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ITU-T L.16

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CONSTRUCTION, INSTALLATION AND PROTECTION OF CABLES AND OTHER ELEMENTS OF OUTSIDE PLANTS

CONDUCTIVE PLASTIC MATERIAL (CPM) AS PROTECTIVE COVERING FOR METAL CABLE SHEATHS

ITU-T Recommendation L.16

(Previously "CCITT Recommendation")

FOREWORD

The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the International Telecommunication Union. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, established the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

ITU-T Recommendation L.16 was prepared by the ITU-T Study Group VI (1988-1993) and was approved by the WTSC (Helsinki, March 1-12, 1993).

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NOTES

1 As a consequence of a reform process within the International Telecommunication Union (ITU), the CCITT ceased to exist as of 28 February 1993. In its place, the ITU Telecommunication Standardization Sector (ITU-T) was created as of 1 March 1993. Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.

In order not to delay publication of this Recommendation, no change has been made in the text to references containing the acronyms "CCITT, CCIR or IFRB" or their associated entities such as Plenary Assembly, Secretariat, etc. Future editions of this Recommendation will contain the proper terminology related to the new ITU structure.

2 In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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CONTENTS

		Page
1	Introduction	1
2	Scope	1
3	Benefits of CPM for protective coverings	1
4	Types of cables	1
5	Properties of CPM coverings	1
6	Performances of CPM cables in field	1
7	Economic criteria suggested for application of CPM cables in areas exposed to lightning discharges	2

CONDUCTIVE PLASTIC MATERIAL (CPM) AS PROTECTIVE COVERING FOR METAL CABLE SHEATHS

(Helsinki, 1993)

1 Introduction

With reference to Recommendation K.29 "Coordinated protection schemes for telecommunication cables below ground", in which conductive plastic coverings (CPMs) are considered, the present Recommendation is based on the experience made available by several Administrations as far as CPM protective coverings are concerned.

2 Scope

This Recommendation:

- refers to conductive plastic material as protective covering for metal cable sheaths as actually used by administrations and operating agencies;
- details physico-chemical properties of CPM coverings and main field performances of cables;
- advises on economic criteria for the applications of CPM coverings.

3 Benefits of CPM for protective coverings

The most important benefits of CPM cables are:

- coordinated protection against corrosion, lightning, effects of electric power and traction lines;
- maintenance cost reduction especially for earthing;
- simplification of protection projects.

Also service quality improvement shall be taken into account.

4 Types of cables

CPM are used in directly buried, underground copper conductor cables either local or junction types. Moreover applications in cables with an improved reduction factor are reported. Also optical cables could be taken into account.

5 Properties of CPM coverings

Polyethylene polymers or PE copolymers with conductive carbon black are used with values for main physical and chemical properties that are equivalent or more severe than the values reported in Recommendation K.29. In the appendix there are several values adopted by some Administrations.

6 Performances of CPM cables in field

The main electrical performances of CPM cables in field and relative values, are the following:

- transversal resistivity (ohm · m): 10 ~ 100;
- resistance to earth (ohm): 1 ~ 5 for cable length ≥ 2 km.

7 Economic criteria suggested for application of CPM cables in areas exposed to lightning discharges

For estimating the risk of damages due to lightning strokes the manual "The protection of telecommunication lines and equipment against lightning discharges" should be consulted.

Defining economic criteria for the application of CPM cables in cases of unacceptable high risk requires further studies.

Appendix I

(This appendice does not form an integral part of this Recommendation)

Up to now CPM coverings have been used by several Administrations either experimentally or regularly; some Administrations are going on in the application.

The values of the main physical and chemical properties of CPM coverings used by some Administrations are reported in the following table:

CPM properties	France	Italy	Norway	Czech.	Test method
Polymer	PE	PE	PE	PE	
Carbon black (%)	10	10.5	12	13	IEC 811-4.1
Density (g/cm^3)	0.924 ~ 0.94	0.92 ~ 0.935	–	–	IEC 811-1.3
Cold bend test at –15 °C	No vis. crack	No vis. crack	–	–	IEC 811-1.4
Melt flow Index (g/10 min)	≤ 0.6	0.05 ~ 1	2.2	–	IEC 811-4.1
Volume resistivity (ohm · m)	0.9 ~ 6.6	≤ 10	1.27	< 10	IEC 93
Tensile strength at break (MPa)	> 12	≥ 9.8	14.7	–	IEC 811-1.1
Var.tens.strength after ageing (%)	< 25	≤ 25	–	–	IEC 811-1.1
Per cent elongation at break (%)	> 400	≥ 350	600	> 200	IEC 811-1.1
Var.per cent elongation after ageing (%)	< 30	≤ 50	–	–	IEC 811-1.1
Environm. stress cracking res. (h)	≥ 72	≥ 200	> 4.500	> 200	IEC 811-4.1
Water absorption –24 h; 100 C (%)	–	≤ 1	0.28	–	IEC 811-1.3