighter design
- Bend insensitive 9µm singlemode
- 50µm multimode version
- Eliminates need for carbon coated fiber



Advantages

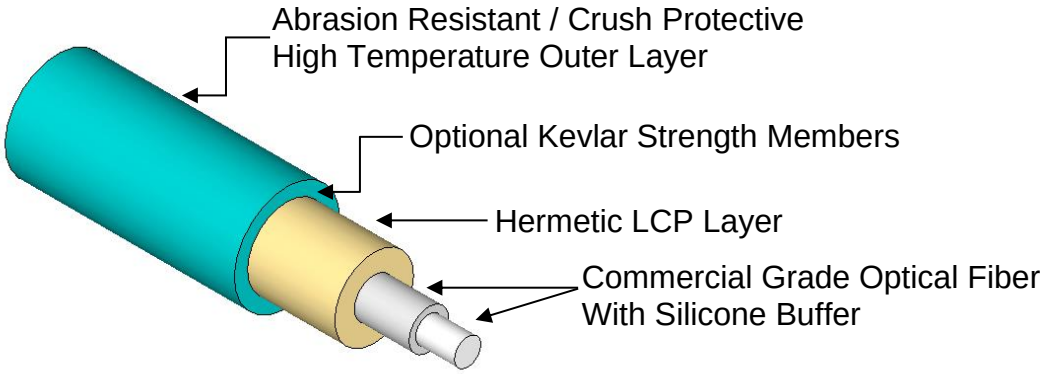
- No Kevlar
- Non-Wicking
- Crush Resistant
- Non-Kink
- Easier to terminate
- Better fatigue performance than carbon coated fibers

Singlemode

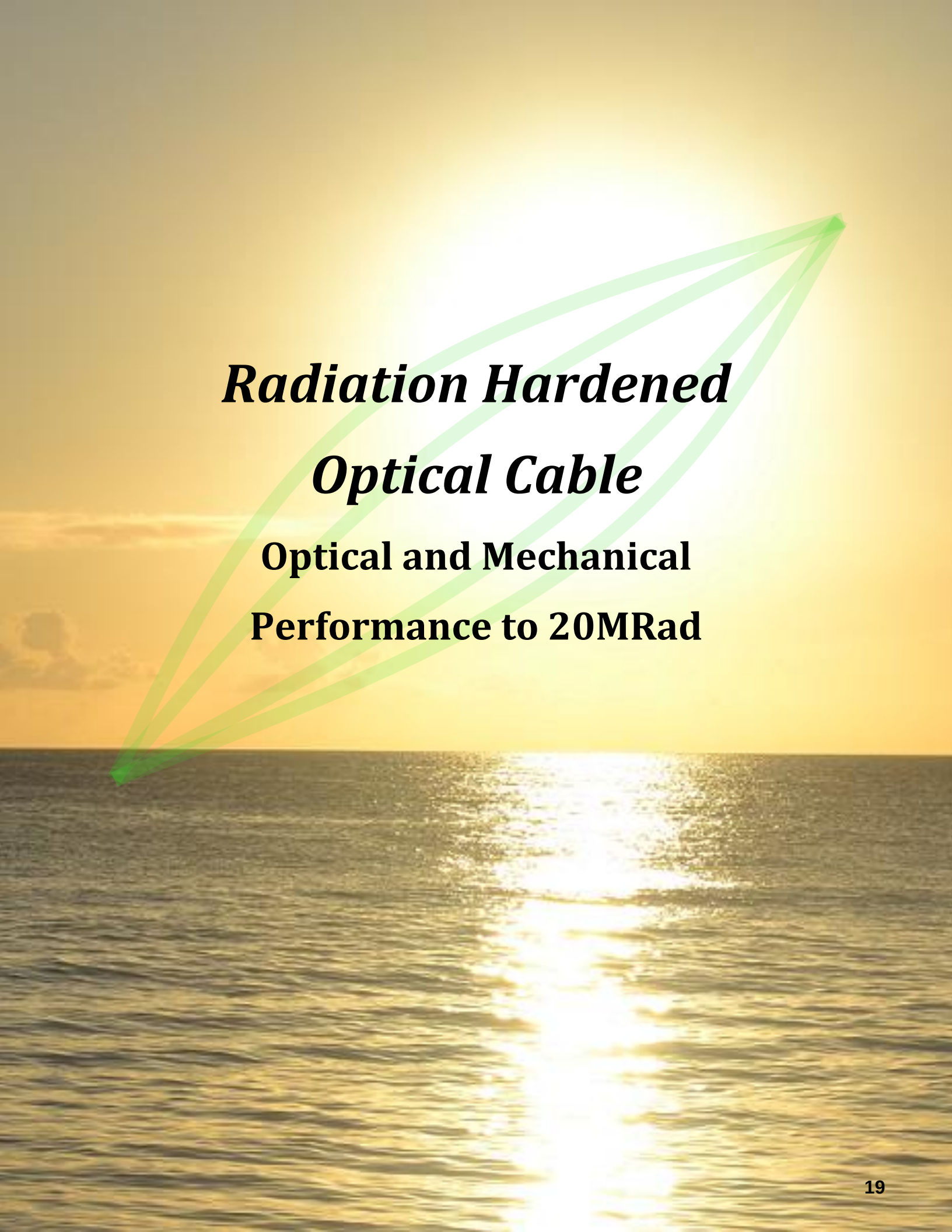
Spec No.	Part No.	Fiber Type	OD (mm)	Attenuation @ 1310nm (dB/km)	Attenuation @ 1550nm (dB/km)	Tensile Strength (lbs)	Weight (kg/km)
LINDEN-SPE-7033	1-XX-A-27-M-66	SM Draka BendBright Elite HTA	1.7	1.5	1.4	45	3.1

Multimode

Spec No.	Part No.	Fiber Type	OD (mm)	Attenuation @ 850nm (dB/km)	Attenuation @ 1310nm (dB/km)	Tensile Strength (lbs)	Weight (kg/km)
LINDEN-SPE-7041	1-YY-A-27-M-66	Draka BendBright MaxCap OM3 HTA (50/125)	1.7	6	4	45	3.1



CONTACT LINDEN FOR MORE DETAILED SPECIFICATIONS OR CUSTOM REQUIREMENTS



Radiation Hardened Optical Cable

Optical and Mechanical Performance to 20MRad

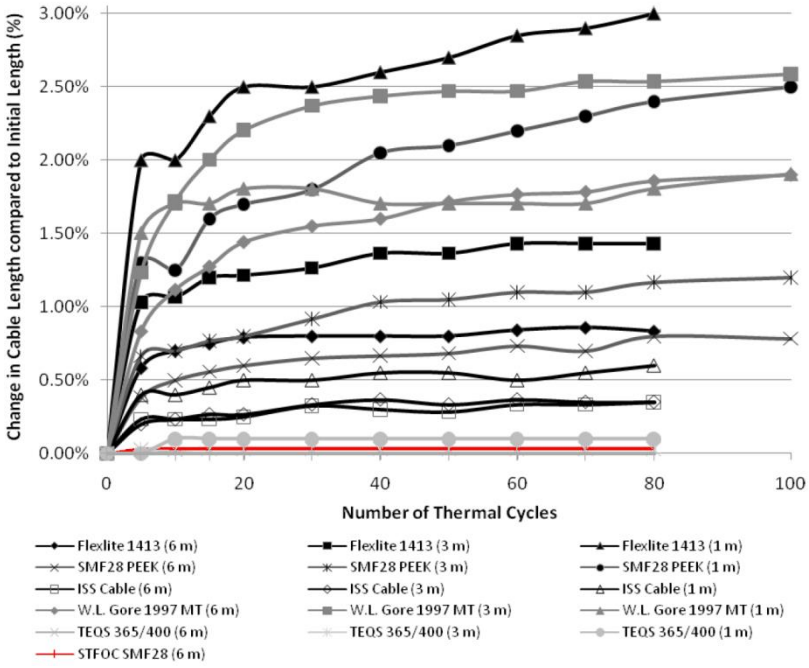
Radiation Hardened

Linden's RadHard fiber optic cables provide a complete solution where a robust fiber optic link is needed in a harsh, high radiation environment. A wide variety of cable constructions are available to meet your specific requirements including our patented Non-Kink™ cable. Tested as per European Space Agency - ESCC Basic Specification No. 2263010

Features

- Maintain optical and mechanical performance to >20MRad Tested to ESCC Spec No. 2263010
- Tested to NASA-STD-8739.5
- Tested to SAE AS5382
- No carbon layer needed

NASA Outgassing Tests on Linden RadHard Cable measured <0.01% CVCM for all jacket material



Advantages

- No Kevlar
- Thermally stable
- Preconditioning prevents jacket shrinkage
- Crush Resistant
- Non-Kink

Singlemode

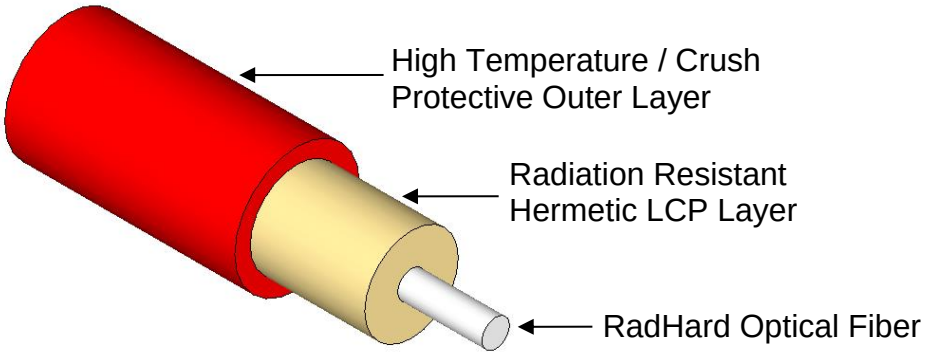
Spec No.	Part No.	Fiber Type	OD (mm)	Typical Connector Loss (dB)	Tensile Strength (lbs)
LINDEN-SPE-7079	1-M-A-27-J-65-YEL	RadHard Singlemode	1.65	<0.2dB	50
LINDEN-SPE-7208	1-M-A-27-J-79-YEL	RadHard Singlemode	2.0	<0.2dB	50
LINDEN-SPE-7209	1-M-A-27-J-87-YEL	RadHard Singlemode	2.2	<0.2dB	50
LINDEN-SPE-7068	1-EE-A-27-J-65	RadHard Polyimide	1.65	<0.2dB	45
LINDEN-SPE-7216	1-EE-A-27-J-79	RadHard Polyimide	2.0	<0.2dB	45
LINDEN-SPE-7217	1-EE-A-27-J-87	RadHard Polyimide	2.2	<0.2dB	45

Multimode

Spec No.	Part No.	Fiber Type	OD (mm)	Typical Connector Loss (dB)	Tensile Strength (lbs)
LINDEN-SPE-7088	1-N-A-27-J-35-ORN	RadHard MM (50/125)	.900	<0.2dB	50
LINDEN-SPE-7210	1-N-A-27-J-65-ORN	RadHard MM (50/125)	1.65	<0.2dB	50
LINDEN-SPE-7211	1-N-A-27-J-79-ORN	RadHard MM (50/125)	2.0	<0.2dB	50
LINDEN-SPE-7212	1-N-A-27-J-47-87-ORN	RadHard MM (50/125)	2.2	<0.2dB	50
LINDEN-SPE-7081	1-O-A-27-J-19-65	RadHard MM (62.5/125)	1.65	<0.2dB	50
LINDEN-SPE-7213	1-O-A-27-J-79-ORN	RadHard MM (62.5/125)	2.0	<0.2dB	50
LINDEN-SPE-7214	1-O-A-27-J-87-ORN	RadHard MM (62.5/125)	2.2	<0.2dB	50
LINDEN-SPE-7346	12-SM-O-U-114	RadHard MM (50/125)	2.9	<0.2dB	60

Singlemode & Multimode

Spec No.	Part No.	Fiber Type	OD (mm)	Typical Connector Loss (dB)	Tensile Strength (lbs)
LINDEN-SPE-7294	4-FO-U-102-O-122-J-137	Two (2) RadHard SM + Two (2) x RadHard MM	3.5	<0.2dB	250



CONTACT LINDEN FOR MORE DETAILED SPECIFICATIONS OR CUSTOM REQUIREMENTS


Patchcords
SubSea
Avionic
Space

Patchcords

Harsh environment fiber optic patchcords for applications demanding high performance. Whether deep beneath the ocean surface where crush resistance and fish bite protection is imperative, near the surface where buoyancy is needed, in the air, or outer space, Linden keeps you connected. A combination of Linden's patented cable constructions and industry leading interconnect solutions provide a top-notch solution for your connectivity needs.

Features

- Rugged, durable, patented STFOC™ fiber optic cables
- Hermetic coating protects fiber from moisture/hydrogen/helium
- Crush proof, non-kink cables
- Buoyant/Avionic/High Temperature/RadHard designs
- Thin wall insulation = thinner/lighter cables
- Various connector types available

Applications

- Subsea
- Surface
- Avionic
- Space

Ordering Information

AAAA-BBB-CCC-DD A = Cable / B = Connector 1 / C = Connector 2 / D = Length (m)

SubSea – Fiber Type		
7043	Non-Kink Singlemode 1.65mm	LINDEN-SPE-7043
7196	Non-Kink Singlemode 2.00mm	LINDEN-SPE-7196
7044	Non-Kink Multimode (50/125) 1.65mm	LINDEN-SPE-7044
7197	Non-Kink Multimode (50/125) 2.00mm	LINDEN-SPE-7197
7046	Non-Kink Multimode (62.5/125) 1.65mm	LINDEN-SPE-7046
7198	Non-Kink Multimode (62.5/125) 2.00mm	LINDEN-SPE-7198
SubSea - Buoyant – Cable Type		
7036	Buoyant High Strength Singlemode 1.9mm	LINDEN-SPE-7036
7076	Buoyant High Strength Multimode (50/125) 1.9mm	LINDEN-SPE-7076
7093	Buoyant High Strength Multimode (62.5/125) 1.9mm	LINDEN-SPE-7093
7055	Buoyant High Strength Singlemode 3.5mm	LINDEN-SPE-7055
7077	Buoyant High Strength Multimode (50/125) 3.5mm	LINDEN-SPE-7077
7091	Buoyant High Strength Multimode (62.5/125) 3.5mm	LINDEN-SPE-7091
7096	Buoyant Singlemode 900µm	LINDEN-SPE-7096
7207	Buoyant Singlmode 1.10mm	LINDEN-SPE-7207
Avionic – Cable Type		
7033	AVNOC Singlemode 1.6mm	LINDEN-SPE-7033
7041	AVNOC Multimode (50/125) 1.6mm	LINDEN-SPE-7041
Space – Cable Type		
7079	RadHard Singlemode 1.65mm	LINDEN-SPE-7079
7208	RadHard Singlemode 2.00mm	LINDEN-SPE-7208
7210	RadHard Multimode (50/125) 1.65mm	LINDEN-SPE-7210
7211	RadHard Multimode (50/125) 2.00mm	LINDEN-SPE-7211
7213	RadHard Multimode (62.5/125) 2.00mm	LINDEN-SPE-7213
7214	RadHard Multimode (62.5/125) 2.20mm	LINDEN-SPE-7214

Connector Type

SubSea		Surface	
LF1	FC-DRY HP Singlemode	TF1	FC/PC
LF2	FC-DRY HP Multimode (50/125)	TF2	FC/APC
LF3	FC-DRY HP Multimode (62.5/125)	SC1	SC/PC
LS1	ST-DRY HP Singlemode	SC2	SC/APC
LS2	ST-DRY HP Multimode (50/125)	TS3	ST
LS3	ST-DRY HP Multimode (62.5/125)	TL1	LC/PC
FS1	Fischer F01 Singlemode	TL2	LC/APC
Avionic/Space – Connector Type			
AV1	Diamond AVIM Singlemode	SF1	Space Qualified FC/PC
AV2	Diamond AVIM Multimode	SF2	Space Qualified FC/APC

Other Cable Types and Connectors available upon request

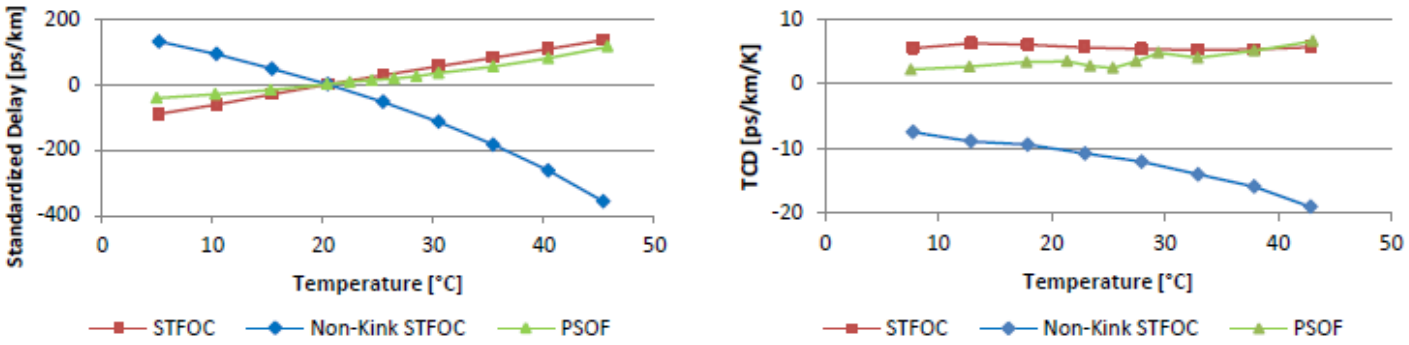

Phase Stabilized STFOC
Cost Effective

Phase Stabilized STFOC

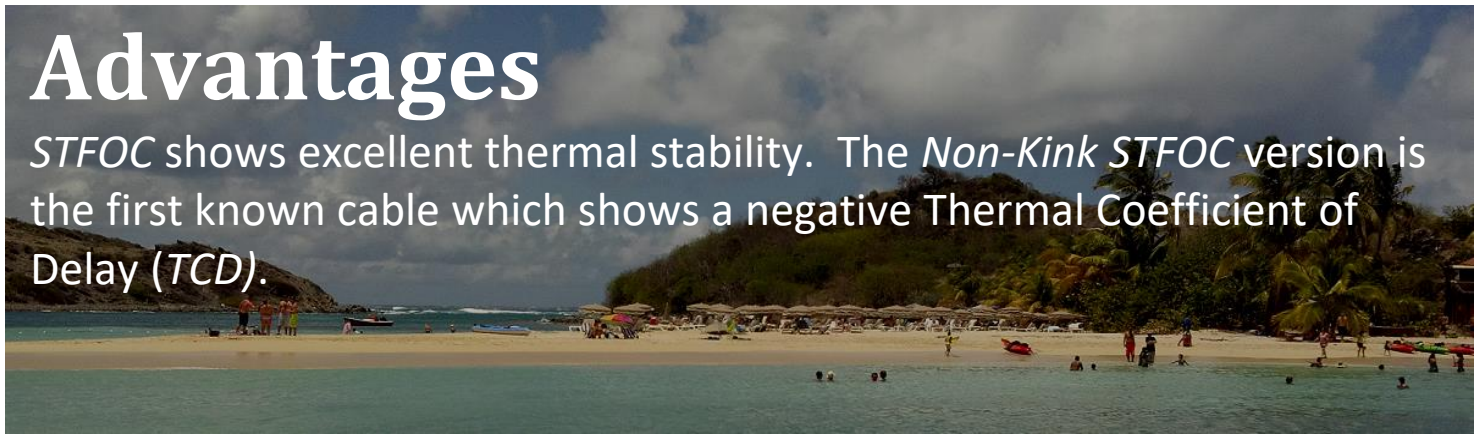
Phase Stabilized STFOC is a specialty fiber which minimizes the temperature dependence of transmission delay time. It is used for transmitting base band signals in synchronized measurement systems. The fiber is buffered with Linden Photonics' patented Liquid Crystal Polymer jacketing, a material with negative thermal expansion coefficient. Kevlar strength members are also available.

Features

- Negative Thermal Coefficient of Delay (TCD) Available



***NEW PHASE STABLE OPTICAL FIBER, M. Bousonville, et al, 2012**
(http://accelconf.web.cern.ch/accelconf/BIW2012/papers/mopg033.pdf)

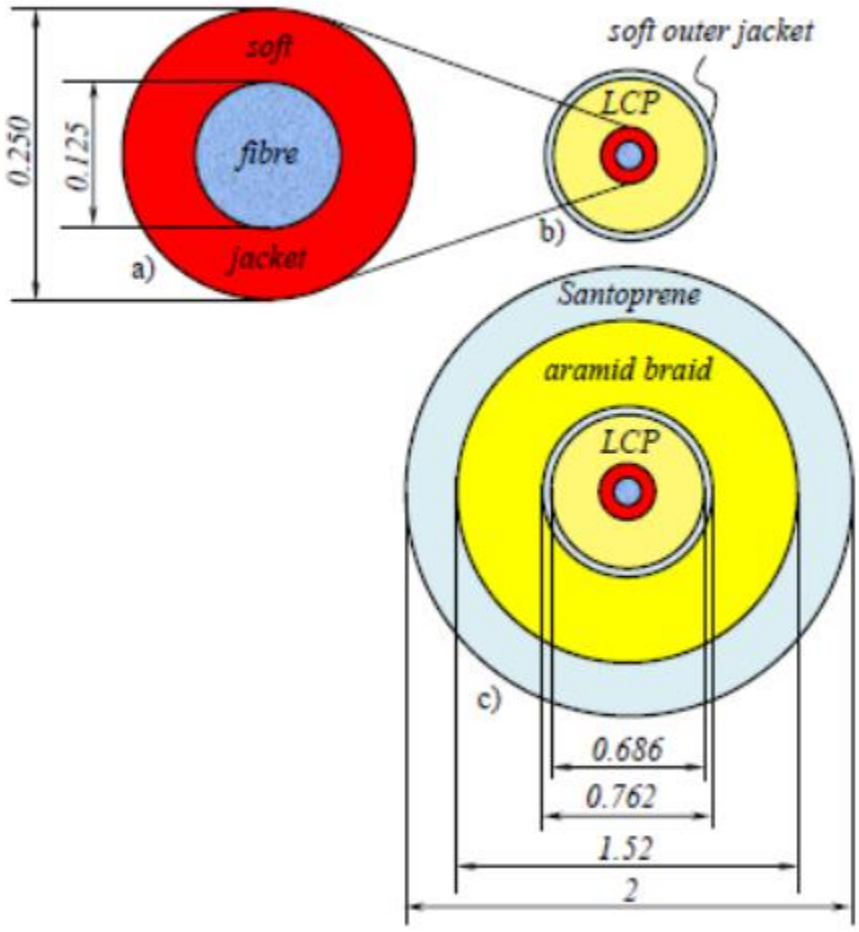


Advantages

STFOC shows excellent thermal stability. The *Non-Kink STFOC* version is the first known cable which shows a negative Thermal Coefficient of Delay (*TCD)*.

Singlemode

Description	Specification No. Part No.	Fiber Type	OD (mm)	Attenuation @ 1310nm (dB/km)	Attenuation @ 1550nm (dB/km)	Tensile Strength (lbs)	TCD Value (ps/°C/km)
STFOC	LINDEN-SPE-7193 1-SM-A-27-B-30-TCD	Singlemode	0.762	0.45	0.35	50	~ 10
Non-kink STFOC	LINDEN-SPE-7192 1-SM-A-27-O-47-L-75-TCD	Singlemode	1.9	0.45	0.35	250	~ -10



***NEW PHASE STABLE OPTICAL FIBER, M. Bousonville, et al, 2012 (http://accelconf.web.cern.ch/accelconf/BIW2012/papers/mopg033.pdf)**

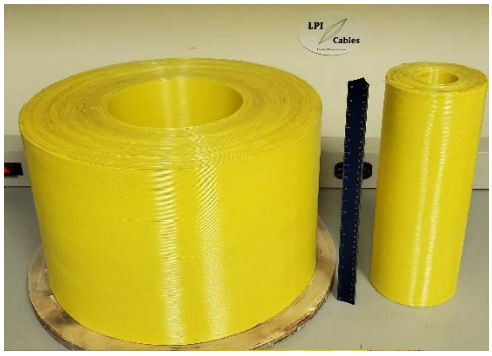
CONTACT LINDEN FOR MORE DETAILED SPECIFICATIONS OR CUSTOM REQUIREMENTS

Precision Wound Spools

Tangle Free

Internal Deployment

Precision Wound Packs



These precision-wound optical fiber packs are designed for use in such critical applications as submarine-launched buoys, underwater munitions and terrestrial robots to provide a capability for two-way, high-bandwidth communications.

Our standard spools are made from either Strong Tether Fiber Optic Cable (STFOC™), Buoyant STFOC™- or bare optical fiber. These spools are for slow, low tension payout or high-speed rapid payout. Fiber pays out from the inside of the spool so spool remains stationary during deployment. Precision packs can be designed with singlemode or can be modified with multimode fiber. Linden has delivered packs 30 km in length!

EXAMPLE PACK SIZES - STFOC™ - BSTFOC™

Spool ID	Spool OD	Spool Length	Cable Length	P/N
2”	5”	12”	3.75km	7260-2-5-12
7”	13”	9.5”	20km	7260-7-13-9.5
7”	16”	9.5”	30km	7260-7-16-9.5

Ordering Information

AAAA-BB-CC-DD A = Cable Type / B= ID (in.) / C = OD (in.) / D = Spool Length (in.)

Custom Spools

In addition to our standard, cost efficient precision wound spools, we are able to leverage our quality team of engineers to design and build custom spools with specialty fiber or cable in custom sizes to meet your exacting requirements. Some of our custom design capabilities include;

- Externally deployable spools
- Buoyant cables
- High strength cables
- Specialty optics
- Custom Sizes
- Custom designed canisters

CONTACT LINDEN FOR DRAWINGS, SPECIFICATIONS OR CUSTOM REQUIREMENTS

PRESSURE TESTING AND DEPLOYMRNT TESTING AVAILABLE

One Park Drive, Suite 10, Westford, MA 01886 978-392-7985; info@LindenPhotonics.com
www.LindenPhotonics.com


MicroTethers
Thin & Lightweight
Flexible
Power & Optics

MicroTethers

Expanding upon our well-known subsea cables, Linden Photonics introduces a line of **MicroTethers** to its product line. Typically small gauge copper and fiber elements are enclosed in a **lightweight** cable designed to provide power and communications to airborne drones or aerostats. Linden can customize your size, weight and strength; from **high-strength** designs intended to provide anchoring for large aerostats in high winds to extremely thin tethers designed for the smallest of drones. Linden's expertise in low density cable jacketing is ideal for this environment. Our cables are compact and rugged; flexible and strong.

Features

- **Lightweight**: Designs from 0.007lbs/ft (10.4g/m)
- Designs from 100 to 13,000 lbs work load
- 3-channels in 2.9mm OD
- Designs with or without fiber
- Various power options
- MIL M22759 Tefzel coated wire – up to 1,000V rated
- Braided or extruded jackets

Advantages

- Highly Flexible
- Thin, lightweight, yet strong
- Reduced cable weight = maximum payload capacity

Specifications

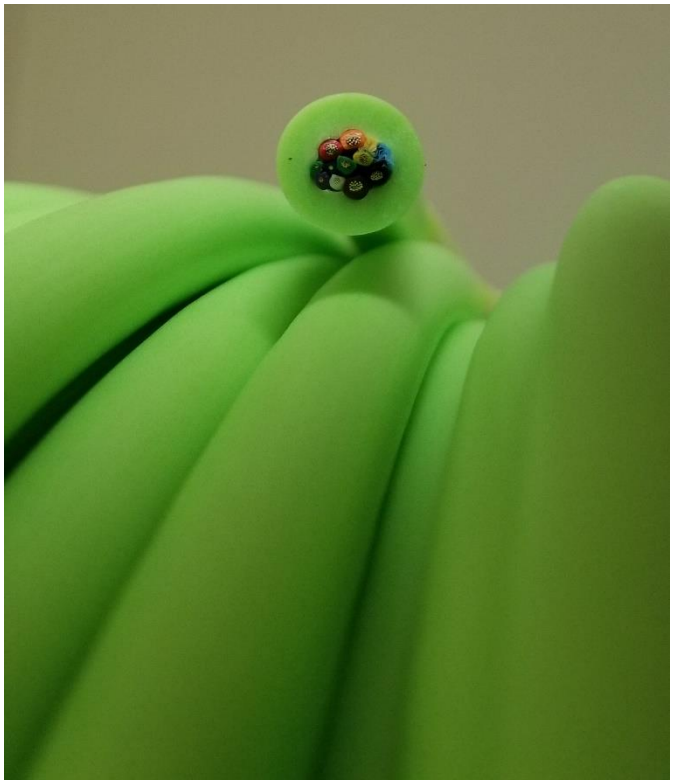
Spec No.	Part No.	OD (mm)	Fiber Type*	Conductor Type	Weight (lbs/1kft)
Lightweight - Drones					
LINDEN-SPE-7140	1-FO-2-CU-BB-115-22759	2.9	1 x LINDEN-SPE-7096	2 x 22 AWG	7.0
LINDEN-SPE-7156	1-FO-2-CU-BB-115	2.9	1 x LINDEN-SPE-7034	2 x 24 AWG	6.0
LINDEN-SPE-7157	1-FO-2-CU-BB-120-22759	3.0	1 x LINDEN-SPE-7043	2 x 22 AWG	8.5
LINDEN-SPE-7158	1-FO-2-CU-EE-120-22759-24	3.0	1 x LINDEN-SPE-7096	2 x 24 AWG	8.5
LINDEN-SPE-7185	1-FO-3-CU-O-116-BB-125-22759	3.2	1 x LINDEN-SPE-7096	2 x 22 AWG & 1 x 26 AWG	8.25
LINDEN-SPE-7186	1-FO-3-CU-O-R-116-BB-125-22759	3.2	1 x LINDEN-SPE-7096	2 x 22 AWG & 1 x 26 AWG	9.1
LINDEN-SPE-7187	1-FO-3-CU-O-120-BB-130-22759	3.3	1 x LINDEN-SPE-7096	2 x 20 AWG & 1 x 26 AWG	9.5
LINDEN-SPE-7215	1-FO-3-CU-O-125-BB-130-22759M	3.3	1 x LINDEN-SPE-7096	2 x 20 AWG & 1 x 26 AWG	9.5
LINDEN-SPE-7381	1-FO-4-CU-O-130	3.3	1 x LINDEN-SPE-7096	2 x 20 AWG & 2 x 28 AWG	14.7
LINDEN-SPE-7397	3-CU-PP-110-Q-130	3.3	None	2 x 20 AWG & 1 x 28 AWG	12.5
LINDEN-SPE-7258	1-FO-3-CU-BB-133	3.4	1 x LINDEN-SPE-7096	2 x 20 AWG & 1 x 26 AWG	12.8
LINDEN-SPE-7352	1-FO-2-CU-O-100-Q-140	3.5	1 x LINDEN-SPE-7096	2 x 24 AWG	8.4
LINDEN-SPE-7337	4-CU-O-120-R-140	3.6	None	2 x 24 AWG & 2 x 28 AWG	12
LINDEN-SPE-7335	1-FO-4-CU-BB-1245	3.7	1 x LINDEN-SPE-7034	4 x 24 AWG	10
LINDEN-SPE-7287	2-CU-BB-145	3.7	None	2 x 22 AWG TP	10
LINDEN-SPE-7336	1-FO-4-CU-EE-150-22759-24	3.8	1 x LINDEN-SPE-7096	4 x 24 AWG	12.7
LINDEN-SPE-7343	4-CU-BB-160	4.0	None	2 x 22 AWG & 2 x 26 AWG	10.5
LINDEN-SPE-7382	2-CU-BB-160	4.0	None	2 x 20 AWG	13.5
LINDEN-SPE-7155	1-FO-2-CU-BB-160-22759	4.1	1 x LINDEN-SPE-7096	2 x 20 AWG	12
LINDEN-SPE-7183	2-FO-2-CU-BB-160-22759	4.1	2 x LINDEN-SPE-7096	2 x 20 AWG	12
LINDEN-SPE-7259	1-FO-3-CU-EE-164	4.2	1 x LINDEN-SPE-7096	2 x 20 AWG & 1 x 26 AWG	18.8
LINDEN-SPE-7315	1-FO-4-CU-O-143-R-163	4.2	1 x LINDEN-SPE-7034	2 x 20 AWG & 2 x 28 AWG	16
LINDEN-SPE-7340	2-CU-BB-165	4.2	None	2 x 18 AWG TP	17.5
LINDEN-SPE-7188	6-CU-Q-168	4.3	None	4 x 26 AWG + 2 x 28 AWG	15
LINDEN-SPE-7358	1-FO-2-CU-BB-170-22759	4.3	1 x LINDEN-SPE-7207	2 x 18 AWG	14.5
LINDEN-SPE-7269	2-CU-EE-174	4.4	None	2 x 24 AWG	10.7
LINDEN-SPE-7181	2-FO-2-CU-EE-180-22759-24	4.6	2 x LINDEN-SPE-7034	2 x 24 AWG	7
LINDEN-SPE-7380	2-CU-NN-143-R-183	4.6	None	2 x 20 AWG	16
LINDEN-SPE-7353	1-FO-2-CU-O-137-Q-187	4.75	1 x LINDEN-SPE-7096	2 x 20 AWG	17.5
Spec No.	**Part No.**	**OD (mm)**	**Fiber Type***	**Conductor Type**	**Weight (lbs/1kft)**
Heavy Duty - Aerostat					
LINDEN-SPE-7278	4-CU-T-181-OO-197	5.0	None	4 x 22 AWG	20
LINDEN-SPE-7338	2-SM-2-CU-O-185-BB-205	5.2	1 x LINDEN-SPE-7283	2 x 18AWG	22.5
LINDEN-SPE-7270	2-CU-EE-253	6.4	None	2 x 24AWG	12.7
LINDEN-SPE-7174	1-FO-3-CU-O-174-Q-254	6.5	1 x LINDEN-SPE-7034	2 x 24 AWG & 1 x 26 AWG	25
LINDEN-SPE-7179	1-FO-3-CU-S-130-O-174-Q-254	6.5	1 x LINDEN-SPE-7034	2 x 24 AWG & 1 x 26 AWG	25
LINDEN-SPE-7232	2-FO-3-CU-S-130-O-191-Q-257	6.5	2 x LINDEN-SPE-7034	2 x 24 AWG & 1 x 26 AWG	27
LINDEN-SPE-7279	6-CU-T-300-OO-316	8.0	None	3 x 24 STP & 3 x 24 TRPL	52
LINDEN-SPE-7342	2-CU-O-270-S-330	8.4	None	2 x 12 AWG	67
LINDEN-SPE-7289	4-FO-P-140-O-308-OO-349	8.8	4 x LINDEN-SPE-7096	None	57
LINDEN-SPE-7314	2-FO-4-CU-O-320-U-390-BLK	9.9	2 x LINDEN-SPE-7043	4 x 22 AWG	60
LINDEN-SPE-7323	2-FO-2-CU-S-122-T-425-00-465	12.4	1 x LINDEN-SPE-7283	2 x 20 AWG	65
LINDEN-SPE-7341	2-FO-2-CU-NN-216-T-422-B-520	13.2	1 X LINDEN-SPE-7283	2 x 16 AWG	94
LINDEN-SPE-7109	2-FO-5-CU-O-155-Q-550	13.9	2 x LINDEN-SPE-7034	5 x 16 AWG	138

Contact Linden For Drawings, Specifications Or Custom Requirements

*Fiber types listed are Singlemode


Specialty Copper
Buoyant Designs
Built to Last

Specialty Copper

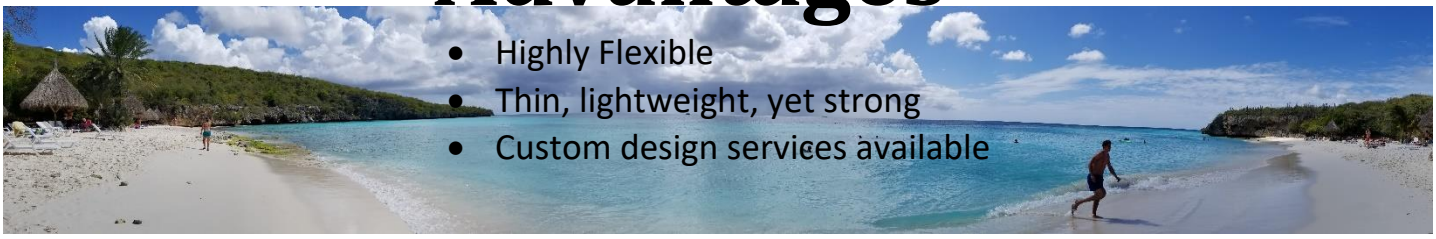


Using the technology we developed building more difficult fiber optic and hybrid cables, Linden Photonics now applies that materials and design knowledge to our line of specialty copper cables. Using specialty materials that make a cable light, temperature resistant, radiation hardened or ***buoyant***, we draw from our years of expertise in specialty markets such as subsea, space and other harsh environments in between. Linden can customize your size, weight and strength; from **high-strength** designs to complex configurations incorporating mil-spec conductors. Our cables are compact and rugged; flexible and strong!

Features

- **Wide Range of Size Capabilities**: from 3mm to >20mm OD
- Designs from 100 to 5,000 lbs work load
- Twisted Pairs / Shielded Twisted Pairs
- High Voltage
- Various insulation options
- MIL M22759 Tefzel coated wire – up to 1,000V rated
- Braided or extruded jackets

Advantages



- Highly Flexible
- Thin, lightweight, yet strong
- Custom design services available

Specifications

Spec No.	Part No.	OD (mm)	Conductor Type	Tensile Strength (lbs)
LINDEN-SPE-7306	2-CU-HH-110	2.8	2 x 20 AWG	N/A
LINDEN-SPE-7134	2-CU-O-80-FQ-120	3.0	2 x 28 AWG	100
LINDEN-SPE-7302*	2-CU-O-100-L-140-ORN	3.5	2 x 28 AWG	250
LINDEN-SPE-7360*	2-CU-O-100-L-150	3.8	2 x 26 AWG	250
LINDEN-SPE-7236	1-CO-O-130-Q-150-YEL	3.81	1 x 28 (Coax)	300
LINDEN-SPE-7296*	2-CU-O-100-L-153-ORN	3.9	2 x 26 AWG	250
LINDEN-SPE-7165*	2-CU-O-62-FQ-156-YEL	4.0	1 x 26 AWG TP	100
LINDEN-SPE-7144	2-CU-I-157	4.0	2 x 30 AWG	800
LINDEN-SPE-7359*	2-CU-NN-O-100-L-160	4.0	2 x 26 AWG	250
LINDEN-SPE-7242	1-CU-FQ-160-YEL	4.0	1 x 26 AWG TP	300
LINDEN-SPE-7135*	2-CU-O-80-FQ-164	4.15	2 x 28 AWG	300
LINDEN-SPE-7244*	2-CU-O-80-FQ-164-Q-170	4.3	2 x 28 AWG	300
LINDEN-SPE-7133*	2-CU-FQ-182	4.6	2 x 26 AWG	300
LINDEN-SPE-7246*	2-CU-O-80-Q-100-FQ-170-Q-190-YEL	4.8	2 x 28 AWG	300
LINDEN-SPE-7247*	2-CU-O-80-Q-100-FQ-170-Q-190-NWB-YEL	4.8	2 x 28 AWG	300
LINDEN-SPE-7224*	2-CU-O-110-FQ-210-YEL	5.3	2 x 24 AWG STP + 1 x 26 AWG DW	400
LINDEN-SPE-7235	2-CU-O-138-Q-153-YEL	3.88	2 x 22 AWG TP	300
LINDEN-SPE-7356	3-CU-O-200-S-230	6.0	3 x 16 AWG	250
LINDEN-SPE-7115	2-CU-O-161-Q-241	6.1	2 x 26 AWG	1,800
LINDEN-SPE-7145*	5-CU-O-20-FQ-248	6.3	5 x 26 AWG	1,500
LINDEN-SPE-7116	2-CU-O-175-Q-40-255	6.5	2 x 26 AWG	2,200
LINDEN-SPE-7285	3-CU-O-230-S-260	6.6	2 x 26 AWG + 3 X 14 AWG	250
LINDEN-SPE-7378	6-CU-O-214-Q-264	6.7	3 x 26 AWG TP	250
LINDEN-SPE-7370*	4-FO-O-200-FQ-295	7.5	2 x 22 AWG + 2 x 26 AWG TP	450
LINDEN-SPE-7243	4-CU-O-150-FQ-300-YEL	7.62	4 x 24 TP	300
LINDEN-SPE-7301*	2-CU-O-200-FQ-300-BLK	7.6	2 x 20 AWG	6,667
LINDEN-SPE-7328*	4-FO-O-177-FQ-315	8.0	2 x #24 AWG STP + 1 x #26 AWG DW	300
LINDEN-SPE-7105	4-CU-O-155-Q-340	8.6	4 x 22 AWG	440
LINDEN-SPE-7220	3-CU-O-279-U-350-BLK	8.86	2 x 22 AWG + 1 x 22 AWG TP	5,000
LINDEN-SPE-7230	4-CU-O-283-S-359-YEL	9.1	4 x 24 AWG STP	1,200
LINDEN-SPE-7117*	2-CU-O-283-Q-360	9.2	2 x 20 AWG	1,500
LINDEN-SPE-7147*	3-CU-O-20-FQ-360-GRA	9.1	1 x 20 AWG TP; 2 x 20 AWG	1,500
LINDEN-SPE-7118*	2-CU-O-283-Q-363	9.2	2 x 20 AWG	3,000
LINDEN-SPE-7298*	2-CU-O-236-FQ-365-YEL	9.3	2 x 18 AWG	10,000
LINDEN-SPE-7379*	4-CU-O-252-FQ-393	10.0	2 x 18 AWG + 1 x 22 STP + 1 x 22 AWG DW	1,000
LINDEN-SPE-7339	4-CU-O-238-FQ-400	10.2	2 x #16 AWG + 2 x #24 TP	880
LINDEN-SPE-7168	12-CU-O-324-Q-414-YEL	10.5	4 x 24 AWG; 2 x 18 AWG; 6 x 20 AWG	1,200
LINDEN-SPE-7172*	10-CU-O-260-FQ-420	10.7	4 x 20 AWG; 1 x 24 AWG TP; 2 x 28 AWG TP	200
LINDEN-SPE-7190*	8-CU-O-260-FQ-420	10.7	4 x 20 AWG; 1 x 24 AWG TP; 1 x 24 AWG TP	200
LINDEN-SPE-7239	18-CU-CAT6-Q-420	10.7	18 x 24 AWG + Cat 6	200
LINDEN-SPE-7254*	5-CU-O-310-FQ-420	10.7	2 x 18 AWG; 2 x 22 STP; 1 x 22 AWG	1,000
LINDEN-SPE-7240	7-CU-M-266-O-320-FQ-420-ORN	10.7	4 x 16 AWG + 3 x 24 AWG TP	2,500
LINDEN-SPE-7225*	4-CU-O-316-FQ-422-YEL	10.7	1 x 18 AWG STP + 1 x 24 WG STP	400
LINDEN-SPE-7238	O-90-5-CU-FQ-425-ORN	10.8	4 x 22 AWG + 1 x 26 AWG TP	1,000
LINDEN-SPE-7173*	3-CU-O-240-FQ-350-Q-430	10.9	1x20 AWG TP; 1x28 AWG TP; 1x24 AWG TP	1,200
LINDEN-SPE-7169	6-CU-O-381-Q-461	11.7	2 x 16 AWG; 3 x 22 AWG TP; 1 x 20	200
LINDEN-SPE-7257	4-CU-O-390-Q-490-BLK	12.45	4 x 18 AWG	13,500
LINDEN-SPE-7245	4-CU-O-362-FQ-451-YEL	13.5	4 x 20 WG TP	1,200
LINDEN-SPE-7369	4-FO-O-354-FQ-550	14	2 x 16 AWG + 2 x 22 AWG TP	4,400
LINDEN-SPE-7119*	5-CU-Q-562	14.3	2 x 16 AWG; 1 x 22 AWG; 1 x 24 AWG	2,400
LINDEN-SPE-7184*	20-CU-CAT6-O-336-FQ-566	14.4	20 x 24 AWG + CAT6	200
LINDEN-SPE-7175*	19-CU-CAT6-O-336-FQ-586	14.9	19 x 24 AWG + CAT6	200
LINDEN-SPE-7176*	7-CU-T-287-X-523-Q-602	15.3	3 x #16, 1 x #18, 1 x #24TP, 1 x #24, Coax	1,100

*Denotes Buoyant Design / TP=Twisted Pair; STP=Shielded Twisted Pair; DW=Drain Wire

CONTACT LINDEN FOR DRAWINGS, SPECIFICATIONS OR CUSTOM REQUIREMENTS

Cable Basics 101

Minimum Bend Radius (MBR): This is the most common question we receive about our cables and one with a complicated answer. MBR is always application and environment dependent and can vary with cable type too. Some cables can be tied in a knot and others (k)not so much. Is the cable a multi element cable? Is it under load? Is it in use? A good Rule of Thumb is MBR = 20 x Cable O.D.

Safe Working Load (SWL): Our cables are rated to an Ultimate Tensile Strength (UTS), which is the maximum load it will support (for a short time) before it physically breaks. Like MBR, SWL is application and environment dependent. For more complicated hybrid cables with optics it is best to operate between 15% and 20% of the rated UTS. A cable strengthened with torque balanced aramid fibers brought to 50% UTS may see up to 3% elongation.

Optical Loss: Optical fibers transmit data along their length in the form of light, usually at wavelengths of 850nm, 1310nm or 1550nm. As the light bounces down the core of the fiber inevitably some of the photons escape into the cladding and are lost. This loss is measured in Decibels (dB) and can be as low as 0.25 dB/km for some singlemode fibers and as much as 4 dB/km for multimode fibers. Higher loss limits effective working length.

Lay Length: Cables with multiple elements are twisted down the length of the cable. This is down to increase flexibility and protect these elements from being over strained. The Lay Length is the linear distance for one full twist. A shorter lay length yields a more flexible cable, but changes some characteristics related to weight size and performance. For cables with optics, the effective MBR must be considered to mitigate Optical Loss.

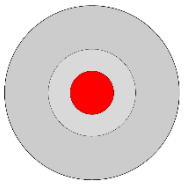
Waterproofing: There are several methods of moisture protection ranging from tape wrap, gel filling, metal tube enclosure. Optical fibers can be made hermetic by carbon deposition or LCP jacketing. LCP has been shown to be better than carbon in terms of moisture protection and it also allows for low cost, fast manufacturing.

Conductors: Conductors come in many shapes and sizes, but the most common is stranded, tin-plated copper. We use the American Wire Gauge (AWG) system (conversion to mm^2 on the next page). Generally, the larger the wire (smaller the gauge) the larger its current carrying capacity. The gauge number refers to the number of drawing processes the wire must go through to reach its size, hence the inverse relationship between gauge size and OD. Interestingly for gauges 5 through 14, the gauge is the number for wires that will fit side-by-side in one inch.

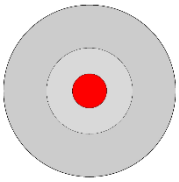
Fiber Basics 101

Common Fiber Types:

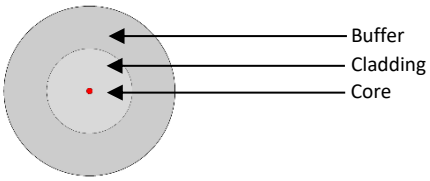
Multimode 62.5/125/250
Larger core = larger power budget
Typical maximum length <300 m



Multimode 50/125/250
Higher Bandwidth than 62.5
Typical maximum length <1km



Singlemode
Small core = Very high bandwidth
Typical maximum length 50,000m



dB Loss to Power Ratio Conversion

dB (loss)	Power ratio
0	1.000
0.1	0.977
0.2	0.955
0.3	0.933
0.4	0.912
0.5	0.891
0.6	0.871
0.7	0.851
0.8	0.832
0.9	0.813
1	0.794
2	0.631
3	0.501
4	0.398
5	0.316
6	0.251
7	0.200
8	0.158
9	0.126
10	0.1
20	0.01
30	0.001
40	0.0001
50	0.00001
60	0.000

Wire Charts

AWG to mm² Conversion

#AWG	Diameter (in)	Diameter (mm)	Cross Sectional Area (mm²)
1	0.289	7.35	42.4
2	0.258	6.54	33.6
4	0.204	5.19	21.1
6	0.162	4.11	13.3
8	0.129	3.26	8.36
10	0.102	2.59	5.26
12	0.0808	2.05	3.31
14	0.0641	1.63	2.08
16	0.0508	1.29	1.31
18	0.0403	1.02	0.82
20	0.032	0.81	0.52
22	0.0254	0.65	0.33
24	0.0201	0.51	0.2
26	0.0159	0.4	0.13
28	0.0126	0.32	0.081
30	0.0984	0.25	0.051
32	0.0787	0.2	0.035

Wire Weight and Resistance

AWG Size	Strands / Strand Size	Approximate Weight		Maximum DC Resistance	
		lbs/ 1000 ft	Kg/Km	Ohms/1000 ft	Ohms/Km
34	7/42	0.136	0.2	265	869
34	19/46	0.147	0.22	247	809
32	7/40	0.21	0.31	170	556
32	19/44	0.237	0.35	156	511
30	7/38	0.349	0.52	100	329
30	19/42	0.37	0.55	97.6	320
28	7/36	0.546	0.81	63.6	209
28	19/40	0.569	0.85	62.5	205
26	7/34	0.866	1.3	39.7	130
26	19/38	0.947	1.4	37	121
24	7/32	1.4	2.1	24.5	80.2
24	19/36	1.48	2.2	23.4	76.8
22	7/30	2.18	3.3	15.6	51.1
22	19/34	2.35	3.5	14.6	48
20	7/28	3.32	5.2	9.77	32
20	19/32	3.79	5.6	9.01	29.6
18	7/26	5.52	8.2	6.19	20.3
18	19/30	5.92	8.8	5.74	18.8
16	7/24	8.82	13.1	3.85	12.6
16	19/29	7.56	11.3	4.48	14.7
14	7/22	11.9	17.7	3.15	10.03
14	19/27	11.9	17.8	2.83	9.28

Cable Definitions

Ampere — Amount of current that flows when one volt is applied across one ohm of resistance. One ampere (A) is produced by one coulomb of charge passing a point in one second.

Attenuation — The decrease in magnitude of a signal as it travels through any medium. It is usually expressed in decibels (dB). See power conversion chart above.

Braid Angle — The angle between a strand of wire in a braid shield and the longitudinal axis (i.e. axis along the length of the center) of the cable it is wound around. Also expressed in picks per inch (ppi).

Current Carrying Capacity — The maximum current a conductor can carry without being heated beyond a safe limit. Ampacity.

Impedance — The effective resistance of an electric circuit or component to alternating current, arising from the combined effects of ohmic resistance and reactance.

Ohm — The unit of electrical resistance. The value of resistance through which a potential difference of one volt will maintain a current of one ampere.

Ohm's Law — Stated V=IR, I=V/R or R=V/I. The current I in a circuit is directly proportional to the voltage V, and inversely proportional to the resistance R.

Power — The amount of work per unit of time; Watts. Power equals the product of voltage and current (P = V x I).

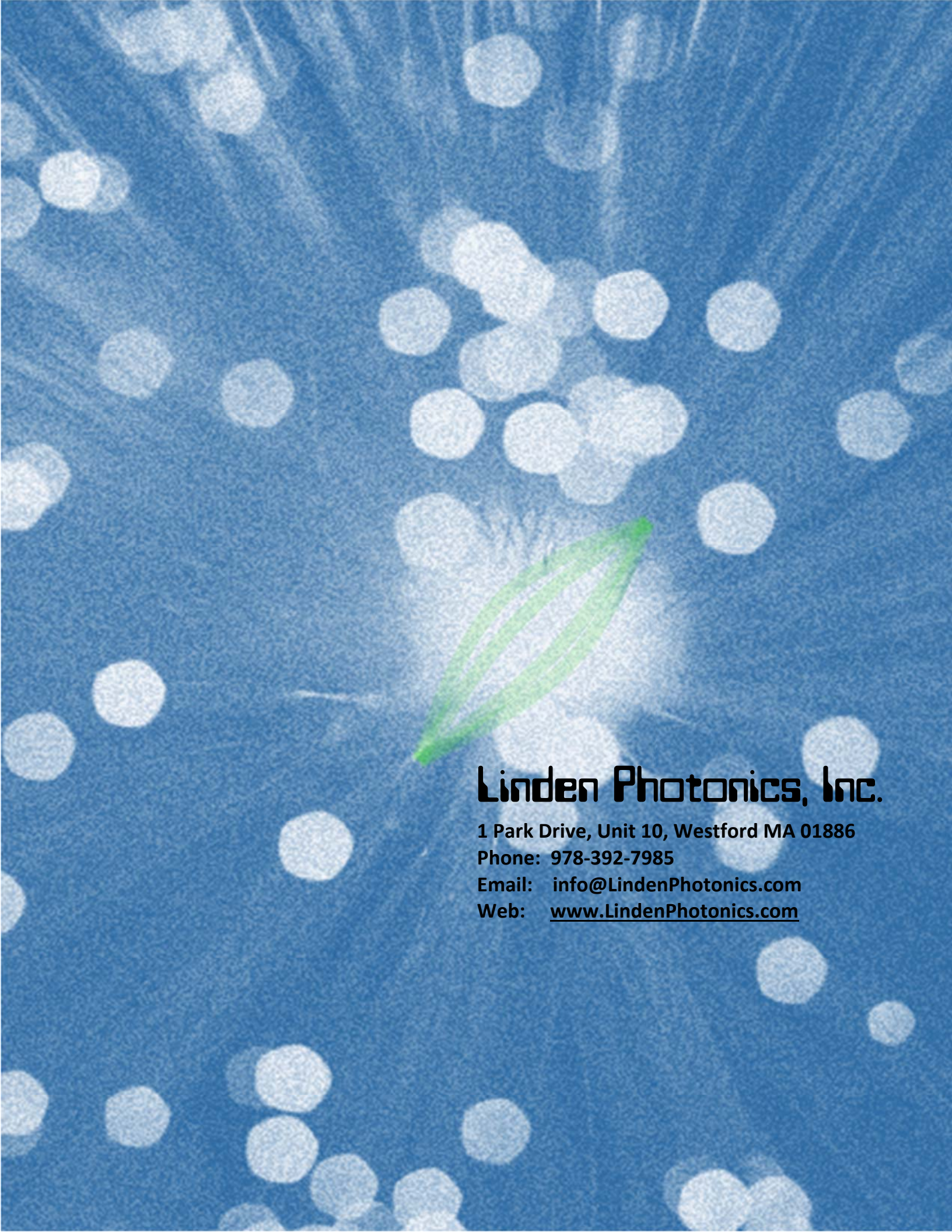
Resistance — In DC circuits, the opposition a material offers to current flow, measured in ohms. In AC circuits, resistance is the real component of impedance, and may be higher than the value measured at DC.

Shield — A tape, serve or braid placed around or between electric circuits or cables or their components, to prevent signal leakage or interference.

Voltage — also called electromotive force, is a quantitative expression of the potential difference in charge between two points in an electrical field.

Voltage Drop — The voltage developed across a component or conductor by the current flow through the resistance or impedance of the component or conductor.

Voltage Rating — The highest voltage that may be continuously applied to a cable construction in conformance with standards or specifications.



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