

Proximus Reference Offer for Subduct Access in P2P Fiber Underground Deployments

Access to HDPE-type of Fiber subducts in the geographical area covered by the Proximus P2MP footprint

Annex B Technical Specifications

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1. Introduction

- 1) This annex describes the technical specifications related to the Proximus Reference Offer for P2P Fiber subduct Access, as are known at this stage of the learning process at Proximus in this regard.
- 2) In order to safeguard the integrity of the subducts and fiber cables of Proximus, Beneficiaries must notify their acceptance of and willingness to comply with the Proximus technical requirements before they can be supplied with a subduct or an introduction fiber cable.
- 3) Conformity with the Proximus technical requirements is essential for an efficient and safe installation of fibre cables in Proximus subducts minimizing the risk for problems or damages.
- 4) This document contains a general description of the requirements that cables must meet to be suitable for use in Proximus subducts and it gives the technical specifications of the concerned Proximus network elements.
- 5) In its pursuit of improved efficiency and higher quality, Proximus constantly questions the choices of its network infrastructure and materials. Proximus reserves the right to modify the network infrastructure and materials mentioned in this document. The test procedure described in this document, which verifies the conformity of the equipment and materials, may therefore also be modified.
- 6) More additional details might further be provided to the Beneficiary at the time that a specific concrete project will occur. These details will be worked out in the elaboration of the detailed processes in the context of a concrete project whereby a concrete access is provided in response to a reasonable request for access from a concrete wholesale customer.

2. Specifications of Proximus network elements

- 7) The Beneficiary undertakes it will be using only cables that are compatible with the concerned Proximus network elements, e.g. ducts, subducts, Y-branches, fiber cables. For example, the diameter of the cables that the Beneficiary will blow into the subducts of Proximus must be sufficiently smaller than and suitable for the inner diameter of the subduct.
- 8) In order to be able to blow all fiber cables in all subducts of the Proximus network, the maximum diameter of a fiber micro cable used at Proximus is 6,5 mm. Based on this, all single fiber cable input port at the splice closures are standardized on a cable diameter range between 4 and 7 mm. So, in order to enable the sealing between the fiber cable and the splice closure, the Beneficiary's cable, entering that closure, needs to have an external cable diameter between 4 and 7mm, independent of the cable capacity.
- 9) At Proximus all fibers fulfill the G-652D standard. Other types of fiber can be spliced on a G-652D fiber, but in those cases the insertion loss of the splice can become quite high. ($> 0,15$ dB @ 1550 nm). So, in order to avoid additional losses in the splices between Proximus and the Beneficiary's fibers, the Beneficiary's fiber should be a G652 type too.
- 10) The color code, used at Proximus, for identification of fibers and fiber modules is:
 - 1 : black
 - 2 : brown
 - 3 : red
 - 4 : orange

5 : yellow

6 : green

7 : blue

8 : purple

9 : grey

10 : white

11 : red + ring mark

12 : orange + ring mark

In case the Beneficiary's fiber color code would differ from the Proximus color code, the Beneficiary provides to Proximus a list with the correct color code

11) Proximus puts at the disposal of the Beneficiary the following technical documentation:

- Annex 5.1 gives, as an example, the technical specifications of the HDPE ducts currently used in the Proximus network. They have an outer diameter of 50 mm.
- Annex 5.2 gives, as an example, the technical specifications of the subducts currently used in the Proximus network. They have an outer diameter of 10 mm and an inner diameter of 8 mm.
- Annex 5.3 gives, as an example, the technical specifications of the Y-branch, branching-off subducts currently used in the Proximus network.
- Annex 5.5. gives, as an example, the technical specifications of the SRV ducts, ometimes used in the Proximus network for introduction to the End-User site..

3. Cable capacity specification

- 12) Before starting the cable blowing performance test, the Beneficiary supplies Proximus with the vendor datasheet of the cable that the Beneficiary would like to install.
- 13) Annex 5.4 gives, as an example, the vendor datasheet of a cable containing 24 fibres that is currently used in the Proximus P2P Fiber underground network.

4. Cable blowing performance

- 14) Before installing any cable type in any Proximus subduct the Beneficiary needs to have the cable's blowing performance validated by Proximus at Proximus's own test site in Liedekerke.
- 15) The cable's blowing performance differs strongly between vendors and between cable types of the same vendor. The cable's blowing performance needs to be validated to prevent the usage of cables with inferior blowing performance.
- 16) Cables that have already been validated for being used for Duct Access in GPON Underground Deployments, as described in Annex B "Technical Specifications" of the Proximus Reference Offer for Duct Access in GPON Underground Deployments, should not be validated again for being used for Subduct Access in P2P Fiber Underground Deployments.

- 17) The cable's blowing performance is validated by the same testing protocol as Proximus uses for its own fibre distribution cables, for example for deciding on the supplier in RFQ's and for regular quality check tests to control the quality and conformity of the cables supplied.
- 18) The test is executed by Proximus. The cost of this test will be at the Beneficiary's expense.
- 19) The test site of Proximus is located in Liedekerke. It consists of an underground loop of 295 m distance with 6 HDPE ducts containing each 7 subducts of outer diameter of 10 mm and inner diameter of 8 mm. Figure 1 schematically depicts the Proximus test site regarding HDPE's at Liedekerke.

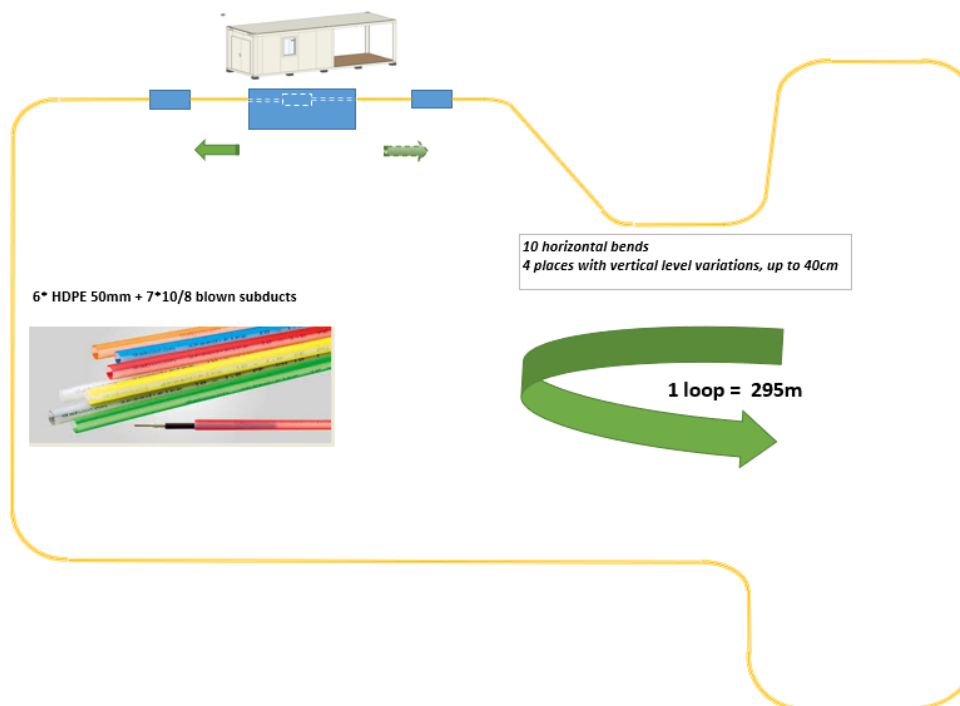


Figure 1: Test site for cable's blowing performance in HDPE's of Proximus

- 20) The following acceptance criterium is applied: when blown inside an 8 mm inner diameter subduct, the cable has to reach the minimum distance of 1.000 meters within a maximum time of 50 minutes with a minimum blowing speed of 10 meters/minute and a maximum air pressure of 14 bar.

5. Sub-annexes to Annex B

- 5.1. Technical vendor datasheet of HDPE ducts of 50 mm outer diameter.
 - B.5.1. Technical vendor datasheet – Macroduct Mono 50x4,6mm.pdf
- 5.2. Technical vendor datasheet of subducts of outer diameter of 10 mm and inner diameter of 9 mm.
 - B.5.2. Technical vendor datasheet – Speed pipe 10x1,0.pdf
- 5.3. Technical vendor datasheet of Y-branches, branching off subducts.
 - B.5.3. Technical vendor datasheet – HRMA.pdf
- 5.4. Technical vendor datasheet of multi micro-tubes cable (SP 1822) containing 24fibers.
 - B.5.4. Technical vendor datasheet – Multi Micro-Tubes Cable SP1822 – 24 fibres.pdf
- 5.5. Technical vendor datasheet of SRV duct with 4 subducts.
 - B.5.5. Technical vendor data sheet – SRV-G 40x12.pdf