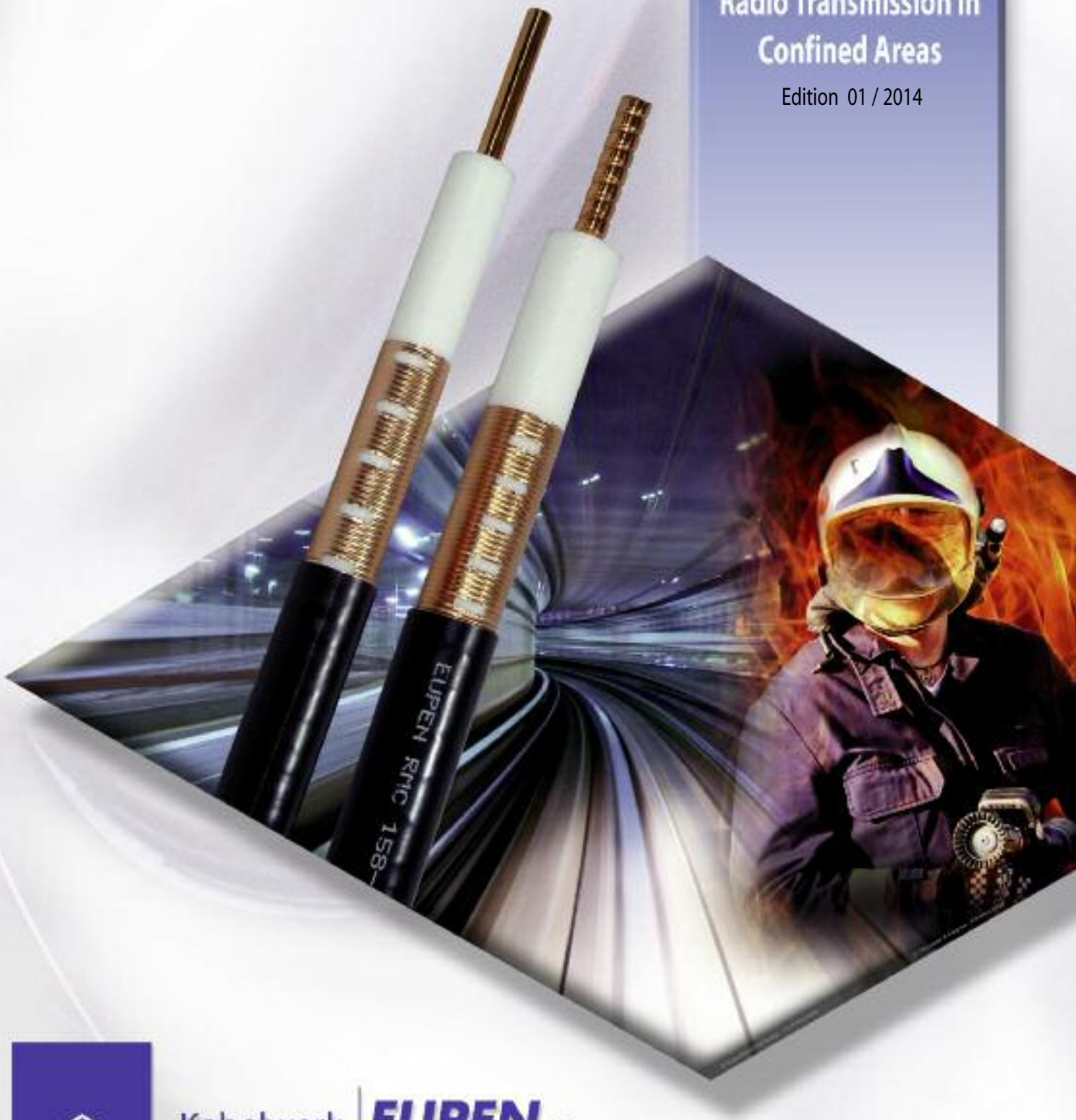
RADIATING CABLES

RF Cables for Radio Transmission in Confined Areas

Edition 01 / 2014



Kabelwerk EUPEN AG

cable

Radio for




Contents

Communications
Confined Areas

Technical data, designs and specifications presented in this catalogue are not binding and are subject to change without prior notice.

1 Introduction

Introduction

100 Years of Experience

Eupen is a global cable manufacturer offering a wide range of cables and accessories.

Our product range includes:

Radiating cables
Transmission lines
Safety cables
Power cables
Fibre optic cables
Instrumentation cables

As a leading supplier of transmission lines and accessories to global wireless communications markets, EUPEN has the experience and resources to effectively service customers in today's challenging wireless communications markets.

Since broadband transmission became possible, EUPEN has been involved in the design and manufacture of transmission lines.

The introduction of Cable Television in 1962 was decisive for the start of coaxial cables on a larger scale.

At a time when wireless communication in confined areas, such as underground, street and service tunnels, became an important business to the network operators, EUPEN developed high quality radiating cables.

Today, customers worldwide rely upon EUPEN products for wireless transmission of data, voice and video.

Underground communication systems using EUPEN radiating cables operate worldwide:

in the Metros of:

Brussels
Caracas
Instambul
Kiev
Moscow
Rome
Santiago de Chile
Washington, DC
....

in Railway Tunnels of:

Austria
Belgium
Germany
Malaysia
Spain
Switzerland
The Netherlands
...

in road tunnels in

Austria
Belgium
France
Germany
Greece
Norway
Singapore
Spain
the Netherlands
...

and many other challenging locations.

Research & Development

EUPEN's expertise in the wireless communications market is an invaluable resource to our customers.

To anticipate and to follow the continuously changing demand of the market, we carefully evaluate customer feedback, which serves as stimulant for future improvements and developments of EUPEN's product portfolio.

Innovative designs, a careful choice of raw materials together with consistent manufacturing and quality assurance techniques, ensure the electrical and mechanical superiority of Eupen cables for the needs of modern radio communication systems such as:

FM
VHF
TETRA / TETRAPOL
TDMA / CDMA 800
GSM 900/1800
GSM-R (European Railway)
PCN / PCS 1900
UMTS 2200
LTE
W-CDMA 2200
WLAN 2400
WLAN 5700

Together the cables and the connectors from EUPEN are an unbeatable match that optimises the entire system performance:

- **Low attenuation**
- **Excellent field strength with low coupling loss**
- **Increased amplifier spacing due to very low system loss**
- **Simple connector installation**
- **Quick cable installation**
- **Halogen-free and fire retardant jacketing**

EUPEN Support

EUPEN provides tailor made support for all kind of RF System needs.

To meet customer demand for independent and unbiased support in the expert field of Specialised RF Coverage Solutions, Eupen has gathered a Team of dedicated advisors, who can provide complete support on all aspects of RF Coverage Solutions.

Based on the Teams knowledge, that spans more than two decades, combined with good local knowledge of all major market places and by keeping close liaison with Consultants, Manufacturers, System Integrators and Installers world-wide, this Team is able to deliver advice that is combines state of the art technology, latest legislation and cost effectiveness.

Quality management

Over the World

Agencies Europe

Austria
Bulgaria
Finland
Germany
Hungary
Ireland
Italy
Norway
Poland
Romania
Russia
Spain
Slovenia
Sweden
Tchech Republik
Turkey
Ukraine

Agencies America

Canada
Mexico
USA
- Florida
- New Jersey
- Texas

Guatemala

Agencies Africa

Egypt
South Africa

Agencies Asia

India
Iran
Pakistan
Kingdom of Saudi Arabia
Singapore
Syria
Thailand
Taiwan R.O.C.
UAE

Agencies Oceania

Australia
New Zealand

KABELWERK EUPEN AG

Malmedyer Strasse 9
4700 Eupen
BELGIUM

EUPEN CABLE MEXICO SA

Avenida Manta 705
Lindavista,
07300 Mexico, D.F.
MEXICO

EUPEN CABLE USA Inc.

5181 110th Avenue North
Unit D,
Clearwater, Florida - 33760
USA

EUPEN CABLES FRANCE

Z.A. La Haie Griselle
24, rue du 8 mai 1945
94470 Boissy St Leger
FRANCE

KABELWERK RHENANIA GmbH

Karl-Kuck-Str. 3
52078 Aachen
GERMANY

Technic

2

Technical Parameters

FREQUENCY

TETRA / TETRAPOL

TDMA/CDMA 800

GSM-R

DCS / GSM 1800

UMTS 2200

WLAN 2400

WLAN 5700

LTE

Radiating Cables

al Parameters

Eupen Cables

General

Radiating cables are used wherever normal radio communication is difficult or impossible, in particular in communication systems where a discrete antenna would not provide adequate coverage, such as in tunnels, underground railways, mines, buildings, etc.

RF energy is simultaneously transmitted down radiating cables and radiated from all points along them into the surrounding space.

Slots cut into the outer conductor of the coaxial cable allow controlled levels of electromagnetic energy to be radiated both out of and into the cable.

A radiating cable functions both as a transmission line and as an antenna. The amount of radiation is quantified by the coupling loss. In the tables of the Data Sheets, the coupling loss is defined as the difference between the power transmitted into the cable and the power received by a $\lambda/2$-dipole antenna located at a distance of 2 m from the cable. (This definition is taken from IEC-61196-4).

An Application Note is available, free, on request.

Cable construction

Radiating cables have generally a coaxial design. They consist of a centre conductor, a dielectric, an outer conductor, which covers the dielectric, and a thermoplastic outer sheath. The characteristic impedance of the cables is normally 50 Ω , but 75 Ω cables are also possible. Sizes from 1/2" up to 1-5/8" are available.

The inner conductor is made of solid copper, copper-clad aluminium wire, smooth copper tube or corrugated copper tube, according to the conductor size.

The dielectric is a cellular polyethylene foam, manufactured by an unique process using an ozone-friendly gas. The low density of the foam guarantees low longitudinal attenuation.

The foam dielectric is bonded to the inner conductor by a pre-coating layer. This layer ensures good adhesion of the inner conductor to the dielectric. It also permits easy, clean removal of the dielectric during connector installation.

For the outer conductor, a copper tape is used, longitudinally overlapped and bonded to the outer jacket to improve bend radius and water-tightness.

Halogen-free, Flame-retardant and Fire-resistant features

The standard cable construction uses a weather-resistant **H**alogen-free, **L**ow-smoke and **F**lame-**R**etardant (**HLFR**) outer jacket.

This construction meets such international standards as IEC 60332-3 (for flame propagation), IEC 61034 (smoke density) and IEC 60754 (acidity of evolved gases).

If a fire barrier tape (e.g., of mica) is added and placed between dielectric and outer conductor (HLFR/M outer jacket) the cable meets also the requirements of IEC 60331 electrical test (circuit integrity).

The barrier tape does not affect the transmission characteristics of the cable.

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

also available: UL 1685, FT4, IEEE 1202

Smoke density

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

also available: UL 1685, LS

Corrosive gas emissions

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

Insulation integrity (HLFR/M jacket only)

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

Technical Parameters

Theory of radiation

In a coaxial cable a Transverse Electromagnetical (TEM)-wave travels from the transmitter to the cable end.

In the case of a cable with a metallically fully closed outer conductor, the wave inside the cable is totally screened from the surrounding.

Outside the coaxial cable, no electromagnetic field, or in other terms no electromagnetic radiation, can be measured. In the same case, no electromagnetic field outside the cable has any influence on the inside wave.

By applying apertures to the outer conductor of a coaxial cable, a part of the energy from inside the cable is transferred to the outside surrounding.

Also energy can intrude into the cable from the environment.

Openings in the outer conductor cause electromagnetic coupling between the field of the inner wave and the outer wave of the outer space of the cable. The arrangement of the openings determines the mechanism of the coupling.

The typical example of a radiating cable is a coaxial cable with a braided outer conductor. The largest part of the energy travels as an inside wave through the cable.

At any point of inhomogeneity of the outer conductor, surface waves will be induced which travel in both, forward and backward direction along the outside of the cable and interfere with each other.

The quality of the radio communication varies very much, due to level variation of the field outside the cable.

The installation and the surrounding of the cable affects the radiated field along the cable.

Most tunnels contain metallic conductors, such as power cables along the lateral walls, or rails, water pipes, etc.

Such conductors can change drastically the electromagnetic field properties.

The main electrical characteristics of a radiating cable are:
Frequency ranges
Longitudinal losses
Coupling losses
System losses

Frequency ranges

To determine the right cable for an application, the used frequency ranges has to be known precisely. The design of the apertures in the outer conductor influences the frequency range for which the cable is optimised.

Three kinds of radiating coaxial cables are distinguished:

CMC (Coupled Mode) Cables:

These radiating cables are designed for in-building applications (where the system length is typically less than 100 m), for which a leaky section cable may not be appropriate.

LSC (Leaky Section) Cables:

Best performances up to 1 GHz. Although this cable can be used at higher frequencies, the sharp increase of its longitudinal losses generally limits its use above 1 GHz.

RMC (Radiated Mode) Cables:

Designed for a frequency range up to 6 GHz, these cables can be broadband, or are tuned for specific frequency ranges or applications. The particular design of the apertures creates some resonant frequencies. These resonant frequencies are well chosen and do not fall within the currently used communication bands.

Longitudinal loss

The most important characteristic for energy transportation along a cable by the inner wave, is the longitudinal loss (or attenuation loss).

A coaxial cable attenuates the signal travelling inside in function of the frequency.

The higher the frequency, the higher the attenuation losses.

The type of dielectric and the size of the cable mainly influence the longitudinal attenuation. The longitudinal loss depends also on the arrangement of the apertures in the outer conductor.

Coupling loss

The coupling loss describes the signal loss between the cable and a receiver. It is defined as the ratio of the received power, at a certain distance, to the power in the cable.

Because of the reciprocity, analogue considerations are valid for the transmission from an antenna into the cable.

The coupling loss is affected by the arrangement of the openings as well as by interferences and reflections of the cable surrounding.

An intensive radiation means a low coupling loss over a broad frequency range.

Two different physical modes carry the energy from the cable into the air : coupling mode and radiating mode.

System loss

The system loss is the sum of longitudinal and coupling loss and of various losses depending on the installation and the environment. Detailed information about the environmental influences are given in the chapter "Installation".

To design a radio communications systems the system loss needs to be calculated for the uplink and downlink connection.

Resonant frequencies

The cable design, more precisely the arrangement of the apertures in the outer conductor, can lead to resonant frequencies.

This occurs when a certain wavelength interferes with the regular structure of the apertures. The reflection coefficient (SWR) jumps up and the longitudinal loss increases.

While LSC and CMC cables don't show this behaviour, RMC cables are designed to present this resonance frequency (stop band) in frequency ranges, where the cables are generally not used.

An Application Note is available, free, on request.

Cable Characteristics

CMC Cables

These radiating cables are designed for in-building applications (where the system length is typically less than 100 m), for which a leaky section cable may not be appropriate.

Radiating cables of this type are suited for high-performance applications in the 450 MHz, 900 MHz and 1800 MHz bands.

The electromagnetic field diffracted by the apertures of this cable type induces an external mode outside the outer conductor. A current flows on the outer part of the outer conductor and the cable radiates as a long traveling wave antenna. The coupled mode cable is therefore equivalent to a long electrical antenna.

The "coupled mode" corresponds to a power flow, which is parallel to the cable axis. The electromagnetic energy is concentrated in the close vicinity of the cable and decreases quickly with distance: this is the reason why these modes are sometimes referred to as "surface waves". The modes, confined around the cable axis, are partially diffracted by surrounding obstacles and discontinuities (clamps, walls, ...): a fraction of the power is randomly radiated radially.

LSC Cables

Leaky sections are pre-punched into the outer conductor; the distance between sections is set to optimise low coupling loss and low longitudinal attenuation over a wide bandwidth.

With this unique construction the distance between repeaters can be increased, and the broadband coupling loss is not significantly degraded from that obtained using continuously-slotted coupled-mode cables or radiating-mode cables.

LSC cables are mode converters. They consist of a section of leaky cable, inserted in a non-leaky cable.

A leaky section is equivalent to a directive antenna connected to the coaxial cable through a power divider. Only a small part of the power propagated inside the cable is extracted and converted into radiation. The spacing between leaky sections has to be chosen in order to provide acceptable results at various frequencies.

Cables with leaky sections, designed in this way, can be used under the same conditions as continuous leaky feeders, but with better characteristics for longitudinal and coupling loss.

The leaky sections are efficient mode converters and can produce a controlled field level in the cable vicinity, as a function of their length and their electrical characteristics.

RMC Cables

Radiated Mode cables are designed for applications at frequencies of 75 MHz to 6 GHz. The slots are arranged so that the direction of radiation is predominantly orthogonal to the cable axis. This results in optimised, reduced coupling loss variations over specific frequency bands.

With a radiated mode cable, the electric field is produced by periodic apertures (slots) on the cable's outer conductor. The aperture spacing d is comparable to the operational wavelength (λ_c).

The radiated modes correspond to the "in-phase addition" of all apertures. They appear for only very well defined slot arrangements and over a well-defined "Radiated mode frequency band". The coupling loss is low only in a certain frequency band. Above and below this frequency band it is increased due to interference. The direction of propagation is radially oriented.

RMC Cables for Digital Trunk Radio

The advent of new Digital Trunk Radio Services, demands improved products to support these techniques. Eupen has met this challenge by including specially designed RMC cables that provide industry leading performances by being optimised for use with this new technology.

TETRA

TETRAPOL

Cable Selection Guide

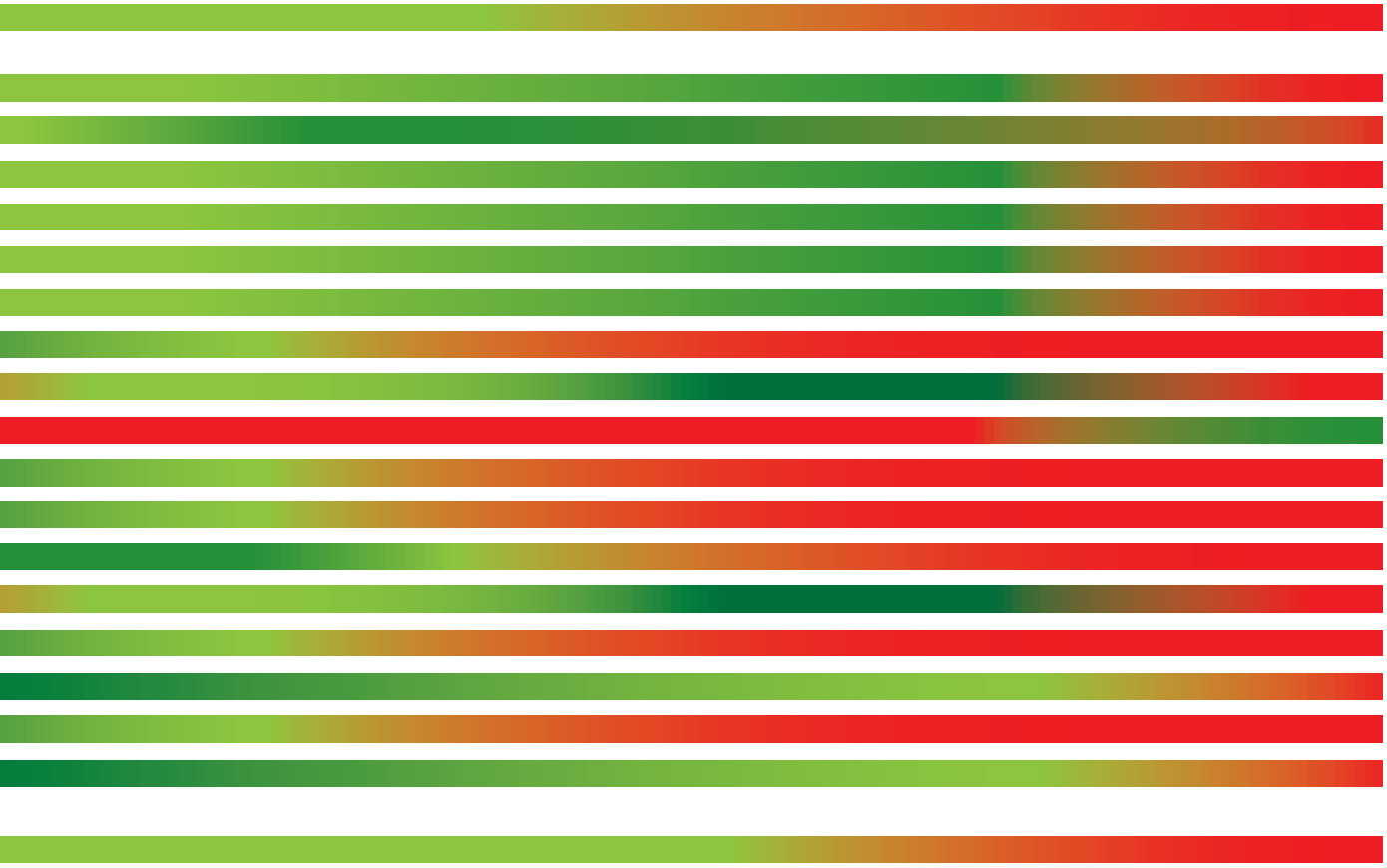
Frequency Bands	page	*75 - 100 MHz*	*150 - 170 MHz*	*400 - 500 MHz*
Applications		**FM PMR**	**PMR**	**PMR TETRA TETRAPOL**
LSC 12	22	best	best	best
RMC 12	26	best	best	best
RMC 12-A	28	best	best	best
RMC 58	36	best	best	best
RMC 78	40	best	best	best
RMC 114 "A" Series	48	best	best	best
RMC 158 "A" Series	54	best	best	best
RMC 12-T	30	best	best	good
RMC 12-CL	32	best	good	not recommended
RMC 12-CH	34	best	good	not recommended
RMC 58-T	38	best	best	good
RMC 78-T "A" Series	42	best	best	good
RMC 78-B "A" Series	44	best	best	good
RMC 78-CL "A" Series	46	best	good	not recommended
RMC 114-T "A" Series	50	best	best	good
RMC 114-B "A" Series	52	best	best	good
RMC 158-T "A" Series	56	best	best	good
RMC 158-B "A" Series	58	best	best	good
CMC 12	60	best	best	best

best good not recommended

Jacket Selection Guide

Jacket Type (suffix of Cable Name)	*IEC 60754-1/-2*	*IEC 61034*
Requirements	**Halogen free non corrosive smoke emission**	**Low smoke density**
PE	•	
HLFR	•	•
HLFR/M	•	•

800 - 1000 MHz	*1.7 - 1.9 GHz*	*2.2 - 2.3 GHz*	*2.4 - 2.5 GHz*	*6 GHz*
TDMA **CDMA** **GSM 900** **GSM - R** **TETRA**	**PCN** **DECT** **GSM 1800**	**UMTS**	**ISM** **WLAN** **WIFI**	**WLAN**



Important: please always check for resonant frequencies

IEC 60332-1	*IEC 60332-3C*	*IEC 60331*
Flame retardant	**Fire retardant**	**DC Circuit integrity**
•	•	
•	•	•

Rad

3

Cable Characteristics

iating Cable

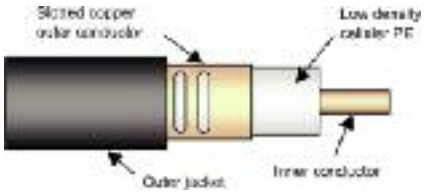
Characteristics

LSC 12

PRODUCT DESCRIPTION

LSC 12-HLFR

Reference suffix [1] : -HLFR



Fire behaviour

Halogen free and flame retardant outer sheath, Low corrosive gas emission acc. to IEC 60754-2
Flame retardant acc. to IEC 60332-1 and IEC 60332-3 cat. C, Low smoke emission acc. to IEC 61034

Slots in the copper outer conductor allow a controlled portion of the internal RF energy to be radiated into the surrounding environment. Conversely, a signal transmitted near the cable will couple into the slots and be carried along the cable length.

FEATURES and BENEFITS

- Broadband from 30 MHz to 1.9 GHz
- Robust Cable, with low bending radius
- No Resonant Frequencies
- No Cable Orientation Required
- Main Applications: Tunnel - FM, TETRA, GSM, GSM-R, DCS-1800
- Only for use in Tunnels - Not suitable for use in Buildings

TECHNICAL FEATURES

• Size		1/2"
• Previous Model Number		512RC8R-HLFR
• Frequency Range	MHz	30 - 2000
• Recommended for Frequency	MHz	N.A.
• Cable Type		LSC (Leaky Section Cable)
• Jacket		HLFR (Halogen Free Low Smoke Flame Retardant)
• Slot Design		Groups of Slots at longer intervals
• Impedance	Ω	50 +/- 2
• Velocity Ratio	%	88
• Capacitance	pF/m	76
• Inner Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.48 (0.45) HLFR
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	2.62 (0.80)
• Inner Conductor Material		Copper clad aluminium wire (HLFR)
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping copper foil, with slot groups, bonded to the jacket

LSC 12

TECHNICAL FEATURES (continued)

• Diameter Inner Conductor	mm (in)	4.8 (0.19)
• Diameter Dielectric	mm (in)	12.4 (0.49)
• Diameter over Jacket	mm (in)	15.5 (0.61)
• Minimum Bending Radius, Single Bend	mm (in)	200 (7.87)
• Cable Weight	kg/m (lb/ft)	0.33 (0.22) HLFR
• Tensile Strength	daN (lb)	110 (242)
• Indication of Slot Alignment		N.A.
• Storage Temperature	°C (°F)	-70 to +85 (-94 to +185)
• Installation Temperature	°C (°F)	-25 to +60 (-13 to +140)
• Operation Temperature	°C (°F)	-40 to +85 (-40 to +185)
• Longitudinal Loss and Coupling Loss [2]		

Frequency	Longitudinal Loss	Coupling Loss	
	dB/100 m (dB/100 ft)	C50% [dB]	C95% [dB]
75 MHz	1.87 (0.57)	65	75
150 MHz	2.69 (0.82)	67	77
225 MHz	3.35 (1.02)	67	78
450 MHz	4.93 (1.50)	68	79
900 MHz	7.43 (2.26)	63	75
1800 MHz	11.7 (3.57)	64	75
1900 MHz	12.2 (3.70)	64	75
2200 MHz	-	-	-
2400 MHz	-	-	-

• Resonant Frequencies	MHz	None
• Clamp Spacing Recommended / Maximum	m (ft)	0.5 (1.64) / 1.20 (3.90)
• Distance to Wall Recommended / Minimum	mm (in)	80 - 180 (3.15 - 7.00) / 50 (1.96)

[1] Must be specified in case of order - standard PE jacket available on request.
[2] Measured in tunnel according to **IEC 61196-4 - Ground Level Method**.
Distance = 2m. C50 & (C95) are the average coupling losses with 50% (95%) probability calculated in accordance with the standard.

The above stated values are nominal values and subject to manufacturing tolerances as follows: Longitudinal Loss +/-5 % and Coupling Loss +/- 3dB.

As with any radiating cable, the performance in building or tunnel may deviate from figures measured according to the IEC 61196-4 standard.

Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

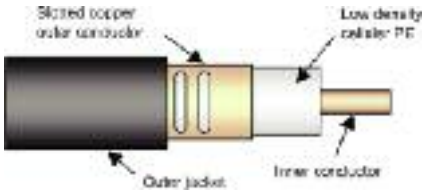
These Radiating Cables have been especially developed for use in Tunnels. Due to the Cables inherent design, based on Groups of Slots at longer intervals, these Radiating Cables are not suitable for In-Building use.

LSC 78

PRODUCT DESCRIPTION

LSC 78-HLFR

Reference suffix [1] : -HLFR



Fire behaviour

Halogen free and flame retardant outer sheath, Low corrosive gas emission acc. to IEC 60754-2
Flame retardant acc. to IEC 60332-1 and IEC 60332-3 cat. C, Low smoke emission acc. to IEC 61034

Slots in the copper outer conductor allow a controlled portion of the internal RF energy to be radiated into the surrounding environment. Conversely, a signal transmitted near the cable will couple into the slots and be carried along the cable length.

FEATURES and BENEFITS

- Broadband from 30 MHz to 1.9 GHz
- Robust Cable, with low bending radius
- No Resonant Frequencies
- No Cable Orientation Required
- Main Applications: Tunnel - FM, TETRA, GSM, GSM-R, DCS-1800
- Only for use in Tunnels - Not suitable for use in Buildings

TECHNICAL FEATURES

• Size		7/8"
• Previous Model Number		522RC8R-HLFR
• Frequency Range	MHz	30 - 2000
• Recommended for Frequency	MHz	N.A.
• Cable Type		LSC (Leaky Section Cable)
• Jacket		HLFR (Halogen Free Low Smoke Flame Retardant)
• Slot Design		Groups of Slots at longer intervals
• Impedance	Ω	50 +/- 2
• Velocity Ratio	%	88
• Capacitance	pF/m	76
• Inner Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.63 (0.49)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.40 (0.43)
• Inner Conductor Material		Smooth copper tube
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping copper foil, with slot groups, bonded to the jacket

LSC 78

TECHNICAL FEATURES (continued)

• Diameter Inner Conductor	mm (in)	9.2 (0.36)
• Diameter Dielectric	mm (in)	23.5 (0.93)
• Diameter over Jacket	mm (in)	27.0 (1.06)
• Minimum Bending Radius, Single Bend	mm (in)	350 (13.80)
• Cable Weight	kg/m (lb/ft)	0.480 (0.32) HLFR
• Tensile Strength	daN (lb)	130 (287)
• Indication of Slot Alignment		N.A.
• Storage Temperature	°C (°F)	-70 to +85 (-94 to +185)
• Installation Temperature	°C (°F)	-25 to +60 (-13 to +140)
• Operation Temperature	°C (°F)	-40 to +85 (-40 to +185)
• Longitudinal Loss and Coupling Loss [2]		

Frequency	Longitudinal Loss	Coupling Loss	
	dB/100 m (dB/100 ft)	C50% [dB]	C95% [dB]
75 MHz	1.06 (0.32)	62	73
150 MHz	1.58 (0.48)	59	69
225 MHz	2.01 (0.61)	59	68
450 MHz	3.09 (0.94)	58	65
900 MHz	4.86 (1.48)	63	73
1800 MHz	10.10 (3.08)	63	73
1900 MHz	11.20 (3.41)	63	73
2200 MHz	-	-	-
2400 MHz	-	-	-

• Resonant Frequencies	MHz	None
• Clamp Spacing Recommended / Maximum	m (ft)	0.5 (1.64) / 1.20 (3.90)
• Distance to Wall Recommended / Minimum	mm (in)	80 - 180 (3.15 - 7.00) / 50 (1.96)

[1] Must be specified in case of order - standard PE jacket available on request.
[2] Measured in tunnel according to **IEC 61196-4 - Ground Level Method**.
Distance = 2m. C50 & (C95) are the average coupling losses with 50% (95%) probability calculated in accordance with the standard.

The above stated values are nominal values and subject to manufacturing tolerances as follows: Longitudinal Loss +/-5 % and Coupling Loss +/- 3dB.

As with any radiating cable, the performance in building or tunnel may deviate from figures measured according to the IEC 61196-4 standard.

Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

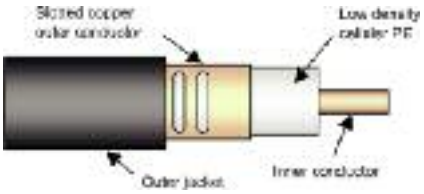
These Radiating Cables have been especially developed for use in Tunnels. Due to the Cables inherent design, based on Groups of Slots at longer intervals, these Radiating Cables are not suitable for In-Building use.

RMC 12

PRODUCT DESCRIPTION

RMC 12-HLFR

Reference suffix [1] : -HLFR



Fire behaviour

Halogen free and flame retardant outer sheath, Low corrosive gas emission acc. to IEC 60754-2
Flame retardant acc. to IEC 60332-1 and IEC 60332-3 cat. C, Low smoke emission acc. to IEC 61034

Slots in the copper outer conductor allow a controlled portion of the internal RF energy to be radiated into the surrounding environment. Conversely, a signal transmitted near the cable will couple into the slots and be carried along the cable length.

FEATURES and BENEFITS

- From 30 MHz to 2.5 GHz with resonant frequencies
- Robust Cable, with low bending radius
- Main Applications: Tunnel - GSM, GSM-R, DCS-1800, WLAN

TECHNICAL FEATURES

• Size		1/2"
• Previous Model Number		512RC8RM-HLFR
• Frequency Range	MHz	30 - 2500
• Recommended for Frequency	MHz	900 and above
• Cable Type		RMC (Radiated Mode Cable)
• Jacket		HLFR (Halogen Free Low Smoke Flame Retardant)
• Slot Design		Groups of Slots at short intervals
• Impedance	Ω	50 +/- 3
• Velocity Ratio	%	88
• Capacitance	pF/m	76
• Inner Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.48 (0.45) HLFR
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	2.90 (0.88)
• Inner Conductor Material		Copper clad aluminium (HLFR)
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping copper foil, with slot groups, bonded to the jacket

RMC 12

TECHNICAL FEATURES (continued)

• Diameter Inner Conductor	mm (in)	4.8 (0.19)
• Diameter Dielectric	mm (in)	12.4 (0.49)
• Diameter over Jacket	mm (in)	15.5 (0.61)
• Minimum Bending Radius, Single Bend	mm (in)	200 (7.87)
• Cable Weight	kg/m (lb/ft)	0.23 (0.16) HLFR
• Tensile Strength	daN (lb)	110 (243)
• Indication of Slot Alignment		embossed line 180° opposite
• Storage Temperature	°C (°F)	-70 to +85 (-94 to +185)
• Installation Temperature	°C (°F)	-25 to +60 (-13 to +140)
• Operation Temperature	°C (°F)	-40 to +85 (-40 to +185)
• Longitudinal Loss and Coupling Loss [2]		

Frequency	Longitudinal Loss	Coupling Loss	
	dB/100 m (dB/100 ft)	C50% [dB]	C95% [dB]
75 MHz	2.35 (0.72)	52	66
150 MHz	3.25 (0.99)	62	74
225 MHz	3.70 (1.13)	72	82
450 MHz	5.00 (1.53)	79	88
900 MHz	7.70 (2.36)	60	63
1800 MHz	12.25 (3.76)	60	70
1900 MHz	12.70 (3.90)	60	70
2200 MHz	14.80 (4.54)	61	70
2400 MHz	16.50 (5.07)	60	68

• Resonant Frequencies	MHz	547, 1641, 2734
• Clamp Spacing Recommended / Maximum	m (ft)	0.5 (1.64) / 1.20 (3.90)
• Distance to Wall Recommended / Minimum	mm (in)	80 - 180 (3.15 - 7.00) / 50 (1.96)

[1] Must be specified in case of order - standard PE jacket available on request.
[2] Measured in tunnel according to **IEC 61196-4 - Ground Level Method**.
Distance = 2m. C50 & (C95) are the average coupling losses with 50% (95%) probability calculated in accordance with the standard.

The above stated values are nominal values and subject to manufacturing tolerances as follows: Longitudinal Loss +/-5 % and Coupling Loss +/- 3dB.

As with any radiating cable, the performance in building or tunnel may deviate from figures measured according to the IEC 61196-4 standard.

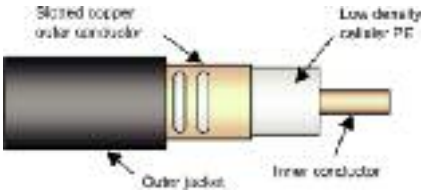
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

RMC 12-A

PRODUCT DESCRIPTION

RMC 12-A-HLFR

Reference suffix [1] : -HLFR



Fire behaviour

Halogen free and flame retardant outer sheath
Low corrosive gas emission acc. to IEC 60754-2
Flame retardant acc. to IEC 60332-1 and IEC 60332-3 cat. C
Low smoke emission acc. to IEC 61034

Slots in the copper outer conductor allow a controlled portion of the internal RF energy to be radiated into the surrounding environment. Conversely, a signal transmitted near the cable will couple into the slots and be carried along the cable length.

FEATURES and BENEFITS

- From 30 MHz to 2.5 GHz with resonant frequencies
- Robust Cable, with low bending radius
- Main Applications: AIRCRAFT - GSM, DCS-1800, UMTS, WLAN-short length
- Specially designed for use in Aircraft

TECHNICAL FEATURES

• Size		1/2"
• Previous Model Number		512RC8RMA-HLFR
• Frequency Range	MHz	30 - 2500
• Recommended for Frequency	MHz	450 and above
• Cable Type		RMC (Radiated Mode Cable)
• Jacket		HLFR (Halogen Free Low Smoke Flame Retardant)
• Slot Design		Groups of Slots at short intervals
• Impedance	Ω	50 +/- 3
• Velocity Ratio	%	88
• Capacitance	pF/m	76
• Inner Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.48 (0.45)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	3 (0.91)
• Inner Conductor Material		Copper clad aluminium wire
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping copper foil, with slot groups, bonded to the jacket

RMC 12-A

TECHNICAL FEATURES (continued)

• Diameter Inner Conductor	mm (in)	4.8 (0.19)
• Diameter Dielectric	mm (in)	12.4 (0.49)
• Diameter over Jacket	mm (in)	15.5 (0.61)
• Minimum Bending Radius, Single Bend	mm (in)	200 (7.87)
• Cable Weight	kg/m (lb/ft)	0.21 (0.14) HLFR
• Tensile Strength	daN (lb)	110 (242)
• Indication of Slot Alignment		embossed line 180° opposite
• Storage Temperature	°C (°F)	-70 to +85 (-94 to +185)
• Installation Temperature	°C (°F)	-25 to +60 (-13 to +140)
• Operation Temperature	°C (°F)	-40 to +85 (-40 to +185)
• Longitudinal Loss and Coupling Loss [2]		

Frequency	Longitudinal Loss	Coupling Loss	
	dB/100 m (dB/100 ft)	C50% [dB]	C95% [dB]
75 MHz	3.59 (1.09)	61	65
150 MHz	4.26 (1.30)	67	78
225 MHz	4.67 (1.42)	63	67
450 MHz	5.85 (1.78)	62	67
900 MHz	9.52 (2.90)	59	66
1800 MHz	20.8 (6.34)	52	59
1900 MHz	22.7 (6.92)	52	59
2200 MHz	30.4 (9.27)	52	63
2400 MHz	37.8 (11.52)	51	62

• Resonant Frequencies	MHz	184, 552, 920 ±5, 1288, 1656, 2024, 2392
• Clamp Spacing Recommended / Maximum	m (ft)	0.5 (1.64) / 1.20 (3.90)
• Distance to Wall Recommended / Minimum	mm (in)	80 - 180 (3.15 - 7.00) / 50 (1.96)

[1] Must be specified in case of order - standard PE jacket available on request.
[2] Measured in tunnel according to **IEC 61196-4 - Ground Level Method**.
Distance = 2m. C50 & (C95) are the average coupling losses with 50% (95%) probability calculated in accordance with the standard.

The above stated values are nominal values and subject to manufacturing tolerances as follows: Longitudinal Loss +/-5 % and Coupling Loss +/- 3dB.

As with any radiating cable, the performance in building or tunnel may deviate from figures measured according to the IEC 61196-4 standard.

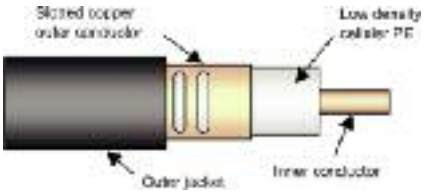
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

RMC 12-T

PRODUCT DESCRIPTION

RMC 12-T-HLFR

Reference suffix [1] : -HLFR



Fire behaviour

Halogen free and flame retardant outer sheath, Low corrosive gas emission acc. to IEC 60754-2
Flame retardant acc. to IEC 60332-1 and IEC 60332-3 cat. C, Low smoke emission acc. to IEC 61034

Slots in the copper outer conductor allow a controlled portion of the internal RF energy to be radiated into the surrounding environment. Conversely, a signal transmitted near the cable will couple into the slots and be carried along the cable length.

FEATURES and BENEFITS

- From 30 MHz to 1 GHz with resonant frequencies
- Robust Cable, with low bending radius
- Main Applications: Tunnel - FM, TETRA

TECHNICAL FEATURES

• Size		1/2"
• Previous Model Number		512RC8RMT-HLFR
• Frequency Range	MHz	30 - 1000
• Recommended for Frequency	MHz	450
• Cable Type		RMC (Radiated Mode Cable)
• Jacket		HLFR (Halogen Free Low Smoke Flame Retardant)
• Slot Design		Groups of Slots at short intervals
• Impedance	Ω	50 +/- 3
• Velocity Ratio	%	88
• Capacitance	pF/m	76
• Inner Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.48 (0.45) HLFR
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	2.80 (0.85)
• Inner Conductor Material		Copper clad aluminium (HLFR)
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping copper foil, with slot groups, bonded to the jacket

RMC 12-T

TECHNICAL FEATURES (continued)

• Diameter Inner Conductor	mm (in)	4.8 (0.19)
• Diameter Dielectric	mm (in)	12.4 (0.49)
• Diameter over Jacket	mm (in)	15.5 (0.61)
• Minimum Bending Radius, Single Bend	mm (in)	200 (7.87)
• Cable Weight	kg/m (lb/ft)	0.22 (0.15) HLFR
• Tensile Strength	daN (lb)	110 (243)
• Indication of Slot Alignment		embossed line 180° opposite
• Storage Temperature	°C (°F)	-70 to +85 (-94 to +185)
• Installation Temperature	°C (°F)	-25 to +60 (-13 to +140)
• Operation Temperature	°C (°F)	-40 to +85 (-40 to +185)
• Longitudinal Loss and Coupling Loss [2]		

Frequency	Longitudinal Loss	Coupling Loss	
	dB/100 m (dB/100 ft)	C50% [dB]	C95% [dB]
75 MHz	2.2 (0.67)	55	67
150 MHz	3.0 (0.91)	59	70
225 MHz	3.8 (1.16)	56	63
400 MHz	5.4 (1.65)	55	57
450 MHz	5.9 (1.80)	53	56
900 MHz	10.6 (3.23)	63	74
1800 MHz	-	-	-
1900 MHz	-	-	-
2200 MHz	-	-	-
2400 MHz	-	-	-

• Resonant Frequencies	MHz	37, 111, 185, 259, 334, 408, 482, 556, 630, 704, 778, 853, 927, 1001
• Clamp Spacing Recommended / Maximum	m (ft)	0.5 (1.64) / 1.20 (3.90)
• Distance to Wall Recommended / Minimum	mm (in)	80 - 180 (3.15 - 7.00) / 50 (1.96)

[1] Must be specified in case of order - standard PE jacket available on request.
[2] Measured in tunnel according to **IEC 61196-4 - Ground Level Method**.
Distance = 2m. C50 & (C95) are the average coupling losses with 50% (95%) probability calculated in accordance with the standard. All Values are going to be confirmed by independent Test Centre soonest.

The above stated values are nominal values and subject to manufacturing tolerances as follows: Longitudinal Loss +/-5 % and Coupling Loss +/- 3dB.

As with any radiating cable, the performance in building or tunnel may deviate from figures measured according to the IEC 61196-4 standard.

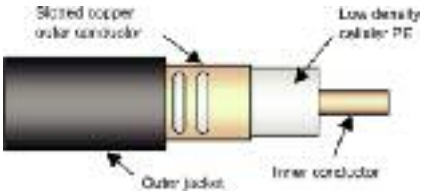
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

RMC 12-CL

PRODUCT DESCRIPTION

RMC 12-CL-HLFR

Reference suffix [1] : -HLFR



Fire behaviour

Halogen free and flame retardant outer sheath
Low corrosive gas emission acc. to IEC 60754-2
Flame retardant acc. to IEC 60332-1 and IEC 60332-3 cat. C
Low smoke emission acc. to IEC 61034

Slots in the copper outer conductor allow a controlled portion of the internal RF energy to be radiated into the surrounding environment. Conversely, a signal transmitted near the cable will couple into the slots and be carried along the cable length.

FEATURES and BENEFITS

- Low Fading at short Aerial to Cable distance
- Robust Cable
- Main Applications: WLAN controlled Transportation Systems
- Optimised for WLAN applications in the 2.40 - 2.485 GHz band

TECHNICAL FEATURES

• Size		1/2"
• Previous Model Number		N.A.
• Frequency Range	MHz	75 - 2900
• Recommended for Frequency	MHz	2400 - 2485
• Cable Type		RMC (Radiated Mode Cable)
• Jacket		HLFR (Halogen Free Low Smoke Flame Retardant)
• Slot Design		Groups of Slots at short intervals
• Impedance	Ω	50 +/- 3
• Velocity Ratio	%	88
• Capacitance	pF/m	76
• Inner Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.48 (0.45)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	2.8 (0.85)
• Inner Conductor Material		Copper clad aluminium wire
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping copper foil, with slot groups, bonded to the jacket

RMC 12-CL

TECHNICAL FEATURES (continued)

• Diameter Inner Conductor	mm (in)	4.8 (0.19)
• Diameter Dielectric	mm (in)	12.4 (0.49)
• Diameter over Jacket	mm (in)	15.5 (0.61)
• Minimum Bending Radius, Single Bend	mm (in)	200 (7.87)
• Cable Weight	kg/m (lb/ft)	0.23 (0.16) HLFR
• Tensile Strength	daN (lb)	110 (243)
• Indication of Slot Alignment		embossed line 180° opposite
• Storage Temperature	°C (°F)	-70 to +85 (-94 to +185)
• Installation Temperature	°C (°F)	-25 to +60 (-13 to +140)
• Operation Temperature	°C (°F)	-40 to +85 (-40 to +185)
• Longitudinal Loss and Coupling Loss [2]		

Frequency	Longitudinal Loss	Coupling Loss	
	dB/100 m (dB/100 ft)	C50% [dB]	C95% [dB]
75 MHz	1.87 (0.57)	54	66
150 MHz	2.75 (0.83)	64	75
225 MHz	3.42 (1.04)	62	66
450 MHz	4.96 (1.51)	65	69
900 MHz	7.32 (2.22)	63	73
1800 MHz	11.94 (3.63)	59	67
1900 MHz	12.45 (3.78)	59	67
2200 MHz	13.90 (4.22)	58	67
2400 MHz	14.71 (4.47)	54	60

• Resonant Frequencies	MHz	156, 469, 781, 1094, 1406, 1718, 2031, 2344, 2656
• Clamp Spacing Recommended / Maximum	m (ft)	0.5 (1.64) / 1.20 (3.90)
• Distance to Wall Recommended / Minimum	mm (in)	80 - 180 (3.15 - 7.00) / 50 (1.96)

[1] Must be specified in case of order - standard PE jacket available on request.
[2] Measured in tunnel according to IEC 61196-4 - Ground Level Method.
Distance = 2m. C50 & (C95) are the average coupling losses with 50% (95%) probability calculated in accordance with the standard.

The above stated values are nominal values and subject to manufacturing tolerances as follows: Longitudinal Loss +/-5 % and Coupling Loss +/- 3dB.

As with any radiating cable, the performance in building or tunnel may deviate from figures measured according to the IEC 61196-4 standard.

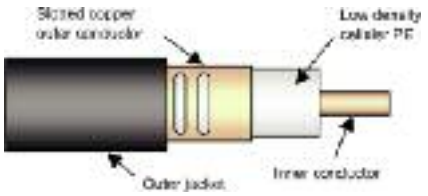
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

RMC 12-CH

PRODUCT DESCRIPTION

RMC 12-CH-HLFR

Reference suffix [1] : -HLFR



Fire behaviour

Halogen free and flame retardant outer sheath
Low corrosive gas emission acc. to IEC 60754-2
Flame retardant acc. to IEC 60332-1 and IEC 60332-3 cat. C
Low smoke emission acc. to IEC 61034

Slots in the copper outer conductor allow a controlled portion of the internal RF energy to be radiated into the surrounding environment. Conversely, a signal transmitted near the cable will couple into the slots and be carried along the cable length.

FEATURES and BENEFITS

- Low Fading at short Aerial to Cable distance
- Robust Cable
- Main Applications: WLAN controlled Transportation Systems
- Optimised for WLAN applications in the 5.15 - 5.35 and 5.47 - 5.85 GHz bands

TECHNICAL FEATURES

• Size		1/2"
• Previous Model Number		N.A.
• Frequency Range	MHz	5000 - 6000
• Recommended for Frequency	MHz	5150 - 5350 and 5470 - 5850
• Cable Type		RMC (Radiated Mode Cable)
• Jacket		HLFR (Halogen Free Low Smoke Flame Retardant)
• Slot Design		Groups of Slots at short intervals
• Impedance	Ω	50 +/- 3
• Velocity Ratio	%	88
• Capacitance	pF/m	76
• Inner Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.48 (0.45)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	2.8 (0.85)
• Inner Conductor Material		Copper clad aluminium wire
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping copper foil, with slot groups, bonded to the jacket

RMC 12-CH

TECHNICAL FEATURES (continued)

• Diameter Inner Conductor	mm (in)	4.8 (0.19)
• Diameter Dielectric	mm (in)	12.4 (0.49)
• Diameter over Jacket	mm (in)	15.5 (0.61)
• Minimum Bending Radius, Single Bend	mm (in)	200 (7.87)
• Cable Weight	kg/m (lb/ft)	0.23 (0.16) HLFR
• Tensile Strength	daN (lb)	110 (243)
• Indication of Slot Alignment		embossed line 180° opposite
• Storage Temperature	°C (°F)	-70 to +85 (-94 to +185)
• Installation Temperature	°C (°F)	-25 to +60 (-13 to +140)
• Operation Temperature	°C (°F)	-40 to +85 (-40 to +185)
• Longitudinal Loss and Coupling Loss [2]		

Frequency	Longitudinal Loss	Coupling Loss	
	dB/100 m (dB/100 ft)	C50% [dB]	C95% [dB]
5200 MHz	19.1 (5,82)	62	71
5500 MHz	20.0 (6,10)	60	61
5800 MHz	21.5 (6,55)	55	59

• Resonant Frequencies	MHz	415, 1246, 2077, 2907, 3738, 4568, 5399, 6230
• Clamp Spacing Recommended / Maximum	m (ft)	0.5 (1.64) / 1.20 (3.90)
• Distance to Wall Recommended / Minimum	mm (in)	80 - 180 (3.15 - 7.00) / 50 (1.96)

[1] Must be specified in case of order - standard PE jacket available on request.
[2] Measured in tunnel according to IEC 61196-4 - Ground Level Method.
Distance = 2m. C50 & (C95) are the average coupling losses with 50% (95%) probability calculated in accordance with the standard.

The above stated values are nominal values and subject to manufacturing tolerances as follows: Longitudinal Loss +/-5 % and Coupling Loss +/- 3dB.

As with any radiating cable, the performance in building or tunnel may deviate from figures measured according to the IEC 61196-4 standard.

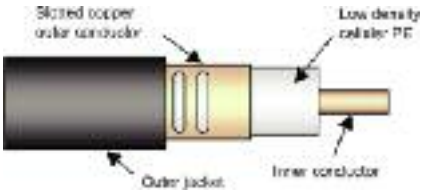
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

RMC 58

PRODUCT DESCRIPTION

RMC 58-HLFR

Reference suffix [1] : -HLFR



Fire behaviour

Halogen free and flame retardant outer sheath, Low corrosive gas emission acc. to IEC 60754-2
Flame retardant acc. to IEC 60332-1 and IEC 60332-3 cat. C, Low smoke emission acc. to IEC 61034

Slots in the copper outer conductor allow a controlled portion of the internal RF energy to be radiated into the surrounding environment. Conversely, a signal transmitted near the cable will couple into the slots and be carried along the cable length.

FEATURES and BENEFITS

- Broadband from 30 MHz to 1.9 GHz
- Robust Cable, with low bending radius
- Main Applications: Tunnel - GSM, GSM-R, DCS-1800

TECHNICAL FEATURES

• Size		5/8"
• Previous Model Number		517RC8RM-HLFR
• Frequency Range	MHz	30 - 1900
• Recommended for Frequency	MHz	900 and 1800
• Cable Type		RMC (Radiated Mode Cable)
• Jacket		HLFR (Halogen Free Low Smoke Flame Retardant)
• Slot Design		Groups of Slots at short intervals
• Impedance	Ω	50 +/- 2
• Velocity Ratio	%	88
• Capacitance	pF/m	76
• Inner Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.9 (0.58)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	2.04 (0.62)
• Inner Conductor Material		Smooth copper tube
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping copper foil, with slot groups, bonded to the jacket

RMC 58

TECHNICAL FEATURES (continued)

• Diameter Inner Conductor	mm (in)	6.8 (0.27)
• Diameter Dielectric	mm (in)	17.6 (0.69)
• Diameter over Jacket	mm (in)	21.0 (0.83)
• Minimum Bending Radius, Single Bend	mm (in)	300 (11.8)
• Cable Weight	kg/m (lb/ft)	0.380 (0.25)
• Tensile Strength	daN (lb)	90 (198)
• Indication of Slot Alignment		embossed line 180° opposite
• Storage Temperature	°C (°F)	-70 to +85 (-94 to +185)
• Installation Temperature	°C (°F)	-25 to +60 (-13 to +140)
• Operation Temperature	°C (°F)	-40 to +85 (-40 to +185)
• Longitudinal Loss and Coupling Loss [2]		

Frequency	Longitudinal Loss	Coupling Loss	
	dB/100 m (dB/100 ft)	C50% [dB]	C95% [dB]
75 MHz	1.36 (0.41)	60	70
150 MHz	1.99 (0.61)	57	61
225 MHz	2.48 (0.76)	64	68
450 MHz	3.58 (1.09)	66	71
900 MHz	5.26 (1.60)	62	65
1800 MHz	9.09 (2.77)	58	62
1900 MHz	9.55 (2.91)	58	62
2200 MHz			
2400 MHz			

• Resonant Frequencies	MHz	116, 348, 580, 812, 1044, 1276, 1508,1740 ±5
• Clamp Spacing Recommended / Maximum	m (ft)	0.5 (1.64) / 1.20 (3.90)
• Distance to Wall Recommended / Minimum	mm (in)	80 - 180 (3.15 - 7.00) / 50 (1.96)

[1] Must be specified in case of order - standard PE jacket available on request.
[2] Measured in tunnel according to **IEC 61196-4 - Ground Level Method**.
Distance = 2m. C50 & (C95) are the average coupling losses with 50% (95%) probability calculated in accordance with the standard.

The above stated values are nominal values and subject to manufacturing tolerances as follows: Longitudinal Loss +/-5 % and Coupling Loss +/- 3dB.

As with any radiating cable, the performance in building or tunnel may deviate from figures measured according to the IEC 61196-4 standard.

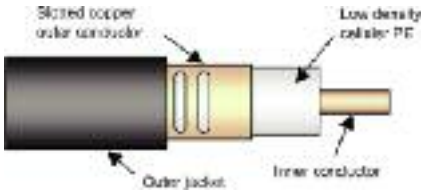
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

RMC 58-T

PRODUCT DESCRIPTION

RMC 58-T-HLFR

Reference suffix [1] : -HLFR



Fire behaviour

Halogen free and flame retardant outer sheath, Low corrosive gas emission acc. to IEC 60754-2
Flame retardant acc. to IEC 60332-1 and IEC 60332-3 cat. C, Low smoke emission acc. to IEC 61034

Slots in the copper outer conductor allow a controlled portion of the internal RF energy to be radiated into the surrounding environment. Conversely, a signal transmitted near the cable will couple into the slots and be carried along the cable length.

FEATURES and BENEFITS

- Broadband from 30 MHz to 1 GHz with resonant frequencies
- Robust Cable, with low bending radius
- Main Applications: Tunnel - FM, TETRA

TECHNICAL FEATURES

• Size		5/8"
• Previous Model Number		517RC8RMT-HLFR / 517MRC8RMT-HLFR (with Mica)
• Frequency Range	MHz	30 - 1000
• Recommended for Frequency	MHz	450
• Cable Type		RMC (Radiated Mode Cable)
• Jacket		HLFR (Halogen Free Low Smoke Flame Retardant)
• Slot Design		Groups of Slots at short intervals
• Impedance	Ω	50 +/- 2
• Velocity Ratio	%	88
• Capacitance	pF/m	76
• Inner Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.9 (0.58)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	2.18 (0.66)
• Inner Conductor Material		Smooth copper tube
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping copper foil, with slot groups, bonded to the jacket

RMC 58-T

TECHNICAL FEATURES (continued)

• Diameter Inner Conductor	mm (in)	6.8 (0.27)
• Diameter Dielectric	mm (in)	17.6 (0.69)
• Diameter over Jacket	mm (in)	21.0 (0.83)
• Minimum Bending Radius, Single Bend	mm (in)	300 (11.8)
• Cable Weight	kg/m (lb/ft)	0.350 (0.23)
• Tensile Strength	daN (lb)	90 (198)
• Indication of Slot Alignment		embossed line 180° opposite
• Storage Temperature	°C (°F)	-70 to +85 (-94 to +185)
• Installation Temperature	°C (°F)	-25 to +60 (-13 to +140)
• Operation Temperature	°C (°F)	-40 to +85 (-40 to +185)
• Longitudinal Loss and Coupling Loss [2]		

Frequency	Longitudinal Loss	Coupling Loss	
	dB/100 m (dB/100 ft)	C50% [dB]	C95% [dB]
75 MHz	1.7 (0.52)	54	66
150 MHz	2.5 (0.76)	58	69
225 MHz	3.1 (0.94)	54	60
400 MHz	4.2 (1.28)	53	58
450 MHz	4.6 (1.40)	50	55
900 MHz	10.5 (3.20)	64	75
1800 MHz	-	-	-
1900 MHz	-	-	-
2200 MHz	-	-	-
2400 MHz	-	-	-

• Resonant Frequencies	MHz	37, 111, 184, 258, 332, 405 ±3, 479, 553, 627, 700, 774, 848, 922, 995 ±5
• Clamp Spacing Recommended / Maximum	m (ft)	0.5 (1.64) / 1.20 (3.90)
• Distance to Wall Recommended / Minimum	mm (in)	80 - 180 (3.15 - 7.00) / 50 (1.96)

[1] Must be specified in case of order - standard PE jacket available on request.
[2] Measured in tunnel according to **IEC 61196-4 - Ground Level Method**.
Distance = 2m. C50 & (C95) are the average coupling losses with 50% (95%) probability calculated in accordance with the standard.

The above stated values are nominal values and subject to manufacturing tolerances as follows: Longitudinal Loss +/-5 % and Coupling Loss +/- 3dB.

As with any radiating cable, the performance in building or tunnel may deviate from figures measured according to the IEC 61196-4 standard.

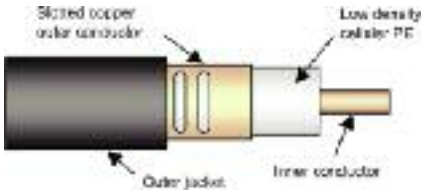
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

RMC 78

PRODUCT DESCRIPTION

RMC 78-HLFR

Reference suffix [1] : -HLFR



Fire behaviour

Halogen free and flame retardant outer sheath, Low corrosive gas emission acc. to IEC 60754-2
Flame retardant acc. to IEC 60332-1 and IEC 60332-3 cat. C, Low smoke emission acc. to IEC 61034

Slots in the copper outer conductor allow a controlled portion of the internal RF energy to be radiated into the surrounding environment. Conversely, a signal transmitted near the cable will couple into the slots and be carried along the cable length.

FEATURES and BENEFITS

- From 30 MHz to 2.8 GHz with resonant frequencies
- Robust Cable, with low bending radius
- Main Applications: Tunnel - FM, TETRA, GSM, DCS-1800, UMTS, WLAN

TECHNICAL FEATURES

• Size		7/8"
• Previous Model Number		522RC8RM-HLFR
• Frequency Range	MHz	30 - 2800
• Recommended for Frequency	MHz	900, 1800, 2200, 2400 and 2700
• Cable Type		RMC (Radiated Mode Cable)
• Jacket		HLFR (Halogen Free Low Smoke Flame Retardant)
• Slot Design		Groups of Slots at short intervals
• Impedance	Ω	50 +/- 2
• Velocity Ratio	%	88
• Capacitance	pF/m	76
• Inner Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.63 (0.49)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.50 (0.46)
• Inner Conductor Material		Smooth copper tube
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping copper foil, with slot groups, bonded to the jacket

RMC 78

TECHNICAL FEATURES (continued)

• Diameter Inner Conductor	mm (in)	9.2 (0.36)
• Diameter Dielectric	mm (in)	23.5 (0.93)
• Diameter over Jacket	mm (in)	27.0 (1.06)
• Minimum Bending Radius, Single Bend	mm (in)	350 (13.8)
• Cable Weight	kg/m (lb/ft)	0.480 (0.32) HLFR
• Tensile Strength	daN (lb)	130 (287)
• Indication of Slot Alignment		embossed line 180° opposite
• Storage Temperature	°C (°F)	-70 to +85 (-94 to +185)
• Installation Temperature	°C (°F)	-25 to +60 (-13 to +140)
• Operation Temperature	°C (°F)	-40 to +85 (-40 to +185)
• Longitudinal Loss and Coupling Loss [2]		

Frequency	Longitudinal Loss	Coupling Loss	
	dB/100 m (dB/100 ft)	C50% [dB]	C95% [dB]
75 MHz	1.02 (0.31)	61	71
150 MHz	1.42 (0.43)	73	84
225 MHz	1.74 (0.53)	69	73
450 MHz	2.50 (0.76)	69	74
900 MHz	3.82 (1.16)	66	73
1800 MHz	6.17 (1.88)	64	69
1900 MHz	6.42 (1.96)	64	69
2200 MHz	7.22 (2.20)	62	73
2400 MHz	7.81 (2.38)	64	73
2600 MHz	8.47 (2.58)	64	73
2800 MHz	9.43 (2.87)	65	73

• Resonant Frequencies	MHz	184, 552, 920 ±5, 1288, 1656, 2024, 2392
• Clamp Spacing Recommended / Maximum	m (ft)	0.5 (1.64) / 1.20 (3.90)
• Distance to Wall Recommended / Minimum	mm (in)	80 - 180 (3.15 - 7.00) / 50 (1.96)

[1] Must be specified in case of order - standard PE jacket available on request.
[2] Measured in tunnel according to **IEC 61196-4 - Ground Level Method**.
Distance = 2m. C50 & (C95) are the average coupling losses with 50% (95%) probability calculated in accordance with the standard.

The above stated values are nominal values and subject to manufacturing tolerances as follows: Longitudinal Loss +/-5 % and Coupling Loss +/- 3dB.

As with any radiating cable, the performance in building or tunnel may deviate from figures measured according to the IEC 61196-4 standard.

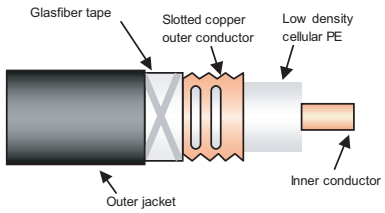
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

RMC 78-T "A" Series

PRODUCT DESCRIPTION

RMC 78-T-HLFR "A" Series

Reference suffix [1] : -HLFR



Fire behaviour

Halogen free and flame retardant outer sheath, Low corrosive gas emission acc. to IEC 60754-2
Flame retardant acc. to IEC 60332-1 and IEC 60332-3 cat. C, Low smoke emission acc. to IEC 61034

Slots in the copper outer conductor allow a controlled portion of the internal RF energy to be radiated into the surrounding environment. Conversely, a signal transmitted near the cable will couple into the slots and be carried along the cable length.

FEATURES and BENEFITS

- From 30 MHz to 1.0 GHz with resonant frequencies
- Robust Cable, with low bending radius
- Main Applications: Tunnel - FM, TETRA, GSM, GSM-R

TECHNICAL FEATURES

• Size		7/8"
• Frequency Range	MHz	30 - 1000
• Recommended for Frequency	MHz	450
• Cable Type		RMC (Radiated Mode Cable)
• Jacket		HLFR (Halogen Free Low Smoke Flame Retardant)
• Slot Design		Groups of Slots at short intervals
• Impedance	Ω	50 +/- 2
• Velocity Ratio	%	88
• Capacitance	pF/m	72
• Inner Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.63 (0.49)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	2.50 (0.76)
• Inner Conductor Material		Smooth copper tube
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping corrugated copper foil with slot groups

RMC 78-T "A" Series

TECHNICAL FEATURES (continued)

• Diameter Inner Conductor	mm (in)	9.2 (0.36)
• Diameter Dielectric	mm (in)	23.5 (0.93)
• Diameter over Jacket	mm (in)	27.0 (1.06)
• Minimum Bending Radius, Single Bend	mm (in)	350 (13.8)
• Cable Weight	kg/m (lb/ft)	0.350 (0.29) HLFR
• Tensile Strength	daN (lb)	130 (287)
• Indication of Slot Alignment		embossed line 180° opposite
• Storage Temperature	°C (°F)	-70 to +85 (-94 to +185)
• Installation Temperature	°C (°F)	-25 to +60 (-13 to +140)
• Operation Temperature	°C (°F)	-40 to +85 (-40 to +185)
• Longitudinal Loss and Coupling Loss [2]		

Frequency	Longitudinal Loss	Coupling Loss	
	dB/100 m (dB/100 ft)	C50% [dB]	C95% [dB]
75 MHz	1.27 (0.39)	57	69
150 MHz	1.73 (0.53)	60	71
225 MHz	2.14 (0.65)	56	61
450 MHz	3.29 (1.00)	52	53
900 MHz	5.41 (1.65)	66	77

• Resonant Frequencies	MHz	37; 111; 184; 258; 332; 405 ±5; 479; 553; 627; 700; 774; 848; 922; 995
• Clamp Spacing Recommended / Maximum	m (ft)	0.5 (1.64) / 1.20 (3.90)
• Distance to Wall Recommended / Minimum	mm (in)	80 - 180 (3.15 - 7.00) / 50 (1.96)

[1] Must be specified in case of order - standard PE jacket available on request.
[2] Measured in tunnel according to **IEC 61196-4 - Ground Level Method**.
Distance = 2m. C50 & (C95) are the average coupling losses with 50% (95%) probability calculated in accordance with the standard.

The above stated values are nominal values and subject to manufacturing tolerances as follows: Longitudinal Loss +/-5 % and Coupling Loss +/- 3dB.

As with any radiating cable, the performance in building or tunnel may deviate from figures measured according to the IEC 61196-4 standard.

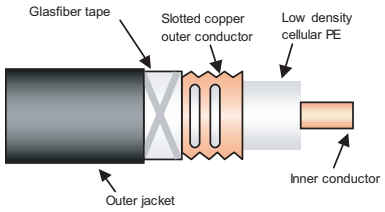
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request.

RMC 78-B "A" Series

PRODUCT DESCRIPTION

RMC 78-B-HLFR "A" Series

Reference suffix [1] : -HLFR



Fire behaviour

Halogen free and flame retardant outer sheath, Low corrosive gas emission acc. to IEC 60754-2
Flame retardant acc. to IEC 60332-1 and IEC 60332-3 cat. C, Low smoke emission acc. to IEC 61034

Slots in the copper outer conductor allow a controlled portion of the internal RF energy to be radiated into the surrounding environment. Conversely, a signal transmitted near the cable will couple into the slots and be carried along the cable length.

FEATURES and BENEFITS

- From 30 MHz to 2.4 GHz with resonant frequencies
- Robust Cable, with low bending radius
- Main Applications: Tunnel - FM, TETRA, GSM, GSM-R
- Specially designed for GSM-R

TECHNICAL FEATURES

• Size		7/8"
• Previous Model Number		522RC8RMB-HLFR
• Frequency Range	MHz	30 - 2400
• Recommended for Frequency	MHz	900
• Cable Type		RMC (Radiated Mode Cable)
• Jacket		HLFR (Halogen Free Low Smoke Flame Retardant) Anti Termite
• Slot Design		Groups of Slots at short intervals
• Impedance	Ω	50 +/- 2
• Velocity Ratio	%	88
• Capacitance	pF/m	72
• Inner Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.63 (0.49)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	2.50 (0.76)
• Inner Conductor Material		Smooth copper tube
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping copper foil, with slot groups

RMC 78-B "A" Series

TECHNICAL FEATURES (continued)

• Diameter Inner Conductor	mm (in)	9.2 (0.36)
• Diameter Dielectric	mm (in)	23.5 (0.93)
• Diameter over Jacket	mm (in)	27.0 (1.06)
• Minimum Bending Radius, Single Bend	mm (in)	350 (13.8)
• Cable Weight	kg/m (lb/ft)	0.350 (0.29) HLFR
• Tensile Strength	daN (lb)	130 (287)
• Indication of Slot Alignment		embossed line 180° opposite
• Storage Temperature	°C (°F)	-70 to +85 (-94 to +185)
• Installation Temperature	°C (°F)	-25 to +60 (-13 to +140)
• Operation Temperature	°C (°F)	-40 to +85 (-40 to +185)
• Longitudinal Loss and Coupling Loss [2]		

Frequency	Longitudinal Loss	Coupling Loss	
	dB/100 m (dB/100 ft)	C50% [dB]	C95% [dB]
75 MHz	1.30 (0.40)	56	67
150 MHz	1.62 (0.49)	60	65
225 MHz	1.91 (0.58)	62	72
450 MHz	2.72 (0.83)	59	63
900 MHz	4.19 (1.28)	53	56
1800 MHz	6.97 (2.12)	66	78
1900 MHz	7.27 (2.22)	65	77
2200 MHz	8.17 (2.49)	65	76
2400 MHz	8.77 (2.67)	64	75

• Resonant Frequencies	MHz	63, 189, 315, 441, 567, 693, 819, 945 ±5, 1071
• Clamp Spacing Recommended / Maximum	m (ft)	0.5 (1.64) / 1.20 (3.90)
• Distance to Wall Recommended / Minimum	mm (in)	80 - 180 (3.15 - 7.00) / 50 (1.96)

[1] Must be specified in case of order - standard PE jacket available on request.
[2] Measured in tunnel according to **IEC 61196-4 - Ground Level Method**.
Distance = 2m. C50 & (C95) are the average coupling losses with 50% (95%) probability calculated in accordance with the standard.

The above stated values are nominal values and subject to manufacturing tolerances as follows: Longitudinal Loss +/-5 % and Coupling Loss +/- 3dB.

As with any radiating cable, the performance in building or tunnel may deviate from figures measured according to the IEC 61196-4 standard.

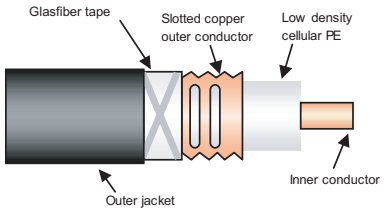
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

RMC 78-CL "A" Series

PRODUCT DESCRIPTION

RMC 78-CL-HLFR "A" Series

Reference suffix [1] : -HLFR



Fire behaviour

Halogen free and flame retardant outer sheath, Low corrosive gas emission acc. to IEC 60754-2
Flame retardant acc. to IEC 60332-1 and IEC 60332-3 cat. C, Low smoke emission acc. to IEC 61034

Slots in the copper outer conductor allow a controlled portion of the internal RF energy to be radiated into the surrounding environment. Conversely, a signal transmitted near the cable will couple into the slots and be carried along the cable length.

FEATURES and BENEFITS

- Low Fading at short aerial to cable distance
- Robust Cable, with low bending radius
- Main Applications: WLAN
- Optimised for WLAN applications in the 2.40 - 2.485 GHz band

TECHNICAL FEATURES

• Size		7/8"
• Frequency Range	MHz	1800 - 2800
• Recommended for Frequency	MHz	2400 - 2485
• Cable Type		RMC (Radiated Mode Cable)
• Jacket		HLFR (Halogen Free Low Smoke Flame Retardant) Anti Termite
• Slot Design		Groups of Slots at short intervals
• Impedance	Ω	50 +/- 2
• Velocity Ratio	%	88
• Capacitance	pF/m	72
• Inner Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.63 (0.49)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	2.50 (0.76)
• Inner Conductor Material		Smooth copper tube
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping copper foil, with slot groups

RMC 78-CL "A" Series

TECHNICAL FEATURES (continued)

• Diameter Inner Conductor	mm (in)	9.2 (0.36)
• Diameter Dielectric	mm (in)	23.5 (0.93)
• Diameter over Jacket	mm (in)	27.0 (1.06)
• Minimum Bending Radius, Single Bend	mm (in)	350 (13.8)
• Cable Weight	kg/m (lb/ft)	0.350 (0.29) HLFR
• Tensile Strength	daN (lb)	130 (287)
• Indication of Slot Alignment		embossed line 180° opposite
• Storage Temperature	°C (°F)	-70 to +85 (-94 to +185)
• Installation Temperature	°C (°F)	-25 to +60 (-13 to +140)
• Operation Temperature	°C (°F)	-40 to +85 (-40 to +185)
• Longitudinal Loss and Coupling Loss [2]		

Frequency	Longitudinal Loss	Coupling Loss	
	dB/100 m (dB/100 ft)	C50% [dB]	C95% [dB]
1800 MHz	5.86 (1.79)	64	69
2400 MHz	7.65 (2.33)	60	67

• Resonant Frequencies	MHz	2054; 2370; 2686
• Clamp Spacing Recommended / Maximum	m (ft)	0.5 (1.64) / 1.20 (3.90)
• Distance to Wall Recommended / Minimum	mm (in)	80 - 180 (3.15 - 7.00) / 50 (1.96)

[11] Must be specified in case of order - standard PE jacket available on request.
[2] Measured in tunnel according to **IEC 61196-4 - Ground Level Method**.
Distance = 2m. C50 & (C95) are the average coupling losses with 50% (95%) probability calculated in accordance with the standard.

The above stated values are nominal values and subject to manufacturing tolerances as follows: Longitudinal Loss +/-5 % and Coupling Loss +/- 3dB.

As with any radiating cable, the performance in building or tunnel may deviate from figures measured according to the IEC 61196-4 standard.

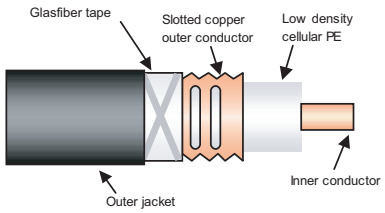
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request.

RMC 114 "A" Series

PRODUCT DESCRIPTION

RMC 114-HLFR "A" Series

Reference suffix [1] : -HLFR



Fire behaviour

Halogen free and flame retardant outer sheath, Low corrosive gas emission acc. to IEC 60754-2
Flame retardant acc. to IEC 60332-1 and IEC 60332-3 cat. C, Low smoke emission acc. to IEC 61034[2]
.

Slots in the copper outer conductor allow a controlled portion of the internal RF energy to be radiated into the surrounding environment. Conversely, a signal transmitted near the cable will couple into the slots and be carried along the cable length.

FEATURES and BENEFITS

- From 30 MHz to 2800 MHz with resonant frequencies
- Robust Cable, with low bending radius
- Main Applications: Tunnel - GSM, DCS-1800, UMTS, WLAN

TECHNICAL FEATURES

• Size		1-1/4"
• Frequency Range	MHz	30 - 2800
• Recommended for Frequency	MHz	900, 1800, 2200, 2400 & 2700
• Cable Type		RMC (Radiated Mode Cable)
• Jacket		HLFR (Halogen Free Low Smoke Flame Retardant)
• Slot Design		Groups of Slots at short intervals
• Impedance	Ω	50 +/- 2
• Velocity Ratio	%	89
• Capacitance	pF/m	76
• Inner Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	0.87 (0.26)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.65 (0.50)
• Inner Conductor Material		Smooth copper tube
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping corrugated copper foil with slot groups

RMC 114 "A" Series

TECHNICAL FEATURES (continued)

• Diameter Inner Conductor	mm (in)	13.0 (0.51)
• Diameter Dielectric	mm (in)	33.5 (1.32)
• Diameter over Jacket	mm (in)	38.0 (1.50)
• Minimum Bending Radius, Single Bend	mm (in)	350 (13.8)
• Cable Weight	kg/m (lb/ft)	0.875 (0.58) HLFR
• Tensile Strength	daN (lb)	180 (397)
• Indication of Slot Alignment		embossed line 180° opposite
• Storage Temperature	°C (°F)	-70 to +85 (-94 to +185)
• Installation Temperature	°C (°F)	-25 to +60 (-13 to +140)
• Operation Temperature	°C (°F)	-40 to +85 (-40 to +185)
• Longitudinal Loss and Coupling Loss [3]		

Frequency	Longitudinal Loss	Coupling Loss	
	dB/100 m (dB/100 ft)	C50% [dB]	C95% [dB]
75 MHz	0.85 (0.26)	64	74
150 MHz	1.21 (0.37)	69	79
225 MHz	1.50 (0.46)	61	64
450 MHz	2.18 (0.66)	68	73
900 MHz	3.18 (0.97)	64	69
1800 MHz	5.36 (1.63)	59	65
2200 MHz	7.36 (2.24)	59	65
2400 MHz	8.86 (2.70)	52	57
2600 MHz	10.80 (3.29)	53	58
2800 MHz	13.66 (4.16)	53	59

• Resonant Frequencies	MHz	199; 598; 997; 1396; 1795; 2193; 2592; 2991
• Clamp Spacing Recommended / Maximum	m (ft)	0.5 (1.64) / 1.20 (3.90)
• Distance to Wall Recommended / Minimum	mm (in)	80 - 180 (3.15 - 7.00) / 50 (1.96)

[1] Must be specified in case of order - standard PE jacket available on request.
[2] The smoke density test is performed, based on the IEC 61034. Considering the usual application of radiating cables, the test is done with one sample (>7/8")
[3] Measured in tunnel according to **IEC 61196-4 - Ground Level Method**.
Distance = 2m. C50 & (C95) are the average coupling losses with 50% (95%) probability calculated in accordance with the standard.

The above stated values are nominal values and subject to manufacturing tolerances as follows: Longitudinal Loss +/-5 % and Coupling Loss +/- 3dB.

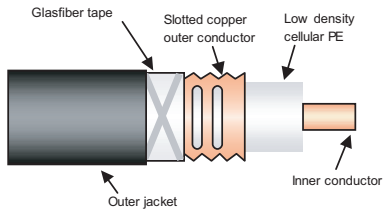
As with any radiating cable, the performance in building or tunnel may deviate from figures measured according to the IEC 61196-4 standard.

RMC 114-T "A" Series

PRODUCT DESCRIPTION

RMC 114-T-HLFR "A" Series

Reference suffix [1] : -HLFR



Fire behaviour

Halogen free and flame retardant outer sheath, Low corrosive gas emission acc. to IEC 60754-2
Flame retardant acc. to IEC 60332-1 and IEC 60332-3 cat. C, Low smoke emission acc. to IEC 61034[2]

Slots in the copper outer conductor allow a controlled portion of the internal RF energy to be radiated into the surrounding environment. Conversely, a signal transmitted near the cable will couple into the slots and be carried along the cable length.

FEATURES and BENEFITS

- From 30 MHz to 1.0 GHz with resonant frequencies
- Robust Cable, with low bending radius
- Main Applications: Tunnel - FM, TETRA, GSM, GSM-R

TECHNICAL FEATURES

• Size		1-1/4"
• Frequency Range	MHz	30 - 1000
• Recommended for Frequency	MHz	450
• Cable Type		RMC (Radiated Mode Cable)
• Jacket		HLFR (Halogen Free Low Smoke Flame Retardant)
• Slot Design		Groups of Slots at short intervals
• Impedance	Ω	50 +/- 2
• Velocity Ratio	%	88
• Capacitance	pF/m	76
• Inner Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	0.87 (0.27)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.65 (0.50)
• Inner Conductor Material		Smooth copper tube
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping corrugated copper foil with slot groups

RMC 114-T "A" Series

TECHNICAL FEATURES (continued)

• Diameter Inner Conductor	mm (in)	13.0 (0.51)
• Diameter Dielectric	mm (in)	33.5 (1.32)
• Diameter over Jacket	mm (in)	38.0 (1.50)
• Minimum Bending Radius, Single Bend	mm (in)	350 (13.8)
• Cable Weight	kg/m (lb/ft)	0.875 (0.58) HLFR
• Tensile Strength	daN (lb)	180 (397)
• Indication of Slot Alignment		embossed line 180° opposite
• Storage Temperature	°C (°F)	-70 to +85 (-94 to +185)
• Installation Temperature	°C (°F)	-25 to +60 (-13 to +140)
• Operation Temperature	°C (°F)	-40 to +85 (-40 to +185)
• Longitudinal Loss and Coupling Loss [3]		

Frequency	Longitudinal Loss	Coupling Loss	
	dB/100 m (dB/100 ft)	C50% [dB]	C95% [dB]
75 MHz	0.78 (0.24)	51	64
150 MHz	1.16 (0.35)	59	70
225 MHz	1.46 (0.44)	59	64
450 MHz	2.13 (0.65)	54	58
900 MHz	3.01 (0,92)	66	76

• Resonant Frequencies	MHz	37; 111; 184; 258; 332; 405 ±5; 479; 553; 627; 700; 774; 848; 922; 995
• Clamp Spacing Recommended / Maximum	m (ft)	0.5 (1.64) / 1.20 (3.90)
• Distance to Wall Recommended / Minimum	mm (in)	80 - 180 (3.15 - 7.00) / 50 (1.96)

[1] Must be specified in case of order - standard PE jacket available on request.
[2] The smoke density test is performed, based on the IEC 61034. Considering the usual application of radiating cables, the test is done with one sample (>7/8")
[3] Measured in tunnel according to **IEC 61196-4 - Ground Level Method**.
Distance = 2m. C50 & (C95) are the average coupling losses with 50% (95%) probability calculated in accordance with the standard.

The above stated values are nominal values and subject to manufacturing tolerances as follows: Longitudinal Loss +/-5 % and Coupling Loss +/- 3dB.

As with any radiating cable, the performance in building or tunnel may deviate from figures measured according to the IEC 61196-4 standard.

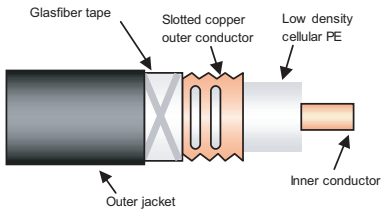
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request.

RMC 114-B "A" Series

PRODUCT DESCRIPTION

RMC 114-B-HLFR "A" Series

Reference suffix [1] : -HLFR



Fire behaviour

Halogen free and flame retardant outer sheath, Low corrosive gas emission acc. to IEC 60754-2
Flame retardant acc. to IEC 60332-1 and IEC 60332-3 cat. C, Low smoke emission acc. to IEC 61034[2]
.

Slots in the copper outer conductor allow a controlled portion of the internal RF energy to be radiated into the surrounding environment. Conversely, a signal transmitted near the cable will couple into the slots and be carried along the cable length.

FEATURES and BENEFITS

- From 30 MHz to 2600 MHz with resonant frequencies
- Robust Cable, with low bending radius
- Main Applications: Tunnel - GSM, GSM-R, TETRA

TECHNICAL FEATURES

• Size		1-1/4"
• Frequency Range	MHz	30 - 2600
• Recommended for Frequency	MHz	75 to 900
• Cable Type		RMC (Radiated Mode Cable)
• Jacket		HLFR (Halogen Free Low Smoke Flame Retardant)
		Anti Termite & Anti Rodent
• Slot Design		Groups of Slots at short intervals
• Impedance	Ω	50 +/- 2
• Velocity Ratio	%	89
• Capacitance	pF/m	76
• Inner Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	0.87 (0.26)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.65 (0.50)
• Inner Conductor Material		Smooth copper tube
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping corrugated copper foil with slot groups

RMC 114-B "A" Series

TECHNICAL FEATURES (continued)

• Diameter Inner Conductor	mm (in)	13.0 (0.51)
• Diameter Dielectric	mm (in)	33.5 (1.32)
• Diameter over Jacket	mm (in)	38.0 (1.50)
• Minimum Bending Radius, Single Bend	mm (in)	350 (13.8)
• Approximate Cable Weight	kg/km (lb/ft)	0.809 (0.54) HLFR
• Tensile Strength	daN (lb)	180 (397)
• Indication of Slot Alignment		embossed line 180° opposite
• Storage Temperature	°C (°F)	-70 to +85 (-94 to +185)
• Installation Temperature	°C (°F)	-25 to +60 (-13 to +140)
• Operation Temperature	°C (°F)	-40 to +85 (-40 to +185)
• Longitudinal Loss and Coupling Loss [3]		

Frequency	Longitudinal Loss	Coupling Loss	
	dB/100 m (dB/100 ft)	C50% [dB]	C95% [dB]
75 MHz	0.89 (0.27)	52	61
150 MHz	1.25 (0.38)	62	70
225 MHz	1.52 (0.46)	63	70
450 MHz	2.17 (0.66)	60	64
900 MHz	3.28 (1.00)	55	58
1800 MHz	5.70 (1.74)	60	71
2200 MHz	6.98 (2.13)	60	68
2400 MHz	7.68 (2.43)	61	69
2600 MHz	8.42 (2.57)	61	69

• Resonant Frequencies	MHz	65; 195; 325; 455; 585; 715; 845; 975; 1105; 1235; 1365; 1496; 1626; 1756; 1886; 2016; 2146; 2276; 2406; 2536
• Clamp Spacing Recommended / Maximum	m (ft)	0.5 (1.64) / 1.20 (3.90)
• Distance to Wall Recommended / Minimum	mm (in)	80 - 180 (3.15 - 7.00) / 50 (1.96)

[1] Must be specified in case of order - standard PE jacket available on request.
[2] The smoke density test is performed, based on the IEC 61034. Considering the usual application of radiating cables, the test is done with one sample (>7/8")
[3] Measured in tunnel according to **IEC 61196-4 - Ground Level Method**.
Distance = 2m. C50 & (C95) are the average coupling losses with 50% (95%) probability calculated in accordance with the standard.

The above stated values are nominal values and subject to manufacturing tolerances as follows: Longitudinal Loss +/-5 % and Coupling Loss +/- 3dB.

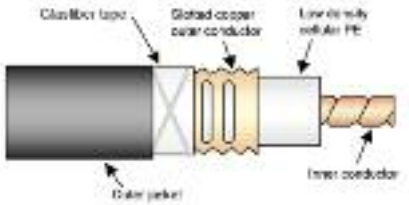
As with any radiating cable, the performance in building or tunnel may deviate from figures measured according to the IEC 61196-4 standard.

RMC 158 "A" Series

PRODUCT DESCRIPTION

RMC 158-HLFR "A" Series

Reference suffix [1] : -HLFR



Fire behaviour

Halogen free and flame retardant outer sheath, Low corrosive gas emission acc. to IEC 60754-2
Flame retardant acc. to IEC 60332-1 and IEC 60332-3 cat. C, Low smoke emission acc. to IEC 61034

Slots in the copper outer conductor allow a controlled portion of the internal RF energy to be radiated into the surrounding environment. Conversely, a signal transmitted near the cable will couple into the slots and be carried along the cable length.

FEATURES and BENEFITS

- From 30 MHz to 3.5 GHz with resonant frequencies
- Robust Cable, with low bending radius
- Main Applications: Tunnel - GSM, DCS-1800, UMTS, WLAN, LTE

TECHNICAL FEATURES

• Size		1-5/8"
• Frequency Range	MHz	30 - 3500
• Recommended for Frequency	MHz	400, 450, 900, 1800, 2200, 2400 and 2700
• Cable Type		RMC (Radiated Mode Cable)
• Jacket		HLFR (Halogen Free Low Smoke Flame Retardant)
• Slot Design		Groups of Slots at short intervals
• Impedance	Ω	50 +/- 2
• Velocity Ratio	%	89
• Capacitance	pF/m	75
• Inner Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.44 (0.44)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.28 (0.39)
• Inner Conductor Material		Corrugated copper tube
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping corrugated copper foil with slot groups

RMC 158 "A" Series

TECHNICAL FEATURES (continued)

• Diameter Inner Conductor	mm (in)	17.7 (0.70)
• Diameter Dielectric	mm (in)	43.0 (1.69)
• Diameter over Jacket	mm (in)	48.0 (1.89)
• Minimum Bending Radius, Single Bend	mm (in)	400 (15.7)
• Cable Weight	kg/m (lb/ft)	0.92 (0.62) HLFR
• Tensile Strength	daN (lb)	200 (441)
• Indication of Slot Alignment		embossed line 180° opposite
• Storage Temperature	°C (°F)	-70 to +85 (-94 to +185)
• Installation Temperature	°C (°F)	-25 to +60 (-13 to +140)
• Operation Temperature	°C (°F)	-40 to +85 (-40 to +185)
• Longitudinal Loss and Coupling Loss [3]		

Frequency	Longitudinal Loss	Coupling Loss	
	dB/100 m (dB/100 ft)	C50% [dB]	C95% [dB]
75 MHz	0.58 (0.18)	66	77
150 MHz	0.84 (0.26)	76	85
225 MHz	1.06 (0.32)	61	64
450 MHz	1.59 (0.48)	71	76
900 MHz	2.44 (0.74)	70	75
1800 MHz	4.27 (1.33)	57	62
1900 MHz	4.55 (1.39)	56	60
2200 MHz	5.60 (1.71)	54	58
2400 MHz	6.50 (1.98)	52	60
2800 MHz	8.99 (2.74)	55	62
3500 MHz	16.56 (5.05)	52	60

• Resonant Frequencies	MHz	199, 598, 997, 1396, 1795, 2193, 2592, 2991
• Clamp Spacing Recommended / Maximum	m (ft)	0.5 (1.64) / 1.20 (3.90)
• Distance to Wall Recommended / Minimum	mm (in)	80 - 180 (3.15 - 7.00) / 50 (1.96)

[1] Must be specified in case of order - standard PE jacket available on request.
[2] The smoke density test is performed, based on the IEC 61034. Considering the usual application of radiating cables, the test is done with one sample (>7/8")
[3] Measured in tunnel according to **IEC 61196-4 - Ground Level Method**.
Distance = 2m. C50 & (C95) are the average coupling losses with 50% (95%) probability calculated in accordance with the standard.

The above stated values are nominal values and subject to manufacturing tolerances as follows: Longitudinal Loss +/-5 % and Coupling Loss +/- 3dB.

As with any radiating cable, the performance in building or tunnel may deviate from figures measured according to the IEC 61196-4 standard.

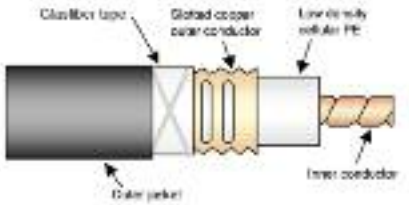
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request.

RMC 158-T "A" Series

PRODUCT DESCRIPTION

RMC 158-T-HLFR "A" Series

Reference suffix [1] : -HLFR



Fire behaviour

Halogen free and flame retardant outer sheath, Low corrosive gas emission acc. to IEC 60754-2
Flame retardant acc. to IEC 60332-1 and IEC 60332-3 cat. C, Low smoke emission acc. to IEC 61034[2]

Slots in the copper outer conductor allow a controlled portion of the internal RF energy to be radiated into the surrounding environment. Conversely, a signal transmitted near the cable will couple into the slots and be carried along the cable length.

FEATURES and BENEFITS

- From 30 MHz to 1.0 GHz with resonant frequencies
- Robust Cable, with low bending radius
- Main Applications: Tunnel - FM, TETRA, GSM, GSM-R

TECHNICAL FEATURES

• Size		1-5/8"
• Frequency Range	MHz	30 - 1000
• Recommended for Frequency	MHz	450
• Cable Type		RMC (Radiated Mode Cable)
• Jacket		HLFR (Halogen Free Low Smoke Flame Retardant)
• Slot Design		Groups of Slots at short intervals
• Impedance	Ω	50 +/- 2
• Velocity Ratio	%	89
• Capacitance	pF/m	75
• Inner Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.44 (0.44)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.28 (0.39)
• Inner Conductor Material		Corrugated copper tube
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping corrugated copper foil with slot groups

RMC 158-T "A" Series

TECHNICAL FEATURES (continued)

• Diameter Inner Conductor	mm (in)	17.7 (0.70)
• Diameter Dielectric	mm (in)	43.0 (1.69)
• Diameter over Jacket	mm (in)	48.0 (1.89)
• Minimum Bending Radius, Single Bend	mm (in)	400 (15.7)
• Cable Weight	kg/m (lb/ft)	0.925 (0.62) HLFR
• Tensile Strength	daN (lb)	200 (441)
• Indication of Slot Alignment		embossed line 180° opposite
• Storage Temperature	°C (°F)	-70 to +85 (-94 to +185)
• Installation Temperature	°C (°F)	-25 to +60 (-13 to +140)
• Operation Temperature	°C (°F)	-40 to +85 (-40 to +185)
• Longitudinal Loss and Coupling Loss [3]		

Frequency	Longitudinal Loss	Coupling Loss	
	dB/100 m (dB/100 ft)	C50% [dB]	C95% [dB]
75 MHz	0.80 (0.24)	57	69
150 MHz	1.09 (0.33)	59	68
225 MHz	1.32 (0.40)	57	61
450 MHz	1.86 (0.57)	53	56
900 MHz	2.76 (0.84)	64	75

• Resonant Frequencies	MHz	37; 111; 184; 258; 332; 405 ±5; 479; 553; 627; 700; 774; 848; 922; 995
• Clamp Spacing Recommended / Maximum	m (ft)	0.5 (1.64) / 1.20 (3.90)
• Distance to Wall Recommended / Minimum	mm (in)	80 - 180 (3.15 - 7.00) / 50 (1.96)

[1] Must be specified in case of order - standard PE jacket available on request.
[2] The smoke density test is performed, based on the IEC 61034. Considering the usual application of radiating cables, the test is done with one sample (>7/8")
[3] Measured in tunnel according to **IEC 61196-4 - Ground Level Method**.
Distance = 2m. C50 & (C95) are the average coupling losses with 50% (95%) probability calculated in accordance with the standard.

The above stated values are nominal values and subject to manufacturing tolerances as follows: Longitudinal Loss +/-5 % and Coupling Loss +/- 3dB.

As with any radiating cable, the performance in building or tunnel may deviate from figures measured according to the IEC 61196-4 standard.

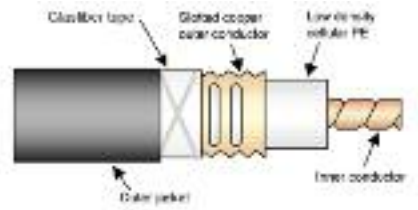
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Methode are available on request.

RMC 158-B "A" Series

PRODUCT DESCRIPTION

RMC 158-B-HLFR "A" Series

Reference suffix [1] : -HLFR



Fire behaviour

Halogen free and flame retardant outer sheath, Low corrosive gas emission acc. to IEC 60754-2
Flame retardant acc. to IEC 60332-1 and IEC 60332-3 cat. C, Low smoke emission acc. to IEC 61034[2]

Slots in the copper outer conductor allow a controlled portion of the internal RF energy to be radiated into the surrounding environment. Conversely, a signal transmitted near the cable will couple into the slots and be carried along the cable length.

FEATURES and BENEFITS

- From 30 MHz to 2600 MHz with resonant frequencies
- Robust Cable, with low bending radius
- Main Applications: Tunnel - GSM, DCS-1800, UMTS, WLAN

TECHNICAL FEATURES

• Size		1-5/8"
• Frequency Range	MHz	30 - 2600
• Recommended for Frequency	MHz	75 to 900
• Cable Type		RMC (Radiated Mode Cable)
• Jacket		HLFR (Halogen Free Low Smoke Flame Retardant)
• Slot Design		Groups of Slots at short intervals
• Impedance	Ω	50 +/- 2
• Velocity Ratio	%	89
• Capacitance	pF/m	75
• Inner Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.44 (0.44)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.28 (0.39)
• Inner Conductor Material		Corrugated copper tube
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping corrugated copper foil with slot groups

RMC 158-B "A" Series

TECHNICAL FEATURES (continued)

• Diameter Inner Conductor	mm (in)	17.7 (0.70)
• Diameter Dielectric	mm (in)	43.0 (1.69)
• Diameter over Jacket	mm (in)	48.0 (1.89)
• Minimum Bending Radius, Single Bend	mm (in)	400 (15.7)
• Cable Weight	kg/m (lb/ft)	0.945 (0.63) HLFR
• Tensile Strength	daN (lb)	200 (441)
• Indication of Slot Alignment		embossed line 180° opposite
• Storage Temperature	°C (°F)	-70 to +85 (-94 to +185)
• Installation Temperature	°C (°F)	-25 to +60 (-13 to +140)
• Operation Temperature	°C (°F)	-40 to +85 (-40 to +185)
• Longitudinal Loss and Coupling Loss [3]		

Frequency	Longitudinal Loss	Coupling Loss	
	dB/100 m (dB/100 ft)	C50% [dB]	C95% [dB]
75 MHz	0.70 (0.21)	58	68
150 MHz	0.98 (0.30)	63	69
225 MHz	1.20 (0.37)	71	80
450 MHz	1.74 (0.53)	62	68
900 MHz	2.66 (0.81)	58	62
1800 MHz	4.73 (1.44)	65	76
2200 MHz	5.84 (1.78)	65	75
2400 MHz	6.44 (1.96)	65	76
2600 MHz	7.09 (2.16)	65	76

• Resonant Frequencies	MHz	58; 174; 290; 406; 522; 638; 754; 870; 986; 1102; 1218; 1334; 1450; 1566; 1682; 1798; 1914; 2029; 2145; 2261
• Clamp Spacing Recommended / Maximum	m (ft)	0.5 (1.64) / 1.20 (3.90)
• Distance to Wall Recommended / Minimum	mm (in)	80 - 180 (3.15 - 7.00) / 50 (1.96)

[1] Must be specified in case of order - standard PE jacket available on request.
[2] The smoke density test is performed, based on the IEC 61034. Considering the usual application of radiating cables, the test is done with one sample (>7/8")
[3] Measured outside according to **IEC 61196-4 - Free Space Method**.
Distance = 2m. C50 & (C95) are the average coupling losses with 50% (95%) probability calculated in accordance with the standard.

The above stated values are nominal values and subject to manufacturing tolerance.

As with any radiating cable, the performance in building or tunnel may deviate from figures measured according to the IEC 61196-4 standard.

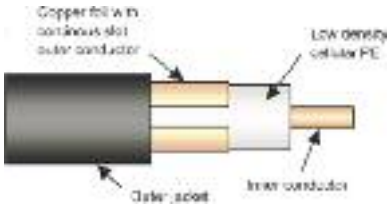
Coupling loss measurements taken inside Tunnel in accordance with IEC 61196-4 - Ground Level Method are available on request.

CMC 12

PRODUCT DESCRIPTION

CMC 12-HLFR

Reference suffix [1] : -HLFR



Fire behaviour

Halogen free and flame retardant outer sheath
Low corrosive gas emission acc. to IEC 60754-2
Flame retardant acc. to IEC 60332-1 and IEC 60332-3 cat. C
Low smoke emission acc. to IEC 61034

The Slot in the copper outer conductor allows a controlled portion of the internal RF energy to be radiated into the surrounding environment. Conversely, a signal transmitted near the cable will couple into the slots and be carried along the cable length.

FEATURES and BENEFITS

- Broadband from 30 MHz to 2.5 GHz
- Robust Cable, with low bending radius
- No Resonant Frequencies
- No Cable Orientation Required
- Main Applications: Inhouse, Short Length, FM, TETRA, GSM, DCS-1800, WLAN

TECHNICAL FEATURES

• Size		1/2"
• Previous Model Number		512RC8RI-HLFR
• Frequency Range	MHz	30 - 2500
• Recommended for Frequency	MHz	N.A.
• Cable Type		CMC (Coupled Mode Cable)
• Jacket		HLFR (Halogen Free Low Smoke Flame Retardant)
• Slot Design		Continous slot
• Impedance	Ω	50 +/- 2
• Velocity Ratio	%	88
• Capacitance	pF/m	76
• Inner Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.48 (0.45)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	3.3 (1.01)
• Inner Conductor Material		Copper clad aluminium wire
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Copper foil, with continous slot, bonded to the jacket

CMC 12

TECHNICAL FEATURES (continued)

• Diameter Inner Conductor	mm (in)	4.8 (0.19)
• Diameter Dielectric	mm (in)	12.4 (0.49)
• Diameter over Jacket	mm (in)	15.5 (0.61)
• Minimum Bending Radius	mm (in)	150 (5.9)
• Cable Weight	kg/m (lb/ft)	0.23 (0.15) HLFR
• Tensile Strength	daN (lb)	110 (242)
• Indication of Slot Alignment		N.A.
• Storage Temperature	°C (°F)	-70 to +85 (-94 to +185)
• Installation Temperature	°C (°F)	-25 to +60 (-13 to +140)
• Operation Temperature	°C (°F)	-40 to +85 (-40 to +185)

• Longitudinal Loss and Coupling Loss [2]

Frequency	Longitudinal Loss	Coupling Loss	
	dB/100 m (dB/100 ft)	C50% [dB]	C95% [dB]
75 MHz	2.06 (0.63)	61	72
150 MHz	3.10 (0.94)	68	80
225 MHz	3.95 (1.20)	69	81
450 MHz	5.90 (1.80)	83	94
900 MHz	8.63 (2.63)	82	94
1800 MHz	12.75 (3.89)	80	93
1900 MHz	13.19 (4.02)	80	93
2200 MHz	14.47 (4.41)	82	97
2400 MHz	15.25 (4.65)	82	97

• Resonant Frequencies	MHz	None
• Clamp Spacing Recommended / Maximum	m (ft)	0.5 (1.64) / 1.20 (3.90)
• Distance to Wall Recommended / Minimum	mm (in)	80 - 180 (3.15 - 7.00) / 50 (1.96)

[1] Must be specified in case of order - standard PE jacket available on request.
[2] Measured in tunnel according to **IEC 61196-4 - Ground Level Method**.
Distance = 2m. C50 & (C95) are the average coupling losses with 50% (95%) probability calculated in accordance with the standard.

The above stated values are nominal values and subject to manufacturing tolerances.

As with any radiating cable, the performance in building or tunnel may deviate from figures measured according to the IEC 61196-4 standard.

Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

messenger wire

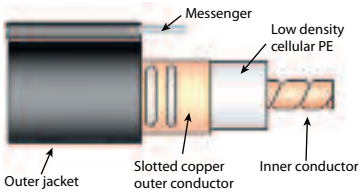
with integrated

messenger wire

Radiating Cable with Integrated Messenger Wire

PRODUCT DESCRIPTION

Reference prefix : F- **suffix : -HLFR**



Integrated messenger wire is available as an option on radiating cables 7/8" to 1-5/8". Please consult us.

TECHNICAL FEATURES

		7/8"	1-1/4"	1-5/8"
• Cable Weight (HLFR)	kg/m	0.75	1.1	1.2
	lb/ft	0.61	0.83	0.83
• Breaking Strength of Messenger	daN (lb)	1225 (2700)	1900 (4190)	1900 (4190)
• Indication of Slot Alignment			Opposite of messenger	
• Material of Messenger		galvanised steel	stainless steel	stainless steel
• Diameter over Messenger Jacket	mm (in)	7.5 (0.3)	11 (0.43)	11 (0.43)
• Maximum Pole Spacing	m (ft)	20 (65)	20 (65)	20 (65)

PRODUCT REFERENCE

for example: **F-RMC114-HLFR**

4

Accessories

Radiating Cables
Accessories

Connectors for LSC/RMC radiating cables

PRODUCT DESCRIPTION

The connectors are designed according the standard interfaces as N or DIN 7-16. The special quick trimming tool makes installation very easy and cost effective in time.

NM50R78

NF50R12

716FR158MPA

FEATURES and BENEFITS

- High contact force through inner contacts made of high-strength copper alloy
- Watertight (IP67/IP68)
- Corrosion resistant
- Quick trimming tool
- Installation "fit on and tighten it"

TECHNICAL FEATURES

Connector type	N-male	N-female	7-16 male	7-16 female
Electrical specifications				
• Nominal impedance [Ω]		50		
• Reflection coefficient @ 3 GHz [dB]		≥ 35		
• Insulation resistance [GΩ]	≥ 5		≥ 10	
• Test voltage (at sea level) [kV rms, 50Hz]	2.5		4	
• Working voltage (at sea level) [kV rms,50Hz]	1		2.7	
• Contact resistance (outer contact) [mΩ]		≤ 2		
• Contact resistance (inner contact) [mΩ]		≤ 2		
Mechanical specifications				
• Torque of coupling mechanism [Nm]	8		30	
• Tensile strength of coupling mechanism [N]	400		700	
• Cable retention [N]	> 500		> 1000	
• Mechanical endurance (Nr of couplings)		≥ 500		

Connectors for LSC/RMC radiating cables

TECHNICAL FEATURES (continued)

Connector type	N-male	N-female	7-16 male	7-16 female
Environmental specifications				
• Temperature range		-40 °C to +85 °C (-40 °F to +185 °F)		
• Degree of protection		IP67/IP68 (mated connectors)		
Connectors codes				
• 1/2″	NM50R12	NF50R12	-	716FR12
• 5/8″	NM50R58	NF50R58	-	-
• 7/8″	NM50R78	NF50R78	-	716FR78
• 1-1/4″	NM50R114MPA	NF50R114MPA	*	716FR114MPA
• 1-5/8″	NM50R158MPA	NF50R158MPA	*	716FR158MPA

* Availble on request - MOQ may apply.

Cable Preparation Tools

PRODUCT DESCRIPTION

The use of the appropriate EUPEN stripping tools enables EUPEN connectors to be fitted with a consistently high standard.

Cable type	Connector reference	Connector type	Connector part number	Tool type	Tool part number	Picture
1/2"	NM50R12	N male	0087	SPTC50R12	0088	
CMC12	NF50R12	N female	B712			
LSC12	716FR12	7-16 female	4075			
RMC12						
5/8"	NM50R58	N male	7087	SPTC50R58	0875	
LSC58	716FR58	7-16 female	7090			
RMC58						
7/8"	NM50R78	N male	J990	SPTC50R78	9323	
LSC78	NF50R78	N female	J991			
RMC78	716FR78	7-16 male	J989			
1-1/4"	NM50R114	N male	0971	SPTC50R114	0972	
LSC114	NF50R114	N female	2146			
RMC114	716MR114	7-16 male	B884			
"A" Series	716FR114	7-16 female	5921			
	NM50R114MPA	N male	I508			
	NF50R114MPA	N female	I511			
	716MR114MPA	7-16 male	I501			
	716FR114MPA	7-16 female	I502			
1-5/8"	NM50R158	N male	5886	SPTC50R158	0876	
LSC158	NF50R158	N female	B887			
RMC158	716FR158	7-16 female	0874			
1-5/8"	NM50R158MPA	N male	J939			
"A" Series	NF50R158MPA	N female	J938			
	716FR158MPA	7-16 female	J937			

FEATURES and BENEFITS

- Fast and reliable preparation of cables
- One-step operation
- Removable handle allowing cutting head to be fitted on a power drill
- Long-lasting cutting blades

Jumper Cables

PRODUCT DESCRIPTION

EUPEN offers jumper cables manufactured with

1/2"-HIFLEX cable (EC4-50-HF / 5092) or
1/2" standard cable (EC4-50 / 5128) and
soldered **DIN 7-16** or
N type connectors in straight or right angle version.
Available in standard PE or optional HLFR jacketing.

The high quality silver plated connectors are designed for watertight applications and optimized for optimum performances.

EUPEN offers jumper cables with a complete watertight DIN 7-16 connectors:

- watertight connector front side by means of two O-rings: one between the inner contact and the dielectric, the other one between the dielectric and the connector body.
- the cable outer conductor is soldered over 360° to the connector body to ensure a perfect water tightness.
- the overmolding of the connector acts as a first protection against water ingress.

FEATURES and BENEFITS

- ***easy, fast and reliable installation***
- ***excellent return loss (VSWR) values***
- ***high screening effectiveness***
- ***low level and stable 3rd oder intermodulation products (IM3)***
- ***water tight according to IP 68***
- ***high mechanical stability***
- ***LTE compliant***

Grounding Kits

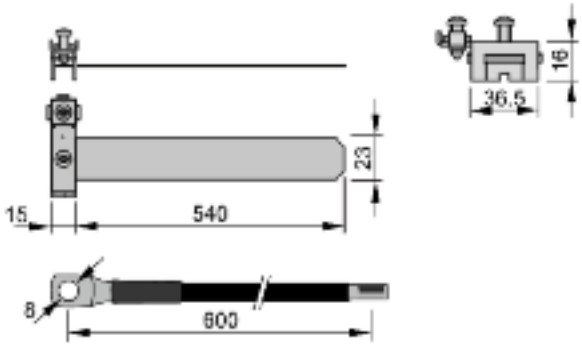
For connectors

PRODUCT DESCRIPTION

- All-purpose earthing clip with 16 mm² grounding conductor for all connector sizes from 1/2" to 1-5/8".

Grounding conductor

Strip earthing clip



FEATURES and BENEFITS

- Fast, easy and reliable installation
- Corrosion resistant
- Multiple use for connector sizes from 1/2" to 1-5/8"

TECHNICAL FEATURES

Strip earthing clip		
• Tightening block and screws material		Nickel-plated brass
• Tightening strap material		Stainless steel
• Clamping diameter range	mm	10 ... 150
• Connection options	mm²	max. 2 conductors 2.5 - 25
Grounding conductor		
• Insulation		PVC (free of lead)
• Color		black
• Cross section	mm²	16 (copper)
• Length	mm	600
• Cable lug	mm	16 x 8
• Screw: Stainless steel, hex socket cap screw	mm	M6 x 20

PRODUCT OVERVIEW

Product reference	Contents
• CGC 12-158	• 1 strip earthing clip
	• 1 earth lead (60 cm) with attached lug + M6 + washer + nut

Additional Weatherproofing Solutions

PRODUCT DESCRIPTION

To provide additional Weatherproofing to Connector Joints of RF Cables

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:

TECHNICAL FEATURES

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

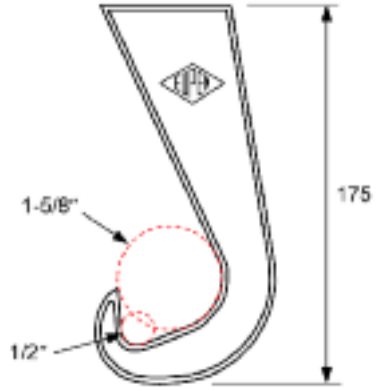
Hook Hanger

PRODUCT DESCRIPTION

The Hook Hanger (Durethan Hanger HLFR) is used for installing Radiating Cables in galleries or tunnels. The optimal distance to the wall is maintained and the hanger is universally for all cable sizes (1/2" to 1-5/8").

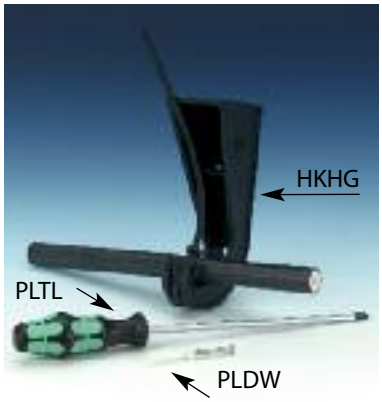
FEATURES and BENEFITS

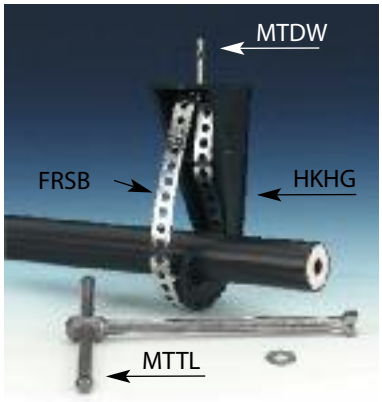
- **Universally for all cable sizes**
- **No spacer required**
- **Suitable for ceiling or wall mount**



TECHNICAL DATA

• Material		Durethan® (PA 6)
• Burning behavior		according to UL 94 V-0, halogen free
• Color		black (RAL 9005)
• Overall dimensions	mm	175 x 85
• Cable diameter	mm	15 to 50
• Maximum load	daN	
- Ceiling mount		100
- Wall mount		20
• Weight	kg	0.115





PRODUCT OVERVIEUW

Product reference	**Contents**
• HKHG	Hook hanger
	Plastic cable tie
	Metal washer (no screw, no dowel)
Other parts for HKHG*	**Contents**
• PLDW	HPS hammer screw with plastic dowel (Ø 6mm)
• MTDW	Metallic HSA stud anchor (M6, V4A)
• FRSB	Fire resistant stainless steel belt (V4A)
• PLTL	Installation tool for HKHG with PLDW
• MTTL	Installation tool for HKHG with MTDW

* must be ordered separately

Clic Clamp

PRODUCT DESCRIPTION

Clic clamps are used for installing radiating cables in galleries and tunnels with or without spacers. The installation is very simple and quick.

CC78

FEATURES and BENEFITS

- Lock with 1 or 2 locking positions
- Automatic locking by pushing cable into clamp, reusable
- Unlocks with screwdriver
- Pivoted hangers allow installation down to -25°C
- Slot design allows installation correction of up to 4.5 mm
- Slot for insertion of flange for rod and stud mounting

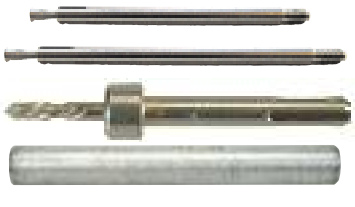
TECHNICAL FEATURES

Clic type		Clic Clamp
• Material		Pure Polyamide, halogen free, fire class UL94HB, UV-resistant
• Environmental		
Operating Temperature	°C	-40 to +110
Installation Temperature	°C	-25 to +60
• Color		standard: black, light grey (RAL 7035) by request

Clic type		for 1/2"	for 5/8"	for 7/8"	for 1-1/4"	for 1-5/8"
• Clamping range	mm	14.3 - 16.8	19.5 - 21.8	27.8 - 31.2	35.5 - 39.5	46.5 - 50.5
• Max. load	N	600	700	850	1100	1300
• Part reference		CC12	CC58	CC78	CC114	CC158

Clic Clamp - Accessories

SPACERS and ACCESSORIES

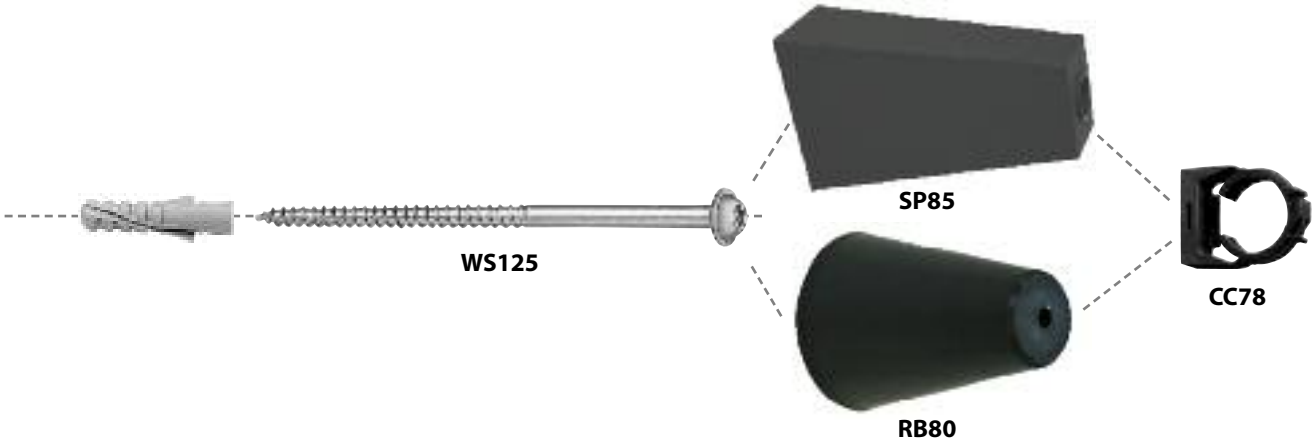
Reference	Description	Use with	Picture
Spacers			
• RB80	Round base spacer 80 mm	WS125, B6/90-SS	
• RB50	Round base spacer 50 mm	WS90, B6/60-SS	
• SP45	Rectangular base spacer 45 mm	WS90	
• SP85	Rectangular base spacer 85 mm	WS125	
• SSP6/75/8	Stainless steel spacer 75 mm	HPM8, FN6	
Flat nuts			
• FN6	Flat nut M6, stainless steel	All clic clamps	
Wood screws, stainless steel			
• WS40	Wood screw 4.5 x 40 Clic Clamp without spacer		
• WS90	Wood screw 4.5 x 90	SP45 or RB50	
• WS125	Wood screw 4.5 x 125	SP85 or RB80	
Bolt with metric thread, stainless steel			
• B6/90-SS	M6 x 90, hex socket head	RB80, HPM6	
• B6/60-SS	M6 x 60, hex socket head	RB50, HPM6	
Plugs			
• P6	Nylon plug for wood screw diameter 4.5 mm	Wood screws	
• HPM6-SS	Stainless steel plug M6	Bolt B6/90-SS	
• HPM8-SS	Stainless steel plug M8	Spacer SSP6/75/8	
• HSP6/84	Stainless steel hammer set plug	FN6, RB80	
• HSP6/90	Stainless steel hammer set plug	FN6, SP85	
• Drill HSP	Drill for installation of the hammer set plugs	HSP6/90	
• Tool HSP	Setting tool of the hammer set plugs	HSP6/90	

Clic Clamp - Installation examples

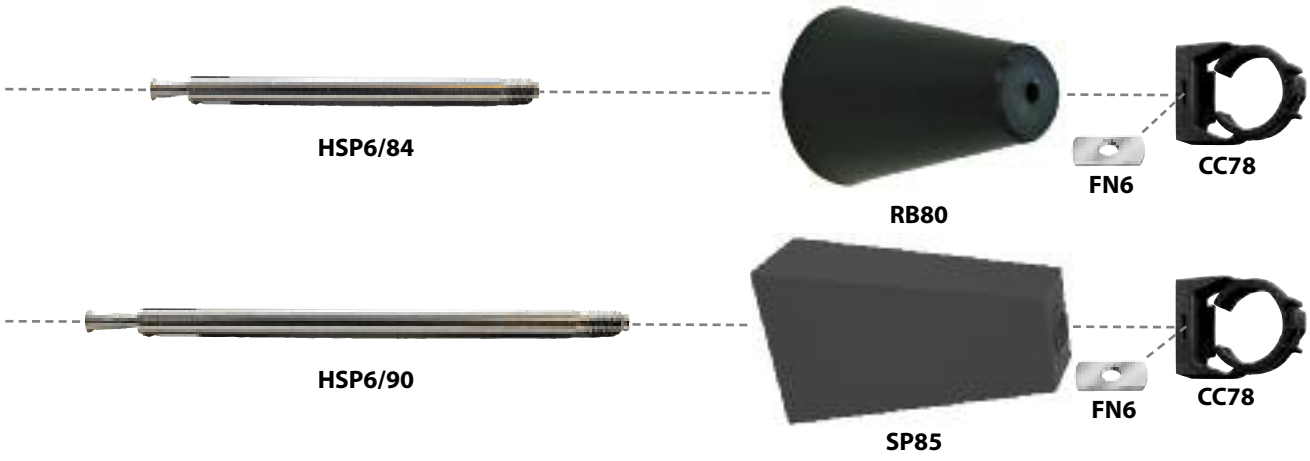
Single-hand installation – a matter of course with CLIC, place the cable, apply slight pressure and the clamp locks itself with a sharp clic.

1. Installation with wood screw and Nylon plug

2. Installation with Spacers, buttonhead wood screw pressed-on washer and Nylon plug



3. Installation with Hammer Set Plug (with or without spacer)



4. Installation with M8/M6 stainless steel spacer, FN6 and flush metal anchor

Stainless Steel Clamping Solutions *(Recomended every 10 m)*

PRODUCT DESCRIPTION

Stainless Stell Cable Clamps are used to provide Fire Resistant installations of Radiating Cables in galleries or tunnels with or without spacers. The installation is very simple and quick. To limit the interference that could be caused by Metal Objects on the RF Field generated by a Radiating Cable, only every 10th fixing should be metallic.

Stainless Steel Cable Clamp

Cable type	Clamp type	Use with
• 1/2"	DN 20	Hammer set plug
• 5/8"	DN 25	HSP6/90
• 7/8"	DN 32	or
• 1-1/4"	DN 46	Stainless Steel spacer
• 1-5/8"	DN 50	SSP6/75/8

TECHNICAL FEATURES

Product Reference	Clamp Type	Ø min. mm	Max. Load (N)
• MCFR12	DN 20	19	450
• MCFR58	DN 25	24	380
• MCFR78	DN 32	31	300
• MCFR114	DN 40	39	230
• MCFR158	DN 50	48	180

Installation with M8/M6 spacer and stainless steel clamp

MCFR114

Stainless Steel Clamping Solutions *(Recomended every 10 m)*

Stainless Steel Clip Hangers

Cable type	Hanger type	Use with
• 1/2″	EUCH-12-NH	Round base RB80
• 5/8″	EUCH-58-NH	and
• 7/8″	EUCH-78-NH	hex head bolt
• 1-1/4″	EUCH-114-NH	B6/90
• 1-5/8″	EUCH-158-NH	

Installation with hex head bold and stainless steel clip hanger

HPM6 **B6/90-SS** **RB80** **EUCH-78-NH**

Passi

DC Isolators - EPC DC Isolators - VHF UHF Directional Couplers - Splitte

EPC 5

EUPEN

ve Components

ers Broadband Hybrid Coupler - Attenuators

EPC DL - Dummy Loads

FEATURES and BENEFITS

- ***Broadband***
- ***Low VSWR***
- ***Nm interface (7-16 on request)***
- ***1,2 or 10 W (other rating on request)***

SPECIFICATIONS

		0 - 6 GHz N male	0 - 18 GHz N male	0 - 18 GHz N male
• Part Number		EPC DL-T1 01	EPC DL-T2 01	EPC DL-T10 01
• Frequency Range	GHz	0 - 6 GHz	0 - 18 GHz	0 - 18 GHz
• Max. Input power	W	1	2	10
• Impedance		Nom. 50 Ω	Nom. 50 Ω	Nom. 50 Ω
• VSWR		<1.15 / 6 GHz	<1.15 / 4 GHz	<1.15/ 4 GHz
• Temperature Range	°C	-30 to +60	-30 to +60	-30 to +60
• Dimensions (L x Ø)	mm	34.5 x 20.8	34.5 x 20.8	73 x 52

EPC DB - DC Isolators (DC Block)

FEATURES and BENEFITS

- ***High RF power rating***
- ***High DC voltage rating***
- ***Small size***
- ***IP 65 rated***
- ***Low Passive Intermodulation***
- ***In-line protection against induced DC (inner/inner & outer/outer)***

SPECIFICATIONS

		N female-female	N male-female (*)	7-16 DIN female-female (*)	7-16 DIN male-female (*)
• Part number		EPC DB-P 01	EPC DB-P 02	EPC DB-P 03	EPC DB-P 04
• Frequency Range	MHz	R1: 50 - 500 R2: 800 - 1100 R3: 1700 - 2500			
• Insertion Loss	dB	R1: < 0.1 R2: < 0.2 R3: < 0.4			
• VSWR		R1, R2: < 1.2 R3: < 1.3			
• Max. voltage	DC	1 kV (Input centre to output centre conductor) 1.4 kV (Centre conductor to ground) 2 kV (Input ground to output ground)			
• Power handling		R1, R2: Max. 250 W R3: Max. 100 W			
• Dimensions (L x W x H)	mm	80 x 42 x 42 with N-connectors 100 x 42 x 42 with 7-16 DIN connectors			

(*) Consult us for MOQ

EPC SP - Splitters

FEATURES and BENEFITS

- ***Low loss***
- ***Good balance***
- ***Wide bandwidth***
- ***Isolated outputs***
- ***Suitable for low power combining***

SPECIFICATIONS

		800 - 2500 MHz N female	10 - 1000 MHz N female	50 - 1000 MHz N female
• Part Number		EPC SP-P2 01	EPC SP-P2 02	EPC SP-P4 03
• Frequency Range	MHz	800 - 2500	40 - 1000	50 - 1000
• Way		2	2	4
• VSWR		< 1.2	< 1.5	≤ 1.3
• Max. Input power	W	200	10	2
• Total loss	dB	< 3.5	≤ 4.8 dB @ 1000 MHz	< 6.8
• Impedance		Nom. 50 Ω	Nom. 50 Ω	Nom. 50 Ω
• Temperature Range	°C	-35 to +50	-30 to +60	-30 to +60
• Dimensions (L x W x H)	mm	212 x 61 x 26	138 x152 x 35	89 x 39 x 29
• Weight approx.	g	401	360	200


EUPEN RMC 158-HLFR "A"
RF
Solution
Frequency

Packin

Cable

ng Information

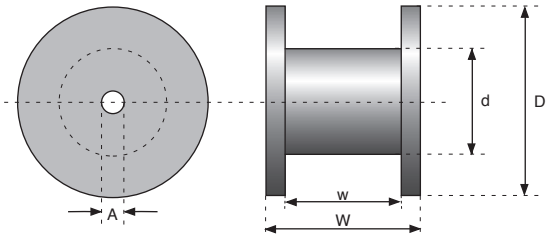
Packing Information 6

Cable Packing 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 and production batch. The drums can be impregnated on request.

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

To calculate the total weight, add the approximate cable weight to the drum weight.



			Cable length		Outer dim.* D		Drum dim. d	
Cable type		**Drum type**	m	(ft)	cm	(in)	cm	(in)
RMC, LSC, CMC	1/2"	HE 10	500	(1640)	100	(39.37)	46	(18.11)
		HE 12	1000	(3280)	120	(47.24)	40	(15.74)
		HE 12	1500	(4921)	120	(47.24)	40	(15.74)
RMC	5/8"	HE 14S	600	(1968)	140	(55.11)	80	(31.49)
		HE 14B	1100	(3600)	140	(55.11)	80	(31.49)
		HF 17S	1800	(5900)	170	(66.92)	90	(35.43)
RMC, LSC	7/8"	HE 14	500	(1640)	140	(55.11)	80	(31.49)
		HF 17B	1000	(3280)	170	(66.92)	90	(35.43)
		HF 20	1500	(4921)	200	(78.74)	90	(35.43)
RMC, LSC	1-1/4"	HF 17S	500	(1640)	170	(66.92)	90	(35.43)
		HF 20	1000	(3280)	200	(78.74)	90	(35.43)
RMC, LSC	1-5/8"	HF 17B	350	(1148)	170	(66.92)	90	(35.43)
		HF 20	600	(1968)	200	(78.74)	90	(35.43)
F-RMC, F-LSC	7/8"	HF 17B	500	(1640)	170	(66.92)	90	(35.43)
		HF 20	1000	(3280)	200	(78.74)	90	(35.43)
F-RMC, F-LSC	1-1/4"	HF 17B	500	(1640)	170	(66.92)	90	(35.43)
		HF 20	1000	(3280)	200	(78.74)	90	(35.43)
F-RMC	1-5/8"	HF 20	600	(1968)	200	(78.74)	90	(35.43)

* battened + 5 cm

** Cables with mica tape: see cable data sheet

*** Depending on the humidity of the wood, drum weights can vary greatly !

Drum label

Outer width W		Inner width w		Shaft hole A		Drum freight Volume		Approx. Drum weight*** drum / battened drum		Approx. Cable weight**	
cm	(in)	cm	(in)	cm	(in)	m^3	(ft^3)	kg	(Lb)	kg/km	(Lb)
70	(27.55)	64	(25.19)	6.5	(2.55)	0.69	(24.36)	16 / 46	(35 / 101)	240	(530)
54	(21.25)	50	(19.68)	6.5	(2.55)	0.78	(27.54)	25 / 55	(55 / 121)	240	(530)
54	(21.25)	50	(19.68)	6.5	(2.55)	0.78	(27.54)	25 / 55	(55 / 121)	240	(530)
42	(16.53)	38.2	(15.03)	8	(3.14)	0.83	(29.31)	40 / 65	(88 / 143)	380	(840)
76	(29.92)	72.2	(28.42)	8	(3.14)	1.50	(52.97)	40 / 85	(88 / 187)	380	(840)
74	(29.13)	64.4	(25.35)	9	(3.54)	2.20	(77.69)	232 / 275	(511 / 605)	380	(840)
76	(29.92)	72	(28.34)	8	(3.14)	1.49	(52.61)	40 / 100	(88 / 220)	500	(1104)
104	(40.94)	98	(38.58)	9	(3.54)	3.03	(107.00)	380 / 470	(837 / 1034)	500	(1104)
116	(45.66)	104	(40.94)	9	(3.54)	4.75	(167.74)	440 / 555	(970 / 1221)	500	(1104)
70	(27.55)	64	(25.19)	9	(3.54)	2.20	(77.69)	232 / 275	(511 / 605)	895	(1980)
116	(45.66)	104	(40.94)	9	(3.54)	4.75	(167.74)	440 / 555	(970 / 1221)	895	(1980)
104	(40.94)	98	(38.58)	9	(3.54)	3.03	(107.00)	380 / 470	(837 / 1034)	925	(2040)
116	(45.66)	104	(40.94)	9	(3.54)	4.75	(167.74)	440 / 555	(970 / 1221)	925	(2040)
104	(40.94)	98	(38.58)	9	(3.54)	3.03	(107.00)	380 / 470	(837 / 1034)	750	(1675)
116	(45.66)	104	(40.94)	9	(3.54)	4.75	(167.74)	440 / 555	(970 / 1221)	750	(1675)
104	(40.94)	98	(38.58)	9	(3.54)	3.03	(107.00)	380 / 470	(837 / 1034)	1230	(2711)
116	(45.66)	104	(40.94)	9	(3.54)	4.75	(167.74)	440 / 555	(970 / 1221)	1230	(2711)
116	(45.66)	104	(40.94)	9	(3.54)	4.75	(167.74)	440 / 555	(970 / 1221)	1300	(2870)

Kabelwerk EUPEN AG

cable

Malmedyer Str. 9 - 4700 EUPEN - BELGIUM

Tel.: +32(0)87.59.70.00 ***Fax: +32(0)87.59.71.00***
http://www.eupen.com ***e-mail:info@eupen.com*** ***ISO Certified Company***

01/2014 - 300