

International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

L.35

Amendment 1
(11/2007)

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

Installation of optical fibre cables in the access
network

**Amendment 1: New Appendix II – Korean
experience with access network installation
procedures**

ITU-T Recommendation L.35 (1998) – Amendment 1



ITU-T Recommendation L.35

Installation of optical fibre cables in the access network

Amendment 1

New Appendix II – Korean experience with access network installation procedures

Summary

This appendix gives:

- some comments on general requirements for the method;
- a brief explanation of the equipment required;
- methods and procedures for performing the work.

Source

Amendment 1 to ITU-T Recommendation L.35 (1998) was agreed on 23 November 2007 by ITU-T Study Group 6 (2005-2008).

FOREWORD

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ITU-T Recommendation L.35

Installation of optical fibre cables in the access network

Amendment 1

Insert new Appendix II with the following contents.

Appendix II – Korean experience with access network installation procedures

II.1 Introduction

With the advent of a highly networked society, the need for broadband services increases. To meet these service requirements, optical fibre networks are deployed extensively. The installation of optical fibre needs empty underground ducts and, if there are no spare ducts, additional ducts should be installed, which makes it expensive to deploy FTTx. Recently, copper cables are being replaced by fibre-optic cable to cope with the increasing number of FTTx subscribers. It is, however, difficult to pull out copper cable from the duct in which a big cable is placed by conventional winching equipment. It has been found that the pulling operation encounters difficulties when the diameter of copper cable is larger than 50 mm.

The installation of additional underground ducts is very important for deploying FTTx in urban areas where there are no spare ducts. Therefore, an easier method to pull out copper cables and to install sub-ducts for fibre-optic cables in the underground duct has been recently developed. General indications for the installation of any type of fibre are discussed in the main body of this Recommendation and Chapter II (Cable installation) of the Manual on Optical Fibre Cables "Construction, installation, jointing and protection of optical fibre cables". This appendix provides more detailed information about the installation of fibre-optic cables in the access network based upon the experiences of one country.

II.2 Scope of Appendix II

This appendix gives:

- some comments on general requirements for the method;
- a brief explanation of the equipment required;
- methods and procedures for performing the work.

II.3 Method for pulling out the copper cable from a duct and installing a new sub-duct for fibre-optic cable

This method can be applied to pull out the unused or useless copper cables from an underground duct and to install new sub-duct for fibre-optic cables in order to deploy FTTx. The main purpose of this method is to secure new additional underground ducts on routes where there are no empty ducts. The advantage of this method is its speed of execution because pulling out copper cable and installing the sub-duct are done at the same time.

It is not recommended that this method be applied to ducts where multiple cables or sub-ducts are installed. This method is suitable for single-way duct unit systems including PVC and PE ducts that have inside diameters of 100 mm. It is recommended that the diameter of copper cable which will

be pulled out ranges from 50 to 87 mm, and the sub-duct which will be followed by copper cable has an outside diameter less than these ranges. It is estimated that the maximum pulling force is about 200 kN.

II.3.1 Preparatory steps

All precautions considered in other installation techniques shall be taken into account during the works. The pulling force is so great that precautions and preventive measures are provided. All rotating parts are covered for safety and a protective device is installed against excessive current and voltage. An emergency stop button is required in case of accident. All workmen must remain outside the manhole and at least an agreed minimum distance from the machine during pulling out operations. In addition, the safety procedures described in [b-ITU-T L.63] should be observed.

The equipment and sub-duct drum are positioned as shown in Figure II.1. The subsidiary facilities such as hydraulic pump, controller and generator are also located near the equipment. It has to be taken into account that at least four persons are necessary to perform the installation process: one to set spare parts in the manhole; one to handle the cable drum and to connect the copper cable to the sub-duct; one for any traffic control; and one to manage the overall operations. In case of long routes with many bends, it is recommended to apply an appropriate lubricant along the surface of a sub-duct.

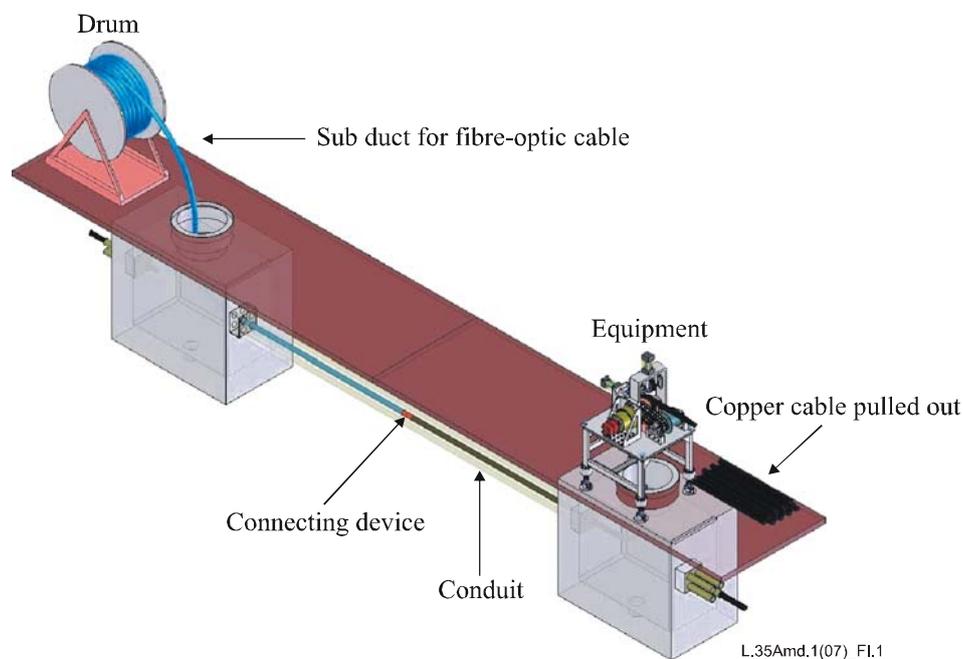


Figure II.1 – Schematic layout

II.3.2 Pulling out copper cable

Due to the friction between the cable and duct, pulling out the copper cable from duct requires the application of great force. In addition, the force to grip the copper cable tightly is an important factor to be considered. The cable grip is designed so that the pulling force can be employed, and all works are operated by hydraulic pressure. The copper cable is pulled out using this equipment as shown in Figure II.2. The copper cables removed are then sent for recycling.



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Figure II.2 – Example of equipment for pulling out copper cables

II.3.3 Inspection of host duct

It is recommended that the host duct be inspected by test mandrel or by CCTV camera after the copper cable is pulled out completely. Test mandrel and CCTV systems can be used to ascertain the present state of the duct. If the host duct is deformed severely or has many defects, repairing work is carried out.

II.3.4 Installation of sub-duct

The sub-duct follows the copper cable during the pulling operation. The sub-duct is connected tightly to the copper cable with a coupling device, and has enough tensile strength to withstand the pulling operation. HDPE duct is appropriate due to its flexibility and continuity. The diameter of copper cable which will be pulled out ranges from 50 to 87 mm, and the outside diameter of the sub-duct used should be less than that of copper cable so that the sub-duct can enter the host duct without difficulties. To minimize the friction at the bends, it is preferable to use turning wheels.

Bibliography

- [b-ITU-T L.63] ITU-T Recommendation L.63 (2004), *Safety procedures for outdoor installations*.

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