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TECHNICAL REPORT

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Fibre optic interconnecting devices and passive components – Summarising results of round robin on connector end face scratch recognition and verification by automated microscopes

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IEC TR 63367 has been prepared by subcommittee 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics. It is a Technical Report.

The text of this Technical Report is based on the following documents:

Draft	Report on voting
86B/4492/DTR	86B/4521/RVDTR

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

The language used for the development of this Technical Report is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
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INTRODUCTION

It is known that contamination and scratches on connector end face can result in degradation of optical performance as described in IEC TR 62627-05. It is important to inspect and clean, when necessary, each connector before mating with another connector to ensure they are fit for function. The visual inspection methods and criteria for fibre optic connectors and fibre-stub transceivers are defined in IEC 61300-3-35. Three different methods can be used for visual inspection: direct view optical microscopy (method A), video microscopy (method B) and automated analysis microscopy (method C). All methods are susceptible to system variability: methods A and B are operator dependent; method C is operator independent but relies on software analysis for measurement results. The uncertainty inherent to imaging equipment, processing methods, and detection software can lead to measurement variability among different brands and even the same types of microscopy. For all methods, the fibre microscopes can be certified for use in either low- and high-resolution applications with a purpose-built certification artefact.

There is industry concern about the veracity of the results of the visual inspection of the same part using different automated inspection equipment and software for method C. The IEC SC 86B task force group on scratch recognition was organized to investigate automated inspection system variability and provide recommendations to improve repeatability and reproducibility of the inspection. The task force group specifically limited its investigation to inspection using method C.

The task force group consisted of the following members (in alphabetical order): Arden, CommScope, Corning, Data Pixel, Exfo, Fibre QA, Fluke Corporation, Sumix, University College of London, and decided to perform this investigation by means of a round robin. The round robin involved inspection systems from multiple vendors in a blind study to determine the baseline performance of the systems with regard to automated scratch detection relative to IEC criteria of pre-selected samples.

This report summarizes the results (data collection and analysis) of end face scratch recognition and verification round robin performed by the following task force contributors (5 fibre inspection system manufactures). The following sequence in which the contributors are listed does not represent the order in which the data is presented in the results section. One contributor provided results from four unique inspection systems, each having their own participant ID (eight ID’s in total):

- Data-Pixel;
- Exfo;
- FiberQA;
- Fluke Corporation;
- Sumix.

FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – SUMMARISING RESULTS OF ROUND ROBIN ON CONNECTOR END FACE SCRATCH RECOGNITION AND VERIFICATION BY AUTOMATED MICROSCOPES

1 Scope

This document summarises the results of a round robin on connector end face scratch recognition and verification by automated microscopes. The prime objectives of the study were:

- determine the amount of variability (repeatability and reproducibility) when different state-of-the-art inspection systems are assessed against IEC 61300-3-35:2015;
- evaluate any system-to-system variation in the quantity of reported scratches;
- provide recommendations to improve the repeatability and reproducibility of fibre optic inspection systems.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at https://www.iso.org/obp
- IEC Electropedia: available at http://www.electropedia.org/

4 Round robin procedure

The round robin workflow consisted of the following steps.

a) Specimen preparation (see Clause 5): Multimode and single-mode single-fibre and multi-fibre test specimens were produced. An image of each end face was captured by high resolution microscope, attenuation and return loss were measured for each fibre, and end-face geometry was determined to verify that the specimens met the IEC interface requirements.

b) Circulation initiation: Measurement procedure and results template (see Annex A) were developed and approved by the group. The order of participants for specimen circulation was agreed.

c) Measurements: Specimens were circulated among round robin participants. Every participant performed measurements and collected image data according to the agreed procedure.

d) Analysis of results: The results were gathered from all participants. Data analysis was performed, and the synthesis report was composed.