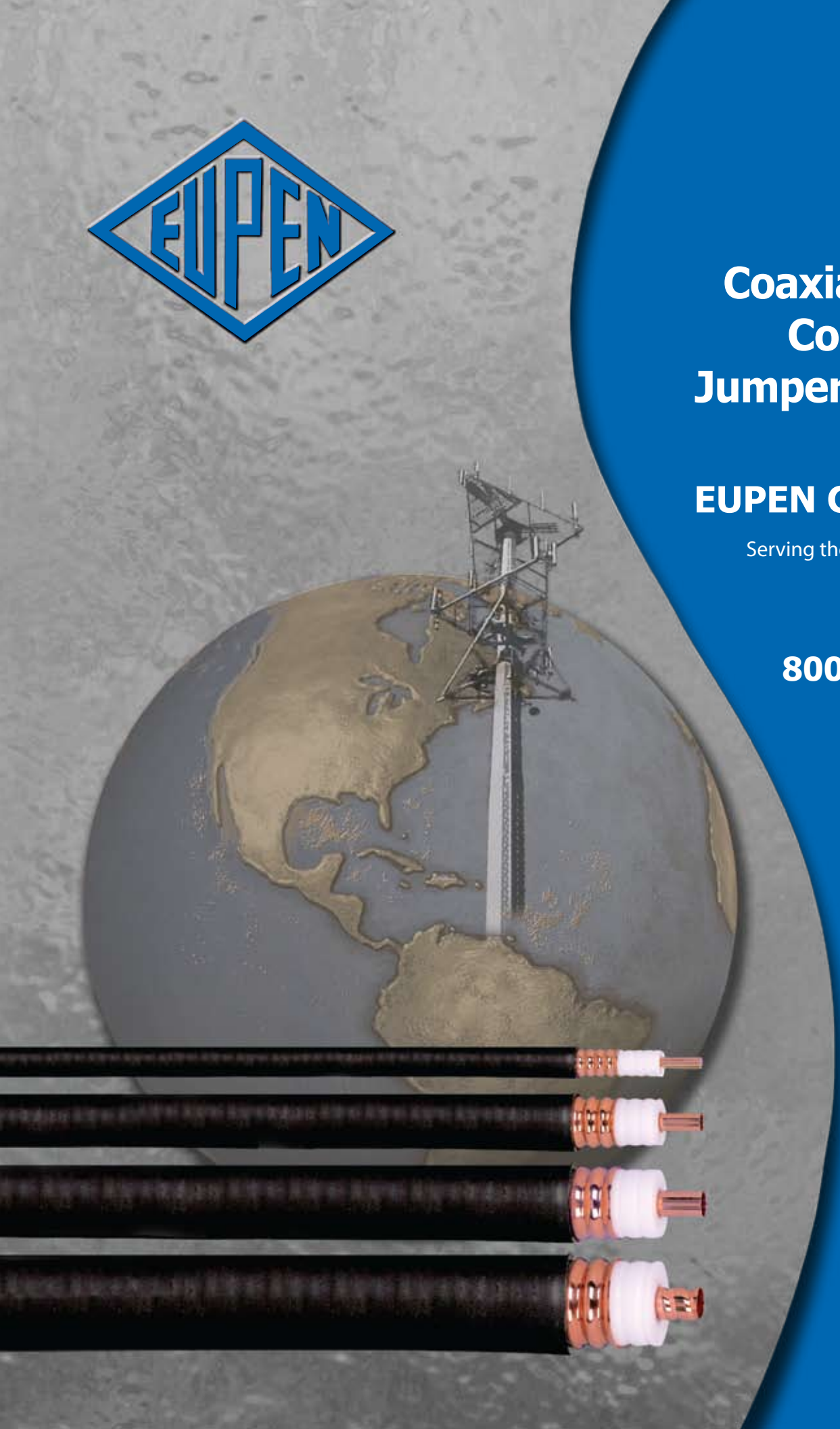

Coaxial Cables, Connectors, Jumpers & Tools

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Eupen Today

Eupen has redefined OEM-BASED LOGISTICS in the wireless industry, setting new standards for performance, service and value in manufacturing and provisioning wireless infrastructure products. Eupen has built a network of industrial processing and logistics centers to provide regional excellence on a national platform. Eupen locations in Tampa, FL; Dallas, TX; Phillipsburg, NJ; Salem, OR and Mexico City, Mexico provide a complete line of site implementation products and services, including site steel components, anywhere in North America in the shortest lead time and at the most cost effective freight terms possible.

The people of Eupen are committed to providing creative solutions and pinpoint accuracy. Eupen is called on by the best in wireless to solve their toughest problems in their most challenging markets. Eupen's low loss cable, connectors and jumper assemblies are in a class of their own. Eupen engineering maximizes electrical performance and mechanical integrity.

Call your Eupen customer service manager today at 1(800) 419-5100 or visit us on line at www.eupen.us.
Choose Eupen when it just has to be right.

Eupen, a Company Rich in History, Tradition and Excellence

Kabelwerk Eupen's history can be traced back to 1747. The company based in Eupen, Belgium fabricated all kinds of jute ropes and hawsers.

Their wide knowledge and experience, acquired over many decades, led the brothers Carl and August Bourseaux to begin manufacturing cables toward the end of the 19th century.

Years before the Second World War, the company had a fully-integrated cable factory with several other sidelines.

Plastics appeared in the 1950's. The company realized the importance of this new material and installed two new production lines: one for plastic tube extrusion, and the other for the *first production of synthetic foam in Europe*.

A pilot project was set up in 1962 where two Belgium towns had cable television transmission systems installed using coaxial cable manufactured by Kabelwerk Eupen.

In the 70's Eupen was at the forefront of an industry-wide awareness for safety. Alongside the research and extensive investments made by the energy generating companies, Kabelwerk Eupen began work on safety cables for nuclear power plants.

In the early 1980's the company's nuclear power plant safety cables fully complied with the IEEE quality control standards. Long before the formation of ISO, Kabelwerk Eupen was already committed to promoting the concept of quality.

The 1990's were marked by increasingly intense research and development, continuous refinement of manufacturing processes and the pursuit of the highest possible product quality.

Consequently, the technology and expertise gained in the fields of cables, pipes, and foam were combined to complement each other, providing a sound structural framework for Eupen's move into the 21st century.

In 2005, Eupen introduced EC7-50A 1 5/8" A-Series Low Loss coaxial feeder cable. In 2006, Eupen continued with the introduction of 1 1/4" and 7/8" low loss feeder cables, thereby becoming the only company to offer low loss technology in all three cable sizes. These cables are designed to maximize electrical performance and mechanical integrity. The pairing of Eupen MonoBlock connectors with A-Series Low Loss cable provides a feeder system performance advantage unmatched in the industry today.

Table of Contents

EUPEN Corrugated Copper Cable

Wireless, microwave, and broadcast communication systems require high quality coaxial cable and connections for very low loss and high power signal transmission. Eupen cable and connectors are specifically designed to meet the needs of these modern radio communications systems.

Eupen corrugated copper cable offers better electrical performance and greater long-term durability when compared to other corrugated and all smooth-walled cables. Eupen's very low loss, high mechanical strength and excellent flexibility, make it the best choice for the stringent requirements of today's 50 Ohm wireless applications. Eupen's innovative design, careful choice of raw materials, consistent manufacturing processes and stringent quality assurance systems, result in a cable with superior performance. This allows Eupen to offer the best warranty in the industry – 12 years.

Eupen cable products, with low density cellular polyethylene foam dielectric and ring-corrugated copper outer conductor feature:

- Very Low Loss
- High Crush Resistance
- Excellent Flexibility
- Longitudinal Watertightness

The dielectric is a cellular polyethylene foam manufactured by a proprietary process using ozone-friendly expansion gas. A high foaming ratio guarantees low attenuation and provides superior structural support of the conductors. The foam is bonded to the inner conductor by a pre-coat layer. This ensures good adhesion while also allowing easy and clean removal of the dielectric during connector installation.

The ring corrugation of the copper outer conductor mechanically retains the dielectric. In addition, the dielectric is adhered to the outer conductor. This construction prevents relative movement between the inner and the outer conductor due to bending, pulling, and temperature variations.

Eupen standard cable features a weather-resistant black Durathene™ PE jacket, suitable for indoor, outdoor or underground installation. UV protection is provided by 5% carbon black. Additional colors and fire retardant jackets are available upon request.

Electrical specifications of Eupen cable are unsurpassed. Every reel is swept for attenuation and return loss before it leaves the factory. When terminated with Eupen connectors, return loss is typically better than 30 dB and guaranteed to be at least 25 dB, up to 2.5 Ghz. Eupen attenuation specifications are the best in the industry.

Eupen offers corrugated copper cable in a complete range of sizes from 1/4" to 1 5/8" to fit all requirements.

Eupen offers the most advanced low loss cable in the three primary feeder sizes:

• EC5-50A	7/8"	Low Loss
• EC6-50A	1 1/4"	Low Loss
• EC7-50A	1 5/8"	Low Loss

All coaxial cables are constructed in accordance with MIL spec MIL-C-28830.

Eupen Connectors

The connector is arguably the single most important component in the feeder system. It must be both easy to install and provide a high degree of long lasting electrical and mechanical performance.

Eupen connectors are designed for fast, easy, and reliable installation. Eupen offers the most innovative and advanced connector installation tooling available. See more about connector installation in the Tool section of this catalog.

For long term stable performance a connector must accomplish three things:

- It must be watertight.
- It must have RF transparency.
- It must maintain contact force and surface area.

The connector functions as the first line of defense against water ingress. Eupen connectors are equipped with heavy gauge, high compression silicone rubber O-rings, designed to seat in the corrugation valley – not on the peak, and not on the jacket where effectiveness would be minimal at best. Eupen connectors are rated to meet or exceed IP 68 waterproof specifications.

Eupen connectors are designed with RF transparency in mind. The heavy-duty bodies are machined precisely so that Impedance is held to exacting levels, allowing the lowest possible reflection loss.

Patented connector designs are the key to Eupen connectors' long-term performance stability. Eupen connectors are designed to have elastic junctions. Compared to the conventional copper alloys used by other manufacturers, Eupen's use of silver-plated, beryllium-copper spring finger contacts provides superior and sustained mechanical elasticity. Eupen's unique mechanical design coupled with the use of beryllium-copper creates high pressure RF connections. This ensures that Eupen connectors will maintain their low loss and low PIM performance for the life of your system.

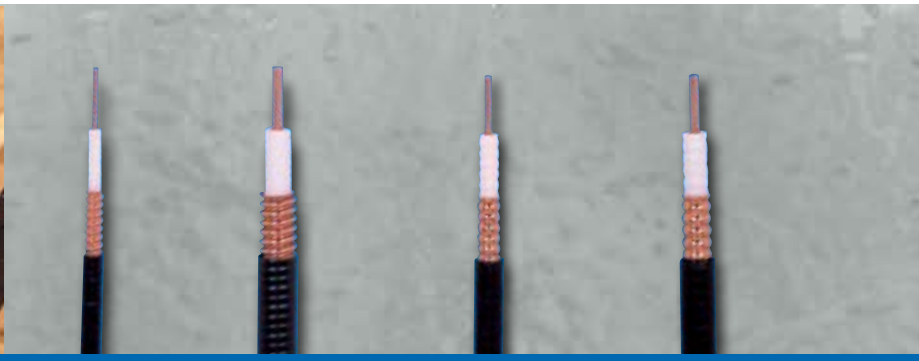
The Eupen MonoBlock connector stands at the forefront of modern connector design. It is absolutely the most reliable, highest performing 50 Ohm coaxial connector available today. This design is available for all three primary feeder sizes: EC5, EC6 and EC7.

The MonoBlock connector, together with the latest advancements in Eupen Low Loss cable, offers a total network feeder system package delivering performance and reliability untouched by any other product – or combination of products – on the market.

Materials Used in the Connector:

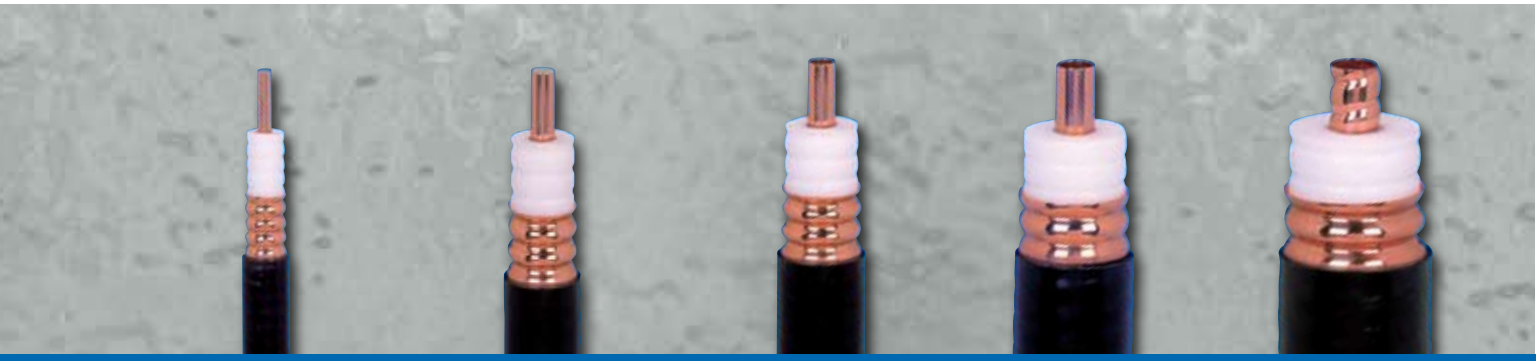
External Parts:	Passivated silver-plated or electroless nickel-plated brass
Outer Contact:	Passivated silver-plated brass
Inner Contact:	Passivated silver-plated Cu-Be and brass
Dielectric:	PTFE/TPX

EUPEN CORRUGATED COPPER COAXIAL CABLE SELECTION GUIDE



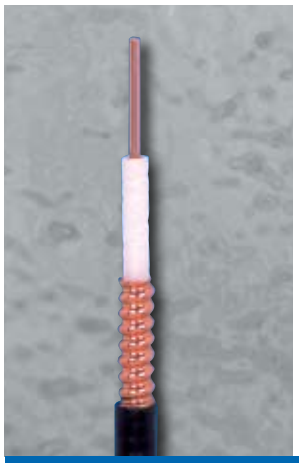
	HIFLEX SERIES		STANDARD SERIES	
Nominal Sizes	**1/4"**	**1/2"**	**1/4"**	**3/8"**
Catalog Pages	**8 & 9**	**10 & 11**	**12 & 13**	**14 & 15**
Factory Swept Low VSWR Cable Cellular/PCS 806-960 MHz & 1700-2200 MHZ	**EC1-50-HF**	**EC4-50-HF**	**EC1-50**	**EC2-50**
Characteristics				
Cut-Off Frequency (GHz)	22	13.2	18.6	14.2
RF Peak Power Rating (kW)	3.6	12.8	6.9	11
Velocity Ratio (%)	82	82	82	88
Minimum Single Bending Radius (in)	1.0	1.2	1.2	1.6
Attenuation, dB/100ft Standard Conditions: VSWR 1.0; Ambient Temperature 68º F				
30 MHz	0.932	0.513	0.708	0.515
100 MHz	1.72	0.955	1.31	0.950
450 MHz	3.72	2.12	2.86	2.07
1000 MHz	5.66	3.30	4.38	3.16
2000 MHz	8.20	4.90	6.39	4.60
6000 MHz	15.0	9.51	12.0	8.55
Average Power Rating kW, Standard Conditions: VSWR 1.0; Ambient Temperature 104º F Inner Conductor Temperature 212º F no solar loading				
30 MHz	2.26	5.66	3.24	4.11
100 MHz	1.23	3.04	1.75	2.23
450 MHz	0.57	1.37	0.80	1.02
1000 MHz	0.37	0.88	0.52	0.67
2000 MHz	0.26	0.59	0.36	0.46
6000 MHz	0.14	0.31	0.19	0.25

EUPEN CORRUGATED COPPER COAXIAL CABLE SELECTION GUIDE



STANDARD SERIES

1/2"	5/8"	7/8"	1 1/4"	1 5/8"
16 & 17	18 & 19	20 & 21	22 & 23	24 & 25
EC4-50	EC4.5-50	EC5-50A	EC6-50A	EC7-50A
Characteristics				
9.8	6.5	5.1	3.7	2.7
25.6	62	86	184	302
88	88	89	88	89
2.8	4	4	8	8
Attenuation, dB/100ft Standard Conditions: VSWR 1.0; Ambient Temperature 68º F				
0.357	0.246	0.189	0.134	0.110
0.661	0.456	0.347	0.247	0.203
1.45	1.00	0.762	0.549	0.449
2.22	1.54	1.17	0.850	0.694
3.25	2.26	1.71	1.26	1.03
6.11	4.27	–	–	–
Average Power Rating kW, Standard Conditions: VSWR 1.0; Ambient Temperature 104º F Inner Conductor Temperature 212º F no solar loading				
6.73	9.27	14.60	21.24	28.27
3.64	5.00	7.89	11.44	15.22
1.66	2.28	3.60	5.17	6.88
1.08	1.48	2.35	3.34	4.45
0.74	1.01	1.60	2.26	3.01
0.39	0.53	–	–	–



1/4" Hiflex Foam-Dielectric Coaxial Cable
Corrugated Copper – 50 Ohm

ITEM NUMBER	DESCRIPTION
EC1-50-HF	Hiflex Cable, standard jacket
EC1-50-HF-HLFR	Hiflex Cable, fire retardant, halogen free jacket

CONSTRUCTION

- **Inner conductor**
  - Material: copper clad aluminum
  - Diameter, in (mm): 0.075 (1.9)
- **Dielectric**
  - Material: microcell gas-injected PE
  - Diameter, in (mm): 0.181 (4.6)
- **Outer conductor**
  - Material: corrugated copper
  - Diameter, in (mm): 0.252 (6.4)
- **Outer sheath**
  - Material: Durathene™
  - Thickness, in (mm): 0.022 (0.55)
  - Diameter, in (mm): 0.295 (7.5)

MECHANICAL CHARACTERISTICS

- **Minimum bending radius**
  - a) Single bending, in (cm): 1.0 (2.5)
  - b) 15 repeated bends, in (cm): 1.0 (2.5)
- **Maximum pulling strength**, lb (kg): 67 (30)
- **Recommended temperature range**
  - Storage: -94 to +185°F (-70 to +85°C)
  - Installation: -40 to +140°F (-40 to +60°C)
  - Operation: -67 to +185°F (-55 to +85°C)
- **Maximum length per hoisting grip**, ft (m): 230 (70)
- **Maximum hanger spacing**, ft (m): —
- **Flat plate crush resistance**, lb/in (kg/mm): 101 (1.8)
- **Bending moment**, lb-ft (N•m): 0.8 (1.1)
- **Weight**, lb/ft (kg/m): 0.05 (0.08)

ELECTRICAL CHARACTERISTICS

- **Characteristic impedance**, : 50 ± 1.5
- **Nominal capacitance**, pF/ft (pF/m): 24.4 (80)
- **Relative propagation velocity**, %: 82
- **Inductance**, µH/ft (µH/m): 0.061 (0.20)
- **DC-resistance at 68°F (20°C)**
  - Inner conductor, /1000 ft (/1000 m): 2.80 (9.19)
  - Outer conductor, /1000 ft (/1000 m): 1.34 (4.40)
- **RF peak voltage**, kV: 0.60
- **RF peak power**, kW: 3.6
- **Cut-off frequency**, GHz: 22
- **Insulation resistance**, M /km: >>5000

ELECTRICAL CHARACTERISTICS

- **Attenuation and power rating**

Frequency (MHz)	Attenuation at 68°F (20°C)* (dB/100 ft)	(dB/100m)	Mean power rating** (kW)
10	0.536	1.76	3.93
20	0.759	2.49	2.77
30	0.932	3.06	2.26
50	1.21	3.96	1.74
88	1.61	5.28	1.31
100	1.72	5.63	1.23
108	1.79	5.86	1.18
150	2.11	6.93	1.00
174	2.28	7.47	0.92
200	2.45	8.03	0.86
300	3.02	9.89	0.70
400	3.50	11.5	0.60
450	3.72	12.2	0.57
500	3.93	12.9	0.54
512	3.98	13.1	0.53
600	4.32	14.2	0.49
700	4.69	15.4	0.45
800	5.03	16.5	0.42
824	5.11	16.8	0.41
894	5.33	17.5	0.39
960	5.54	18.2	0.38
1000	5.66	18.6	0.37
1250	6.37	20.9	0.33
1500	7.02	23.0	0.30
1700	7.51	24.6	0.28
1800	7.74	25.4	0.27
2000	8.20	26.9	0.26
2100	8.42	27.6	0.25
2200	8.63	28.3	0.24
2300	8.84	29.0	0.24
3000	10.2	33.5	0.21
3400	11.0	35.9	0.19
4000	12.0	39.3	0.18
5000	13.6	44.5	0.16
6000	15.0	49.4	0.14

* Nominal values

** Ambient temperature = 104°F (40°C); temperature of inner conductor = 212°F (100°C); VSWR = 1.0; no solar loading

1/4" Hiflex Coaxial Connectors

ITEM NUMBER	DESCRIPTION
NM50B14X	N-male, O-ring
NF50B14X	N-female, O-ring
7/16M50B14X	7/16 DIN male, O-ring
7/16F50B14X	7/16 DIN female, O-ring

For factory connector attachment, see Jumper Section, page 27.

ELECTRICAL

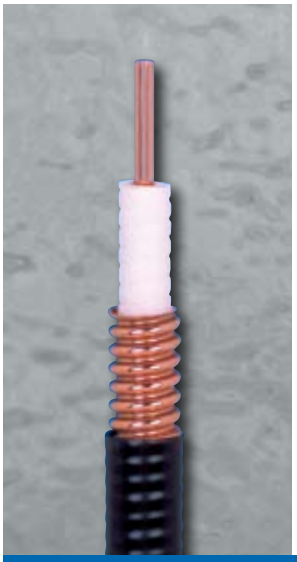
- **Nominal impedance**, Ω — 50
- **Return loss @ 2.5 GHz**, dB — -35
- **3rd order intermodulation product**, dBc — -155 (-163 typ)
- **Temperature range** — -40°F to +185°F (-40°C to +85°C)
- **Water immersion testing** — IP67 / IP68
- **Materials**

External parts	Passivated silver plated or electroless nickel plated brass
Outer contact	Passivated silver plated brass
Inner contact	Passivated silver plated Cu-Be
Dielectric	TXP / PTFE
O-rings	Silicone rubber

ACCESSORIES

For complete accessory, refer to Eupen Site Steel & Accessory Catalog.

DESCRIPTION	ITEM NUMBER
Tools *(See Tool Section page 45)*	
Cable Prep Tool	SPTC50B14X



1/2" Hiflex Foam-Dielectric Coaxial Cable
Corrugated Copper – 50 Ohm

ITEM NUMBER	DESCRIPTION
EC4-50-HF	Hiflex Cable, standard jacket
EC4-50-HF-HLFR	Hiflex Cable, fire retardant, halogen free jacket

CONSTRUCTION

- **Inner conductor**
  - Material: copper clad aluminum
  - Diameter, in (mm): 0.140 (3.55)
- **Dielectric**
  - Material: microcell gas-injected PE
  - Diameter, in (mm): 0.354 (9.0)
- **Outer conductor**
  - Material: corrugated copper
  - Diameter, in (mm): 0.480 (12.2)
- **Outer sheath**
  - Material: Durathene™
  - Thickness, in (mm): 0.028 (0.7)
  - Diameter, in (mm): 0.535 (13.6)

MECHANICAL CHARACTERISTICS

- **Minimum bending radius**
  - a) Single bending, in (cm): 1.2 (3)
  - b) 15 repeated bends, in (cm): 1.2 (3)
- **Maximum pulling strength**, lb (kg): 155 (70)
- **Recommended temperature range**
  - Storage: -94 to +185°F (-70 to +85°C)
  - Installation: -40 to +140°F (-40 to +60°C)
  - Operation: -67 to +185°F (-55 to +85°C)
- **Maximum length per hoisting grip**, ft (m): 230 (70)
- **Maximum hanger spacing**, ft (m): 1.5 (0.5)
- **Flat plate crush resistance**, lb/in (kg/mm): 115 (2.05)
- **Bending moment**, lb-ft (N•m): 1.6 (2.2)
- **Weight**, lb/ft (kg/m): 0.13 (0.20)

ELECTRICAL CHARACTERISTICS

- **Characteristic impedance**, 50 ± 1
- **Nominal capacitance**, pF/ft (pF/m): 25 (82)
- **Relative propagation velocity**, %: 82
- **Inductance**, µH/ft (µH/m): 0.062 (0.20)
- **DC-resistance at 68°F (20°C)**
  - Inner conductor, /1000 ft (/1000 m): 0.81 (2.65)
  - Outer conductor, /1000 ft (/1000 m): 0.91 (3.0)
- **RF peak voltage**, kV: 1.13
- **RF peak power**, kW: 12.8
- **Cut-off frequency**, GHz: 13.2
- **Insulation resistance**, M /km: ≥5000

ELECTRICAL CHARACTERISTICS

- **Attenuation and power rating**

Frequency (MHz)	Attenuation at 68°F (20°C)* (dB/100 ft)	(dB/100m)	Mean power rating** (kW)
10	0.293	0.963	9.90
20	0.417	1.37	6.96
30	0.513	1.68	5.66
50	0.667	2.19	4.35
88	0.894	2.93	3.25
100	0.955	3.13	3.04
108	0.995	3.26	2.92
150	1.18	3.88	2.46
174	1.28	4.19	2.27
200	1.37	4.51	2.11
300	1.71	5.60	1.70
400	1.99	6.53	1.46
450	2.12	6.96	1.37
500	2.25	7.38	1.29
512	2.28	7.47	1.28
600	2.48	8.15	1.17
700	2.70	8.87	1.07
800	2.91	9.55	1.00
824	2.96	9.71	0.98
894	3.10	10.2	0.94
960	3.22	10.6	0.90
1000	3.30	10.8	0.88
1250	3.74	12.3	0.78
1500	4.15	13.6	0.70
1700	4.46	14.6	0.65
1800	4.61	15.1	0.63
2000	4.90	16.1	0.59
2100	5.04	16.5	0.58
2200	5.18	17.0	0.56
2300	5.32	17.4	0.55
3000	6.22	20.4	0.47
3400	6.71	22.0	0.43
4000	7.40	24.3	0.39
5000	8.49	27.9	0.34
6000	9.51	31.2	0.31

* Nominal values
** Ambient temperature = 104°F (40°C); temperature of inner conductor = 212°F (100°C); VSWR = 1.0; no solar loading

1/2" Hiflex Coaxial Connectors

ITEM NUMBER	DESCRIPTION
NM50B12X	N-male, O-ring
NM50BL12X	N-male, right angle, O-ring
NF50B12X	N-female, O-ring
7/16M50B12X	7/16 DIN male, O-ring
7/16M50BL12X	7/16 DIN male, right angle, O-ring
7/16F50B12X	7/16 DIN female, O-ring

For factory connector attachment, see Jumper Section, page 27.

ELECTRICAL

- **Nominal impedance**, Ω — 50
- **Return loss @ 2.5 GHz,** dB — -35
- **3rd order intermodulation product**, dBc — -155 (-163 typ)
- **Temperature range** — -40°F to +185°F (-40°C to +85°C)
- **Water immersion testing** — IP67 / IP68
- **Materials**

External parts	Passivated silver plated or electroless nickel plated brass
Outer contact	Passivated silver plated brass
Inner contact	Passivated silver plated Cu-Be
Dielectric	TXP / PTFE
O-rings	Silicone rubber

ACCESSORIES

For complete accessory, refer to Eupen Site Steel & Accessory Catalog.

DESCRIPTION	ITEM NUMBER
Tools *(See Tool Section page 45)*	
Cable Prep Tool	SPTC50B12X
Cable Prep Tool Right Angle Connectors	SPTC50BL12X
Torque Wrench, Back Nut	TQ-34-F15
Torque Wrench, 7/16 DIN Coupler	TQ-114-F18-M

1/4" Foam-Dielectric Coaxial Cable
Corrugated Copper – 50 Ohm

ITEM NUMBER	DESCRIPTION
EC1-50	Low Loss Cable, standard jacket
EC1-50-HLFR	Low Loss Cable, fire retardant, halogen free jacket

CONSTRUCTION

- **Inner conductor**
  - Material: copper clad aluminum
  - Diameter, in (mm): 0.094 (2.4)
- **Dielectric**
  - Material: microcell gas-injected PE
  - Diameter, in (mm): 0.256 (6.5)
- **Outer conductor**
  - Material: corrugated copper
  - Diameter, in (mm): 0.295 (7.5)
- **Outer sheath**
  - Material: Durathene™
  - Thickness, in (mm): 0.043 (1.1)
  - Diameter, in (mm): 0.382 (9.7)

MECHANICAL CHARACTERISTICS

- **Minimum bending radius**
  - a) Single bending, in (cm): 1.2 (3)
  - b) 15 repeated bends, in (cm): 3.1 (8)
- **Maximum pulling strength**, lb (kg): 88 (40)
- **Recommended temperature range**
  - Storage: -94 to +185°F (-70 to +85°C)
  - Installation: -40 to +140°F (-40 to +60°C)
  - Operation: -67 to +185°F (-55 to +85°C)
- **Maximum length per hoisting grip**, ft (m): 230 (70)
- **Maximum hanger spacing**, ft (m): —
- **Flat plate crush resistance**, lb/in (kg/mm): 45 (0.8)
- **Bending moment**, lb-ft (N•m): 1.1 (1.5)
- **Weight**, lb/ft (kg/m): 0.07 (0.11)

ELECTRICAL CHARACTERISTICS

- **Characteristic impedance**, : 50 ± 1
- **Nominal capacitance**, pF/ft (pF/m): 25 (82)
- **Relative propagation velocity**, %: 82
- **Inductance**, µH/ft (µH/m): 0.061 (0.20)
- **DC-resistance at 68°F (20°C)**
  - Inner conductor, /1000 ft (/1000 m): 1.78 (5.85)
  - Outer conductor, /1000 ft (/1000 m): 1.01 (3.30)
- **RF peak voltage**, kV: 0.83
- **RF peak power**, kW: 6.9
- **Cut-off frequency**, GHz: 18.6
- **Insulation resistance**, M /km: ≥5000

ELECTRICAL CHARACTERISTICS

- **Attenuation and power rating**

Frequency (MHz)	Attenuation at 68°F (20°C)* (dB/100 ft)	(dB/100m)	Mean power rating** (kW)
10	0.406	1.33	5.64
20	0.576	1.89	3.98
30	0.708	2.32	3.24
50	0.918	3.01	2.50
88	1.23	4.02	1.87
100	1.31	4.29	1.75
108	1.36	4.46	1.68
150	1.61	5.29	1.42
174	1.74	5.71	1.32
200	1.87	6.14	1.23
300	2.31	7.58	0.99
400	2.69	8.81	0.85
450	2.86	9.38	0.80
500	3.02	9.91	0.76
512	3.06	10.0	0.75
600	3.33	10.9	0.69
700	3.61	11.9	0.63
800	3.88	12.7	0.59
824	3.94	12.9	0.58
894	4.12	13.5	0.56
960	4.28	14.0	0.54
1000	4.38	14.4	0.52
1250	4.94	16.2	0.46
1500	5.46	17.9	0.42
1700	5.85	19.2	0.39
1800	6.03	19.8	0.38
2000	6.39	21.0	0.36
2100	6.57	21.6	0.35
2200	6.74	22.1	0.34
2300	6.91	22.7	0.33
3000	8.02	26.3	0.29
3400	8.62	28.3	0.27
4000	9.45	31.0	0.24
5000	10.8	35.3	0.21
6000	12.0	39.3	0.19

* Nominal values
** Ambient temperature = 104°F (40°C); temperature of inner conductor = 212°F (100°C); VSWR = 1.0; no solar loading

1/4" Coaxial Connectors

ITEM NUMBER	DESCRIPTION
NM50V14	N-male, O-ring
NF50V14	N-female, O-ring

For factory connector attachment, see Jumper Section, page 27.

ELECTRICAL

- **Nominal impedance**, Ω: 50
- **Return loss @ 2.5 GHz,** dB: -35
- **3rd order intermodulation product**, dBc: -155 (-163 typ)
- **Temperature range**: -40°F to +185°F (-40°C to +85°C)
- **Water immersion testing**: IP67 / IP68
- **Materials**

External parts	Passivated silver plated or electroless nickel plated brass
Outer contact	Passivated silver plated brass
Inner contact	Passivated silver plated Cu-Be
Dielectric	TXP / PTFE
O-rings	Silicone rubber

ACCESSORIES

For complete accessory, refer to Eupen Site Steel & Accessory Catalog.

DESCRIPTION	ITEM NUMBER
Hoisting Grips	
Pre-Laced Hoisting Grip	HG-14L
Hangers	
Butterfly Hangers, Kit of 10	BH-14-NH
Angle Adapters, Stainless Steel	
Universal SST Angle Adaptor, Kit of 10	AA-U
SST Angle Adaptor, Kit of 10	AA-SL
Grounding Kits	
Standard Grounding Kit	GK-S14

DESCRIPTION	ITEM NUMBER
Weatherproofing	
Standard Weatherproofing Kit	WK-U
Boots and Cushions	
4" Boot Assembly, 1 hole	BA-14-1A
4" Boot Assembly, 3 hole	BA-14-3A
Standard Port Cushion, 1 hole	SC-14-1
Standard Port Cushion, 2 hole	SC-14-2
Standard Port Cushion, 3 hole	SC-14-3
4" Boot Assembly, Cushion not included	BA-400
5" Boot Assembly, Cushion not included	BA-500

3/8" Foam-Dielectric Coaxial Cable
Corrugated Copper – 50 Ohm

ITEM NUMBER	DESCRIPTION
EC2-50	Low Loss Cable, standard jacket
EC2-50-HLFR	Low Loss Cable, fire retardant, halogen free jacket

CONSTRUCTION

- **Inner conductor**
  - Material: copper clad aluminum
  - Diameter, in (mm): 0.128 (3.25)
- **Dielectric**
  - Material: microcell gas-injected PE
  - Diameter, in (mm): 0.331 (8.4)
- **Outer conductor**
  - Material: corrugated copper
  - Diameter, in (mm): 0.378 (9.6)
- **Outer sheath**
  - Material: Durathene™
  - Thickness, in (mm): 0.043 (1.1)
  - Diameter, in (mm): 0.465 (11.8)

MECHANICAL CHARACTERISTICS

- **Minimum bending radius**
  - a) Single bending, in (cm): 1.6 (4)
  - b) 15 repeated bends, in (cm): 3.7 (9.5)
- **Maximum pulling strength**, lb (kg): 121(55)
- **Recommended temperature range**
  - Storage: -94 to +185°F (-70 to +85°C)
  - Installation: -40 to +140°F (-40 to +60°C)
  - Operation: -67 to +185°F (-55 to +85°C)
- **Maximum length per hoisting grip**, ft (m): 230 (70)
- **Maximum hanger spacing**, ft (m): 1.5 (0.5)
- **Flat plate crush resistance**, lb/in (kg/mm): 112 (2.0)
- **Bending moment**, lb-ft (N•m): 2.1 (2.8)
- **Weight,** lb/ft (kg/m): 0.09 (0.14)

ELECTRICAL CHARACTERISTICS

- **Characteristic impedance**, 50 ± 1
- **Nominal capacitance**, pF/ft (pF/m): 23 (76)
- **Relative propagation velocity**, %: 88
- **Inductance**, µH/ft (µH/m): 0.058 (0.19)
- **DC-resistance at 68°F (20°C)**
  - Inner conductor, /1000 ft (/1000 m): 0.95 (3.10)
  - Outer conductor, /1000 ft (/1000 m): 0.81 (2.65)
- **RF peak voltage**, kV: 1.05
- **RF peak power**, kW: 11
- **Cut-off frequency**, GHz: 14.2
- **Insulation resistance**, M /km: ≥5000

ELECTRICAL CHARACTERISTICS

- **Attenuation and power rating**

Frequency (MHz)	Attenuation at 68°F (20°C)* (dB/100 ft)	(dB/100m)	Mean power rating** (kW)
10	0.296	0.970	7.17
20	0.419	1.38	5.05
30	0.515	1.69	4.11
50	0.667	2.19	3.17
88	0.890	2.92	2.38
100	0.950	3.12	2.23
108	0.988	3.24	2.14
150	1.17	3.84	1.81
174	1.26	4.14	1.68
200	1.36	4.45	1.56
300	1.67	5.49	1.26
400	1.95	6.38	1.09
450	2.07	6.79	1.02
500	2.19	7.18	0.97
512	2.21	7.27	0.96
600	2.41	7.90	0.88
700	2.61	8.57	0.81
800	2.80	9.20	0.76
824	2.85	9.35	0.74
894	2.98	9.76	0.71
960	3.09	10.1	0.69
1000	3.16	10.4	0.67
1250	3.56	11.7	0.59
1500	3.93	12.9	0.54
1700	4.21	13.8	0.50
1800	4.34	14.3	0.49
2000	4.60	15.1	0.46
2100	4.73	15.5	0.45
2200	4.85	15.9	0.44
2300	4.97	16.3	0.43
3000	5.76	18.9	0.37
3400	6.18	20.3	0.34
4000	6.77	22.2	0.31
5000	7.69	25.2	0.28
6000	8.55	28.0	0.25

* Nominal values

** Ambient temperature = 104°F (40°C); temperature of inner conductor = 212°F (100°C); VSWR = 1.0; no solar loading

3/8" Coaxial Connectors

ITEM NUMBER	DESCRIPTION
NM50V38	N-male, O-ring
NF50V38	N-female, O-ring
7/16M50V38	7/16 DIN male, O-ring
7/16F50V38	7/16 DIN female, O-ring
EIA7/8V38	7/8 EIA flange, O-ring

For factory connector attachment, see Jumper Section, page 27.

ELECTRICAL

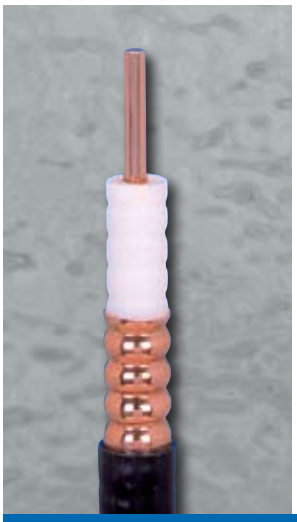
- **Nominal impedance**, Ω — 50
- **Return loss @ 2.5 GHz,** dB — -35
- **3rd order intermodulation product**, dBc — -155 (-163 typ)
- **Temperature range** — -40°F to +185°F (-40°C to +85°C)
- **Water immersion testing** — IP67 / IP68
- **Materials**
  - External parts — Passivated silver plated or electroless nickel plated brass
  - Outer contact — Passivated silver plated brass
  - Inner contact — Passivated silver plated Cu-Be
  - Dielectric — TXP / PTFE
  - O-rings — Silicone rubber

ACCESSORIES

For complete accessory, refer to Eupen Site Steel & Accessory Catalog.

DESCRIPTION	ITEM NUMBER
Hoisting Grips	
Pre-Laced Hoisting Grip	HG-38L
Hangers	
Butterfly Hangers, Kit of 10	BH-38-NH
Angle Adapters, Stainless Steel	
Universal SST Angle Adaptor, Kit of 10	AA-U
SST Angle Adaptor, Kit of 10	AA-SL
Grounding Kits	
Standard Grounding Kit	GK-S38

DESCRIPTION	ITEM NUMBER
Weatherproofing	
Standard Weatherproofing Kit	WK-U
Boots and Cushions	
4" Boot Assembly, 1 hole	BA-38-1A
4" Boot Assembly, 3 hole	BA-38-3A
Standard Port Cushion, 1 hole	SC-38-1
Standard Port Cushion, 2 hole	SC-38-2
Standard Port Cushion, 3 hole	SC-38-3
4" Boot Assembly, Cushion not included	BA-400
5" Boot Assembly, Cushion not included	BA-500



1/2" Foam-Dielectric Coaxial Cable
Corrugated Copper – 50 Ohm

ITEM NUMBER	DESCRIPTION
EC4-50	Low Loss Cable, standard jacket
EC4-50-HLFR	Low Loss Cable, fire retardant, halogen free jacket

CONSTRUCTION

- **Inner conductor**
  - Material: copper clad aluminum
  - Diameter, in (mm): 0.189 (4.8)
- **Dielectric**
  - Material: microcell gas-injected PE
  - Diameter, in (mm): 0.488 (12.4)
- **Outer conductor**
  - Material: corrugated copper
  - Diameter, in (mm): 0.543 (13.8)
- **Outer sheath**
  - Material: Durathene™
  - Thickness, in (mm): 0.043 (1.1)
  - Diameter, in (mm): 0.630 (16.0)

MECHANICAL CHARACTERISTICS

- **Minimum bending radius**
  - a) Single bending, in (cm): 2.8 (7)
  - b) 15 repeated bends, in (cm): 4.7 (12)
- **Maximum pulling strength**, lb (kg): 220 (100)
- **Recommended temperature range**
  - Storage: -94 to +185°F (-70 to +85°C)
  - Installation: -40 to +140°F (-40 to +60°C)
  - Operation: -67 to +185°F (-55 to +85°C)
- **Maximum length per hoisting grip**, ft (m): 230 (70)
- **Maximum hanger spacing**, ft (m): 3 (0.9)
- **Flat plate crush resistance**, lb/in (kg/mm): 106 (1.9)
- **Bending moment**, lb-ft (N•m): 2.6 (3.5)
- **Weight**, lb/ft (kg/m): 0.16 (0.24)

ELECTRICAL CHARACTERISTICS

- **Characteristic impedance**, 50 ± 1
- **Nominal capacitance**, pF/ft (pF/m): 23 (76)
- **Relative propagation velocity**, %: 88
- **Inductance**, µH/ft (µH/m): 0.058 (0.19)
- **DC-resistance at 68°F (20°C)**
  - Inner conductor, /1000 ft (/1000 m): 0.45 (1.48)
  - Outer conductor, /1000 ft (/1000 m): 0.62 (2.04)
- **RF peak voltage**, kV: 1.6
- **RF peak power**, kW: 25.6
- **Cut-off frequency**, GHz: 9.8
- **Insulation resistance**, M /km: ≥5000

ELECTRICAL CHARACTERISTICS

- **Attenuation and power rating**

Frequency (MHz)	Attenuation at 68°F (20°C)* (dB/100 ft)	(dB/100m)	Mean power rating** (kW)
10	0.205	0.672	11.74
20	0.291	0.954	8.28
30	0.357	1.17	6.74
50	0.463	1.52	5.19
88	0.619	2.03	3.88
100	0.661	2.17	3.63
108	0.688	2.26	3.49
150	0.815	2.67	2.94
174	0.880	2.89	2.72
200	0.946	3.10	2.53
300	1.17	3.83	2.05
400	1.36	4.46	1.76
450	1.45	4.75	1.66
500	1.53	5.02	1.57
512	1.55	5.08	1.54
600	1.69	5.53	1.43
700	1.83	6.01	1.31
800	1.97	6.45	1.22
824	2.00	6.56	1.20
894	2.09	6.85	1.15
960	2.17	7.12	1.11
1000	2.22	7.28	1.08
1250	2.51	8.22	0.96
1500	2.77	9.09	0.87
1700	2.97	9.74	0.81
1800	3.07	10.1	0.79
2000	3.25	10.7	0.74
2100	3.34	11.0	0.72
2200	3.43	11.2	0.70
2300	3.52	11.5	0.68
3000	4.09	13.4	0.59
3400	4.39	14.4	0.55
4000	4.82	15.8	0.50
5000	5.49	18.0	0.44
6000	6.11	20.1	0.39

* Nominal values

** Ambient temperature = 104°F (40°C); temperature of inner conductor = 212°F (100°C); VSWR = 1.0; no solar loading

1/2" Coaxial Connectors

ITEM NUMBER	DESCRIPTION
NM50V12	N-male, O-ring
NF50V12	N-female, O-ring
NM50VL12	N-male, right angle, O-ring
7/16M50V12	7/16 DIN male,O-ring
7/16F50V12	7/16 DIN female, O-ring
7/16M50VL12	7/16 DIN male, right angle, O-ring
EIA7/8V12	7/8 EIA flange, O-ring

For factory connector attachment, see Jumper Section, page 27.

ELECTRICAL

- **Nominal impedance** (Ω) 50
- **Return loss @ 2.5 GHz** (dB) -35
- **3rd order intermodulation product** (dBc) -155 (-163 typ)
- **Temperature range** -40°F to +185°F (-40°C to +85°C)
- **Water immersion testing** IP67 / IP68
- **Materials**
  - External parts: Passivated silver plated or electroless nickel plated brass
  - Outer contact: Passivated silver plated brass
  - Inner contact: Passivated silver plated Cu-Be
  - Dielectric: TXP / PTFE
  - O-rings: Silicone rubber

ACCESSORIES

For complete accessory, refer to Eupen Site Steel & Accessory Catalog.

DESCRIPTION	ITEM NUMBER
Tools *(See Tool Section page 45)*	
Cable Prep Tool	SPTC50AV12
Torque Wrench, Back Nut	TQ-34-F15
Torque Wrench, 7/16 DIN Coupler	TQ-114-F18-M
Hoisting Grips	
Lace-Up Hoisting Grip	HG-12
Pre-Laced Hoisting Grip	HG-12L
Hangers	
Butterfly Hangers, Kit of 10	BH-12-NH
Snap-In Hangers, Kit of 10	SH-U12
Snap-Stack Hangers, Kit of 10	SH-S12
Coax Support Blocks	
Mini Coax Support Blks, Kit of 10	CB-12
Large Coax Support Blks, Kit of 10	CB-12L
Angle Adapters, Stainless Steel	
Universal SST Angle Adaptor, Kit of 10	AA-U
SST Angle Adaptor, Kit of 10	AA-SL
Weatherproofing	
Standard Weatherproofing Kit	WK-U
Boots and Cushions	
4" Boot Assembly, 1 hole	BA-12-1A
4" Boot Assembly, 3 hole	BA-12-3A
Standard Port Cushion, 1 hole	SC-12-1
Standard Port Cushion, 2 hole	SC-12-2
Standard Port Cushion, 3 hole	SC-12-3
4" Boot Assembly, Cushion not included	BA-400
5" Boot Assembly, Cushion not included	BA-500

5/8" Foam-Dielectric Coaxial Cable
Corrugated Copper – 50 Ohm

ITEM NUMBER	DESCRIPTION
EC4.5-50	Low Loss Cable, standard jacket
EC4.5-50-HLFR	Low Loss Cable, fire retardant, halogen free jacket

CONSTRUCTION

- **Inner conductor**
  - Material: copper clad aluminum
  - Diameter, in (mm): 0.28 (7.04)
- **Dielectric**
  - Material: microcell gas-injected PE
  - Diameter, in (mm): 0.70 (17.8)
- **Outer conductor**
  - Material: corrugated copper
  - Diameter, in (mm): 0.78 (19.7)
- **Outer sheath**
  - Material: Durathene™
  - Thickness, in (mm): 0.04 (1.1)
  - Diameter, in (mm): 0.86 (21.9)

MECHANICAL CHARACTERISTICS

- **Minimum bending radius**
  - a) Single bending, in (cm): 4 (10)
  - b) 15 repeated bends, in (cm): 8 (20)
- **Maximum pulling strength**, lb (kg): 375 (170)
- **Recommended temperature range**
  - Storage: -94 to +185°F (-70 to +85°C)
  - Installation: -40 to +140°F (-40 to +60°C)
  - Operation: -67 to +185°F (-55 to +85°C)
- **Maximum length per hoisting grip**, ft (m): 230 (70)
- **Maximum hanger spacing**, ft (m): 4 (1.2)
- **Flat plate crush resistance**, lb/in (kg/mm): 106 (1.9)
- **Bending moment**, lb-ft (N•m): 7.4 (10)
- **Weight**, lb/ft (kg/m): 0.27 (0.40)

ELECTRICAL CHARACTERISTICS

- **Characteristic impedance**, 50 ± 1
- **Nominal capacitance**, pF/ft (pF/m): 23 (76)
- **Relative propagation velocity**, %: 88
- **Inductance**, µH/ft (µH/m): 0.058 (0.19)
- **DC-resistance at 68°F (20°C)**
  - Inner conductor, /1000 ft (/1000 m): 0.21 (0.68)
  - Outer conductor, /1000 ft (/1000 m): 0.39 (1.28)
- **RF peak voltage**, kV: 2.5
- **RF peak power**, kW: 62
- **Cut-off frequency**, GHz: 6.5
- **Insulation resistance**, M /km: ≥5000

ELECTRICAL CHARACTERISTICS

- **Attenuation and power rating**

Frequency (MHz)	Attenuation at 68°F (20°C)* (dB/100 ft)	(dB/100m)	Mean power rating** (kW)
10	0.140	0.463	16.17
20	0.201	0.658	11.38
30	0.246	0.808	9.27
80	0.407	1.33	5.61
100	0.456	1.50	5.00
150	0.563	1.85	4.06
200	0.654	2.14	3.49
300	0.808	2.65	2.82
400	0.941	3.09	2.43
450	1.00	3.29	2.28
500	1.06	3.47	2.16
600	1.17	3.83	1.95
700	1.27	4.16	1.80
800	1.36	4.47	1.67
894	1.45	4.75	1.58
960	1.51	4.94	1.52
1000	1.54	5.05	1.48
1500	1.92	6.31	1.19
1700	2.06	6.77	1.11
1800	2.13	6.99	1.07
1880	2.18	7.16	1.05
2000	2.26	7.41	1.01
2170	2.37	7.76	0.96
2200	2.38	7.82	0.96
2300	2.45	8.02	0.93
2400	2.51	8.22	0.91
2500	2.56	8.41	0.89
3000	2.85	9.34	0.80
4000	3.36	11.03	0.68
6000	4.27	14.02	0.53

* Nominal values
** Ambient temperature = 104°F (40°C); temperature of inner conductor = 212°F (100°C); VSWR = 1.0; no solar loading

5/8" Coaxial Cable Connectors

ITEM NUMBER	DESCRIPTION
NM50V58	N-male, O-ring
NF50V58	N-female, O-ring

ELECTRICAL

- **Nominal impedance**, Ω: 50
- **Return loss @ 2.5 GHz**, dB: -35
- **3rd order intermodulation product**, dBc: -155 (-163 typ)
- **Temperature range**: -40°F to +185°F (-40°C to +85°C)
- **Water immersion testing**: IP67 / IP68
- **Materials**

External parts	Passivated silver plated or electroless nickel plated brass
Outer contact	Passivated silver plated brass
Inner contact	Passivated silver plated Cu-Be
Dielectric	TXP / PTFE
O-rings	Silicone rubber

ACCESSORIES

For complete accessory, refer to Eupen Site Steel & Accessory Catalog.

DESCRIPTION	ITEM NUMBER
Hoisting Grips	
Lace-Up Hoisting Grip	HG-58
Pre-Laced Hoisting Grip	HG-58L
Hangers	
Butterfly Hangers, Kit of 10	BH-58-NH
Snap-In Hangers, Kit of 10	SH-U58
Coax Support Blocks	
Mini Coax Support Blks, Kit of 10	CB-58
Large Coax Support Blks, Kit of 10	CB-58L

DESCRIPTION	ITEM NUMBER
Angle Adapters, Stainless Steel	
Universal SST Angle Adaptor, Kit of 10	AA-U
SST Angle Adaptor, Kit of 10	AA-SL
Weatherproofing	
Standard Weatherproofing Kit	WK-U
Boots and Cushions	
4" Boot Assembly, 1 hole	BA-58-1A
4" Boot Assembly, 3 hole	BA-58-3A
Standard Port Cushion, 1 hole	SC-58-1
Standard Port Cushion, 2 hole	SC-58-2
Standard Port Cushion, 3 hole	SC-58-3
4" Boot Assembly, Cushion not included	BA-400
5" Boot Assembly, Cushion not included	BA-500

7/8" Foam-Dielectric Coaxial Cable
Corrugated Copper – 50 Ohm

ITEM NUMBER	DESCRIPTION
EC5-50A	Low Loss Cable, standard jacket
EC5-50A-HLFR	Low Loss Cable, fire retardant, halogen free jacket

A-Series LOW LOSS

CONSTRUCTION

- **Inner conductor**
  - Material: smooth copper tube
  - Diameter, in (mm): 0.36 (9.2)
- **Dielectric**
  - Material: microcell gas-injected PE
  - Diameter, in (mm): 0.93 (23.5)
- **Outer conductor**
  - Material: corrugated copper
  - Diameter, in (mm): 0.98 (25.0)
- **Outer sheath**
  - Material: Durathene™
  - Thickness, in (mm): 0.06 (1.4)
  - Diameter, in (mm): 1.10 (28.0)

MECHANICAL CHARACTERISTICS

- **Minimum bending radius**
  - a) Single bending, in (cm): 4 (10)
  - b) 15 repeated bends, in (cm): 10 (25)
- **Maximum pulling strength**, lb (kg): 308 (140)
- **Recommended temperature range**
  - Storage: -94 to +185°F (-70 to +85°C)
  - Installation: -40 to +140°F (-40 to +60°C)
  - Operation: -67 to +185°F (-55 to +85°C)
- **Maximum length per hoisting grip**, ft (m): 230 (70)
- **Maximum hanger spacing**, ft (m): 4 (1.2)
- **Flat plate crush resistance**, lb/in (kg/mm): 79 (1.4)
- **Bending moment**, lb-ft (N•m): 8.6 (11.6)
- **Weight**, lb/ft (kg/m): 0.31 (0.47)

ELECTRICAL CHARACTERISTICS

- **Characteristic impedance**, 50 ± 1
- **Nominal capacitance**, pF/ft (pF/m): 23 (75)
- **Relative propagation velocity**, %: 89
- **Inductance**, µH/ft (µH/m): 0.057 (0.187)
- **DC-resistance at 68°F (20°C)**
  - Inner conductor, /1000 ft (/1000 m): 0.45 (1.46)
  - Outer conductor, /1000 ft (/1000 m): 0.40 (1.31)
- **RF peak voltage**, kV: 2.9
- **RF peak power**, kW: 86
- **Cut-off frequency**, GHz: 5.1
- **Insulation resistance**, M /km: ≥5000

ELECTRICAL CHARACTERISTICS

- **Attenuation and power rating**

Frequency (MHz)	Attenuation at 68°F (20°C)* (dB/100 ft)	(dB/100m)	Mean power rating** (kW)
10	0.108	0.353	25.46
20	0.153	0.502	17.93
30	0.188	0.616	14.60
80	0.310	1.02	8.85
100	0.348	1.14	7.89
150	0.429	1.41	6.40
200	0.498	1.63	5.51
300	0.615	2.02	4.46
400	0.716	2.35	3.83
450	0.762	2.50	3.60
500	0.805	2.64	3.41
600	0.888	2.91	3.09
700	0.964	3.16	2.85
800	1.04	3.40	2.65
894	1.10	3.61	2.49
960	1.14	3.75	2.40
1000	1.17	3.83	2.35
1500	1.46	4.79	1.88
1700	1.56	5.13	1.75
1800	1.61	5.30	1.70
1880	1.65	5.43	1.66
2000	1.71	5.62	1.60
2170	1.79	5.88	1.53
2200	1.81	5.92	1.52
2300	1.85	6.07	1.48
2400	1.90	6.22	1.45
2500	1.94	6.37	1.41
3000	2.15	7.06	1.27
4000	2.54	8.33	1.08
6000	-	-	-

* Nominal values

** Ambient temperature = 104°F (40°C); temperature of inner conductor = 212°F (100°C); VSWR = 1.0; no solar loading

7/8" Coaxial Connectors

MonoBlock

A-Series

ITEM NUMBER	DESCRIPTION
NM50V78MA	N-male, MonoBlock, O-ring
NF50V78MA	N-female, MonoBlock, O-ring
7/16M50V78MA	7/16 DIN male, MonoBlock, O-ring
7/16F50V78MA	7/16 DIN female, MonoBlock, O-ring

(Not compatible with previous generation EC5-50 cable. Contact factory for previous styles.)

ELECTRICAL

- **Nominal impedance**, Ω — 50
- **Return loss @ 2.5 GHz,** dB — -35
- **3rd order intermodulation product**, dBc — -155 (-163 typ)
- **Temperature range** — -40°F to +185°F (-40°C to +85°C)
- **Water immersion testing** — IP67 / IP68
- **Materials**

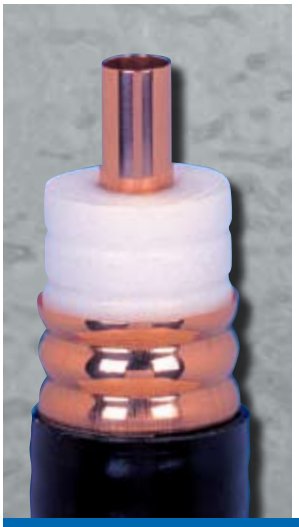
External parts	Passivated silver plated or electroless nickel plated brass
Outer contact	Passivated silver plated brass
Inner contact	Passivated silver plated Cu-Be
Dielectric	TXP / PTFE
O-rings	Silicone rubber

ACCESSORIES

For complete accessory, refer to Eupen Site Steel & Accessory Catalog.

DESCRIPTION	ITEM NUMBER
Tools *(See Tool Section page 45)*	
Cable Prep Tool, MonoBlock Connectors	F-78
Ground Kit Tool	GKT-EC5
Torque Wrench, Back Nut	TQ-30MM-F22
Torque Wrench, 7/16 DIN Coupler	TQ-114-F18-M
Hoisting Grip	
Lace-Up Hoisting Grip	HG-78
Pre-Laced Hoisting Grip	HG-78L
Hangers	
Butterfly Hangers, Kit of 10	BH-78
Snap-In Hangers, Kit of 10	SH-U78
Snap-Stack Hangers, Kit of 10	SH-S78
Coax Support Blocks	
Mini Coax Support Blks, Kit of 10	CB-78

DESCRIPTION	ITEM NUMBER
Angle Adapters, Stainless Steel	
Universal SST Angle Adaptor, Kit of 10	AA-U
SST Angle Adaptor, Kit of 10	AA-SL
Grounding Kits	
Standard Grounding Kit	GK-S78
Clip-On Grounding Kit	GK-C78
Weatherproofing	
Standard Weatherproofing Kit	WK-U
Boots and Cushions	
4" Boot Assembly, 1 hole	BA-78-1A
4" Boot Assembly, 3 hole	BA-78-3A
Standard Port Cushion, 1 hole	SC-78-1
4" Boot Assembly, Cushion not included	BA-400
5" Boot Assembly, Cushion not included	BA-500



1 1/4" Foam-Dielectric Coaxial Cable
Corrugated Copper – 50 Ohm

ITEM NUMBER	DESCRIPTION
EC6-50A	Low Loss Cable, standard jacket
EC6-50A-HLFR	Low Loss Cable, fire retardant, halogen free jacket

A-Series LOW LOSS

CONSTRUCTION

- **Inner conductor**
  - Material: smooth copper tube
  - Diameter, in (mm): 0.51 (13.0)
- **Dielectric**
  - Material: microcell gas-injected PE
  - Diameter, in (mm): 1.32 (33.5)
- **Outer conductor**
  - Material: corrugated copper
  - Diameter, in (mm): 1.42 (36.0)
- **Outer sheath**
  - Material: Durathene™
  - Thickness, in (mm): 0.06 (1.5)
  - Diameter, in (mm): 1.54 (39.0)

MECHANICAL CHARACTERISTICS

- **Minimum bending radius**
  - a) Single bending, in (cm): 8 (20)
  - b) 15 repeated bends, in (cm): 14 (35)
- **Maximum pulling strength**, lb (kg): 594 (270)
- **Recommended temperature range**
  - Storage: -94 to +185°F (-70 to +85°C)
  - Installation: -40 to +140°F (-40 to +60°C)
  - Operation: -67 to +185°F (-55 to +85°C)
- **Maximum length per hoisting grip**, ft (m): 230 (70)
- **Maximum hanger spacing**, ft (m): 5 (1.4)
- **Flat plate crush resistance**, lb/in (kg/mm): 134 (2.4)
- **Bending moment**, lb-ft (N•m): 24 (32)
- **Weight**, lb/ft (kg/km): 0.58 (871)

ELECTRICAL CHARACTERISTICS

- **Characteristic impedance**, 50 ± 1
- **Nominal capacitance**, pF/ft (pF/m): 23 (76)
- **Relative propagation velocity**, %: 88
- **Inductance**, µH/ft (µH/m): 0.058 (0.189)
- **DC-resistance at 68°F (20°C)**
  - Inner conductor, /1000 ft (/1000 m): 0.22 (0.72)
  - Outer conductor, /1000 ft (/1000 m): 0.18 (0.58)
- **RF peak voltage**, kV: 4.3
- **RF peak power**, kW: 184
- **Cut-off frequency**, GHz: 3.7
- **Insulation resistance**, M /km: >>5000

ELECTRICAL CHARACTERISTICS

- **Attenuation and power rating**

Frequency (MHz)	Attenuation at 68°F (20°C)* (dB/100 ft)	(dB/100m)	Mean power rating** (kW)
10	0.076	0.251	37.13
20	0.109	0.356	26.12
30	0.134	0.438	21.24
80	0.221	0.725	12.84
100	0.248	0.814	11.44
150	0.307	1.01	9.26
200	0.357	1.17	7.96
300	0.442	1.45	6.42
400	0.515	1.69	5.51
450	0.549	1.80	5.17
500	0.581	1.91	4.88
600	0.641	2.10	4.42
700	0.698	2.29	4.07
800	0.751	2.46	3.78
894	0.798	2.62	3.56
960	0.830	2.72	3.42
1000	0.849	2.79	3.34
1500	1.07	3.50	2.66
1700	1.14	3.76	2.48
1800	1.18	3.88	2.40
1880	1.21	3.98	2.34
2000	1.26	4.12	2.26
2170	1.32	4.32	2.15
2200	1.33	4.35	2.14
2300	1.36	4.47	2.08
2400	1.40	4.58	2.03
2500	1.43	4.69	1.98
3000	1.59	5.22	1.78
4000	-	-	-
6000	-	-	-

* Nominal values
** Ambient temperature = 104°F (40°C); temperature of inner conductor = 212°F (100°C); VSWR = 1.0; no solar loading

1 1/4" Coaxial Connectors

MonoBlock

ITEM NUMBER	DESCRIPTION
NM50V114M	N-male, MonoBlock, O-ring
NF50V114M	N-female, MonoBlock, O-ring
7/16M50V114M	7/16 DIN male, MonoBlock, O-ring
7/16F50V114M	7/16 DIN female, MonoBlock, O-ring

ELECTRICAL

- **Nominal impedance**, Ω — 50
- **Return loss @ 2.5 GHz,** dB — -35
- **3rd order intermodulation product**, dBc — -155 (-163 typ)
- **Temperature range** — -40°F to +185°F (-40°C to +85°C)
- **Water immersion testing** — IP67 / IP68
- **Materials**

External parts	Passivated silver plated or electroless nickel plated brass
Outer contact	Passivated silver plated brass
Inner contact	Passivated silver plated Cu-Be
Dielectric	TXP / PTFE
O-rings	Silicone rubber

ACCESSORIES

For complete accessory, refer to Eupen Site Steel & Accessory Catalog.

DESCRIPTION	ITEM NUMBER
Tools *(See Tool Section page 45)*	
Cable Prep Tool	F-114
Ground Kit Tool	GKT-EC6
Torque Wrench, Back Nut	TQ-11116-F29
Torque Wrench, 7/16 DIN Coupler	TQ-114-F18M
Hoisting Grips	
Lace-Up Hoisting Grip	HG-114
Pre-Laced Hoisting Grip	HG-114L
Hangers	
Butterfly Hangers, Kit of 10	BH-114-NH
Snap-In Hangers, Kit of 10	SH-U114
Snap-Stack Hangers, Kit of 10	SH-S114
Coax Support Blocks	
Mini Coax Support Blks, Kit of 10	CB-114
Angle Adapters, Stainless Steel	
Universal SST Angle Adaptor, Kit of 10	AA-U
SST Angle Adaptor, Kit of 10	AA-SL
Grounding Kits	
Standard Grounding Kit	GK-S114
Clip-On Grounding Kit	GK-C114
Weatherproofing	
Standard Weatherproofing Kit	WK-U
Boots and Cushions	
4" Boot Assembly, 1 hole	BA-114-1A
4" Boot Assembly, 3 hole	BA-114-3A
Standard Port Cushion, 1 hole	SC-114-1
Standard Port Cushion, 2 hole	SC-114-2
Standard Port Cushion, 3 hole	SC-114-3
4" Boot Assembly, Cushion not included	BA-400
5" Boot Assembly, Cushion not included	BA-500

1 5/8" Foam-Dielectric Coaxial Cable
Corrugated Copper – 50 Ohm

ITEM NUMBER	DESCRIPTION
EC7-50A	Low Loss Cable, standard jacket
EC7-50A-HLFR	Low Loss Cable, fire retardant, halogen free jacket

A-Series LOW LOSS

CONSTRUCTION

- **Inner conductor**
  - Material: corrugated copper tube
  - Diameter, in (mm): 0.70 (17.7)
- **Dielectric**
  - Material: microcell gas-injected PE
  - Diameter, in (mm): 1.69 (43.0)
- **Outer conductor**
  - Material: corrugated copper
  - Diameter, in (mm): 1.83 (46.6)
- **Outer sheath**
  - Material: Durathene™
  - Thickness, in (mm): 0.07 (1.7)
  - Diameter, in (mm): 1.97 (50.0)

MECHANICAL CHARACTERISTICS

- **Minimum bending radius**
  - a) Single bending, in (cm): 8 (20)
  - b) 15 repeated bends, in (cm): 16 (40)
- **Maximum pulling strength**, lb (kg): 550 (250)
- **Recommended temperature range**
  - Storage: -94 to +185°F (-70 to +85°C)
  - Installation: -40 to +140°F (-40 to +60°C)
  - Operation: -67 to +185°F (-55 to +85°C)
- **Maximum length per hoisting grip**, ft (m): 230 (70)
- **Maximum hanger spacing**, ft (m): 5 (1.5)
- **Flat plate crush resistance**, lb/in (kg/mm): 146 (2.6)
- **Bending moment**, lb (N•m): 33 (45)
- **Weight,** lb/ft (kg/m): 0.72 (1.07)

ELECTRICAL CHARACTERISTICS

- **Characteristic impedance**, 50 ± 1
- **Nominal capacitance**, pF/ft (pF/m): 23 (75)
- **Relative propagation velocity**, %: 89
- **Inductance**, µH/ft (µH/m): 0.057 (0.187)
- **DC-resistance at 68°F (20°C)**
  - Inner conductor, /1000 ft (/1000 m): 0.42 (1.37)
  - Outer conductor, /1000 ft (/1000 m): 0.137 (0.45)
- **RF peak voltage**, kV: 5.5
- **RF peak power**, kW: 302
- **Cut-off frequency**, GHz: 2.7
- **Insulation resistance**, M /km: >>5000

ELECTRICAL CHARACTERISTICS

- **Attenuation and power rating**

Frequency (MHz)	Attenuation at 68°F* (20°C) (dB/100 ft)	(dB/100m)	Mean power rating** (kW)
10	0.062	0.205	49.42
20	0.089	0.291	34.76
30	0.109	0.358	28.27
80	0.181	0.593	17.09
100	0.203	0.665	15.22
150	0.250	0.822	12.32
200	0.291	0.956	10.60
300	0.361	1.18	8.55
400	0.421	1.38	7.33
450	0.449	1.47	6.88
500	0.475	1.56	6.50
600	0.524	1.72	5.89
700	0.570	1.87	5.41
800	0.613	2.01	5.03
824	0.624	2.05	4.88
894	0.652	2.14	4.73
960	0.678	2.23	4.55
1000	0.694	2.28	4.45
1500	0.871	2.86	3.54
1700	0.935	3.07	3.30
1800	0.966	3.17	3.19
1880	0.99	3.25	3.03
2000	1.03	3.37	3.01
2100	1.06	3.46	2.93
2170	1.08	3.53	2.87
2200	1.08	3.56	2.85
2300	1.11	3.65	2.77
2400	1.14	3.74	2.71
2500	1.17	3.83	2.64
4000	-	-	-
6000	-	-	-

* Nominal values

** Ambient temperature = 104°F (40°C); temperature of inner conductor = 212°F (100°C); VSWR = 1.0; no solar loading

1 5/8" Coaxial Connectors

MonoBlock

ITEM NUMBER	DESCRIPTION
NM50V158MA	N-male, MonoBlock, O-ring
NF50V158MA	N-female, MonoBlock, O-ring
7/16M50V158MPA	7/16 DIN male, MonoBlock, O-ring
7/16F50V158MPA	7/16 DIN female, MonoBlock, O-ring

(7/16M50V158MA & 7/16F50V158MA available, please contact Customer Service)

ELECTRICAL

- **Nominal impedance**, Ω: 50
- **Return loss @ 2.5 GHz,** dB: -35
- **3rd order intermodulation product**, dBc: -155 (-163 typ)
- **Temperature range**: -40°F to +185°F (-40°C to +85°C)
- **Water immersion testing**: IP67 / IP68
- **Materials**

External parts	Passivated silver plated or electroless nickel plated brass
Outer contact	Passivated silver plated brass
Inner contact	Passivated silver plated Cu-Be
Dielectric	TXP / PTFE
O-rings	Silicone rubber

ACCESSORIES

For complete accessory, refer to Eupen Site Steel & Accessory Catalog.

DESCRIPTION	ITEM NUMBER
Tools *(See Tool Section page 45)*	
Cable Prep Tool	F-158
Ground Kit Tool	GKT-EC7
Torque Wrench, Back Nut	TQ-214-F29
Torque Wrench, 7/16 DIN Coupler	TQ-114-F18M
Hoisting Grips	
Lace-Up Hoisting Grip	HG-158
Pre-Laced Hoisting Grip	HG-158L
Hangers	
Butterfly Hangers, Kit of 10	BH-158-NH
Snap-In Hangers, Kit of 10	SH-U158
Snap-Stack Hangers, Kit of 10	SH-S158
Coax Support Blocks	
Mini Coax Support Blks, Kit of 10	CB-158

DESCRIPTION	ITEM NUMBER
Angle Adapters, Stainless Steel	
Universal SST Angle Adaptor, Kit of 10	AA-U
SST Angle Adaptor, Kit of 10	AA-SL
Grounding Kits	
Standard Grounding Kit	GK-S158
Clip-On Grounding Kit	GK-C158
Weatherproofing	
Standard Weatherproofing Kit	WK-U
Boots and Cushions	
4" Boot Assembly, 1 hole	BA-158-1A
Standard Port Cushion, 1 hole	SC-158-1
4" Boot Assembly, Cushion not included	BA-400
5" Boot Assembly, Cushion not included	BA-500

Notes

Jumpers

Eupen Jumper Cable Assemblies provide excellent electrical performance combined with high mechanical integrity which makes them both *rugged* and *flexible*. Durable enough to withstand the harshest of environments yet flexible enough to function in the tightest of spaces, these assemblies are the best choice for all your interconnect applications.

Each jumper assembly is built and tested to exacting standards. Return Loss for 1/2" assemblies is guaranteed at 28 dB (1.08:1 VSWR) or better, up to 2.5 Ghz. Eupen's advanced polymer dielectric ensures the attenuation loss will be minimized. Eupen's proprietary connector designs ensure passive intermodulation will remain low and stable long after installation and throughout drastic changes in environmental conditions.

Eupen offers a wide selection of cable and connector types and sizes. We offer common lengths in any cable/connector configuration in an easy to determine part number. Eupen also has the capability to make any number of units in any uncommon length you require.

Call on Eupen for all your jumper needs!

EUPEN Jumper Part Number Guide

EC4 – 100 – DMDM

CABLE

EC1: 1/4" Standard
EC1-HF: 1/4" Hiflex
EC2: 3/8" Standard
EC4: 1/2" Standard
EC4-HF: 1/2" Hiflex

LENGTH

030 : 1'
061 : 2'
100 : 3' (1m)
122 : 4'
150 : 5' (1.5m)
200 : 6.5' (2m)
213 : 7'
250 : 8' (2.5m)
274 : 9'
300 : 10' (3m)
366 : 12'
426 : 14'
488 : 16'
609 : 20'
762 : 25'
914 : 30'
1066 : 35'

CONNECTOR TYPE

D: 7/16 DIN
N: TYPE N
M: MALE
F: FEMALE
R: RT. ANGLE
L: LOOSE
O: OFF

Custom jumper lengths available on request.

EC1: 1/4" Standard Foam-Dielectric Jumper Assemblies 50 Ohm

CONNECTORS	PART NUMBER
N-Male / N-Male	EC1-(*)-NMNM
N-Male / N-Female	EC1-(*)-NMNF
N-Male / OFF (No connector)	EC1-(*)-NMO
N-Female / OFF (No connector)	EC1-(*)-NFO

*Use cm value for the length in jumper part number.

NOTE: To order a jumper with one connector unattached (Loose), add an “L” after the connector to be loose.
Example: NMNML = Attached N-Male on one end, with an unattached N-Male packaged “loose” with the jumper.

NOTE: To order a jumper with only one connector, add an “O” after the one connector to be included.
Example: NMO = Attached N-Male on one end, with no connector provided for the other end.

ft.	*cm
1'	030
2'	061
3'	100
4'	122
5'	150
6.5'	200
7'	213
8'	250
9'	274
10'	300
12'	366
14'	426
16'	488
20'	609
25'	762
30'	914
35'	1066

ELECTRICAL CHARACTERISTICS

- *Attenuation for 3 foot jumper at 68ºF**
  - *0.13 dB at 960 MHz*
  - *0.19 dB at 1880 MHz*
  - *0.20 dB at 2200 MHz*
  - *values without connectors, typical connector attenuation is less than 0.1√ f (GHz) (1 link / 2 connectors)
- *Intermodulation measured with 43dBm/20W*
  - *-162 dBc (cellular bands), typical*
- *VSWR (typ)*
  - *≤ 1.06 at 960 MHz*
  - *≤ 1.06 at 1880 MHz*
  - *≤ 1.06 at 2200 MHz*
- *Power rating at 104ºF ambient temperature*
  - *0.54 kW at 960 MHz*
  - *0.37 kW at 1880 MHz*
  - *0.34 kW at 2200 MHz*

Test results included with each jumper.

Additional connector combinations and lengths available on request.

ft.		*cm
1'	:	030
2'	:	061
3'	:	100
4'	:	122
5'	:	150
6.5'	:	200
7'	:	213
8'	:	250
9'	:	274
10'	:	300
12'	:	366
14'	:	426
16'	:	488
20'	:	609
25'	:	762
30'	:	914
35'	:	1066

EC1-HF: 1/4" Hiflex Foam-Dielectric Jumper Assemblies 50 Ohm

CONNECTORS	PART NUMBER
DIN Male / DIN Male	EC1-HF-(*)-DMDM
DIN Male / DIN Female	EC1-HF-(*)-DMDF
DIN Male / N-Male	EC1-HF-(*)-DMNM
DIN Male / N-Female Panel Mount	EC1-HF-(*)-DFNF
DIN Male / OFF (No connector)	EC1-HF-(*)-DMO
DIN Female / DIN Female	EC1-HF-(*)-DFDF
DIN Female / N-Male	EC1-HF-(*)-DFNM
DIN Female / N-Female Panel Mount	EC1-HF-(*)-DFDF
DIN Female / OFF (No connector)	EC1-HF-(*)-DFO
N-Male / N-Male	EC1-HF-(*)-NMNM
N-Male / N-Female Panel Mount	EC1-HF-(*)-NMNF
N-Male / OFF (No connector)	EC1-HF-(*)-NMO
N-Female Panel Mount/ OFF (No connector)	EC1-HF-(*)-NFO

*Use cm value for the length in jumper part number.

NOTE: To order a jumper with one connector unattached (Loose), add an “L” after the connector to be loose.
Example: DMDML = Attached DIN Male on one end, with an unattached DIN Male packaged “loose” with the jumper.

NOTE: To order a jumper with only one connector, add an “O” after the one connector to be included.
Example: DMO = Attached DIN Male on one end, with no connector provided for the other end.

ELECTRICAL CHARACTERISTICS

- *Attenuation for 3 foot jumper at 68ºF**
  - *0.18 dB at 960 MHz*
  - *0.26 dB at 1880 MHz*
  - *0.28 dB at 2200 MHz*
  - **values without connectors, typical connector attenuation is less than 0.1√ f (GHz) (1 link / 2 connectors)*
- *Intermodulation measured with 43dBm/20W*
  - *-162 dBc (cellular bands), typical*
- *VSWR (typ)*
  - *≤ 1.09 at 960 MHz*
  - *≤ 1.09 at 1880 MHz*
  - *≤ 1.09 at 2200 MHz*
- *Power rating at 104ºF ambient temperature*
  - *0.38 kW at 960 MHz*
  - *0.27 kW at 1880 MHz*
  - *0.24 kW at 2200 MHz*

Test results included with each jumper.

Additional connector combinations and lengths available on request.

EC2: 3/8" Standard Foam-Dielectric Jumper Assemblies 50 Ohm

CONNECTORS	PART NUMBER
DIN Male / DIN Male	EC2-(*)-DMDM
DIN Male / DIN Female	EC2-(*)-DMDF
DIN Male / N-Male	EC2-(*)-DMNM
DIN Male / N-Female	EC2-(*)-DMNF
DIN Male / OFF (No connector)	EC2-(*)-DMO
DIN Female / DIN Female	EC2-(*)-DFDF
DIN Female / N-Male	EC2-(*)-DFNM
DIN Female / N-Female	EC2-(*)-DFNF
DIN Female / OFF (No connector)	EC2-(*)-DFO
N-Male / N-Male	EC2-(*)-NMNM
N-Male / N-Female	EC2-(*)-NMNF
N-Male / OFF (No connector)	EC2-(*)-NMO
N-Female / OFF (No connector)	EC2-(*)-NMO

ft.	*cm
1'	030
2'	061
3'	100
4'	122
5'	150
6.5'	200
7'	213
8'	250
9'	274
10'	300
12'	366
14'	426
16'	488
20'	609
25'	762
30'	914
35'	1066

*Use cm value for the length in jumper part number.

NOTE: To order a jumper with one connector unattached (Loose), add an “L” after the connector to be loose.
Example: DMDML = Attached DIN Male on one end, with an unattached DIN Male packaged “loose” with the jumper.

NOTE: To order a jumper with only one connector, add an “O” after the connector to be included.
Example: DMO = Attached DIN Male on one end, with no connector provided for the other end.

ELECTRICAL CHARACTERISTICS

- *Attenuation for 3 foot jumper at 68ºF**
  - *0.09 dB at 960 MHz*
  - *0.13 dB at 1880 MHz*
  - *0.15 dB at 2200 MHz*
  - *values without connectors, typical connector attenuation is less than 0.1√ f (GHz) (1 link / 2 connectors)
- *Intermodulation measured with 43dBm/20W*
  - *-162 dBc (cellular bands), typical*
- *VSWR (typ)*
  - *≤ 1.06 at 960 MHz*
  - *≤ 1.06 at 1880 MHz*
  - *≤ 1.06 at 2200 MHz*
- *Power rating at 104ºF ambient temperature*
  - *0.68 kW at 960 MHz*
  - *0.48 kW at 1880 MHz*
  - *0.44 kW at 2200 MHz*

Test results included with each jumper.

Additional connector combinations and lengths available on request.

ft.	*cm
1'	030
2'	061
3'	100
4'	122
5'	150
6.5'	200
7'	213
8'	250
9'	274
10'	300
12'	366
14'	426
16'	488
20'	609
25'	762
30'	914
35'	1066

EC4: 1/2" Standard Foam-Dielectric Jumper Assemblies 50 Ohm

CONNECTORS	PART NUMBER
DIN Male / DIN Male	EC4-(*)-DMDM
DIN Male / DIN Female	EC4-(*)-DMDF
DIN Male / Right Angle DIN Male	EC4-(*)-DMDMR
DIN Male / N-Male	EC4-(*)-DMNM
DIN Male / N-Female	EC4-(*)-DMNF
DIN Male / Right Angle N-Male	EC4-(*)-DMDMR
DIN Male / OFF (No connector)	EC4-(*)-DMO
Right Angle DIN Male / OFF (No connector)	EC4-(*)-DMRO
DIN Female / DIN Female	EC4-(*)-DFDF
DIN Female / N-Male	EC4-(*)-DFNM
DIN Female / N-Female	EC4-(*)-DFNF
DIN Female / Right Angle DIN Male	EC4-(*)-DFDMR
DIN Female / Right Angle N-Male	EC4-(*)-DFNMR
DIN Female / OFF (No connector)	EC4-(*)-DFO

*Use cm value for the length in jumper part number.

EC4 1/2" Standard Foam-Dielectric Jumper Assemblies (Continued Page 33)

EC4: Standard 1/2" Foam-Dielectric Jumper Assemblies
50 Ohm (Continued)

CONNECTORS	PART NUMBER
N-Male / N-Male	EC4-(*)-NMNM
N-Male / N-Female	EC4-(*)-NMNF
N-Male / Right Angle N-Male	EC4-(*)-NMNMR
N-Male / Right Angle DIN Male	EC4-(*)-NMDMR
N-Male / OFF (No connector)	EC4-(*)-NMO
Right Angle N-Male / OFF (No connector)	EC4-(*)-NMRO
N-Female / Right Angle N-Male	EC4-(*)-NFNMR
N-Female / Right Angle DIN Male	EC4-(*)-NFDMR
N-Female / OFF (No connector)	EC4-(*)-NFO

*Use cm value for the length in jumper part number.

NOTE: To order a jumper with one connector unattached (Loose), add an “L” after the connector to be loose.
Example: DMDMRL = Attached DIN Male on one end, with an unattached Right Angle DIN Male packaged “loose” with the jumper.

NOTE: To order a jumper with only one connector, add an “O” after the one connector to be included.
Example: DMO = Attached DIN Male on one end, with no connector provided for the other end.

ELECTRICAL CHARACTERISTICS

- Attenuation for 3 foot jumper at 68ºF*
  - 0.07 dB at 960 MHz
  - 0.09 dB at 1880 MHz
  - 0.10 dB at 2200 MHz

  *values without connectors, typical connector attenuation is less than 0.1√ f (GHz) (1 link / 2 connectors)
- Intermodulation measured with 43dBm/20W
  - -162 dBc (cellular bands), typical
- VSWR
  - ≤ 1.06 at 960 MHz
  - ≤ 1.06 at 1880 MHz
  - ≤ 1.06 at 2200 MHz
- Power rating at 104ºF ambient temperature
  - 1.1 kW at 960 MHz
  - 0.77 kW at 1880 MHz
  - 0.70 kW at 2200 MHz

Test results included with each jumper.

Additional connector combinations and lengths available on request.

EC4-HF: 1/2" Hiflex Foam-Dielectric Jumper Assemblies
50 Ohm

ft.	*cm
1'	030
2'	061
3'	100
4'	122
5'	150
6.5'	200
7'	213
8'	250
9'	274
10'	300
12'	366
14'	426
16'	488
20'	609
25'	762
30'	914
35'	1066

CONNECTORS	PART NUMBER
DIN Male / DIN Male	EC4-HF-(*)-DMDM
DIN Male / DIN Female	EC4-HF-(*)-DMDF
DIN Male / Right Angle DIN Male	EC4-HF-(*)-DMDMR
DIN Male / N-Male	EC4-HF-(*)-DMNM
DIN Male / N-Female	EC4-HF-(*)-DMNF
DIN Male / Right Angle N-Male	EC4-HF-(*)-DMDMR
DIN Male / OFF (No connector)	EC4-HF-(*)-DMO
Right Angle DIN Male / OFF (No connector)	EC4-HF-(*)-DMRO
DIN Female / DIN Female	EC4-HF-(*)-DFDF
DIN Female / N-Male	EC4-HF-(*)-DFNM
DIN Female / N-Female	EC4-HF-(*)-DFNF
DIN Female / Right Angle DIN Male	EC4-HF-(*)-DFDMR
DIN Female / Right Angle N-Male	EC4-HF-(*)-DFNMR
DIN Female / OFF (No connector)	EC4-HF-(*)-DFO

*Use cm value for the length in jumper part number.

EC4-HF 1/2" Hiflex Foam-Dielectric Jumper Assemblies (Continued Page 35)

EC4-HF: 1/2" Hiflex Foam-Dielectric Jumper Assemblies

50 Ohm (Continued)

CONNECTORS	PART NUMBER
N-Male / N-Male	EC4-HF-(*)-NMNM
N-Male / N-Female	EC4-HF-(*)-NMNF
N-Male / Right Angle N-Male	EC4-HF-(*)-NMNMR
N-Male / Right Angle DIN Male	EC4-HF-(*)-NMDMR
N-Male / OFF (No connector)	EC4-HF-(*)-NMO
Right Angle N-Male / OFF (No connector)	EC4-HF-(*)-NMRO
N-Female / Right Angle N-Male	EC4-HF-(*)-NFNMR
N-Female / Right Angle DIN Male	EC4-HF-(*)-NFDMR
N-Female / OFF (No connector)	EC4-HF-(*)-NFO

*Use cm value for the length in jumper part number.

NOTE: To order a jumper with one connector unattached (Loose), add an “L” after the connector to be loose.
Example: DMDMRL = Attached DIN Male on one end, with an unattached Right Angle DIN Male packaged “loose” with the jumper.

NOTE: To order a jumper with only one connector, add an “O” after the one connector to be included.
Example: DMO = Attached DIN Male on one end, with no connector provided for the other end.

ELECTRICAL CHARACTERISTICS

- *Attenuation for 3 foot jumper at 68ºF**
  - *0.10 dB at 960 MHz*
  - *0.14 dB at 1880 MHz*
  - *0.17 dB at 2200 MHz*
  - *values without connectors, typical connector attenuation is less than 0.1√ f (GHz) (1 link / 2 connectors)
- *Intermodulation measured with 43dBm/20W*
  - *-162 dBc (cellular bands), typical*
- *VSWR*
  - *≤ 1.06 at 960 MHz*
  - *≤ 1.06 at 1880 MHz*
  - *≤ 1.06 at 2200 MHz*
- *Power rating at 104ºF ambient temperature*
  - *0.9 kW at 960 MHz*
  - *0.61 kW at 1880 MHz*
  - *0.56 kW at 2200 MHz*

Test results included with each jumper.

Additional connector combinations and lengths available on request.

Notes

Technical Information

Mechanical Properties

The mechanical characteristics of corrugated cables, when compared to smooth-wall cables, provide a significant advantage to a system's electrical performance during and, most importantly, after the antenna lines are installed. It should be noted that, during its 50 year history, the wireless communications industry has overwhelmingly chosen corrugated cable over smooth-wall cable for maximum system performance. Below are the terms most commonly used to describe and evaluate mechanical performance. Eupen strongly recommends careful consideration of these properties when selecting a feed line product."

Bending Moment – The amount of force required to cause a cable to bend

Minimum Bending Radius (Single Bend) – Once a cable has been bent to this radius it should not be bent again or the cable could be damaged

Minimum Bending Radius (Repeated Bends) – A cable bent to this radius or larger, can be re-bent several times during installation without concern for damage; only corrugated cable has this capability

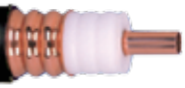
Flat Plate Crush Resistance or Strength – The amount of crushing force required to deform the cable to a point where it will no longer meet the specified impedance

Maximum Pulling Strength or Tensile Strength – The maximum force that can be applied (normally during hoisting operations) before deforming the cable to a point where due to elongation, it will no longer meet specifications

Electrical Properties

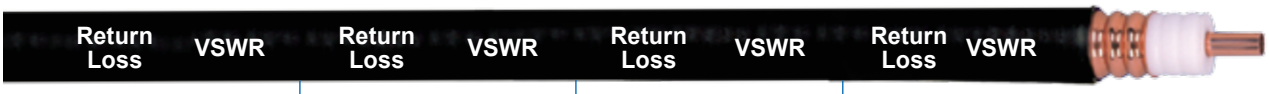
The most common and important electrical parameters of coaxial cable assemblies are return loss, insertion loss and intermodulation. Advanced design and manufacturing techniques enable Eupen corrugated cable to offer the highest possible performance in each of these areas without sacrificing flexibility, crush strength, installation ease or reliability.

Return Loss – This is a measure of how much of a signal sent into a device is reflected back from that device. It's expressed in decibels so -10dB return loss means 10% of the signal was reflected back, -20dB means 1% was reflected back and so on. The larger the magnitude of the return loss, the less power is reflected. After about 20 dB the improvement from additional return loss begins to become less significant. Return loss is caused by transitions and imperfections. For example, a feeder line systems return loss would be limited by the junctions with other components such as connectors, jumpers or antennas. The chart below quantifies the impact of various return loss levels on power delivered to a cable.



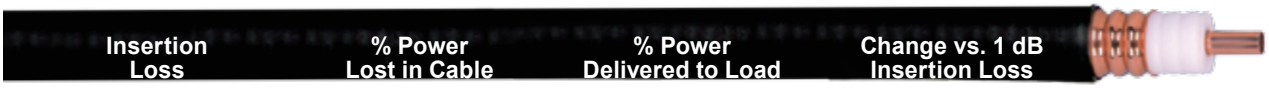
Return Loss	% Power Lost to Reflection	% Power Delivered to Cable	Change vs. 25 dB Return Loss
15.0	3.16%	96.84%	-2.85%
20.0	1.00%	99.00%	-0.68%
25.0	0.32%	99.68%	-
30.0	0.10%	99.90%	0.22%
35.0	0.03%	99.97%	0.29%
40.0	0.01%	99.99%	0.31%

Voltage Standing Wave Ratio (VSWR) – Return loss and VSWR are both used to express the same thing: the magnitude of the reflected signal relative to the input signal. VSWR is a measure of the voltage of the reflected wave vs. the voltage of the input wave. The chart below shows the relationship between return loss and VSWR.



Return Loss	VSWR	Return Loss	VSWR	Return Loss	VSWR	Return Loss	VSWR
50.00	1.006	40.00	1.020	30.00	1.065	20.00	1.222
49.00	1.007	39.00	1.023	29.00	1.074	19.00	1.253
48.00	1.008	38.00	1.025	28.00	1.083	18.00	1.288
47.00	1.009	37.00	1.029	27.00	1.094	17.00	1.329
46.00	1.010	36.00	1.032	26.00	1.106	16.00	1.377
45.00	1.011	35.00	1.036	25.00	1.119	15.00	1.433
44.00	1.013	34.00	1.041	24.00	1.135	14.00	1.499
43.00	1.014	33.00	1.046	23.00	1.152	13.00	1.577
42.00	1.016	32.00	1.052	22.00	1.173	12.00	1.671
41.00	1.018	31.00	1.058	21.00	1.196	11.00	1.785

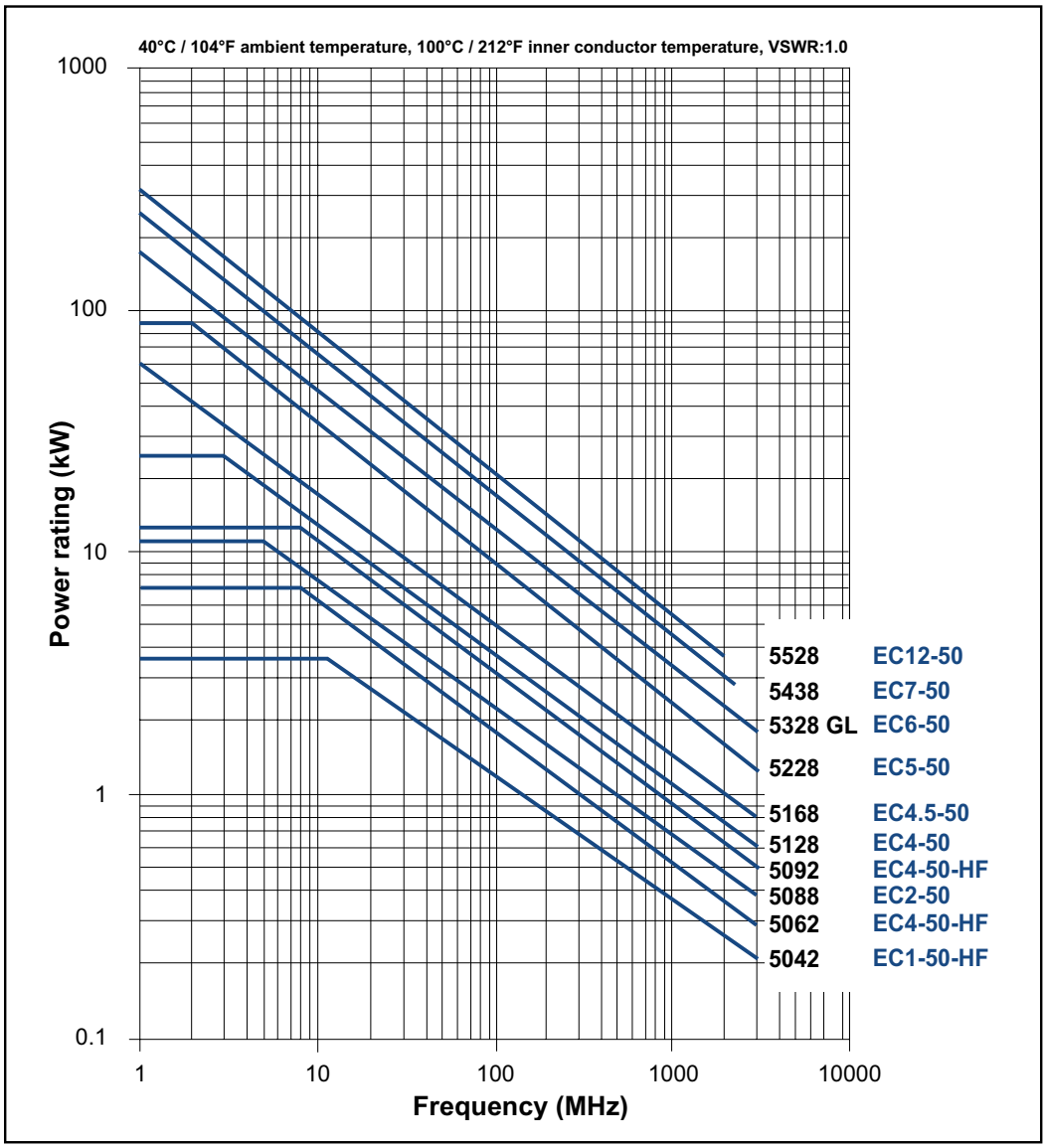
Insertion Loss or Attenuation – This is the reduction of signal amplitude or strength. It is normally proportional to the distance the signal travels. The longer the cable, the higher the loss will be. Loss is mainly caused by the resistive properties of the conductors. Resistive loss increases with the square root of the frequency. Resistive loss per unit length decreases as cable size is increases. Loss is also caused by absorption of energy in the dielectric material. Absorption loss is a smaller contributor to the overall loss. Absorption loss increases directly proportional to increasing frequency. The chart below quantifies the impact of various levels of insertion loss on the power delivered thru a cable to a load. Most feeder cables have losses between 1 and 3 dB. A change in attenuation (decibels or dBs) of 10% only changes the power delivered to the load by about 1 to 3%.



Insertion Loss	% Power Lost in Cable	% Power Delivered to Load	Change vs. 1 dB Insertion Loss
1.10	22.38%	77.62%	-2.27%
1.08	22.02%	77.98%	-1.82%
1.06	21.66%	78.34%	-1.37%
1.04	21.30%	78.70%	-0.91%
1.02	20.93%	79.07%	-0.46%
1.00	20.57%	79.43%	-

Intermodulation – This is the creation of an unwanted signal due to the mixing of two or more signals in a non-linear device. If this unwanted signal happens to fall in the receive band of an RF system, it can raise the noise floor and cause the system to be unable to detect desired signals. This could result in a base station being unable to recover certain incoming voice or data signals from a mobile. In passive components, such as cables and connectors, intermodulation can be caused by magnetic materials, small surface imperfections, areas of high current or voltage density, debris, areas or weak or poor contact and semiconductor effects due to metal oxidation.

Average Power Rating – The average or mean power rating of a coaxial cable is determined by the maximum allowable inner conductor temperature, and depends on the type of dielectric used. The average power rating of a coaxial cable decreases as frequency rises.



Characteristic Impedance – This is the ratio of the voltage wave to the current wave of a signal traveling on a transmission line. What's important is that all of the components in the system have the same characteristic impedance. Wireless RF communications normally set the characteristic impedance at 50 Ohms. 50 Ohms was selected as a compromise between maximum power handling (approximately 30 Ohm) and minimum insertion loss (about 75 Ohms).

Cut-off or Maximum Operating Frequency – This is the highest frequency at which the specifications of the cable are valid. Above this frequency, signals begin to propagate or travel down the line in a waveguide mode and their behavior cannot be predicted by the same specifications.

RF Peak Power or Peak Power Rating – This is the maximum input power at which the cable can reliably operate. Above this power level, voltage break down or arcing within the connector is possible.

RF Peak Voltage – This is the maximum RF voltage at which the cable can operate. It is limited by the gap between the inner and outer conductor and the voltage breakdown capacity of air. Since there will be an air gap between the end of the foam and the connector, the gap is not limited by the breakdown voltage capacity of the foam.

Relative Propagation Velocity or Velocity Ratio – This establishes the speed at which a signal passes through a cable relative to the speed in free space. It is computed by taking the inverse of the square root of the relative dielectric constant.

Capacitance – This is independent of frequency and determined by the relative dielectric constant and the diameters of the inner and outer conductors.

Inductance – This is slightly frequency dependent and determined by the conductor material and the diameters of the inner and outer conductors.

DC Resistance – This is the DC resistance of the conductors in ohms per unit length.

Electrical Length – The electrical length is related to the propagation velocity and the physical length (Physical Length/Relative Propagation Velocity). Transmission lines filled with a dielectric material with a relative dielectric constant of greater than one appear to be electrically longer than a line with air as the dielectric.

Skin Effect – At DC, current flows uniformly through the cross section of a conductor. As frequency increases, current becomes more concentrated in the outer layers of the conductor. At high frequencies, current only travels within the outermost layer of "skin" of the conductor.

Decibels – The decibel (dB) is a logarithmic expression of the ratio between two power or voltage levels. A power difference in decibels is calculated by $10 \log_{10} \frac{P_2}{P_1}$ and a voltage difference in decibels is calculated by $20 \log_{10} \frac{V_2}{V_1}$. A doubling in power is a 3 dB increase, and a doubling in voltage is a 6 dB increase. Determining system performance by summing all gains and losses is best accomplished using dBm, or decibels relative to one milliwatt, or 0.001 watts.

$$\text{dBm} = 10 \log_{10} \frac{P1}{0.001}$$

Watts	dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts	dBm
1.00E-15	-120.0	0.010	10.0	0.175	22.4	6.000	37.8	35.000	45.4
1.00E-14	-110.0	0.015	11.8	0.200	23.0	7.000	38.5	40.000	46.0
1.00E-13	-100.0	0.020	13.0	0.250	24.0	8.000	39.0	45.000	46.5
1.00E-12	-90.0	0.025	14.0	0.300	24.8	9.000	39.5	50.000	47.0
1.00E-11	-80.0	0.030	14.8	0.350	25.4	10.000	40.0	55.000	47.4
1.00E-10	-70.0	0.035	15.4	0.400	26.0	11.000	40.4	60.000	47.8
1.00E-09	-60.0	0.040	16.0	0.450	26.5	12.000	40.8	65.000	48.1
1.00E-08	-50.0	0.045	16.5	0.500	27.0	13.000	41.1	70.000	48.5
1.00E-07	-40.0	0.050	17.0	0.600	27.8	14.000	41.5	75.000	48.8
1.00E-06	-30.0	0.055	17.4	0.700	28.5	15.000	41.8	80.000	49.0
1.00E-05	-20.0	0.060	17.8	0.800	29.0	20.000	43.0	85.000	49.3
1.00E-04	-10.0	0.065	18.1	0.900	29.5	21.000	43.2	90.000	49.5
0.001	0.0	0.070	18.5	1.000	30.0	22.000	43.4	95.000	49.8
0.002	3.0	0.075	18.8	1.500	31.8	23.000	43.6	100.000	50.0
0.003	4.8	0.080	19.0	2.000	33.0	24.000	43.8	110.000	50.4
0.004	6.0	0.085	19.3	2.500	34.0	25.000	44.0	120.000	50.8
0.005	7.0	0.090	19.5	3.000	34.8	26.000	44.1	130.000	51.1
0.006	7.8	0.095	19.8	3.500	35.4	27.000	44.3	140.000	51.5
0.007	8.5	0.100	20.0	4.000	36.0	28.000	44.5	150.000	51.8
0.008	9.0	0.125	21.0	4.500	36.5	29.000	44.6	160.000	52.0
0.009	9.5	0.150	21.8	5.000	37.0	30.000	44.8	170.000	52.3

Common Environmental Specifications

Temperature Range – This is the range of temperature over which the cable can be reliably used.

Ingress Protection (Water, Dust, ...) Ratings – IP67 is dust proof and protected from immersion in one meter of water for 30 minutes. IP68 is dust proof and protected from continuous immersion in water. To insure protection from water ingress, Eupen cables and connectors are tested in one meter of water and under 0.5 bar atmospheric pressure (200 inches).

Flame Retardant Cables – For applications requiring flame-retardance, coaxial cables are available with a flame retardant and halogen-free outer jacket. This construction meets international standards for flame propagation, smoke density and corrosive gas emissions.

Tests on Flame Retardancy of Cables

Test on flammability of single cables

Test in accordance with	VDE 0472 Part 804-B BS 4066 Part 1 IEC 60332-1

Test on flammability of cable bundles

Test in accordance with	VDE 0472 Part 804-C BS 4066 Part 3 (NMV 1,5) IEC 60332-3 Cat. C

Test on Smoke Density

Test in accordance with	VDE 0472 Part 816 BS 6724 Appendix F IEC 61034-1 and 2

Test on Corrosive Gas Emissions

Test in accordance with	VDE 0472 Part 813 BS 6725 IEC 60754-2

Test on Insulation Integrity

Test in accordance with	VDE 0472 Part 814 IEC 60331

Installation Considerations

Feeder cable systems are installed and used in extremely harsh environments. Because of this, cables cannot be compared solely on electrical performance in a lab environment. As covered previously, small changes in attenuation can have little if any impact on system performance. These small “gains” are quickly lost when scrap rates and installation cost increase and project schedules are extended. Eupen has taken special care to be sure our products are the best possible products for the intended application.

Bend Test - Eupen cables require the smallest amount of force to bend, bend to the smallest radius and still retain the highest levels of flat plate crush resistance. This insures easy installation and cable routing. Smooth wall cable requires nearly five times the force (over 150 lbs!) to create a bend. Smooth wall cable is also very unforgiving. Bends cannot be undone. With Eupen corrugated cable, you won’t need two people to make a bend and you are allowed multiple bends.

Dynamic PIM - Eupen connectors are also the best designed and manufactured connectors on the market. Eupen engineers have been designing for the PIM sensitive European market since the first cellular network deployments. Eupen understands that PIM testing in a static laboratory is not relevant in a world where feeder lines and jumpers are installed on towers and rooftops and left to withstand severe wind, rain, ice and temperature swings. These conditions create a dynamic environment where connector junctions are constantly being stressed. Eupen has developed dynamic PIM testing fixtures which simulate these mechanical stresses. Eupen has tested and compared our connectors to our competitors and found that ours is the only design which is capable of meeting PIM specifications under these dynamic stress conditions.

The ideal cable will have very low loss, bend to a very tight radius with very little force applied, and yet withstand crushing forces and extreme environmental conditions. With Eupen corrugated cable, no sacrifices are necessary. Eupen cable and connector systems have the best possible balance between mechanical performance, electrical performance, ease of use, and reliability. Eupen cables have the lightest bending radius, require the least amount of force to bend, and still have the highest flat plate crush resistance, all with no sacrifice in electrical performance or the ability to maintain this performance in extreme environments over an extended period of time.

Tools

Cable Prep Tools
Torque Wrenches
Tool Kits

Eupen Provides the Best Tools to Build the Highest Quality Network

Eupen has long been the leader in cable prep tool designs and now offers the most innovatively designed cable prep tool ever to hit the market. The new ***F-Series*** Eupen tools are designed with two concepts in mind: Consistently Perfect Cable Preparations & Long-lasting Durability.

This drill mounted tool automatically cuts the jacket to the proper dimension. Then it utilizes the installed base of the MonoBlock connector as a stop for the cable cut. Involving the connector in the process of making this important cut ensures perfect consistency from user to user and creates a more reliable process than the use of plastic saw guides or other tool designs which drop ball bearings into the corrugation valley as a stop. Because the tool bottoms out on the connector base and spins freely, there is no need for the user to "feel" the right amount of pressure that must be applied or listen for a change in RPM, as is the case with the ball bearing designs.

The *F*-Series tools are made to be user friendly and very durable for long term rugged use. Blades are extremely long lasting yet easy to replace when needed, and the modular style of the design allows interchangeability of key components.

Eupen also offers a full line of wrenches and other wireless construction tools that can be purchased individually or in kits. Eupen provides an array of smartly packaged standard tool kits for common applications. You can even order a custom kit built to your specifications.

As an added service to our customers, Eupen provides factory training and certification with a fast and flexible connector installation training program. We can provide a classroom at one of our facilities or come to your location or job site.

Eupen truly understands the needs of the installation contractor. We incorporate our understanding into our products and services. We make it easy for installers because we realize the importance of your role in building the highest quality network.

Eupen connectors are easy to install, our tools are easy to use, and our cable is made to bend!

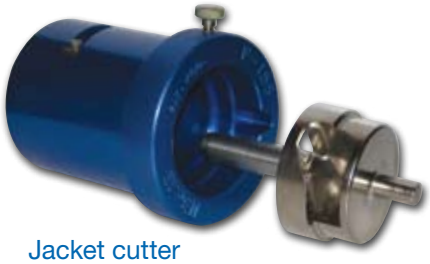
To order tools or schedule training, call your local Eupen representative today.

PREP TOOL SELECTION GUIDE

Match the cable to connector from left to right to determine the appropriate prep tool.

CABLE PART NUMBER	CABLE SIZE	CONNECTOR TYPE	RECOMMENDED PREP TOOL
EC1-50-HF	1/4" Hiflex	Hiflex	SPTC50B14X
EC4-50-HF	1/2" Hiflex	Hiflex	SPTC50B12X
		Rt. Angle Hiflex	SPTC50BL12X
EC4-50	1/2"	Standard	SPTC50AV12
		Rt. Angle Standard	
EC5-50A	7/8"	MonoBlock	F-78
EC6-50A	1 1/4"	MonoBlock	F-114
EC7-50A	1 5/8"	MonoBlock	F-158
EC12-50	2 1/4"	Modular	SG-5528 (or) SPB13

F-158



Jacket cutter

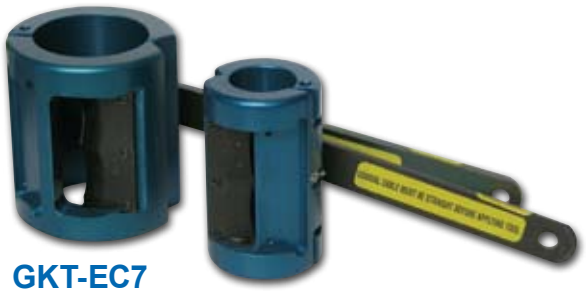
Trim head

SPTC50AV12

SPTC50B12X

GROUND KIT STRIPPING TOOLS

ITEM NUMBER	DESCRIPTION
GKT-EC5	7/8" Ground Kit Stripping Tool
GKT-EC6	1 1/4" Ground Kit Stripping Tool
GKT-EC7	1 5/8" Ground Kit Stripping Tool



GKT-EC7

GKT-EC5

CONNECTOR TORQUE SPECIFICATIONS

CONNECTOR TYPE	WRENCH SIZE	MAX WRENCH HEAD THICKNESS	BACK NUT TORQUE SPEC	ITEM NUMBER
1/2" Hiflex	19mm	N/A	20 lb-ft	TQ-34-F20
1/2" Standard	19mm	7mm	15 lb-ft	TQ-34-F20
7/8" MonoBlock	30mm	12mm	22 lb-ft	TQ-30MM-F22
1 1/4" MonoBlock	1 11/16"	N/A	29 lb-ft	TQ-11116-F29
1 5/8" MonoBlock	2 1/4"	N/A	37 lb-ft	TQ-214-F37
2 1/4" Modular	2 5/8"	N/A	37 lb-ft	TQ-258-F37

NOTE: To tighten connector, turn back nut while holding head fixed.

CONNECTOR INTERFACE TORQUE SPECIFICATIONS

INTERFACE TYPE	WRENCH SIZE	MAX WRENCH HEAD THICKNESS	TORQUE SPEC	ITEM NUMBER
7-16 DIN male	1 1/4"	N/A	18 - 22 lb-ft	TQ-114-F18-M

TOOL KITS

ITEM NUMBER	DESCRIPTION		
TK-4	**Jumper Tool Kit**		
	1	1/2" Hiflex Cable Prep Tool	SPTC50B12X
	1	1/2" Standard Cable Prep Tool	SPTC50AV12
	1	1/2" Back Nut Torque Wrench (Fits Standard & Hiflex)	TQ-34-F20
	1	7-16 DIN Coupler Torque Wrench	TQ-114-F18-M
	1	19mm Wrench	AD6119
	1	21mm Wrench	AD6121
	1	24mm Wrench	AD6124
	1	Metric Hex Key Set	946702
	Each 10	1/2" Hiflex Grommets	A187
	Each 10	1/2" Main O-Rings	B708
	Each 10	1/2" Body O-Rings	B707
TK-78	**7/8" Mini Kit**		
	1	F-Series Drill-mount Cable Prep Tool	F-78
	1	7/8" Back Nut Torque Wrench	TQ-30MM-F22
	1	30mm Wrench	AD91030
	1	Trim Head Blade, F-78/F114	SPB14
	5	7/8" Main O-Rings	B709
TK-114	**1 1/4" Mini Kit**		
	1	F-Series Drill-mount Cable Prep Tool	F-114
	1	1 1/4" Back Nut Torque Wrench	TQ-11116-F29
	1	1 1/4" Spanner Wrench	5472A1
	1	Trim Head Blade, F-78/F114	SPB14
	5	1 1/4" Main O-Rings	B710
TK-158	**1 5/8" Mini Kit**		
	1	F-Series Drill-mount Cable Prep Tool	F-158
	1	1 5/8" Back Nut Torque Wrench	TQ-214-F37
	1	1 5/8" Spanner Wrench	5472A3
	1	15mm Box Wrench (for 1 5/8" Pin Insert)	AD6115
	1	Trim Head Blade, F-158	SPB11
	5	1 5/8" Main O-Rings	B711

TOOL KITS (continued)

ITEM NUMBER	DESCRIPTION		
TK-6	Full Deluxe Tool Kit		
	1	1/2" Hiflex Cable Prep Tool	SPTC50B12X
	1	1/2" Hiflex Cable Prep Tool for Rt. Angle Connectors	SPTC50BL12X
	1	1/2" Standard Cable Prep Tool	SPTC50AV12
	1	7/8" MonoBlock Drill-mount Cable Prep Tool	F-78
	1	1 1/4" MonoBlock Drill-mount Cable Prep Tool	F-114
	1	1 5/8" MonoBlock Drill-mount Cable Prep Tool	F-158
	1	1/2" Back Nut Torque Wrench (Fits Standard & Hiflex)	TQ-34-F20
	1	7/8" Back Nut Torque Wrench	TQ-30MM-F22
	1	1 1/4" Back Nut Torque Wrench	TQ-11116-F29
	1	1 5/8" Back Nut Torque Wrench	TQ-214-F37
	1	7-16 DIN Coupler, MonoBlock male Torque Wrench	TQ-114-F18-M
	1	7/8" Ground Kit Stripping Tool	GKT-EC5
	1	1 1/4" Ground Kit Stripping Tool	GKT-EC6
	1	1 5/8" Ground Kit Stripping Tool	GKT-EC7
	2	1 5/8" Open-end Short Wrench, Each	28-072
	2	1 1/4" Spanner Wrench, Each	5472A1
	1	15mm Box Wrench (for 1 5/8" Pin Insert)	AD6115
	1	19mm Wrench	AD6119
	1	21mm Wrench	AD6121
	1	24mm Wrench	AD6124
	1	30mm Wrench	AD91030
	1	Needle-Nosed Pliers	AD656
	1	Metric Hex Key Set	946702
	1	Straight Edge Knife	3951A11
	1	2 1/4" Saw Guide (For Two Piece Connectors)	SG-5528
	10	1/2" Hiflex Grommets, Each	A187
	10	1/2" Hiflex Rear O-Rings, Each	B706
	10	1/2" Main O-Rings, Each	B708
	10	1/2" Body O-Rings, Each	B707
	10	7/8" Main O-Rings, Each	B709
	10	7/8" Body O-Rings, Each	B712
	10	7/8" Silicone Balls, Each	B712A
	10	1 1/4" Main O-Rings, Each	B710
	10	1 1/4" Body O-Rings, Each	B714
	10	1 1/4" Silicone Balls, Each	B715
	10	1 5/8" Main O-Rings, Each	B711
	10	1 5/8" Body O-Rings, Each	B711B
	10	1 5/8" Silicone Balls, Each	B713
	1	Tube Silicone Grease	PST-504
	1	Trim Head Blade, F-158 Prep tool	SPB11

ADDITIONAL TOOLS

HAND TOOLS & SAW GUIDES

ITEM NUMBER	DESCRIPTION
28-072	1 5/8" Open-end Short Wrench
5472A3	1 5/8" Spanner Wrench
5472A1	1 1/4" Spanner Wrench
AD6115	15mm Box Wrench (for 1 5/8” Pin Insert)
AD6119	19mm Wrench
AD6121	21mm Wrench
AD6124	24mm Wrench
AD91030	30mm Wrench
AD656	Needle-Nosed Pliers
946702	Metric Hex Key Set
3951A11	Straight Edge Knife
SG-5228	7/8” Saw Guide (for old style two-piece connectors)
SG-5328	1 1/4" Saw Guide (for old style two-piece connectors)
SG-5438	1 5/8" Saw Guide (for old style two-piece connectors)
SG-5528	2 1/4" Saw Guide (for old style two-piece connectors)

O-RINGS & SEALANT

A187	1/2" Hiflex Grommets
B706	1/2" Hiflex Rear O-Rings
B708	1/2" Main O-Rings
B707	1/2" Body O-Rings
B709	7/8" Main O-Rings
B712	7/8" Body O-Rings
B712A	7/8" Silicone Balls
B710	1 1/4" Main O-Rings
B714	1 1/4" Body O-Rings
B715	1 1/4" Silicone Balls
B711	1 5/8" Main O-Rings
B711B	1 5/8" Body O-Rings
B713	1 5/8" Silicone Balls
B716	2 1/4" Main O-Rings
B717	2 1/4" Body O-Rings
PST-504	Tube Silicone Grease

REPLACEMENT BLADES AND COMPONENTS

ITEM NUMBER	DESCRIPTION
A255	1/2" Hiflex Central Blade
A254	1/2" Hiflex Peeling Blade
A257	1/2" Standard Central Blade
A256	1/2" Standard Peeling Blade
F-78-JCA	F-78 Jacket Cutter Assembly
F-114-JCA	F-114 Jacket Cutter Assembly
F-158-JCA	F-158 Jacket Cutter Assembly
F-78-THA	F-78 Trim Head Assembly
F-114-THA	F-114 Trim Head Assembly
F-158-THA	F-158 Trim Head Assembly
SPB11	Trim Head Blade, F-158
SPB14	Trim Head Blade, F-114, F78
SPB03PP	Trim Head Pilot Pin for F-78
SPB05PP	Trim Head Pilot Pin for F-114
SPB01PP	Trim Head Pilot Pin for F-158
SPB13PP	Trim Head Pilot Pin for SPB13 (2 1/4" Cable Prep Tool)
SPB09	Jacket Peeling Blade for F-78
SPB12	Jacket Peeling Blade for F-114
SPB10	Jacket Peeling Blade for F-158 & SPB13
GKT-BK512	Replacement Blade for GKT-EC5
GKT-BK67	Replacement Blade for GKT-EC6 & GKT-EC7

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