

RF-CABLES 50 Ω

Edition January 2008

**EUPEN Corrugated Aluminium Cables
for radio transmission systems**

NEW



KABELWERK EUPEN AG





NEW EUPEN CORRUGATED ALUMINIUM CABLES

INTRODUCTION

EUPEN extends its cable product range with two specifically designed foam dielectric corrugated aluminum cables EA5-50 – 7/8" and EA7-50 - 1-5/8".

FEATURES AND BENEFITS

- Good Price / Performance Ratio
- Light weight
- Very good flexibility
- Good Crush Resistance
- Low return loss
- Low and stable Intermodulation
- Closed cell foam and corrugation ensures a good longitudinally water tightness.
- Compatible with existing EUPEN Tools, Connectors and Accessories

PERFORMANCE AT LOWER COST

The new corrugated aluminium cables from EUPEN offer a cost effective alternative to the high performance corrugated copper cable range. Further, they perform electrically and mechanically as well as corrugated copper cables proposed by some other brands.



CABLES DESIGN

While the copper inner conductor and the closed-cell foam dielectric of these cables have a similar design to the well proven coaxial technology from EUPEN, the outer conductor of the EA5-50 and EA7-50 is made of high quality, corrugated aluminum.

COMPATIBILITY

EUPEN's EA5-50 and EA7-50 are using the existing range of EUPEN connectors, grounding clamps (GCS) and tools. They can thus be introduced without risk of incompatibility with the accessories actually supplied for copper corrugated cables.



Grounding Clamp
GCS78PAR



Tool
SPTC50AV78M

COMPLETE SOLUTION

Unlike other brands, Eupen manufactures its own range of RF cables, connectors and grounding clamps, and can thus propose a complete solution for a long term quality RF transmission line.

Despite aluminium being softer and having a higher creep than copper, the Eupen connector maintains a tight contact on the outer conductor and ensures low and stable Intermodulation Products.

EUPEN's Grounding Clamp System (GCS) is designed to be perfectly watertight and the chosen materials are compatible with, both, copper and aluminium and thus, they are well suited to be used with corrugated aluminium cables.

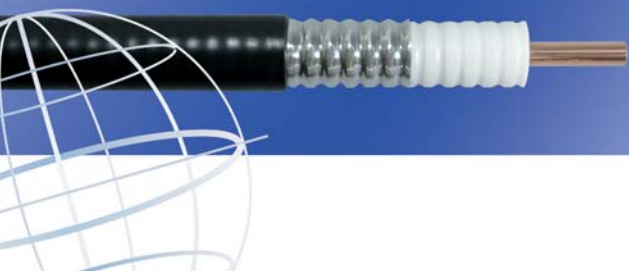
To complete the protection against humidity at the sensitive cable-connector interface, EUPEN recommends its unique EUCASEAL™ weatherproofing solution, or its universal tape kit.



Weatherproofing Tape Kit



Eucaseal



7/8" - ALUMINIUM

STANDARD

5227

Cable type :

5227

Reference :

EA5-50

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

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 aluminium 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)	110
• 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 (m)	1.2
• Flat Plate Crush resistance (kg/mm)	1.3
• Bending moment (Nm)	11.1
• Weight (kg/km)	395

[1] The attenuation can be approximated by the formula:
 $\alpha(f \text{ [MHz]}) = A \cdot \sqrt{f \text{ [MHz]}} + B \cdot f \text{ [MHz]}$ (dB/100m)
 A = 0.121
 B = 0.000391

Electrical

• Characteristic impedance (Ω)	50 \pm 1
• Nominal capacity (pF/m)	75
• Relative propagation velocity (%)	89
• Inductance (μ H/m)	0.187
• DC-resistance at 20°C	
- inner conductor (Ω /km)	1.38
- outer conductor (Ω /km)	0.96
• RF peak voltage (kV)	3.0
• RF peak power (kW)	87
• Cut-off-frequency (GHz)	5.2
• Insulation resistance (M Ω .km)	>>5000

Attenuation [1] and power rating

Frequency (MHz)	Attenuation at 20°C ^(*) (dB/100m)	Mean power rating ^(**) (kW)
10	0.39	24.39
20	0.55	17.17
30	0.67	13.98
80	1.11	8.46
100	1.25	7.55
150	1.54	6.12
200	1.79	5.27
300	2.21	4.26
400	2.58	3.66
450	2.74	3.44
500	2.90	3.25
600	3.20	2.95
700	3.48	2.71
800	3.74	2.52
894	3.97	2.38
960	4.12	2.29
1000	4.22	2.24
1500	5.27	1.79
1700	5.65	1.67
1800	5.84	1.61
1880	5.98	1.58
2000	6.19	1.52
2170	6.49	1.45
2200	6.54	1.44
2300	6.70	1.41
2400	6.87	1.37
2500	7.03	1.34
3000	7.80	1.21
4000	9.22	1.02
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

ACCESSORIES

• Grounding clamp with parallel outlet	GCS78PAR
• Additional weatherproofing tape kit	Ref. 2849-996
• EUCASEAL Weatherproofing system	ES-12-78

Specification of N-connectors 7-16 connectors

Electrical

• Nominal impedance (Ω)	50	50
• Reflection coefficient at 2 GHz	≤ 0.02	≤ 0.02
• Insulation resistance ($G\Omega$)	≥ 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 (m Ω)	≤ 0.7	≤ 0.7
• Inner contact resistance (m Ω)	≤ 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 ($^{\circ}C$)	-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



1-5/8" - ALUMINIUM

STANDARD

5437

Cable type :

5437

Reference :

EA7-50

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

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 aluminium 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)	185
• 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 (m)	1.5
• Flat plate crush resistance (kg/mm)	1.85
• Bending moment (Nm)	45
• Weight (kg/km)	920

[1] The attenuation can be approximated by the formula:
 $\alpha(f \text{ [MHz]}) = A \cdot \sqrt{f \text{ [MHz]}} + B \cdot f \text{ [MHz]}$ (dB/100m)
 A = 0.0686
 B = 0.000287

Electrical

• Characteristic impedance (Ω)	50 \pm 1
• Nominal capacity (pF/m)	75
• Relative propagation velocity (%)	89
• Inductance (μ H/m)	0.187
• DC-resistance at 20°C	
- inner conductor (Ω /km)	1.37
- outer conductor (Ω /km)	0.34
• RF peak voltage (kV)	5.4
• RF peak power (kW)	291
• Cut-off-frequency (GHz)	2.7
• Insulation resistance (M Ω .km)	>>5000

Attenuation [1] and power rating

Frequency (MHz)	Attenuation at 20°C(*) (dB/100m)	Mean power rating(**) (kW)
10	0.22	41.46
20	0.31	29.16
30	0.38	23.71
80	0.64	14.32
100	0.71	12.75
150	0.88	10.32
200	1.03	8.87
300	1.27	7.15
400	1.49	6.13
450	1.58	5.75
500	1.68	5.43
600	1.85	4.92
700	2.02	4.52
800	2.17	4.20
894	2.31	3.95
960	2.40	3.80
1000	2.46	3.71
1500	3.09	2.95
1700	3.32	2.75
1800	3.43	2.66
1880	3.51	2.59
2000	3.64	2.50
2170	3.82	2.39
2200	3.85	2.37
2300	3.95	2.31
2400	4.05	2.25
2500	4.15	2.20
3000	-	-
4000	-	-
6000	-	-

(*) nominal values

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

1-5/8" - ALUMINIUM



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

ACCESSORIES

- | | |
|---|---------------|
| • Grounding clamp with parallel outlet | GCS158PAR |
| • Additional weatherproofing tape kit | Ref. 2849-996 |
| • EUCASEAL Weatherproofing system | ES-12-158 |

Specification of N-connectors 7-16 connectors

Electrical

• Nominal impedance (Ω)	50	50
• Reflection coefficient at 2 GHz	≤ 0.02	≤ 0.02
• Insulation resistance ($G\Omega$)	≥ 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 (m Ω)	≤ 0.5	≤ 0.5
• Inner contact resistance (m Ω)	≤ 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 ($^{\circ}C$)	-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

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