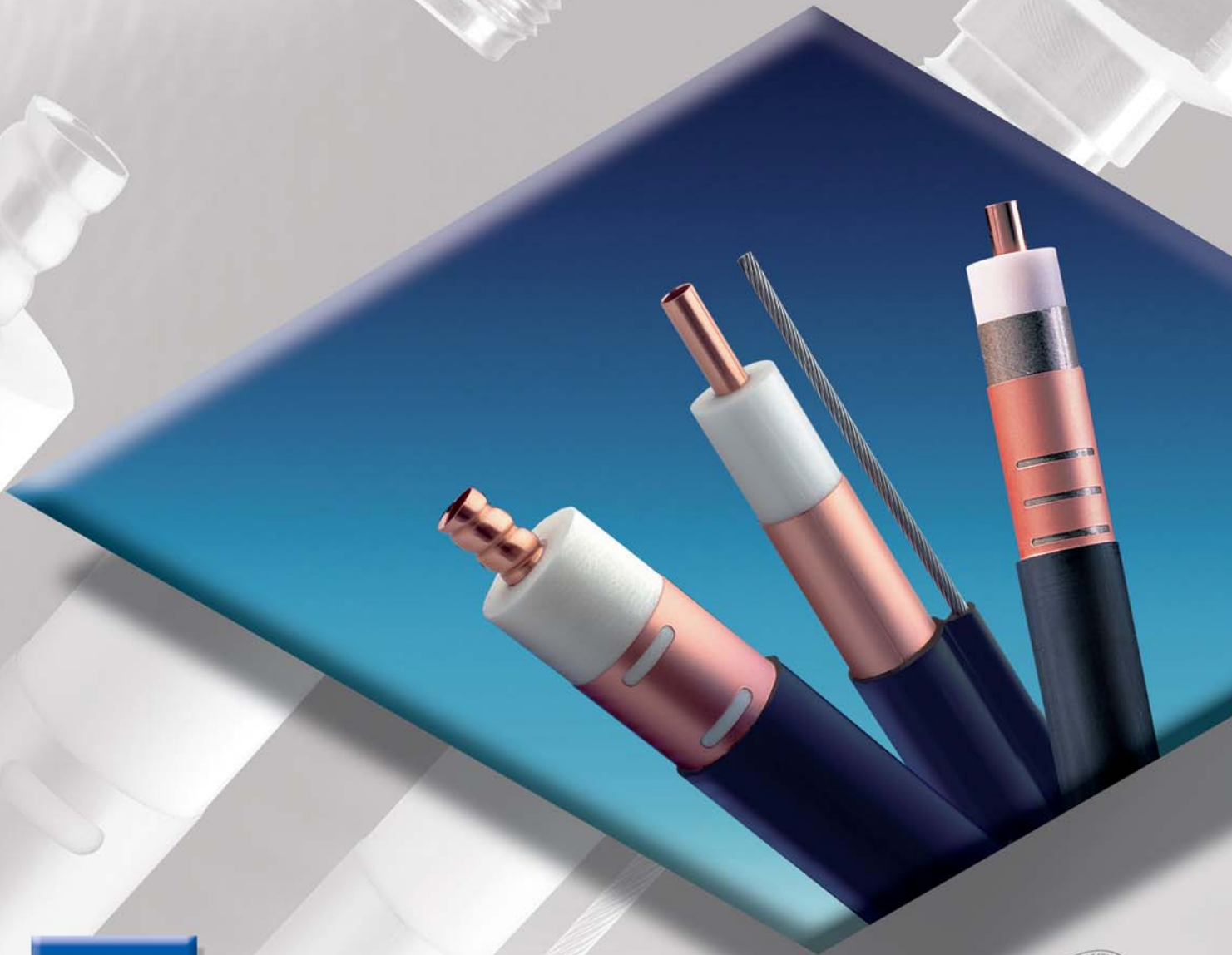
RADIATING CABLES

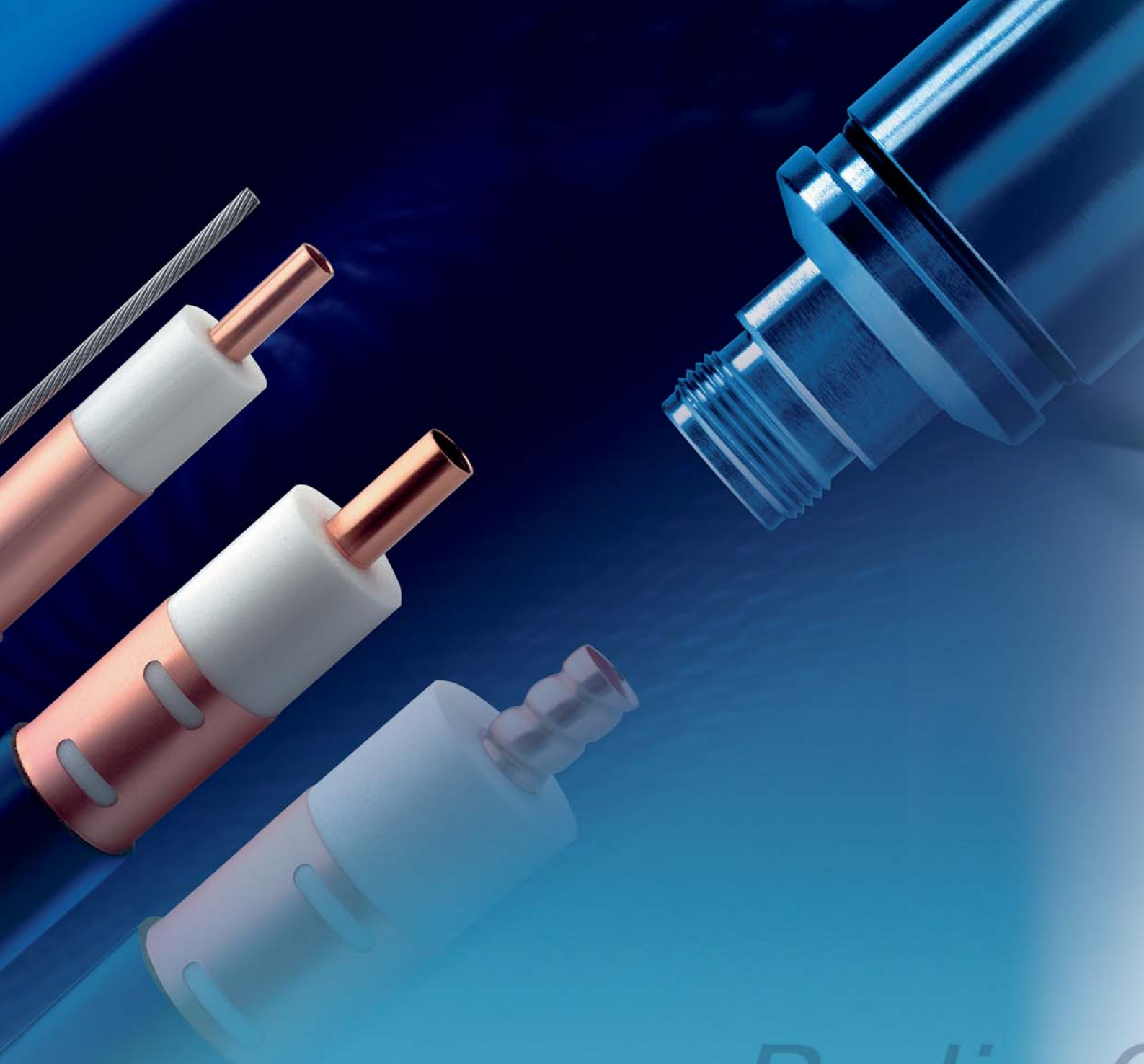
Edition November 2007

RF CABLES for RADIO TRANSMISSION IN CONFINED AREAS



KABELWERK EUPEN AG

CERTIFIED QUALITY SYSTEM ISO 9001 AIB VINCOTTE INTERNATIONAL

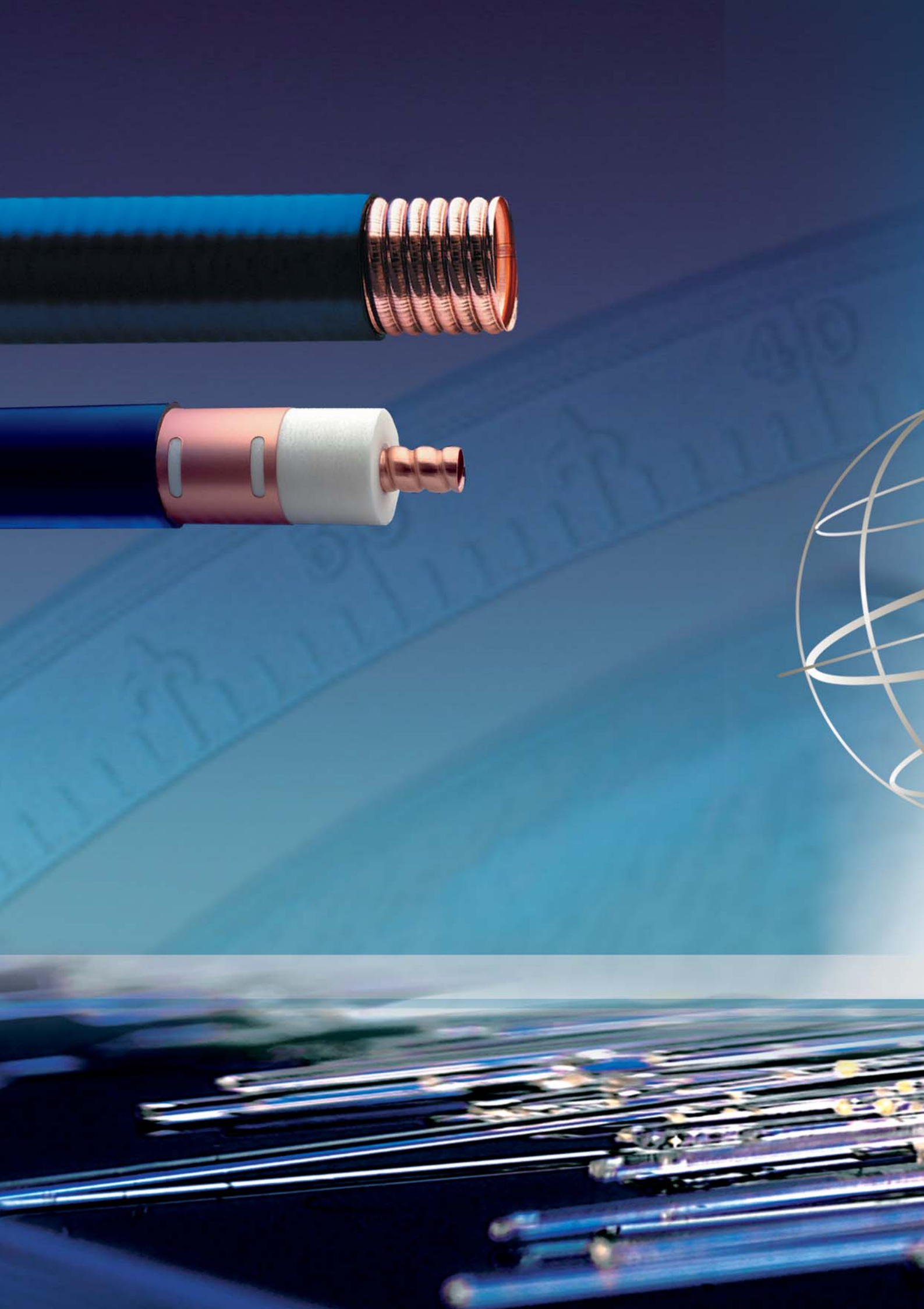


Radio C
for

Contents

Communications
Confined Areas

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



40 Years of Experience

Introduction

40 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
Budapest
Caracas
Kiev
Moscow
Paris
Santiago de Chili
Seoul
Washington, DC

in road tunnels in

Australia
Austria
Belgium
France
Germany
Greece
Norway
Singapore
Spain
the Netherlands

and many other challenging locations.

FREQUENCY

TETRA / TETRAPOL
TDMA/CDMA 800
GSM-R
DCS / GSM 1800
UMTS 2200
WLAN 2400
WLAN 5700

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:

TETRA / TETRAPOL
TDMA / CDMA 800
GSM 900
DCS / GSM 1800
PCN / PCS 1900
UMTS 2200
W-CDMA 2200
DECT 900
Paging systems
GSM-R (European Railway)
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 longitudinal attenuation**
- **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
Denmark
Estonia
Finland
Germany
Greece
Hungary
Ireland
Italy
Latvian Republic
Norway
Poland
Romania
Russia
Spain
Slovenia
Sweden
Tchech Republik
The Netherlands
Turkey
Ukraine

Agencies America

Brazil
Canada
Chile
Columbia
Cuba
USA
Peru
San Salvador

Agencies Africa

Egypt
South Africa

Agencies Asia

Bahrain
Hong Kong
India
Iran
Japan
Jemen
Jordanien
Korea
Lebanon
Pakistan
Kingdom of Saudi Arabia
Singapore
Sri Lanka
Syria
Thailand
Taiwan R.O.C.
UAE

Agencies Oceania

Australia
New Zealand

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GERMANY

FREQUENCY

TETRA / TETRAPOL

TDMA/CDMA 800

GSM-R

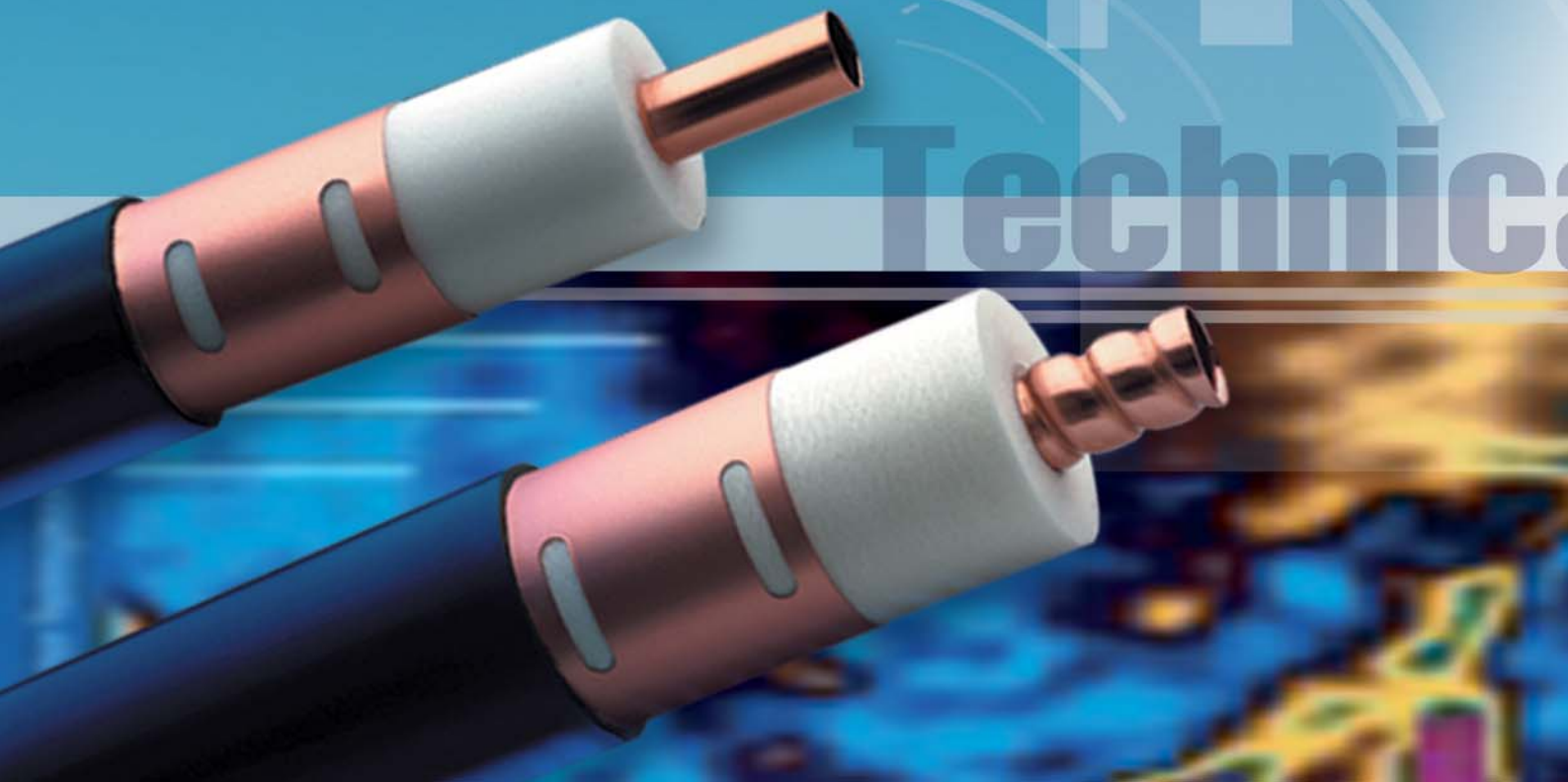
DCS / GSM 1800

UMTS 2200

WLAN 2400

WLAN 5700

Technica



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Technical Parameters

Radiating Cables

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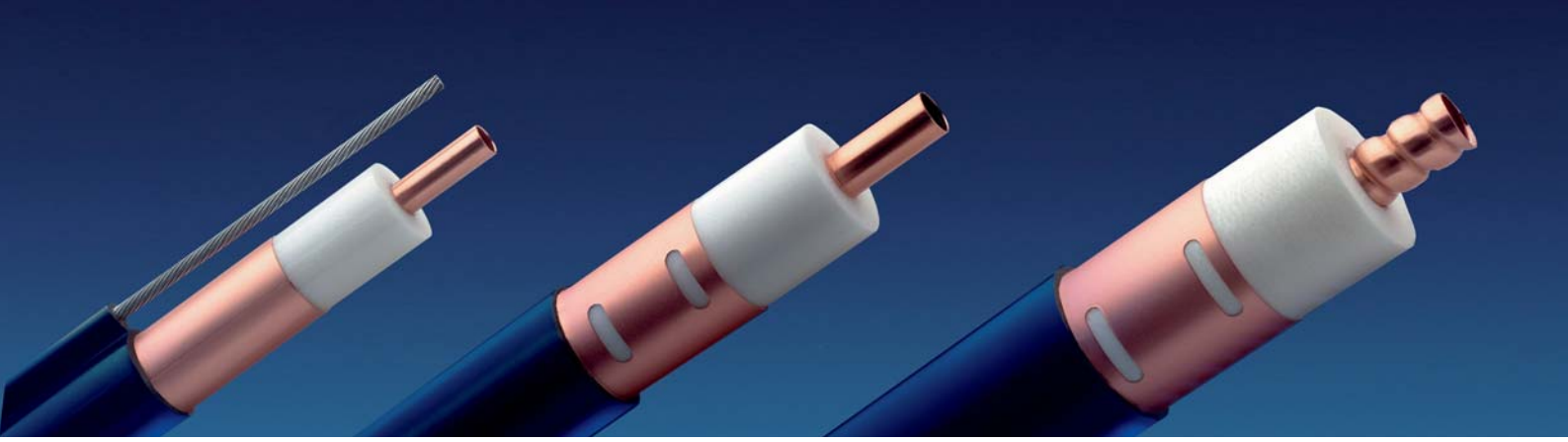


Eupen Cables

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).

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 the cable meets also the requirements of IEC 60331 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

Smoke density

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

Corrosive gas emissions

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

Insulation integrity

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.

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

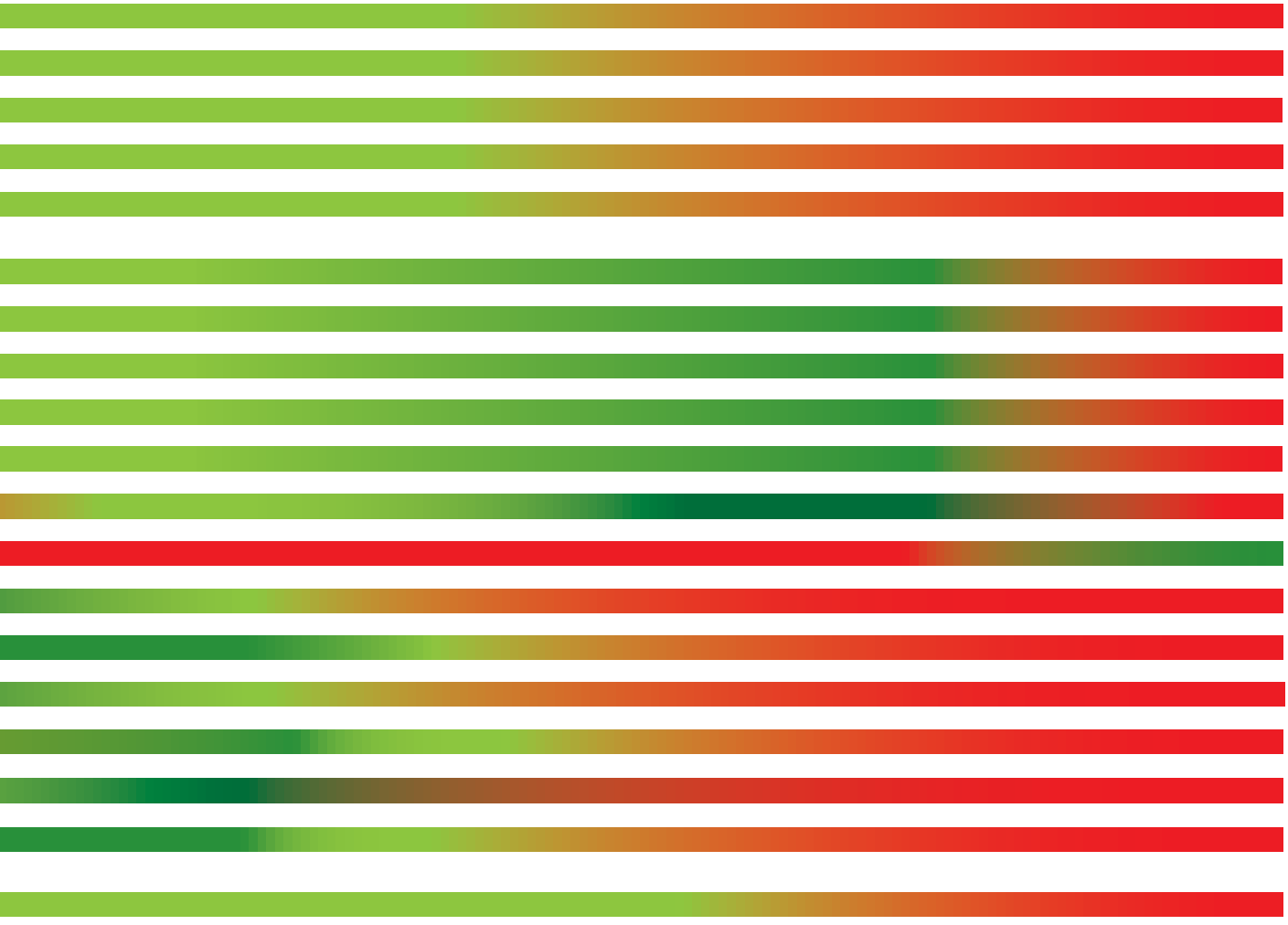
Cable Selection Guide

Frequency Bands	*75 - 100 MHz*	*150 - 170 MHz*	*400 - 500 MHz*
Applications	**FM PMR**	**PMR**	**PMR TETRA TETRAPOL**

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**



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

F-LSC 78

PRODUCT DESCRIPTION

Reference suffix "-HLFR

Fire behaviour

Reference suffix "-HLFR/M

Fire behaviour

FEATURES and BENEFITS

TECHNICAL

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TECHNI

• Size
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• Recom
• Cable
• Jacke
• Slot
• Impe
• Velo
• Ca
• In
• O
• Te

iating Cable
haracteristics

CAL FEATURES

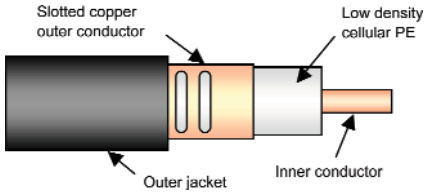
			7/8"
s Model Number			F 522RC8R-HLFR / F 522MRC8R-HLFR (with Mica)
ncy Range		MHz	30 - 2000
mended for Frequency		MHz	N.A.
Type			LSC (Leaky Section Cable)
t			HLFR (Halogen Free Low Smoke Flame Retardant)
Design			Groups of Slots at longer intervals
edance			50 +/- 2
city Ratio		%	88
pacitance		pF/m	76
er Conductor dc Resistance	/1000 m (	/1000 ft)	1.05 (0.32)
ter Conductor dc Resistance	/1000 m (	/1000 ft)	1.40 (0.43)
nner Conductor Material			Smooth copper tube
Dielectric Material			Cellular polyethylene
Outer Conductor Material			Overlapping copper foil, with slot groups, bonded to the jacket

LSC 12

PRODUCT DESCRIPTION

LSC 12-HLFR

Reference suffix [1] : -HLFR

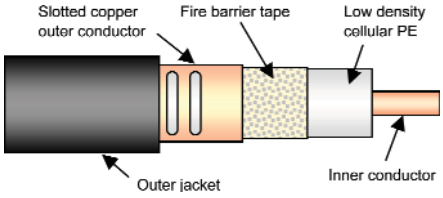


Fire behaviour

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

LSC 12-HLFR/M

Reference suffix [1] : -HLFR/M



Fire behaviour

Halogen free and flame retardant outer sheath + mica insulated fire barrier tape, under the outer conductor,
acc. to IEC 60754-2, 60332-1, 60332-3 cat. C, 61034,
circuit integrity under fire conditions acc. to IEC 60331.
Flame temperature = 750°C / voltage = 150 V / flame application = 180 min.

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

TECHNICAL FEATURES

• Size		1/2"
• Previous Model Number		512RC8R-HLFR / 512MRC8R-HLFR (with Mica)
• 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 / 0.94 (0.29) HLFR/M
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	2.62 (0.80)
• Inner Conductor Material		Copper clad aluminium wire (HLFR) / copper wire (HLFR/M)
• 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 / 0.34 (0.23) HLFR/M
• 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%	C95%
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 tolerance.

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

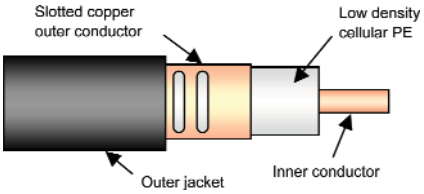
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

LSC 58

PRODUCT DESCRIPTION

LSC 58-HLFR

Reference suffix [1] : -HLFR

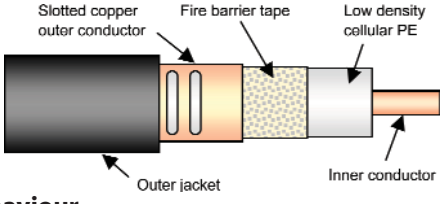


Fire behaviour

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

LSC 58-HLFR/M

Reference suffix [1] : -HLFR/M



Fire behaviour

Halogen free and flame retardant outer sheath + mica insulated fire barrier tape, under the outer conductor,
acc. to IEC 60754-2, 60332-1, 60332-3 cat. C, 61034,
circuit integrity under fire conditions acc. to IEC 60331.
Flame temperature = 750°C / voltage = 150 V / flame application = 180 min.

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

TECHNICAL FEATURES

• Size		5/8"
• Previous Model Number		517RC8R-HLFR / 517MRC8R-HLFR (with Mica)
• 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)	0.7 (0.21) HLFR
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.9 (0.58)
• Inner Conductor Material		Copper clad aluminium (HLFR) / copper wire (HLFR/M)
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping copper foil, with slot groups, bonded to the jacket

LSC 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 (11.81)
• Cable Weight	kg/m (lb/ft)	0.405 (0.27) HLFR / 0.431 (0.29) HLFR/M
• Tensile Strength	daN (lb)	150 (331)
• 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%	C95%
75 MHz	1.36 (0.41)	65	77
150 MHz	2.01 (0.61)	65	77
225 MHz	2.54 (0.77)	65	77
450 MHz	3.86 (1.18)	65	77
900 MHz	6.00 (1.83)	65	78
1800 MHz	10.6 (3.23)	65	78
1900 MHz	11.5 (3.49)	65	78
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 tolerance.

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

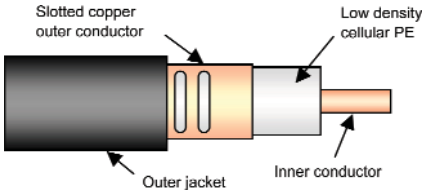
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

LSC 78

PRODUCT DESCRIPTION

LSC 78-HLFR

Reference suffix [1] : -HLFR

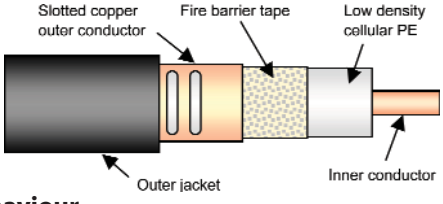


Fire behaviour

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

LSC 78-HLFR/M

Reference suffix [1] : -HLFR/M



Fire behaviour

Halogen free and flame retardant outer sheath + mica insulated fire barrier tape, under the outer conductor,
acc. to IEC 60754-2, 60332-1, 60332-3 cat. C, 61034,
circuit integrity under fire conditions acc. to IEC 60331.
Flame temperature = 750°C / voltage = 150 V / flame application = 180 min.

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

TECHNICAL FEATURES

• Size		7/8"
• Previous Model Number		522RC8R-HLFR / 522MRC8R-HLFR (with Mica)
• 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)	1.38 (0.42)
• 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)	9.1 (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)	0.511 (0.34) HLFR / 0.524 (0.35) HLFR/M
• Tensile Strength	daN (lb)	160 (353)
• 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%	C95%
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 tolerance.

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

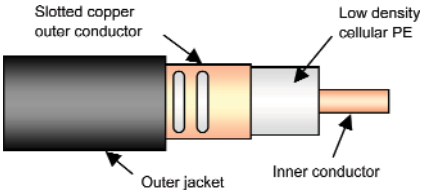
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

LSC 78-75 (75 Ohm)

PRODUCT DESCRIPTION

LSC 78-75-HLFR

Reference suffix [1] : -HLFR

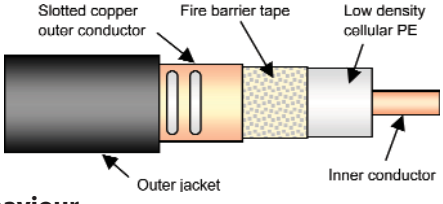


Fire behaviour

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

LSC 78-75-HLFR/M

Reference suffix [1] : -HLFR/M



Fire behaviour

Halogen free and flame retardant outer sheath + mica insulated fire barrier tape, under the outer conductor,
acc. to IEC 60754-2, 60332-1, 60332-3 cat. C, 61034,
circuit integrity under fire conditions acc. to IEC 60331.
Flame temperature = 750°C / voltage = 150 V / flame application = 180 min.

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

- 75 Ohm impedance
- 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

TECHNICAL FEATURES

• Size		7/8"
• Previous Model Number		722RC8R-HLFR / 722MRC8R-HLFR (with Mica)
• 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	75 +/- 2
• Velocity Ratio	%	88
• Capacitance	pF/m	50
• Inner Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	0.66 (0.20)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.40 (0.43)
• Inner Conductor Material		Copper wire
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping copper foil, with slot groups, bonded to the jacket

LSC 78-75 (75 Ohm)

TECHNICAL FEATURES (continued)

• Diameter Inner Conductor	mm (in)	5.7 (0.22)
• 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)	0.621 (0.42) HLFR / 0.634 (0.43) HLFR/M
• Tensile Strength	daN (lb)	180 (397)
• 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%	C95%
75 MHz	0.86 (0.26)	67	79
150 MHz	1.33 (0.41)	65	77
225 MHz	1.73 (0.53)	65	77
450 MHz	2.82 (0.86)	64	76
900 MHz	4.73 (1.44)	65	77
1800 MHz	9.47 (2.89)	69	81
1900 MHz	10.40 (3.17)	69	81
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 tolerance.

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

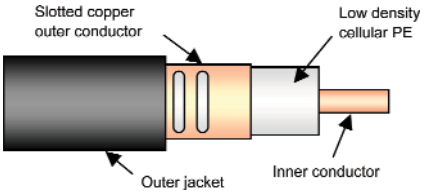
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

LSC 114

PRODUCT DESCRIPTION

LSC 114-HLFR

Reference suffix [1] : -HLFR

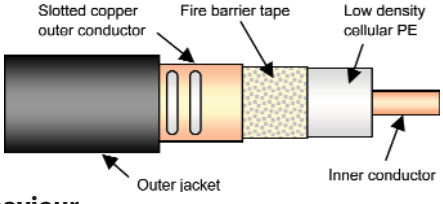


Fire behaviour

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[2]

LSC 114-HLFR/M

Reference suffix [1] : -HLFR/M



Fire behaviour

Halogen free and flame retardant outer sheath + mica insulated fire barrier tape, under the outer conductor,
acc. to IEC 60754-2, 60332-1, 60332-3 cat. C, 61034[2],
circuit integrity under fire conditions acc. to IEC 60331.
Flame temperature = 750°C / voltage = 150 V / flame application = 180 min.

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

TECHNICAL FEATURES

• Size		1-1/4"
• Previous Model Number		532RC8R-HLFR / 532MRC8R-HLFR (with Mica)
• 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)	0.73 (0.22)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.0 (0.30)
• Inner Conductor Material		Smooth copper tube
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping copper foil, with slot groups, bonded to the jacket

LSC 114

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)	400 (15.7)
• Cable Weight	kg/m (lb/ft)	0.894 (0.60) HLFR / 0.918 (0.62) HLFR/M
• Tensile Strength	daN (lb)	180 (397)
• 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 [3]		

Frequency	Longitudinal Loss	Coupling Loss	
	dB/100 m (dB/100 ft)	C50%	C95%
75 MHz	0.76 (0.23)	63	72
150 MHz	1.13 (0.34)	67	77
225 MHz	1.44 (0.44)	67	76
450 MHz	2.22 (0.68)	64	72
900 MHz	3.69 (1.12)	64	75
1800 MHz	9.75 (2.97)	58	69
1900 MHz	11.0 (3.36)	58	69
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] 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 tolerance.

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

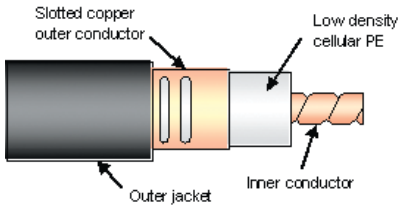
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

LSC 158

PRODUCT DESCRIPTION

LSC 158-HLFR

Reference suffix [1] : -HLFR

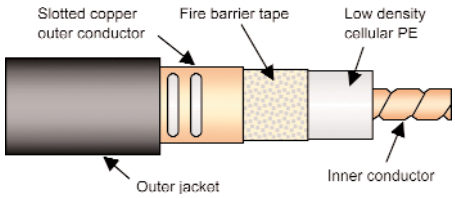


Fire behaviour

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[2]

LSC 158-HLFR/M

Reference suffix [1] : -HLFR/M



Fire behaviour

Halogen free and flame retardant outer sheath + mica insulated fire barrier tape, under the outer conductor,
acc. to IEC 60754-2, 60332-1, 60332-3 cat. C, 61034[2],
circuit integrity under fire conditions acc. to IEC 60331.
Flame temperature = 750°C / voltage = 150 V / flame application = 180 min.

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

TECHNICAL FEATURES

• Size		1-5/8"
• Previous Model Number		543RC8R-HLFR / 543MRC8R-HLFR (with Mica)
• 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)	1.40 (0.43)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	0.77 (0.23)
• Inner Conductor Material		Corrugated copper tube
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping copper foil, with slot groups, bonded to the jacket

LSC 158

TECHNICAL FEATURES (continued)

• Diameter Inner Conductor	mm (in)	17.3 (0.68)
• Diameter Dielectric	mm (in)	43.0 (1.69)
• Diameter over Jacket	mm (in)	48.0 (1.89)
• Minimum Bending Radius, Single Bend	mm (in)	500 (19.7)
• Cable Weight	kg/m (lb/ft)	1.102 (0.74) HLFR / 1.130 (0.76) HLFR/M
• Tensile Strength	daN (lb)	200 (441)
• 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 [3]		

Frequency	Longitudinal Loss	Coupling Loss	
	dB/100 m (dB/100 ft)	C50%	C95%
75 MHz	0.59 (0.18)	71	80
150 MHz	0.90 (0.27)	70	80
225 MHz	1.17 (0.36)	69	80
450 MHz	1.86 (0.57)	67	78
900 MHz	3.17 (0.97)	65	76
1800 MHz	7.93 (2.42)	65	75
1900 MHz	8.89 (2.71)	65	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] 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 tolerance.

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

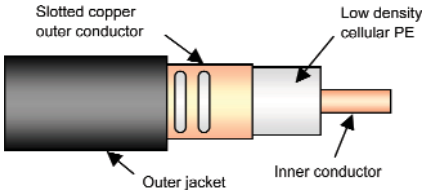
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

RMC 12

PRODUCT DESCRIPTION

RMC 12-HLFR

Reference suffix [1] : -HLFR

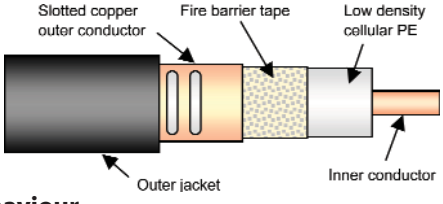


Fire behaviour

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

RMC 12-HLFR/M

Reference suffix [1] : -HLFR/M



Fire behaviour

Halogen free and flame retardant outer sheath + mica insulated fire barrier tape, under the outer conductor,
acc. to IEC 60754-2, 60332-1, 60332-3 cat. C, 61034,
circuit integrity under fire conditions acc. to IEC 60331.
Flame temperature = 750°C / voltage = 150 V / flame application = 180 min.

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 / 512MRC8RM-HLFR (with Mica)
• 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 / 0.94 (0.29) HLFR/M
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	2.90 (0.88)
• Inner Conductor Material		Copper clad aluminium (HLFR) / copper wire (HLFR/M)]
• 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)	0.232 (0.16) HLFR / 0.239 (0.16) HLFR/M
• Tensile Strength	daN (lb)	110 (243)
• Indication of Slot Alignment		Sheath marking
• 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%	C95%
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 tolerance.

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

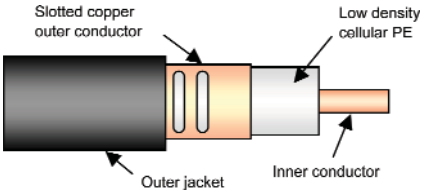
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

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)	0.207 (0.14) HLFR
• Tensile Strength	daN (lb)	110 (242)
• Indication of Slot Alignment		Sheath marking
• 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%	C95%
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 tolerance.

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

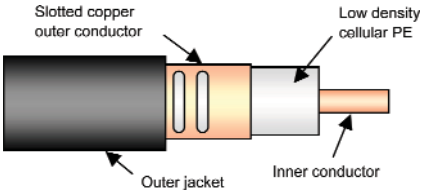
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

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	2000 - 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)	0.232 (0.16) HLFR
• Tensile Strength	daN (lb)	110 (243)
• Indication of Slot Alignment		Sheath marking
• 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%	C95%
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 tolerance.

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

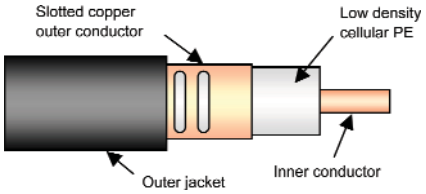
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

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 GHz and 5.47 - 5.85 GHz bands

TECHNICAL FEATURES

• Size		1/2"
• Previous Model Number		N.A.
• Frequency Range	GHz	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)	0.232 (0.16) HLFR
• Tensile Strength	daN (lb)	110 (243)
• Indication of Slot Alignment		Sheath marking
• 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 Attenuation between 5.15 and 5.85 GHz

Configurations	Longitudinal Attenuation	
	5.15 GHz	5.85 GHz
	dB/100 m (dB/100 ft)	
• RC at 10 cm from a concrete floor	22.5 (6.86)	24 (7.32)
• RC at 15 mm from a metal surface	24.2 (7.38)	27 (8.23)
• RC directly against a metal surface	25 (7.62)	27 (8.23)

• Coupling Loss and Peak to peak variations at 5.20 and 5.70 GHz (radial antenna orientation)

Antenna to RC distance	Coupling Loss C50%		Peak to peak variations	
	5.20 GHz	5.70 GHz		
cm	dB		dB	
2	36	35	16	10
5	39	38	7	6
10	42	40	6	6
20	45	44	5	5
50	49	47	4	5

• 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)	N.A.

[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 tolerance.

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

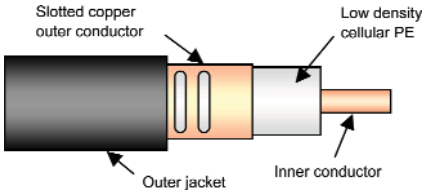
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

RMC 58

PRODUCT DESCRIPTION

RMC 58-HLFR

Reference suffix [1] : -HLFR

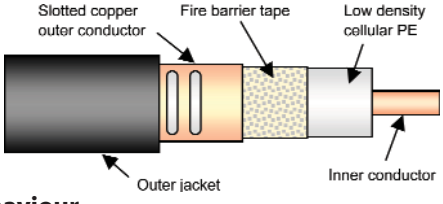


Fire behaviour

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

RMC 58-HLFR/M

Reference suffix [1] : -HLFR/M



Fire behaviour

Halogen free and flame retardant outer sheath + mica insulated fire barrier tape, under the outer conductor,
acc. to IEC 60754-2, 60332-1, 60332-3 cat. C, 61034,
circuit integrity under fire conditions acc. to IEC 60331.
Flame temperature = 750°C / voltage = 150 V / flame application = 180 min.

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 / 517MRC8RM-HLFR (with Mica)
• 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)	0.70 (0.21)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	2.04 (0.62)
• Inner Conductor Material		Copper clad aluminium wire / 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)	0.405 (0.272) HLFR / 0.431 (0.28) HLFR/M
• Tensile Strength	daN (lb)	150 (331)
• 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%	C95%
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	119, 358, 597, 835, 1074, 1313, 1551, 1790 ±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 tolerance.

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

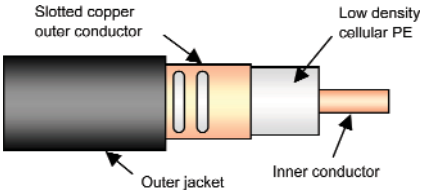
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

RMC 78

PRODUCT DESCRIPTION

RMC 78-HLFR

Reference suffix [1] : -HLFR

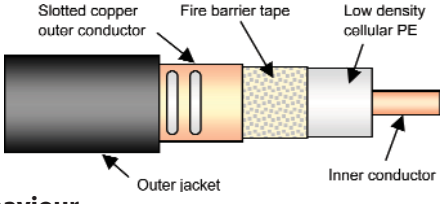


Fire behaviour

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

RMC 78-HLFR/M

Reference suffix [1] : -HLFR/M



Fire behaviour

Halogen free and flame retardant outer sheath + mica insulated fire barrier tape, under the outer conductor,
acc. to IEC 60754-2, 60332-1, 60332-3 cat. C, 61034,
circuit integrity under fire conditions acc. to IEC 60331.
Flame temperature = 750°C / voltage = 150 V / flame application = 180 min.

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 - FM, TETRA, GSM, DCS-1800, UMTS, WLAN

TECHNICAL FEATURES

• Size		7/8"
• Previous Model Number		522RC8RM-HLFR / 522MRC8RM-HLFR (with Mica)
• Frequency Range	MHz	30 - 2500
• Recommended for Frequency	MHz	1800 and 2200
• 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)	1.38 (0.42)
• 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)	9.1 (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)	0.511 (0.34) HLFR / 0.524 (0.35) HLFR/M
• Tensile Strength	daN (lb)	160 (353)
• Indication of Slot Alignment		Sheath marking + printed line
• 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%	C95%
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

• 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 tolerance.

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

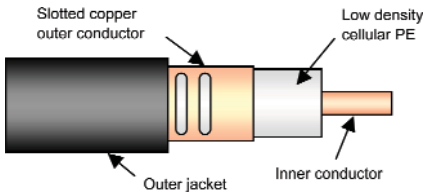
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

RMC 78-T

PRODUCT DESCRIPTION

RMC 78-T-HLFR

Reference suffix [1] : -HLFR

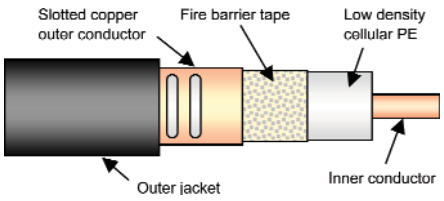


Fire behaviour

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

RMC 78-T-HLFR/M

Reference suffix [1] : -HLFR/M



Fire behaviour

Halogen free and flame retardant outer sheath + mica insulated fire barrier tape, under the outer conductor,
acc. to IEC 60754-2, 60332-1, 60332-3 cat. C, 61034,
circuit integrity under fire conditions acc. to IEC 60331.
Flame temperature = 750°C / voltage = 150 V / flame application = 180 min.

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		7/8"
• Previous Model Number		522RC8RMT-HLFR / 522MRC8RMT-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)	1.38 (0.42)
• 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-T

TECHNICAL FEATURES (continued)

• Diameter Inner Conductor	mm (in)	9.1 (0.36)
• Diameter Dielectric	mm (in)	23.5 (0.93)
• Diameter over Jacket	mm (in)	27.0 (1.06)
• Minimum Bending Radius	mm (in)	350 (13.78)
• Cable Weight	kg/m (lb/ft)	0.511 (0.34) HLFR / 0.524 (0.35) HLFR/M
• Tensile Strength	daN (lb)	160 (354)
• Indication of Slot Alignment		Print Line on Cable Jacket
• 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%	C95%
75 MHz	1.1 (0.34)	57	63
150 MHz	1.8 (0.55)	61	72
225 MHz	2.0 (0.61)	60	68
400 MHz	2.7 (0.82)	53	57
450 MHz	2.9 (0.88)	52	55
900 MHz	5.1 (1.55)	67	77
1800 MHz	-	-	-
1900 MHz	-	-	-
2200 MHz	-	-	-

• Resonant Frequencies	MHz	37, 111, 184, 258, 332, 406 ±5, 479, 553, 627, 700, 774, 848, 922, 995
• Clamp Spacing Recommended / Maximum	m (ft)	1 (3.3) / 1.5 (4.90)
• 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 tolerance.

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

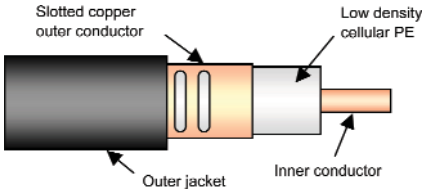
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

RMC 78-B

PRODUCT DESCRIPTION

RMC 78-B-HLFR

Reference suffix [1] : -HLFR

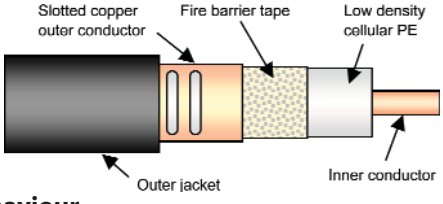


Fire behaviour

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

RMC 78-B-HLFR/M

Reference suffix [1] : -HLFR/M



Fire behaviour

Halogen free and flame retardant outer sheath + mica insulated fire barrier tape, under the outer conductor,
acc. to IEC 60754-2, 60332-1, 60332-3 cat. C, 61034,
circuit integrity under fire conditions acc. to IEC 60331.
Flame temperature = 750°C / voltage = 150 V / flame application = 180 min.

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 2.0 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 / 522MRC8RMB-HLFR (with Mica)
• Frequency Range	MHz	30 - 2000
• Recommended for Frequency	MHz	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	%	88
• Capacitance	pF/m	76
• Inner Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.38 (0.42)
• 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-B

TECHNICAL FEATURES (continued)

• Diameter Inner Conductor	mm (in)	9.1 (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)	0.511 (0.34) HLFR / 0.524 (0.35) HLFR/M
• Tensile Strength	daN (lb)	160 (353)
• Indication of Slot Alignment		Sheath marking + printed line
• 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%	C95%
75 MHz	1.03 (0.31)	69	80
150 MHz	1.46 (0.45)	59	63
225 MHz	1.79 (0.55)	60	65
450 MHz	2.64 (0.80)	63	66
900 MHz	4.39 (1.34)	56	59
1800 MHz	6.40 (1.95)	66	76
1900 MHz	6.55 (2.00)	66	76
2200 MHz	-	-	-
2400 MHz	-	-	-

• Resonant Frequencies	MHz	65, 195, 325, 455 ±5, 585, 715, 845, 975 ±5, 1105, 1235, 1364, 1494, 1624, 1754, 1884
• 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 tolerance.

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

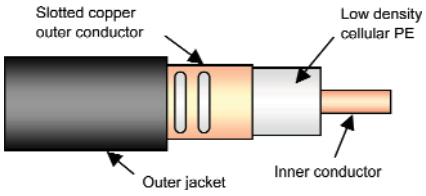
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

RMC 114

PRODUCT DESCRIPTION

RMC 114-HLFR

Reference suffix [1] : -HLFR

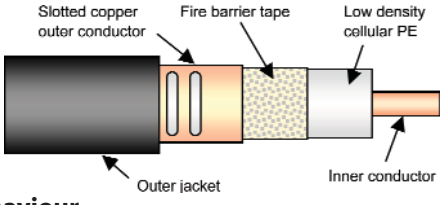


Fire behaviour

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[2]

RMC 114-HLFR/M

Reference suffix [1] : -HLFR/M



Fire behaviour

Halogen free and flame retardant outer sheath + mica insulated fire barrier tape, under the outer conductor,
acc. to IEC 60754-2, 60332-1, 60332-3 cat. C, 61034[2],
circuit integrity under fire conditions acc. to IEC 60331.
Flame temperature = 750°C / voltage = 150 V / flame application = 180 min.

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, DCS-1800, UMTS, WLAN

TECHNICAL FEATURES

• Size		1-1/4"
• Previous Model Number		532RC8RM-HLFR / 532MRC8RM-HLFR (with Mica)
• Frequency Range	MHz	30 - 2500
• Recommended for Frequency	MHz	1800 and 2200
• 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)	0.73 (0.22)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.0 (0.30)
• Inner Conductor Material		Smooth copper tube
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping copper foil, with slot groups, bonded to the jacket

RMC 114

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)	400 (15.7)
• Cable Weight	kg/m (lb/ft)	0.894 (0.60) HLFR / 0.918 (0.62) HLFR/M
• Tensile Strength	daN (lb)	180 (397)
• Indication of Slot Alignment		Sheath marking + printing line
• 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%	C95%
75 MHz	0.77 (0.23)	61	72
150 MHz	1.04 (0.32)	73	84
225 MHz	1.25 (0.38)	69	73
450 MHz	1.83 (0.56)	73	83
900 MHz	2.99 (0.91)	64	71
1800 MHz	5.36 (1.63)	61	68
1900 MHz	5.72 (1.74)	60	67
2200 MHz	7.15 (2.18)	58	65
2400 MHz	8.55 (2.61)	57	64

• 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] 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 tolerance.

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

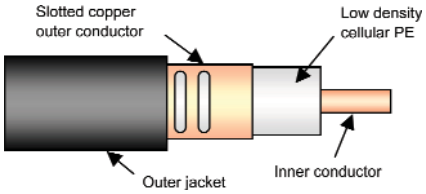
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

RMC 114-T

PRODUCT DESCRIPTION

RMC 114-T-HLFR

Reference suffix [1] : -HLFR

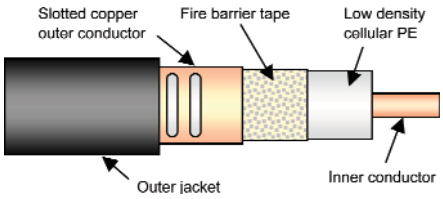


Fire behaviour

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[2]

RMC 114-T-HLFR/M

Reference suffix [1] : -HLFR/M



Fire behaviour

Halogen free and flame retardant outer sheath + mica insulated fire barrier tape, under the outer conductor,
acc. to IEC 60754-2, 60332-1, 60332-3 cat. C, 61034[2],
circuit integrity under fire conditions acc. to IEC 60331.
Flame temperature = 750°C / voltage = 150 V / flame application = 180 min.

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"
• Previous Model Number		532RC8RMT-HLFR / 532MRC8RMT-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)	0.73 (0.22)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.0 (0.30)
• Inner Conductor Material		Smooth copper tube
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping copper foil, with slot groups, bonded to the jacket

RMC 114-T

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)	400 (15.7)
• Cable Weight	kg/m (lb/ft)	0.894 (0.60) HLFR / 0.918 (0.62) HLFR/M
• Tensile Strength	daN (lb)	180 (397)
• Indication of Slot Alignment		Printed line on Cable jacket
• 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%	C95%
75 MHz	0.80 (0.24)	58	69
150 MHz	1.25 (0.38)	62	73
225 MHz	1.40 (0.43)	64	72
400 MHz	2.00 (0.61)	56	60
450 MHz	2.20 (0.67)	55	58
900 MHz	2.97 (0.91)	67	76
1800 MHz	-	-	-
1900 MHz	-	-	-
2200 MHz	-	-	-
2400 MHz	-	-	-

• 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 tolerance.

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

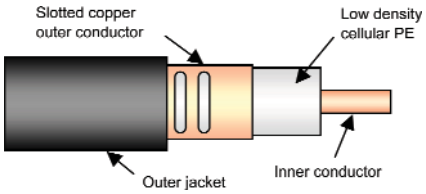
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

RMC 114-B

PRODUCT DESCRIPTION

RMC 114-B-HLFR

Reference suffix [1] : -HLFR

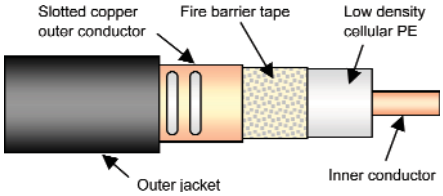


Fire behaviour

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[2]

RMC 114-B-HLFR/M

Reference suffix [1] : -HLFR/M



Fire behaviour

Halogen free and flame retardant outer sheath + mica insulated fire barrier tape, under the outer conductor,
acc. to IEC 60754-2, 60332-1, 60332-3 cat. C, 61034[2],
circuit integrity under fire conditions acc. to IEC 60331.
Flame temperature = 750°C / voltage = 150 V / flame application = 180 min.

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 2.0 GHz
- Robust Cable, with low bending radius
- Main Applications: Tunnel - GSM, GSM-R, DCS-1800

TECHNICAL FEATURES

• Size		1-1/4"
• Previous Model Number		532RC8RMB-HLFR / 532MRC8RMB-HLFR (with Mica)
• Frequency Range	MHz	30 -2000
• Recommended for Frequency	MHz	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	%	88
• Capacitance	pF/m	76
• Inner Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	0.73 (0.22)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.0 (0.30)
• Inner Conductor Material		Smooth copper tube
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping copper foil, with slot groups, bonded to the jacket

RMC 114-B

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)	400 (15.7)
• Cable Weight	kg/m (lb/ft)	0.879 (0.591) HLFR / 0.918 (0.620) HLFR/M
• Tensile Strength	daN (lb)	180 (397)
• Indication of Slot Alignment		Printed line on cable
• 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%	C95%
75 MHz	0.80 (0.32)	59	70
150 MHz	1.00 (0.37)	60	68
225 MHz	1.25 (0.41)	67	78
450 MHz	1.80 (0.62)	61	65
900 MHz	3.35 (1.10)	54	58
1800 MHz	5.05 (1.46)	64	73
1900 MHz	5.10 (1.49)	63	72
2200 MHz	-	-	-
2400 MHz	-	-	-

• Resonant Frequencies	MHz	65, 195, 325, 455 ±2, 585, 715, 845, 975 ±5, 1105, 1235, 1364, 1494, 1624, 1754, 1884
• Clamp Spacing Recommended / Maximum	m (ft)	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 tolerance.

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

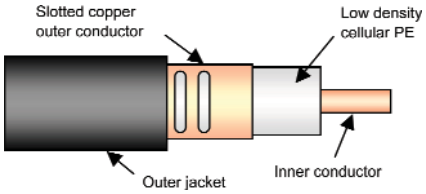
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

RMC 114-L

PRODUCT DESCRIPTION

RMC 114-L-HLFR

Reference suffix [1] : -HLFR

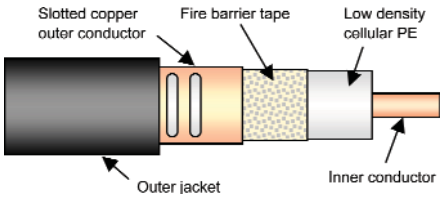


Fire behaviour

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[2]

RMC 114-L-HLFR/M

Reference suffix [1] : -HLFR/M



Fire behaviour

Halogen free and flame retardant outer sheath + mica insulated fire barrier tape, under the outer conductor,
acc. to IEC 60754-2, 60332-1, 60332-3 cat. C, 61034[2],
circuit integrity under fire conditions acc. to IEC 60331.
Flame temperature = 750°C / voltage = 150 V / flame application = 180 min.

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 1.5 GHz
- Robust Cable, with low bending radius
- Main Applications: Tunnel - TETRA, GSM, GSM-R, DCS-1800

TECHNICAL FEATURES

• Size		1-1/4"
• Previous Model Number		532RC8RML-HLFR / 532MRC8RML-HLFR (with Mica)
• Frequency Range	MHz	30 -1500
• Recommended for Frequency	MHz	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	%	88
• Capacitance	pF/m	76
• Inner Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	0.73 (0.22)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.0 (0.30)
• Inner Conductor Material		Smooth copper tube
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping copper foil, with slot groups, bonded to the jacket

RMC 114-L

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)	400 (15.7)
• Cable Weight	kg/m (lb/ft)	0.894 (0.60) HLFR / 0.918 (0.62) HLFR/M
• Tensile Strength	daN (lb)	180 (397)
• Indication of Slot Alignment		Printed line on cable
• 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%	C95%
75 MHz	1.04 (0.32)	59	70
150 MHz	1.25 (0.38)	61	66
225 MHz	1.42 (0.43)	62	65
450 MHz	2.07 (0.63)	64	71
900 MHz	3.59 (1.09)	61	67
1500 MHz	6.80 (2.07)	59	65
1900 MHz	-	-	-
2200 MHz	-	-	-
2400 MHz	-	-	-

• Resonant Frequencies	MHz	89 ±1, 267, 445 ±4, 623, 801, 979 ±10, 1157, 1335
• 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 tolerance.

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

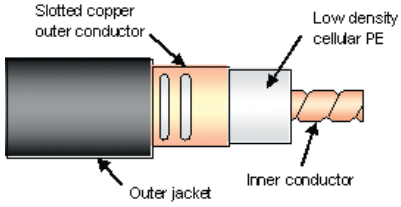
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

RMC 158 "A" Series

PRODUCT DESCRIPTION

RMC 158-HLFR "A" Series

Reference suffix [1] : -HLFR

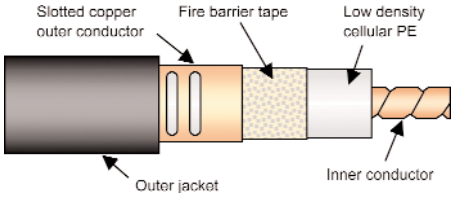


Fire behaviour

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[2]

RMC 158-HLFR/M "A" Series

Reference suffix [1] : -HLFR/M



Fire behaviour

Halogen free and flame retardant outer sheath + mica insulated fire barrier tape, under the outer conductor,
acc. to IEC 60754-2, 60332-1, 60332-3 cat. C, 61034[2],
circuit integrity under fire conditions acc. to IEC 60331.
Flame temperature = 750°C / voltage = 150 V / flame application = 180 min.

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, DCS-1800, UMTS, WLAN

TECHNICAL FEATURES

• Size		1-5/8"
• Frequency Range	MHz	30 -2500
• Recommended for Frequency	MHz	400, 450, 900, 1800 and 2200
• 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)	1.37 (0.42)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	0.85 (0.26)
• Inner Conductor Material		Corrugated copper tube
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping copper foil, with slot groups, bonded to the jacket

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)	500 (19.7)
• Cable Weight	kg/m (lb/ft)	1.045 (0.70) HLFR / 1.073 (0.72) HLFR/M
• Tensile Strength	daN (lb)	200 (441)
• Indication of Slot Alignment		Sheath marking + printed line
• 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%	C95%
75 MHz	0.45 (0.14)	72	84
150 MHz	0.72 (0.22)	71	83
225 MHz	0.94 (0.28)	70	82
450 MHz	1.44 (0.44)	66	68
900 MHz	2.17 (0.66)	68	74
1800 MHz	3.80 (1.15)	62	68
1900 MHz	4.06 (1.23)	62	68
2200 MHz	5.01 (1.52)	59	63
2400 MHz	5.80 (1.76)	60	67

• 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 tolerance.

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

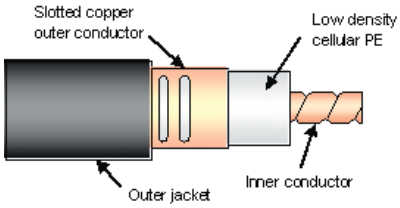
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request.

RMC 158-B

PRODUCT DESCRIPTION

RMC 158-B-HLFR

Reference suffix [1] : -HLFR

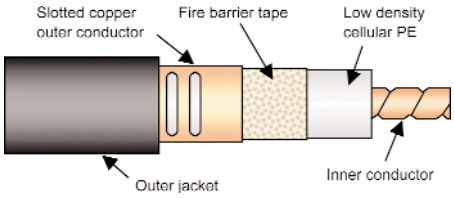


Fire behaviour

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[2]

RMC 158-B-HLFR/M

Reference suffix [1] : -HLFR/M



Fire behaviour

Halogen free and flame retardant outer sheath + mica insulated fire barrier tape, under the outer conductor,
acc. to IEC 60754-2, 60332-1, 60332-3 cat. C, 61034[2],
circuit integrity under fire conditions acc. to IEC 60331.
Flame temperature = 750°C / voltage = 150 V / flame application = 180 min.

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 2.0 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		1-5/8"
• Previous Model Number		543RC8RMB-HLFR / 543MRC8RMB-HLFR (with Mica)
• Frequency Range	MHz	30 -2000
• Recommended for Frequency	MHz	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	%	88
• Capacitance	pF/m	76
• Inner Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	1.40 (0.43)
• Outer Conductor dc Resistance	Ω/1000 m (Ω/1000 ft)	0.85 (0.26)
• Inner Conductor Material		Corrugated copper tube
• Dielectric Material		Cellular polyethylene
• Outer Conductor Material		Overlapping copper foil, with slot groups, bonded to the jacket

RMC 158-B

TECHNICAL FEATURES (continued)

• Diameter Inner Conductor	mm (in)	17.3 (0.68)
• Diameter Dielectric	mm (in)	43.0 (1.69)
• Diameter over Jacket	mm (in)	48.0 (1.89)
• Minimum Bending Radius, Single Bend	mm (in)	500 (19.7)
• Cable Weight	kg/m (lb/ft)	1.089 (0.73) HLFR / 1.117 (0.75) HLFR/M
• Tensile Strength	daN (lb)	200 (441)
• Indication of Slot Alignment		Sheath marking + printed line
• 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%	C95%
75 MHz	0.65 (0.20)	67	78
150 MHz	0.87 (0.27)	65	70
225 MHz	1.05 (0.32)	67	69
450 MHz	1.51 (0.46)	65	68
900 MHz	2.52 (0.77)	58	60
1800 MHz	3.65 (1.11)	72	82
1900 MHz	3.88 (1.18)	72	82
2200 MHz	-	-	-
2400 MHz	-	-	-

• Resonant Frequencies	MHz	65, 195, 325, 455 ±5, 585, 715, 845, 975 ±5, 1105, 1235, 1364, 1494, 1624, 1754, 1884
• 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 tolerance.

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

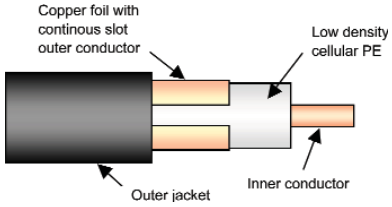
Coupling loss measurements taken in accordance with IEC 61196-4 - Free Space Method are available on request

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)	0.227 (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%	C95%
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

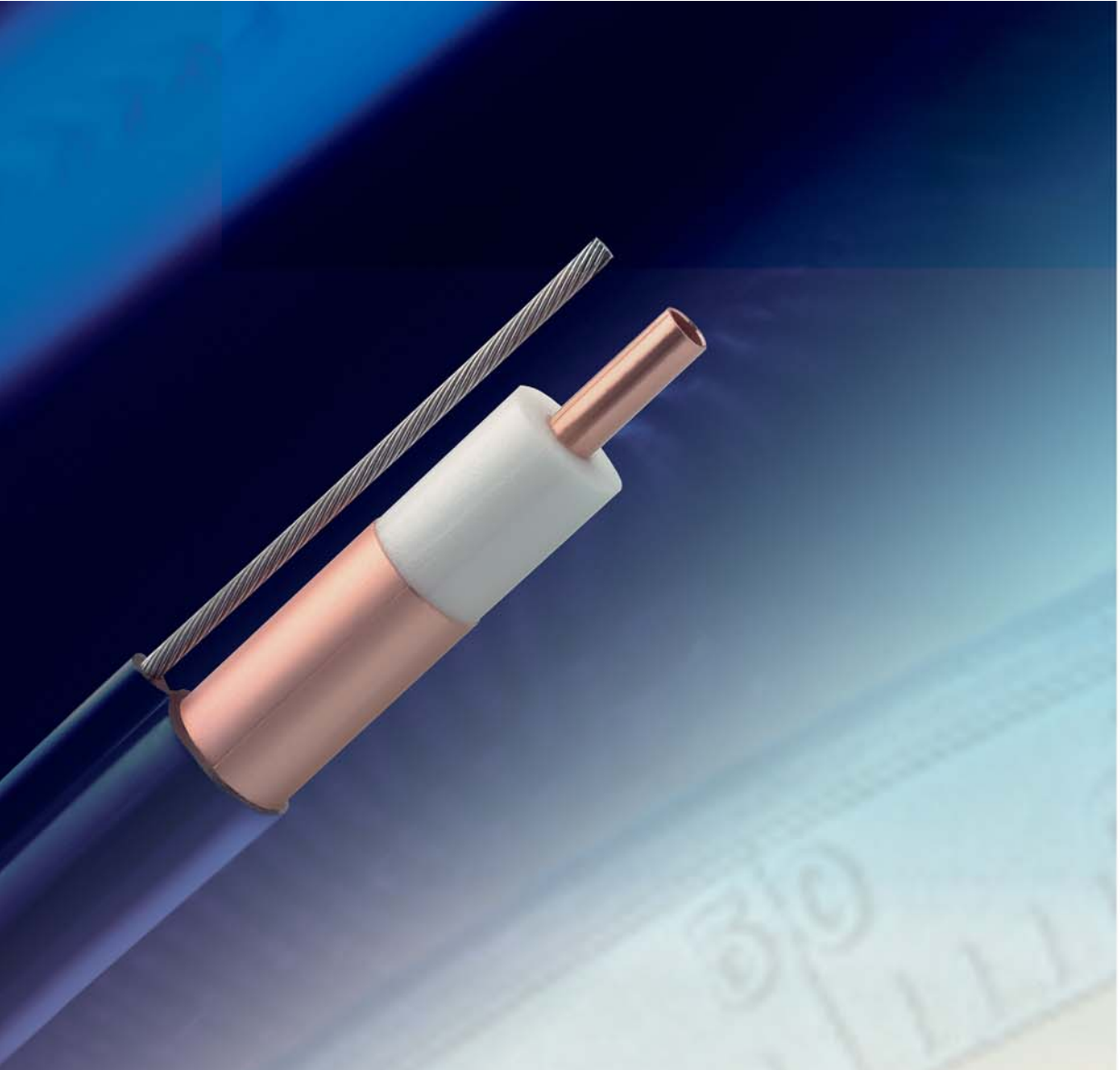
• Resonant Frequencies	MHz	None
• Clamp Spacing Recommended / Maximum	m (ft)	0.5 (1.64) / 1.20 (3.90)
• Distance to Wall Recommended / Minimum	mm (in)	80 - 180 (3.15 - 7.00) / 50 (1.96)

[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 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 in accordance with IEC 61196-4 - Free Space Method are available on request



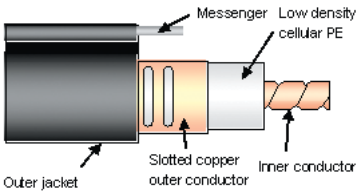
messenger wire

with integrated
messenger wire

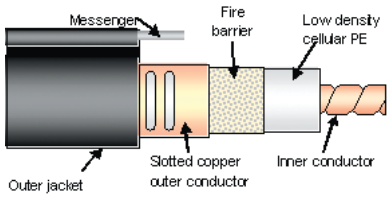
Radiating Cable with Integrated Messenger Wire

PRODUCT DESCRIPTION

Reference prefix : F- suffix : -HLFR



Reference prefix : F- suffix : -HLFR/M



Integrated messenger wire is available as an option on all LSC or RMC type radiating cable from 7/8" to 1-5/8".

TECHNICAL FEATURES*

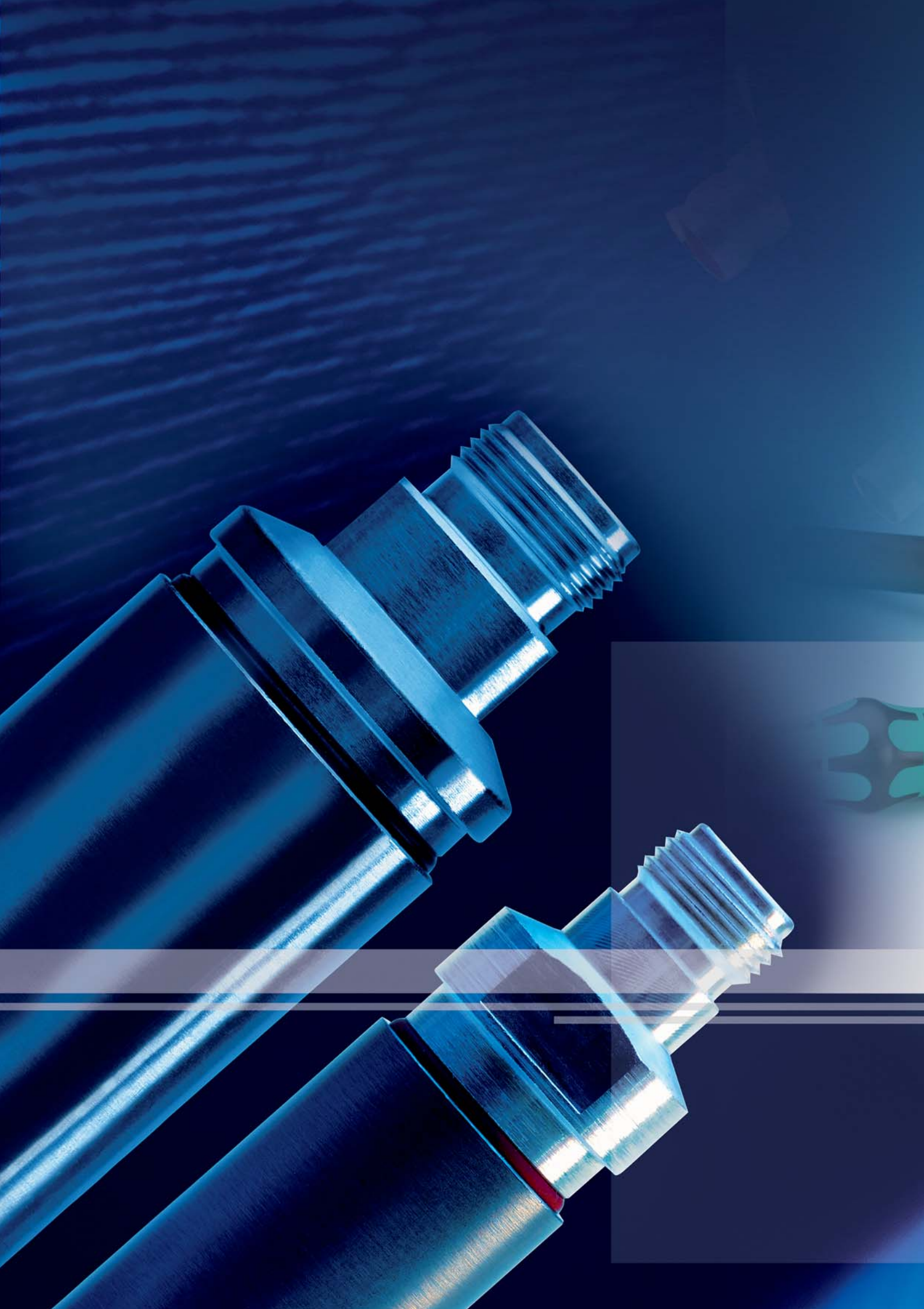
		7/8"	1-1/4"	1-5/8"
• Diameter Inner Conductor	mm (in)	9.1 (36)	13.0 (0.51)	17.3 (0.63)
• Diameter Dielectric	mm (in)	23.5 (0.93)	33.5 (1.32)	43.0 (1.69)
• Diameter over Jacket	mm (in)	27.0 (1.06)	38.0 (1.50)	48.0 (1.89)
• Minimum Bending Radius	mm (in)	350 (13.78)	400 (15.7)	500 (19.7)
• Cable Weight (HLFR/HLFR/M)	kg/m	0.907 / 0.920	1.233 / 1.257	1.510 / 1.550
	fb/ft	0.61 / 0.62	0.83 / 0.84	1.01 / 1.04
• Tensile Strength	daN (lb)	160 (354)	180 (397)	200 (441)
• Indication of Slot Alignment			Opposite of messenger	
• 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)	
• Material of Messenger			galvanised steel	
• Construction of Messenger	Nbr x mm (Nbr x in)	19 x 0.8 (19 x 0.03)	7 x 2.3 (7 x 0.09)	7 x 2.6 (7 x 0.1)
• Diameter over Messenger Jacket		7.5 (0.3)	12.2 (0.48)	14 (0.55)

PRODUCT REFERENCE

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

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

* For electrical specifications, please refer to the specification of the relevant cable type and size.



Radiating Cables Accessories

Connectors for 1/2" up to 1-5/8" Radiating Cables

PRODUCT DESCRIPTION

The connectors are designed according the standard interfaces as N or DIN 7-16. Contact components are silver plated to minimize insertion loss; mechanical parts are nickel plated for heavy-duty handling and best corrosion resistance. The special quick trimming tool makes installation very easy and cost effective in time.

FEATURES and BENEFITS

- High contact force and Cu-Be inner contacts
- Silver plated
- Watertight (IP67/IP68)
- Corrosion resistant
- Quick trimming tool
- Installation "fit on and tighten it"

TECHNICAL FEATURES

Connector type		N type	7-16 type
Electrical specifications			
• Nominal impedance	Ω	50	
• Reflection coefficient @ 2.5 GHz		≤ 0.03	
• 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	1000
• Cable retention	N	> 500	> 1000
• Mechanical endurance (nr of coupling)		≥ 500	

Connectors for 1/2" up to 1-5/8" Radiating Cables

TECHNICAL FEATURES (continued)

Connector type		N-male	N-female	7-16 male	7-16 female
Environmental specifications					
• Temperature range	°C (°F)	-40 to +85 (-40 to +185)			
• Leakage testing		IP67/IP68*			
Materials					
• Externals parts		Passivated silver plated or electroless nickel plated brass			
• Outer contact		Passivated silver plated brass			
• Inner contact		Passivated silver plated Cu-Be and brass			
• Dielectric		PTFE and (or) TPX			
• Gaskets		High quality silicone & nitrile			
Connectors Part Reference					
• 1/2"		NM50R12	NF50R12	-	716FR12
• 5/8"		NM50R58	-	-	716FR58
• 7/8"		NM50R78	NF50R78	-	716FR78
• 1-1/4"		NM50R114	NF50R114	716MR114	716FR114
• 1-5/8"		NM50R158	NF50R158	-	716FR158

N M 50 R 12

N	=	N-Type
7-16	=	7-16 Type
M	=	male
F	=	female
50	=	50 Ohm
R	=	Radiating
12	=	1/2"
58	=	5/8"
78	=	7/8"
114	=	1-1/4"
158	=	1-5/8"

* For N-type: mated connectors

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	Tool type	Picture
1/2" CMC12 LSC12 RMC12	NM50R12 NF50R12 716F50R12	N male N female 7-16 female	SPTC50R12	
5/8" LSC58	NM50R34 NF50R34 716F50R34	N male N female 7-16 female	SPTC50R34	
7/8" LSC78 RMC78	NM50R78 NF50R78 716M50R78 716F50R78	N male N female 7-16 male 7-16 female	SPTC50R78	
1-1/4" LSC114 RMC114	NM50R114 NF50R114 716M50R114 716F50R114	N male N female 7-16 male 7-16 female	SPTC50R114	
1-5/8" LSC158 RMC158	NM50R158 NF50R158 716F50R158	N male N female 7-16 female	SPTC50R158	

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 with 1/2" Hiflex cable (5092 / EC4-50-HF) or 1/2" standard cable (5128 / EC4-50) with soldered DIN 7-16 or N type straight and right angle connectors.
- Also available as halogen-free, flame-retardant (HLFR) version.
- All metal contact parts are silver plated. They are designed for watertight applications and optimised jumper cable performances.

FEATURES and BENEFITS

- excellent return loss values
- very low bending radius
  - 30 mm for 1/2" Hiflex (5092) for single bending (36 mm for repeated bendings)
  - 70 mm for 1/2" standard (5128) for single bending (125 mm for repeated bendings)
- very low level of 3rd order intermodulation products
- easy, fast and reliable installation
- water tightness according to IP 68 (according EN 60529)
- longitudinal water tightness is provided by the special connector design (inner and outer conductors are soldered)
- the overmolding of the connector provides an additional mechanical stability

Grounding Kits

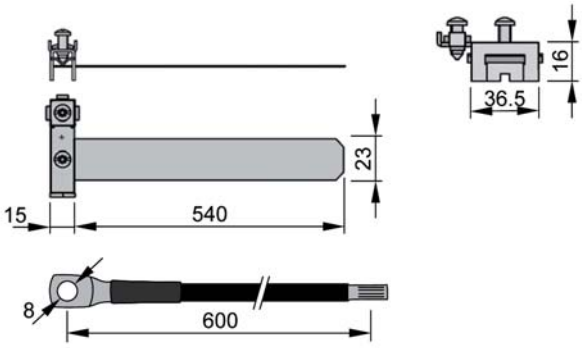
For connectors

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 Hangers

PRODUCT DESCRIPTION

Eupen Hook hangers are used for installing Radiating Cables in galleries or tunnels without spacers. Optimal distance to wall is maintained and the Hanger is universally useable for all cable sizes, making the installation very simple and quick.

FEATURES and BENEFITS

• One size fits all; No spacer required

HKHG (shown with optional PLDW & PLTL)

HKHG (shown with optional FRSB & MTDW & MTTL)

TECHNICAL FEATURES

• Overall dimensions		mm	175 x 85
• Cable diameter		mm	15 - 50
• Maximum load		daN	100
• Flame Retardant			according to UL 94V0 & Halogen free
• Colour			Black (RAL 9005)
• Weight		kg	0.10
• Mechanical			Suitable for Celling or Wall Mount
• Part Reference			HKHG
• Included Parts			Hook Hanger, Plastic cable tie, Metal washer (no srew, no dowel)
• Optional Parts:	Plastic Dowel and Srew (M6) for HKHG		PLDW
	Metal Dowel and Srew (V4A) for HKHG		MTDW
	Fire resistant VA4 stainless steel belt		FRSB
	Installation Tool for HKHG with PLDW		PLTL
	Installation Tool for HKHG with MTDW		MTTL

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.

CC 78

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, grey (RAL 7035) by request

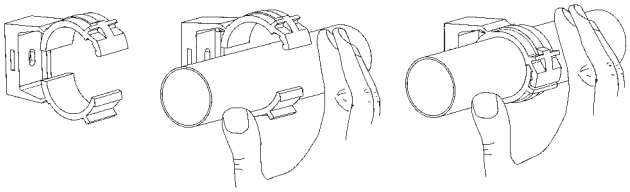
Clic type		**for 1/2"**	**for 5/8"**	**for 7/8"**	**for 1-1/4"**	**for 1-5/8"**
• Clamping range	mm	14.3 - 16.8	19.5 - 22.0	24.6 - 27.8	35.5 - 39.5	46.5 - 50.5
• Max. load	N	600	700	850	1100	1300
• Part reference		CC12	CC58	CC78	CC114	CC158

Clic Clamp

SPACERS and ACCESSORIES

Reference	Description	Use with	Picture
Spacers			
• RB 80	Round base spacer 80 mm	WS125, B6/90-SS	
• SP 45	Rectangular base spacer 45 mm	WS85	
• SP 85	Rectangular base spacer 85 mm	WS125	
• SSP6/75/8	Stainless steel spacer 75 mm	HPM8, FN6	
Flat nuts			
• FN 6	Flat nut M6, stainless steel	All clic clamps	
Wood screws, stainless steel			
• WS40	Wood screw 4.5 x 40 Clic Clamp without spacer		
• WS85	Wood screw 4.5 x 85	SP45	
• 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	RB 80, 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	
• HSP 6/90	Stainless steel hammer set plug	FN6, SP-85	
• Drill HSP	Drill for installation of the hammer set plugs	HSP 6/90	
• Tool HSP	Setting tool of the hammer set plugs	HSP 6/90	

Clic Clamp - Installation examples



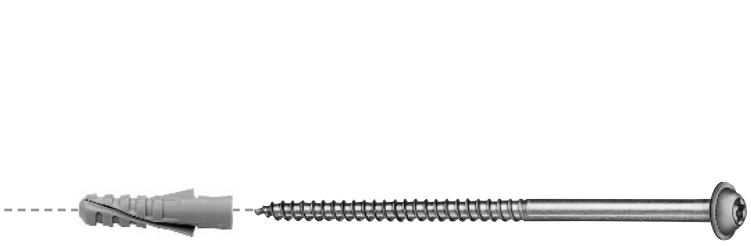
Single-hand installation – a matter of course with CLIC, place the cable, apply slight pressure and the clamp locks itself with a sharp clic.

1. Installation with wood screw and Nylon plug

WS40

CC78

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



WS125

SP85

RB80

CC78

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

HSP 6/90

FN6

SP85

CC78

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

HPM8-SS

SSP6/75/8

FN6

CC78

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	HSP 6/90
• 7/8"	DN 32	or
• 1-1/4"	DN 46	Stainless Steel spacer
• 1-5/8"	DN 50	SPS6/75/8

TECHNICAL FEATURES

Clamp Type	Ø min. mm	Max. Load (N)
• DN 20	13	450
• DN 25	18	380
• DN 32	24	300
• DN 46	39	230
• DN 50	51	180

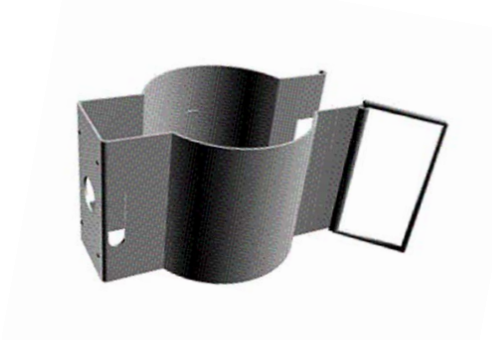
Installation with M8/M6 spacer and stainless steel clamp

DN46

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

Stainless Steel Clip Clamp

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	

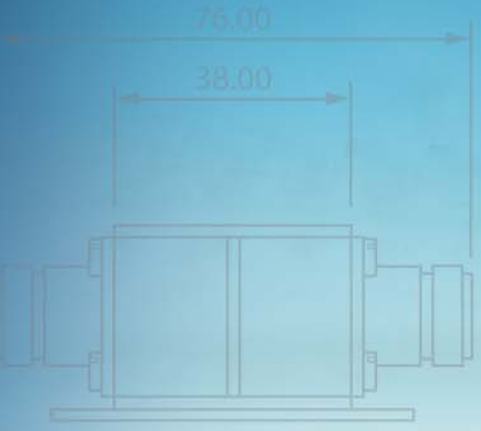


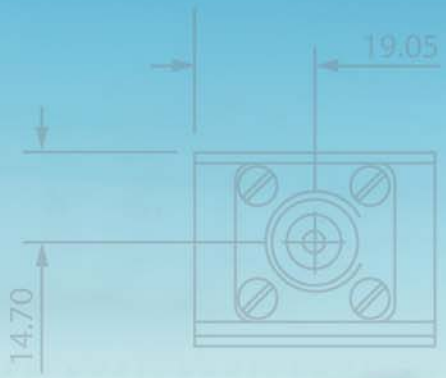
Installation with hex head bold and stainless steel clip hanger

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

DC Isolators - EPC DC Isolators - VHF UHF Directional Couplers - Splitters E

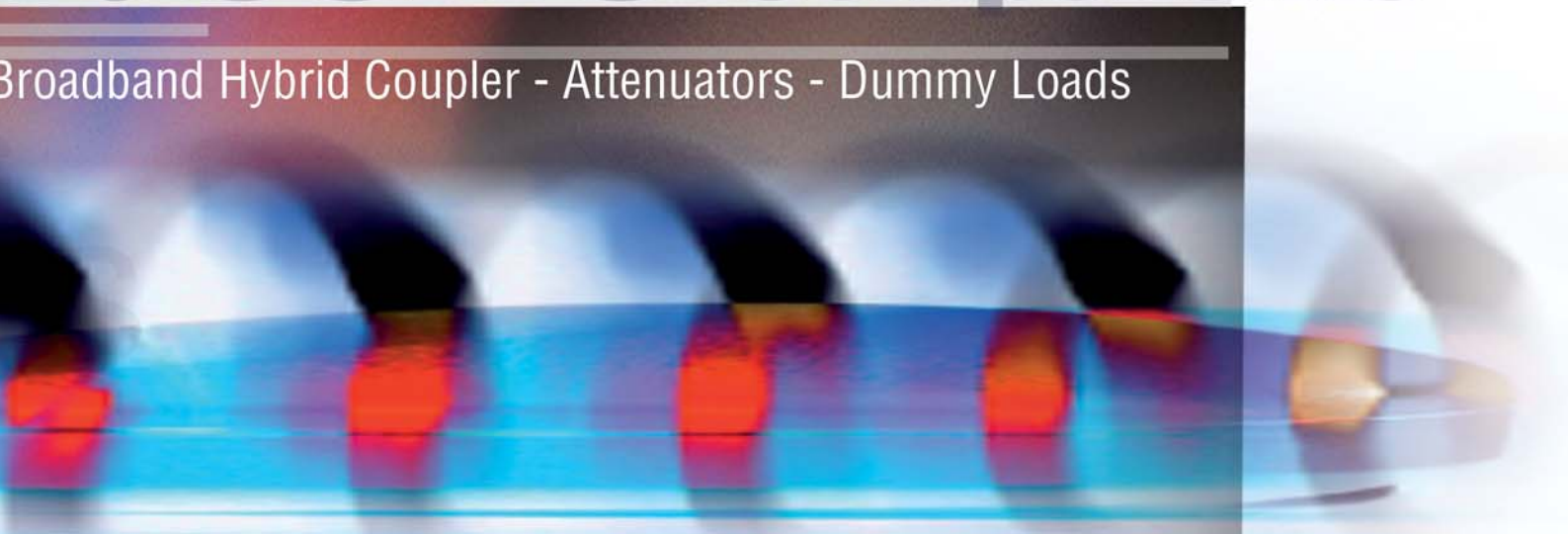
EPC 5





EUPEN
Passive Components

Broadband Hybrid Coupler - Attenuators - Dummy Loads



EPC DL - Dummy Loads

FEATURES and BENEFITS

- ***Up to 250 W power rating***
- ***Broadband***
- ***Low VSWR***

PRODUCT DESCRIPTION

The Eupen range of dummy loads or terminating load resistors has been designed to give an economic solution to the ever growing need for a compact, rugged and simple termination suitable for bench or field use.

The coaxial loads use either a low noise chip resistor or a rod resistor, depending on the power rating required.

Black anodised aluminium alloy heatsinks are used for maximum thermal radiation with N type connectors as standard. Other connectors may be offered to meet particular customer requirements.

Eupen dummy loads are available for use over the frequency range 300kHz to 2.4GHz, and at power ratings of 0.25W to 250W. Other power ratings may be available on request.

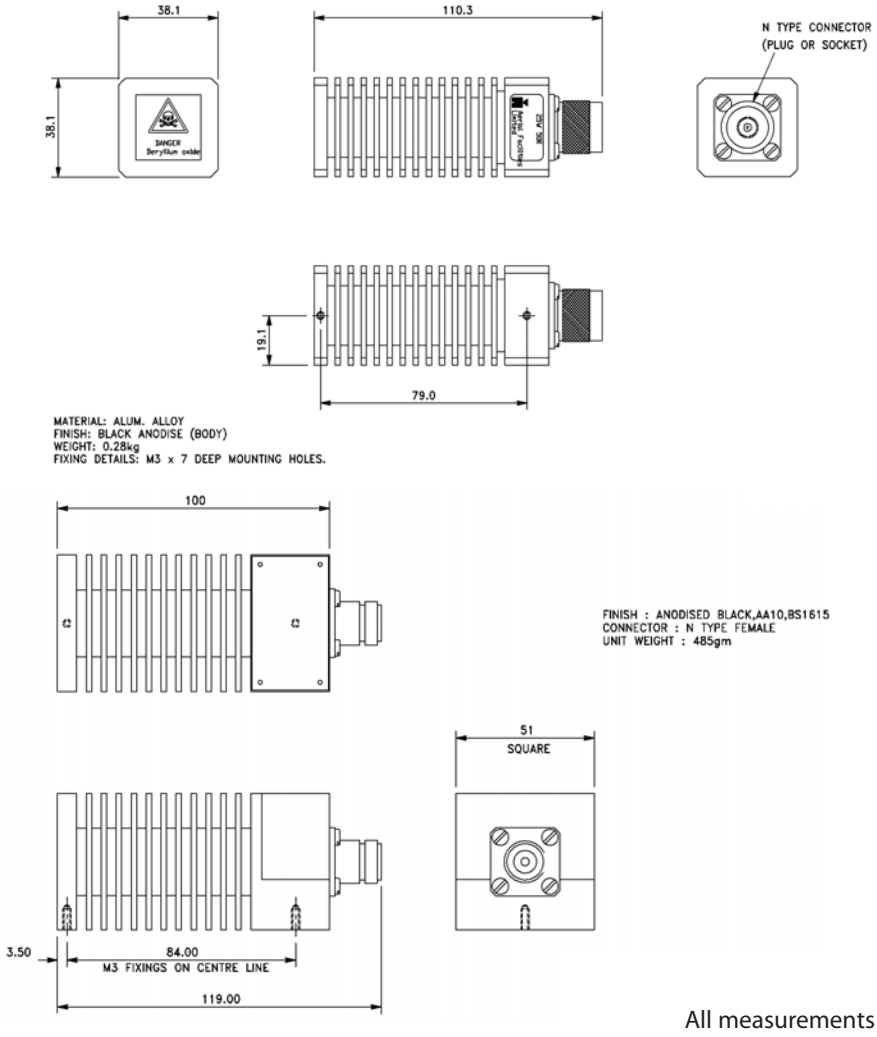
APPLICATIONS

- Transmitter / Combiner Output Termination
- Coaxial Line Terminations
- Circulator Port Terminations

EPC DL - Dummy Loads

TECHNICAL FEATURES

• Power Ratings	W	1	5	10	15	25	50	100	150
• Part Reference N-Type N/MEPC DL-A...		1 01	5 01	10 01	15 01	25 01	50 03	100 03	-
• Part Reference N-Type N/F EPC DL-A...		1 02	5 02	10 02	15 02	25 02	50 01	100 01	150 01
• Part Reference 7-16 DIN M EPC DL-A...		-	-	-	15 03	25 03	50 04	100 04	150 03
• Part Reference 7-16 DIN F EPC DL-A...		-	-	-	-	-	50 02	100 02	150 02
• Frequency Range	MHz	DC to 2500							
• Insertion Loss (Typical)	dB	6.5							
• VSWR		1.1:1							
• Impedance	Ω	50							
• Operating Temperature Range	°C	-20 to +55							
• Weigth	kg	1							
• Environmental		IP54 standard, IP65 on request							
• Connectors		N-Type Standard, DIN 7-16 on request							



All measurements in mm

EPC DB - DC Isolators (DC Block)

FEATURES and BENEFITS

- ***High RF power rating***
- ***High DC voltage rating***
- ***Small size***
- ***IP 65 rated***
- ***Low intermods***

PRODUCT DESCRIPTION

The Eupen DC isolator covers all of the mobile radio bands in a single unit minimising losses and VSWR. The isolator is an in-line unit and offers protection against induced DC both inner/inner and outer/outer.

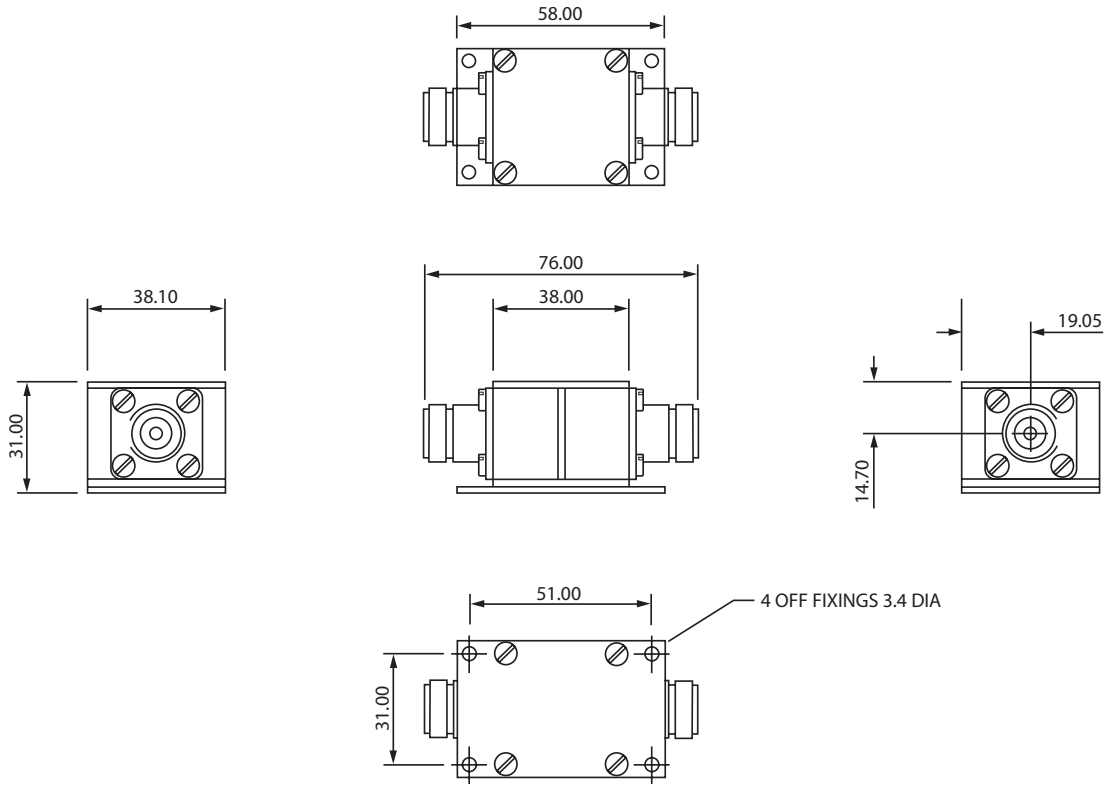
APPLICATIONS

- Radiating Feeder Network Protection
- Equipment protection

EPC DB - DC Isolators (DC Block)

TECHNICAL FEATURES

• Frequency Range	MHz		50 to 2200	
• Part Reference (N-Type) Female			EPC DB-A 01	
• Part Reference (7-16 DIN) Female			EPC DB-A 02	
• Insertion Loss	dB	<0.1 (50 to 500 MHz)	<0.2 (800 to 1000 MHz)	<0.4 (1700 to 2200 MHz)
• DC Isolation (inner -inner) (outer-outer) (inner-outer)	kV		1, 2, 1.4 (dependant upon connector)	
• VSWR			<1.2:1	
• Power Rating	W		250	
• Impedance	Ω		50	
• Operating Temperature Range	℃		-30 to +65	
• Weigth	kg		0.5	
• Environmental			IP54 standard and IP65	
• Connectors			N-Type or 7-16 DIN (Female)	
• Colour			Black (RAL 9005)	
• Mechanical			Suitable for Pole or Wall Mount	



All measurements in mm

EPC FA - Fixed Attenuators

FEATURES and BENEFITS

- ***Fixed values from 2 to 30 dB***
- ***Female/female or male/female connectors***
- ***DC to 2500 MHz***
- ***Power ratings up to 100 W***

PRODUCT DESCRIPTION

The Eupen range of power attenuators is available in ratings of 10, 25, 50 & 100 Watts, and are available in attenuation values of 2, 3, 4, 5, 6, 9, 10, 20 and 30dB.

The mechanical fixings of these devices are arranged to provide flexibility for inclusion within all types of equipment. A wide variety of alternative base plates can be offered with drilled and tapped holes to suit individual requirements.

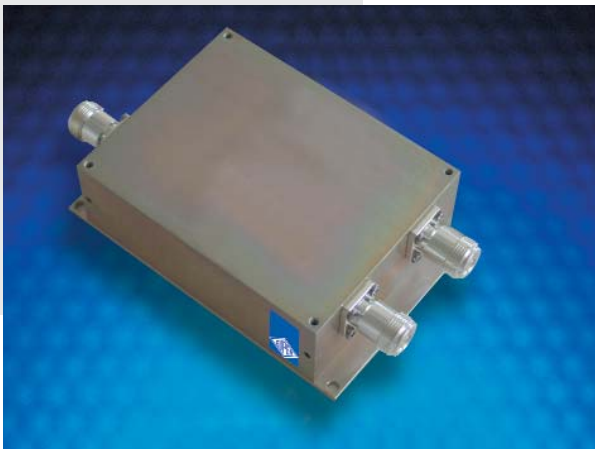
APPLICATIONS

- Transmitter / Combiner Power Level Adjustment
- Equipment Protection

EPC CC - Crossband Couplers

FEATURES and BENEFITS

- ***High isolation***
- ***Low insertion loss***
- ***Good VSWR***
- ***Low intermodulation***



PRODUCT DESCRIPTION

The Eupen range of crossband couplers, or diplexers, offers a compact solution to allow the co-siting of two different frequency bands on to one common output.

Designed using high performance filters - either bandpass or highpass/lowpass - these units provide excellent inter-band isolation, low insertion loss and good intermodulation performance.

By using crossband couplers it is possible to reduce feeder cable requirement by 50%, thereby reducing rigging and tower rental costs, in applicable situations.

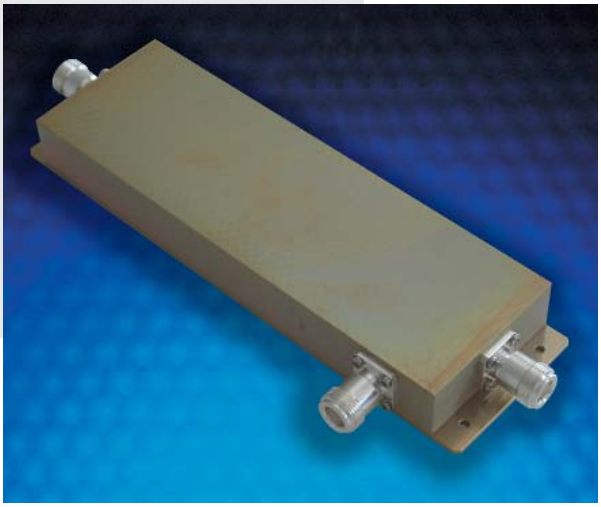
APPLICATIONS

- Transmitter / Dual Band Networks
- Common Antenna Sharing
- In-building Coverage Systems

EPC DC - VHF/UHF Directional Couplers

FEATURES and BENEFITS

- ***High directivity***
- ***Good VSWR***
- ***High power***
- ***Broadband 70 MHz to 2.2 GHz or narrowband***



PRODUCT DESCRIPTION

A wide range of directional or transmitter couplers is available - from miniature low power to broadband high power versions.

Directional couplers are available to sample power/frequency at a pre-set coupling level with a sampling/coupling range 6 dB to 30 dB. Single or dual outputs can be provided.

The Eupen broadband transmitter coupler design allows operation across the range from 70 MHz to 2.2 GHz, making it particularly suitable for use in the distribution of multiple operators into buildings and tunnels.

All units can be manufactured to IP65 standard.

N female connector standard, N male or DIN 7-16 on request.

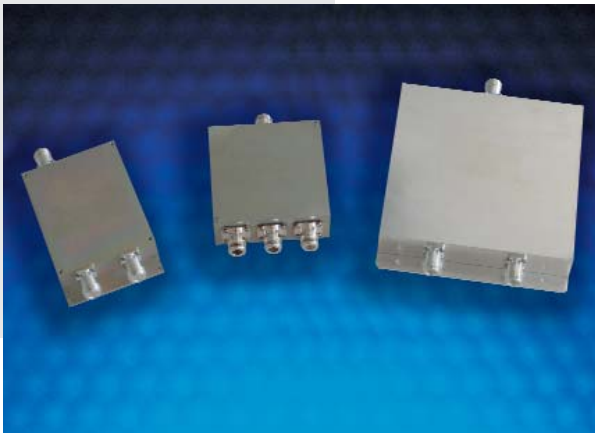
APPLICATIONS

- Radiating Cable Networks
- Combiner Systems
- Testing
- Distributed Antenna Systems

EPC SP - Splitters

FEATURES and BENEFITS

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



PRODUCT DESCRIPTION

A wide range of splitters is available for power splitting or providing multiple receiver outputs.

Most combinations of split can be catered for i.e. 2, 3, 4 and 8 ways.

A splitter may also be used in reverse (as a combiner) provided that the power rating of the internal load is not exceeded.

Eupen splitters are housed in milled aluminium cases that can be sealed to IP65 for external use.

N female connector standard, N male or DIN 7-16 on request.

APPLICATIONS

- Feeder Network Distribution
- Multiple Receiver Outputs
- Combining Systems
- Base Band Distribution Systems
- Antenna Arrays

Packi

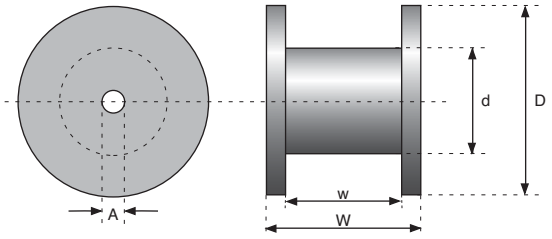
6 Packing Information

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 type		Drum type	Cable length m	(ft)	Outer dim.* D cm	(in)	Drum dim. d 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)	435	(960)
76	(29.92)	72.2	(28.42)	8	(3.14)	1.50	(52.97)	40 / 85	(88 / 187)	435	(960)
74	(29.13)	64.4	(25.35)	9	(3.54)	2.20	(77.69)	232 / 275	(511 / 605)	435	(960)
76	(29.92)	72	(28.34)	8	(3.14)	1.49	(52.61)	40 / 100	(88 / 220)	560	(1235)
104	(40.94)	98	(38.58)	9	(3.54)	3.03	(107.00)	380 / 470	(837 / 1034)	560	(1235)
116	(45.66)	104	(40.94)	9	(3.54)	4.75	(167.74)	440 / 555	(970 / 1221)	560	(1235)
70	(27.55)	64	(25.19)	9	(3.54)	2.20	(77.69)	232 / 275	(511 / 605)	920	(2028)
116	(45.66)	104	(40.94)	9	(3.54)	4.75	(167.74)	440 / 555	(970 / 1221)	920	(2028)
104	(40.94)	98	(38.58)	9	(3.54)	3.03	(107.00)	380 / 470	(837 / 1034)	1120	(2470)
116	(45.66)	104	(40.94)	9	(3.54)	4.75	(167.74)	440 / 555	(970 / 1221)	1120	(2470)
104	(40.94)	98	(38.58)	9	(3.54)	3.03	(107.00)	380 / 470	(837 / 1034)	760	(1675)
116	(45.66)	104	(40.94)	9	(3.54)	4.75	(167.74)	440 / 555	(970 / 1221)	760	(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)	1610	(3550)

Notes

Notes

KABELWERK EUPEN AG

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