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TECHNICAL REPORT

colour inside

Environmental declaration – Part 1: Wires, cables and accessory products – Specific rules

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ENVIRONMENTAL DECLARATION –

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FOREWORD

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IEC TR 62839-1, which is a technical report, has been prepared by IEC technical committee 46: Cables, wires, waveguides, R.F. connectors, R.F. and microwave passive components and accessories.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
46/496/DTR	46/528/RVC

Full information on the voting for the approval of this technical report can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62839 series, published under the general title *Environmental declaration*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

ENVIRONMENTAL DECLARATION –

Part 1: Wires, cables and accessory products – Specific rules

1 Scope

This part of IEC 62839 specifies the PSR (product specific rules) for wires and cables used for communication, data, control and command. This PSR covers the use, installation and end-of-life stages and provides methodological precisions to PEP/PCR writing for “wires and cables and accessories” products used for communication, data, control and command. PSR and general rules all together form the product category rules.

ISO 14025:2006 establishes the principles and specifies the procedures for developing Type III environmental declaration programmes and Type III environmental declarations. It specifically establishes the use of the ISO 14040 series of standards in the development of Type III environmental declaration programmes and Type III environmental declarations. It establishes principles for the use of environmental information, in addition to those given in ISO 14020:2000.

Type III environmental declarations as described in ISO 14025:2006 are primarily intended for use in business-to-business communication, but their use in business-to-consumer communication under certain conditions is not precluded. These environmental declarations, referred here after as PEP, follow a specific set of rules and requirements specified in product category rules declaration that are referred here after as “PEP/PCR”.

Three categories of wires and cables are covered:

– communication and data wires and cables, which may have metal or optical fiber conductors;

– control and command wires and cables , which can have metal or fiber optical conductors;

– accessories.

This document only deals with the “wires and cables“ products. “Accessories products” are for further study.

This document is primarily intended for:

– environment and/or product managers;

– LCA (life cycle assessment) experts in companies, in charge of PEP/PCR development;

– verifiers in charge of PEP/PCR conformity assessment in accordance with the defined rules.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60793 (all parts), *Optical fibres*

IEC 60793-2-10, *Optical fibres – Part 2-10: Product specifications – Sectional specification for category A1 multimode fibres*

IEC 60794 (all parts), *Optical fibre cables*

IEC 61156 (all parts), *Multicore and symmetrical pair/quad cables for digital communications*

IEC 61156-5, *Multicore and symmetrical pair/quad cables for digital communications – Part 5: Symmetrical pair/quad cables with transmission characteristics up to 1 000 MHz – Horizontal floor wiring – Sectional specification*

IEC 61156-7, *Multicore and symmetrical pair/quad cables for digital communications - Part 7: Symmetrical pair cables with transmission characteristics up to 1 200 MHz - Sectional specification for digital and analog communication cables*

ISO/IEC 15018, *Information technology – Generic cabling for homes*

ISO 14020:2000, *Environmental labels and declarations – General principles*

ISO 14025:2006, *Environmental labels and declarations – Type III environmental declarations – Principles and procedures*

ISO 14040:2006, *Environmental management – Life cycle assessment – Principles and framework*

ISO 14044, *Environmental management – Life cycle assessment – Requirements and guidelines*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
functional unit
quantified performance of a system of products intended to be used as a reference unit in a life cycle assessment

[SOURCE: ISO 14040:2006, 3.20, modified – modified for fitting with the specific category of products that are covered in this document]

3.2
product specific rules
PSR
set of specific rules, requirements and guidelines for developing Type III environmental declarations for a product category

3.3
product category rules
PCR
set of specific rules, requirements and guidelines for developing Type III environmental declarations for one or more product categories

[SOURCE: ISO 14025:2006, 3.5]

3.4
product environmental profile
PEP
declaration indicating the environmental aspects of a product established in compliance with the PEP ecopassport program according to ISO 14025, ISO 14040 and ISO 14044

3.5
reference product
product or products system modeled in the LCA and representative of a homogeneous environmental family

3.6
reference flow
measure of the outputs from processes in a given system required to fulfill the function expressed by the functional unit

[SOURCE: ISO 14040:2006, 3.29, modified – modified for fitting with the specific category of products that are covered in this document]

3.7
life cycle assessment
LCA
compilation and evaluation of inputs, outputs and the potential environmental impacts of a product system throughout its life cycle

[SOURCE: ISO 14040:2006, 3.2]

3.8
system boundary
set of criteria that specify which elementary processes are part of a system of products

[SOURCE: ISO 14040:2006, 3.32, modified – modified for fitting with the specific category of products that are covered in this document]

4 Communication and data wires and cables

4.1 Functional unit and reference flow description

Subclause 4.1 specifies for communication and data wires and cables category the chapter ”Functional unit and reference flow description” of the PEP/PCR by defining more accurately the functional unit of this product category.

To define the functional unit of the communication and data wires and cables, manufacturers shall use the following sentence.

“Transmit a communication signal on 1 m according to XX protocol, YY category, during X years and a Y % use rate in accordance with the standards in force.”

Lifetime and use rate match the Z application defined in Table A.1 of “Wires, cables and accessories products specific rules“.

The determination of the number of years X depends on the application and is explained in 5.2.2. “Use phase”.

To the functional unit corresponds a reference flow, expressed in metres and which includes:

– the reference product;
– the reference product packaging;

– products and items necessary for the installation which are integrated in the field of the study.

4.2 System boundaries

4.2.1 Overview

As described in the PEP/PCR, the following life cycle phases are to be recorded:

- the manufacturing phase: from the natural resources extraction to product manufacturing and its disposal to the producer's last logistic platform;
- the distribution phase: from the producer's logistic platform until its arrival at the place of implementation;
- the installation phase;
- the use phase of the product including its use, and maintenance necessary to ensure the service ability;
- the end of life phase which takes into account the product end of life transportation to a treatment centre or dump.

4.2.2 Installation phase

Concerning communication and data wires and cables, due to the wide range of possible installation of these products, the installation phase is excluded from the PEP/PCR perimeter. The impact determination of the installation will be performed by the PEP users according to the product use context.

So, in the chart of the environmental impacts, the installation column will include the reference "has to be determined by the user" indicating that the assessment of the installation phase impact has not been carried out and has to be treated by the PEP user.

4.2.3 Use phase

4.2.3.1 Overview

Subclause 4.2.3 completes PEP/PCR "use phase" for communication and data wires and cables category. It gives the hypothesis for the calculation of the use phase impact.

There are three types of communication and data transmission cables:

- twisted pair cables;
- coaxial cables;
- optical fibre cables.

In the case of communication wires and cables, the impact of the product use phase on the product total life cycle is low.

The energy consumed in the use phase by communication and data cables is related to the cable attenuation for the transmitted signals. This attenuation is due to the signal energy loss along the conductors.

NOTE On metal conductors, resistive losses and electromagnetic emission occurring at high frequency induce attenuation. Attenuation increases with conductors' length and frequency of emitted signal.

On optical fiber cables, attenuation depends on the type of fibers, on the used wavelength and on the optical fiber length .The attenuation measurement (in dB) expresses the ratio between the emitted energy and the received energy: the smaller the measured value, the better the link.

The energy consumption during use phase will correspond, in order of preference, to growing energy consumption:

– Either to be measured. (The following paragraphs “Use phase losses determined by measurement” describe the losses measurement methods.)
– Or will reference the losses maximum values as specified in the respective standards. (The following paragraphs “Use phase losses determined by standards” describe how to calculate the losses.)

In all cases, the determination of loss method used shall be specified in the PEP/PCR and justified in the LCA report.

4.2.3.2 Twisted pair cables

Twisted pair cables are mainly used for computers networking and telephony.

Networks are defined in the standards, such as being links of length up to 100 m maximum, consisting of 90 m of horizontal cables and 2 times 5 m of patchcords. In business, installed horizontal cables can vary from 10 m to 90 m. The average length usually found on a set of connections is 40 m. This average length of 40 m is used to calculate the energy loss at the frequency of considered protocol because attenuation is not proportional to the length but has an exponential behaviour. Indeed, we know that more than 50 % of the energy is consumed in the first 20 m of cable.

The energy loss is calculated using a 40 m cable, and the consumed power is then reduced to the functional unit (1 m of cable).

a) Use phase losses determined by measurement

For the use phase losses measurement, the following formulas from physics of transmission will be used:

$$P_{lost} = \frac{(P_e - P_s) \times Nb_{pair}}{L_{average}}$$

$$P_e = \frac{U^2}{Z} = Z \times I^2 = UI$$

$$P_s = P_e \times 10^{-\frac{Att}{10}}$$

where

P_{lost} is the consumed power in watts/meter of cable;
P_e is the power input in watts;
Z is the resistance in ohms;
U is the voltage in volts;
I is the intensity in amperes;
P_s is the watt output power;
Att is the linear attenuation in dB of the cable at the frequency of the maximum amplitude of the spectrum used in the communication protocol for an average length ($L_{average}$) used in meters. The frequencies to be used are mentioned in Table 1. The measurement method of linear attenuation is described by IEC 61156-1;
Nb_{pair} is the the number of pairs used in the communication protocol;
$L_{average}$ is the average length in meters of an installed cable.

In all cases, the obtained value in watts has to be multiplied by the lifetime and use rate of the corresponding application to obtain the energy consumed in Wh or joules (see Annex A).

Generally, choices will be identified in the PEP/PCR and justified in the LCA report.

b) Use phase losses determined by standards