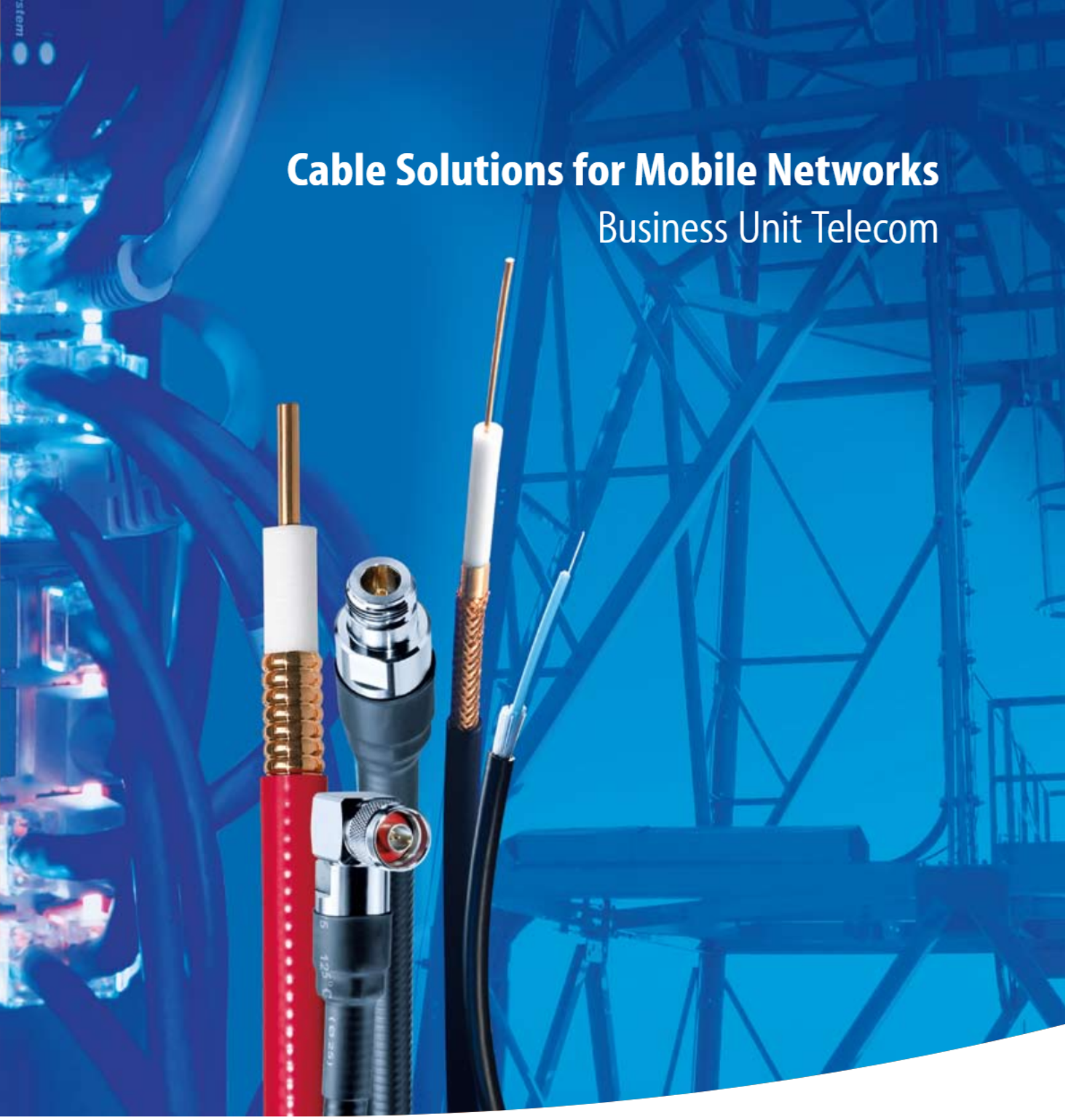
Cable Solutions for Mobile Networks

Business Unit Telecom



The Quality Connection

LEONI

Connection Technology for Wireless Communication Systems

A consistent focus on the market, in-depth sector and product knowledge, decades of manufacturing experience and innovative products – that's LEONI, one of the world's largest producers of special cable solutions. Its Telecom business unit supplies all kinds of cables and cable systems for telecommunication applications.

Due to its almost unique value added chain, LEONI is able to offer cable solutions both with copper and fiber optic elements, making up standard as well as special or hybrid cables according to our customer's requirements or whole cable systems for their optimal solution.

LEONI Business Unit Telecom products are manufactured in LEONI plants around the world: Germany, China and Slovakia. All these plants offer high-quality and environmentally compatible products (DIN EN ISO 9001 and DIN EN ISO 14001, DIN EN 9100 in Friesoythe, Germany).

LEONI Business Unit Telecom offers a comprehensive product range of cables, connectors and accessories for **Mobile Network Solutions**, such as GSM, CDMA, 3G, WiMAX and radio link systems. Our **Flex*Line*** products offer the whole of **Connection Technology for Wireless Communication Systems** and will be highlighted in this catalogue. Feel free to contact our sales team if you are looking for further information on a product or any other site solution to suit your special application. We are happy to provide you the perfect cable or cable system solution!

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All Flex*Line* products are permanently enhanced for our customers. Therefore this brochure is subject to change and error. You will find the updated status in our datasheets at www.leoni-telecom.com

Fields of Application

The high pace of innovation in mobile communications requires products that meet the highest standards of performance and reliability.

Flex*Line* cables, connectors and acessories were specially developed to serve as the link between the base station (BTS or Node B) and the antenna in current and new GSM, 3G, CDMA, WiMAX and radio link systems. Flex*Line* cable systems show excellent electrical performance and are ideal for a wide range of RF applications. Some of these applications include jumper cables for the connection of antennas.

Flexibility, low attenuation values and high shielding effectiveness make Flex*Line* cable systems a world class product.

LEONI offers Flex*Line* Coaxial cables with corrugated as well as with braided outer conductor for highly flexible applications.

For latest Remote Radio Head (RRH) technology, LEONI's Telecom and Fiber Optic business units offer new generation Flex*Line* Symmetric cables to interconnect the transceiver unit at the top of the antenna mast with the frequent base station. Additional to high quality fiber optic or copper cables for RRH, LEONI offers hybrid cables including both copper and fiber optic elements in only one cable.

Outdoor Applications

Highly efficient data transfer between base station and transceiver as well as a high frequency supply to the antenna are guaranteed by choosing Flex*Line* products. Together with the right installation materials, Flex*Line* creates connections that are both futureproof and durable to resist any harsh environment.

Special features such as sunlight resistance and waterproofness according to IP 68 standard make Flex*Line* solutions suitable for any challenging outdoor application.

Indoor Applications

To distribute an up to date WLAN and mobile network system in a building, LEONI shows up a big variety of Flex*Line* Coaxial and Symmetric cables and accessories for in-building and rooftop installations. To fulfil the strict fire protection requirements in the indoor area, Flex*Line* cables with FRNC (flame retardant, non corrosive) jacket are required to guarantee flame retardance and non corrosiveness according to in-building standards. Flexibility and small outside diameters are only two requirements of Flex*Line* cables for indoor applications,which they fulfil.

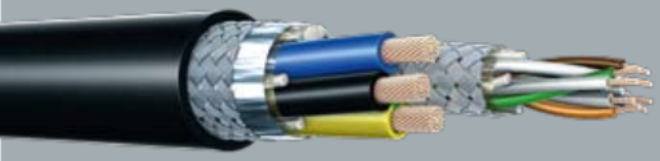
Indoor Applications

Outdoor Applications

Flex*Line* Coaxial cables, corrugated conductor

Flex*Line* Coaxial cables, braided conductor

Flex*Line* Symmetric cables



FlexLine®

Coaxial Cables

The Flex*Line* product range of coaxial cables with suitable stripping tools and connectors for site solutions guarantees excellent electrical characteristics and has outstanding mechanical and climatic properties ideal for outdoor installations. Its small sizes and super flexible types are additionally applicable as high performance cables for base station and antenna feeders in mobile radio stations and radio link systems, as well as for in-building and rooftop installations. One part of these Flex*Line* Coaxial cables has a corrugated outer conductor construction, which guarantees optimal shielding, low attenuation and provides the flexibility for easy stripping, handling and installation.

Apart from different sizes there are four different **Flex*Line* Coaxial types with corrugated outer conductor** to be distinguished:

Flex*Line* Coaxial flexible cables R *[ring-shaped corrugations in outer conductor]*
are designed to provide low-loss connections between electronic transmission or reception units and antennas.

Flex*Line* Coaxial low loss cables R *[ring-shaped corrugations in outer conductor]*
have optimised transmission characteristics while still assuring constant outer dimensions to suit to all frequent Flex*Line* installation material and connectors.

Flex*Line* Coaxial super flexible cables S *[spiral corrugations in outer conductor]*
for use in thight wiring spaces, which request cables with the smallest bending radii, high flexibility, low attenuation and high shielding.

Flex*Line* Coaxial super flexible feeder cables H *[spiral corrugations in outer conductor]*
ideal as feeder cables for difficult installations thanks to the cables' minimal bending radius, flexibility and low weight and having a ring-shaped inner and a spiral outer conductor.

Flexibility and bendability are hallmarks of the **Flex*Line* Coaxial cables with braided outer conductor**. The single or double braids of different wire materials enable the tightest bending radii available for any cable of similar size and performance.

The standard Flex*Line* Coaxial cable is protected by a sunlight resistant PE jacket. The addition of waterproofing compound in and around the foil/braid ensures continuous reliable service in case of any damage during installation or operation. Flex*Line* Coaxial cables with FRNC jacket are flame retardant, non-corrosive cables, especially designed for in-building applications. Flex*Line* Coaxial cables with PVC jacket are for general-purpose indoor-/outdoor-applications and are characterised by their high flexibility.

Overview on different cable types with Flex*Line* 7/8"	7/8" H	7/8" R	7/8" R low loss
Inner conductor	Spiral	Smooth	Smooth
Outer conductor	Ring (flex)	Ring	Ring
Attenuation for GSM 900 MHz (dB/100m/dB/100ft)	4.22 (1.29)	3.81 (1.16)	3.54 (1.10)
Attenuation for GSM 1800 MHz (dB/100m/dB/100ft)	6.23 (1.90)	5.63 (1.72)	5.19 (1.60)
Attenuation for GSM 2200 MHz (dB/100m/dB/100ft)	6.99 (2.13)	6.32 (1.93)	5.81 (1.80)
Flexibility	Super flexible	Flexible	Flexible
Accessories	Standard	Standard	Standard

Overview Flex*Line* Coaxial cables with corrugated outer conductor

Type	Inner conductor	Outer conductor	Jacket options	Order number
Superflexible cables				
Flex*Line* 1/6" S	Bare copper wire	Spiral corrugated copper tube	PE	**L45466- B13-C116**
Flex*Line* 1/6" S High power	Silver plated copper wire	Spiral corrugated copper tube	FEP	**L45466-B13-G7**
Flex*Line* 1/5" S	Copper clad aluminium wire	Spiral corrugated copper tube	FRNC	**L45466-B14-C46**
Flex*Line* 1/4" S	Copper clad aluminium wire	Spiral corrugated copper tube	PE	**L45466-B15-C76**
			FRNC	**L45466-B15-C36**
			FRNC-CMR	**L45466-B15-C96**
Flex*Line* 1/4" S High power	Silver plated copper wire	Spiral corrugated copper tube	FEP	**L45466-B15-N7**
Flex*Line* 3/8" S	Copper clad aluminium wire	Spiral corrugated copper tube	PE	**V45466-B17-C146**
			FRNC-UL listed	**L45466-B17-C116**
			FRNC-CMR/CATVR	**V45466-B17-C156**
Flex*Line* 1/2" S	Copper clad aluminium wire	Spiral corrugated copper tube	PE	**V45466-B19-C56**
			FRNC-UL listed	**L45466-B20-C6**
			FRNC-CMR/CATVR	**V45466-B19-C76**
Flexible cables				
Flex*Line* 1/4" R	Copper clad aluminium wire	Ring-shaped corrugated copper tube	PE	**L45466-B17-C216**
			FRNC	**L45466-B17-C226**
			FRNC-CMR	**L45466-B17-C206**
Flex*Line* 1/2" R	Copper clad aluminium wire	Ring-shaped corrugated copper tube	PE	**V45466-B21-C26**
			FRNC	**V45466-B21-C36**
			FRNC-CMR/CATVR	**V45466-B21-C66**
Flex*Line* 7/8" R	Copper tube	Ring-shaped corrugated copper tube	PE	**V45466-B23-C26**
			FRNC	**V45466-B23-C36**
			FRNC-CMR/CATVR	**V45466-B23-C126**
Flex*Line* 1 1/4" R	Copper tube	Ring-shaped corrugated copper tube	PE	**V45466-B24-C6**
			FRNC	**V45466-B24-C16**
			FRNC-CMR	**V45466-B24-C46**
Flex*Line* 1 5/8" R	Spiral corrugated copper tube	Ring-shaped corrugated copper tube	PE	**V45466-B25-C16**
			FRNC	**V45466-B25-C26**
			FRNC-CMR	**V45466-B25-C66**
Superflexible feeder cables				
Flex*Line* 7/8" H	Spiral corrugated copper tube	Ring-shaped corrugated copper tube	PE	**L45466-B23-C176**
			FRNC	**L45466-B23-C186**
Low loss cables				
Flex*Line* 7/8" R	Copper tube	Ring-shaped corrugated copper tube	PE	**V45466-B23-C226**
			FRNC	**V45466-B23-C236**
Flex*Line* 1 1/4" R	Copper tube	Ring-shaped corrugated copper tube	PE	**V45466-B23-C206**
			FRNC	**V45466-B23-C216**
Flex*Line* 1 5/8" R	Spiral corrugated copper tube	Ring-shaped corrugated copper tube	PE	**V45466-B25-C216**
			FRNC	**V45466-B25-C226**

FRNC = Flame Retardant Non Corosive (halogene free)
S = Spiral corrugation of the outer conductor
R = Ring corrugation of the outer conductor
CATVR = Community Antenna Television System with Riser Flame Test,classified according to NEC
UL listed = Listed by UL (Underwriters Laboratories) for Wires, Miscellaneous
FEP = Perfluorethylenepropylene
PE = Polyethylene
CMR = Conductor Metallic with Riser Flame Test, classified according to NEC

Flex*Line* 1/6" S super flexible

Type	Order number
Standard polyethylene jacket	**L45466-B13-C116**

Mechanical characteristics			
Inner conductor	bare copper wire	1.13 mm	0.044 in
Dielectric	foamed PE	2.95 mm	0.116 in
Diameter over outer conductor	spiral corrugated copper tube	4.1 mm	0.161 in
Diameter over outer jacket		4.9 mm	0.193 in
Cable weight		38 kg/km	26 lb/1000 ft
Tensile strength		100 N	22.5 lbf
Bending moment		0.5 Nm	0.37 lbf*ft
Flat plate crush strength		3 N/mm	17.10 lbf/in
Min. bending radius, single		7 mm	0.28 in
Min. bending radius, repeated		13 mm	0.51 in
Number of bends, minimum (typical)		20 (50)	
Permissable temperature range, installation		– 40 °C to + 60 °C	– 40 °F to + 140 °F
Permissable temperature range, operation		– 55 °C to + 85 °C	– 67 °F to + 185 °F

Electrical characteristics		
Impedance	50 ± 2 Ω	
Relative velocity of propagation	82 %	
Capacitance	85 pF/m	25.9 pF/ft
Inductance	0.19 µH/m	0.06 µH/ft
Maximum operating frequency	18 GHz	
Cut off frequency	40 GHz	
Peak power rating	2.5 kW	
DC breakdown voltage	1000 V	
Jacket spark, volts RMS	2000 V	
Inner conductor DC-resistance	18 Ω/km	5.49 Ω/1000 ft
Outer conductor DC-resistance	23 Ω/km	7.01 Ω/1000 ft
Return loss 800 – 2200 MHz	26 dB	

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
30	5.43	1.65	0.65
50	7.06	2.15	0.49
88	9.46	2.88	0.36
100	10.1	3.08	0.34
108	10.5	3.21	0.32
150	12.5	3.81	0.27
174	13.5	4.11	0.25
200	14.5	4.43	0.23
300	18.0	5.49	0.18
400	21.0	6.40	0.16
450	22.4	6.82	0.15
500	23.7	7.22	0.14
512	24.0	7.31	0.14
600	26.1	7.97	0.13
700	28.4	8.66	0.12
800	30.6	9.32	0.11
824	31.1	9.48	0.11
894	32.5	9.91	0.10
900	32.6	9.95	0.10
925	33.1	10.1	0.10
960	33.8	10.3	0.10
1000	34.6	10.5	0.09
1250	39.2	11.9	0.08
1500	43.4	13.2	0.08
1700	46.6	14.2	0.07
1800	48.2	14.7	0.07

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
1900	49.7	15.1	0.07
2000	51.2	15.6	0.06
2100	52.6	16.0	0.06
2200	54.1	16.5	0.06
2300	55.5	16.9	0.06
2500	58.2	17.7	0.06
2700	60.9	18.6	0.05
3000	64.8	19.7	0.05
3300	68.5	20.9	0.05
3400	69.7	21.3	0.05
4000	76.8	23.4	0.04
4900	86.8	26.5	0.04
5000	87.9	26.8	0.04
6000	98.3	30.0	0.04
6100	99.3	30.3	0.04
8000	118	35.8	0.03
8800	125	38.1	0.03
10000	135	41.3	0.03
10200	137	41.8	0.03
12000	152	46.4	0.02
13400	164	49.9	0.02
14000	169	51.4	0.02
16000	184	56.1	0.02
18000	199	60.7	0.02

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature

Flex*Line* 1/6" S super flexible, high power

Type	Order number
High power, FEP jacket	**L45466-B13-G7**

Mechanical characteristics			
Inner conductor	silver plated copper wire	1.02 mm	0.040 in
Dielectric	Perfluorethylen-propylen (FEP)	2.95 mm	0.116 in
Diameter over outer conductor	spiral corrugated copper tube	4.1 mm	0.161 in
Diameter over outer jacket	FEP	4.9 mm	0.193 in
Cable weight		46 kg/km	31lb/1000 ft
Tensile strength		100 N	22.5 lbf
Bending moment		0.5 Nm	0.37 lbf*ft
Flat plate crush strength		3 N/mm	17.10 lbf/in
Min. bending radius, single		7 mm	0.28 in
Min. bending radius, repeated		13 mm	0.51 in
Number of bends, minimum (typical)		20 (50)	
Permissable temperature range, installation		– 40 °C to + 60 °C	– 40 °F to + 140 °F
Permissable temperature range, operation		– 50 °C to + 205 °C	– 58 °F to + 401 °F

Electrical characteristics		
Impedance	50 ± 2 Ω	
Relative velocity of propagation	82 %	
Capacitance	95 pF/m	28.69 pF/ft
Inductance	0.38 µH/m	0.12 µH/ft
Maximum operating frequency	8 GHz	
Cut off frequency	40 GHz	
Peak power rating	2.8 kW	
DC breakdown voltage	1000 V	
Jacket spark, volts RMS	2000 V	
Inner conductor DC-resistance	23 Ω/km	7.01 Ω/1000 ft
Outer conductor DC-resistance	23 Ω/km	7.01 Ω/1000 ft
Return loss 800 – 2200 MHz	20 dB	

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
30	5.30	1.61	4.37
50	7.17	2.19	3.18
88	10.0	3.05	2.23
100	10.8	3.28	2.06
108	11.3	3.44	1.96
150	13.7	4.17	1.60
174	14.9	4.55	1.45
200	16.2	4.94	1.33
300	20.6	6.29	1.03
400	24.6	7.49	0.86
450	26.4	8.05	0.80
500	28.2	8.58	0.75
512	28.6	8.71	0.74
600	31.5	9.61	0.67
700	34.7	10.6	0.61
800	37.7	11.5	0.56
824	38.5	11.7	0.55
894	40.5	12.3	0.52
900	40.7	12.4	0.52
925	41.4	12.6	0.51
960	42.4	12.9	0.50

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
1000	43.5	13.3	0.49
1250	50.2	15.3	0.42
1500	56.6	17.3	0.38
1700	61.5	18.8	0.35
1800	63.9	19.5	0.34
1900	66.3	20.2	0.33
2000	68.6	20.9	0.32
2100	70.9	21.6	0.31
2200	73.2	22.3	0.30
2300	75.4	23.0	0.29
2500	79.8	24.3	0.27
2700	84.2	25.7	0.26
3000	90.5	27.6	0.24
3300	96.8	29.5	0.23
3400	98.8	30.1	0.23
4000	111	33.8	0.20
4900	128	39.1	0.18
5000	130	39.7	0.18
6000	149	45.3	0.16
6100	150	45.9	0.16
8000	184	56.1	0.13

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature

Flex*Line* 1/5" S super flexible

Type	Order number
Flame retardant, non corrosive jacket (FRNC)	**L45466-B14-C46**

Mechanical characteristics			
Inner conductor	copper clad aluminium wire	1.57 mm	0.062 in
Dielectric	foamed PE	3.9 mm	0.154 in
Diameter over outer conductor	spiral corrugated copper tube	5.7 mm	0.224 in
Diameter over outer jacket	FRNC	6.9 mm	0.272 in
Cable weight	FRNC	54.6 kg/km	36.6 lb/1000 ft
Tensile strength		250 N	56.2 lbf
Bending moment		1 Nm	0.73 lbf*ft
Flat plate crush strength		6 N/mm	34.3 lbf/in
Min. bending radius, single		8 mm	0.31 in
Min. bending radius, repeated		15 mm	0.412 in
Number of bends, minimum (typical)		15 (50)	
Permissable temperature range, installation (FRNC)		– 25 °C to + 60 °C	– 13 °F to + 140 °F
Permissable temperature range, operation		– 40 °C to + 85 °C	– 40 °F to + 185 °F

Electrical characteristics		
Impedance	50 ± 1 Ω	
Relative velocity of propagation	82 %	
Capacitance	80 pF/m	24.4 pF/ft
Inductance	0.19 µH/m	0.06 µH/ft
Maximum operating frequency	8 GHz	
Cut off frequency	25 GHz	
Peak power rating	4.2 kW	
DC breakdown voltage	1300 V	
Jacket spark, volts RMS	1500 V	
Inner conductor DC-resistance	14 Ω/km	4.27 Ω/1000 ft
Outer conductor DC-resistance	10 Ω/km	3.05 Ω/1000 ft
Return loss 400 – 500 MHz	26 dB	
Return loss 800 – 1000 MHz	26 dB	
Return loss 1700 – 2700 MHz	26 dB	

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
30	3.97	1.21	1.31
50	5.16	1.57	1.00
88	6.89	2.10	0.75
100	7.35	2.24	0.70
108	7.65	2.33	0.67
150	9.06	2.76	0.57
174	9.79	2.98	0.53
200	10.5	3.21	0.49
300	13.0	3.96	0.40
400	15.1	4.61	0.34
450	16.1	4.90	0.32
500	17.0	5.19	0.30
512	17.2	5.25	0.30
600	18.7	5.71	0.28
700	20.4	6.20	0.26
800	21.9	6.66	0.24
824	22.2	6.77	0.24
894	23.2	7.07	0.23
900	23.3	7.10	0.22
925	23.6	7.21	0.22

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
960	24.1	7.35	0.22
1000	24.7	7.52	0.21
1250	27.8	8.49	0.19
1500	30.8	9.38	0.17
1700	33.0	10.0	0.16
1800	34.0	10.4	0.16
1900	35.1	10.7	0.15
2000	36.1	11.0	0.15
2100	37.1	11.3	0.14
2200	38.0	11.6	0.14
2300	39.0	11.9	0.14
2500	40.9	12.5	0.13
2700	42.7	13.0	0.13
3000	45.3	13.8	0.12
3300	47.8	14.6	0.11
3400	48.7	14.8	0.11
4000	53.4	16.3	0.10
4900	60.1	18.3	0.09
5000	60.8	18.5	0.09
6000	67.7	20.6	0.08
6100	68.3	20.8	0.08
8000	80.3	24.5	0.07

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature

Flex*Line* 1/4" S super flexible

Type	Order number
Standard polyethylene jacket	**L45466-B15-C76**
Flame retardant, non corrosive jacket (FRNC)	**L45466-B15-C36**
Flame retardant, non corrosive jacket (FRNC), UL CMR	**L45466-B15-C96**

Mechanical characteristics			
Inner conductor	copper clad aluminium wire	1.88 mm	0.074 in
Dielectric	foamed PE	4.40 mm	0.173 in
Diameter over outer conductor	spiral corrugated copper tube	6.50 mm	0.256 in
Diameter over outer jacket	PE	7.70 mm	0.303 in
	FRNC	7.70 mm	0.303 in
	FRNC, CMR	7.70 mm	0.303 in
Cable weight	PE (FRNC)	73(83) kg/km	49(56) lb/1000 ft
Tensile strength		350 N	78.6 lbf
Bending moment		1.5 Nm	1.1 lbf*ft
Flat plate crush strength		8 N/mm	45.7 lbf/in
Min. bending radius, single		12.5 mm	0.492 in
Min. bending radius, repeated		25 mm	0.984 in
Number of bends, minimum (typical)		20 (50)	
Recommended hanger spacing		0.6 m	1.97 ft
Permissable temperature range, installation (PE)		– 40 °C to + 60 °C	– 40 °F to + 140 °F
Permissable temperature range, installation (FRNC)		– 25 °C to + 60 °C	– 13 °F to + 140 °F
Permissable temperature range, operation		– 55 °C to + 85 °C	– 67 °F to + 185 °F

Electrical characteristics		
Impedance	50 ± 1 Ω	
Relative velocity of propagation	82 %	
Capacitance	80 pF/m	24.4 pF/ft
Inductance	0.195 µH/m	0.06 µH/ft
Maximum operating frequency	20.4 GHz	
Cut off frequency	25 GHz	
Peak power rating	8.2 kW	
DC breakdown voltage	1600 V	
Jacket spark, volts RMS	5000 V	
Inner conductor DC-resistance	10.5 Ω/km	3.5 Ω/1000 ft
Outer conductor DC-resistance	6.6 Ω/km	2.01 Ω/1000 ft
Return loss 400 – 500 MHz	26 dB	
Return loss 800 – 1000 MHz	26 dB	
Return loss 1700 – 2700 MHz	26 dB	

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
30	2.99	0.91	2.09
50	3.89	1.19	1.61
88	5.22	1.59	1.21
100	5.58	1.70	1.13
108	5.81	1.77	1.09
150	6.90	2.10	0.92
174	7.46	2.27	0.86
200	8.02	2.45	0.80
300	9.94	3.03	0.65
400	11.6	3.53	0.56
450	12.3	3.76	0.52
500	13.0	3.98	0.50
512	13.2	4.03	0.49
600	14.4	4.39	0.45
700	15.6	4.77	0.42
800	16.8	5.13	0.39
824	17.1	5.21	0.38
894	17.9	5.45	0.37
900	17.9	5.47	0.37
925	18.2	5.55	0.36
960	18.6	5.66	0.35
1000	19.0	5.79	0.35
1250	21.5	6.55	0.31
1500	23.8	7.25	0.28
1700	25.5	7.77	0.26

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
1800	26.3	8.03	0.25
1900	27.2	8.28	0.25
2000	28.0	8.52	0.24
2100	28.7	8.76	0.23
2200	29.5	8.99	0.23
2300	30.3	9.22	0.22
2500	31.7	9.67	0.21
2700	33.2	10.1	0.20
3000	35.2	10.7	0.19
3300	37.2	11.3	0.18
3400	37.9	11.5	0.18
4000	41.7	12.7	0.16
4900	47.0	14.3	0.15
5000	47.5	14.5	0.14
6000	53.0	16.2	0.13
6100	53.5	16.3	0.13
8000	63.1	19.2	0.11
8800	67.0	20.4	0.10
10000	72.5	22.1	0.10
10200	73.4	22.4	0.10
12000	81.3	24.8	0.09
13400	87.2	26.6	0.08
14000	89.7	27.3	0.08
16000	97.7	29.8	0.07
18000	106	32.2	0.07
19000	109	33.3	0.07
20400	115	34.9	0.06

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature

Flex*Line* 1/4" S super flexible, high power

Type	Order number
High power, FEP jacket	**L45466-B15-N7**

Mechanical characteristics			
Inner conductor	silver plated copper wire	1.8 mm	0.071 in
Dielectric	foamed Fluorethylen	4.4 mm	0.173 in
Diameter over outer conductor	spiral corrugated copper tube	6.4 mm	0.252 in
Diameter over outer jacket	Perfluoethylen-propylen (FEP)	7.4 mm	0.291 in
Cable weight		102 kg/km	68.4 lb/1000 ft
Tensile strength		100 N	22.5 lbf
Bending moment		1.5 Nm	1.10 lbf*ft
Flat plate crush strength		8 N/mm	45.60 lbf/in
Min. bending radius, single		12.5 mm	0.492 in
Min. bending radius, repeated		25 mm	0.984 in
Number of bends, minimum (typical)		20 (50)	
Permissable temperature range, installation		– 40 °C to + 60 °C	– 40 °F to + 140 °F
Permissable temperature range, operation		– 200 °C to + 205 °C	– 328 °F to + 401 °F

Electrical characteristics		
Impedance	50 ± 2 Ω	
Relative velocity of propagation	82 %	
Capacitance	78 pF/m	23.8 pF/ft
Inductance	0.3 µH/m	0.09 µH/ft
Maximum operating frequency	8 GHz	
Cut off frequency	25.4 GHz	
Peak power rating	6.4 kW	
DC breakdown voltage	1600 V	
Jacket spark, volts RMS	2000 V	
Inner conductor DC-resistance	6.9 Ω/km	2.10 Ω/1000 ft
Outer conductor DC-resistance	5.0 Ω/km	1.52 Ω/1000 ft
Return loss 800 – 2200 MHz	20 dB	

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
0.5	0.06	0.02	6.40
1	0.24	0.07	6.40
1.5	0.38	0.12	6.40
2	0.50	0.15	6.40
10	1.62	0.49	6.40
20	2.47	0.75	5.49
30	3.14	0.96	4.59
50	4.23	1.29	3.67
88	5.85	1.78	2.87
100	6.30	1.92	2.71
108	6.58	2.01	2.62
150	7.94	2.42	2.27
174	8.65	2.64	2.13
200	9.37	2.86	2.00
300	11.9	3.61	1.67
400	14.0	4.28	1.48
450	15.1	4.59	1.40
500	16.0	4.88	1.34
512	16.3	4.95	1.32
600	17.9	5.45	1.24
700	19.6	5.98	1.15
800	21.3	6.48	1.09
824	21.7	6.60	1.08

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
894	22.8	6.94	1.04
900	22.9	6.97	1.03
925	23.2	7.08	1.02
960	23.8	7.25	1.01
1000	24.4	7.43	0.99
1250	28.0	8.54	0.90
1500	31.4	9.58	0.83
1700	34.0	10.4	0.78
1800	35.3	10.8	0.76
1900	36.6	11.1	0.75
2000	37.8	11.5	0.73
2100	39.0	11.9	0.71
2200	40.2	12.3	0.70
2300	41.4	12.6	0.69
2500	43.7	13.3	0.66
2700	46.0	14.0	0.64
3000	49.3	15.0	0.61
3300	52.6	16.0	0.59
3400	53.6	16.3	0.58
4000	59.9	18.2	0.54
4900	68.8	21.0	0.49
5000	69.8	21.3	0.49
6000	79.3	24.2	0.45
6100	80.2	24.5	0.45
8000	97.4	29.7	0.40

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature

Flex*Line* 1/4" R flexible

Type	Order number
Standard polyethylene jacket	**L45466-B17-C216**
Flame retardant, non corrosive jacket (FRNC), CATV (NEC)	**L45466-B17-C226**
Flame retardant, non corrosive jacket (FRNC), UL CMR	**L45466-B17-C206**

Mechanical characteristics			
Inner conductor	copper wire	2.38 mm	0.094 in
Dielectric	foamed PE	6.4 mm	0.252 in
Diameter over outer conductor	ring-shaped corrugated copper tube	7.5 mm	0.295 in
Diameter over outer jacket	PE	8.8 mm	0.346 in
	FRNC	8.7 mm	0.343 in
	FRNC, CMR	8.7 mm	0.343 in
Cable weight	PE (FRNC)	102 (110) kg/km	69(74.4) lb/1000 ft
Tensile strength		600 N	135 lbf
Bending moment		2 Nm	1.47 lbf*ft
Flat plate crush strength		10 N/mm	57 lbf/in
Min. bending radius, single		40 mm	1.57 in
Min. bending radius, repeated		120 mm	4.72 in
Number of bends, minimum (typical)		15 (50)	
Recommended hanger spacing		0.6 m	1.97 ft
Permissable temperature range, installation (PE)		– 40 °C to + 60 °C	– 40 °F to + 140 °F
Permissable temperature range, installation (FRNC)		– 25 °C to + 60 °C	– 13 °F to + 140 °F
Permissable temperature range, operation		– 55 °C to + 85 °C	– 67 °F to + 185 °F

Electrical characteristics		
Impedance	50 ± 1 Ω	
Relative velocity of propagation	82 %	
Capacitance	80 pF/m	24.4 pF/ft
Inductance	0.195 µH/m	0.06 µH/ft
Maximum operating frequency	15.8 GHz	
Cut off frequency	19 GHz	
Peak power rating	13 kW	
DC breakdown voltage	2200 V	
Jacket spark, volts RMS	5000 V	
Inner conductor DC-resistance	5.95 Ω/km	1.82 Ω/1000 ft
Outer conductor DC-resistance	3.5 Ω/km	1.07 Ω/1000 ft
Return loss 400 – 500 MHz	26 dB	
Return loss 800 – 1000 MHz	26 dB	
Return loss 1700 – 2700 MHz	26 dB	

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
30	2.29	0.70	3.30
50	2.97	0.91	2.54
88	3.98	1.21	1.91
100	4.25	1.30	1.79
108	4.43	1.35	1.72
150	5.25	1.60	1.45
174	5.68	1.73	1.34
200	6.11	1.86	1.25
300	7.57	2.31	1.01
400	8.82	2.69	0.87
450	9.39	2.86	0.82
500	9.94	3.03	0.77
512	10.1	3.07	0.77
600	11.0	3.34	0.71
700	11.9	3.63	0.65
800	12.8	3.91	0.61
824	13.0	3.97	0.60
894	13.6	4.15	0.57
900	13.7	4.17	0.57
925	13.9	4.23	0.56
960	14.2	4.32	0.55
1000	14.5	4.42	0.54
1250	16.4	5.00	0.48
1500	18.2	5.54	0.43
1700	19.5	5.94	0.40

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
1800	20.1	6.14	0.39
1900	20.8	6.33	0.38
2000	21.4	6.51	0.37
2100	22.0	6.70	0.36
2200	22.6	6.88	0.35
2300	23.1	7.05	0.34
2500	24.3	7.40	0.33
2700	25.4	7.74	0.31
3000	27.0	8.23	0.30
3300	28.5	8.70	0.79
3400	29.0	8.85	0.28
4000	32.0	9.74	0.25
4900	36.1	11.0	0.22
5000	36.5	11.1	0.22
6000	40.8	12.4	0.20
6100	41.2	12.5	0.20
8000	48.6	14.8	0.17
8800	51.6	15.7	0.16
10000	55.9	17.1	0.15
10200	56.7	17.3	0.15
12000	62.8	19.2	0.13
13400	67.5	20.6	0.12
14000	69.4	21.2	0.12
16000	75.7	23.1	0.11
18000	81.8	24.9	0.10
19000	84.8	25.9	0.10

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature

Flex*Line* 3/8" S super flexible

Type	Order number
Standard polyethylene jacket	**V45466-B17-C146**
Flame retardant, non corrosive jacket (FRNC), UL listed	**L45466-B17-C116**
Flame retardant, non corrosive jacket (FRNC), UL CATVR+CMR	**V45466-B17-C156**

Mechanical characteristics			
Inner conductor	copper clad aluminium wire	2.6 mm	0.102 in
Dielectric	foamed PE	6.5 mm	0.256 in
Diameter over outer conductor	spiral corrugated copper tube	9.1 mm	0.358 in
Diameter over outer jacket	PE	10.3 mm	0.406 in
	FRNC	10.3 mm	0.406 in
	FRNC, CMR	10.7 mm	0.421 in
Cable weight	PE (FRNC)	125(130) kg/km	84.5(87.9) lb/1000 ft
Tensile strength		600 N	134.9 lbf
Bending moment		2.5 Nm	1.84 lbf*ft
Flat plate crush strength		15 N/mm	85.6 lbf/in
Min. bending radius, single		12.5 mm	0.492 in
Min. bending radius, repeated		25 mm	0.984 in
Number of bends, minimum (typical)		20 (50)	
Recommended hanger spacing		0.6 m	1.97 ft
Permissable temperature range, installation (PE)		– 40 °C to + 60 °C	– 40 °F to + 140 °F
Permissable temperature range, installation (FRNC)		– 25 °C to + 60 °C	– 13 °F to + 140 °F
Permissable temperature range, operation		– 55 °C to + 85 °C	– 67 °F to + 185 °F

Electrical characteristics		
Impedance	50 ± 1 Ω	
Relative velocity of propagation	82 %	
Capacitance	80 pF/m	24.4 pF/ft
Inductance	0.195 µH/m	0.06 µH/ft
Maximum operating frequency	13.4 GHz	
Cut off frequency	17.0 GHz	
Peak power rating	13.5 kW	
DC breakdown voltage	2300 V	
Jacket spark, volts RMS	5000 V	
Inner conductor DC-resistance	5.4 Ω/km	1.65 Ω/1000 ft
Outer conductor DC-resistance	5.6 Ω/km	1.71 Ω/1000 ft
Return loss 400 – 500 MHz	26 dB	
Return loss 800 – 1000 MHz	26 dB	
Return loss 1700 – 2700 MHz	26 dB	

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
30	2.12	0.65	3.43
50	2.74	0.84	2.65
88	3.66	1.12	1.98
100	3.91	1.19	1.86
108	4.06	1.24	1.79
150	4.82	1.47	1.51
174	5.20	1.59	1.40
200	5.59	1.71	1.30
300	6.93	2.11	1.05
400	8.08	2.46	0.91
450	8.61	2.62	0.85
500	9.11	2.78	0.81
512	9.23	2.81	0.80
600	10.1	3.07	0.73
700	10.9	3.34	0.68
800	11.8	3.59	0.63
824	12.0	3.65	0.62
894	12.5	3.82	0.59
900	12.6	3.83	0.59
925	12.8	3.89	0.58
960	13.0	3.97	0.57
1000	13.3	4.06	0.56
1250	15.1	4.61	0.49

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
1500	16.8	5.11	0.45
1700	18.0	5.49	0.42
1800	18.6	5.67	0.41
1900	19.2	5.85	0.39
2000	19.8	6.03	0.38
2100	20.3	6.20	0.37
2200	20.9	6.37	0.36
2300	21.5	6.54	0.35
2500	22.5	6.87	0.34
2700	23.6	7.19	0.32
3000	25.1	7.65	0.31
3300	26.6	8.10	0.29
3400	27.0	8.25	0.28
4000	29.8	9.10	0.26
4900	33.8	10.3	0.23
5000	34.2	10.4	0.23
6000	38.3	11.7	0.21
6100	38.7	11.8	0.20
8000	45.9	14.0	0.17
8800	48.8	14.9	0.16
10000	53.1	16.2	0.15
10200	53.8	16.4	0.15
12000	59.8	18.2	0.14
13400	64.4	19.6	0.13

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature

Flex*Line* 1/2" S super flexible

Type	Order number
Standard polyethylene jacket	**V45466-B19-C56**
Flame retardant, non corrosive jacket (FRNC), UL listed	**L45466-B20-C6**
Flame retardant, non corrosive jacket (FRNC), UL CATVR+CMR	**V45466-B19-C76**

Mechanical characteristics			
Inner conductor	copper clad aluminium wire	3.6 mm	0.142 in
Dielectric	foamed PE	9.1 mm	0.358 in
Diameter over outer conductor	ring-shaped corrugated copper tube	12.3 mm	0.484 in
Diameter over outer jacket	PE	13.5 mm	0.531 in
	FRNC	13.5 mm	0.531 in
	FRNC, CMR	13.9 mm	0.547 in
Cable weight	PE (FRNC)	203(226) kg/km	136.1 (149.5) lb/1000 ft
Tensile strength		1000 N	225 lbf
Bending moment		3 Nm	2.21 lbf*ft
Flat plate crush strength		15 N/mm	85.6 lbf/in
Min. bending radius, single		15 mm	0.59 in
Min. bending radius, repeated		30 mm	1.18 in
Number of bends, minimum (typical)		20 (50)	
Recommended hanger spacing		0.8 m	2.6 ft
Permissable temperature range, installation (PE)		– 40 °C to + 60 °C	– 40 °F to + 140 °F
Permissable temperature range, installation (FRNC)		– 25 °C to + 60 °C	– 13 °F to + 140 °F
Permissable temperature range, operation		– 55 °C to + 85 °C	– 67 °F to + 185 °F

Electrical characteristics		
Impedance	50 ± 1 Ω	
Relative velocity of propagation	82 %	
Capacitance	80 pF/m	24.4 pF/ft
Inductance	0.195 µH/m	0.06 µH/ft
Maximum operating frequency	10.2 GHz	
Cut off frequency	13.0 GHz	
Peak power rating	19 kW	
DC breakdown voltage	2500 V	
Jacket spark, volts RMS	5000 V	
Inner conductor DC-resistance	3.0 Ω/km	0.92 Ω/1000 ft
Outer conductor DC-resistance	3.4 Ω/km	1.04 Ω/1000 ft
Return loss 400 – 500 MHz	26 dB	
Return loss 800 – 1000 MHz	26 dB	
Return loss 1700 – 2700 MHz	26 dB	

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
30	1.58	0.48	4.82
50	2.11	0.64	3.72
88	2.89	0.88	2.78
100	3.10	0.94	2.60
108	3.23	0.99	2.50
150	3.87	1.18	2.11
174	4.20	1.28	1.95
200	4.53	1.38	1.81
300	5.67	1.73	1.46
400	6.64	2.02	1.26
450	7.09	2.16	1.18
500	7.52	2.29	1.11
512	7.62	2.32	1.10
600	8.32	2.54	1.01
700	9.07	2.76	0.93
800	9.78	2.98	0.87
824	9.94	3.03	0.85
894	10.4	3.17	0.82
900	10.4	3.18	0.81
925	10.6	3.23	0.80

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
960	10.8	3.30	0.79
1000	11.1	3.38	0.77
1250	12.6	3.84	0.68
1500	14.0	4.26	0.61
1700	15.0	4.58	0.57
1800	15.5	4.74	0.55
1900	16.0	4.89	0.54
2000	16.5	5.04	0.52
2100	17.0	5.18	0.51
2200	17.5	5.33	0.49
2300	17.9	5.47	0.48
2500	18.8	5.74	0.46
2700	19.7	6.01	0.44
3000	21.0	6.40	0.41
3300	22.2	6.78	0.39
3400	22.6	6.90	0.39
4000	25.0	7.61	0.35
4900	28.3	8.62	0.31
5000	28.6	8.73	0.31
6000	32.1	9.77	0.27
6100	32.4	9.88	0.27
8000	38.5	11.7	0.23
8800	40.9	12.5	0.22
10000	44.4	13.5	0.20
10200	45.0	13.7	0.20

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature

Flex*Line* 1/2" R flexible

Type	Order number
Standard polyethylene jacket	**V45466-B21-C26**
Flame retardant, non corrosive jacket (FRNC)	**V45466-B21-C36**
Flame retardant, non corrosive jacket (FRNC), UL CATVR+CMR	**V45466-B21-C66**

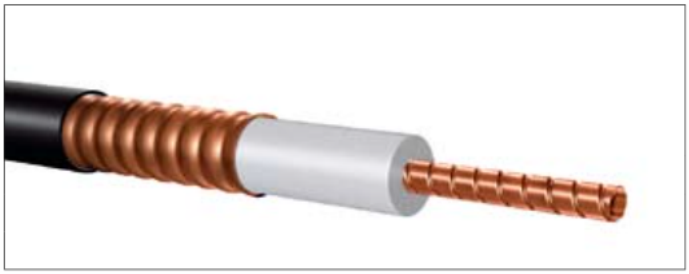
Mechanical characteristics			
Inner conductor	copper clad aluminium wire	4.8 mm	0.189 in
Dielectric	foamed PE	12.1mm	0.476 in
Diameter over outer conductor	ring-shaped corrugated copper tube	13.7 mm	0.539 in
Diameter over outer jacket	PE	16.0 mm	0.630 in
	FRNC	16.0 mm	0.630 in
	FRNC, CMR	15.3 mm	0.602 in
Cable weight	PE (FRNC)	235(274) kg/km	157.5 (183.6) lb/1000 ft
Tensile strength		1200 N	269 lbf
Bending moment		5 Nm	3.68 lbf*ft
Flat Plate Crush Strength		20 N/mm	114.2 lbf/in
Min. bending radius, single		70 mm	2.75 in
Min. bending radius, repeated		120 mm	4.72 in
Number of bends, minimum (typical)		15 (50)	
Recommended hanger spacing		0.8 m	2.62 ft
Permissable temperature range, installation (PE)		– 40 °C to + 60 °C	– 40 °F to + 140 °F
Permissable temperature range, installation (FRNC)		– 25 °C to + 60 °C	– 13 °F to + 140 °F
Permissable temperature range, operation		– 55 °C to + 85 °C	– 67 °F to + 185 °F

Electrical characteristics		
Impedance	50 ± 1 Ω	
Relative velocity of propagation	88 %	
Capacitance	76 pF/m	23.2pF/ft
Inductance	0.19 µH/m	0.06 µH/ft
Maximum operating frequency	8.8 GHz	
Cut off frequency	10.0 GHz	
Peak power rating	58 kW	
DC breakdown voltage	4000 V	
Jacket spark, volts RMS	8000 V	
Inner conductor DC-resistance	1.6 Ω/km	0.49 Ω/1000 ft
Outer conductor DC-resistance	1.9 Ω/km	0.58 Ω/1000 ft
Return loss 400 – 500 MHz	26 dB	
Return loss 800 – 1000 MHz	26 dB	
Return loss 1700 – 2700 MHz	26 dB	

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
30	1.14	0.35	7.31
50	1.48	0.45	5.62
88	1.98	0.60	4.19
100	2.12	0.65	3.92
108	2.20	0.67	3.77
150	2.61	0.80	3.17
174	2.82	0.86	2.93
200	3.04	0.93	2.72
300	3.76	1.15	2.19
400	4.38	1.33	1.87
450	4.66	1.42	1.76
500	4.93	1.50	1.66
512	4.99	1.52	1.64
600	5.44	1.66	1.50
700	5.91	1.80	1.38
800	6.35	1.94	1.28
824	6.46	1.97	1.25
894	6.75	2.06	1.20
900	6.78	2.07	1.19
925	6.88	2.10	1.18

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
960	7.02	2.14	1.15
1000	7.18	2.19	1.12
1250	8.12	2.48	0.99
1500	8.99	2.74	0.90
1700	9.64	2.94	0.83
1800	9.96	3.04	0.81
1900	10.3	3.13	0.78
2000	10.6	3.22	0.76
2100	10.9	3.31	0.74
2200	11.2	3.40	0.72
2300	11.4	3.49	0.70
2500	12.0	3.66	0.66
2700	12.5	3.82	0.63
3000	13.3	4.06	0.59
3300	14.1	4.30	0.56
3400	14.3	4.37	0.55
4000	15.8	4.81	0.50
4900	17.8	5.42	0.44
5000	18.0	5.49	0.43
6000	20.1	6.13	0.39
6100	20.3	6.19	0.38
8000	24.0	7.31	0.32
8800	25.4	7.75	0.30

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature



Flex*Line* 7/8" H super flexible

Type	Order number
Standard polyethylene jacket	**L45466-B23-C176**
Flame retardant, non corrosive jacket (FRNC)	**L45466-B23-C186**

Mechanical characteristics			
Inner conductor	spiral copper tube	9.3 mm	0.362 in
Dielectric	foamed PE	21.1 mm	0.831 in
Diameter over outer conductor	ring-shaped corrugated copper tube	25.0 mm	0.984 in
Diameter over outer jacket	PE	27.7 mm	1.091 in
	FRNC	27.7 mm	1.091 in
Cable weight	PE (FRNC)	462 (534) kg/km	309.7(357.9) lb/1000 ft
Tensile strength		2000 N	449.6 lbf
Bending moment		14 Nm	10.3 lbf*ft
Flat plate crush strength		14 N/mm	79.6 lbf/in
Min. bending radius, single		90 mm	3.543 in
Min. bending radius, repeated		125 mm	4.921 in
Number of bends, minimum (typical)		20 (50)	
Recommended hanger spacing		1.0 m	3.28 ft
Permissable temperature range, installation (PE)		– 40 °C to + 60 °C	– 40 °F to + 140 °F
Permissable temperature range, installation (FRNC)		– 25 °C to + 60 °C	– 13 °F to + 140 °F
Permissable temperature range, operation		– 55 °C to + 85 °C	– 67 °F to + 185 °F

Electrical characteristics		
Impedance	50 ± 1 Ω	
Relative velocity of propagation	88 %	
Capacitance	78 pF/m	23.8 pF/ft
Inductance	0.195 µH/m	0.06 µH/ft
Maximum operating frequency	5.0 GHz	
Cut off frequency	5.3 GHz	
Peak power rating	90 kW	
DC breakdown voltage	6000 V	
Jacket spark, volts RMS	8000 V	
Inner conductor DC-resistance	3.0 Ω/km	0.91 Ω/1000 ft
Outer conductor DC-resistance	1.2 Ω/km	0.37 Ω/1000 ft
Return loss 400 – 500 MHz	26 dB	
Return loss 800 – 1000 MHz	26 dB	
Return loss 1700 – 2700 MHz	26 dB	

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
30	0.71	0.22	12.30
50	0.92	0.28	9.47
88	1.23	0.37	7.07
100	1.31	0.40	6.62
108	1.36	0.42	6.36
150	1.62	0.49	5.36
174	1.75	0.53	4.96
200	1.88	0.57	4.61
300	2.33	0.71	3.72
400	2.72	0.83	3.19
450	2.90	0.88	2.99
500	3.06	0.93	2.83
512	3.10	0.95	2.79
600	3.38	1.03	2.56
700	3.68	1.12	2.36
800	3.96	1.21	2.19
824	4.02	1.23	2.16
894	4.21	1.28	2.06
900	4.22	1.29	2.06
925	4.29	1.31	2.03

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
960	4.38	1.33	1.98
1000	4.48	1.37	1.94
1250	5.07	1.55	1.71
1500	5.62	1.71	1.54
1700	6.03	1.84	1.57
1800	6.23	1.90	1.39
1900	6.43	1.96	1.35
2000	6.62	2.02	1.31
2100	6.81	2.08	1.27
2200	6.99	2.13	1.24
2300	7.18	2.19	1.21
2500	7.53	2.30	1.16
2700	7.88	2.40	1.11
3000	8.38	2.55	1.04
3300	8.86	2.70	0.99
3400	9.02	2.75	0.96
4000	9.94	3.03	0.87
4900	11.23	3.42	0.77

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature

Flex*Line* 7/8" R flexible

Type	Order number
Standard polyethylene jacket	**V45466-B23-C26**
Flame retardant, non corrosive jacket (FRNC)	**V45466-B23-C36**
Flame retardant, non corrosive jacket (FRNC), UL CATVR+CMR	**V45466-B23-C126**

Mechanical characteristics			
Inner conductor	copper tube	9.13 mm	0.359 in
Dielectric	foamed PE	22.5 mm	0.886 in
Diameter over outer conductor	ring-shaped corrugated copper tube	25.0 mm	0.984 in
Diameter over outer jacket	PE	27.7 mm	1.091 in
	FRNC	27.7 mm	1.091 in
	FRNC, CMR	27.3 mm	1.075 in
Cable weight	PE (FRNC)	495 (564) kg/km	331.8 (378.0)lb/1000 ft
Tensile strength		2000 N	449.6 lbf
Bending moment		18 Nm	13.27 lbf*ft
Flat plate crush strength		14 N/mm	79.9 lbf/in
Min. bending radius, single		120 mm	4.724 in
Min. bending radius, repeated		240 mm	9.449 in
Number of bends, minimum (typical)		15 (50)	
Recommended hanger spacing		1.0 m	3.28 ft
Permissable temperature range, installation (PE)		– 40 °C to + 60 °C	– 40 °F to + 140 °F
Permissable temperature range, installation (FRNC)		– 25 °C to + 60 °C	– 13 °F to + 140 °F
Permissable temperature range, operation		– 55 °C to + 85 °C	– 67 °F to + 185 °F

Electrical characteristics		
Impedance	50 ± 1 Ω	
Relative velocity of propagation	88 %	
Capacitance	76 pF/m	23.2pF/ft
Inductance	0.190 µH/m	0.06 µH/ft
Maximum operating frequency	5.0 GHz	
Cut off frequency	5.3 GHz	
Peak power rating	91 kW	
DC breakdown voltage	6000 V	
Jacket spark, volts RMS	8000 V	
Inner conductor DC-resistance	1.65 Ω/km	0.5 Ω/1000 ft
Outer conductor DC-resistance	1.3 Ω/km	0.4 Ω/1000 ft
Return loss 400 – 500 MHz	26 dB	
Return loss 800 – 1000 MHz	26 dB	
Return loss 1700 – 2700 MHz	26 dB	

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
30	0.61	0.19	17.4
50	0.81	0.25	13.3
88	1.09	0.33	9.83
100	1.17	0.36	9.17
108	1.21	0.37	8.80
150	1.45	0.44	7.35
174	1.57	0.48	6.78
200	1.69	0.51	6.27
300	2.10	0.64	4.99
400	2.45	0.75	4.24
450	2.61	0.80	3.96
500	2.76	0.84	3.72
512	2.80	0.85	3.67
600	3.05	0.93	3.34
700	3.32	1.01	3.05
800	3.57	1.09	2.82
824	3.63	1.11	2.77
894	3.80	1.16	2.63
900	3.81	1.16	2.62
925	3.87	1.18	2.58
960	3.95	1.20	2.52

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
1000	4.04	1.23	2.46
1250	4.58	1.40	2.14
1500	5.08	1.55	1.91
1700	5.45	1.66	1.77
1800	5.63	1.72	1.70
1900	5.81	1.77	1.64
2000	5.98	1.82	1.59
2100	6.15	1.87	1.54
2200	6.32	1.93	1.50
2300	6.48	1.98	1.45
2500	6.80	2.07	1.38
2700	7.11	2.17	1.31
3000	7.57	2.31	1.22
3300	8.00	2.44	1.14
3400	8.15	2.48	1.12
4000	8.97	2.73	1.00
4900	10.1	3.09	0.88
5000	10.3	3.13	0.86

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature

Flex*Line* 7/8" R flexible, low loss

Type	Order number
Standard polyethylene jacket	**V45466-B23-C226**
Flame retardant, non corrosive jacket (FRNC)	**V45466-B23-C236**

Mechanical characteristics			
Inner conductor	copper tube	9.3 mm	0.366 in
Dielectric	foamed PE	22.5 mm	0.886 in
Diameter over outer conductor	ring-shaped corrugated copper tube	25.0 mm	0.984 in
Diameter over outer jacket	PE	27.7 mm	1.091 in
	FRNC	27.7 mm	1.091 in
Cable weight	PE (FRNC)	495 (564) kg/km	331.8(378.0)lb/1000 ft
Tensile strength		2000 N	449.6 lbf
Bending moment		18 Nm	13.27 lbf*ft
Flat plate crush strength		14 N/mm	79.9 lbf/in
Min. bending radius, single		120 mm	4.724 in
Min. bending radius, repeated		240 mm	9.449 in
Number of bends, minimum (typical)		15 (50)	
Recommended hanger spacing		1.0 m	3.28 ft
Permissable temperature range, installation (PE)		– 40 °C to + 60 °C	– 40 °F to + 140 °F
Permissable temperature range, installation (FRNC)		– 25 °C to + 60 °C	– 13 °F to + 140 °F
Permissable temperature range, operation		– 55 °C to + 85 °C	– 67 °F to + 185 °F

Electrical characteristics		
Impedance	50 ± 1 Ω	
Relative velocity of propagation	90 %	
Capacitance	76 pF/m	23.2pF/ft
Inductance	0.190 µH/m	0.058 µH/ft
Maximum operating frequency	5.0 GHz	
Cut off frequency	5.2 GHz	
Peak power rating	90 kW	
DC breakdown voltage	4000 V	
Jacket spark, volts RMS	8000 V	
Inner conductor DC-resistance	1.65 Ω/km	0.5 Ω/1000 ft
Outer conductor DC-resistance	1.3 Ω/km	0.4 Ω/1000 ft
Return loss 400 – 500 MHz	26 dB	
Return loss 800 – 1000 MHz	26 dB	
Return loss 1700 – 2700 MHz	26 dB	

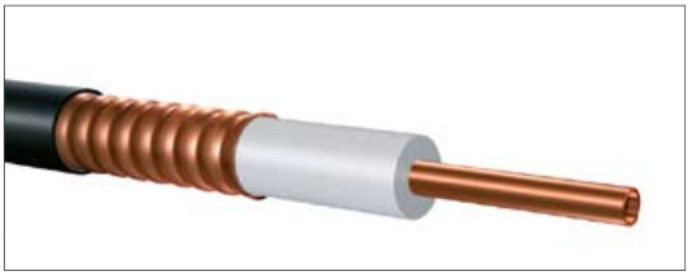
Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
30	0.61	0.19	17.4
50	0.78	0.24	13.3
88	1.04	0.31	9.83
100	1.11	0.34	9.17
108	1.16	0.35	8.80
150	1.37	0.42	7.35
174	1.48	0.45	6.78
200	1.59	0.48	6.27
300	1.97	0.60	4.99
400	2.29	0.70	4.24
450	2.44	0.74	3.96
500	2.58	0.79	3.72
512	2.61	0.80	3.67
600	2.84	0.87	3.34
700	3.09	0.94	3.05
800	3.32	1.01	2.82
824	3.37	1.03	2.77

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
894	3.52	1.07	2.63
900	3.54	1.08	2.62
925	3.59	1.09	2.58
960	3.66	1.12	2.52
1000	3.75	1.14	2.46
1250	4.24	1.29	2.14
1500	4.69	1.43	1.91
1700	5.03	1.53	1.77
1800	5.19	1.58	1.70
1900	5.35	1.63	1.64
2000	5.51	1.68	1.59
2100	5.66	1.73	1.54
2200	5.81	1.77	1.50
2300	5.97	1.82	1.45
2500	6.25	1.91	1.38
2700	6.53	1.99	1.31
3000	6.97	2.12	1.22
3300	7.35	2.24	1.14
3400	7.48	2.28	1.12
4000	8.22	2.51	1.00
4900	9.28	2.83	0.88
5000	9.39	2.86	0.86

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature

Flex*Line* 1 1/4" R flexible

Type	Order number
Standard polyethylene jacket	**V45466-B24-C6**
Flame retardant, non corrosive jacket (FRNC)	**V45466-B24-C16**
Flame retardant, non corrosive jacket (FRNC), UL CMR	**V45466-B24-C46**



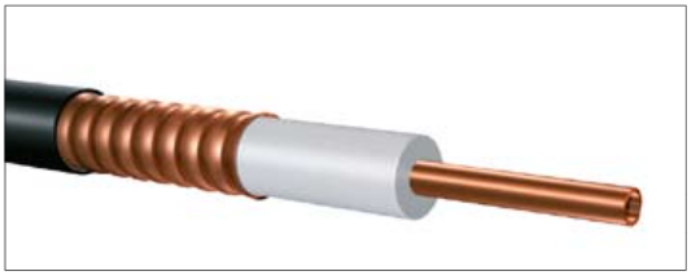
Mechanical characteristics			
Inner conductor	copper tube	12.7 mm	0.500 in
Dielectric	foamed PE	32.5 mm	1.280 in
Diameter over outer conductor	ring-shaped corrugated copper tube	36.0 mm	1.417 in
Diameter over outer jacket	PE	39.5 mm	1.555 in
	FRNC	39.5 mm	1.555 in
	FRNC, CMR	38.3 mm	1.508 in
Cable weight	PE (FRNC)	881(987) kg/km	590.5(661.5)lb/1000 ft
Tensile strength		2000 N	449.6 lbf
Bending moment		50 Nm	36.87 lbf*ft
Flat plate crush strength		14 N/mm	79.9 lbf/in
Min. bending radius, single		200 mm	7.87 in
Min. bending radius, repeated		380 mm	14.96 in
Number of bends, minimum (typical)		15 (50)	
Recommended hanger spacing		1.2 m	3.93 ft
Permissable temperature range, installation (PE)		– 40 °C to + 60 °C	– 40 °F to + 140 °F
Permissable temperature range, installation (FRNC)		– 25 °C to + 60 °C	– 13 °F to + 140 °F
Permissable temperature range, operation		– 55 °C to + 85 °C	– 67 °F to + 185 °F

Electrical characteristics		
Impedance	50 ± 1 Ω	
Relative velocity of propagation	88 %	
Capacitance	78 pF/m	23.2pF/ft
Inductance	0.190 µH/m	0.06 µH/ft
Maximum operating frequency	3.3 GHz	
Cut off frequency	3.7 GHz	
Peak power rating	200 kW	
DC breakdown voltage	9000 V	
Jacket spark, volts RMS	10000 V	
Inner conductor DC-resistance	1.25 Ω/km	0.38 Ω/1000 ft
Outer conductor DC-resistance	0.6 Ω/km	0.18 Ω/1000 ft
Return loss 400 – 500 MHz	26 dB	
Return loss 800 – 1000 MHz	26 dB	
Return loss 1700 – 2700 MHz	26 dB	

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
30	0.44	0.13	24.6
50	0.57	0.18	19.1
88	0.77	0.24	13.5
100	0.82	0.25	12.9
108	0.86	0.26	12.5
150	1.02	0.31	10.3
174	1.11	0.34	9.42
200	1.19	0.36	8.81
300	1.49	0.45	7.17
400	1.74	0.53	6.03
450	1.86	0.57	5.62
500	1.97	0.60	5.27
512	2.00	0.61	5.19
600	2.18	0.67	4.71
700	2.38	0.73	4.27
800	2.57	0.79	3.93

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
824	2.62	0.80	3.85
894	2.74	0.84	3.66
900	2.75	0.84	3.64
925	2.80	0.85	3.58
960	2.86	0.87	3.50
1000	2.93	0.89	3.40
1250	3.34	1.02	2.94
1500	3.72	1.13	2.61
1700	4.01	1.22	2.40
1800	4.15	1.26	2.31
1900	4.29	1.31	2.22
2000	4.42	1.35	2.15
2100	4.55	1.39	2.07
2200	4.69	1.43	2.01
2300	4.82	1.47	1.95
2500	5.07	1.55	1.84
2700	5.32	1.62	1.74
3000	5.68	1.73	1.62
3300	6.03	1.84	1.51

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature



Flex*Line* 1 1/4" R flexible, low loss

Type	Order number
Standard polyethylene jacket	**V45466-B23-C206**
Flame retardant, non corrosive jacket (FRNC)	**V45466-B23-C216**

Mechanical characteristics			
Inner conductor	copper tube	12.9 mm	0.500 in
Dielectric	foamed PE	32.5 mm	1.280 in
Diameter over outer conductor	ring-shaped corrugated copper tube	36.0 mm	1.417 in
Diameter over outer jacket	PE	39.5 mm	1.555 in
	FRNC	39.5 mm	1.555 in
Cable weight	PE (FRNC)	770(987) kg/km	234.7(300.8)lb/1000 ft
Tensile strength		2000 N	449.6 lbf
Bending moment		50 Nm	36.87 lbf*ft
Flat plate crush strength		14 N/mm	79.9 lbf/in
Min. bending radius, single		200 mm	7.87 in
Min. bending radius, repeated		380 mm	14.96 in
Number of bends, minimum (typical)		15 (50)	
Recommended hanger spacing		1.2 m	3.93 ft
Permissable temperature range, installation (PE)		– 40 °C to + 60 °C	– 40 °F to + 140 °F
Permissable temperature range, installation (FRNC)		– 25 °C to + 60 °C	– 13 °F to + 140 °F
Permissable temperature range, operation		– 55 °C to + 85 °C	– 67 °F to + 185 °F

Electrical characteristics		
Impedance	50 ± 1 Ω	
Relative velocity of propagation	90 %	
Capacitance	78 pF/m	23.2pF/ft
Inductance	0.190 µH/m	0.06 µH/ft
Maximum operating frequency	3.3 GHz	
Cut off frequency	3.7 GHz	
Peak power rating	200 kW	
DC breakdown voltage	9000 V	
Jacket spark, volts RMS	10000 V	
Inner conductor DC-resistance	1.25 Ω/km	0.38 Ω/1000 ft
Outer conductor DC-resistance	0.6 Ω/km	0.18 Ω/1000 ft
Return loss 400 – 500 MHz	26 dB	
Return loss 800 – 1000 MHz	26 dB	
Return loss 1700 – 2700 MHz	26 dB	

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
30	0.43	0.13	24.6
50	0.53	0.17	19.1
88	0.74	0.23	13.5
100	0.79	0.24	12.9
108	0.83	0.25	12.5
150	0.98	0.30	10.3
174	1.06	0.32	9.42
200	1.14	0.35	8.81
300	1.42	0.43	7.17
400	1.66	0.50	6.03
450	1.77	0.54	5.62
500	1.87	0.57	5.27
512	1.90	0.58	5.19
600	2.07	0.63	4.71
700	2.25	0.69	4.27
800	2.43	0.74	3.93
824	2.47	0.75	3.85
894	2.58	0.79	3.66

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
900	2.59	0.79	3.64
925	2.63	0.80	3.58
960	2.69	0.82	3.50
1000	2.75	0.84	3.40
1250	3.12	0.95	2.94
1500	3.47	1.06	2.61
1700	3.73	1.14	2.40
1800	3.86	1.18	2.31
1900	3.98	1.21	2.22
2000	4.10	1.25	2.15
2100	4.22	1.29	2.07
2200	4.34	1.32	2.01
2300	4.46	1.36	1.95
2500	4.69	1.43	1.84
2700	4.91	1.50	1.74
3000	5.23	1.59	1.62
3300	5.54	1.69	1.51

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature

Flex*Line* 1 5/8" R flexible

Type	Order number
Standard polyethylene jacket	**V45466-B25-C16**
Flame retardant, non corrosive jacket (FRNC)	**V45466-B25-C26**
Flame retardant, non corrosive jacket (FRNC), UL CMR	**V45466-B25-C66**

Mechanical characteristics			
Inner conductor	spiral corrugated copper wire	17.3 mm	0.681 in
Dielectric	foamed PE	43.5 mm	1.713 in
Diameter over outer conductor	ring-shaped corrugated copper tube	46.5 mm	1.83 in
Diameter over outer jacket	PE	50.5 mm	1.988 in
	FRNC	50.5 mm	1.988 in
	FRNC, CMR	49.5 mm	1.949 in
Cable weight	PE (FRNC)	1300(1490) kg/km	871.3 (998.7)lb/1000 ft
Tensile strength		2000 N	449 lbf
Bending moment		68 Nm	50.15 lbf*ft
Flat plate crush strength		20 N/mm	114.2 lbf/in
Min. bending radius, single		300 mm	11.81 in
Min. bending radius, repeated		510 mm	20 in
Number of bends, minimum (typical)		15 (50)	
Recommended hanger spacing		1.2 m	3.93 ft
Permissable temperature range, installation (PE)		– 40 °C to + 60 °C	– 40 °F to + 140 °F
Permissable temperature range, installation (FRNC)		– 25 °C to + 60 °C	– 13 °F to + 140 °F
Permissable temperature range, operation		– 55 °C to + 85 °C	– 67 °F to + 185 °F

Electrical characteristics		
Impedance	50 ± 1 Ω	
Relative velocity of propagation	88 %	
Capacitance	76 pF/m	23.2pF/ft
Inductance	0.19 µH/m	0.06 µH/ft
Maximum operating frequency	2.7 GHz	
Cut off frequency	3.0 GHz	
Peak power rating	300 kW	
DC breakdown voltage	11000 V	
Jacket spark, volts RMS	10000 V	
Inner conductor DC-resistance	1.5 Ω/km	0.46 Ω/1000 ft
Outer conductor DC-resistance	0.5 Ω/km	0.15 Ω/1000 ft
Return loss 400-500 MHz	26 dB	
Return loss 800-1000 MHz	26 dB	
Return loss 1700-2700 MHz	26 dB	

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
30	0.37	0.11	36.7
50	0.47	0.14	27.8
88	0.64	0.19	20.3
100	0.68	0.21	18.9
108	0.71	0.22	18.0
150	0.84	0.26	14.9
174	0.91	0.28	13.7
200	0.99	0.30	12.6
300	1.23	0.38	9.92
400	1.45	0.44	8.32
450	1.55	0.47	7.73
500	1.65	0.50	7.24
512	1.67	0.51	7.13
600	1.83	0.56	6.45
700	2.00	0.61	5.84

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
800	2.17	0.66	5.35
824	2.21	0.67	5.25
894	2.32	0.71	4.97
900	2.33	0.71	4.95
925	2.36	0.72	4.86
960	2.42	0.74	4.74
1000	2.48	0.76	4.62
1250	2.84	0.87	3.97
1500	3.18	0.97	3.51
1700	3.44	1.05	3.22
1800	3.56	1.09	3.09
1900	3.69	1.12	2.97
2000	3.81	1.16	2.87
2100	3.93	1.20	2.77
2200	4.05	1.23	2.68
2300	4.16	1.27	2.60
2500	4.40	1.34	2.45

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature

Flex*Line* 1 5/8" R flexible, low loss

Type	Order number
Standard polyethylene jacket	**V45466-B25-C216**
Retardant, non corrosive jacket (FRNC)	**V45466-B25-C226**

Mechanical characteristics			
Inner conductor	spiral corrugated copper wire	17.3 mm	0.681 in
Dielectric	foamed PE	43.5 mm	1.713 in
Diameter over outer conductor	ring-shaped corrugated copper tube	46.5 mm	1.83 in
Diameter over outer jacket	PE	49.5 mm	1.949 in
	FRNC	50.5 mm	1.988 in
Cable weight	PE (FRNC)	1150(1390) kg/km	770.8(931.6)lb/1000 ft
Tensile strength		2000 N	449.6 lbf
Bending moment		68 Nm	50.15 lbf*ft
Flat plate crush strength		20 N/mm	114.2 lbf/in
Min. bending radius, single		300 mm	11.81 in
Min. bending radius, repeated		510 mm	20 in
Number of bends, minimum (typical)		15 (50)	
Recommended hanger spacing		1.2 m	3.93 ft
Permissable temperature range, installation (PE)		– 40 °C to + 60 °C	– 40 °F to + 140 °F
Permissable temperature range, installation (FRNC)		– 25 °C to + 60 °C	– 13 °F to + 140 °F
Permissable temperature range, operation		– 55 °C to + 85 °C	– 67 °F to + 185 °F

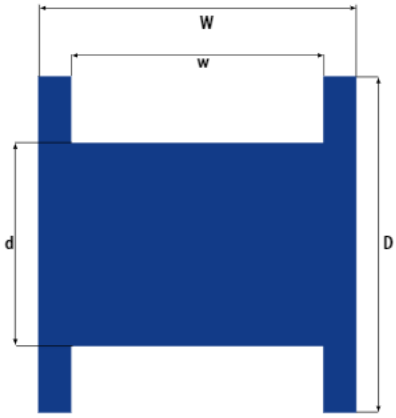
Electrical characteristics		
Impedance	50 ± 1 Ω	
Relative velocity of propagation	90 %	
Capacitance	76 pF/m	23.2pF/ft
Inductance	0.190 µH/m	0.058 µH/ft
Maximum operating frequency	2.7 GHz	
Cut off frequency	3.0 GHz	
Peak power rating	290 kW	
DC breakdown voltage	7000 V	
Jacket spark, volts RMS	10000 V	
Inner conductor DC-resistance	1.5 Ω/km	0.46 Ω/1000 ft
Outer conductor DC-resistance	0.5 Ω/km	0.15 Ω/1000 ft
Return loss 400-500 MHz	26 dB	
Return loss 800-1000 MHz	26 dB	
Return loss 1700-2700 MHz	26 dB	

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
30	0.34	0.10	36.7
50	0.44	0.14	27.8
88	0.60	0.18	20.3
100	0.64	0.20	18.9
108	0.67	0.20	18.0
150	0.79	0.24	14.9
174	0.86	0.26	13.7
200	0.93	0.28	12.6
300	1.15	0.35	9.92
400	1.35	0.41	8.32
450	1.44	0.44	7.73
500	1.53	0.46	7.24
512	1.55	0.47	7.13
600	1.69	0.51	6.45
700	1.84	0.56	5.84

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
800	1.98	0.60	5.35
824	2.02	0.61	5.25
894	2.11	0.64	4.97
900	2.12	0.65	4.95
925	2.15	0.66	4.86
960	2.20	0.67	4.74
1000	2.25	0.69	4.62
1250	2.56	0.78	3.97
1500	2.84	0.87	3.51
1700	3.06	0.93	3.22
1800	3.16	0.96	3.09
1900	3.26	0.99	2.97
2000	3.36	1.02	2.87
2100	3.46	1.05	2.77
2200	3.56	1.08	2.68
2300	3.65	1.11	2.60
2500	3.84	1.17	2.45

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature

Packaging Information
for Flex*Line*® Coaxial cables with corrugated outer conductor



Flex*Line* Coaxial cables with corrugated outer conductor are manufactured and shipped on disposable wooden drums, which are fastened to pallets for transportation. These wooden drums provide optimal protection for the cables and are also easy to handle during loading and processing.

These Flex*Line* Coaxial cables can also be supplied pre assembled and cut to customer specified lengths. Cut-to-length cables are shipped either on drums or in special cable boxes.

Cable type	Max. cable length	Outer dimension D	Drum dimension d	Outer width W	Inner width w	Drum weight	Drum freight
	[m]	[cm]	[cm]	[cm]	[cm]	[kg]	[m³]
Flex*Line* 1/6" S	500	40	15	23	18	2	0.03
Flex*Line* 1/5" S	1000	59	30	45	40	14	0.13
Flex*Line* 1/4" S	1000	70	35.5	47.5	40	15	0.20
Flex*Line* 1/4" R	500	59	30	45	40	14	0.13
Flex*Line* 3/8" S	500	70	35.5	47.5	40	15	0.20
Flex*Line* 1/2" S	500	80	40	47.5	40	18	0.25
Flex*Line* 1/2" R	500	90	45	51.5	44	24	0.33
Flex*Line* 7/8" H	500	100	50	105	95	65	0.83
Flex*Line* 7/8" R	500	100	50	105	95	65	0.83
Flex*Line* 1 1/4" R	500	160	90	100	91	125	2.01
Flex*Line* 1 5/8" R	500	192	108	110	98	190	3.20

Cable type	Max. cable length	Outer dimension D	Drum dimension d	Outer width W	Inner width w	Drum weight	Drum freight
	[m]	[cm]	[cm]	[cm]	[cm]	[kg]	[m³]
Flex*Line* 1/4" S	250	40	15	43	30	2.3	0.05
Flex*Line* 1/4" R	250	40	15	43	30	2.3	0.05
Flex*Line* 3/8" S	250	40	15	40	38	2.0	0.05
Flex*Line* 1/2" S	250	50	15	43	40	3.0	0.08
Flex*Line* 1/2" R	250	71	35	44	40	8.5	0.17
Flex*Line* 7/8" H	250	95	56	75	71	30	0.53
Flex*Line* 7/8" R	250	95	56	75	71	30	0.53
Flex*Line* 1 1/4" R	250	140	80	75	67	65	1.15
Flex*Line* 1 5/8" R	250	190	125	75	65	110	2.13

For planking of drum, add 6 cm to the outer diameter D

Overview Flex*Line* Coaxial Cables with braided outer conductor

Type	Inner conductor	Outer conductor	Jacket options	Order number
Single braid				
Flex*Line* 58 (equivalent to RG 58)	Stranded tinned copper wire	Shield braiding of tinned copper wires	FRNC	**L45466-B13-B256**
Flex*Line* 174 (equivalent to RG 174)	Bare copper-clad steel stranded wire	Shield braiding of tinned copper wires	FRNC	**L45466-B12-B6**
Flex*Line* 213 (equivalent to RG 213)	Stranded bare copper wire	Shield braiding of tinned copper wires	FRNC	**L45466-B18-B26**
Foil and single braid				
Flex*Line* 195	Stranded bare copper wire	Bonded alulaminate foil overlapped, shield braiding of tinned copper wires	PE	**L45466-B13-C186**
			FRNC	**L45466-B13-C196**
			PVC	**L45466-B13-C195**
Flex*Line* 200	Bare copper wire	Bonded alulaminate foil overlapped, shield braiding of tinned copper wires	PE	**L45466-B13-C206**
			FRNC	**L45466-B13-C216**
			PVC	**L45466-B13-C215**
Flex*Line* 240	Bare copper wire	Bonded alulaminate foil overlapped, shield braiding of tinned copper wires	PE	**L45466-B14-C246**
			FRNC	**L45466-B14-C256**
			PVC	**L45466-B14-C255**
Flex*Line* 300	Copper-clad aluminium wire	Bonded alulaminate foil overlapped, shield braiding of tinned copper wires	PE	**L45466-B15-C306**
			FRNC	**L45466-B15-C316**
			PVC	**L45466-B15-C315**
Flex*Line* 400	Copper-clad aluminium wire	Bonded alulaminate foil overlapped, shield braiding of tinned copper wires	PE	**L45466-B18-C406**
			FRNC	**L45466-B18-C416**
			PVC	**L45466-B18-C415**
Double braid				
Flex*Line* 214 (equivalent to RG 214)	Stranded silver-plated wire	Two shield braidings of siver-plated copper wires	FRNC	**L45466-B18-B36**
Flex*Line* 223 (equivalent to RG 223)	Silver-plated copper wire	Two shield braidings of siver-plated copper wires	FRNC	**L45466-B13-B226**

FRNC = Flame Retardant Non Corosive (halogene free)
PE = Polyethylene
PVC = Polyvinylchloride

Flex*Line* 58 single braid (equivalent to RG 58)

Type	Order number
Flame retardant, non corrosive jacket (FRNC)	**L45466-B13-B256**

Mechanical characteristics			
Inner conductor	stranded tinned copper wire	0.93 mm	0.037 in
Dielectric	PE	2.85 mm	0.112 in
Shield	braid of tinned copper wires	Coverage about 80%	
Diameter over shield		3.4 mm	0.134 in
Diameter over outer jacket		4.9 mm	0.193 in
Cable weight		34 kg/km	23 lb/1000ft
Min. bending radius, single		15 mm	0.579 in
Min. bending radius, repeated		30 mm	1.157 in
Permissable temperature range, installation		– 25 °C to +60 °C	– 13 °F to +140 °F
Permissable temperature range, operation		– 40 °C to +80 °C	– 40 °F to +176 °F

Electrical characteristics		
Impedance	50 ± 2 Ω	
Relative velocity of propagation	66 %	
Capacitance	105 pF/m	32 pF/ft
Inductance	0.250 µH/m	0.06 µH/ft
Maximum operating frequency	25 GHz	
Cut off frequency	33 GHz	
Peak power rating	2 kW	
DC breakdown voltage	2000 V	
Jacket spark, volts RMS	2000 V	
Inner conductor DC-resistance	37 Ω/km	11.29 Ω/1000 ft
Outer conductor DC-resistance	18 Ω/km	5.47 Ω/1000 ft
Return loss 800 – 2200 MHz	26 dB	

Attenuation values and power ratings			
Frequency	**Attenuation**		**Mean power rating**
MHz	dB/100m	dB/100ft	kW
30	9.11	2.78	0.31
50	12.0	3.7	0.24
88	16.57	5.05	0.18
100	17.0	5.2	0.17
108	18.54	5.65	0.17
150	22.21	6.77	0.14
174	24.09	7.35	0.13
200	27.0	8.2	0.12
300	34.0	10.4	0.10
400	38.16	11.64	0.09
450	40.75	12.43	0.08
500	41.0	12.5	0.08
512	43.80	13.36	0.08
600	47.88	14.60	0.07
700	52.23	15.93	0.06
800	56.34	17.18	0.06
824	57.29	17.47	0.06
894	60.02	18.31	0.06
900	60.25	18.38	0.06

Attenuation values and power ratings			
Frequency	**Attenuation**		**Mean power rating**
MHz	dB/100m	dB/100ft	kW
925	61.20	18.67	0.06
960	62.51	19.07	0.06
1000	65.0	19.8	0.05
1250	72.77	22.20	0.05
1500	80.91	24.68	0.04
1700	87.07	26.56	0.04
1800	90.05	27.47	0.04
1900	92.98	28.36	0.04
2000	95.0	29.0	0.04
2100	98.66	30.09	0.04
2200	101.44	30.94	0.04
2300	104.17	31.77	0.04
2500	110.0	33.5	0.03

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature

Flex*Line* 174 single braid (equivalent to RG 174)

Type	Order number
Flame retardant, non corrosive jacket (FRNC)	**L45466-B12-B6**

Mechanical characteristics			
Inner conductor	bare copper-clad steel stranded wire	0.48 mm	0.019 in
Dielectric	PE	1.5 mm	0.058 in
Shield	braid of tinned copper wires	Coverage about 90%	
Diameter over shield		1.9 mm	0.074 in
Diameter over outer jacket		2.8 mm	0.110 in
Cable weight		12 kg/km	8 lb/1000ft
Min. bending radius, single		8 mm	0.31 in
Min. bending radius, repeated		16 mm	0.63 in
Permissable temperature range, installation		– 25 °C to +60 °C	– 13 °F to +140 °F
Permissable temperature range, operation		– 40 °C to +80 °C	– 40 °F to +176 °F

Electrical characteristics		
Impedance	50 ± 2 Ω	
Relative velocity of propagation	66 %	
Capacitance	101 pF/m	30.04 pF/ft
Inductance	0.25 uH/m	0.076 uH/ft
Maximum operating frequency	55 GHz	
Cut off frequency	64 GHz	
Peak power rating	1.5 kW	
DC breakdown voltage	2000 V	
Jacket spark, volts RMS	2000 V	
Inner conductor DC-resistance	350 Ω/km	106.75 Ω/1000 ft
Outer conductor DC-resistance	40 Ω/km	12.2 Ω/1000 ft
Return loss 800 – 2200 MHz	26 dB	

Attenuation values and power ratings			
Frequency	**Attenuation**		**Mean power rating**
MHz	dB/100m	dB/100ft	kW
30	14.52	4.43	0.20
50	19.0	5,80	0.16
88	25.34	7.73	0.12
100	27.1	8.27	0.11
108	28.24	8.61	0.11
150	33.64	10.26	0.09
174	36.43	11.11	0.08
200	39.2	11.98	0.08
300	48.9	14.95	0.06
400	57.53	17.55	0.06
450	61.46	18.75	0.05
500	65.2	19.90	0.05
512	66.11	20.16	0.05
600	72.36	22.07	0.05
700	79.06	24.11	0.04
800	85.42	26.05	0.04
824	86.90	26.50	0.04
894	91.14	27.80	0.04
900	91.50	27.91	0.04

Attenuation values and power ratings			
Frequency	**Attenuation**		**Mean power rating**
MHz	dB/100m	dB/100ft	kW
925	92.98	28.36	0.04
960	95.03	28.98	0.04
1000	97.5	29.69	0.04
1250	111.15	33.90	0.03
1500	124.05	37.84	0.03
1700	133.87	40.83	0.03
1800	138.65	42.29	0.03
1900	143.34	43.72	0.03
2000	148.0	45.13	0.03
2100	152.50	46.51	0.02
2200	156.98	47.88	0.02
2300	161.40	49.23	0.02
2500	170.0	51.87	0.02

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature

Flex*Line* 213 single braid (equivalent to RG 213)

Type	Order number
Flame retardant, non corrosive jacket (FRNC)	**L45466-B18-B26**

Mechanical characteristics			
Inner conductor	stranded bare copper wire	2.25 mm	0.089 in
Dielectric	PE	7.3 mm	0.287 in
Shield	braid of bare copper wire	Coverage about 95%	
Diameter over shield		8.0 mm	0.315 in
Diameter over outer jacket		10.3 mm	0.406 in
Cable weight		157 kg/km	106.21 lb/1000ft
Min. bending radius, single		31 mm	1.22 in
Min. bending radius, repeated		62 mm	2.44 in
Permissable temperature range, installation		– 25 °C to +60 °C	– 13 °F to +140 °F
Permissable temperature range, operation		– 40 °C to +80 °C	– 40 °F to +176 °F

Electrical characteristics		
Impedance	50 ± 2 Ω	
Relative velocity of propagation	66 %	
Capacitance	101 pF/m	23.2pF/ft
Inductance	0.253 µH/m	0.077 µH/ft
Maximum operating frequency	5.8 GHz	
Cut off frequency	13.2 GHz	
Peak power rating	3 kW	
DC breakdown voltage	5000 V	
Jacket spark, volts RMS	5000 V	
Inner conductor DC-resistance	6.2 Ω/km	1.89 Ω/1000 ft
Outer conductor DC-resistance	3.8 Ω/km	1.16 Ω/1000 ft
Return loss 800 – 2200 MHz	26 dB	

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
30	4.21	1.28	0.96
50	5.43	1.66	0.74
88	7.24	2.21	0.56
100	7.7	2.36	0.52
108	8.05	2.45	0.50
150	9.55	2.91	0.43
174	10.32	3.15	0.40
200	11.1	3.39	0.37
300	13.8	4.20	0.30
400	16.1	4.91	0.26
450	17.17	5.24	0.25
500	18.2	5.55	0.23
512	18.43	5.62	0.23
600	20.11	6.13	0.21
700	21.92	6.68	0.20
800	23.62	7.20	0.18
824	24.02	7.33	0.18
894	25.15	7.67	0.17
900	25.25	7.70	0.17
925	25.64	7.82	0.17
960	26.19	28.98	0.17

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
1000	27.0	8.20	0.16
1250	30.47	9.29	0.15
1500	33.87	10.33	0.13
1700	36.45	11.12	0.13
1800	37.70	11.50	0.12
1900	38.93	11.87	0.12
2000	40.0	12.20	0.12
2100	41.32	12.60	0.11
2200	42.49	12.96	0.11
2300	43.64	13.31	0.11
2500	46.0	14.10	0.10

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature

Flex*Line* 195 foil and single braid

Type	Order number
Standard polyethylene jacket (PE)	**L45466-B13-C186**
Flame retardant, non corrosive jacket (FRNC)	**L45466-B13-C196**
Standard polyvinylchloride jacket (PVC)	**L45466-B13-C195**

Mechanical characteristics			
Inner conductor	bare copper wire	0.95 mm	0.037 in
Dielectric	foamed PE with skin	2.8 mm	0.110 in
Shield	bonded alulaminate foil	Coverage about 90 %	
	braid of tinned copper wire		
Diameter over shield		3.4 mm	0.134 in
Diameter over outer jacket		4.9 mm	0.193 in
Cable weight		35 kg/km	23 lb/1000ft
Tensile strength		160 N	35.97 lbf
Min. bending radius, single		20 mm	0.772 in
Min. bending radius, repeated		50 mm	1.930 in
Number of bends, minimum (typical)		50	
Permissable temperature range, installation		– 25 °C to +60 °C	– 13 °F to +140 °F
Permissable temperature range, operation		– 40 °C to +80 °C	– 40 °F to +176 °F

Electrical characteristics		
Impedance	50 ± 2 Ω	
Relative velocity of propagation	78%	
Capacitance	82 pF/m	18.84 pF/ft
Inductance	0.220 µH/m	0.067 µH/ft
Maximum operating frequency	32 GHz	
Cut off frequency	39 GHz	
Peak power rating	2 kW	
DC breakdown voltage	2000 V	
Jacket spark, volts RMS	2000 V	
Inner conductor DC-resistance	26 Ω/km	7.90 Ω/1000 ft
Outer conductor DC-resistance	16 Ω/km	4.80 Ω/1000 ft
Return loss 800 – 2200 MHz	23 dB	

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
30	6.5	2.0	0.76
50	8.4	2.6	0.58
88	11.1	3.4	0.44
100	11.9	3.6	0.41
108	12.4	3.8	0.39
150	14.6	4.4	0.33
174	15.7	4.8	0.31
200	16.9	5.2	0.29
300	20.8	6.3	0.24
400	24.1	7.3	0.20
450	25.5	7.8	0.19
500	27.0	8.2	0.18
512	27.3	8.3	0.18
600	29.6	9.0	0.17
700	32.1	9.8	0.15
800	34.4	10.5	0.14
824	34.9	10.6	0.14
894	36.4	11.1	0.14
900	36.5	11.1	0.13
925	37.0	11.3	0.13
960	37.8	11.5	0.13

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
1000	38.6	11.8	0.13
1250	43.3	13.2	0.11
1500	47.7	14.5	0.10
1700	50.9	15.5	0.10
1800	52.5	16.0	0.09
1900	54.0	16.5	0.09
2000	55.4	16.9	0.09
2100	56.9	17.3	0.09
2200	58.3	17.8	0.09
2300	59.7	18.2	0.08
2500	62.4	19.0	0.08
2700	65.0	19.8	0.08
3000	68.8	21.0	0.07
3300	72.3	22.0	0.07
3400	73.5	22.4	0.07
4000	80.2	24.4	0.06
4900	89.5	27.3	0.06
5000	90.5	27.6	0.06
5800	98.1	29.9	0.05

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature

Flex*Line* 200 foil and single braid

Type	Order number
Standard polyethylene jacket (PE)	**L45466-B13-C206**
Flame retardant, non corrosive jacket (FRNC)	**L45466-B13-C216**
Standard polyvinylchloride jacket (PVC)	**L45466-B13-C215**

Mechanical characteristics			
Inner conductor	bare copper wire	1.12 mm	0.044 in
Dielectric	foamed PE with skin	2.95 mm	0.116 in
Shield	bonded alulaminate foil	Coverage about 90%	
	braid of tinned copper wire		
Diameter over shield		3.50 mm	0.138 in
Diameter over outer jacket		5.00 mm	0.197 in
Cable weight		36 kg/km	24 lb/1000ft
Tensile strength		185 N	41.59 lbf
Min. bending radius, single		20 mm	0.787 in
Min. bending radius, repeated		50 mm	1.97 in
Number of bends, minimum (typical)		50	
Permissable temperature range, installation		– 25 °C to +60 °C	– 13 °F to +140 °F
Permissable temperature range, operation		– 40 °C to +80 °C	– 40 °F to +176 °F

Electrical characteristics		
Impedance	50 ± 2 Ω	
Relative velocity of propagation	85 %	
Capacitance	80 pF/m	18.38 pf/ft
Inductance	0.195 µH/m	0.060 µH/ft
Maximum operating frequency	33 GHz	
Cut off frequency	38 GHz	
Peak power rating	2.3 kW	
DC breakdown voltage	1000 V	
Jacket spark, volts RMS	2000 V	
Inner conductor DC-resistance	18 Ω/km	5.47 Ω/1000 ft
Outer conductor DC-resistance	16 Ω/km	4.86 Ω/1000 ft
Return loss 800 – 2200 MHz	23 dB	

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
30	5.8	1.8	0.94
50	7.5	2.3	0.72
88	10.0	3.0	0.54
100	10.7	3.3	0.50
108	11.1	3.4	0.48
150	13.1	4.0	0.40
174	14.1	4.3	0.37
200	15.1	4.6	0.35
300	18.6	5.7	0.28
400	21.5	6.6	0.24
450	22.8	6.9	0.23
500	24.1	7.3	0.21
512	24.4	7.4	0.21
600	26.5	8.1	0.19
700	28.6	8.7	0.18
800	30.7	9.4	0.17
824	31.1	9.5	0.16
894	32.5	9.9	0.16
900	32.6	9.9	0.16
925	33.0	10.1	0.16
960	33.7	10.3	0.15

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
1000	34.4	10.5	0.15
1250	38.6	11.8	0.13
1500	42.4	12.9	0.12
1700	45.3	13.8	0.11
1800	46.6	14.2	0.11
1900	48.0	14.6	0.11
2000	49.3	15.0	0.10
2100	50.6	15.4	0.10
2200	51.8	15.8	0.10
2300	53.0	16.2	0.10
2500	55.4	16.9	0.09
2700	57.7	17.6	0.09
3000	60.9	18.6	0.08
3300	64.1	19.5	0.08
3400	65.1	19.8	0.08
4000	71.0	21.6	0.07
4900	79.0	24.1	0.06
5000	79.9	24.4	0.06
5800	86.5	26.4	0.06

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature

Flex*Line* 240 foil and single braid

Type	Order number
Standard polyethylene jacket (PE)	**L45466-B14-C246**
Flame retardant, non corrosive jacket (FRNC)	**L45466-B14-C256**
Standard polyvinylchloride jacket (PVC)	**L45466-B14-C255**

Mechanical characteristics			
Inner conductor	bare copper wire	1.4 mm	0.06 in
Dielectric	foamed PE with skin	3.8 mm	0.15 in
Shield	bonded alulaminate foil	Coverage about 90%	
	braid of tinned copper wire		
Diameter over shield		4.4 mm	0.17 in
Diameter over outer jacket		6.1 mm	0.240 in
Cable weight		52 kg/km	35 lb/1000ft
Tensile strength		230 N	51.71 lbf
Min. bending radius, single		24 mm	0.96 in
Min. bending radius, repeated		60 mm	2.40 in
Number of bends, minimum (typical)		50	
Permissable temperature range, installation		– 25 °C to +60 °C	– 13 °F to + 140 °F
Permissable temperature range, operation		– 40 °C to +80 °C	– 40 °F to + 176 °F

Electrical characteristics		
Impedance	50 ± 2 Ω	
Relative velocity of propagation	85%	
Capacitance	80 pF/m	18.38 pf/ft
Inductance	0.195 µH/m	0.060 µH/ft
Maximum operating frequency	27 GHz	
Cut off frequency	30 GHz	
Peak power rating	4.2 kW	
DC breakdown voltage	1500 V	
Jacket spark, volts RMS	2000 V	
Inner conductor DC-resistance	12 Ω/Km	3.65 Ω/1000ft
Outer conductor DC-resistance	12.5 Ω/Km	3.80 Ω/1000ft
Return loss 800 – 2200 MHz	23 dB	

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
30	4.4	1.3	1.32
50	5.7	1.7	1.01
88	7.6	2.3	0.75
100	8.1	2.5	0.70
108	8.4	2.6	0.67
150	9.9	3.0	0.56
174	10.7	3.3	0.52
200	11.5	3.5	0.48
300	14.1	4.3	0.39
400	16.3	5.0	0.34
450	17.3	5.3	0.32
500	18.3	5.6	0.30
512	18.5	5.6	0.29
600	20.1	6.1	0.27
700	21.8	6.6	0.25
800	23.3	7.1	0.23
824	23.7	7.2	0.23
894	24.7	7.5	0.22
900	24.8	7.6	0.22
925	25.1	7.7	0.22
960	25.6	7.8	0.21

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
1000	26.2	8.0	0.21
1250	29.4	9.0	0.18
1500	32.4	9.9	0.17
1700	34.6	10.5	0.16
1800	35.6	10.9	0.15
1900	36.7	11.2	0.15
2000	37.7	11.5	0.14
2100	38.7	11.8	0.14
2200	39.6	12.1	0.14
2300	40.6	12.4	0.13
2500	42.4	12.9	0.13
2700	44.2	13.5	0.12
3000	46.8	14.3	0.12
3300	49.2	15.0	0.11
3400	50.0	15.2	0.11
4000	54.6	16.6	0.10
4900	60.9	18.6	0.09
5000	61.6	18.8	0.09
5800	66.8	20.4	0.08

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature

Flex*Line* 300 foil and single braid

Type	Order number
Standard polyethylene jacket (PE)	**L45466-B15-C306**
Flame retardant, non corrosive jacket (FRNC)	**L45466-B15-C316**
Standard polyvinylchloride jacket (PVC)	**L45466-B15-C315**

Mechanical characteristics			
Inner conductor	copper-clad aluminium wire	1.79 mm	0.070 in
Dielectric	foamed PE with skin	4.8 mm	0.189 in
Shield	bonded alulaminate foil	Coverage about 90%	
	braid of tinned copper wire		
Diameter over shield		5.6 mm	0.220 in
Diameter over outer jacket		7.2 mm	0.283 in
Cable weight		48 kg/km	32.2 lb/1000ft
Tensile strength		240 N	53.96 lbf
Min. bending radius, single		29 mm	1.13 in
Min. bending radius, repeated		72 mm	2.83 in
Number of bends, minimum (typical)		50	
Permissable temperature range, installation		– 25 °C to + 60 °C	–13 °F to + 140 °F
Permissable temperature range, operation		– 40 °C to + 80 °C	–40 °F to + 176 °F

Electrical characteristics		
Impedance	50 ± 2 Ω	
Relative velocity of propagation	85 %	
Capacitance	78 pF/m	17.92 pF/ft
Inductance	0.195 µH/m	0.060 µH/ft
Maximum operating frequency	21 GHz	
Cut off frequency	24 GHz	
Peak power rating	8.1 kW	
DC breakdown voltage	2000 V	
Jacket spark, volts RMS	2000 V	
Inner conductor DC-resistance	11 Ω/km	3.35 Ω/1000 ft
Outer conductor DC-resistance	8 Ω/km	2.44 Ω/1000 ft
Return loss 800 – 2200 MHz	23 dB	

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
30	3.5	1.1	1.41
50	4.5	1.4	1.07
88	6.0	1.8	0.79
100	6.4	2.0	0.74
108	6.7	2.0	0.71
150	7.9	2.4	0.60
174	8.5	2.6	0.55
200	9.1	2.8	0.51
300	11.2	3.4	0.41
400	13.0	4.0	0.35
450	13.8	4.2	0.33
500	14.6	4.4	0.31
512	14.8	4.5	0.31
600	16.1	4.9	0.28
700	17.4	5.3	0.26
800	18.7	5.7	0.24
824	19.0	5.8	0.24
894	19.8	6.0	0.23
900	19.9	6.1	0.23
925	20.2	6.2	0.23
960	20.6	6.3	0.22

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
1000	21.0	6.4	0.22
1250	23.6	7.2	0.19
1500	26.0	7.9	0.17
1700	27.8	8.5	0.16
1800	28.7	8.7	0.16
1900	29.5	9.0	0.15
2000	30.3	9.2	0.15
2100	31.1	9.5	0.15
2200	31.9	9.7	0.14
2300	32.7	10.0	0.14
2500	34.2	10.4	0.13
2700	35.6	10.9	0.13
3000	37.7	11.5	0.12
3300	39.7	12.1	0.11
3400	40.4	12.3	0.11
4000	44.1	13.4	0.10
4900	49.4	15.1	0.09
5000	49.9	15.2	0.09
5800	54.2	16.5	0.08

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature

Flex*Line* 400 foil and single braid

Type	Order number
Standard polyethylene jacket (PE)	**L45466-B18-C406**
Flame retardant, non corrosive jacket (FRNC)	**L45466-B18-C416**
Standard polyvinylchloride jacket (PVC)	**L45466-B18-C415**

Mechanical characteristics			
Inner conductor	copper-clad aluminium wire	2.75 mm	0.108 in
Dielectric	foamed PE with skin	7.2 mm	0.283 in
Shield	bonded alulaminate foil	Coverage about 90%	
	braid of tinned copper wire		
Diameter over shield		8.0 mm	0.315 in
Diameter over outer jacket		10.2 mm	0.402 in
Cable weight		100 kg/km	67 lb/1000ft
Tensile strength		420 N	94.43 lbf
Min. bending radius, single		41 mm	1.61 in
Min. bending radius, repeated		102 mm	4.02 in
Number of bends, minimum (typical)		50	
Permissable temperature range, installation		– 25 °C to + 60 °C	–13 °F to + 140 °F
Permissable temperature range, operation		– 40 °C to + 80 °C	–40 °F to + 176 °F

Electrical characteristics		
Impedance	50 ± 2 Ω	
Relative velocity of propagation	85%	
Capacitance	78 pF/m	17.92 pF/ft
Inductance	0.195 µH/m	0.060 µH/ft
Maximum operating frequency	12.5 GHz	
Cut off frequency	16 GHz	
Peak power rating	12.9 kW	
DC breakdown voltage	2500 V	
Jacket spark, volts RMS	2000 V	
Inner conductor DC-resistance	5 Ω/km	1.52 Ω/1000ft
Outer conductor DC-resistance	5 Ω/km	1.52 Ω/1000ft
Return loss 800 – 2200 MHz	23 dB	

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
30	2.2	0.7	2.56
50	2.9	0.9	1.94
88	3.8	1.2	1.43
100	4.1	1.2	1.33
108	4.3	1.3	1.28
150	5.0	1.5	1.07
174	5.4	1.7	0.98
200	5.8	1.8	0.91
300	7.2	2.2	0.73
400	8.4	2.6	0.63
450	8.9	2.7	0.59
500	9.4	2.9	0.55
512	9.5	2.9	0.55
600	10.3	3.1	0.50
700	11.2	3.4	0.46
800	12.0	3.7	0.43
824	12.2	3.7	0.42
894	12.8	3.9	0.40
900	12.8	3.9	0.40
925	13.0	4.0	0.40
960	13.2	4.0	0.39

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
1000	13.5	4.1	0.38
1250	15.2	4.6	0.34
1500	16.8	5.1	0.31
1700	18.0	5.5	0.29
1800	18.6	5.7	0.28
1900	19.1	5.8	0.27
2000	19.6	6.0	0.26
2100	20.2	6.2	0.25
2200	20.7	6.3	0.25
2300	21.2	6.5	0.24
2500	22.2	6.8	0.23
2700	23.2	7.1	0.22
3000	24.5	7.5	0.21
3300	25.9	7.9	0.20
3400	26.3	8.0	0.20
4000	28.8	8.8	0.18
4900	32.3	9.8	0.16
5000	32.6	9.9	0.16
5800	35.5	10.8	0.15

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature

Flex*Line* 214 double braid (equivalent to RG 214)

Type	Order number
Flame retardant, non corrosive jacket (FRNC)	**L45466-B18-B36**

Mechanical characteristics			
Inner conductor	stranded silver-plated wire	2.25 mm	0.089 in
Dielectric	PE	7.25 mm	0.285 in
Shield	double braid of silver-plated copper wires	Coverage about 95%	
Diameter over shield		8.9 mm	0.350 in
Diameter over outer jacket		11.1 mm	0.437 in
Cable weight		215 kg/km	144.05 lb/1000ft
Tensile strength		720 N	161.88 lbf
Min. bending radius, single		33 mm	1.30 in
Min. bending radius, repeated		66 mm	2.60 in
Number of bends, minimum (typical)		50	
Permissable temperature range, installation		– 25 °C to +60 °C	– 13 °F to +140 °F
Permissable temperature range, operation		– 40 °C to +80 °C	– 40 °F to +176 °F

Electrical characteristics		
Impedance	50 ± 2 Ω	
Relative velocity of propagation	66 %	
Capacitance	101 pF/m	23.2 pF/ft
Inductance	0.253 µH/m	0.077 µH/ft
Maximum operating frequency	5.8 GHz	
Cut off frequency	13.2 GHz	
Peak power rating	2 kW	
DC breakdown voltage	5000 V	
Jacket spark, volts RMS	2000 V	
Inner conductor DC-resistance	6.2 Ω/km	1.89 Ω/1000 ft
Outer conductor DC-resistance	2.5 Ω/km	0.76 Ω/1000 ft
Return loss 800 – 2200 MHz	26 dB	

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
30	2.58	0.79	1.00
50	3.44	1.05	0.77
88	4.79	1.46	0.58
100	5.2	1.58	0.55
108	5.43	1.66	0.52
150	6.66	2.03	0.44
174	7.31	2.23	0.41
200	8.00	2.44	0.38
300	10.4	3.18	0.31
400	12.7	3.87	0.27
450	13.76	4.20	0.26
500	14.8	4.52	0.24
512	15.06	4.59	0.24
600	16.84	5.14	0.22
700	18.81	5.74	0.21
800	20.72	6.32	0.19
824	21.18	6.46	0.19
894	22.48	6.86	0.18
900	22.60	6.89	0.18
925	23.06	7.03	0.18
960	23.70	7.23	0.18

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
1000	24.4	7.45	0.17
1250	28.89	8.81	0.15
1500	33.21	10.13	0.14
1700	36.59	11.16	0.13
1800	38.26	11.67	0.13
1900	39.92	12.18	0.12
2000	41.6	12.68	0.12
2100	43.20	13.17	0.12
2200	44.82	13.67	0.12
2300	46.43	14.16	0.11
2500	49.6	15.14	0.11

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature

Flex*Line* 223 double braid (equivalent to RG 223)

Type	Order number
Flame retardant, non corrosive jacket (FRNC)	**L45466-B13-B226**

Mechanical characteristics			
Inner conductor	silver-plated copper wire	0.89 mm	0.035 in
Dielectric	PE	2.95 mm	0.116 in
Shield	double braid of tinned copper wires	Coverage about 95%	
Diameter over shield		4.0 mm	0.157 in
Diameter over outer jacket		5.4 mm	0.213 in
Cable weight		58 kg/km	39 lb/1000ft
Tensile strength		250 N	56.21 lbf
Min. bending radius, single		27.0 mm	1.06 in
Min. bending radius, repeated		43 mm	1.70 in
Number of bends, minimum (typical)		50	
Permissable temperature range, installation		– 25 °C to +60 °C	– 13 °F to +140 °F
Permissable temperature range, operation		– 40 °C to +80 °C	– 40 °F to +176 °F

Electrical characteristics		
Impedance	50 ± 2 Ω	
Relative velocity of propagation	66 %	
Capacitance	101 pF/m	23.2 pF/ft
Inductance	0.25 uH/m	0.072 uH/ft
Maximum operating frequency	25 GHz	
Cut off frequency	33 GHz	
Peak power rating	2 kW	
DC breakdown voltage	2000 V	
Jacket spark, volts RMS	2000 V	
Inner conductor DC-resistance	30 Ω/km	9.15 Ω/1000 ft
Outer conductor DC-resistance	7 Ω/km	2.14 Ω/1000 ft
Return loss 800 – 2200 MHz	26 dB	

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
30	6.35	1.94	0.39
50	9.0	2.60	0.30
88	11.72	3.58	0.23
100	13.0	3.84	0.21
108	13.15	4.01	0.21
150	15.81	4.82	0.17
174	17.18	5.24	0.16
200	19.0	5.66	0.15
300	23.0	7.11	0.12
400	27.44	8.37	0.11
450	29.34	8.95	0.10
500	30.0	9.50	0.10
512	31.58	9.63	0.09
600	34.58	10.55	0.09
700	37.79	11.52	0.08
800	40.82	12.45	0.08
824	41.53	12.67	0.07
894	43.54	13.28	0.07
900	43.71	13.33	0.07
925	44.42	13.55	0.07
960	45.39	13.85	0.07

Attenuation values and power ratings			
Frequency	Attenuation		Mean power rating
MHz	dB/100m	dB/100ft	kW
1000	45.0	14.0	0.07
1250	53.02	16.17	0.06
1500	59.10	18.02	0.06
1700	63.70	19.43	0.05
1800	65.94	20.11	0.05
1900	68.13	20.78	0.05
2000	71.0	21.44	0.05
2100	72.40	22.08	0.05
2200	74.49	22.72	0.05
2300	76.54	23.35	0.04
2500	82.0	24.57	0.04
2700	84.49	25.77	0.04
3000	90.21	27.51	0.04
3300	95.75	29.20	0.04
3400	97.56	29.76	0.04
4000	108.13	32.98	0.03
4900	123.15	37.56	0.03
5000	124.77	38.05	0.03
5800	137.42	41.91	0.03

Attenuation values typical at 20 °C ambient temperature;
Mean power rating at 40 °C ambient temperature

Stripping Tools

Flex*Line* Coaxial stripping tools are easy to use and perfect for fast and reliable preparation of the cable to ensure proper connector attachment. By means of a substantially faster and more precise stripping with Flex*Line* automatic stripping tools, installation time is reduced by up to 70 percent. The tools are available for all Flex*Line* Coaxial cables with corrugated outer conductor from 1/4" to 1 5/8".

Automatic stripping tool for FlexLine 1 1/4"

Automatic stripping tool for FlexLine 7/8"

Automatic stripping tools

Cable type	Order number	Spare blades
Flex*Line* 1/4" S	**S45056-Z857-A28**	PJ-2, PJ-4L, X17 (1 pc each)
Flex*Line* 1/4" R	**S45056-Z857-A29**	PJ-2 (3 pcs), PJ-4L (1 pc)
Flex*Line* 3/8" S	**S45056-Z857-A30**	PJ-2, PJ-4L, X17 (1 pc each)
Flex*Line* 1/2" S	**S45056-Z857-A31**	PJ-2, PJ-4L, X17 (1 pc each)
Flex*Line* 1/2" R	**S45056-Z857-A32**	PJ-2 (4 pcs)
Flex*Line* 7/8" S	**S45056-Z857-A33**	PJ-2 (3 pcs)
Flex*Line* 7/8" R	**S45056-Z857-A34**	PJ-2 (3 pcs)
Flex*Line* 1 1/4" R	**S45056-Z857-A26**	PJ-2, PJ-3, PJ-222 (1 pc each)
Flex*Line* 1 5/8" R	**S45056-Z857-A27**	PJ-3 (2 pcs), PJ-333 (1 pc)

Stripping tool for FlexLine 7/8"

Stripping tool

Cable type	Order number	Spare blades
FlexLine 1/2" S	**S45056-Z857-A4-LA**	No. 51 large, No. 78 small (1 pc each)
FlexLine 1/2" R	**S45056-Z857-A5-LA**	No. 51 large, No. 78 small (1 pc each)
FlexLine 7/8" R	**S45056-Z857-A6-LA**	No. 51 large, No. 78 small (1 pc each)
FlexLine 1 1/4" R	**S45056-Z857-A7-LA**	–
FlexLine 1 5/8" R	**S45056-Z857-A8-LA**	–

Stripping tool for grounding kits

Stripping tools for grounding kits

Cable type	Order number	Stripping dimension
FlexLine 1/2" S	**S45056-Z857-A41-LA**	15 mm and 26 mm
FlexLine 1/2" R	**S45056-Z857-A42-LA**	15 mm and 26 mm
FlexLine 7/8" R	**S45056-Z857-A43-LA**	20 mm and 26 mm
FlexLine 1 1/4" R	**S45056-Z857-A44-LA**	20 mm and 30 mm
FlexLine 1 5/8" R	**S45056-Z857-A45-LA**	20 mm and 30 mm

Flaring tools

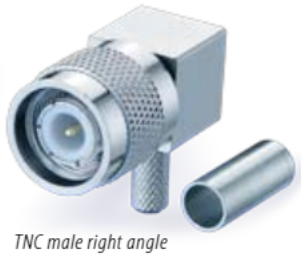
Cable type	Order number
FlexLine 1/4" R	**S45056-Z857-A14**
FlexLine 1/2" R	**S45056-Z857-A15**
FlexLine 7/8" R	**S45056-Z857-A16**
FlexLine 1 1/4" R	**S45056-Z857-A17**
FlexLine 1 5/8" R	**S45056-Z857-A18**

Spare blades for stripping tools

Spare blade type	Order number
PJ-2	**S45056-Z857-A35**
PJ-3	**S45056-Z857-A36**
PJ-4L	**S45056-Z857-A37**
PJ-222	**S45056-Z857-A38**
PJ-333	**S45056-Z857-A39**
X17	**S45056-Z857-A40**

No. 51 large (10 pcs)	**S45056-Z857-A10**
No. 78 small (10 pcs)	**S45056-Z857-A11**

N male straight



TNC male right angle

Connectors and adaptors are available in N and DIN 7-16 series with both male and female interfaces for Flex*Line* Coaxial cables. All connectors are designed to guarantee excellent electrical characteristics with Flex*Line* Coaxial cables, such as excellent return loss, high quality standards, waterproof IP 68 and low attenuation values.

Connectors

Technical characteristics Flex*Line* Coaxial N-Series

Nominal impedance	50 Ω
Frequency range	DC to 11 GHz
Insertion loss	0.1 dB
Intermodulation	≤ –117 dBm @ 2 x 43 dBm
Shielding effectiveness	≥ 128 dB @ 1 GHz
Operating temperature	– 45 °C to +85 °C
Waterproof	IP 68

Return loss[1]

Flex*Line* 1/4", 3/8", 1/2", 7/8" and 1 1/4"	≥ 35 dB	DC to 1.0 GHz
	≥ 30 dB	1.0 to 2.7 GHz
Flex*Line* 1 5/8"	≥ 30 dB	DC to 2.7 GHz

Technical characteristics Flex*Line* Coaxial DIN 7-16-Series

Nominal impedance	50 Ω
Frequency range	DC to 8.3 GHz
Insertion loss	0.05 dB
Intermodulation	≤ –117 dBm @ 2 x 43 dBm
Shielding effectiveness	≥ 128 dB @ 1 GHz
Operating temperature	– 45 °C to + 85 °C
Waterproof	IP 68

Return loss[1]

Flex*Line* 1/4", 3/8", 1/2" and 7/8"	≥ 35 dB	DC to 1.0 GHz
	≥ 30 dB	1.0 to 2.7 GHz
Flex*Line* 1 1/4" and 1 5/8"	≥ 30 dB	DC to 2.7 GHz

[1] *Magnitude in dB*

N female straight

DIN 7/16 male straight

DIN 7/16 female straight

Cable type	Connector type	Order number
Flex*Line* 1/4" S	N male straight	**V45250-Z5077-A 1-LA**
	N female straight	**V45250-Z5077-A 2-LA**
	N male right angle	**V45250-Z5077-A 3-LA**
Flex*Line* 1/4" R	N male straight	**V45250-Z5077-A 56-LA**
	N female straight	**V45250-Z5077-A 57-LA**
	N right angle	**V45250-Z5077-A 58-LA**
Flex*Line* 3/8" S	N male straight	**V45250-Z5077-A 7-LA**
	N female straight	**V45250-Z5077-A 8-LA**
	N male right angle	**V45250-Z5077-A 9-LA**
Flex*Line* 1/2" S	N male straight	**V45250-Z5077-A 13-LA**
	N female straight	**V45250-Z5077-A 14-LA**
	N male right angle	**V45250-Z5077-A 15-LA**
Flex*Line* 1/2" R	N male straight	**V45250-Z5077-A 19-LA**
	N female straight	**V45250-Z5077-A 20-LA**
	N male right angle	**V45250-Z5077-A 21-LA**
Flex*Line* 7/8" H	N male straight	**V45250-Z5077-A 71-LA**
	N female straight	**V45250-Z5077-A 72-LA**
Flex*Line* 7/8" R and 7/8" R low loss	N male straight	**V45250-Z5077-A 25-LA**
	N female straight	**V45250-Z5077-A 26-LA**
Flex*Line* 1 1/4" R and 1 1/4" R low loss	N male straight	**V45250-Z5077-A 43-LA**
	N female straight	**V45250-Z5077-A 44-LA**
Flex*Line* 1 5/8" R and 1 5/8" R low loss	N male straight	**V45250-Z5077-A 45-LA**
	N female straight	**V45250-Z5077-A 46-LA**

Cable type	Connector type	Order number
Flex*Line* 1/4" S	DIN 7/16 male straight	**V45250-Z5077-A 4-LA**
	DIN 7/16 female straight	**V45250-Z5077-A 5-LA**
	DIN 7/16 male right angle	**V45250-Z5077-A 6-LA**
Flex*Line* 1/4" R	DIN 7/16 male straight	**V45250-Z5077-A 59-LA**
	DIN 7/16 female straight	**V45250-Z5077-A 60-LA**
	DIN 7/16 male right angle	**V45250-Z5077-A 61-LA**
Flex*Line* 3/8" S	DIN 7/16 male straight	**V45250-Z5077-A 10-LA**
	DIN 7/16 female straight	**V45250-Z5077-A 11-LA**
	DIN 7/16 male right angle	**V45250-Z5077-A 12-LA**
Flex*Line* 1/2" S	DIN 7/16 male straight	**V45250-Z5077-A 16-LA**
	DIN 7/16 female straight	**V45250-Z5077-A 17-LA**
	DIN 7/16 male right angle	**V45250-Z5077-A 18-LA**
Flex*Line* 1/2" R	DIN 7/16 male straight	**V45250-Z5077-A 22-LA**
	DIN 7/16 female straight	**V45250-Z5077-A 23-LA**
	DIN 7/16 male right angle	**V45250-Z5077-A 24-LA**
Flex*Line* 7/8" H	DIN 7/16 male straight	**V45250-Z5077-A 73-LA**
	DIN 7/16 female straight	**V45250-Z5077-A 74-LA**
Flex*Line* 7/8" R and 7/8" R low loss	DIN 7/16 male straight	**V45250-Z5077-A 27-LA**
	DIN 7/16 female straight	**V45250-Z5077-A 28-LA**
Flex*Line* 1 1/4" R and 1 1/4" R low loss	DIN 7/16 male straight	**V45250-Z5077-A 29-LA**
	DIN 7/16 female straight	**V45250-Z5077-A 30-LA**
Flex*Line* 1 5/8" R and 1 5/8" R low loss	DIN 7/16 male straight	**V45250-Z5077-A 31-LA**
	DIN 7/16 female straight	**V45250-Z5077-A 32-LA**

N male right angle

N male straight

TNC male straight

TNC male right angle

Cable type	Connector type		Order number
Flex*Line* 195	N male straight	solder/crimp	**V45250-Z5077-A50-LA**
	N female straight	solder/crimp	**V45250-Z5077-A52-LA**
	N male right angle	solder/crimp	**V45250-Z5077-A51-LA**
	TNC male straight	solder/crimp	**V45250-Z5077-A47-LA**
	TNC female straight	solder/crimp	**V45250-Z5077-A49-LA**
	TNC male right angle	solder/crimp	**V45250-Z5077-A48-LA**
Flex*Line* 200	N male straight	solder/crimp	**V45250-Z5077-A90-LA**
	N female straight	solder/crimp	**V45250-Z5077-A91-LA**
	N male right angle	solder/crimp	**V45250-Z5077-A92-LA**
	TNC male straight	solder/crimp	**V45250-Z5077-A53-LA**
	TNC female straight	solder/crimp	**V45250-Z5077-A55-LA**
	TNC male right angle	solder/crimp	**V45250-Z5077-A54-LA**
Flex*Line* 240	N male straight	solder/crimp	**V45250-Z5077-A62-LA**
	N female straight	solder/crimp	**V45250-Z5077-A64-LA**
	N male right angle	solder/crimp	**V45250-Z5077-A63-LA**
	TNC male straight	solder/crimp	**V45250-Z5077-A93-LA**
	TNC female straight	solder/crimp	**V45250-Z5077-A94-LA**
	TNC male right angle	solder/crimp	**V45250-Z5077-A95-LA**

Cable type	Connector type		Order number
Flex*Line* 300	N male straight	solder/crimp	**V45250-Z5077-A68-LA**
	N female straight	solder/crimp	**V45250-Z5077-A70-LA**
	N male right angle	solder/crimp	**V45250-Z5077-A69-LA**
	TNC male straight	solder/crimp	**V45250-Z5077-A65-LA**
	TNC female straight	solder/crimp	**V45250-Z5077-A67-LA**
	TNC male right angle	solder/crimp	**V45250-Z5077-A66-LA**
	DIN 7/16 male straight	solder/crimp	**V45250-Z5077-A96-LA**
	DIN 7/16 male right angle	solder/crimp	**V45250-Z5077-A97-LA**
Flex*Line* 400	N male straight	solder/crimp	**V45250-Z5077-A78-LA**
	N male straight	spring/clamp	**V45250-Z5077-A79-LA**
	N female straight	solder/crimp	**V45250-Z5077-A82-LA**
	N female straight	solder/crimp	**V45250-Z5077-A83-LA**
	N male right angle	spring/clamp	**V45250-Z5077-A80-LA**
	N male right angle	solder/crimp	**V45250-Z5077-A81-LA**
	TNC male straight	spring/clamp	**V45250-Z5077-A98-LA**
	TNC male straight	solder/crimp	**V45250-Z5077-A99-LA**
	TNC female straight	solder/clamp	**V45250-Z5077-A76-LA**
	TNC female straight	solder/crimp	**V45250-Z5077-A77-LA**
	TNC male right angle	spring/clamp	**V45250-Z5077-A75-LA**
	DIN 7/16 male straight	solder/crimp	**V45250-Z5077-A84-LA**
	DIN 7/16 male straight	spring/clamp	**V45250-Z5077-A85-LA**
	DIN 7-16 female straight	solder/crimp	**V45250-Z5077-A88-LA**
	DIN 7-16 female straight	solder/clamp	**V45250-Z5077-A89-LA**
	DIN 7/16 male right angle	solder/crimp	**V45250-Z5077-A86-LA**
	DIN 7/16 male right angle	spring/clamp	**V45250-Z5077-A87-LA**

RA = Right Angle
solder/crimp = solder inner conductor, crimp outer conductor
spring/clamp = spring inner conductor, clamp outer conductor

Adaptor straight

Adaptor right angle

Terminations

Adaptors

Interface	Order number
N male - N male, straight	**V45250-Z5077-A308-LA**
N female - N female, straight	**V45250-Z5077-A307-LA**
N male - N female, straight	**V45250-Z5077-A311-LA**
N male - N female, right angle	**V45250-Z5077-A341-LA**

DIN 7-16 male – DIN 7-16 male, straight	**V45250-Z5077-A309-LA**
DIN 7-16 female – DIN 7-16 female, straight	**V45250-Z5077-A304-LA**
DIN 7-16 male – DIN 7-16 female, straight	**V45250-Z5077-A312-LA**
DIN 7-16 male – DIN 7-16 female, right angle	**V45250-Z5077-A342-LA**

N male, straight – DIN 7-16 male	**V45250-Z5077-A306-LA**
N male, straight – DIN 7-16 female	**V45250-Z5077-A313-LA**
N female, straight – DIN 7-16 male	**V45250-Z5077-A310-LA**
N female, straight – DIN 7-16 female	**V45250-Z5077-A314-LA**

Terminations, 50 Ohms

Multiband 800-3000 MHz, N male

Power rating	Order number
1W	**S45055-Z61-A940-LA**
2 W	**S45055-Z61-A941-LA**
5 W	**S45055-Z61-A942-LA**
10 W	**S45055-Z61-A943-LA**
20 W	**S45055-Z61-A944-LA**
30 W	**S45055-Z61-A945-LA**
50 W	**S45055-Z61-A946-LA**
100W	**S45055-Z61-A947-LA**

Multiband 800-2500 MHz, DIN 7-16 male

Power rating	Order number
20 W	**S45055-Z61-A948-LA**
30 W	**S45055-Z61-A949-LA**
50 W	**S45055-Z61-A950-LA**
100 W	**S45055-Z61-A951-LA**

Attenuators, frequency range DC to 8 GHz

Attenuation	Interface	Power rating	Order number
3 dB	DIN 7-16 male-female	5 W	**V45250-Z5077-A351-LA**
		20 W	**V45250-Z5077-A352-LA**
	N male-female	5 W	**V45250-Z5077-A353-LA**
		20 W	**V45250-Z5077-A354-LA**
6 dB	DIN 7-16 male-female	5 W	**V45250-Z5077-A355-LA**
		20 W	**V45250-Z5077-A356-LA**
	N male-female	5 W	**V45250-Z5077-A357-LA**
		20 W	**V45250-Z5077-A358-LA**
10 dB	DIN 7-16 male-female	5 W	**V45250-Z5077-A359-LA**
		20 W	**V45250-Z5077-A360-LA**
	N male-female	5 W	**V45250-Z5077-A361-LA**
		20 W	**V45250-Z5077-A362-LA**
20 dB	DIN 7-16 male-female	5 W	**V45250-Z5077-A363-LA**
		20 W	**V45250-Z5077-A364-LA**
	N male-female	5 W	**V45250-Z5077-A365-LA**
		20 W	**V45250-Z5077-A366-LA**

For any other type,
please contact your LEONI sales agency.

Jumper Cables

Flex*Line* Coaxial jumper cables are ideal for applications requiring durability, small bending radii, high flexibility, low attenuation and high shielding. They are connected between the main feeder and antennas or between the main feeder and the RF equipment.

The jumper cables are offered with Flex*Line* 214, 1/4", 3/8" and 1/2" and are designed for indoor and outdoor use to withstand the harshest environmental conditions.

Flex*Line* Coaxial jumper cables are distinguished by the following features:

- Designed for outdoor applications under extreme climatic conditions
- High flexibility and small bending diameters
- High shielding effectiveness 120 dB
- Low intermodulation product IM3 –160 dBc (–117 dBm @ 2 x 43 dBm carriers)
- Sealing between connector and cable jacket
- Waterproof to safety class IP 68 (according to IEC 529)
- Cable jackets of Polyethylene (PE) or flame retardant, halogen-free material (FRNC)
- Available in any cable length with a large variety of connector combinations

Technical specification

Electrical data

Type		214	1/4" S	3/8" S	1/2" S	1/2" R
Frequency range		DC to 2700 MHz				
Peak power rating		200 kW	8 kW	13 kW	19 kW	58 kW
Nominal impedance		50 Ω				
Return loss[1]	30 – 1000 MHz	≥ 26 dB	≥ 30 dB			
	1000 – 2200 MHz	≥ 26 dB	≥ 28 dB			
	2200 – 2700 MHz	≥ 24 dB	≥ 26 dB			
Insertion loss	900 MHz	0.18 dB/m (cable) 0.05 dB/ft + 0.10 dB (connectors)	0.18 dB/m (cable) 0.05 dB/ft + 0.10 dB (connectors)	0.13 dB/m (cable) 0.04 dB/ft + 0.10 dB (connectors)	0.10 dB/m (cable) 0.03 dB/ft + 0.10 dB (connectors)	0.07 dB/m (cable) 0.02 dB/ft + 0.10 dB (connectors)
	1800 MHz	0.18 dB/m (cable) 0.05 dB/ft + 0.10 dB (connectors)	0.26 dB/m (cable) 0.08 dB/ft + 0.10 dB (connectors)	0.20 dB/m (cable) 0.06 dB/ft + 0.10 dB (connectors)	0.16 dB/m (cable) 0.05 dB/ft + 0.10 dB (connectors)	0.10 dB/m (cable) 0.03 dB/ft + 0.10 dB (connectors)
	2200 MHz	0.18 dB/m (cable) 0.05 dB/ft + 0.10 dB (connectors)	0.30 dB/m (cable) 0.09 dB/ft + 0.10 dB (connectors)	0.22 dB/m (cable) 0.07dB/ft + 0.10 dB (connectors)	0.17 dB/m (cable) 0.05 dB/ft + 0.10 dB (connectors)	0.11 dB/m (cable) 0.03 dB/ft + 0.10 dB (connectors)
Relatice velocity of propagation		65 %	82 % to – 84 %			
Intermodulation at 900 MHz + 1800 MHz + 2200 MHz		≤ – 117 dBm (3rd order product with 2 x 43 dBm carriers)				

Mechanical data

Type	214	1/4" S	3/8" S	1/2" S	1/2" R
Bending radius, repeated bending	111 mm (4.370 in)	25 mm (0.98 in)	25 mm (0.98 in)	30 mm (1.18 in)	120 mm (4.72 in)
Bending radius, single bending	83.25 mm (3.278 in)	12.5 mm (0.49 in)	12.5 mm (0.49 in)	15 mm (0.59 in)	70 mm (2.76 in)
Max. tensile strength	max. 420 N	max. 350 N	max. 600 N	max. 1000 N	max. 1200 N

Environment

Type	214	1/4" S	3/8" S	1/2" S	1/2" R
Waterproof to safety class (IEC 529)	IP 68[2] with coupled interface				
Max. operating temperature range	– 40 °C to + 80 °C (– 40 °F to +176 °F)				
recommended Installation temperature range	– 15 °C to + 60 °C (+5 °F to +140 °F)				

Materials

Type		214	1/4" S	3/8" S	1/2" S	1/2" R
Cable	Inner conductor	stranded silver-plated wire	copper clad aluminum wire			
	Dielectric	Polyethylene	highly foamed polyethylene			
	Outer conductor	two shields of silver-plated copper wires	spiral corrugated	spiral corrugated	spiral corrugated	ring-shaped corrugated
			copper tube	copper tube	copper tube	copper tube
	Jacket options	FRNC, black	FRNC and PE, black and light grey (RAL 7004)			
Connector	Inner conductor	brass / CuBe, silver-plated				
	Outer conductor	brass, silver-plated				
	Insulator	PP / PE / PTFE				

[1] *Magnitude in dB*

Standard jumper cable Flex*Line* 214 FRNC

Connector 1	Connector 2	Order number
N	N	V45594-A4015-R …*
N	N	V45594-A4515-R …
N	N	V45594-A4540-R …
N	N	V45594-A4545-R …
7-16	7-16	V45594-A8055-R …
7-16	N	V45594-A8545-R …
7-16	7-16	V45594-A8555-R …
7-16	7-16	V45594-A8580-R …
7-16	7-16	V45594-A8585-R …

Standard jumper cable Flex*Line* 1/4" S FRNC

Connector 1	Connector 2	Order number
N	N	V45594-A4015-A …*
N	N	V45594-A4515-A …
N	N	V45594-A4540-A …
N	N	V45594-A4545-A …
7-16	7-16	V45594-A8055-A …
7-16	N	V45594-A8545-A …
7-16	7-16	V45594-A8555-A …
7-16	7-16	V45594-A8580-A …
7-16	7-16	V45594-A8585-A …

Standard jumper cable Flex*Line* 1/4" S PE

Connector 1	Connector 2	Order number
N	N	V45594-A4015-E …*
N	N	V45594-A4515-E …
N	N	V45594-A4540-E …
N	N	V45594-A4545-E …
7-16	7-16	V45594-A8055-E …
7-16	N	V45594-A8545-E …
7-16	7-16	V45594-A8555-E …
7-16	7-16	V45594-A8580-E …
7-16	7-16	V45594-A8585-E …

Standard jumper cable Flex*Line* 1/4" R FRNC

Connector 1	Connector 2	Order number
N	N	V45594-A4015-K …*
N	N	V45594-A4515-K …
N	N	V45594-A4540-K …
N	N	V45594-A4545-K …
7-16	7-16	V45594-A8055-K …
7-16	N	V45594-A8545-K …
7-16	7-16	V45594-A8555-K …
7-16	7-16	V45594-A8580-K …
7-16	7-16	V45594-A8585-K …

**Please insert assembly length in cm*

Standard jumper cable Flex*Line* 1/4" R PE

Connector 1	Connector 2	Order number
N	N	V45594-A4015-L …*
N	N	V45594-A4515-L …
N	N	V45594-A4540-L …
N	N	V45594-A4545-L …
7-16	7-16	V45594-A8055-L …
7-16	N	V45594-A8545-L …
7-16	7-16	V45594-A8555-L …
7-16	7-16	V45594-A8580-L …
7-16	7-16	V45594-A8585-L …

Standard jumper cable Flex*Line* 3/8" S FRNC

Connector 1	Connector 2	Order number
N	N	V45594-A4015-B …*
N	N	V45594-A4515-B …
N	N	V45594-A4540-B …
N	N	V45594-A4545-B …
7-16	7-16	V45594-A8055-B …
7-16	N	V45594-A8545-B …
7-16	7-16	V45594-A8555-B …
7-16	7-16	V45594-A8580-B …
7-16	7-16	V45594-A8585-B …

Standard jumper cable Flex*Line* 3/8" S PE

Connector 1	Connector 2	Order number
N	N	V45594-A4015-F …*
N	N	V45594-A4515-F …
N	N	V45594-A4540-F …
N	N	V45594-A4545-F …
7-16	7-16	V45594-A8055-F …
7-16	N	V45594-A8545-F …
7-16	7-16	V45594-A8555-F …
7-16	7-16	V45594-A8580-F …
7-16	7-16	V45594-A8585-F …

Standard jumper cable Flex*Line* 1/2" S FRNC

Connector 1	Connector 2	Order number
N	N	V45594-A4015-C …*
N	N	V45594-A4515-C …
N	N	V45594-A4540-C …
N	N	V45594-A4545-C …
7-16	7-16	V45594-A8055-C …
7-16	N	V45594-A8545-C …
7-16	7-16	V45594-A8555-C …
7-16	7-16	V45594-A8580-C …
7-16	7-16	V45594-A8585-C …

**Please insert assembly length in cm*

Standard jumper cable Flex*Line* 1/2" S PE

Connector 1	Connector 2	Order number
N	N	V45594-A4015-G …*
N	N	V45594-A4515-G …
N	N	V45594-A4540-G …
N	N	V45594-A4545-G …
7-16	7-16	V45594-A8055-G …
7-16	N	V45594-A8545-G …
7-16	7-16	V45594-A8555-G …
7-16	7-16	V45594-A8580-G …
7-16	7-16	V45594-A8585-G …

Standard jumper cable Flex*Line* 1/2" R FRNC

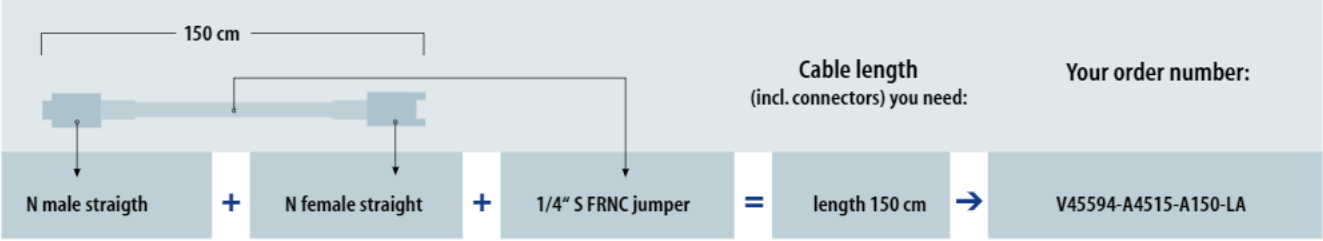
Connector 1	Connector 2	Order number
N	N	V45594-A4015-D …*
N	N	V45594-A4515-D …
N	N	V45594-A4540-D …
N	N	V45594-A4545-D …
7-16	7-16	V45594-A8055-D …
7-16	N	V45594-A8545-D …
7-16	7-16	V45594-A8555-D …
7-16	7-16	V45594-A8580-D …
7-16	7-16	V45594-A8585-D …

Standard jumper cable Flex*Line* 1/2" R PE

Connector 1	Connector 2	Order number
N	N	V45594-A4015-H …*
N	N	V45594-A4515-H …
N	N	V45594-A4540-H …
N	N	V45594-A4545-H …
7-16	7-16	V45594-A8055-H …
7-16	N	V45594-A8545-H …
7-16	7-16	V45594-A8555-H …
7-16	7-16	V45594-A8580-H …
7-16	7-16	V45594-A8585-H …

**Please insert assembly length in cm*

For example:



Order number generator for custom made jumper cables

Your order number:

Color +	Connector 1 +	Connector 2 +	Cable +	Length =
	N female	N female		
black A	straight 15	straight 15	FlexLine 214 FRNC R	50 cm 50
	N male	N male	FlexLine 1/4" S FRNC A	100 cm 100
light grey B	right angle 40	right angle 40	FlexLine 1/4" S PE E	150 cm 150
	straight 45	straight 45	FlexLine 1/4" R FRNC K	250 cm 250
	DIN 7-16 female	DIN 7-16 female	FlexLine 1/4" R PE L	300 cm 300
	right angle 50	right angle 50	FlexLine 3/8" S FRNC B	Customer´s need ?
	straight 55	straight 55	FlexLine 3/8" S PE F	
	DIN 7-16 male	DIN 7-16 male	FlexLine 1/2" S FRNC C	
	right angle 80	right angle 80	FlexLine 1/2" S PE G	
	straight 85	straight 85	FlexLine 1/2" R FRNC D	
			FlexLine 1/2" R PE H	

V45594 -A 85 55 -B 150-LA

- FlexLine jumper cable
- Jacket color
- Connector 1. side
- Connector 2. side
- Cable type
- Length in cm

DIN female - DIN male (GT)

Flex*Line* Coaxial surge arrestors provide excellent protection and outstanding RF performance to ensure the security of the whole system (antenna, cable connections and base station) against overvoltage damage and effective lightning.
Flex*Line* Coaxial surge arrestors are ideal for frequency ranges from 700 to 2700 MHz and they are available in both Type N and 7/16 DIN interfaces configured for either the antenna side or RxTx (protected) installations.

Three different functional types of Flex*Line* Coaxial surge arrestors are available:

Wideband surge arrestors
Applications for a broad frequency range from 700 to 2700 MHz with either Aluminium (AL-) or Brass (SX-) type.

Gas-capsule surge arrestors
Applications from DC to 7000 MHz with N connectors or DC to 3000 MHz with 7/16 DIN connectors with gas discharge capsules (GT-type).

Wideband DC-pass surge arrestors
Applications from 800 – 2500 MHz (GX-type).

Technical characteristics

Wideband surge arrestors	DIN 7-16	N
Characteristic impedance	50 Ω	
Frequency range	800 – 2500 MHz	
Return loss[1] 800 to 880 MHz	≥ 20 dB	≥ 23 dB
880 to 2400 MHz	≥ 26 dB	≥ 26 dB
2400 to 2500 MHz	≥ 20 dB	≥ 23 dB
Insertion loss	≤ 0.05 dB	≤ 0.1 dB
Temperature range	– 45 °C to + 85 °C	
Design based on specifications	IEC 60169-4; DIN 47223; CECC 22190; VG 95250	IEC 60169-16; MIL C-39012; CECC 22210
Quality tested in accordance with	US MIL-Std 202	US MIL-Std 202
Residual voltage	1 V (50 kA, wave 8/20 µs)	

Gas-capsule surge arrestors	DIN 7-16	N
Characteristic impedance	50 Ω	
Frequency range	DC to 3 GHz	DC to 3 GHz
Return loss[1] DC to 1 GHz	≥ 30 dB	≥ 30 dB
1 to 2 GHz	≥ 20 dB	≥ 17 dB
2 to 3 GHz	–	≥ 10 dB
Insertion loss	≤ 0.2 dB	≤ 0.1 dB
Temperature range	– 45 °C to + 85 °C	
Design in accordance with	IEC 60169-4; DIN 47223; CECC 22190; VG 95250	IEC 60169-16; MIL C-39012; CECC 22210
Quality tested in accordance with	US MIL-Std 202	US MIL-Std 202
Residual voltage	in corresponence with gas-capsule	

[1] *Magnitude in dB*

Wideband surge arrestors for 700 – 2700 MHz, application: wideband-dc blocked

Aluminium-Type (AL-Type)	Antenna Side	RxTx Side [protected]	RF Power [Watts]	Order number
N series	N female	N female	500	S45055-Z61-A451-AL
	N male	N female		S45055-Z61-A441-AL
	N female	N male		S45055-Z61-A440-AL
N/DIN 7-16 interconnection series	DIN 7-16 male	N female		S45055-Z61-A442-AL
DIN 7-16 series	DIN 7-16 female	DIN 7-16 female	750	S45055-Z61-A258-AL
	DIN 7-16 male	DIN 7-16 female		S45055-Z61-A439-AL
	DIN 7-16 female	DIN 7-16 male		S45055-Z61-A500-AL

N female - N female (AL)

N male - N female (SX)

Brass Type (SX-Type)	Antenna Side	RxTx Side [protected]	RF Power [Watts]	Order number
N series	N female	N female	500	S45055-Z61-A451-SX
	N male	N female		S45055-Z61-A441-SX
	N female	N male		S45055-Z61-A440-SX
N/DIN 7-16 interconnection series	DIN 7-16 male	N female		S45055-Z61-A442-SX
DIN 7-16 series	DIN 7-16 female	DIN 7-16 female	750	S45055-Z61-A258-SX
	DIN 7-16 male	DIN 7-16 female		S45055-Z61-A439-SX
	DIN 7-16 female	DIN 7-16 male		S45055-Z61-A500-SX

DIN male - DIN female (GT)

Gas-capsule surge arrestors for DC-3000 MHz (DIN type) and DC-7000 (N type); application: gastube-dc pass

GT-Type	Antenna Side	RxTx Side [protected]	RF Power [Watts]	Order number
N series	N female	N female	80	S45055-Z61-A128-GT
	N male	N female		S45055-Z61-A448-GT
DIN 7-16 series	DIN 7-16 female	DIN 7-16 female		S45055-Z61-A449-GT
	DIN 7-16 male			S45055-Z61-A122-GT

N male - N female (GX)

Wideband DC-pass surge arrestors for 800 – 2500 MHz

GX-Type	Antenna Side	Antenna Side	RxTx Side [protected]	Operating Voltage [V]	Order number
N series	N female	N female	0.25	6	S45055-Z61-A1138-GX
			2.25	15	S45055-Z61-A1139-GX
				24	S45055-Z61-A1140-GX
			40	48	S45055-Z61-A1142-GX
				– 48	S45055-Z61-A1143-GX
				– 60	S45055-Z61-A1144-GX
	N male		40	36	S45055-Z61-A1141-GX
DIN 7-16 series	DIN 7-16 female	DIN 7-16 female	0.25	6	S45055-Z61-A1137-GX
			300	± 72	S45055-Z61-A1145-GX

Power Splitters

Flex*Line* Coaxial power splitters are available with N and DIN 7/16 interfaces to combine various antenna systems to one radio base station for mobile communication networks.
The Flex*Line* Coaxial power splitters product range comprises 2-way, 3-way and 4-way types for male and female interfaces. They are designed for indoor and outdoor use for a broad frequency range from 800 to 2500 MHz.

This product range comprises Flex*Line* couplers which can be implemented in antenna line installations to distribute or combine transmitted signals with certain coupling values.
The couplers are available with N and DIN 7-16 interfaces and can cover 800 – 2500 MHz.

Power Splitters N Type

Wideband power splitters 800 – 2500 MHz N female, power rating 300 W

Type	Order number
2-way	**S45055-Z61-A456-LA**
3-way	**S45055-Z61-A457-LA**
4-way	**S45055-Z61-A458-LA**

Power Splitters DIN 7/16 Type

Wideband power splitters 800 – 2500 MHz DIN 7-16 female, power rating 700 W

Type	Order number
2-way	**S45055-Z61-A459-LA**
3-way	**S45055-Z61-A460-LA**
4-way	**S45055-Z61-A461-LA**

Wideband directional couplers
800 – 2500 MHz, DIN 7-16 female,
power rating 200 W

Type	Order number
5 dB	S45055-Z61-A910-LA
6 dB	S45055-Z61-A911-LA
7 dB	S45055-Z61-A912-LA
8 dB	S45055-Z61-A913-LA
10 dB	S45055-Z61-A914-LA
13 dB	S45055-Z61-A915-LA
15 dB	S45055-Z61-A916-LA
20 dB	S45055-Z61-A917-LA
25 dB	S45055-Z61-A918-LA
30 dB	S45055-Z61-A919-LA

Wideband directional couplers
800 – 2500 MHz, N female,
power rating 200 W

Type	Order number
5 dB	S45055-Z61-A900-LA
6 dB	S45055-Z61-A901-LA
7 dB	S45055-Z61-A902-LA
8 dB	S45055-Z61-A903-LA
10 dB	S45055-Z61-A904-LA
13 dB	S45055-Z61-A905-LA
15 dB	S45055-Z61-A906-LA
20 dB	S45055-Z61-A907-LA
25 dB	S45055-Z61-A908-LA
30 dB	S45055-Z61-A909-LA

Wideband directional coupler

Wideband hybrid 3dB couplers
800 – 2500 MHz, N female,
insulation 25 dB

Type	Order number
3 dB	S45055-Z61-A920-LA

Wideband hybrid 3dB couplers
800 – 2500 MHz, DIN 7-16 female,
insulation 25 dB

Type	Order number
3 dB	S45055-Z61-A921-LA

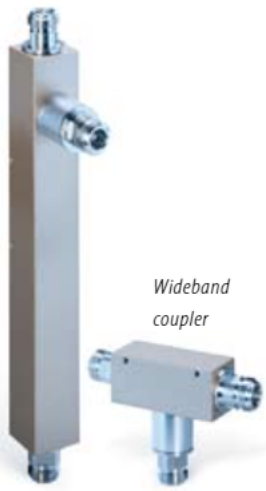
Wideband hybrid coupler

Wideband couplers
800 – 2500 MHz, N female,
power rating 200 W

Type	Order number
5 dB	S45055-Z61-A922-LA
6 dB	S45055-Z61-A923-LA
7 dB	S45055-Z61-A924-LA
10 dB	S45055-Z61-A925-LA
15 dB	S45055-Z61-A926-LA
20 dB	S45055-Z61-A927-LA
25 dB	S45055-Z61-A928-LA
30 dB	S45055-Z61-A929-LA
40 dB	S45055-Z61-A930-LA

Wideband couplers
800 – 2500 MHz, DIN 7-16 female,
power rating 200 W

Type	Order number
5 dB	S45055-Z61-A931-LA
6 dB	S45055-Z61-A932-LA
7 dB	S45055-Z61-A933-LA
10 dB	S45055-Z61-A934-LA
15 dB	S45055-Z61-A935-LA
20 dB	S45055-Z61-A936-LA
25 dB	S45055-Z61-A937-LA
30 dB	S45055-Z61-A938-LA
40 dB	S45055-Z61-A939-LA



Wideband coupler

Grounding Kits

Flex*Line* Coaxial grounding kits are used for the low-induction connection of cable systems to the antenna site ground. They discharge any lightning strikes that occur to ground. For equipotential bonding on site, the grounding kits are installed in the upper cable ends,in the vicinity of the mast foundation and at the building entrances. In longer feeder systems, additional ground connections are recommended at distances of every 60 m.

Flex*Line* Coaxial grounding kits demonstrate the following features:

- simple, rapid and safe installation
- compact version with no loose component parts
- high security against lightning strikes
- contact resistance < 1
- installation time of approx. 3 min
- waterproof to IP 68
- weather-resistant due to the use of stainless steel
- DIN EN 50164-1, VDE 0185 part 201:2000-4
- max. current 100 kA
- Amper +/– 10 %

Grounding kit KMT

Cable type	Normal exit	Order number
Flex*Line* 1/4" S	KMT 7-N, Ø 7-8mm	**S45055-Z61-A1**
Flex*Line* 1/4" R	KMT 9-N, Ø 8-9mm	**S45055-Z61-A560**
Flex*Line* 3/8" S	KMT 11-N, Ø 10-11mm	**S45055-Z61-A2**
Flex*Line* 1/2" S	KMT 14-N, Ø 13-14mm	**S45055-Z61-A463**
Flex*Line* 1/2" R	KMT 1/2"-N, Ø 16-17mm	**S45055-Z61-A3**
Flex*Line* 7/8" S + H + R	KMT 7/8"-N, Ø 26-28mm	**S45055-Z61-A4**
Flex*Line* 1 1/4" R	KMT 1.1/4"-N, Ø 38-40mm	**S45055-Z61-A5**
Flex*Line* 1 5/8" R	KMT 1.5/8"-N, Ø 50-52mm	**S45055-Z61-A6**

Grounding kit KMT-N

Grounding kit KMT

Cable type	Parallel exit	Order number
Flex*Line* 1/4" S	KMT 7-P, Ø 7-8mm	**S45055-Z61-A7**
Flex*Line* 1/4" R	KMT 9-P, Ø 8-9mm	**S45055-Z61-A561**
Flex*Line* 3/8" S	KMT 11-P, Ø 10-11mm	**S45055-Z61-A8**
Flex*Line* 1/2" S	KMT 14-P, Ø 13-14mm	**S45055-Z61-A464**
Flex*Line* 1/2" R	KMT 1/2"-P, Ø 16-17mm	**S45055-Z61-A9**
Flex*Line* 7/8" S + H + R	KMT 7/8"-P, Ø 26-28mm	**S45055-Z61-A10**
Flex*Line* 1 1/4" R	KMT 1.1/4"-P, Ø 38-40mm	**S45055-Z61-A11**
Flex*Line* 1 5/8" R	KMT 1.5/8"-P, Ø 50-52mm	**S45055-Z61-A12**

Grounding kit KMT-P

Grounding kit QEM

Cable type	Normal exit	Order number
Flex*Line* 1/4" S	QEM - 14 - P	**S45055-Z61-A427**
Flex*Line* 1/4"R + 3/8"S	QEM - 38 - P	**S45055-Z61-A428**
Flex*Line* 1/2" S + R	QEM - 12 - P	**S45055-Z61-A429**
Flex*Line* 7/8" S + H + R	QEM - 78 - P	**S45055-Z61-A430**
Flex*Line* 1 1/4" R	QEM - 114 - P	**S45055-Z61-A431**
Flex*Line* 1 5/8" R	QEM - 158 - P	**S45055-Z61-A432**

Grounding kit QEM

Clip-on grounding kit with 3/8" (9.5 mm) two-hole lugs

Cable type	Order number	Description
Flex*Line* 1/2" R	**S45055-Z61-A1013-LA**	includes 3' (1 m) lead
Flex*Line* 1/2" R	**S45055-Z61-A1014-LA**	includes 2' (0.6 m) lead
Flex*Line* 7/8" S + H + R	**S45055-Z61-A1015-LA**	includes 3' (1 m) lead
Flex*Line* 7/8" S + H + R	**S45055-Z61-A1016-LA**	includes 2' (0.6 m) lead
Flex*Line* 1 1/4" R	**S45055-Z61-A1017-LA**	includes 3' (1 m) lead
Flex*Line* 1 1/4" R	**S45055-Z61-A1018-LA**	includes 2' (0.6 m) lead
Flex*Line* 1 5/8" R	**S45055-Z61-A1019-LA**	includes 3' (1 m) lead
Flex*Line* 1 5/8" R	**S45055-Z61-A1020-LA**	includes 2' (0.6 m) lead

Each clip-on grounding kit also includes required mastic and electrical tape for weatherproofing each kit.

Clip-on grounding kit

Grounding kit strap type

Cable type	Diameter (mm)	Order number
Flex*Line* 3/8"	10 –12	**S45055-Z61-A863-LA**
Flex*Line* 1/2"	16 –17	**S45055-Z61-A854-LA**
Flex*Line* 7/8" S + H + R	26 – 28	**S45055-Z61-A855-LA**
Flex*Line* 1 1/4"	38 – 40	**S45055-Z61-A856-LA**
Flex*Line* 1 5/8"	50 – 52	**S45055-Z61-A857-LA**

Each grounding kit strap type also includes required mastic and electrical tape for weatherproofing each kit.

Grounding kit strap type

Antennas

LEONI offers two Flex*Line* Coaxial antennas for Flex*Line* in-building wireless coverage solutions, which are 3G-ready and absolutely capable with other products from the Flex*Line* Coaxial product family for quick and easy installation.
Both, the full-band indoor directional and the multi-band ceiling mount antenna are equipped with N-female connectors.

Implemented in a Flex*Line* Site Solution for in-building and rooftop installations, the antennas can dispatch and receive frequencies from 890 up to 2500 MHz and so enable GSM, 3G and WLAN network interconnections.

A1050-LA

A1051-LA

Multi-Band Ceiling Mount Antenna

Gain	Frequency (MHz)	RF Power (Watts)	Order number
6 dBi 9 dBi 10 dBi	800 – 960 1700 – 2200 2400 – 2500	100	**S45055-Z61-A1050-LA**

Full-Band Indoor Directional Antenna

Gain	Frequency (MHz)	RF Power (Watts)	Order number
3 dBi	824 – 2500	50	**S45055-Z61-A1051-LA**

FlexLine®

Symmetric Cables

New generation Flex*Line* Symmetric cables correspond to the demands of the new Remote Radio Head (RRH) technology for site solutions. RRH is characterised by the installation of mobile radio station's transceiver units close to the antenna.

Flex*Line* Symmetric cables offer the choice of combining data, control and power elements in one hybrid cable based on copper or fiber optic technologies as well as separated cable types. The communication with the base station is realised by fiber optic or twisted pair cables, which are making reference to the IEEE 802.16 WiMAX standard. Therefore, LEONI Flex*Line* Symmetric cables either comprise Ethernet Cat 5 copper twisted pair or fiber optic elements.

Control- and power supply elements are offered optionally referring to the design of the RRH.

The interconnection of and the data transmission between transceiver unit and antenna is generally provided by a coaxial cable, e.g. Flex*Line* Coaxial jumper cable.

Especially high mechanical demands with regard to sturdiness and resistance are placed on Flex*Line* Symmetric outdoor cables to guarantee stability towards environmental influences such as frost and humidity. To fulfil the strict fire protection requirements in the indoor area, LEONI Flex*Line* Symmetric cables with halogen-free and flame-retardant jacket (FRNC) are required because they guarantee that fire does not spread through the cables and no corrosive and toxic gases arise.

The comprehensive Flex*Line* Symmetric product range from LEONI Business Unit Telecom is completed by the big variety of indoor and outdoor fiber optic cables, which are used in the campus area of local area networks (LAN) as well as for bridging over the long distances in the Metropolitan Area Network (MAN) and Wide Area Network (WAN).

Feel free to investigate LEONI's fiber optic solutions at www.leoni-fiber-optics.com.

Overview Flex*Line* Symmetric cables

Type	Inner conductor	Insulation	Jacket options	Order number
Power				
Power star-quad copper Flex*Line* Symmetric cable	Stranded bare copper wire	FRNC	FRNC	**L45551-G41-W6**
Data & Control				
Data star-quad copper Flex*Line* Symmetric cable	Bare copper wire	Foamed PE with skin	FRNC	**L45467-F114-C36**
Control copper Flex*Line* Symetric cable with six twisted pair elements	Stranded bare copper wire	FRNC	FRNC	**L45466-A62-B6**
Data fiber optic LEONI Giga*Line*® indoor duplex cable	Tight buffered fiber (TB), semi-tight fiber (STB) or superstrip (LB)	**Strain relief elements:** non-metallic (aramid)	FRNC	**L46910 – – – – –**
Data fiber optic outdoor cable with additional rodent protection and central tube (1750 N)	Loose tube, gel filled	**Armouring:** multi-functional E-glass yarn, water-absorbent as strain relief elements and as rodent protection	PE	**L46910 – – – – –**
Data fiber optic outdoor cable with additional rodent protection and stranded loose tubes	Central strength member with stranding elements, designed as gel filled loose tubes	**Armouring:** multi-functional, strengthened E-glass yarn, water-absorbent as non-metallic strain relief element and as rodent protection	PE	**L46910 – – – – –**

Fiber specification: The order number depends on the cable's final configuration with the required fiber specification. Please contact our sales team to find your perfect solution!

Hybrid				
Hybrid copper Flex*Line* Symmetric cable with Cat 5 element	Stranded bare copper wire	PP	PVC	**L45467-J216-W15**
Hybrid Flex*Line* Symmetric cable with fiber optic elements acc. to ITU-T Rec. G.652 and IEC 60 793-2-50	Stranded bare copper wire / glas optical fiber	PVC / FRNC	PVC	**L46910-L2-H36**

Flex*Line* Symmetric

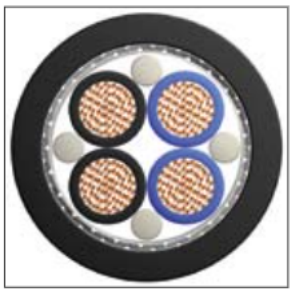
Power star-quad copper cable

	Order number
	L45551-G41-W6

Construction	
Conductor	4x1x stranded bare copper wire 14 AWG, insulation of FRNC
Core	4 wires twisted
Shield	Shield braiding of tinned copper wires
Jacket	Thermoplastic copolymer (FRNC) black

Temperature range		
Transport and storage	– 40 °C up to +80 °C	– 40 °F up to +176 °F
Installation	– 40 °C up to +80 °C	– 40 °F up to +176 °F
Operation	– 40 °C up to +80 °C	– 40 °F up tp +176 °F

Mechanical characteristics		
min. bending radius, single	42 mm	1.654 in
min. bending radius, repeated	84 mm	3.307 in
weight about	207 kg/km	139 lb/1000ft



Application
Power supply of transceiver unit according to RRH technology

Safety Standards
Flame retardant acc. to UL 1581 Sec. 1080 (VW-1)

Flex*Line* Symmetric

Data star-quad copper cable

Certification	Order number
UL 13 and NEC Art. 725 Type CL2	**L45467-F114-C36**

Construction	
Conductor	4x1x bare copper wire 26 AWG, insulation of foamed PE with skin
Core	4 wires twisted
Shield	Alulaminate foil overlapped, shield braiding of tinned copper wires
Jacket	Thermoplastic copolymer (FRNC) black

Temperature range		
Transport and storage	– 40 °C up to +80 °C	– 40 °F up to +176 °F
Installation	– 40 °C up to +80 °C	– 40 °F up to +176 °F
Operation	– 40 °C up to +80 °C	– 40 °F up tp +176 °F

Mechanical characteristics		
min. bending radius, single	27 mm	1.063 in
min. bending radius, repeated	54 mm	2.126 in
weight about	39 kg/km	26 lb/1000ft

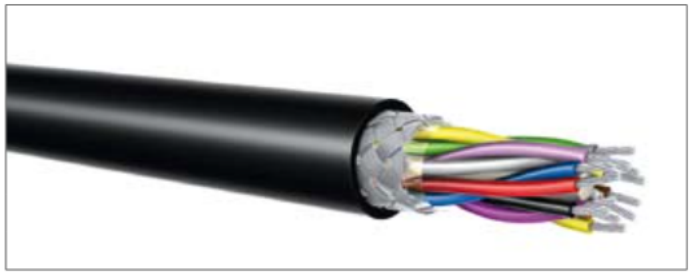
Application
Interconnection of base station (BTS or Node B) and transceiver unit according to RRH technology.

Safety Standards
Flame retardant acc. to IEC 60332-1-2
UL File E116441 Vol. 1 Sec. 10 Page 1
CL2

Flex*Line* Symmetric

Control copper cable with six twisted pair elements

Certification	Order number
UL 758 AWM Style 21286	**L45551-A62-B6**



Construction	
Conductor	6x2x stranded tinned copper wire 24 AWG, insulation of FRNC
Core	6 pairs
Shield	Shield braiding of tinned copper wires
Jacket	Thermoplastic copolymer (FRNC) black

Temperature range		
Transport and storage	– 25 °C up to +70 °C	– 13 °F up to +158 °F
Installation	– 25 °C up to +70 °C	– 13 °F up to +158 °F
Operation	– 25 °C up to +70 °C	– 13 °F up tp +158 °F

Mechanical characteristics		
min. bending radius, single	32.4 mm	1.276 in
min. bending radius, repeated	64.8 mm	2.551 in
weight about	87 kg/km	58 lb/1000ft

Application

Interconnection of base station (BTS or Node B) and transceiver unit according to RRH technology.

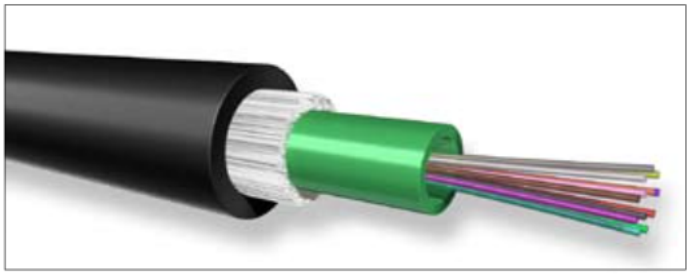
Safety Standards

Flame retardant acc. to UL 1581 Sec. 1080 (VW-1) UL-Style 21286

LEONI Fiber Optics

Data fiber optic outdoor cable with additional rodent protection and central tube (1750 N)

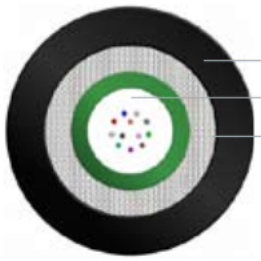
Standardisation	Order number
IEC 60 794-3	**L46910 – – – – –**



Construction	
Cable core	Loose tube, gel filled
Armouring	multi-functional E-glass yarn, water-absorbent as strain relief elements and as rodent protection
Cable jacket	PE-jacket with imprint
Colour of jacket	black

Mechanical characteristics	
min. bending radius	static 15 x outside diameter
	dynamic 20 x outside diameter
max. pull force	long-term 1750 N
max. crush resistance	long-term 1500 N/dm

Temperature range		
Transport and storage	– 25 °C up to +70 °C	– 13 °F up to +158 °F
Installation	– 5 °C up to +50 °C	+23 °F up to +122 °F
Operation	– 20 °C up to +60 °C	– 4 °F up tp +140 °F



Application
Light, flexible and non-metallic outdoor cable for the backbone. For pulling into conduits, installation on cable trays or directly in the ground.

Fire performance
Jacket is halogen-free
No toxic and corrosive fumes

Remarks
The jacket material PE offers good protection against transverse water ingress.

available with different connectors, dimensions, constructions, UL- and conductor-approvals; for further information, please contact our sales team

LEONI Fiber Optics

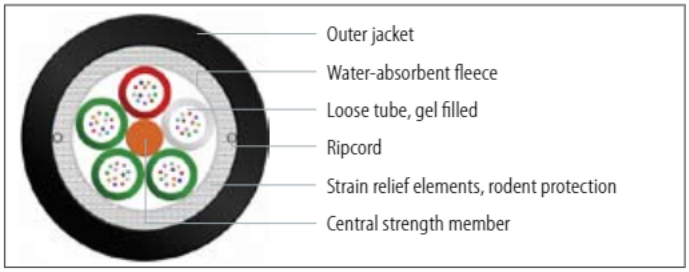
Data fiber optic outdoor cable with additional rodent protection and stranded loose tubes

Standardisation	Order number
DIN VDE 0888, Part 3 and IEC 60 794-3	**L46910** – – – – –

Construction	
Cable core	Central strength member with stranding elements, designed as gel filled loose tubes and if necessary fillers
Water-absorbent fleece	
Armouring	multi-functional, strengthened E-glass yarn water-absorbent as non-metallic strain relief element and as rodent protection
Cable jacket	PE-jacket with sinter marking
Colour of jacket	black

Mechanical characteristics	
min. bending radius	static 15 x outside diameter
	dynamic 20 x outside diameter
max. pull force	long-term 4000 N
max. crush resistance	long-term 3000 N/dm

Temperature range		
Transport and storage	– 40 °C up to +70 °C	– 40 °F up to +158 °F
Installation	+23 °C up to +50 °C	– 4 °F up to +122 °F
Operation	– 40 °C up to +60 °C	– 40 °F up tp +140 °F

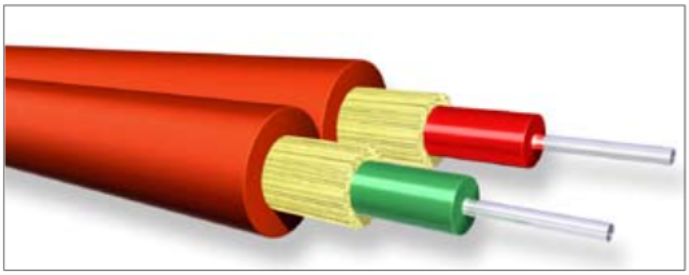


Application
Non-metallic, robust outdoor cable. Installation-friendly because of the cable core kept free of grease. For pulling into conduits, installation on cable trays or directly in the ground.

Fire performance
Jacket is halogen-free.
No toxic and corrosive fumes.

Remarks
The jacket material PE offers good protection against transverse water ingress.
Higher pull forces on request.
Also available with aluminium- or corrugated steel tape.

available with different connectors, dimensions, constructions, UL- and conductor-approvals; for further information, please contact our sales team

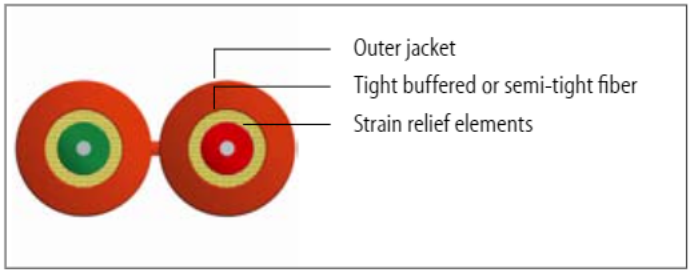


LEONI Fiber Optics Giga*Line*®

Data fiber optic indoor duplex cable

Standardisation	Order number
DIN VDE 0888, Part 6 and IEC 60 794-2	**L46910** – – – – –

Construction	
Cable core	Tight buffered fiber (TB), semi-tight fiber (STB) or superstrip (LB)
Strain relief elements	non-metallic (aramid)
Cable jacket	halogen-free and flame-retardant material
Colour of jacket	orange for multi-mode, yellow for single-mode ➔ other colors possible



Mechanical characteristics	
min. bending radius(over flat side)	static 30 mm
	dynamic 60 mm

Temperature range		
Transport and storage	– 25 °C up to +70 °C	– 13 °F up to +158 °F
Installation	– 5 °C up to +50 °C	+24.8 °F up to +122 °F
Operation	– 10 °C up to +70 °C	+14 °F up tp +158 °F

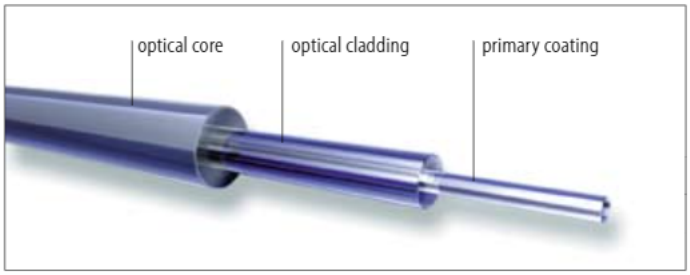
Application
Because of the small diameter and high flexibility, ideal as patch cable in distribution systems as well as for connecting terminals.

Fire performance
Flame retardancy: IEC 60332-1 and IEC 60332-3 Cat. A
Smoke density: IEC 61034
Halogen-free: IEC 60754-2
No toxic and corrosive fumes

Remarks
All duplex cables are available with TB, STB and LB cores.

available with different connectors, dimensions, constructions, UL- and conductor-approvals; for further information, please contact our sales team

Fiber Specifications for fiber optic cables



Multi-mode fiber G50/125

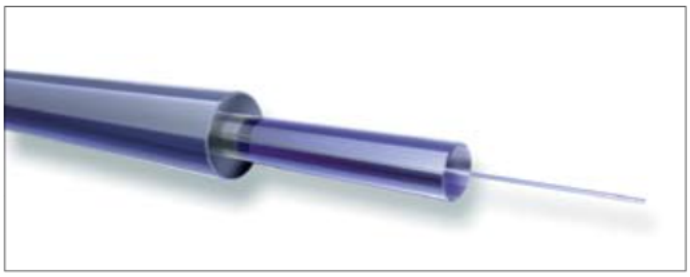
Standardisation

acc. to IEC 60 793-2-10

Multi-mode fiber G62,5/125

Standardisation

acc. to IEC 60 793-2-10



Single-mode fiber E9/125

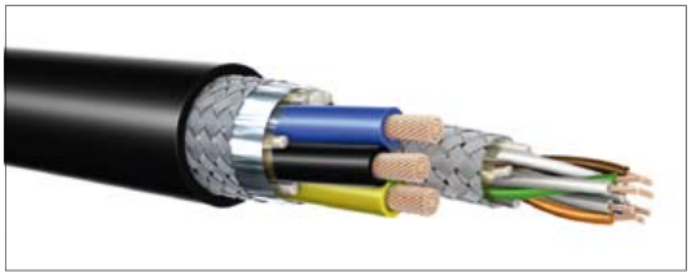
matched cladding type

Standardisation

acc. to ITU-T Rec. G.652 and IEC 60 793-2-50

Fiber specification	G50/125	G62,5/125	E9/125
Geometry/mechanical properties			
Core diameter (µm)	50 ± 2.5	62.5 ± 3	
Mode field diameter (at 1310 nm) (µm)			9.2 ± 0.4
Cladding diameter (µm)	125 ± 2	125 ± 1	125 ± 2
Coating diameter (µm)	245 ± 10	245 ± 5	245 ± 10
Core non-circularity (%)	< 5	< 5	
Cladding non-circularity (%)	**< 1**	**< 1**	**< 1**
Core/Clad concentricity error (µm)	< 1.5	< 1.5	< 0.8
Eccentricity of coating (µm)	< 10	< 10	< 10
Screen test	≥100 kpsi	≥100 kpsi	≥100 kpsi

Transmission properties	Fiber type G (OM2)		Fiber type L (OM1)		Fiber type B (OS1)	
Wavelength (nm)	850	1300	850	1300	1310	1550
Attenuation max. (dB/km)	2.7	0.8	3.2	0.9	0.36	0.22
Bandwidth min. (MHz · km)	500	1000	250	600		
Effective group of refraction	1.483	1.478	1.497	1.493	1.4695	1.4701
Numerical apperture	0.200 ± 0.015		0.275 ± 0.015			
Dispersion coefficient max. (ps/nm · km)					3.5	18
Zero dispersion wavelength (nm)					1300 –1322	
Dispersion slope (ps/nm² · km)					≤ 0.092	
Cutoff wavelength (cabled) (nm)					≤ 1250	
Polarization mode dispersion (ps/√km)					≤ 0.1	



Flex*Line* Symmetric

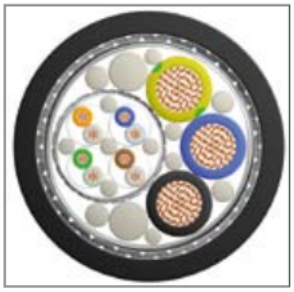
Hybrid copper cable with Ethernet Cat 5 element

	Order number
	L45467-J216-W15

Construction	
Conductor	3x1x stranded bare copper wire 14AWG, insulation of PP 4x2x stranded bare copper wire 26AWG, insulation of PP
Core	2 wires twisted to a pair, 4 pairs twisted
Shield	Alulaminate foil overlapped, shield braiding of tinned copper wires
Core	3 wires
Shield	Alulaminate foil overlapped, shield braiding of tinned copper wires
Jacket	Polyvinylchloride (PVC) black
Diameter	2.1 mm [0.083 in] 3.1 mm [0.122 in] 11.9 ± 0.4 mm [0.469 ± 0.016 in]

Temperature range		
Transport and storage	– 40 °C up to +80 °C	– 40 °F up to +176 °F
Installation	– 20 °C up to +80 °C	– 4 °F up to +176 °F
Operation	– 30 °C up to +80 °C	– 22 °F up tp +176 °F

Mechanical Characteristics		
min. bending radius, single	59.5 mm	2.343 in
min. bending radius, repeated	119 mm	4.690 in
weight about	233 kg/km	160 lb/1000ft



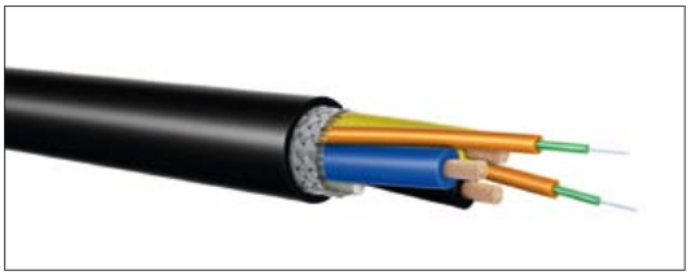
Application
Interconnection of base station (BTS or Node B) and transceiver unit according to RRH technology

Safety Standards
Sunlight resistant acc. to UL 1581 Sec. 1200 Crush resistant acc. to EN 50289-3-5

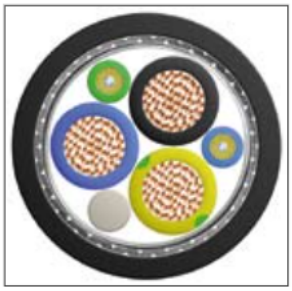
Flex*Line* Symmetric

Hybrid copper and fiber optic cable

Certification	Order number
UL 758 AWM Style 2464	**L46910-L2-H36**



Construction	
Conductor	3 x1x stranded bare copper wire 14 AWG, insulation of PVC 2 x glas optical fiber insulation of FRNC
Core	3 wires, 2 optical fibers
Shield	Shield braiding of tinned copper wires
Jacket	Polyvinylchloride (PVC) black
Diameter	4.3 mm 0.169 in 2.0 mm 0.079 in 12.2 ± 0.3 mm 0.480 ± 0.012 in



Application
Interconnection of base station (BTS or Node B) and transceiver unit according to RRH technology.

Temperature range		
Transport and storage	– 40 °C up to +70 °C	– 40 °F up to +158 °F
Installation	– 20 °C up to +60 °C	– 4 °F up to +140 °F
Operation	– 30 °C up to +70 °C	– 22 °F up tp +158 °F

Mechanical Characteristics		
min. bending radius, single	61 mm	2.402 in
min. bending radius, repeated	122 mm	4.803 in
weight about	218 kg/km	146 lb/1000ft

Installation Material

All installation materials for Flex*Line* Site Solutions are simple and easy to assemble. Durable quality components are used to provide the reliability for years of trouble-free installations.

- **angle adapters:** secure hangers to angle members or in areas where mounting holes are not easily accessible; allow locking to units of less than 22 mm thickness
- **clip hangers:** have a dual-clip locking mechanism to hold the cable firmly in place and offer different mounting options
- **round member adapter kits:** provide an easy method for supporting transmission lines to small diameter pipes or poles and contain adjustable clamps.
- **coax block clamp sets:** each unit holds two cables, allowing a compact bundle of six runs to be supported by stacking three blocks
- **hanger clamp sets:** each set holds up to three runs of cables in the smallest area possible
- **feed-thru entry panels 4":** these aluminium panels multiple cable runs to enter buildings and shelters and can be used in interior and exterior wall mounting applications
- **feed-thru boot assemblies:** each assembly includes the boot and two round member adapter clamps

Angle adaptor

Dimension	Kit quantity	Order number
with 10 mm tapped hole	10 pcs.	S45055-Z61-A952-LA

Clip hanger

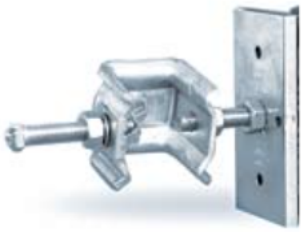
Cable type	Kit quantity	Order number
Flex*Line* 1/2" R	10 pcs.	S45055-Z61-A961-LA
Flex*Line* 7/8" H + R		S45055-Z61-A962-LA
Flex*Line* 1 1/4" R		S45055-Z61-A963-LA
Flex*Line* 1 5/8" R		S45055-Z61-A964-LA

Round member adapter kits

Dimension	Kit quantity	Cable type
1" - 2" (25.4 mm - 50.8 mm)	10 pcs.	S45055-Z61-A953-LA
2" - 3" (50.8 mm - 76.2 mm)		S45055-Z61-A954-LA
3" - 4" (76.2 mm - 101.6 mm)		S45055-Z61-A955-LA
4" - 5" (101.6 mm - 127.0 mm)		S45055-Z61-A956-LA
5" - 6" (127.0 mm - 152.4 mm)		S45055-Z61-A957-LA
6" - 8" (152.4 mm - 203.2 mm)		S45055-Z61-A958-LA

Adjustable clamps

Dimension	Kit quantity	Order number
2" - 7" (50.8 mm - 177.8 mm)	1 pcs.	S45055-Z61-A959-LA
1/2" - 1-7/8" (12.7 mm - 47.6 mm)		S45055-Z61-A960-LA



Right angle adapter

Clip hanger

Coax block set, 2, 4 and 6 holes

Feeder clamp stack type

Feed through entry panel, 4 ports, 2x2

Feed through boot assembly, 3 holes

Coax block clamp set

Cable type	Order number	Description
FlexLine 1/2" R	S45055-Z61-A965-LA	single stack 2 runs
	S45055-Z61-A966-LA	double stack 4 runs
	S45055-Z61-A967-LA	triple stack 6 runs
FlexLine 7/8" H + R	S45055-Z61-A968-LA	single stack 2 runs
	S45055-Z61-A969-LA	double stack 4 runs
	S45055-Z61-A970-LA	triple stack 6 runs
FlexLine 1 1/4" R	S45055-Z61-A971-LA	single stack 2 runs
	S45055-Z61-A972-LA	double stack 4 runs
	S45055-Z61-A973-LA	triple stack 6 runs
FlexLine 1 5/8" R	S45055-Z61-A974-LA	single stack 2 runs
	S45055-Z61-A975-LA	double stack 4 runs
	S45055-Z61-A976-LA	triple stack 6 runs

Feed trough entry panel 4" (101.6mm)

Order number	Description
S45055-Z61-A989-LA	1 port, 1 x 1
S45055-Z61-A990-LA	2 ports, 1 x 2
S45055-Z61-A991-LA	4 ports, 2 x 2
S45055-Z61-A992-LA	6 ports, 2 x 3
S45055-Z61-A993-LA	8 ports, 2 x 4
S45055-Z61-A994-LA	9 ports, 3 x 3
S45055-Z61-A995-LA	10 ports, 2 x 5
S45055-Z61-A996-LA	12 ports, 3 x 4

Hanger clamp set

Cable type	Order number	Description
FlexLine 1/2" R	S45055-Z61-A977-LA	for 1 run
	S45055-Z61-A978-LA	for 2 runs
	S45055-Z61-A979-LA	for 3 runs
FlexLine 7/8" H + R	S45055-Z61-A980-LA	for 1 run
	S45055-Z61-A981-LA	for 2 runs
	S45055-Z61-A982-LA	for 3 runs
FlexLine 1 1/4" R	S45055-Z61-A983-LA	for 1 run
	S45055-Z61-A984-LA	for 2 runs
	S45055-Z61-A985-LA	for 3 runs
FlexLine 1 5/8" R	S45055-Z61-A986-LA	for 1 run
	S45055-Z61-A987-LA	for 2 runs
	S45055-Z61-A988-LA	for 3 runs

Feed trough boot assembly 4" (101.6mm)

Cable type	Order number	Description
FlexLine 213, FlexLine 214, FlexLine 400	S45055-Z61-A997-LA	6 holes
FlexLine 1/2" R	S45055-Z61-A998-LA	1 holes
	S45055-Z61-A999-LA	2 holes
	S45055-Z61-A1000-LA	3 holes
	S45055-Z61-A1001-LA	4 holes
	S45055-Z61-A1002-LA	5 holes
FlexLine 1/2" S	S45055-Z61-A1003-LA	1 holes
	S45055-Z61-A1004-LA	2 holes
	S45055-Z61-A1005-LA	3 holes
	S45055-Z61-A1006-LA	4 holes
FlexLine 7/8" H + R	S45055-Z61-A1007-LA	1 holes
	S45055-Z61-A1008-LA	2 holes
	S45055-Z61-A1009-LA	3 holes
	S45055-Z61-A1010-LA	4 holes
FlexLine 1 1/4" R	S45055-Z61-A1011-LA	1 holes
FlexLine 1 5/8" R	S45055-Z61-A1012-LA	1 holes

Insulation and Weatherproofing

3M™ Cold Shrink Kit

The cold shrink sealing kits are specially designed for cable installations. Cold shrink is the fastest way to secure waterproof protection for connectors, splices and jumper-antenna interfaces. Installation is quick and easy and no tools are required. The shrinking process is performed by removing (unwinding) the core from inner side of the cold shrink kit.

Weatherproofing Tapes

Weatherproofing tapes are used for protection of connectors, splices and interfaces that are exposed to corrosive environmental conditions. They also help to prevent the loosening of connectors at interfaces that are subjected to vibration.

Universal Weatherproofing Kit

These kits are used to protect connector junctions from moisture ingress and to prevent vibration from loosening the connection. They accommodate connections consisting of any size from Flex*Line* 58 to 1 5/8", simplifying ordering and inventory management and installation setup. The kits feature a combination of butyl mastic and electrical tapes, which are applied using a multi-layer wrapping procedure to create a long-term environmental seal for main feed, jumper, and antenna connections.

3M Cold shrink™	Supported cable types	Application diameter	Length	Order number
Cold Shrink™ jumper/antenna 1/2"	Flex*Line* 1/2" - Antenna connector	39.0 mm – 13.5 mm	150 mm (5.9 in)	**S45055-Z61-A433**
Cold Shrink Coax-Kit 1/2" to 7/8"	Flex*Line* 1/2" to Flex*Line* 7/8"	49.3 mm – 13.5 mm	220 mm (8.7 in)	**S45055-Z61-A434**
Cold Shrink Coax-Kit 1/2" to 1 5/8"	Flex*Line* 1/2" to Flex*Line* 1 5/8"	67.8 mm – 13.5 mm	280 mm (11 in)	**S45055-Z61-A435**

3M™ Insulating material	Dimensions	Length per roll	Operating temperature	Order number
Scotchfil, Electrical insulation putty	38 mm x 3.20 mm (1.5 in x 0.125 in)	1.5 m (4.9 ft)	up to +80 °C (176 °F)	**S45055-Z61-A436**
Scotch 23, All voltage splicing tape	19 mm x 0.75 mm (0.75 in x 0.03 in)	9 m (29.5 ft)	up to +90 °C (194 °F)	**S45055-Z61-A437**
Scotch 710, Vinyl electrical tape	19 mm x 0.17 mm (0.75 in x 0.01 in)	20 m (65.6 ft)	–10 °C to +90 °C (14 °F to 194 °F)	**S45055-Z61-A438**
Scotch 33+, Vinyl electrical tape, bk	19 mm x 0.18 mm (0.75 in x 0.01 in)	6 m (19.7 ft)	up to +105 °C (221 °F)	**S45055-Z61-A604**
Scotch 33+, Vinyl electrical tape, bk	19 mm x 0.18 mm (0.75 in x 0.01 in)	20 m (65.6 ft)	up to +105 °C (221 °F)	**S45055-Z61-A605**
Scotch 33+, Vinyl electrical tape, bk	19 mm x 0.18 mm (0.75 in x 0.01 in)	33 m (9.8 ft)	up to +105 °C (221 °F)	**S45055-Z61-A607**
Scotch 33+, Vinyl electrical tape, gy	19 mm x 0.18 mm (0.75 in x 0.01 in)	20 m (65.6 ft)	up to +105 °C (221 °F)	**S45055-Z61-A829**

Insulating material	Dimensions	Length per roll	Operating temperature	Order number
SCAPA 34, Electrical insulation putty	38 mm x 3.00 mm (1.5 in x 0.125 in)	1.5 m (4.9 ft)	– 30 °C to +90 °C (– 22 °F to 194 °F)	**S45055-Z61-A728**
NAS 1, Self agglomerating silicon rubber tape	25 mm x 0.50 mm (0.98 in x 0.02 in)	1.0 m (3.3 ft)	– 50 °C to +150 °C (– 58 °F to 302 °F)	**S45055-Z61-A444**
NAS 10, Self agglomerating silicon rubber tape	25 mm x 0.50 mm (0.98 in x 0.02 in)	10 m (32.8 ft)	– 50 °C to +150 °C (– 58 °F to 302 °F)	**S45055-Z61-A445**
NEP 19, Self agglomerating tape	19 mm x 0,75 mm (0.75 in x 0.03 in)	10 m (32.8 ft)	– 40 °C to +70 °C (– 40 °F to 158 °F)	**S45055-Z61-A705**

Heat-shrinking tubes for the protection of cable joints	Supported cable types	Application diameter	Length	Order number
MWT-M 25/ 8, Heat shrinking tubes	Flex*Line* 1/2" to Flex*Line* 3/8"	25 mm (0.984 in) (shrinked 8 mm (0.315 in))	1 m (3.3 ft)	**S45055-Z61-A574**
MWT-M 35/ 12, Heat shrinking tubes	Flex*Line* 7/8"	35 mm (1.378 in) (shrinked 12 mm (0.472 in))	1 m (3.3 ft)	**S45055-Z61-A575**
MWT-M 50/ 16, Heat shrinking tubes	Flex*Line* 1 1/4"	50 mm (1.969 in) (shrinked 16 mm (0.630 in))	1 m (3.3 ft)	**S45055-Z61-A576**
MWT-M 63/ 19, Heat shrinking tubes	Flex*Line* 1 5/8"	63 mm (2.480 in) (shrinked 19 mm (0.748 in))	1 m (3.3 ft)	**S45055-Z61-A577**

Universal Weatherproofing kit	for connection size	Connections per kit	Order number
6x butyl mastic tape & 3x wide electrical tape	1/2" to 7/8"	6	**S45055-Z61-A1021-LA**
	1/2" to 1 1/4"	5	
	1/2" to 1 5/8"	4	
	1/2" to 1/2"	8	
	7/8" to 7/8"	4	
	1 1/4" to 1 1/4"	3	
	1 5/8" to 1 5/8"	2	

Hoisting Grips

Hoisting grips are important tools for the installation of Flex*Line* cables. In use for many years, hoisting grips ensure a smooth and safe distribution of tensile forces from the pulling member onto the cable.

Only with a suitable hoisting grip, can the maximum cable pull force be applied without elongation, deformation or damage. A wide range of hoisting grips are offered.
The assortment of hoisting grips includes both open and closed versions. The closed version is used at the end of a standard feeder cable. The open version is typically used on feeder cables with attached connectors and can be applied at any point along the cable. Open and closed versions are offered in either galvanized steel or stainless steel.

Cable type	Description	Application diameter		Order number
Flex*Line* 1/2" R	Cable grip, closed, galvanized steel	15 –18 mm	(0.59 – 0.71 in)	**S45055-Z61-A568**
	Cable grip, closed, stainless steel	16 –18 mm	(0.59 – 0.71 in)	**S45055-Z61-A588**
	Cable grip, lace-up, galvanized steel	15 – 25 mm	(0.59 – 0.98 in)	**S45055-Z61-A715**
	Cable grip, lace-up, stainless steel	16 – 25 mm	(0.59 – 0.98 in)	**S45055-Z61-A718**
Flex*Line* 7/8" H + R + R low loss	Cable grip, closed, galvanized steel	22 – 28 mm	(0.87 – 1.10 in)	**S45055-Z61-A569**
	Cable grip, closed, stainless steel	23 – 28 mm	(0.87 – 1.10 in)	**S45055-Z61-A589**
	Cable grip, lace-up, galvanized steel	25 – 45 mm	(0.98 – 1.77 in)	**S45055-Z61-A716**
	Cable grip, lace-up, stainless steel	25 – 45 mm	(0.98 – 1.77 in)	**S45055-Z61-A719**
Flex*Line* 1 1/4" R	Cable grip, closed, galvanized steel	37 – 44 mm	(1.46 – 1.73 in)	**S45055-Z61-A570**
	Cable grip, closed, stainless steel	37 – 44 mm	(1.46 – 1.73 in)	**S45055-Z61-A590**
	Cable grip, lace-up, galvanized steel	25 – 45 mm	(0.98 – 1.77 in)	**S45055-Z61-A716**
	Cable grip, lace-up, stainless steel	25 – 45 mm	(0.98 – 1.77 in)	**S45055-Z61-A719**
Flex*Line* 1 5/8" R	Cable grip, closed, galvanized steel	50 – 55 mm	(1.97 – 2.17 in)	**S45055-Z61-A571**
	Cable grip, closed, stainless steel	50 – 55 mm	(1.97 – 2.17 in)	**S45055-Z61-A591**
	Cable grip, lace-up, galvanized steel	45 – 60 mm	(0.98 – 2.36 in)	**S45055-Z61-A717**
	Cable grip, lace-up, stainless steel	45 – 60 mm	(0.98 – 2.36 in)	**S45055-Z61-A720**

Mechanical characteristics

Inner conductor

The inner conductors of corrugated Flex*Line* Coaxial cables consist of copper wire, copperclad aluminium wire or a copper tube. For corrugated cables with small dimensions or braided Flex*Line* Coaxial cables, wires or even litz wires are used to guarantee sufficient flexibility. The inner conductors of corrugated Flex*Line* Coaxial cables with larger dimensions are made of copper tubes. This ensures low weight as well as the necessary flexibility. Spiral corrugation of the inner conductor tube lends the corrugated Flex*Line* Coaxial cable additional flexibility.

Outer conductor

The outer conductor of corrugated Flex*Line* Coaxial cables is formed by a welded copper tube with either spiral or ring-shaped corrugations. The welded copper tube guarantees RF shielding with screening attenuation values in excess of 120 dB. Spiral corrugations, braids and foils are used for highly flexible cable versions. The deep and tightly spaced corrugations in the outer conductor of corrugated Flex*Line* Coaxial cables result in the smallest possible bending radii and highest flexibility. Flex*Line* Coaxial cables are often used for jumper cables.

Dielectric

In all Flex*Line* Coaxial cables, highly foamed polyethylene ensures excellent attenuation to be achieved with the smallest possible dimensions. A thin layer of unfoamed polyethylene is applied directly to the inner conductor so that the dielectric can be stripped with ease. A physical foaming process produces up to 80% of the polyethylene with a fine-pore, non-hygroscopic cell structure that lays the foundation for the cable's electrical performance. High foaming means a high proportion of air in the dielectric which results in lower weight, and attenuation characteristics approaching those of air dielectric cables of similar size.

Jacket options

Black polyethylene is the standard outer jacket for all Flex*Line* cables. This material is suitable for indoor and outdoor use (also underground). It is UV-resistant and halogen-free, and develops no corrosive gases in case of fire.

For applications which demand flame-retardant cables an outer cable jacket made of FRNC material (Flame Retardant Non Corrosive) is available. The FRNC-material is also halogen-free and enables the cable to comply with the various listed IEC, NEC and UL flame tests. FRNC material is used as the standard outer jacket for Flex*Line* Coaxial jumper cables. All Flex*Line* cable jackets are available in various colours for both polyethylene and FRNC material.

Specifications according to IEC, NEC and UL

IEC 60754-1
Test on gases evolved during combustion of materials from cables part 1: Determination of the amount of halogen acid gas

IEC 60754-2
Test on gases evolved during combustion of electric cables part 2: Determination of degree of acidity of gases evolved during the combustion of materials taken from electric cables by measuring pH and conductivity

IEC 61034
Measurement of smoke density of electric cables burning under defined conditions

IEC 60332-1
Tests on electric cables under fire conditions part 1: Test on a single vertical insulated wire or cable

IEC 60332-3.C
Tests on electric cables under fire conditions part 3: Tests on bunched wires or cables category C

UL 1581, sec. 1080
Vertical wire flame test ,VW-1

CATV
Community Antenna Television Systems compliant with the NEC (National Electric Code) require a flame test in accordance with UL (Underwriters Laboratories) 1685 vertical tray (UL1581 sec.1160).

Tensile strength

The tensile strength of a cable defines the maximum permissible tensile force which may be applied to the cable during installation or handling. The unit of measurement is Newton (N) and takes into account all the materials used in the cable. Exceeding the quoted values may result in impairment of the cable's mechanical or electrical characteristics. The values are determined by technical measuring instruments and include an additional safety factor.

Bending radius

Specific minimal bending radii are defined for all Flex*Line* types and cable sizes. A distinction is drawn between single bending and repeated bending. In the case of single bending, the cable should not be bent back again after reaching its minimal bending radius. Repeated bending allows the cable to be bent to the minimal bending radius at least 15 times. It is typical for a cable to be bent between 40 and 50 times without any impairment of its transmission characteristics. A cable's behaviour and stability when subjected to repeated bending is very important during installation and assembly.

Tests are conducted parallel to production by subjecting a cable specimen to repeated alternating bends up to the minimal permissible bending radius and then checking the cable's characteristics.

Corrugations of the outer conductor enable the smallest bending radii with corrugated Flex*Line* Coaxial cables. Electrical and mechanical values of all Flex*Line* cables remain stable even after repeated bending. The minimum bending radii of Flex*Line* cables guarantee simple and reliable installation of the cables, resulting in dependable and endurable connections.

P_{in} = power input into a cable of a specific length in W; P_{out} = power at the other end of the cable in W; α_R = return loss in dB; r = reflection factor; s = voltage standing wave ratio (VSWR); Z_1 = input impedance of the cable in Ω; Z_2 = impedance of the reflection wave in Ω

Temperature ranges

Temperature ranges are defined for cables in storage, during installation and operation. The following table shows the temperature ranges which apply for cables with a standard polyethylene jacket or FRNC jacket:

	Polyethylene jacket	FRNC jacket
Storage:	– 70 °C to +85 °C	– 70 °C to +85 °C
Installation:	– 40 °C to +60 °C	– 40 °C to +60 °C
Operation:	– 55 °C to +85 °C	– 55 °C to +85 °C

The cables are approved for continuous duty within these temperature ranges.

Recommended hanger spacing

Various aspects need to be considered when fastening corrugated cables. Hangers must be spaced in accordance with specific values that are dependent on the location, the environmental conditions and the choice of installation materials. Extreme loads to the cable due to icing or strong winds must be taken into account when calculating the distance between the hangers.

The recommended maximum hanger spacings for the various cable sizes are shown in the following table:

Flex*Line* Coaxial with corrugated outer conductor

1/4"S	3/8"S	1/2"S	1/2"R	5/8"R	7/8"S	7/8"R	1 1/4"R	1 5/8"R
0.6 m	0.6 m	0.8 m	0.8 m	1.0 m	1.0 m	1.0 m	1.2 m	1.5 m

Electrical characteristics

DC resistance

The direct current resistance denotes the ohmic value of the inner or outer conductor based on a length of 1 km and expressed in Ω/km. It is dependent on the cross section of the conductor and on the conductor materials (specific conductance).

DC breakdown voltage

The DC breakdown voltage is determined between the inner conductor and the outer conductor. It is defined as the voltage at which the insulation between two conductors will fail and allow electricity to conduct or 'arc'. The DC breakdown voltage depends on the type of dielectric used and its dimensions. This value is established for each cable size and forms the basis for determining and calculating the permissible peak power rating.

Capacitance

For coaxial cables the capacitance is calculated directly from the dimensions of the cable and the dielectric constant "ε_r" of the dielectric. The relative dielectric constant depends on the material used and the degree of foaming. The capacitance value depends on the length of the cable and is expressed in farad /unit of length.

$$C' = \frac{\varepsilon_r \cdot 10^3}{18 \cdot \ln\left(\frac{D}{d}\right)} \quad [\text{in pF / m}]$$

Relative velocity of propagation

This defines the velocity of propagation of a wave along the cable in relation to the speed of light in a vacuum. The relative velocity of propagation depends essentially on the dielectric constant "ε_r", which is derived from the type of material used and its degree of foaming. High foaming of the dielectric results in values of 88 % for Flex*Line* Coaxial cables.

$$V_r = \frac{100}{\sqrt{\varepsilon_r}} \quad [\text{in \%}]$$

Impedance

Impedance is defined by the ratio of wave voltages to wave currents at each point along the transmission path. This ratio of voltage to current is constant for the superimposed waves (going and reflected/returning) and thus represents a characteristic parameter of the cable. The impedance is dependent on the frequency but approximates to a defined value for high frequencies. This property enables coaxial cables to be divided into defined impedance classes. Typical examples are 50 Ω cables for antenna systems and 75 Ω cables for television systems. Corrugated cables are normally used for antenna systems and have an impedance of 50 Ω. Tolerances are held very low at +/– 1 Ω for excellent adaptation (for High Power types ± 2 Ω).

The following formula is used for calculating impedance values:

$$Z = \frac{60}{\sqrt{\varepsilon_r}} \cdot \ln\left(\frac{D}{d}\right) \quad [\text{in } \Omega]$$

Attenuation

Attenuation is one of the main criteria for selecting a suitable type of cable. Attenuation is the decrease in signal level over a distance in the direction of propagation. Attenuation is expressed as a ratio (dB) over distance in either feet or meters. The higher the frequency, the greater a cable's attenuation. Every transmission system attenuates the signal when the various components are connected. In addition to frequency, the main factors that influence attenuation are the cross section of the conductors and the dimensions and characteristics of the materials. Attenuation is defined by the following equation:

$$\alpha = 10 \cdot \log\left(\frac{P_{in}}{P_{out}}\right) \quad \text{[in dB / unit of length]}$$

A cable's attenuation is quoted for an ambient temperature of 20 °C. The higher the ambient temperature values and the hotter the cable becomes due to the power transmitted, the higher the attenuation.

Flex*Line* Coaxial cables feature excellent attenuation values. Maximum transmission distances can be realised due to their efficient signal propagation characteristics. The secret lies in the high foaming of the dielectric and the optimised dimensions of the cables. Which cable type is correct depends on the system requirements and the length of the connection.

Return loss – voltage standing wave ratio (VSWR)

Irregularities along the path of a cable and the fluctuations of impedance can result in reflections of the transmitted waves. The outcome can be interfering signals over the complete frequency spectrum of the transmission system. Periodic deviations will cause immense interference at a specific frequency through accumulation. The fact that all manufacturing processes are subject to certain fluctuations, means that reflections are to be found on every cable transmission path. Reflections can also arise at all cable to connector junctions.

Return loss is defined as the ratio in decibels (dB) of the input signal power level to the signal power level that is reflected from the irregularities along the path of the cable or cable system. Corrugated Flex*Line* Coaxial cables and connectors are specifically designed to provide return loss values of 26 dB in the respective frequency ranges of the transmission system.

These reflections are also defined by VSWR (voltage standing wave ratio). The VSWR is a measure of the ratio of the maximum voltage to the minimum voltage in the standing wave. The larger the impedance mismatch (fluctuations in impedance along the path of the cable system) the larger the amplitude of the standing wave. How well the cable and connectors are matched in impedance have a major impact on the VSWR performance of the cable system. When the impedances are improperly matched, reflections occur (increasing the amplitude of the standing wave) resulting in signal loss, which results in attenuation of the transmissions, poor reception or both. Corrugated Flex*Line* Coaxial cables and connectors are specifically designed to provide VSWR values of 1.105 in the respective frequency ranges of the transmission system.

$$\alpha_r = 20 \cdot \log\left(\frac{1}{r}\right) \qquad r = \frac{Z_1 - Z_2}{Z_1 + Z_2} \qquad s = \frac{1+r}{1-r} \quad \text{[in dB]}$$

The following conversion table provides an overview of the most important values:

Return loss	Voltage standing wave ratio
20.0	1.220
21.0	1.196
22.0	1.173
23.0	1.152
24.0	1.133
25.0	1.118
26.0	1.105
27.0	1.094
28.0	1.082
29.0	1.073
30.0	1.065
31.0	1.056
32.0	1.051
33.0	1.045
34.0	1.040
35.0	1.036
36.0	1.032
37.0	1.028
38.0	1.025
39.0	1.022
40.0	1.020

[Subject to error and change]

P_{in} = power input into a cable of a specific length in W; P_{out} = power at the other end of the cable in W; α_R = return loss in dB; r = reflection factor; s = voltage standing wave ratio (VSWR); Z_1 = input impedance of the cable in Ω; Z_2 = impedance of the reflection wave in Ω

Passive intermodulation

Passive intermodulation represents a further potential source of interference in the frequency range for transmission. It arises when two transmission signals form intermodulation products as the result of component nonlinearities (in this case cables and connectors). In particular the product of the third order is critical because it lies in the transmission range and can therefore interfere with the transmission signals.

Passive intermodulation mainly depends on the characteristics of the materials and on the quality of contact between the cable and the connector.

Resulting intermodulation products are measured by imputing two signals with defined frequencies into the transmission system. The degree of intermodulation is expressed as a signal level in either dBm or dBc (dBc = in relation to the carrier signal).

The measurement is conducted using carrier signals at levels of +43 dBm (20 W) and a frequency based on the range of application, e.g. GSM 900 or GSM 1800. Typical measured values for Flex*Line* Coaxial cable systems are < –117 dBm (< –160 dBc).

Cutoff frequency

Cutoff frequency is defined as the highest radio frequency that will pass through the cables. Above this frequency there is a risk of undefined modes (waves) arising and exerting a negative influence (increased attenuation) on the transmission. The cutoff frequency for each cable depends on the dimensions and materials.

The cutoff frequency can be calculated with the following equation:

$$f_c = \frac{1{,}91}{\sqrt{\varepsilon_r} \cdot (D + d)} \cdot 100 \quad \text{[in GHz]}$$

Maximum operating frequency

The maximum operating frequency is normally based on the cutoff frequency and includes a defined safety factor.

Peak power rating

The peak power rating is the input power achieved when operating the coaxial cable with the maximum RF operating voltage (peak value). The measurement is limited by the DC breakdown voltage between the cable's inner conductor and outer conductor. The peak power rating is a calculated value which is independent of the frequency.

Mean power rating

Flex*Line* Coaxial cables permit a continuous maximum temperature of 85 °C at the inner conductor, i.e. the heat generated by the continuous power must not exceed this value. The crucial factor is the material of the dielectric. The values quoted for the maximum continuous power rating are based on an ambient temperature of 40 °C and a voltage standing wave ratio of 1.0. The higher the ambient temperature, the lower the maximum permissible continuous power rating. Increasing the voltage standing wave ratio has the same effect. The continuous power rating is also affected by other ambient conditions, e.g. direct sunlight.

Shielding effectiveness

Shielding effectiveness is quoted as a measure of the shielding effect of a cable's construction. It defines the logarithmic ratio of the power, which is input into the cable to the power that is radiated from the cable. On corrugated Flex*Line* Coaxial cables the shielding attenuation is greater than 120 dB as a result of using a solid copper tube outer conductor with an RF-tight weld. Braided Flex*Line* Coaxial cables that contain a shielding foil typically achieve shielding effectiveness values of only 90 dB.

FlexLine®

Quality and Environment

LEONI quality management

A consistently high level of quality is vital for our products. This means that the entire process at LEONI – from a product´s planning to its completion – is constantly monitored. Our quality management system is certified in accordance with DIN/ISO 9001:2000 and is updated permanently.

Environment-friendly and safe

Of course, halogen-free versions of a great number of the cables in our range are also available. This does reduce the strain in the environment, it also means less smoke and corrosive emissions in the case of a fire – for your safety.

LEONI environmental management

For us, business success with ecological responsibility is not a contradiction in terms. Because of this, environmental protection is an intrinsic element of our corporate activities. Our environment management system is certified as complying with DIN EN ISO 14001, confirming that our environment policy is effectively implemented.

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