RF-CABLES 50 Ω

EC³ : Eupen Corrugated Copper Cables for radio transmission systems

Including the
New LOW LOSS *"A" Version*

Edition 2007

KABELWERK EUPEN AG

KABELWERK EUPEN AG THE SPECIALIST IN

The foundation of the cable factory KABELWERK EUPEN AG as manufacturer of electrical cables goes back to the beginning of this century. Today the company has a staff of 950 people producing power cables, telecommunication cables and RF-Cables.

Since broadband transmission became possible, KABELWERK EUPEN AG has been involved in the design and manufacture of coaxial cables.
The introduction of Cable Television in 1962 was decisive for the start of producing coaxial cables on a larger scale.
With the increasing demand for coaxial cables and the intensive R&D to improve cable construction and transmission characteristics, KABELWERK EUPEN AG has become today ***one of the leading manufacturer for coaxial cables in the World***.

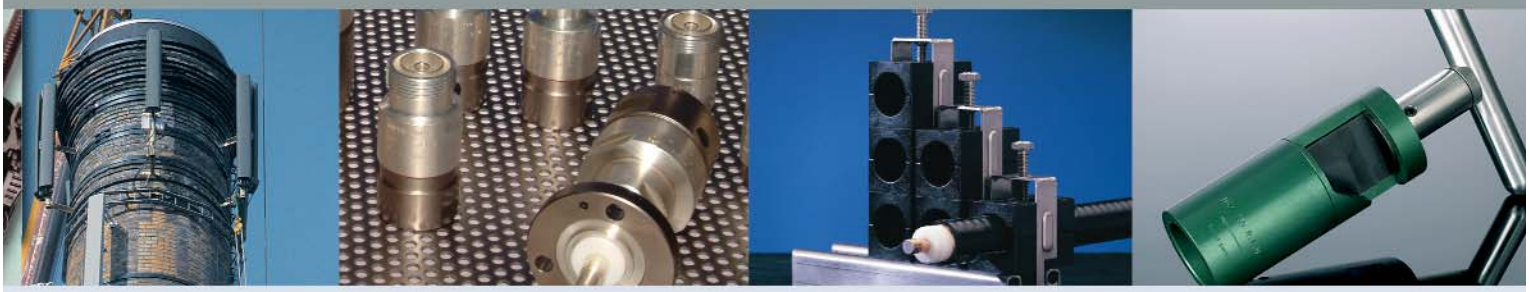
Over 45 years of experience in the field of RF-Cables, the company constantly developed its extensive manufacturing process bearing in mind the improvement of quality.

In 1999 KABELWERK EUPEN AG developed a new generation of coaxial cable connectors.

Since 1993 ***the company is ISO 9001 certified for all its products***.

Today the cables and connectors from KABELWERK EUPEN AG, together is an unbeatable match to guarantee superior performances and long service life.

ABLES



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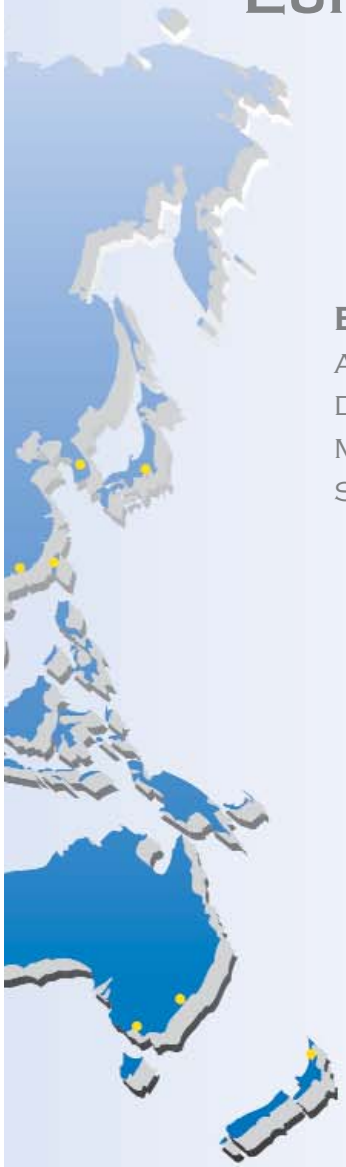
EC³:
Eupen Corrugated Copper Cables



Antenna stations in mobile, cellular, microwave and broadcast communication systems require high quality coaxial cables and connectors for very low loss and high power signal transmission.

EUPEN CABLES AND CABLE ACCESSORIES ARE SPECIFICALLY DESIGNED FOR THE NEEDS OF MODERN RADIO COMMUNICATION SYSTEMS.

EC³ Cable from Eupen offers better electrical performance and greater durability than conventional corrugated copper cables. It is the best choice for UMTS, PCS, cellular antenna feeder cables and other wireless communication applications requiring a cable with the lowest loss and best long term durability. The more durable construction of the EC³ Cable allows us to offer the best warranty in the industry – 12 years.

The electrical specifications of the EC³ Cable are unsurpassed. Every reel is swept for attenuation and return loss before it leaves the factory. Return loss is typically 30 dB and guaranteed to be at least 23 dB over the cellular and PCS bands, when the cable is terminated with EC³ Connectors. Attenuation specifications are the best in the industry.

EC³ Connectors are the easiest attaching corrugated copper cable connectors made. No soldering is required for the attachment of any of the connectors. High quality silver plating is used on all parts in the electrical path, with electroless nickel plating on all mechanical parts.
They feature superior electrical performances.

EC³ Cables are offered in sizes ranging from 1/4" to 2-1/4". A full range of type N, DIN and EIA EC³ Connectors are available to complete the package, including hanging and grounding accessories, as well as other accessories needed to complete installation.

In addition to the cables in this catalogue we can provide:

- **Phase stabilised, phase measured cable**
- **Low VSWR microwave versions**
- **Special colours**
- **Cable assemblies**

Our quality products are delivered fast and on time, saving you also time and money. Eupen has a staff of engineers to provide complete technical support for our products and to help you to select the best cable for your application. We can provide training to assure the best installation of your system.

EC³
FOAM DIELECTRIC

EUPEN CABLES FEATURE INNOVATIVE DESIGN, CAREFUL CHOICE OF RAW MATERIALS, CONSISTENT MANUFACTURING AND QUALITY ASSURANCE TECHNIQUES.
THE RESULT IS A COAXIAL CABLE WITH SUPERIOR LAUNCHED ELECTRICAL AND MECHANICAL PERFORMANCE.

Our coaxial cable design with low density cellular polyethylene foam dielectric and ring-corrugated copper outer conductor and our 45 years of experience in manufacturing these cables are your guarantee of the supply of a technically optimal construction, featuring:

- lowest loss
- excellent flexibility
- excellent RF shielding
- very low VSWR
- easy and reliable installation of connectors

Thanks to intensive R&D, Eupen improved in 2006 the attenuation of its most common sections and launch the ***ultra low loss "A" version*** for 7/8", 1-1/4" and 1-5/8".

The cable ***inner conductor*** is constructed from copperclad aluminium wire, copper tube or corrugated copper tube, depending on the cable size.

The ***dielectric*** is a cellular polyethylene foam manufactured by a proprietary process using ozone friendly expansion gas. A high foaming ratio guarantees low attenuation.
The foam dielectric is bonded to the inner conductor by a precoating layer. This layer ensures good adhesion of the dielectric to the inner conductor. It also permits easy, clean removal of the dielectric during connector installation.
The ring-corrugation of the copper ***outer conductor*** captures the dielectric mechanically and ensures good adhesion to the dielectric. This construction prevents relative movement between the inner and the outer conductor due to bending, pulling and temperature variations.

The standard cable construction uses an all-weather and UV-resistant black (or grey) ***PE jacket,*** suitable for indoor, outdoor or underground installation.

For applications requiring flame-retardance, coaxial cables are available with a flame retardant and halogen free jacket. This construction meets international standards for flame propagation, such as IEC 60332-1-2, smoke density IEC 61034-1+2 and acidity of evolved gases IEC 60754-2.

For very severe installation requirements, cable constructions with steel tape or wire armouring are available.

HALOGEN FREE AND FIRE RESISTANT FEATURES

Test on flammability

a) Test on flammability of single cables

Test in accordance with: IEC 60332-1-2
EN 60332-1-2

b) Test on flammability of cable bundles

Test in accordance with: IEC 60332-3 Cat. C
EN 50266-2-4 Cat. C

Test on smoke density

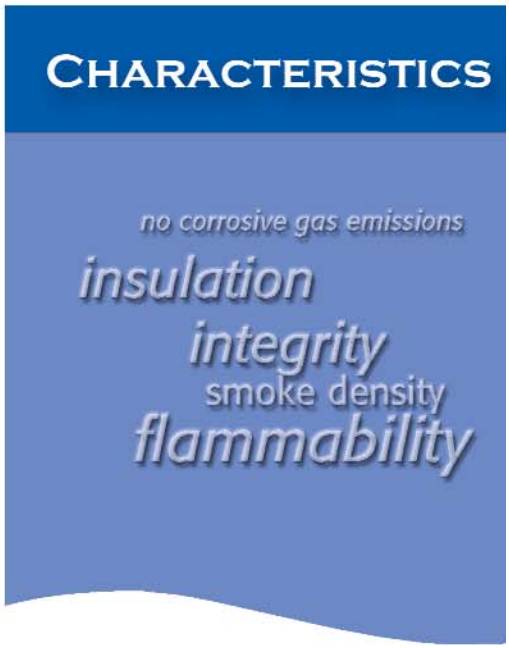
Test in accordance with: IEC 61034-1 and -2
EN 61034-1 and -2

Test on corrosive gas emissions

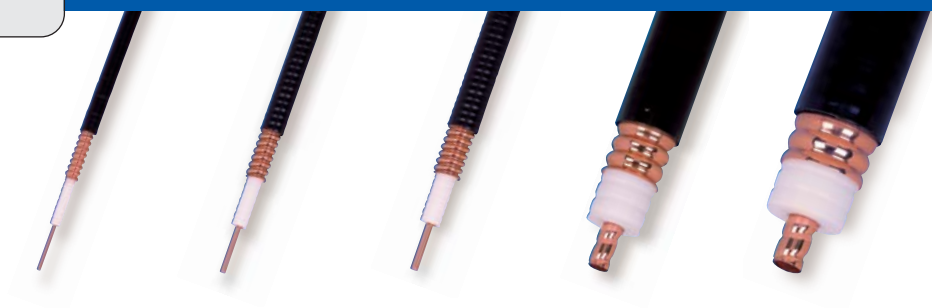
Test in accordance with: IEC 60754-2
EN 50267-2-2

Test on insulation integrity

Test in accordance with: IEC 60331-23
VDE 0472 Part 814



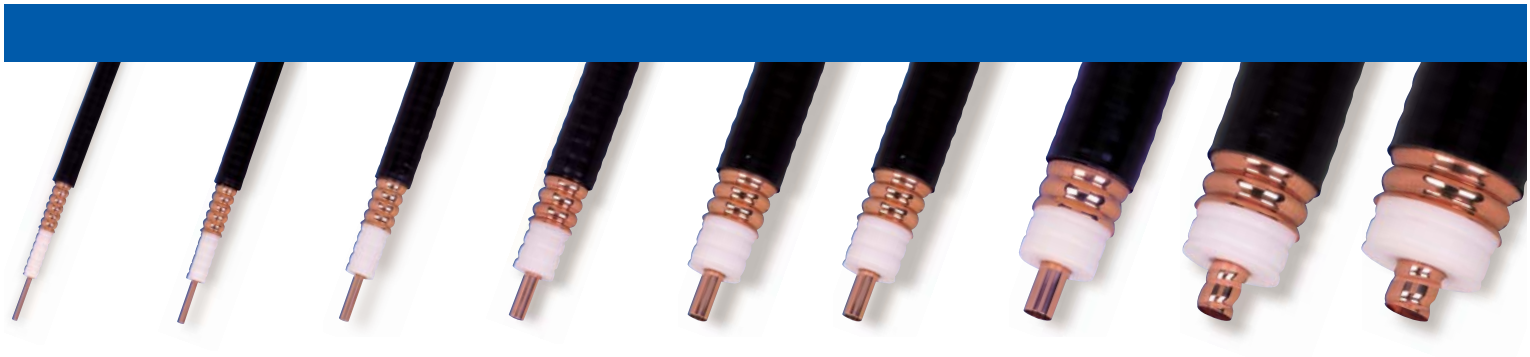
UMTS 3G Qualified



		1/4" Hiflex	3/8" Hiflex*	1/2" Hiflex	7/8" Hiflex	1-1/4" Hiflex
Cable type	STANDARD	**5042**	**5082**	**5092**	**5228X**	**5328X**
Product reference		EC1-50-HF	EC2-50-HF	EC4-50-HF	EC5-50-HF	EC6-50-HF
						Cable with sta
Cable type	HLFR	**5042-HLFR**	**5082-HLFR**	**5092-HLFR**	**5228X-HLFR**	**5328X-HLFR**
Product reference		EC1-50-HF-FR	EC2-50-HF-FR	EC4-50-HF-FR	EC5-50-HF-FR	EC6-50-HF-FR
						Cable with halogen free and flame retar

Construction						
Outer diameter	(mm)	7.5	9.1	13.5	28.0	39.0
Mechanical						
Minimum bending radius						
single bending	(cm)	3	2.5	3	10	20
Electrical						
• Relative prop. velocity	(%)	82	82	82	88	88
• Nominal attenuation at 20°C						
30 MHz	(dB/100m)	3.06	2.28	1.68	0.67	0.47
450 MHz	(dB/100m)	12.20	9.19	6.96	2.76	1.99
960 MHz	(dB/100m)	18.16	13.76	10.57	4.19	3.05
1880 MHz	(dB/100m)	26.00	19.85	15.51	6.14	4.51
2170 MHz	(dB/100m)	28.10	21.49	16.86	6.67	4.91
2400 MHz	(dB/100m)	29.68	22.73	17.89	7.08	5.22
• Mean power rating at 40°C ambient temperature						
30 MHz	(kW)	2.26	3.48	5.66	14.49	22.66
450 MHz	(kW)	0.57	0.86	1.37	3.51	5.40
960 MHz	(kW)	0.38	0.58	0.90	2.31	3.53
1880 MHz	(kW)	0.27	0.40	0.61	1.58	2.38
2170 MHz	(kW)	0.25	0.37	0.57	1.45	2.19
2400 MHz	(kW)	0.23	0.35	0.53	1.37	2.06
• RF peak power	(kW)	3.6	7.2	12.8	90	180
• Cut-off frequency	(GHz)	22	15.6	13.2	5.1	3.3

* Available on request



1/4”	3/8”	1/2”	5/8” *	7/8”	7/8”A	1-1/4”A	1-5/8”A	2-1/4”
					Ultra Low Loss	Ultra Low Loss	Ultra Low Loss	
5062	**5088**	**5128**	**5168**	**5228**	**5228 A**	**5328 A**	**5438 A**	**5528**
EC1-50	EC2-50	EC4-50	EC4.5-50	EC5-50	EC5-50-A	EC6-50-A	EC7-50-A	EC12-50
d jacket - halogen free in acc. with IEC 60754								
062-HLFR	**5088-HLFR**	**5128-HLFR**	**5168-HLFR**	**5228-HLFR**	**5228A-HLFR**	**5328A-HLFR**	**5438A-HLFR**	**5528-HLFR**
EC1-50-FR	EC2-50-FR	EC4-50-FR	EC4.5-50-FR	EC5-50-FR	EC5-50-A-FR	EC6-50-A-FR	EC7-50-A-FR	EC12-50-FR
acket in acc. with IEC 60754-2, 60332-1-2, 60332-3 Cat. C & 61034-1+2								
9.7	11.8	16	21.9	28	28	39	50	60
3	4	7	10	10	10	20	20	25
82	88	88	88	88	89	88	89	88
2.32	1.69	1.17	0.81	0.62	0.62	0.44	0.34	0.29
9.38	6.79	4.75	3.29	2.56	2.50	1.80	1.46	1.27
14.05	10.14	7.12	4.94	3.86	3.75	2.72	2.23	1.99
20.27	14.59	10.30	7.16	5.63	5.43	3.98	3.32	3.03
21.95	15.79	11.16	7.76	6.11	5.88	4.32	3.62	3.32
23.22	16.69	11.81	8.22	6.48	6.22	4.58	3.85	-
3.24	4.11	6.73	9.27	15.06	14.60	21.24	29.36	40.86
0.80	1.02	1.66	2.28	3.68	3.60	5.17	6.96	9.30
0.54	0.68	1.11	1.52	2.43	2.40	3.42	4.53	5.93
0.37	0.48	0.77	1.05	1.67	1.66	2.34	3.05	3.90
0.34	0.44	0.71	0.96	1.54	1.53	2.15	2.80	3.56
0.32	0.42	0.67	0.91	1.45	1.45	2.03	2.63	-
6.9	11	25.6	62	90	86	184	302	462
18.6	14.2	9.8	6.5	5.3	5.1	3.7	2.7	2.3

1/4" Hiflex

STANDARD 5042

Cable type : **5042**

Reference : **EC1-50-HF**

Cable with standard UV resistant PE jacket, halogen free according to IEC 60754

FLAME RETARDANT HLFR

Cable type : **5042-HLFR**

Reference : **EC1-50-HF-FR**

Cable with UV resistant, halogen free, low smoke, flame retardant jacket according to IEC 60754-2, IEC 60332-1-2, IEC 60332-3 Cat. C and IEC 61034-1+2

CHARACTERISTICS

Construction

• ***Inner conductor***	
Material	copper clad aluminium wire
Diameter (mm)	1.9
• ***Dielectric***	
Material	gas-injected cellular polyethylene
Diameter (mm)	4.6
• ***Outer conductor***	
Material	corrugated copper tube
Diameter (mm)	6.4
• ***Jacket***	
Material	black polyethylene
Thickness (mm)	0.55
Diameter (mm)	7.5

Mechanical

• ***Minimum bending radius***	
a) single bending (cm)	3
b) 15 repeated bends (cm)	3
• ***Maximum pulling strength*** (daN)	30
• ***Recommended temperature range***	
- Storage	-70 to +85°C
- Installation	-40 to +60°C
- Operation	-55 to +85°C
• ***Maximum length per hoisting grip*** (m)	70
• ***Maximum hanger spacing***	-
• ***Flat plate crush resistance*** (kg/mm)	0.9
• ***Bending moment*** (Nm)	1.1
• ***Weight*** (kg/km)	80

[1] a = 0.552
b = 0.0011
$\propto(f) = a \cdot \sqrt{f} + b \cdot f$ [dB/100m]

Electrical

• ***Characteristic impedance*** (Ω)	50 ±1.5
• ***Nominal capacity*** (pF/m)	80
• ***Relative propagation velocity*** (%)	82
• ***Inductance*** (µH/m)	0.200
• ***DC-resistance at 20°C***	
- inner conductor (Ω/km)	9.2
- outer conductor (Ω/km)	4.4
• ***RF peak voltage*** (kV)	0.6
• ***RF peak power*** (kW)	3.6
• ***Cut-off-frequency*** (GHz)	22
• ***Insulation resistance*** (MΩ.km)	>>5000

• ***Attenuation [1] and power rating***

Frequency (MHz)	***Attenuation at 20°C***(*) (dB/100m)	***Mean power rating***(**) (kW)
10	1.76	3.93
20	2.49	2.77
30	3.06	2.26
80	5.03	1.37
100	5.63	1.23
150	6.93	1.00
200	8.03	0.86
300	9.89	0.70
400	11.48	0.60
450	12.20	0.57
500	12.89	0.54
600	14.18	0.49
700	15.37	0.45
800	16.49	0.42
894	17.49	0.39
960	18.16	0.38
1000	18.56	0.37
1500	23.03	0.30
1700	24.63	0.28
1800	25.40	0.27
1880	26.00	0.27
2000	26.89	0.26
2170	28.10	0.25
2200	28.31	0.24
2300	29.00	0.24
2400	29.68	0.23
2500	30.35	0.23
3000	33.53	0.21
4000	39.31	0.18
6000	49.36	0.14

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


716MB14X


NM50B14X


NF50P14X


NM50BL14X

CONNECTORS & TOOLS

Reference	Description
NM50B14X	N male, with silicone gasket
NF50B14X	N female, with silicone gasket
NF50P14X	N female, with silicone gasket, panel
NM50BL14X	N male, right angle, with silicone gasket
716MB14X	7-16 DIN male, with silicone gasket
716FP14X	7-16 DIN female, with silicone gasket, panel
SPTC50B14X	Cable preparation tool
Cutting knife (d)	Spare parts for cable preparation tools
Peeling knife (e)	(Refer to installation instruction of the tool)


SPTC50B14X

Specification of	N-connectors	7-16 connectors
Electrical		
• ***Nominal impedance*** (Ω)	50	50
• ***Reflection coefficient at 2 GHz***	≤ 0.02 (*)	≤0.02 (*)
• ***Insulation resistance*** (GΩ)	≥5	≥10
• ***Test voltage*** (at sea level) (kV rms, 50 Hz)	2.5	4
• ***Working voltage*** (at sea level) (kV rms, 50 Hz)	1	2.7
• ***Screening effectiveness up to 1 GHz*** (dB)	>128	>128
• ***Outer contact resistance*** (mΩ)	≤1	≤1
• ***Inner contact resistance*** (mΩ)	≤1.5	≤1.5
• ***PIM ratio*** (2 x 20 W carrier) (dBc)	≤ -155 (Typical -163)	
Mechanical		
• ***Torque on coupling nut*** (Nm)	8	30
• ***Cable retention*** (N)	>400	>600
Environmental		
• ***Temperature range*** (°C)	-40 to +85	
• ***Degree of protection*** (humidity)	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 alloy	
• ***Dielectric***	TPX/PTFE	TPX
• ***Gaskets***	High quality silicone	

(*)≤ 0.03 for right angle connector

ACCESSORIES

Description	Reference
• ***Fixing clamps***	see page 39
• ***Additional weatherproofing***	see page 48

STANDARD 5092

Cable type : **5092**

Reference : **EC4-50-HF**

Cable with standard UV resistant PE jacket, halogen free according to IEC 60754

FLAME RETARDANT HLFR

Cable type : **5092-HLFR**

Reference : **EC4-50-HF-FR**

Cable with UV resistant, halogen free, low smoke, flame retardant jacket according to IEC 60754-2, IEC 60332-1-2, IEC 60332-3 Cat. C and IEC 61034-1+2

CHARACTERISTICS

Construction

• ***Inner conductor***	
Material	copper clad aluminium wire
Diameter (mm)	3.55
• ***Dielectric***	
Material	gas-injected cellular polyethylene
Diameter (mm)	9.0
• ***Outer conductor***	
Material	corrugated copper tube
Diameter (mm)	12.2
• ***Jacket***	
Material	black polyethylene
Thickness (mm)	0.65
Diameter (mm)	13.5

Mechanical

• ***Minimum bending radius***	
a) single bending (cm)	3
b) 15 repeated bends (cm)	4
• ***Maximum pulling strength*** (daN)	70
• ***Recommended temperature range***	
- Storage	-70 to +85°C
- Installation	-40 to +60°C
- Operation	-55 to +85°C
• ***Maximum length per hoisting grip*** (m)	70
• ***Maximum hanger spacing***	0.5
• ***Flat plate crush resistance*** (kg/mm)	1.7
• ***Bending moment*** (Nm)	2.7
• ***Weight*** (kg/km)	200

[1] a = 0.30018
b = 0.001327
$\propto(f) = a \cdot \sqrt{f} + b \cdot f$ [dB/100m]

Electrical

• ***Characteristic impedance*** (Ω)	50 ±1
• ***Nominal capacity*** (pF/m)	82
• ***Relative propagation velocity*** (%)	82
• ***Inductance*** (µH/m)	0.200
• ***DC-resistance at 20°C***	
- inner conductor (Ω/km)	2.65
- outer conductor (Ω/km)	3.0
• ***RF peak voltage*** (kV)	1.13
• ***RF peak power*** (kW)	12.8
• ***Cut-off-frequency*** (GHz)	13.2
• ***Insulation resistance*** (MΩ.km)	>>5000

• ***Attenuation [1] and power rating***

Frequency (MHz)	***Attenuation at 20°C***(*) (dB/100m)	***Mean power rating***(**) (kW)
10	0.96	9.90
20	1.37	6.96
30	1.68	5.66
80	2.79	3.42
100	3.13	3.04
150	3.88	2.46
200	4.51	2.11
300	5.60	1.70
400	6.53	1.46
450	6.96	1.37
500	7.38	1.29
600	8.15	1.17
700	8.87	1.07
800	9.55	1.00
894	10.16	0.94
960	10.57	0.90
1000	10.82	0.88
1500	13.62	0.70
1700	14.63	0.65
1800	15.12	0.63
1880	15.51	0.61
2000	16.08	0.59
2170	16.86	0.57
2200	17.00	0.56
2300	17.45	0.55
2400	17.89	0.53
2500	18.33	0.52
3000	20.42	0.47
4000	24.29	0.39
6000	31.21	0.31

(*) nominal values
(**) Ambient temperature = 40°C; Temperature of inner conductor = 100°C; VSWR = 1.0; no solar loading


716MBL12X


NF50B12X


716MB12X


NM50BL12X

CONNECTORS & TOOLS

Reference	Description
716MB12X	7-16 DIN male, with silicone gasket
716FB12X	7-16 DIN female, with silicone gasket
716MBL12X	7-16 DIN male, right angle, with silicone gasket
NM50B12X	N male, with silicone gasket
NF50B12X	N female, with silicone gasket
NM50BL12X	N male, right angle, with silicone gasket
SPTC50B12X	Cable preparation tool for straight connectors
SPTC50BL12X	Cable preparation tool for right angle connectors
Cutting knife (d)	Spare parts for cable preparation tools
Peeling knife (e)	(Refer to installation instruction of the tool)


SPTC50B12X

SPTC50BL12X

Specification of	N-connectors	7-16 connectors
Electrical		
• ***Nominal impedance*** (Ω)	50	50
• ***Reflection coefficient at 2 GHz***	≤ 0.02 (*)	≤ 0.02 (*)
• ***Insulation resistance*** (GΩ)	≥5	≥10
• ***Test voltage*** (at sea level) (kV rms, 50 Hz)	2.5	4
• ***Working voltage*** (at sea level) (kV rms, 50 Hz)	1	2.7
• ***Screening effectiveness up to 1 GHz*** (dB)	>128	>128
• ***Outer contact resistance*** (mΩ)	≤1	≤1
• ***Inner contact resistance*** (mΩ)	≤1	≤1
• ***PIM ratio*** (2 x 20 W carrier) (dBc)	≤ -155 (Typical -163)	
Mechanical		
• ***Torque on coupling nut*** (Nm)	8	30
• ***Cable retention*** (N)	>400	>700
Environmental		
• ***Temperature range*** (°C)	-40 to +85	
• ***Degree of protection*** (humidity)	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 alloy	
• ***Dielectric***	PTFE	TPX
• ***Gaskets***	High quality silicone	

(*) ≤ 0.03 for right angle connector

ACCESSORIES

Description	Reference
• ***Grounding clamp with normal outlet***	GCS12X
• ***Fixing clamps***	see page 39
• ***Additional weatherproofing***	see page 48


GCS12X

7/8" Hiflex

STANDARD 5228X

Cable type : **5228X**

Reference : **EC5-50-HF**

Cable with standard UV resistant PE jacket, halogen free according to IEC 60754

FLAME RETARDANT HLFR

Cable type : **5228X-HLFR**

Reference : **EC5-50-HF-FR**

Cable with UV resistant, halogen free, low smoke, flame retardant jacket according to IEC 60754-2, IEC 60332-1-2, IEC 60332-3 Cat. C and IEC 61034-1+2

CHARACTERISTICS

Construction

• ***Inner conductor***	
Material	corrugated copper tube
Diameter (mm)	9.4
• ***Dielectric***	
Material	gas-injected cellular polyethylene
Diameter (mm)	23.4
• ***Outer conductor***	
Material	corrugated copper tube
Diameter (mm)	25.0
• ***Jacket***	
Material	black polyethylene
Thickness (mm)	1.4
Diameter (mm)	28.0

Mechanical

• ***Minimum bending radius***	
a) single bending (cm)	10
b) 15 repeated bends (cm)	15
• ***Maximum pulling strength*** (daN)	130
• ***Recommended temperature range***	
- Storage	-70 to +85°C
- Installation	-40 to +60°C
- Operation	-55 to +85°C
• ***Maximum length per hoisting grip*** (m)	70
• ***Maximum hanger spacing***	1.2
• ***Flat plate crush resistance*** (kg/mm)	1.7
• ***Bending moment*** (Nm)	8.4
• ***Weight*** (kg/km)	460

[1] a = 0.11905
b = 0.000518
$\propto(f) = a \cdot \sqrt{f} + b \cdot f$ [dB/100m]

Electrical

• ***Characteristic impedance*** (Ω)	50 ±1
• ***Nominal capacity*** (pF/m)	76
• ***Relative propagation velocity*** (%)	88
• ***Inductance*** (µH/m)	0.190
• ***DC-resistance at 20°C***	
- inner conductor (Ω/km)	2.5
- outer conductor (Ω/km)	1.02
• ***RF peak voltage*** (kV)	3.0
• ***RF peak power*** (kW)	90
• ***Cut-off-frequency*** (GHz)	5.1
• ***Insulation resistance*** (MΩ.km)	>>5000

• ***Attenuation [1] and power rating***

Frequency (MHz)	***Attenuation at 20°C***(*) (dB/100m)	***Mean power rating***(**) (kW)
10	0.38	25.34
20	0.54	17.82
30	0.67	14.49
80	1.11	8.74
100	1.24	7.79
150	1.54	6.30
200	1.79	5.41
300	2.22	4.36
400	2.59	3.74
450	2.76	3.51
500	2.92	3.31
600	3.23	3.00
700	3.51	2.75
800	3.78	2.56
894	4.02	2.40
960	4.19	2.31
1000	4.28	2.26
1500	5.39	1.80
1700	5.79	1.67
1800	5.98	1.62
1880	6.14	1.58
2000	6.36	1.52
2170	6.67	1.45
2200	6.72	1.44
2300	6.90	1.40
2400	7.08	1.37
2500	7.25	1.33
3000	8.07	1.20
4000	9.60	1.01
6000	-	-

(*) nominal values
(**) Ambient temperature = 40°C; Temperature of inner conductor = 100°C; VSWR = 1.0; no solar loading

NF50A78M

716FV78M

CONNECTORS & TOOL

Reference	Description
716MV78M	7-16 DIN male, O-Ring
716FV78M	7-16 DIN female, O-Ring
716MA78M	7-16 DIN male, Sealant injection
716FA78M	7-16 DIN female, Sealant injection
NM50V78M	N male, O-Ring
NF50V78M	N female, O-Ring
NM50A78M	N male, Sealant injection
NF50A78M	N female, Sealant injection
SPTC50AV78X	Cable preparation tool
Inner ring (a)	Spare parts for cable preparation tool
Outer ring (b)	(Refer to installation instruction of the tool)
Spring (c)	
Cutting knife (d)	
Peeling knife (e)	
Flaring knife (f)	
SIL-744 90ml	Sealant for connectors using sealant injection
SIL-744 310 ml	Sealant for connectors using sealant injection

Rem.: • Sealant for connectors using the sealant injection method must be purchased separately.

SPTC50AV78X

Specification of	N-connectors	7-16 connectors
Electrical		
• ***Nominal impedance*** (Ω)	50	50
• ***Reflection coefficient at 2 GHz*** ≤	0.02	≤0.02
• ***Insulation resistance*** (GΩ)	≥5	≥10
• ***Test voltage*** (at sea level) (kV rms, 50 Hz)	2.5	4
• ***Working voltage*** (at sea level) (kV rms, 50 Hz)	1	2.7
• ***Screening effectiveness up to 1 GHz*** (dB)	>128	>128
• ***Outer contact resistance*** (mΩ)	≤0.7	≤0.7
• ***Inner contact resistance*** (mΩ)	≤1	≤1
• ***PIM ratio*** (2 x 20 W carrier) (dBc)	≤ -155 (Typical -163)	
Mechanical		
• ***Torque on coupling nut*** (Nm)	8	30
• ***Cable retention*** (N)	>400	>1000
Environmental		
• ***Temperature range*** (°C)	-40 to +85	
• ***Degree of protection*** (humidity)	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 alloy	
• ***Dielectric***	PTFE	TPX
• ***Gaskets***	High quality silicone	

GCS78PAR

ACCESSORIES

Description	Reference
• ***Grounding clamp with parallel outlet***	GCS78PAR
• ***Fixing clamps***	see page 39
• ***Additional weatherproofing***	see page 48
• ***Lace-up hoisting grip***	HG-78
Pre-laced hoisting grip	HG-78-L
	see page 44

1-1/4" Hiflex

STANDARD 5328X

Cable type : **5328X**

Reference : **EC6-50-HF**

Cable with standard UV resistant PE jacket, halogen free according to IEC 60754

FLAME RETARDANT HLFR

Cable type : **5328-HLFR**

Reference : **EC6-50-HF-FR**

Cable with UV resistant, halogen free, low smoke, flame retardant jacket according to IEC 60754-2, IEC 60332-1-2, IEC 60332-3 Cat. C and IEC 61034-1+2

CHARACTERISTICS

Construction

• ***Inner conductor***	
Material	corrugated copper tube
Diameter (mm)	13.6
• ***Dielectric***	
Material	gas-injected cellular polyethylene
Diameter (mm)	33.5
• ***Outer conductor***	
Material	corrugated copper tube
Diameter (mm)	36.0
• ***Jacket***	
Material	black polyethylene
Thickness (mm)	1.5
Diameter (mm)	39.0

Mechanical

• ***Minimum bending radius***	
a) single bending (cm)	20
b) 15 repeated bends (cm)	30
• ***Maximum pulling strength*** (daN)	200
• ***Recommended temperature range***	
- Storage	-70 to +85°C
- Installation	-40 to +60°C
- Operation	-55 to +85°C
• ***Maximum length per hoisting grip*** (m)	70
• ***Maximum hanger spacing***	1.4
• ***Flat plate crush resistance*** (kg/mm)	3.4
• ***Bending moment*** (Nm)	25
• ***Weight*** (kg/km)	830

[1] a = 0.084
b = 0.000461
$\propto(f) = a \cdot \sqrt{f} + b \cdot f$ [dB/100m]

Electrical

• ***Characteristic impedance*** (Ω)	50 ±1
• ***Nominal capacity*** (pF/m)	76
• ***Relative propagation velocity*** (%)	88
• ***Inductance*** (µH/m)	0.190
• ***DC-resistance at 20°C***	
- inner conductor (Ω/km)	1.8
- outer conductor (Ω/km)	0.5
• ***RF peak voltage*** (kV)	4.25
• ***RF peak power*** (kW)	180
• ***Cut-off-frequency*** (GHz)	3.3
• ***Insulation resistance*** (MΩ.km)	>>5000

• ***Attenuation [1] and power rating***

Frequency (MHz)	***Attenuation at 20°C***(*) (dB/100m)	***Mean power rating***(**) (kW)
10	0.27	39.73
20	0.38	27.90
30	0.47	22.66
80	0.79	13.62
100	0.89	12.12
150	1.10	9.78
200	1.28	8.39
300	1.59	6.74
400	1.86	5.76
450	1.99	5.40
500	2.11	5.09
600	2.33	4.60
700	2.55	4.22
800	2.74	3.91
894	2.92	3.67
960	3.05	3.53
1000	3.12	3.44
1500	3.94	2.72
1700	4.25	2.53
1800	4.39	2.44
1880	4.51	2.38
2000	4.68	2.30
2170	4.91	2.19
2200	4.95	2.17
2300	5.09	2.11
2400	5.22	2.06
2500	5.35	2.01
3000	5.98	1.79
4000	-	-
6000	-	-

(*) nominal values
(**) Ambient temperature = 40°C; Temperature of inner conductor = 100°C; VSWR = 1.0; no solar loading

NM50V114M

716FA114M

CONNECTORS & TOOL

Reference	Description
716MV114M	7-16 DIN male, O-Ring
716FV114M	7-16 DIN female, O-Ring
716MA114M	7-16 DIN male, Sealant injection
716FA114M	7-16 DIN female, Sealant injection
NM50V114M	N male, O-Ring
NF50V114M	N female, O-Ring
NM50A114M	N male, Sealant injection
NF50A114M	N female, Sealant injection
SPTC50AV114X	Cable preparation tool
Inner ring (a)	Spare parts for cable preparation tool
Outer ring (b)	(Refer to installation instruction of the tool)
Spring (c)	
Cutting knife (d)	
Peeling knife (e)	
SIL-744 90ml	Sealant for connectors using sealant injection
SIL-744 310 ml	Sealant for connectors using sealant injection

Rem.: • Sealant for connectors using the sealant injection method must be purchased separately.

SPTC50AV114X

Specification of	N-connectors	7-16 connectors
Electrical		
• ***Nominal impedance*** (Ω)	50	50
• ***Reflection coefficient at 2 GHz***	≤0.02	≤0.02
• ***Insulation resistance*** (GΩ)	≥5	≥10
• ***Test voltage*** (at sea level) (kV rms, 50 Hz)	2.5	4
• ***Working voltage*** (at sea level) (kV rms, 50 Hz)	1	2.7
• ***Screening effectiveness up to 1 GHz*** (dB)	>128	>128
• ***Outer contact resistance*** (mΩ)	≤0.5	≤0.5
• ***Inner contact resistance*** (mΩ)	≤1	≤1
• ***PIM ratio*** (2 x 20 W carrier) (dBc)	≤-155 (Typical -163)	
Mechanical		
• ***Torque on coupling nut*** (Nm)	8	30
• ***Cable retention*** (N)	>400	>1000
Environmental		
• ***Temperature range*** (°C)	-40 to +85	
• ***Degree of protection*** (humidity)	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 alloy	
• ***Dielectric***	PTFE	TPX
• ***Gaskets***	High quality silicone	

GCS114PAR

ACCESSORIES

Description	Reference
• ***Grounding clamp with parallel outlet***	GCS114PAR
• ***Fixing clamps***	see page 39
• ***Additional weatherproofing***	see page 48
• ***Lace-up hoisting grip***	HG-114
Pre-laced hoisting grip	HG-114-L
	see page 44

STANDARD 5062

Cable type : **5062**

Reference : **EC1-50**

Cable with standard UV resistant PE jacket, halogen free according to IEC 60754

FLAME RETARDANT HLFR

Cable type : **5062-HLFR**

Reference : **EC1-50-FR**

Cable with UV resistant, halogen free, low smoke, flame retardant jacket according to IEC 60754-2, IEC 60332-1-2, IEC 60332-3 Cat. C and IEC 61034-1+2

CHARACTERISTICS

Construction

• ***Inner conductor***	
Material	copper clad aluminium wire
Diameter (mm)	2.4
• ***Dielectric***	
Material	gas-injected cellular polyethylene
Diameter (mm)	6.5
• ***Outer conductor***	
Material	corrugated copper tube
Diameter (mm)	7.5
• ***Jacket***	
Material	black polyethylene
Thickness (mm)	1.1
Diameter (mm)	9.7

Mechanical

• ***Minimum bending radius***	
a) single bending (cm)	3
b) 15 repeated bends (cm)	8
• ***Maximum pulling strength*** (daN)	40
• ***Recommended temperature range***	
- Storage	-70 to +85°C
- Installation	-40 to +60°C
- Operation	-55 to +85°C
• ***Maximum length per hoisting grip*** (m)	70
• ***Maximum hanger spacing***	-
• ***Flat plate crush resistance*** (kg/mm)	0.8
• ***Bending moment*** (Nm)	1.5
• ***Weight*** (kg/km)	110

[1] a = 0.41769
b = 0.00115
$\propto(f) = a \cdot \sqrt{f} + b \cdot f$ [dB/100m]

Electrical

• ***Characteristic impedance*** (Ω)	50 ±1
• ***Nominal capacity*** (pF/m)	82
• ***Relative propagation velocity*** (%)	82
• ***Inductance*** (µH/m)	0.200
• ***DC-resistance at 20°C***	
- inner conductor (Ω/km)	5.85
- outer conductor (Ω/km)	3.3
• ***RF peak voltage*** (kV)	0.83
• ***RF peak power*** (kW)	6.9
• ***Cut-off-frequency*** (GHz)	18.6
• ***Insulation resistance*** (MΩ.km)	>>5000

• ***Attenuation [1] and power rating***

Frequency (MHz)	***Attenuation at 20°C***(*) (dB/100m)	***Mean power rating***(**) (kW)
10	1.33	5.64
20	1.89	3.98
30	2.32	3.24
80	3.83	1.96
100	4.29	1.75
150	5.29	1.42
200	6.14	1.23
300	7.58	0.99
400	8.81	0.85
450	9.38	0.80
500	9.91	0.76
600	10.92	0.69
700	11.86	0.63
800	12.73	0.59
894	13.52	0.56
960	14.05	0.54
1000	14.36	0.52
1500	17.90	0.42
1700	19.18	0.39
1800	19.79	0.38
1880	20.27	0.37
2000	20.98	0.36
2170	21.95	0.34
2200	22.12	0.34
2300	22.68	0.33
2400	23.22	0.32
2500	23.76	0.32
3000	26.33	0.29
4000	31.02	0.24
6000	39.25	0.19

(*) nominal values
(**)Ambient temperature = 40°C; Temperature of inner conductor = 100°C; VSWR = 1.0; no solar loading

NF50A14

NM50AL14

CONNECTORS & TOOLS

Reference	Description
716MA14	7-16 DIN male, O-Ring
716FA14	7-16 DIN female, O-Ring
NM50A14	N male, O-Ring
NF50A14	N female, O-Ring
NM50AL14	N male, right angle, O-Ring
SPTC50A14	Cable preparation tool
Cutting knife (d)	Spare parts for cable preparation tools
Peeling knife (e)	(Refer to installation instruction of the tool)

SPTC50A14

Specification of	N-connectors	7-16 connectors
Electrical		
• ***Nominal impedance*** (Ω)	50	50
• ***Reflection coefficient at 2 GHz***	≤0.02 (*)	≤0.02 (*)
• ***Insulation resistance*** (GΩ)	≥5	≥10
• ***Test voltage*** (at sea level) (kV rms, 50 Hz)	2.5	4
• ***Working voltage*** (at sea level) (kV rms, 50 Hz)	1	2.7
• ***Screening effectiveness up to 1 GHz*** (dB)	>128	>128
• ***Outer contact resistance*** (mΩ)	≤1	≤1
• ***Inner contact resistance*** (mΩ)	≤1.5	≤1.5
• ***PIM ratio*** (2 x 20 W carrier) (dBc)	≤ -155 (Typical -163)	
Mechanical		
• ***Torque on coupling nut*** (Nm)	8	30
• ***Cable retention*** (N)	>400	>700
Environmental		
• ***Temperature range*** (°C)	-40 to +85	
• ***Degree of protection*** (humidity)	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 alloy	
• ***Dielectric***	PTFE	TPX
• ***Gaskets***	High quality silicone	

(*) ≤0.03 for right angle connector

ACCESSORIES

Description	Reference
• ***Grounding clamp with normal outlet***	GCS14
• ***Fixing clamps***	see page 39
• ***Additional weatherproofing***	see page 48

GCS14

3/8”

STANDARD 5088

Cable type : **5088**

Reference : **EC2-50**

Cable with standard UV resistant PE jacket, halogen free according to IEC 60754

FLAME RETARDANT HLFR

Cable type : **5088-HLFR**

Reference : **EC2-50-FR**

Cable with UV resistant, halogen free, low smoke, flame retardant jacket according to IEC 60754-2, IEC 60332-1-2, IEC 60332-3 Cat. C and IEC 61034-1+2

CHARACTERISTICS

Construction

• ***Inner conductor***	
Material	copper clad aluminium wire
Diameter (mm)	3.25
• ***Dielectric***	
Material	gas-injected cellular polyethylene
Diameter (mm)	8.4
• ***Outer conductor***	
Material	corrugated copper tube
Diameter (mm)	9.6
• ***Jacket***	
Material	black polyethylene
Thickness (mm)	1.1
Diameter (mm)	11.8

Mechanical

• ***Minimum bending radius***	
a) single bending (cm)	4
b) 15 repeated bends (cm)	12
• ***Maximum pulling strength*** (daN)	55
• ***Recommended temperature range***	
- Storage	-70 to +85°C
- Installation	-40 to +60°C
- Operation	-55 to +85°C
• ***Maximum length per hoisting grip*** (m)	70
• ***Maximum hanger spacing***	0.5
• ***Flat plate crush resistance*** (kg/mm)	1.2
• ***Bending moment*** (Nm)	2.8
• ***Weight*** (kg/km)	140

[1] a = 0.30423
b = 0.000746
$\propto(f) = a \cdot \sqrt{f} + b \cdot f$ [dB/100m]

Electrical

• ***Characteristic impedance*** (Ω)	50 ±1
• ***Nominal capacity*** (pF/m)	76
• ***Relative propagation velocity*** (%)	88
• ***Inductance*** (µH/m)	0.190
• ***DC-resistance at 20°C***	
- inner conductor (Ω/km)	3.1
- outer conductor (Ω/km)	2.65
• ***RF peak voltage*** (kV)	1.05
• ***RF peak power*** (kW)	11
• ***Cut-off-frequency*** (GHz)	14.2
• ***Insulation resistance*** (MΩ.km)	>>5000

• ***Attenuation [1] and power rating***

Frequency (MHz)	***Attenuation at 20°C***(*) (dB/100m)	***Mean power rating***(**) (kW)
10	0.97	7.17
20	1.38	5.05
30	1.69	4.11
80	2.78	2.50
100	3.12	2.23
150	3.84	1.81
200	4.45	1.56
300	5.49	1.26
400	6.38	1.09
450	6.79	1.02
500	7.18	0.97
600	7.90	0.88
700	8.57	0.81
800	9.20	0.75
894	9.76	0.71
960	10.14	0.68
1000	10.37	0.67
1500	12.90	0.54
1700	13.81	0.50
1800	14.25	0.49
1880	14.59	0.48
2000	15.10	0.46
2170	15.79	0.44
2200	15.91	0.44
2300	16.31	0.43
2400	16.69	0.42
2500	17.08	0.41
3000	18.90	0.37
4000	22.23	0.31
6000	28.04	0.25

(*) nominal values
(**) Ambient temperature = 40°C; Temperature of inner conductor = 100°C; VSWR = 1.0; no solar loading

NF50V38

716MA38

CONNECTORS

Reference	Description
716MV38	7-16 DIN male, O-Ring
716FV38	7-16 DIN female, O-Ring
716MA38	7-16 DIN male, Sealant injection
716FA38	7-16 DIN female, Sealant injection
NM50V38	N male, O-Ring
NF50V38	N female, O-Ring
NM50A38	N male, Sealant injection
NF50A38	N female, Sealant injection
SIL-744 90ml	Sealant for connectors using sealant injection
SIL-744 310 ml	Sealant for connectors using sealant injection

Rem.: • Sealant for connectors using the sealant injection method must be purchased separately.

Specification of	N-connectors	7-16 connectors
Electrical		
• ***Nominal impedance*** (Ω)	50	50
• ***Reflection coefficient at 2 GHz***	≤0.02	≤0.02
• ***Insulation resistance*** (GΩ)	≥5	≥10
• ***Test voltage*** (at sea level) (kV rms, 50 Hz)	2.5	4
• ***Working voltage*** (at sea level) (kV rms, 50 Hz)	1	2.7
• ***Screening effectiveness up to 1 GHz*** (dB)	>128	>128
• ***Outer contact resistance*** (mΩ)	≤1	≤1
• ***Inner contact resistance*** (mΩ)	≤1.5	≤1.5
• ***PIM ratio*** (2 x 20 W carrier) (dBc)	≤ -155 (Typical -163)	
Mechanical		
• ***Torque on coupling nut*** (Nm)	8	30
• ***Cable retention*** (N)	>400	>700
Environmental		
• ***Temperature range*** (°C)	-40 to +85	
• ***Degree of protection*** (humidity)	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 alloy	
• ***Dielectric***	TPX	
• ***Gaskets***	High quality silicone	

ACCESSORIES

Description	Reference
• ***Grounding clamp with normal outlet***	GCS38
• ***Fixing clamps***	see page 39
• ***Additional weatherproofing***	see page 48

GCS38

1/2”

STANDARD 5128

Cable type : **5128**

Reference : **EC4-50**

Cable with standard UV resistant PE jacket, halogen free according to IEC 60754

FLAME RETARDANT HLFR

Cable type : **5128-HLFR**

Reference : **EC4-50-FR**

Cable with UV resistant, halogen free, low smoke, flame retardant jacket according to IEC 60754-2, IEC 60332-1-2, IEC 60332-3 Cat. C and IEC 61034-1+2

CHARACTERISTICS

Construction

• ***Inner conductor***	
Material	copper clad aluminium wire
Diameter (mm)	4.8
• ***Dielectric***	
Material	gas-injected cellular polyethylene
Diameter (mm)	12.4
• ***Outer conductor***	
Material	corrugated copper tube
Diameter (mm)	13.7
• ***Jacket***	
Material	black polyethylene
Thickness (mm)	1.1
Diameter (mm)	16.0

Mechanical

• ***Minimum bending radius***	
a) single bending (cm)	7
b) 15 repeated bends (cm)	12.5
• ***Maximum pulling strength*** (daN)	100
• ***Recommended temperature range***	
- Storage	-70 to +85°C
- Installation	-40 to +60°C
- Operation	-55 to +85°C
• ***Maximum length per hoisting grip*** (m)	70
• ***Maximum hanger spacing***	1
• ***Flat plate crush resistance*** (kg/mm)	1.9
• ***Bending moment*** (Nm)	3.5
• ***Weight*** (kg/km)	235

[1] a = 0.2105
b = 0.000625
$\propto(f) = a \cdot \sqrt{f} + b \cdot f$ [dB/100m]

Electrical

• ***Characteristic impedance*** (Ω)	50 ±1
• ***Nominal capacity*** (pF/m)	76
• ***Relative propagation velocity*** (%)	88
• ***Inductance*** (µH/m)	0.190
• ***DC-resistance at 20°C***	
- inner conductor (Ω/km)	1.48
- outer conductor (Ω/km)	2.04
• ***RF peak voltage*** (kV)	1.6
• ***RF peak power*** (kW)	25.6
• ***Cut-off-frequency*** (GHz)	9.8
• ***Insulation resistance*** (MΩ.km)	>>5000

• ***Attenuation [1] and power rating***

Frequency (MHz)	***Attenuation at 20°C***(*) (dB/100m)	***Mean power rating***(**) (kW)
10	0.67	11.74
20	0.95	8.27
30	1.17	6.73
80	1.93	4.08
100	2.17	3.64
150	2.67	2.95
200	3.10	2.54
300	3.83	2.06
400	4.46	1.77
450	4.75	1.66
500	5.02	1.57
600	5.53	1.43
700	6.01	1.31
800	6.45	1.22
894	6.85	1.15
960	7.12	1.11
1000	7.28	1.08
1500	9.09	0.87
1700	9.74	0.81
1800	10.06	0.78
1880	10.30	0.77
2000	10.66	0.74
2170	11.16	0.71
2200	11.25	0.70
2300	11.53	0.68
2400	11.81	0.67
2500	12.09	0.65
3000	13.40	0.59
4000	15.81	0.50
6000	20.06	0.39

(*) nominal values
(**) Ambient temperature = 40°C; Temperature of inner conductor = 100°C; VSWR = 1.0; no solar loading

NF50A12

716FV12

716MAL12

CONNECTORS & TOOL

Reference	Description
716MV12	7-16 DIN male, O-Ring
716FV12	7-16 DIN female, O-Ring
716MA12	7-16 DIN male, Sealant injection
716FA12	7-16 DIN female, Sealant injection
716MVL12	7-16 DIN male, angle, O-Ring
716MAL12	7-16 DIN male, right angle, Sealant injections
NM50V12	N male, O-Ring
NF50V12	N female, O-Ring
NM50A12	N male, Sealant injection
NF50A12	N female, Sealant injection
NM50VL12	N male, angle, O-Ring
NM50AL12	N male, right angle, Sealant injection
SPTC50AV12	Cable preparation tool
Cutting knife (d)	Spare parts for cable preparation tool
Peeling knife (e)	(Refer to installation instruction of the tool)
SIL-744 90ml	Sealant for connectors using sealant injection
SIL-744 310 ml	Sealant for connectors using sealant injection

Rem.: • Sealant for connectors using the sealant injection method must be purchased separately.

SPTC50AV12

Specification of	N-connectors	7-16 connectors
Electrical		
• ***Nominal impedance*** (Ω)	50	50
• ***Reflection coefficient at 2 GHz***	≤0.02 (*)	≤0.02 (*)
• ***Insulation resistance*** (GΩ)	≥5	≥10
• ***Test voltage*** (at sea level) (kV rms, 50 Hz)	2.5	4
• ***Working voltage*** (at sea level) (kV rms, 50 Hz)	1	2.7
• ***Screening effectiveness up to 1 GHz*** (dB)	>128	>128
• ***Outer contact resistance*** (mΩ)	≤1	≤1
• ***Inner contact resistance*** (mΩ)	≤1	≤1
• ***PIM ratio*** (2 x 20 W carrier) (dBc)	≤ -155 (Typical -163)	
Mechanical		
• ***Torque on coupling nut*** (Nm)	8	30
• ***Cable retention*** (N)	>500	>1000
Environmental		
• ***Temperature range*** (°C)	-40 to +85	
• ***Degree of protection*** (humidity)	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 alloy	
• ***Dielectric***	TPX/PTFE	TPX
• ***Gaskets***	High quality silicone	

(*) ≤0.03 for right angle connector

GCS12PAR

ACCESSORIES

Description	Reference
• ***Grounding clamp with parallel outlet***	GCS12PAR
• ***Fixing clamps***	see page 39
• ***Additional weatherproofing***	see page 48
• ***Lace-up hoisting grip***	HG-12
Pre-laced hoisting grip	HG-12-L
	see page 44

STANDARD 5228

Cable type : ***5228***

Reference : ***EC5-50***

Cable with standard UV resistant PE jacket, halogen free according to IEC 60754

FLAME RETARDANT HLFR

Cable type : ***5228-HLFR***

Reference : ***EC5-50-FR***

Cable with UV resistant, halogen free, low smoke, flame retardant jacket according to IEC 60754-2, IEC 60332-1-2, IEC 60332-3 Cat. C and IEC 61034-1+2

CHARACTERISTICS

Construction

• ***Inner conductor***	
Material	smooth copper tube
Diameter (mm)	9.1
• ***Dielectric***	
Material	gas-injected cellular polyethylene
Diameter (mm)	23.5
• ***Outer conductor***	
Material	corrugated copper tube
Diameter (mm)	25.0
• ***Jacket***	
Material	black polyethylene
Thickness (mm)	1.4
Diameter (mm)	28.0

Mechanical

• ***Minimum bending radius***	
a) single bending (cm)	10
b) 10 repeated bends (cm)	25
• ***Maximum pulling strength*** (daN)	170
• ***Recommended temperature range***	
- Storage	-70 to +85°C
- Installation	-40 to +60°C
- Operation	-55 to +85°C
• ***Maximum length per hoisting grip*** (m)	70
• ***Maximum hanger spacing***	1.2
• ***Flat Plate Crush resistance*** (kg/mm)	1.7
• ***Bending moment*** (Nm)	14.5
• ***Weight*** (kg/km)	530

[1] a = 0.1117
b = 0.00042
$\propto(f) = a \cdot \sqrt{f} + b \cdot f$ [dB/100m]

Electrical

• ***Characteristic impedance*** (Ω)	50 ±1
• ***Nominal capacity*** (pF/m)	76
• ***Relative propagation velocity*** (%)	88
• ***Inductance*** (µH/m)	0.190
• ***DC-resistance at 20°C***	
- inner conductor (Ω/km)	1.05
- outer conductor (Ω/km)	1.0
• ***RF peak voltage*** (kV)	3.0
• ***RF peak power*** (kW)	90
• ***Cut-off-frequency*** (GHz)	5.3
• ***Insulation resistance*** (MΩ.km)	>>5000

• ***Attenuation [1] and power rating***

Frequency (MHz)	***Attenuation at 20°C***(*) (dB/100m)	***Mean power rating***(**) (kW)
10	0.36	26.32
20	0.51	18.52
30	0.62	15.06
80	1.03	9.11
100	1.16	8.12
150	1.43	6.57
200	1.66	5.65
300	2.06	4.56
400	2.40	3.92
450	2.56	3.68
500	2.71	3.47
600	2.99	3.15
700	3.25	2.89
800	3.50	2.69
894	3.72	2.53
960	3.86	2.43
1000	3.95	2.38
1500	4.96	1.90
1700	5.32	1.77
1800	5.50	1.71
1880	5.63	1.67
2000	5.84	1.61
2170	6.11	1.54
2200	6.16	1.53
2300	6.32	1.49
2400	6.48	1.45
2500	6.64	1.42
3000	7.38	1.27
4000	8.74	1.08
6000	-	-

(*) nominal values
(**) Ambient temperature = 40°C; Temperature of inner conductor = 100°C; VSWR = 1.0; no solar loading

NM50A78M

716FV78M

CONNECTORS & TOOL

Reference	Description
716MV78M	7-16 DIN male, O-Ring
716FV78M	7-16 DIN female, O-Ring
716MA78M	7-16 DIN male, Sealant injection
716FA78M	7-16 DIN female, Sealant injection
NM50V78M	N male, O-Ring
NF50V78M	N female, O-Ring
NM50A78M	N male, Sealant injection
NF50A78M	N female, Sealant injection
SPTC50AV78M	Cable preparation tool
Inner ring (a)	Spare parts for cable preparation tool
Outer ring (b)	(Refer to installation instruction of the tool)
Spring (c)	
Cutting knife (d)	
Peeling knife (e)	
Flaring knife (f)	
SIL-744 90ml	Sealant for connectors using sealant injection
SIL-744 310 ml	Sealant for connectors using sealant injection

Rem.: • Sealant for connectors using the sealant injection method must be purchased separately.
• EIA connectors available on request.

SPTC50AV78M

Specification of	N-connectors	7-16 connectors
Electrical		
• ***Nominal impedance*** (Ω)	50	50
• ***Reflection coefficient at 2 GHz***	≤0.02	≤0.02
• ***Insulation resistance*** (GΩ)	≥5	≥10
• ***Test voltage*** (at sea level) (kV rms, 50 Hz)	2.5	4
• ***Working voltage*** (at sea level) (kV rms, 50 Hz)	1	2.7
• ***Screening effectiveness up to 1 GHz*** (dB)	>128	>128
• ***Outer contact resistance*** (mΩ)	≤0.7	≤0.7
• ***Inner contact resistance*** (mΩ)	≤1	≤1
• ***PIM ratio*** (2 x 20 W carrier) (dBc)	≤ -155 (Typical -163)	
Mechanical		
• ***Torque on coupling nut*** (Nm)	8	30
• ***Cable retention*** (N)	>400	>1000
Environmental		
• ***Temperature range*** (°C)	-40 to +85	
• ***Degree of protection*** (humidity)	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 alloy	
• ***Dielectric***	PTFE	TPX
• ***Gaskets***	High quality silicone	

GCS78PAR

ACCESSORIES

Description	Reference
• ***Grounding clamp with parallel outlet***	GCS78PAR
• ***Fixing clamps***	see page 39
• ***Additional weatherproofing***	see page 48
• ***Lace-up hoisting grip***	HG-78
Pre-laced hoisting grip	HG-78-L
	see page 44

7/8" A

Ultra Low Loss

STANDARD 5228 A

Cable type : **5228 A**

Reference : **EC5-50-A**

Cable with standard UV resistant PE jacket, halogen free according to IEC 60754

FLAME RETARDANT HLFR

Cable type : **5228A-HLFR**

Reference : **EC5-50A-FR**

Cable with UV resistant, halogen free, low smoke, flame retardant jacket according to IEC 60754-2, IEC 60332-1-2, IEC 60332-3 Cat. C and IEC 61034-1+2

CHARACTERISTICS

Construction

• ***Inner conductor***	
Material	smooth copper tube
Diameter (mm)	9.3
• ***Dielectric***	
Material	gas-injected cellular polyethylene
Diameter (mm)	23.5
• ***Outer conductor***	
Material	corrugated copper tube
Diameter (mm)	25.0
• ***Jacket***	
Material	black polyethylene
Thickness (mm)	1.4
Diameter (mm)	28.0

Mechanical

• ***Minimum bending radius***	
a) single bending (cm)	10
b) 15 repeated bends (cm)	25
• ***Maximum pulling strength*** (daN)	150
• ***Recommended temperature range***	
- Storage	-70 to +85°C
- Installation	-40 to +60°C
- Operation	-55 to +85°C
• ***Maximum length per hoisting grip*** (m)	70
• ***Maximum hanger spacing***	1.2
• ***Flat Plate Crush resistance*** (kg/mm)	1.4
• ***Bending moment*** (Nm)	11.6
• ***Weight*** (kg/km)	496

[1] a = 0.1107
b = 0.000333
$\propto(f) = a \cdot \sqrt{f} + b \cdot f$ [dB/100m]

Electrical

• ***Characteristic impedance*** (Ω)	50 ±1
• ***Nominal capacity*** (pF/m)	75
• ***Relative propagation velocity*** (%)	89
• ***Inductance*** (µH/m)	0.187
• ***DC-resistance at 20°C***	
- inner conductor (Ω/km)	1.34
- outer conductor (Ω/km)	1.0
• ***RF peak voltage*** (kV)	2.9
• ***RF peak power*** (kW)	86
• ***Cut-off-frequency*** (GHz)	5.1
• ***Insulation resistance*** (MΩ.km)	>>5000

• ***Attenuation [1] and power rating***

Frequency (MHz)	***Attenuation at 20°C***(*) (dB/100m)	***Mean power rating***(**) (kW)
10	0.35	25.46
20	0.50	17.93
30	0.62	14.60
80	1.02	8.85
100	1.14	7.89
150	1.41	6.40
200	1.63	5.51
300	2.02	4.46
400	2.35	3.83
450	2.50	3.60
500	2.64	3.41
600	2.91	3.09
700	3.16	2.85
800	3.40	2.65
894	3.61	2.49
960	3.75	2.40
1000	3.83	2.35
1500	4.79	1.88
1700	5.13	1.75
1800	5.30	1.70
1880	5.43	1.66
2000	5.62	1.60
2170	5.88	1.53
2200	5.92	1.52
2300	6.07	1.48
2400	6.22	1.45
2500	6.37	1.41
3000	7.06	1.27
4000	8.33	1.08
6000	-	-

(*) nominal values
(**) Ambient temperature = 40°C; Temperature of inner conductor = 100°C; VSWR = 1.0; no solar loading

NM50A78MA

716FV78MA

CONNECTORS & TOOL

Reference	Description
716MV78MA	7-16 DIN male, O-Ring
716FV78MA	7-16 DIN female, O-Ring
716MA78MA	7-16 DIN male, Sealant injection
716FA78MA	7-16 DIN female, Sealant injection
NM50V78MA	N male, O-Ring
NF50V78MA	N female, O-Ring
NM50A78MA	N male, Sealant injection
NF50A78MA	N female, Sealant injection
SPTC50AV78M	Cable preparation tool
Inner ring (a)	Spare parts for cable preparation tool
Outer ring (b)	(Refer to installation instruction of the tool)
Spring (c)	
Cutting knife (d)	
Peeling knife (e)	
Flaring knife (f)	
SIL-744 90ml	Sealant for connectors using sealant injection
SIL-744 310 ml	Sealant for connectors using sealant injection

Rem.: • Sealant for connectors using the sealant injection method must be purchased separately.
• EIA connectors available on request.

SPTC50AV78M

Specification of	N-connectors	7-16 connectors
Electrical		
• ***Nominal impedance*** (Ω)	50	50
• ***Reflection coefficient at 2 GHz***	≤0.02	≤0.02
• ***Insulation resistance*** (GΩ)	≥5	≥10
• ***Test voltage*** (at sea level) (kV rms, 50 Hz)	2.5	4
• ***Working voltage*** (at sea level) (kV rms, 50 Hz)	1	2.7
• ***Screening effectiveness up to 1 GHz*** (dB)	>128	>128
• ***Outer contact resistance*** (mΩ)	≤0.7	≤0.7
• ***Inner contact resistance*** (mΩ)	≤1	≤1
• ***PIM ratio*** (2 x 20 W carrier) (dBc)	≤ -155 (Typical -163)	
Mechanical		
• ***Torque on coupling nut*** (Nm)	8	30
• ***Cable retention*** (N)	>400	>1000
Environmental		
• ***Temperature range*** (°C)	-40 to +85	
• ***Degree of protection*** (humidity)	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 and brass	
• ***Dielectric***	PTFE	TPX
• ***Gaskets***	High quality silicone	

GCS78PAR

ACCESSORIES

Description	Reference
• ***Grounding clamp with parallel outlet***	GCS78PAR
• ***Fixing clamps***	see page 39
• ***Additional weatherproofing***	see page 48
• ***Lace-up hoisting grip***	HG-78
Pre-laced hoisting grip	HG-78-L
	see page 44

1-1/4" A

Ultra Low Loss

STANDARD 5328 A

Cable type : **5328 A**

Reference : **EC6-50-A**

Cable with standard UV resistant PE jacket, halogen free according to IEC 60754

FLAME RETARDANT HLFR

Cable type : **5328 A-HLFR**

Reference : **EC6-50-A-FR**

Cable with UV resistant, halogen free, low smoke, flame retardant jacket according to IEC 60754-2, IEC 60332-1-2, IEC 60332-3 Cat. C and IEC 61034-1+2

CHARACTERISTICS

Construction

• ***Inner conductor***	
Material	smooth copper tube
Diameter (mm)	13.0
• ***Dielectric***	
Material	gas-injected cellular polyethylene
Diameter (mm)	33.5
• ***Outer conductor***	
Material	corrugated copper tube
Diameter (mm)	36.0
• ***Jacket***	
Material	black polyethylene
Thickness (mm)	1.5
Diameter (mm)	39.0

Mechanical

• ***Minimum bending radius***	
a) single bending (cm)	20
b) 15 repeated bends (cm)	38
• ***Maximum pulling strength*** (daN)	250
• ***Recommended temperature range***	
- Storage	-70 to +85°C
- Installation	-40 to +60°C
- Operation	-55 to +85°C
• ***Maximum length per hoisting grip*** (m)	70
• ***Maximum hanger spacing***	1.4
• ***Flat plate crush resistance*** (kg/mm)	2.4
• ***Bending moment*** (Nm)	32
• ***Weight*** (kg/km)	871

[1] a = 0.0783
b = 0.00031
$\propto(f) = a \cdot \sqrt{f} + b \cdot f$ [dB/100m]

Electrical

• ***Characteristic impedance*** (Ω)	50 ±1
• ***Nominal capacity*** (pF/m)	76
• ***Relative propagation velocity*** (%)	88
• ***Inductance*** (µH/m)	0.189
• ***DC-resistance at 20°C***	
- inner conductor (Ω/km)	0.72
- outer conductor (Ω/km)	0.58
• ***RF peak voltage*** (kV)	4.3
• ***RF peak power*** (kW)	184
• ***Cut-off-frequency*** (GHz)	3.7
• ***Insulation resistance*** (MΩ.km)	>>5000

• ***Attenuation [1] and power rating***

Frequency (MHz)	***Attenuation at 20°C***(*) (dB/100m)	***Mean power rating***(**) (kW)
10	0.25	37.13
20	0.36	26.12
30	0.44	21.24
80	0.73	12.84
100	0.81	11.44
150	1.01	9.26
200	1.17	7.96
300	1.45	6.42
400	1.69	5.51
450	1.80	5.17
500	1.91	4.88
600	2.10	4.42
700	2.29	4.07
800	2.46	3.78
894	2.62	3.56
960	2.72	3.42
1000	2.79	3.34
1500	3.50	2.66
1700	3.76	2.48
1800	3.88	2.40
1880	3.98	2.34
2000	4.12	2.26
2170	4.32	2.15
2200	4.35	2.14
2300	4.47	2.08
2400	4.58	2.03
2500	4.69	1.98
3000	5.22	1.78
4000	-	-
6000	-	-

(*) nominal values
(**) Ambient temperature = 40°C; Temperature of inner conductor = 100°C; VSWR = 1.0; no solar loading

NF50V114M

716MA114M

CONNECTORS & TOOL

Reference	Description
716MV114M	7-16 DIN male, O-Ring
716FV114M	7-16 DIN female, O-Ring
716MA114M	7-16 DIN male, Sealant injection
716FA114M	7-16 DIN female, Sealant injection
NM50V114M	N male, O-Ring
NF50V114M	N female, O-Ring
NM50A114M	N male, Sealant injection
NF50A114M	N female, Sealant injection
SPTC50AV114M	Cable preparation tool
Inner ring (a)	Spare parts for cable preparation tool
Outer ring (b)	(Refer to installation instruction of the tool)
Spring (c)	
Cutting knife (d)	
Peeling knife (e)	
SIL-744 90ml	Sealant for connectors using sealant injection
SIL-744 310 ml	Sealant for connectors using sealant injection

Rem.: • Sealant for connectors using the sealant injection method must be purchased separately.
• EIA connectors available on request.

SPTC50AV114M

Specification of	N-connectors	7-16 connectors
Electrical		
• ***Nominal impedance*** (Ω)	50	50
• ***Reflection coefficient at 2 GHz***	≤0.02	≤0.02
• ***Insulation resistance*** (GΩ)	≥5	≥10
• ***Test voltage*** (at sea level) (kV rms, 50 Hz)	2.5	4
• ***Working voltage*** (at sea level) (kV rms, 50 Hz)	1	2.7
• ***Screening effectiveness up to 1 GHz*** (dB)	>128	>128
• ***Outer contact resistance*** (mΩ)	≤0.5	≤0.5
• ***Inner contact resistance*** (mΩ)	≤1	≤1
• ***PIM ratio*** (2 x 20 W carrier) (dBc)	≤ -155 (Typical -163)	
Mechanical		
• • ***Torque on coupling nut*** (Nm)	8	30
• ***Cable retention*** (N)	>400	>1000
Environmental		
• ***Temperature range*** (°C)	-40 to +85	
• ***Degree of protection*** (humidity)	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 and brass	
• ***Dielectric***	TPX/PTFE	
• ***Gaskets***	High quality silicone	

GCS114PAR

ACCESSORIES

Description	Reference
• ***Grounding clamp with parallel outlet***	GCS114PAR
• ***Fixing clamps***	see page 39
• ***Additional weatherproofing***	see page 48
• ***Lace-up hoisting grip***	HG-114
Pre-laced hoisting grip	HG-114-L
	see page 44

1-5/8" A

Ultra Low Loss

STANDARD 5438 A

Cable type : **5438 A**

Reference : **EC7-50-A**

Cable with standard UV resistant PE jacket, halogen free according to IEC 60754

FLAME RETARDANT HLFR

Cable type : **5438-A-HLFR**

Reference : **EC7-50-A-FR**

Cable with UV resistant, halogen free, low smoke, flame retardant jacket according to IEC 60754-2, IEC 60332-1-2, IEC 60332-3 Cat. C and IEC 61034-1+2

CHARACTERISTICS

Construction

• ***Inner conductor***	
Material	corrugated copper tube
Diameter (mm)	17.7
• ***Dielectric***	
Material	gas-injected cellular polyethylene
Diameter (mm)	43.0
• ***Outer conductor***	
Material	corrugated copper tube
Diameter (mm)	46.6
• ***Jacket***	
Material	black polyethylene
Thickness (mm)	1.7
Diameter (mm)	50.0

Mechanical

• ***Minimum bending radius***	
a) single bending (cm)	20
b) 15 repeated bends (cm)	40
• ***Maximum pulling strength*** (daN)	250
• ***Recommended temperature range***	
- Storage	-70 to +85°C
- Installation	-40 to +60°C
- Operation	-55 to +85°C
• ***Maximum length per hoisting grip*** (m)	70
• ***Maximum hanger spacing***	1.5
• ***Flat plate crush resistance*** (kg/mm)	2.6
• ***Bending moment*** (Nm)	45
• ***Weight*** (kg/km)	1130

[1] a = 0.061
b = 0.000359
$\propto(f) = a \cdot \sqrt{f} + b \cdot f$ [dB/100m]

Electrical

• ***Characteristic impedance*** (Ω)	50 ±1
• ***Nominal capacity*** (pF/m)	75
• ***Relative propagation velocity*** (%)	89
• ***Inductance*** (µH/m)	0.190
• ***DC-resistance at 20°C***	
- inner conductor (Ω/km)	1.37
- outer conductor (Ω/km)	0.39
• ***RF peak voltage*** (kV)	5.5
• ***RF peak power*** (kW)	302
• ***Cut-off-frequency*** (GHz)	2.7
• ***Insulation resistance*** (MΩ.km)	>>5000

• ***Attenuation [1] and power rating***

Frequency (MHz)	***Attenuation at 20°C***(*) (dB/100m)	***Mean power rating***(**) (kW)
10	0.20	51.53
20	0.28	36.17
30	0.34	29.36
80	0.57	17.63
100	0.65	15.68
150	0.80	12.64
200	0.93	10.84
300	1.16	8.70
400	1.36	7.43
450	1.46	6.96
500	1.54	6.56
600	1.71	5.92
700	1.87	5.43
800	2.01	5.03
894	2.14	4.72
960	2.23	4.53
1000	2.29	4.43
1500	2.90	3.49
1700	3.13	3.24
1800	3.23	3.13
1880	3.32	3.05
2000	3.45	2.94
2170	3.62	2.80
2200	3.65	2.77
2300	3.75	2.70
2400	3.85	2.63
2500	3.95	2.57
3000	-	-
4000	-	-
6000	-	-

(*) nominal values
(**)Ambient temperature = 40°C; Temperature of inner conductor = 100°C; VSWR = 1.0; no solar loading

NF50A158MPA

716MV158MPA

CONNECTORS & TOOL

Reference	Description
716MV158MPA	7-16 DIN male, O-Ring
716FV158MPA	7-16 DIN female, O-Ring
716MA158MPA	7-16 DIN male, Sealant injection
716FA158MPA	7-16 DIN female, Sealant injection
NM50V158MPA	N male, O-Ring
NF50V158MPA	N female, O-Ring
NM50A158MPA	N male, Sealant injection
NF50A158MPA	N female, Sealant injection
SPTC50AV158M	Cable preparation tool
Inner ring (a)	Spare parts for cable preparation tool
Outer ring (b)	(Refer to installation instruction of the tool)
Spring (c)	
Cutting knife (d)	
Peeling knife (e)	
SIL-744 90 ml	Sealant for connectors using sealant injection
SIL-744 310 ml	Sealant for connectors using sealant injection

Rem.: • Sealant for connectors using the sealant injection method must be purchased separately.
• EIA connectors available on request.

SPTC50AV158M

Specification of	N-connectors	7-16 connectors
Electrical		
• ***Nominal impedance*** (Ω)	50	50
• ***Reflection coefficient at 2 GHz***	≤0.02	≤0.02
• ***Insulation resistance*** (GΩ)	≥5	≥10
• ***Test voltage*** (at sea level) (kV rms, 50 Hz)	2.5	4
• ***Working voltage*** (at sea level) (kV rms, 50 Hz)	1	2.7
• ***Screening effectiveness up to 1 GHz*** (dB)	>128	>128
• ***Outer contact resistance*** (mΩ)	≤0.5	≤0.5
• ***Inner contact resistance*** (mΩ)	≤1	≤1
• ***PIM ratio*** (2 x 20 W carrier) (dBc)	≤ -155 (Typical -163)	
Mechanical		
• ***Torque on coupling nut*** (Nm)	8	30
• ***Cable retention*** (N)	>400	>1000
Environmental		
• ***Temperature range*** (°C)	-40 to +85	
• ***Degree of protection*** (humidity)	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 and brass	
• ***Dielectric***	TPX / PTFE	
• ***Gaskets***	High quality silicone	

GCS158PAR

ACCESSORIES

Description	Reference
• ***Grounding clamps with parallel outlet***	GCS158PAR
• ***Fixing clamps***	see page 39
• ***Additional weatherproofing***	see page 48
• ***Lace-up hoisting grip***	HG-158
Pre-laced hoisting grip	HG-158-L
	see page 44

2-1/4”

STANDARD 5528

Cable type : **5528**

Reference : **EC12-50**

Cable with standard UV resistant PE jacket, halogen free according to IEC 60754

FLAME RETARDANT HLFR

Cable type : **5528-HLFR**

Reference : **EC12-50-FR**

Cable with UV resistant, halogen free, low smoke, flame retardant jacket according to IEC 60754-2, IEC 60332-1-2, IEC 60332-3 Cat. C and IEC 61034-1+2

CHARACTERISTICS

Construction

• ***Inner conductor***	
Material	corrugated copper tube
Diameter (mm)	21.0
• ***Dielectric***	
Material	gas-injected cellular polyethylene
Diameter (mm)	52.0
• ***Outer conductor***	
Material	corrugated copper tube
Diameter (mm)	56.0
• ***Jacket***	
Material	black polyethylene
Thickness (mm)	2.0
Diameter (mm)	60.0

Mechanical

• ***Minimum bending radius***	
a) single bending (cm)	25
b) 15 repeated bends (cm)	55
• ***Maximum pulling strength*** (daN)	300
• ***Recommended temperature range***	
- Storage	-70 to +85°C
- Installation	-40 to +60°C
- Operation	-55 to +85°C
• ***Maximum length per hoisting grip*** (m)	70
• ***Maximum hanger spacing***	1.8
• ***Flat Plate Crush resistance*** (kg/mm)	4.8
• ***Bending moment*** (kg/km)	90
• ***Weight*** (kg/km)	1960

[1] a = 0.05035
b = 0.00045
$\propto(f) = a \cdot \sqrt{f} + b \cdot f$ [dB/100m]

Electrical

• ***Characteristic impedance*** (Ω)	50 ±1
• ***Nominal capacity*** (pF/m)	76
• ***Relative propagation velocity*** (%)	88
• ***Inductance*** (µH/m)	0.190
• ***DC-resistance at 20°C***	
- inner conductor (Ω/km)	0.55
- outer conductor (Ω/km)	0.25
• ***RF peak voltage*** (kV)	6.8
• ***RF peak power*** (kW)	462
• ***Cut-off-frequency*** (GHz)	2.3
• ***Insulation resistance*** (MΩ.km)	>>5000

• ***Attenuation [1] and power rating***

Frequency (MHz)	***Attenuation at 20°C***(*) (dB/100m)	***Mean power rating***(**) (kW)
10	0.16	72.19
20	0.23	50.47
30	0.29	40.86
80	0.49	24.30
100	0.55	21.55
150	0.68	17.28
200	0.80	14.74
300	1.01	11.74
400	1.19	9.96
450	1.27	9.30
500	1.35	8.75
600	1.50	7.86
700	1.65	7.18
800	1.78	6.62
894	1.91	6.20
960	1.99	5.93
1000	2.04	5.79
1500	2.63	4.50
1700	2.84	4.16
1800	2.95	4.01
1880	3.03	3.90
2000	3.15	3.75
2170	3.32	3.56
2200	3.35	3.53
2300	-	-
2400	-	-
2500	-	-
3000	-	-
4000	-	-
6000	-	-

(*) nominal values
(**) Ambient temperature = 40°C; Temperature of inner conductor = 100°C; VSWR = 1.0; no solar loading

NF50A214

716MV214

CONNECTORS & TOOL

Reference	Description
716MV214	7-16 DIN male, O-Ring
716FV214	7-16 DIN female, O-Ring
716MA214	7-16 DIN male, Sealant injection
716FA214	7-16 DIN female, Sealant injection
NM50V214	N male, O-Ring
NF50V214	N female, O-Ring
NM50A214	N male, Sealant injection
NF50A214	N female, Sealant injection
SG 214	Saw guide
SIL-744 90ml	Sealant for connectors using sealant injection
SIL-744 310 ml	Sealant for connectors using sealant injection

Rem.: • Sealant for connectors using the sealant injection method must be purchased separately.

SG214

Specification of	N-connectors	7-16 connectors
Electrical		
• ***Nominal impedance*** (Ω)	50	50
• ***Reflection coefficient at 2 GHz***	≤0.025	≤0.025
• ***Insulation resistance*** (GΩ)	≥5	≥10
• ***Test voltage*** (at sea level) (kV rms, 50 Hz)	2.5	4
• ***Working voltage*** (at sea level) (kV rms, 50 Hz)	1	2.7
• ***Screening effectiveness up to 1 GHz*** (dB)	>128	>128
• ***Outer contact resistance*** (mΩ)	≤0.5	≤0.5
• ***Inner contact resistance*** (mΩ)	≤1	≤1
• ***PIM ratio*** (2 x 20 W carrier) (dBc)	≤ -155 (Typical -163)	
Mechanical		
• ***Torque on coupling nut*** (Nm)	8	30
• ***Cable retention*** (N)	>400	>1000
Environmental		
• ***Temperature range*** (°C)	-40 to +85	
• ***Degree of protection*** (humidity)	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 alloy	
• ***Dielectric***	PTFE	TPX/PTFE
• ***Gaskets***	High quality silicone	

ACCESSORIES

Type	Reference	Description
• ***Grounding clamp with parallel outlet***		GCS214PAR
• ***Fixing clamps***		see page 39
• ***Additional Weatherproofing***		see page 48

GCS214PAR

JUMPER CABLES

EUPEN offers jumper cables with 1/2" Hiflex cable (5092 / EC4-50-HF) or 1/2" standard cable (5128 / EC4-50) with soldered DIN 7-16 or N type straight and right angle connectors. All metal contact parts are silver plated. They are designed for watertight applications and optimised jumper cable performances.

Features

- *excellent return loss values*
- *very low bending radius:*
  - *30 mm for 1/2" Hiflex (5092) for single bending (40 mm for repeated bendings)*
  - *70 mm for 1/2" standard (5128) for single bending (125 mm for repeated bendings)*
- *very low level of 3rd order intermodulation products*
- *easy, fast and reliable installation*
- *water tightness according to IP 68 (according EN 60529)*
- *longitudinal water tightness is provided by the special connector design (O-Ring in connector head)*
- *the overmolding of the connector provides an additional mechanical stability*

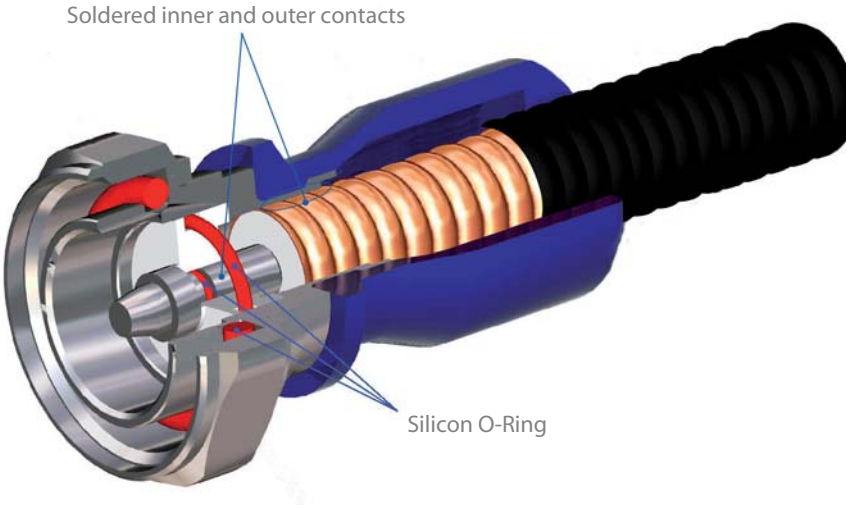
Product reference

EC4-vv-S-www-XYZXYZ

EC4 = 1/2" cable (5128)
vv = HF for Hiflex (5092)
S = soldered connector
www = length in cm
X =D for DIN 7-16 type connector
N for N type connector
Y = M for male or F for female
Z = L for right angle connector

Marking

- Manufacturer EUPEN
- Week & Year of Production
- Product Ref.: for ex.:*EC4-HF-S-200-DMDM*
- Torque
- Product Nr. EUPEN
- Serial Number



1/2" HIFLEX JUMPER 5092

Cable type : **5092**

Reference : **EC4-50-HF**

Specification	800-1000 MHz	1600-2200 MHz
Electrical		
• Return loss [Min] for		
7-16 straight - 7-16 straight (dB)	-31	-30
7-16 straight - 7-16 angle (dB)	-31	-26
N straight - N straight (dB)	-30	-28
N straight - N angle (dB)	-30	-27
N straight - 7-16 straight (dB)	-32	-30
N straight - 7-16 angle (dB)	-32	-27
• Attenuation per 100m at 20°C (dB)	11.4 (+connectors)	17.8
• Power handling [min], continuous (W)	750	500
• Level of intermodulation products		
Typical (dBc)	-162	-162
Max (dBc)	-155	-155
• Impedance (Ohm)	50 ±1	50 ±1
• RF Voltage rating [Peak] (V)	1130	1130
• Velocity of propagation (%)	82	82
Mechanical		
• Minimum bending radius		
single (mm)	30	
repeated (mm)	30	
• Connector torque [nominal] (Nm)	28 (for 7-16 type) 12 (for N type)	
Environmental		
• Temperature range (°C)		
Installation	-40 to +60	
Operating	-55 to +85	
• Relative humidity (%)	10 to 100	
• General environmental	corrosion and UV resistant	

1/2" STANDARD JUMPER 5128

Cable type : **5128**

Reference : **EC4-50**

Specification	800-1000 MHz	1600-2200 MHz
Electrical		
• Return loss [Min] for		
7-16 straight - 7-16 straight (dB)	-31	-30
7-16 straight - 7-16 angle (dB)	-31	-26
N straight - N straight (dB)	-30	-28
N straight - N angle (dB)	-30	-27
N straight - 7-16 straigth (dB)	-32	-30
N straight - 7-16 angle (dB)	-32	-27
• Attenuation per 100m at 20°C (dB)	7.9 (+connectors)	12.4
• Power handling [min], continuous (W)	750	500
• Level of intermodulation products		
Typical (dBc)	-162	-162
Max (dBc)	-155	-155
• Impedance (Ohm)	50 ±1	50 ±1
• RF Voltage rating [Peak] (V)	1600	1600
• Velocity of propagation (%)	82	82
Mechanical		
• Minimum bending radius		
single (mm)	70	
repeated (mm)	125	
• Connector torque [nominal] (Nm)	28 (for 7-16 type) 12 (for N type)	
Environmental		
• Temperature range (°C)		
Installation	-40 to +60	
Operating	-55 to +85	
• Relative humidity (%)	10 to 100	
• General environmental	corrosion and UV resistant	

ACCESSORIES FOR CABLES

1. ADAPTERS

Eupen offers a wide range of inside-series and inter-series 7-16 DIN and N type adapters designed in ***standard*** and ***precision*** models.

Features

- *Low reflection coefficient up to 2.5 GHz*
- *Low PIM (-163dBc)*
- *Cu-Be inner contacts for high contact force*
- *Silver plated*
- *Watertight (IP67/IP68)*
- *Corrosion resistant*

A. STANDARD ADAPTERS

Standard adapters are characterised by a minimum Return loss of -34 dB up to 2.5 GHz.

Description	***Reference***
N male to 7-16 male	AD50NM716M
N female to 7-16 male	AD50NF716M
N male to 7-16 female	AD50NM716F
N female to 7-16 female	AD50NF716F
N male to N female	AD50NMF
N male to N male	AD50NMM
N female to N female	AD50NFF
7-16 male to 7-16 female	AD50716MF
7-16 female to 7-16 female	AD50716FF
7-16 male to 7-16 male	AD50716MM

B. PRECISION ADAPTERS

For applications where high electrical performances and very low return loss are requested, and where high precision measurement equipment is requested - such as field test application in the cellular communication - we offer high precision adaptors featuring lowest return loss with guaranteed minimum -40 dB up to 2.5 GHz.

Description	***Reference***
N male to 7-16 male	PRAD50NM716M
N female to 7-16 male	PRAD50NF716M
N male to 7-16 female	PRAD50NM716F
N female to 7-16 female	PRAD50NF716F
7-16 female to 7-16 female	PRAD50716FF
7-16 male to 7-16 male	PRAD50716MM

2. PRESET TORQUE WRENCH SELECTION GUIDE

A. BLUE WRENCH HANDLES FOR CONNECTOR BACK NUTS

Connector	Wrench size	Max. Wrench Head Thickness	Rear Nut Torque	Reference
	mm	mm	Nm	
1/2”	19	7	20	TQ-34-F15
1/2” Hiflex	19	7	27	TQ-34-F20
7/8” + 7/8”A + 7/8” Hiflex	30	12	30	TQ-30MM-F22
1-1/4” + 1-1/4”A + 1-1/4” Hiflex	44	N/A	40	TQ-11116-F37
1-5/8”A	58	N/A	50	TQ-214-F37
2-1/4”	2-5/8”	N/A	50	TQ-258-F37*

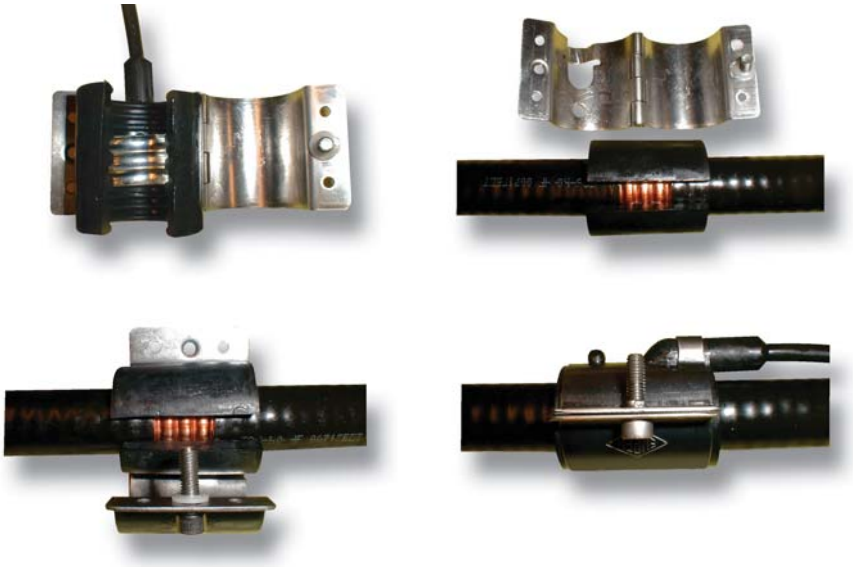
* only available on request

B. RED WRENCH HANDLES FOR CONNECTOR INTERFACES

Connector	Wrench size	Max. Wrench Head Thickness	Rear Nut Torque	Reference
	mm	mm	Nm	
7-16 DIN MonoBloc male	32	N/A	25	TQ-114-F18-M

3. GROUNDING CLAMPS

A. GROUNDING CLAMPS WITH PARALLEL OUTLET



The optimal grounding of the transmission line antenna to base station is a very weak point. In order to guarantee the best grounding we recommend the use of the EUPEN grounding clamps in order to ground the coaxial outer conductor to the antenna tower or ground wire. The main features of the Eupen grounding clamps are:

- ***Ultra quick and easy installation***
- ***No loose parts***
- ***Lightning resistant to 100kA lightning current (wave type 10/350 µs)***
- ***Very low contact resistance < 1mOhm***
- ***Waterproof according IP68 (5 m of water 2,5 hours) without additional tape or sealant***
- ***Corrosion resistant***
- ***Reusable***

GROUNDING CLAMPS

Reference	***GCS14***	***GCS38***	***GCS12X***	***GCS12PAR***	***GCS78PAR***	***GCS114PAR***	***GCS158PAR***	***GCS214PAR***
Cable size	1/4”	3/8”	1/2” Hiflex	1/2”	7/8”, 7/8”A & 7/8” Hiflex	1-1/4”A & 1-1/4” Hiflex	1-5/8”A	2-1/4”
Outlet	normal	normal	normal	parallel	parallel	parallel	parallel	normal
see page	19	21	13	see above	see above	see above	see above	31
Cable cut (mm)	24	20	24	25	21	26	30	30

B. CONNECTOR GROUNDING KIT “CGC” 12-158

Description

- Stainless steel connector grounding clamp
- 60 cm lead with attachment lug and stainless steel M6 Allen screw, washer and nut.

Features

- Fast, easy and reliable installation
- Low contact resistance
- Corrosion resistant stainless steel material
- Reusable
- Only one model for all the connector sizes from 1/2” to 1-5/8”

4. FIXING CLAMPS

A. NEW EUCATEC™ RF CABLE CLAMPS WITH LOCK NUT

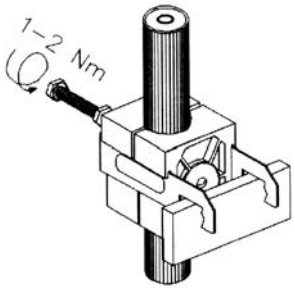
Features

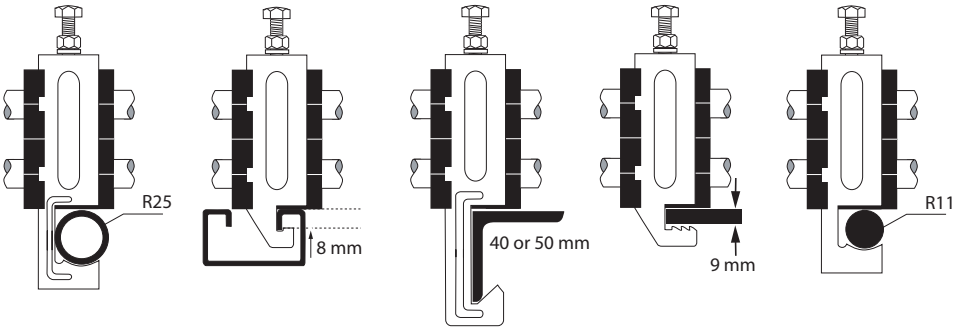
- High durability given by non-corrosive metal components of V2A stainless steel and calibrated saddles from ultraviolet and aging resistant polyamide
- Mountable at ”C”-profile rails usual in radio systems as well as flat sections to a maximum of 25 mm thickness and tubes up to a diameter of 25 mm (according to clamp type)
- Easy handling; the cable clamps (single type) consist of merely two elements
- New inlet design with crotchet on both sides to retain the saddles in the clamp while fixing the cable
- Protection of the cable against a possible harm through the tensioning screw is ensured since the tensioning screw is combined firmly with the polyamide shell
- Extra-secure hold is achieved by the use of a look nut
- All EUCATEC Cable Clamps are available in single, double or triple version
- Also available without look nut

ECC-C-2x78-LN

Suitable profile types

- Standard C-Profile
- Flat sections
- Pipes
- Right angle





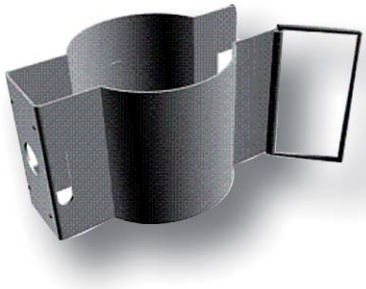
ECC-U-...-LN | ECC-C-...-LN | ECC-A-...-LN | ECC-F-...-LN | ECC-U11-...-LN

For further details please refer to technical specifications.

B. STAINLESS STEEL CLAMP SYSTEM

EU-SH78L

SNAP-IN HANGERS



EU-CH78NH

CLIP HANGERS

Reference	*1/2”*	*7/8”*	*1-1/4”*	*1-5/8”*	*2-1/4”*
Snap-In	EU-SH12L	EU-SH78L	EU-SH114L	EU-SH158L	EU-SH214L
Clip Hangers	EU-CH12NH	EU-CH78NH	EU-CH114NH	EU-CH158NH	–

Material : Stainless steel

OPTION: Angle Adapter for snap-in or clip hangers

Description	*Reference*
Angle Adapter	EU-AA-SL

C. ORIENTABLE STAINLESS STEEL SPRING CLAMP

- For mainting on flat plate or angle
- No additional hardware required
- Orientable

Reference	*1/2”*	*7/8”*	*1-1/4”*	*1-5/8”*
Spring Clamp	EU-ES9016	EU-ES9028	EU-ES9040	EU-ES9040

Other specific clamps are available on request

5. HOISTING GRIPS

We offer two types of hoisting grips: the lace-up one and the pre-laced one.
Please refer to the table below.
Hoisting grips are used to raise the cable up the tower. They can be tied off as a permanent support. Use one hoisting grip for every 60 m cable length.

The hoisting grips are manufactured from high-grade tin coated bronze to provide highest corrosion resistance.

HOISTING GRIPS

Reference	1/2”	7/8”	1-1/4”	1-5/8”
Lace-up type	HG-12	HG-78	HG-114	HG-158
Pre-laced type	HG-12-L	HG-78-L	HG-114-L	HG-158-L

6. SEALANT SIL-744 FOR CONNECTORS WITH SEALANT INJECTION

In outdoor installations the Connector/Cable interface is very sensitive to water ingress.
The Sealant injection waterproofing method creates a quick, secure seal between the back nut and jacket / outer conductor.

The SIL-744 is recommended to be used with all EUPEN connectors where sealant injection is required.
The SIL-744 is supplied either in a box with a 90 ml tube of sealant including connector adapter and key or in a tube containing 310 ml.

With one tube the following quantities of connectors can be sealed:

SIL-744

Reference	3/8”	1/2”	7/8”	1-1/4”	1-5/8”	2-1/4”
with 90 ml tube	26...30	20...25	13...15	7...9	4...5	3...4
with 310 ml tube	90...103	69...86	44...51	24...31	13...17	10...13

7. EUCASEAL

The Eucaseal is an additional and optional gel closure sealing system that provides a reliable sealing of coaxial connectors used at the transition between:

- jumper and antennas or the electric devices like TMA'S ....
- jumper and feeder cables exposed to the outside environment

ES-12-114

Benefit

The housing contains an innovative gel material and provides an efficient moisture block. The ease of installation and the long-term protection makes it a reliable and cost effictive solution.

ES-12-78

Features

- Reliable protection over a wide temperature range: -30°C to 60°C
- Wraparound and no disconnection of the connector
- Quick and easy to install
- Easily removable and re-usable
- Gel material provides an effective barrier against ingress of water and other contaminants - IP 68 acc. EN 60529
- No tape, no mastics or tools required for installation and removal
- UV resistant
- Tested under extremely severe conditions, vibrations (acc. IEC 60068-2-6 Test Fc) and temperature cycles (acc. IEC 60068-2-14 Test Nb)
- Protection against excessive bending of the cable.

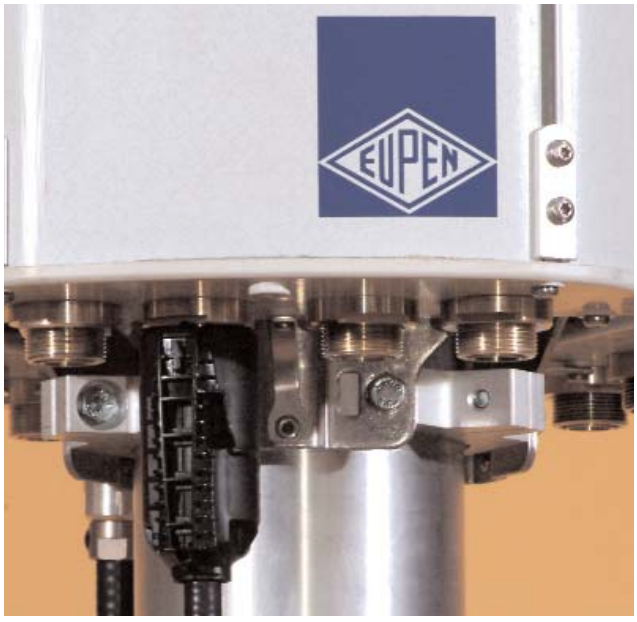
ES-12-114

EUCASEAL

Application	1/2" jumper to antenna or box	1/2" jumper to 7/8" feeder	1/2" jumper to 1-1/4" feeder	1/2" jumper to 1-5/8" feeder
Reference	ES-12-BOX	ES-12-78	ES-12-114	ES-12-158
Cable type	1/2" & 1/2" Hiflex	1/2" & 1/2" Hiflex to 7/8", 7/8"A or 7/8" Hiflex	1/2" & 1/2" Hiflex to 1-1/4"A or 1-1/4" Hiflex	1/2" & 1/2" Hiflex to 1-5/8"A
Connector type	***only DIN 7-16*** - max. length 60 mm - max. body diameter 27 mm - nominal distance between panel connectors 45 mm	N or 7-16	N or 7-16	N or 7-16

Available in black and grey

ES-12-BOX



ES-12-BOX

8. QUARTER WAVE LIGHTNING ARRESTER

The lightning arrester offers an additional protection for the BTS against lightning damages.

EUPEN Quarter Wave protector can be used in wideband applications from 800 to 2500 MHz.

EU-LA-QW-800-2500-DMDF

Features

- Quick and easy to install
- Basic range from 800 to 2500 MHz
- Arrester method: 1/4 Wave

Technical Data

- Impedance: 50 Ohm
- Insertion loss: < 0.1 dB
- Return Loss (VSWR): < 1.20
- Surge current handling capability at least 20 kA (8/20 µS) up to 100 kA (following type)
- Residual pulse energy ≤ 0.5 µJ (3kA@8/20µS)
- Residual pulse voltage ≤ ±3V (3kA@8/20µS)
- Max. power: 100W
- Available in DIN and N type

Reference

for ex.:*EU-LA-QW-800-2500-DM-DF*

9. WEATHERPROOFING TAPE KIT

If additional weatherproofing is required, it can be obtained with appropriate adhesive tapes wrapped around the cable/connector interface.

Eupen supplies a weatherproofing tape kit for additional protection of connector, cable and jumper interfaces. The tape kit includes selffusing butyl tape (65 mm x 2 m) and black PVC tape (25 mm x 10 m).

The following table indicates the quantity of connectors or splices which can be protected by tape kit:

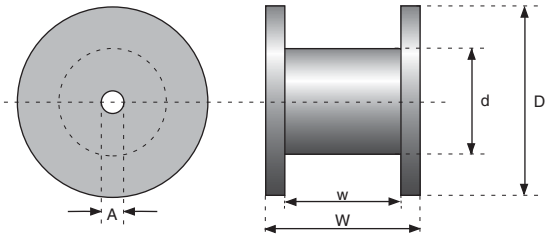
WEATHERPROOFING TAPE KIT

Cable/Connector	*1/4" & 3/8"*	*1/2" & 1/2"X*	*7/8"*	*1-1/4"*	*1-5/8"*
Single connector	10	9	7	5	3
Splice	6	5	4	3	2

CABLE PACKING AND HANDLING INFORMATION

The coaxial cable will be supplied on wooden drums made of planed wooden boards or plywood. In order to protect the cable during transportation and storage, the drums will be battened with wooden boards nailed on the flanges.
The drums are provided with a label containing cable information as cable type, cable length, production batch as well as handling information such as indication of the reeling direction (see label on right). The drums can be impregnated on request.

The standard drum sizes used for the different cable types are shown in the table below.



Cable type		Drum type	Standard length (m)	Outer dim. * D (cm)	Drum dim. d (cm)
EC1-50 (5062)	1/4”	HE 07	400-700	70	40
EC1-50-HF (5042)	1/4” Hiflex	HE 07	400-800	70	40
EC2-50 (5088)	3/8”	HE 07	400-600	70	40
EC2-50 (5088)	3/8”	HE 08 HF	600-1000	80	40
EC4-50 (5128)	1/2”	HE 07	200-250	70	40
EC4-50 (5128)	1/2”	HE 08 HF	250-550	80	40
EC4-50 (5128)	1/2”	HE 12	550-1200	120	47
EC4-50-HF (5092)	1/2” Hiflex	HE 07	200-300	70	40
EC4-50-HF (5092)	1/2” Hiflex	HE 08 HF	300-800	80	40
EC4-50-HF (5092)	1/2” Hiflex	HE 12	800-1200	120	47
EC5-50 (5228)/EC5-50A	7/8” 7/8”A	HE 12	200-550	120	47
EC5-50 (5228))/EC5-50A	7/8” 7/8”A	HE 13	550-850	130	46
EC5-50-HF (5228X)	7/8” Hiflex	HE 12	200-550	120	47
EC5-50-HF (5228X)	7/8” Hiflex	HE 13	550-850	130	46
EC6-50A (5328A)	1-1/4”A	HF 17S	100-400	170	90
EC6-50A (5328A)	1-1/4”A	HF 17	400-650	170	90
EC6-50A (5328A)	1-1/4”A	HF 20	650-1000	200	90
EC6-50-HF(5328X)	1-1/4” Hiflex	HF 17S	100-400	170	90
EC6-50-HF (5328X)	1-1/4” Hiflex	HF 17	400-650	170	90
EC6-50-HF (5328X)	1-1/4” Hiflex	HF 20	650-1000	200	90
EC7-50A (5438A)	1-5/8”A	HF 17S	100-250	170	90
EC7-50A (5438A)	1-5/8”A	HF 17	250-400	170	90
EC7-50A (5438A)	1-5/8”A	HF 20	350-700	200	90
EC12-50 (5528)	2-1/4”	HF 17	100-200	170	90
EC12-50 (5528)	2-1/4”	HF 20	200-400	200	90

* battened + 5 cm

DRUM LABEL

Outer width W (cm)	Inner width w (cm)	Shaft hole A (cm)	Drum freight Volume (m^3)	Drum weight drum/battened drum (kg)	Cable weight (kg/km)
41.6	40	6.5	0.21	7/9	110
41.6	40	6.5	0.21	7/9	80
41.6	40	6.5	0.21	7/9	140
54	49	6.5	0.35	16/35	140
41.6	40	6.5	0.21	7/9	235
54	49	6.5	0.35	16/35	235
54	49	6.5	0.78	25/60	235
41.6	40	6.5	0.21	7/9	200
54	49	6.5	0.35	16/35	200
54	49	8	0.78	25/60	200
54	49	8	0.78	25/60	530
78	74	8	1.32	40/90	530
54	49	8	0.78	25/60	460
78	74	8	1.32	40/90	460
70	64	9	2.20	232/320	970
104	98	9	3.03	380/471	970
116	104	9	4.75	440/556	970
70	64	9	2.20	232/320	830
104	98	9	3.03	380/472	830
116	104	9	4.75	440/556	830
70	64	9	2.20	232/320	1200
104	98	9	3.03	380/472	1200
116	104	9	4.75	440/556	1200
104	98	9	3.03	380/472	1960
116	104	9	4.75	440/556	1960

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