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TECHNICAL REPORT

Guidance on the environmentally conscious design of fibre optics related products and subsystems

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

GUIDANCE ON THE ENVIRONMENTALLY CONSCIOUS DESIGN OF FIBRE OPTICS RELATED PRODUCTS AND SUBSYSTEMS

FOREWORD

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IEC 62785, which is a technical report, has been prepared by IEC technical committee 86: Fibre optics.

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

Enquiry draft	Report on voting
86/433/DTR	86/441/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 technical report should be read in conjunction with IEC 62430:2009.

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

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site 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- withdrawn,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.

INTRODUCTION

Fibre optics related products and subsystems are high performance systems. Their characteristics can have a negative impact on our environment in one way or another through their entire life cycle (design, manufacturing, use, recycling, and disposal).

Among several international standards and guidelines relevant to environmental consciousness, IEC 62430:2009 is the most recently published normative standard of a horizontal nature. Although optical fibres, optical cables, fibre optic interconnecting devices and passive components can be understood as non-electrical or non-electronic, they are within the scope of IEC TC86 (Fibre optics). Thus, designing fibre optic products and subsystems would need to conform to IEC 62430.

This Technical Report therefore provides informative guidance to assist the designer with regard to the general aspects of environmentally conscious design covered by IEC 62430. After quickly grasping the substance of the IEC 62430 requirements through this technical report, it will be necessary to refer directly to the main text of IEC 62430 for details.

GUIDANCE ON THE ENVIRONMENTALLY CONSCIOUS DESIGN OF FIBRE OPTICS RELATED PRODUCTS AND SUBSYSTEMS

1 Scope and objective

This Technical Report, reiterates all the key normative “shall” texts included in IEC 62430 that specify requirements and procedures to integrate environmental aspects into the design and development processes of electrical and electronic products, including combinations of products, and the materials and components of which they are composed. This report also conveys information on the experiences and best practices of environmental consciousness of fibre optics related products and subsystems.

The objectives of this report are to

– help fibre optic industries reduce negative environmental impacts of the equipment and subsystems throughout the lifecycle (design, manufacturing, use, recycling, and disposal),

– raise awareness of IEC 62430 and other standards among fibre optic industries, particularly its mandatory requirements,

– share industry information to cooperatively increase the level of environmental consciousness of fibre optic industries.

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 62075:2012, *Audio/video, information and communication technology equipment – Environmentally conscious design*

IEC 62430:2009, *Environmentally conscious design for electrical and electronic products*

ISO/TR 14006:2011, *Environmental management systems – Guidelines for incorporating design*

ISO/TR 14062:2002, *Environmental management – Integrating environmental aspects into product design and development*

ITU-T-L.1100, *Procedure for recycling rare metals in information and communication technology goods*

3 Overview of relevant international standards

3.1 General

There are several documents (published or to be published) as listed below that are relevant to environmental consciousness of fibre optic industries in one way or another. Among them, this technical report cites IEC 62430 (see 3.2) as the most relevant normative standard to which the fibre optic industry could conform. The other documents listed in this clause may be referred to as needed.

3.2 IEC 62430:2009: Environmentally conscious design for electrical and electronic products

This International Standard specifies requirements and procedures to integrate environmental aspects into design and development processes of electrical and electronic products, including combinations of products, and the materials and components of which they are composed. Moreover, the NOTE of the scope reads that the existence of this standard does not preclude particular sectors from generating their own, more specific, standards or guidelines. Where such documents are produced, it is recommended that they use this standard as the reference in order to ensure consistency throughout the electrotechnical sector.

3.3 IEC 62075:2012: Audio/video, information and communication technology equipment – Environmentally conscious design

3.4 ISO/TR 14062:2002: Environmental management – Integrating environmental aspects into product design and development

Although ISO does not cover electrotechnical products, improvements to ISO/TR 14062:2002 with the intention of publishing it as an International Standard (IS) will be initiated at the ISO TC 207 meeting in 2012. Best efforts will be made to harmonize with IEC activities to revise IEC 62430.

3.5 ISO 14006:2011: Environmental management systems – Guidelines for incorporating ecodesign

This document provides guidelines to assist organizations in establishing, documenting, implementing, maintaining and continually improving their management of ecodesign as part of an environmental management system (EMS). IEC 62430 is partially embedded in Clause 6.

3.6 ITU-T L.1100: Procedure for recycling rare metals in information and communication technology goods

This ITU-T recommendation explains the necessity and importance of rare metal recycling while providing a recycling procedure for rare metals and communication format for providing recycling information of rare metals in ICT (information and communication technologies) products.

3.7 IEC/TR 62839-1, Environmental declaration: Part 1: Wires and cables and accessories products specific rules

The New Work Item Proposal (46/419/NP) for this informative document was approved on 21 September 2012 (46/436/RVN).

4 Requirements of IEC 62430:2009

This clause cites key texts in IEC 62430 that include ”shall,” indicating a requirement which must be strictly followed and from which no deviation is permitted if conformance to IEC 62430:2009 is to be claimed.

Table 1 – IEC 62430:2009 requirements *(1 of 2)*

Clause/Subclause	Requirements
4 Fundamentals of environmentally conscious design (ECD) 4.1 General 4.2 Life cycle thinking	Environmentally conscious design shall be based on the concept of life cycle thinking (LCT), which requires consideration during the design and development process of the significant environmental aspects of a product in all life cycle stages. Key elements of life cycle thinking are as follows: a) having an objective to minimize the overall adverse environmental impact of the product; b) identifying, qualifying and where feasible, quantifying the significant environmental aspects of the product; c) considering the trade-offs between environmental aspects and life cycle stages.
	The above shall be initiated as early as possible in the design and development process, when most opportunities exist to make changes and improvements to the product affecting its overall environmental performance throughout its life cycle.
4.3 Regulatory and stakeholders' requirements	Environmentally conscious design is performed within the boundaries set by regulatory and stakeholders' requirements. Such requirements shall be regularly reviewed so that relevant changes are understood by the organization undertaking the ECD.
4.4 Integration into management system	Environmentally conscious design and its objective of minimizing the overall adverse impact of the product shall be reflected in the policies and strategies of the organization.
	If an organization has a management system which includes the product design and development function, the ECD process shall be an integral part of that documented system
	In line with the procedures of the management system of the organization, the ECD process shall be reviewed when required and at planned intervals to ensure its continuing suitability, adequacy and effectiveness.
	This review shall include assessing opportunities for improvement and the need for changes to the ECD process and the related policies and strategies of the organization.
5 Environmentally conscious design process (ECD process) 5.1 General	Organizations performing environmentally conscious design (ECD) shall establish, document, implement and maintain an ECD process as an integral part of the product design and development process. This ECD process includes the following steps a) analysis of the regulatory and stakeholders' environmental requirements; b) identification and evaluation of environmental aspects and corresponding impacts; c) design and development; d) review and continual improvement.
	The organization shall, while following the above steps, document the relevant results and the subsequent conclusions and responsibilities assigned.

Table 1 *(2 of 2)*

Clause/Subclause	Requirements
5.2 Analysis of regulatory and stakeholders' environmental requirements	As an initial step of ECD, to be carried out in conjunction with the identification of environmental aspects (see 5.3), the organization shall understand the relevant regulatory and stakeholders' requirements, both at horizontal and sector specific level.
	The organization shall ensure, as appropriate, that: a) relevant environmental requirements from applicable regulatory authorities and stakeholders are identified, covering – relevant product functions, – relevant life cycle stages, – relevant environmental aspects of the product, – geographical scope of the intended market, and – related activities of the organization; b) both current and new requirements are regularly reviewed and identified; c) a systematic analysis of these requirements is performed and documented, identifying the affected product function(s) and life cycle stage(s), related activities of and responsibilities in the organization, and resulting action(s) to be taken; d) new or changed requirements, which appear during the design phase are evaluated as to their effect on the product and necessary modifications are made.
5.3 Identification and evaluation of environmental aspects and corresponding impacts 5.4 Design and development	Where certain attributes are required for compliance with regulations (e.g. health and safety, electromagnetic compatibility) these shall be met in a manner that is least damaging to the environment.
	The following steps shall be carried out during design and development: a) specify the functions of the product; b) define significant environmental parameters from the analysis of regulatory and stakeholder requirements and evaluation of the environmental aspects; c) identify relevant environmental improvement strategies for these parameters; d) develop environmental targets based on the improvement strategies; e) develop a product specification addressing the environmental targets (environmental product specification); and f) develop technical solutions to meet the environmental targets while taking into account other design considerations
5.5 Review and continual improvement	The organization shall conduct design reviews to evaluate that the product design has met the targets defined in the environmental product specification whenever significant environmental aspects are affected or a major design phase is completed.
	When the product environmental targets are not met, improvement actions shall be assigned and implemented for the current or future design.
	Records of the design reviews, including the assigned actions arising from the review, shall be maintained and serve as a reference for future product development and continual improvement activities.
5.6 Information sharing for ECD	As part of the ECD process, organizations in the supply chain shall disclose information of their product or product category to organizations involved in design and development to enable them to achieve ECD objectives.

5 Experiences and best practices of environmental consciousness

5.1 Designing fibre optic cables for recycling

The design of one fibre optic cable may use at least ten components. This makes it both technically and economically difficult to re-use or recycle. It is necessary to change the design of the cable to make it easier to dismantle and recycle, and to ensure that technical, economic and environmental criteria are met. Options for the recovery and re-use of materials from the newly designed cable are being identified and the overall economics assessed.

5.2 Environmental protection

Based on one telecommunications supplier's charter, which sets out basic concepts and policies for protecting the environment, they promote company-wide conservation initiatives that improve daily life and culture. In addition, under the Basic Program for Global Environmental Protection Measures, action plans are being carried out to meet specific ecological goals, such as reducing virgin pulp consumption, preventing global warming, and cutting waste volume.

5.3 Recycling of used products

Collecting used products for reuse and recycling after products are delivered to customers that will play an important role in creating a recycling-oriented society. One electronic devices supplier collects used electric wires and cables, optical fibre cables, and carbide chips for cutting tools and their plastic cases for recycling as materials for new products. Notably, their recycling rate for electric wires/cables, from which the copper, coating materials and metals are separated and recycled, is nearly 100 %.

5.4 Recyclability of optical fibre cable

According to one fibre optical cable producer, the first point they consider is to choose a material that is easy to recycle. Recycling techniques for polyethylene, which is usually used for the sheath material of optical fibre cables, were already developed and reported. In this product evaluation, the producer employed an easy-to-recycle polyester-type material for the strength members.

The second point is the cable's ability to be disassembled. In order to recycle optical cables, it is important that the cables be easily disassembled. As a result of optimizing size and composition of both the sheath and the strength members, they were able to strike a balance between disassembility and adhesion force.

During the recycling process, disassembled optical cables are separated material by material. After an impurity removal process, either material recycling or chemical recycling is conducted. Since the optical fibre cable they developed uses easy-to-recycle and disassemble materials, effective recycling of this newly composed material is expected.