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TECHNICAL REPORT



**Fibre optic interconnecting devices and passive components –
Part 05: Investigation on impact of contamination and scratches on optical
performance of single-mode (SM) and multimode (MM) connectors**

INTERNATIONAL
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CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references	7
3 Abbreviations	7
4 Experimental methodology.....	8
5 The impact of scratches on A and RL of single-mode connectors.....	9
6 Effects of scratches on RL of MM connectors	10
7 Investigation of impact of contamination on optical performance of 2,5 mm and 1,25 mm connectors	11
7.1 General.....	11
7.2 Zone definitions	11
7.3 Experimental data for 2,5 mm ferrule connectors	12
7.4 Experimental data for 1,25 mm ferrule connectors (LC, MU)	13
7.5 Image analysis.....	16
7.6 Gaussian weighted per cent occluded area	16
7.7 Inspection criteria matrix.....	17
8 Correlation study between contamination and signal degradation in single-mode APC connectors.....	18
8.1 General.....	18
8.2 Experimental data and analysis for SM APC connectors	18
8.3 Inspection criteria matrix.....	20
9 Development of cleanliness specifications for single-mode, angled physical contact MPO connectors.....	21
9.1 General.....	21
9.2 Core zone analysis	21
9.3 Cladding zone analysis	21
9.4 MT APC scratch analysis	23
10 Conclusion	24
Annex A (informative) The nature of particle redistribution during series of matings/dematings.....	26
A.1 General.....	26
A.2 Accumulation of particles near the core during repetitive fibre matings and de-matings for 2,5 mm ferrule connectors	26
A.3 Redistribution of particles during series of repetitive matings/de-matings for MPO connectors	28
A.4 Attenuation changes and separation factor	29
Bibliography.....	30
Figure 1 – Block diagram of design of experiment.....	8
Figure 2 – Connector endface with the scratches outside the MFD area	9
Figure 3 – Connector endface with scratches passing through the core	10
Figure 4 – Examples of characterized endfaces using confocal microscope [7]	10
Figure 5 – RL random mated connectors, $\lambda=1\ 300\ \text{nm}$ [7]	11
Figure 6 – Influence of the particle location on performance	12

Figure 7 – FC01 images of DUT and reference fibre after contamination and fifth mating	13
Figure 8 – FC04 images of DUT and reference fibre after contamination and second mating	13
Figure 9 – LC07 images of the DUT and the T07 reference fibre after contamination and first mating	14
Figure 10 – LC07 images of the DUT and the T07 reference fibre after contamination and third mating	15
Figure 11 – LC07 images of the DUT (Figure 11a) and the T07 reference fibre (Figure 11b) after contamination and fifth mating	15
Figure 12 – Labelled detected particles with 5 µm annular rings and fibrescope image for LC07-WD-5M	16
Figure 13 – Delta attenuation versus GWPOA	17
Figure 14 – Left to right: Group A, Group B and average return loss decrease by group	18
Figure 15 – Behaviour of relatively large particles versus small particles	19
Figure 16 – Test connector in pristine condition (RL= 67,5 dB) and after scratches applied (RL= 68,5 dB)	20
Figure 17 – Impact of contamination in core zone for SM APC MPO connectors	21
Figure 18 – Contamination failures due to loss of physical contact by fibre position for connections of angled MT ferrules	22
Figure 19 – Endface images of DUT and reference connector showing no impact to signal performance	22
Figure 20 – Minimal MT/APC contamination on limit sample #1 with signal degradation	23
Figure 21 – Typical lack of impact on signal performance of light scratches on MT/APC connections	24
Figure A.1 – Experimental methodology block diagram	26
Figure A.2 – Relationship between the particle centre moving speed and the charge	27
Figure A.3 – Particle migration and the A signal degradation of MPO connector (channel 2) after series of matings/de-matings	28
Figure A.4 – Evolution of particle centre position for channel 1-11 of an MPO connector pair	28
Figure A.5 – Measured and calculated delta attenuation as functions of GWPOA	29
Table 1 – Summary of the result	7
Table 2 – A and RL statistics for representative samples	14
Table 3 – Inspection criteria for SMF pigtail and patch cord connectors, RL >45 dB	18
Table 4 – Inspection criteria for single-mode APC pigtail and patch cord connectors	20

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FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS –

Part 05: Investigation on impact of contamination and scratches on optical performance of single-mode (SM) and multimode (MM) connectors

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IEC/TR 62627-05, which is a technical report, has been prepared by subcommittee 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics.

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

Enquiry draft	Report on voting
86B/3442/DTR	86B/3489A/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 the parts in the IEC 62627 series, published under the general title *Fibre optic interconnecting devices and passive components* 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 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.

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INTRODUCTION

Contaminated optical connectors result in degradation of optical performance, which can be quantified by return loss (RL) and attenuation (A), functional failures and increased deployment costs. Fibre optic connector endface cleaning is recognized as a necessity for optimal signal performance. It is known that contamination impacts signal performance by blocking the core and impeding light transmission, as well as by preventing direct physical contact creating an air gap between the two connector endfaces [1, 2]¹. If an air gap exists, optical performance will be impacted due to the change in transmission medium. As contaminated connectors are mated and demated, contamination can be redistributed around the connectors' endface and block the fibre core. This presents a risk of signal performance degradation during the service life.

Since 2002, the iNEMI (International Electronics Manufacturing Initiative) working group has done substantial work, both theoretical and experimental, on impact of scratches and contamination on connector optical performance (A and RL). The following connector types have been used for this research: single-mode (SM) physical contact (PC) connectors, SM angle polished connectors (APC) and SM APC MPO connector. The impact of polishing scratches has been investigated for SM and multimode (MM) connectors. The work presented in this technical report was used as a base work for the development of IPC-8497-1 [3] and IEC 61300-3-35 [4].

¹ Figures in square brackets refer to the Bibliography.

FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS –

Part 05: Investigation on impact of contamination and scratches on optical performance of single-mode (SM) and multimode (MM) connectors

1 Scope

This part of IEC 62627, which is a technical report, summarizes the extensive industry research on development of cleanliness specifications for single-mode (SM) and multimode (MM) connectors.

The summary of the result shows Table 1.

Table 1 – Summary of the result

Samples		Scratch/Contamination/Defect	A/RL	Clause	Reference
SM/MM	Single-fibre/ multi-fibre				
SM PC	Single-fibre	Scratch	RL	3	[1], [5], [6]
MM PC	Single-fibre	Scratch	RL	4	[7]
SM PC	Single-fibre	Contamination	A and RL	5	[2], [6], [8]
SM APC	Single-fibre	Contamination	A	7	[11]
SM APC	Single-fibre	Scratch	RL	7.2	[11]
SM APC	Multi-fibre	Contamination	A and RL	8	[12]

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 61300-3-6, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-6: Examinations and measurements – Return loss*

IEC 61755-3-1, *Fibre optic connector optical interfaces – Part 3-1: Optical interface, 2,5 mm and 1,25 mm diameter cylindrical full zirconia PC ferrule, single mode fibre*