

I n t e r n a t i o n a l   T e l e c o m m u n i c a t i o n   U n i o n

**ITU-T**

TELECOMMUNICATION  
STANDARDIZATION SECTOR  
OF ITU

**L.79**

(07/2008)

SERIES L: CONSTRUCTION, INSTALLATION AND  
PROTECTION OF CABLES AND OTHER ELEMENTS OF  
OUTSIDE PLANT

---

## **Optical fibre cable elements for microduct blowing-installation application**

Recommendation ITU-T L.79



## **Recommendation ITU-T L.79**

### **Optical fibre cable elements for microduct blowing-installation application**

#### **Summary**

Recommendation ITU-T L.79 describes characteristics, construction and test methods for microduct fibre units and microduct cables to be used with the blowing installation technique. The cable characteristics required for a cable to perform appropriately are described. Also, a method is described for determining whether or not the cable has the required characteristics. The required conditions may differ according to the installation environment; detailed test conditions must be agreed upon between a user and a manufacturer for the environment in which a cable is to be used.

#### **Source**

Recommendation ITU-T L.79 was approved on 7 July 2008 by ITU-T Study Group 6 (2005-2008) under Recommendation ITU-T A.8 procedure.

## FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

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.

## NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure e.g., interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

## INTELLECTUAL PROPERTY RIGHTS

ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at <http://www.itu.int/ITU-T/ipr/>.

© ITU 2009

All rights reserved. No part of this publication may be reproduced, by any means whatsoever, without the prior written permission of ITU.

# CONTENTS

## Page

|     |                                                                           |    |
|-----|---------------------------------------------------------------------------|----|
| 1   | Scope .....                                                               | 1  |
| 2   | References.....                                                           | 1  |
| 3   | Definitions .....                                                         | 3  |
| 4   | Abbreviations and acronyms .....                                          | 4  |
| 5   | Environmental conditions.....                                             | 4  |
| 5.1 | Underground.....                                                          | 4  |
| 5.2 | Aerial .....                                                              | 4  |
| 5.3 | Indoor .....                                                              | 4  |
| 6   | Cable construction .....                                                  | 4  |
| 6.1 | Fibre protection .....                                                    | 4  |
| 6.2 | Protected microducts .....                                                | 5  |
| 6.3 | Microducts.....                                                           | 6  |
| 6.4 | Hybrid protected microduct/cable .....                                    | 6  |
| 6.5 | Blown-in elements.....                                                    | 6  |
| 7   | Test methods.....                                                         | 7  |
| 7.1 | Test methods for cable elements .....                                     | 7  |
| 7.2 | Methods for testing mechanical characteristics.....                       | 8  |
| 7.3 | Test methods for environmental characteristics .....                      | 9  |
| 7.4 | Test methods for fire safety .....                                        | 10 |
|     | Appendix I – Chinese experience .....                                     | 11 |
| I.1 | Product types of microducts .....                                         | 11 |
| I.2 | Blowing performance test for micro-cable or fibre unit in microduct ..... | 12 |
| I.3 | Layout location selection for microduct.....                              | 14 |
|     | Bibliography.....                                                         | 16 |

## Introduction

Air blowing installation methods are based on viscous drag acting upon a cable while forcing a continuous high-speed airflow along it with a compressor. The velocity of the moving air propels the cable and makes it advance at a typical speed supported by the equipment. New generation cabling techniques, based on microduct cables, microduct fibre units and microduct systems, offer the possibility of branching without the need for splices. These techniques are extremely flexible and make it possible to grow in accordance with demand. This gives rise to the concept of "fibre on demand", which involves the pre-installation of a multi-microduct system and then the subsequent, incremental installation of fibre based on individual customer demand.

To support this "fibre on demand" approach, a fibre cable product must allow the installation of only a few fibres at a time. Cable products should take up the smallest possible amount of the service provider's right-of-way (i.e., fit the smallest microduct) so that there is plenty of space to add fibre for future customers. Therefore, usually only a small number of the fibres that are installed are used immediately. Also state-of-the-art fibre technology can be adopted.

When using blowing techniques, there is no pulling force at the front end of the cable; airflow exerts a distributed force along the entire cable. In addition, connection to a pulling cord is not needed.

Generally, the blowing force is an order of magnitude lower than the typical force involved in other installation methods, for example pulling techniques, thus reducing installation hazards. Additionally, with this technique, bends in a duct run are much less of a concern than with pulling techniques, so the installation speed increases and longer lengths of cable can be installed. Cables are installed virtually without stress, leaving the cable relaxed in the duct once the installation has been completed.

# Recommendation ITU-T L.79

## Optical fibre cable elements for microduct blowing-installation application

### 1 Scope

This Recommendation:

- refers to microduct fibre units and microduct cables to be used for telecommunications networks with blowing installation techniques;
- deals with mechanical and environmental characteristics of microduct fibre units and microduct cables. The optical fibre dimensional and transmission characteristics, together with their test methods, should comply with [IEC 60793-2-10], [ITU-T G.652], [ITU-T G.653], [ITU-T G.654], [ITU-T G.655], [ITU-T G.656] and [ITU-T G.657] which deal with multi-mode graded index optical fibres and single-mode optical fibres, respectively;
- deals with fundamental considerations related to optical fibre cable from mechanical and environmental standpoints;
- acknowledges that some optical fibre cables may contain metallic elements, for which reference should be made to [b-ITU-T Handbook] and other L-series Recommendations;
- recommends that microduct fibre units and microduct cables should be provided with end-sealing and protection during delivery and storage, as used for metallic cables.

### 2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [ITU-T G.650.1] Recommendation ITU-T G.650.1 (2004), *Definitions and test methods for linear, deterministic attributes of single-mode fibre and cable*.  
<<http://www.itu.int/rec/T-REC-G.650.1>>
- [ITU-T G.651.1] Recommendation ITU-T G.651.1 (2007), *Characteristics of a 50/125  $\mu\text{m}$  multimode graded index optical fibre cable for the optical access network*.  
<<http://www.itu.int/rec/T-REC-G.651.1>>
- [ITU-T G.652] Recommendation ITU-T G.652 (2005), *Characteristics of a single-mode optical fibre and cable*.  
<<http://www.itu.int/rec/T-REC-G.652>>
- [ITU-T G.653] Recommendation ITU-T G.653 (2006), *Characteristics of a dispersion-shifted single-mode optical fibre and cable*.  
<<http://www.itu.int/rec/T-REC-G.653>>
- [ITU-T G.654] Recommendation ITU-T G.654 (2006), *Characteristics of a cut-off shifted single-mode optical fibre and cable*.  
<<http://www.itu.int/rec/T-REC-G.654>>

- [ITU-T G.655] Recommendation ITU-T G.655 (2006), *Characteristics of a non-zero dispersion-shifted single-mode optical fibre and cable*.  
<<http://www.itu.int/rec/T-REC-G.655>>
- [ITU-T G.656] Recommendation ITU-T G.656 (2006), *Characteristics of a fibre and cable with non-zero dispersion for wideband optical transport*.  
<<http://www.itu.int/rec/T-REC-G.656>>
- [ITU-T G.657] Recommendation ITU-T G.657 (2006), *Characteristics of a bending loss insensitive single mode optical fibre and cable for the access network*.  
<<http://www.itu.int/rec/T-REC-G.657>>
- [ITU-T L.1] Recommendation ITU-T L.1 (1988), *Construction, installation and protection of telecommunication cables in public networks*.  
<<http://www.itu.int/rec/T-REC-L.1>>
- [ITU-T L.10] Recommendation ITU-T L.10 (2002), *Optical fibre cables for duct and tunnel application*.  
<<http://www.itu.int/rec/T-REC-L.10>>
- [ITU-T L.12] Recommendation ITU-T L.12 (2008), *Optical fibre splices*.  
<<http://www.itu.int/rec/T-REC-L.12>>
- [ITU-T L.26] Recommendation ITU-T L.26 (2002), *Optical fibre cables for aerial application*.  
<<http://www.itu.int/rec/T-REC-L.26>>
- [ITU-T L.35] Recommendation ITU-T L.35 (1998), *Installation of optical fibre cables in the access network*.  
<<http://www.itu.int/rec/T-REC-L.35>>
- [ITU-T L.43] Recommendation ITU-T L.43 (2002), *Optical fibre cables for buried application*.  
<<http://www.itu.int/rec/T-REC-L.43>>
- [ITU-T L.59] Recommendation ITU-T L.59 (2004), *Optical fibre cables for indoor applications*.  
<<http://www.itu.int/rec/T-REC-L.59>>
- [IEC 60189-1] IEC 60189-1 (2007), *Low-frequency cables and wires with PVC insulation and PVC sheath – Part 1: General test and measuring methods*.  
<<http://webstore.iec.ch/webstore/webstore.nsf/artnum/038026>>
- [IEC 60332-1] IEC 60332-1 (2004), *Tests on electric and optical fibre cables under fire conditions – Part 1: Test for vertical flame propagation for a single insulated wire or cable*.  
<<http://webstore.iec.ch/webstore/webstore.nsf/artnum/032773>>  
<<http://webstore.iec.ch/webstore/webstore.nsf/artnum/032774>>  
<<http://webstore.iec.ch/webstore/webstore.nsf/artnum/032777>>
- [IEC 60332-3-24] IEC 60332-3-24 (2000), *Tests on electric and optical fibre cables under fire conditions – Part 3-24: Test for vertical flame spread of vertically-mounted bunched wires or cables – Category C*.  
<<http://webstore.iec.ch/webstore/webstore.nsf/artnum/042654>>
- [IEC 60754-1] IEC 60754-1 (1994), *Test on gases evolved during combustion of materials from cables – Part 1: Determination of the amount of halogen acid gas*.  
<<http://webstore.iec.ch/webstore/webstore.nsf/artnum/019243>>