

Supplement **ITU-T G Suppl. 40 (07/2024)**

SERIES G: Transmission systems and media, digital systems and networks

Supplements to ITU-T G-series Recommendations

Optical fibre and cable Recommendations and standards guideline

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Supplement 40 to ITU-T G-series Recommendations

Optical fibre and cable Recommendations and standards guideline

Summary

Supplement 40 to the ITU-T G-series Recommendations provides information on the background and specifications used in the development of optical fibre and cable ITU-T Recommendations such as Recommendations ITU-T G.651.1, ITU-T G.652, ITU-T G.653, ITU-T G.654, ITU-T G.655, ITU-T G.656, ITU-T G.657 and L series Recommendations. It also contains information used in the development of test method Recommendations such as Recommendations ITU-T G.650.1, ITU-T G.650.2 and ITU-T G.650.3. Moreover, this Supplement maps ITU-T documents to optical fibre and cable standards developed under IEC.

The fifth edition covers the new technical report on "Optical fibre, cable, and components for space division multiplexing" and L-series Recommendations for optical fibre cables.

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FOREWORD

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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Supplement 40 to ITU-T G-series Recommendations

Optical fibre and cable Recommendations and standards guideline

1 Scope

This fibre guideline aims at providing a road map with regard to the specifications of various kinds of fibres and their test methods, as well as the most important fibre optics hardware which will be very useful for engineers reading the ITU-T Recommendations and other documents to design an optical fibre network. This guideline should also make it easier for readers to correlate the specifications found in the fibre, terrestrial system interface, components, submarine systems and physical infrastructure Recommendations currently being developed in ITU-T. Moreover, this guideline provides important information for system designs and optical fibre cable installations in relation to, for example, high power limitations and reliability, which is available to optical fibre cable installation suppliers and system designers. This guideline contains:

- Definitions of fibre parameters not specified in current ITU-T fibre Recommendations, but which are very important for practical use.
- Features of existing optical fibre categories and their application areas.
- The relationship between fibre parameters and interface parameters.
- Optical fibre properties for operation and maintenance.

In the appendices, the following items are described for reference:

- Standardization criteria for optical fibres in ITU-T Study Group 15.
- Optical fibre cable structures and constructions.
- Fibre optics hardware and passive components mostly used in the construction of an optical network.
- Comparison of ITU-T Recommendations and IEC documents related to optical fibre specifications and test methods.

In particular, this guideline is prepared concisely by quoting document numbers so as to avoid any overlap with existing ITU-T Recommendations and Handbooks or IEC documents. This guideline would be a very useful desk book for engineers dealing with optical transmission systems.

2 References

- | | |
|-----------------|---|
| [ITU-T G.650.1] | Recommendation ITU-T G.650.1 (2024), <i>Definitions and test methods for linear, deterministic attributes of single-mode fibre and cable.</i> |
| [ITU-T G.650.2] | Recommendation ITU-T G.650.2 (2015), <i>Definitions and test methods for statistical and non-linear related attributes of single-mode fibre and cable.</i> |
| [ITU-T G.650.3] | Recommendation ITU-T G.650.3 (2017), <i>Test methods for installed single-mode optical fibre cable links.</i> |
| [ITU-T G.651.1] | Recommendation ITU-T G.651.1 (2018), <i>Characteristics of a 50/125 μm multimode graded index optical fibre cable for the optical access network.</i> |
| [ITU-T G.652] | Recommendation ITU-T G.652 (2024), <i>Characteristics of a single-mode optical fibre and cable.</i> |

[ITU-T G.653]	Recommendation ITU-T G.653 (2010), <i>Characteristics of a dispersion-shifted single-mode optical fibre and cable.</i>
[ITU-T G.654]	Recommendation ITU-T G.654 (2024), <i>Characteristics of a cut-off shifted single-mode optical fibre and cable.</i>
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[ITU-T L.10x]	Recommendation ITU-T L.10x (in force), <i>Cable structure and characteristics.</i>
[ITU-T L.126]	Recommendation ITU-T L.126/L.27 (1996), <i>Method for estimating the concentration of hydrogen in optical fibre cables.</i>
[ITU-T L.15x]	ITU-T L.15x series (in force), <i>Guidance and installation technique.</i>
[ITU-T L.16x]	ITU-T L.16x series (in force), <i>Guidance and installation technique.</i>
[ITU-T L.161]	Recommendation ITU-T L.161/L.46 (2000), <i>Protection of telecommunication cables and plant from biological attack.</i>
[ITU-T L.256]	Recommendation ITU-T L.256/L.45 (2000), <i>Minimizing the effect on the environment from the outside plant in telecommunication networks.</i>
[ITU-T L.300]	Recommendation ITU-T L.300/L.25 (2015), <i>Optical fibre cable network maintenance.</i>
[ITU-T L.301]	Recommendation ITU-T L.301/L.41 (2000), <i>Maintenance wavelength on fibres carrying signals.</i>

[ITU-T L.302]	Recommendation ITU-T L.302/L.40 (2000), <i>Optical fibre outside plant maintenance support, monitoring and testing system.</i>
[ITU-T L.310]	Recommendation ITU-T L.310 (2016), <i>Optical fibre maintenance criteria for access networks.</i>
[ITU-T L.312]	Recommendation ITU-T L.312/L.68 (2007), <i>Optical fibre cable maintenance support, monitoring and testing system for optical fibre cable networks carrying high total optical power.</i>
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[IEC TR 62000]	IEC TR 62000 (2021), <i>Single-mode fibre compatibility guidelines.</i>
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[IEC TR 62221]	IEC TR 62221 (2012), <i>Optical fibres – Measurement methods – Microbending sensitivity.</i>
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[IEC TR 62284]	IEC TR 62284 (2003), <i>Effective area measurements of single-mode optical fibres – Guidance.</i>
[IEC TR 62285]	IEC TR 62285 (2023), <i>Application guide for non-linear coefficient measuring methods.</i>
[IEC TR 62316]	IEC TR 62316 (2017), <i>Guidance for the interpretation of OTDR backscattering traces.</i>
[IEC TR 62324]	IEC TR 62324 (2007), <i>Single-mode optical fibres – Raman gain efficiency measurement using continuous wave method – Guidance.</i>
[IEC TR 62547]	IEC TR 62547 (2013), <i>Guidelines for the measurement of high-power damage sensitivity of single-mode fibres to bends – Guidance for the interpretation of results.</i>

Furthermore, ITU-T L-series Recommendations and IEC documents concerning optical fibre cables and test methods are quoted in Appendix VI. The detailed information is omitted in this clause.

3 Definitions

For the purposes of this supplement, the definitions given in [ITU-T G.650.1] and [ITU-T G.650.2] are used.

4 Abbreviations and acronyms

This supplement uses the following abbreviations and acronyms:

ATM	Alternative Test Method
DGD	Differential Group Delay
PMD	Polarization Mode Dispersion
PMD _Q	statistical parameter for link PMD
RTM	Reference Test Method
SBS	Stimulated Brillouin Scattering

5 Conventions

None.