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Netcity Telecom SA

TECHNICAL SPECIFICATION

## Specificatie Tehnica

### Microcablul cu fibre optice 24f-96f

Proprietati tipo-constructive, indicatori mecanici



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TS - 01.MCFO.96.02D.20081002

### 1. Scope

This document is related to the technical requirements of fiber optic microcables design to be blown in microducts, with a capacity between 24 to 96 fibers.

### 2. International Standards.

Following documents are generally applicable when not conflicting with present document.

- ITU/ETSI G.650
- ITU/ETSI G.651
- ITU/ETSI G.652
- ITU/ETSI G.653
- ITU/ETSI G.655
- IEC 60-793 series
- IEC 60-794 series
- EN 188000
- EN 187000

### 3. Cable design

#### 3.1. Fiber unit

For cables with more than 24 fibers, the bidder shall propose a solution based on bundles. This bundles will allow easy identification (different colours, ring marking,...) and will offer easy access to fibers without special tools.

In particular, the bidder shall guarantee a mid span access over more than 2 meters by peeling off the bundle thin sheath.

The bundle diameter shall be < 1.4 mm.

The fiber unit shall prevent fibers from water ingress.

Inside the bundle the fibers will be colour coded according to following code:

Color codes according to IEC 60304

1		RED	13		RED/BLACK
2		GREEN	14		GREEN/BLACK
3		BLUE	15		BLUE/BLACK
4		YELLOW	16		YELLOW/BLACK
5		WHITE	17		WHITE/BLACK
6		GREY	18		GREY/BLACK
7		BROWN	19		BROWN/BLACK
8		PURPLE	20		PURPLE/BLACK
9		TURQUOISE	21		TURQUOISE/BLACK
10		BLACK	22		TRANSPARENT/BLACK
11		ORANGE	23		ORANGE/BLACK
12		PINK	24		PINK/BLACK

### 3.2. Cable core

The cable core shall include a central strenght member

Bundles shall be placed around the central member.

The cable core shall be watertight; the bidder shall describe in details how the watertightness is realized; in any case swellable powders cannot be used.

### 3.3. Cable reinforcement

Additional armouring yarns can be used to achieve the requested tensile performances.

### 3.4. Outer sheath

The outer sheath shall be made from HDPE with a minimum thickness of 0,5mm.

The diameter of the cable must be between:

\* **5.5 - 6.5** mm (max.) for up to 96 fibers

## 4. Technical requirements

### 4.1. Optical fiber

. . . . See customer . .

### 4.2. Mechanical requirements

#### 4.2.1. Traction

The cable shall be tested in accordance with IEC 60794-1-2 E1.

At a pulling force equivalent to 1x weight of 1km of cable with a minimum force of 500N, the fiber strain will not exceed 1/3 of the screen-test value.

There shall be no significant variation of attenuation during and after the test.

#### 4.2.2. Crushing

The cable shall be tested in accordance with IEC 60794-1-2 E3.

At a load of 2000 N/dm, there shall be no significant increase of attenuation after the test.

#### 4.2.3. Repeated bending

The cable shall be tested in accordance with IEC 60794-1-2 E6.

The cable will be able to withstand 100 cycles of bending with a radius equivalent to 15xcable diameter.

There shall be no damage to the outer sheath after the test as control by visual inspection.

There shall be no significant increase of attenuation after the test.

#### 4.2.4. Kink

The cable shall be tested in accordance with IEC 60794-1-2 E10.

At a loop diameter of 50 mm no kink shall occur.

### 4.3. Environmental requirements

#### 4.3.1. Thermal requirements

The cable shall be tested in accordance with IEC 60794-1-2 F1.  
 The cable will be subjected to 10 cycles with 1 day duration.  
 Between  $-20^{\circ}\text{C}$  and  $+60^{\circ}\text{C}$  there shall be no significant increase of attenuation.  
 Between  $-40^{\circ}\text{C}$  and  $+70^{\circ}\text{C}$ , increase of attenuation shall be reversible

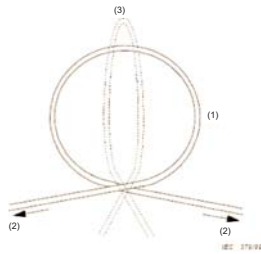
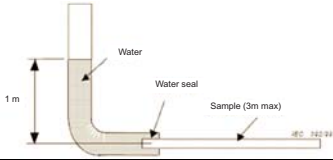
#### 4.3.2. Watertightness

The cable shall be tested in accordance with IEC 60794-1-2 F5b.  
 A piece of 3m of cable will be tested for a period of 10 days.  
 After the test, no trace of water may be detected at the free end of the sample.

#### 4.4. Blowing ability

The bidder shall be able to demonstrate the blowing ability of the proposed cable.  
 A test loop of 500 +/- 100 m shall be used for testing using a 8/10 mm diameter microduct.  
 The bidder shall describe in details the blowing procedure (compressor, blowing machine, lubricant, ...).  
 It must be possible to blow the cable over more than 1750 m in less than 60minutes.

	Test Procedure		Parameters / Requirements
Tensile performance	IEC-60794-1-2 E1		Tensile load: min 500N Minimum length: 200 m  Optical fibre strain < 1/3 screen test Attenuation var. $\leq 0.1$ dB/km Residual attenuation var. $\leq 0.1$ dB/km
Crush	IEC-60794-1-2 E3		Load: 2000 N/dm – 1 min Residual attenuation var. $\leq 0.1$ dB
Repeated bending	IEC-60794-1-2 E6		Number of cycles: 100 Bending radius: 15 X D Mass: 1 kg No damage to the outer sheath after the test.  Attenuation var. $\leq 0.1$ dB Residual attenuation var. $\leq 0.1$ dB

	Test Procedure		Parameters / Requirements
Kink	IEC-60794-1-2 E10		Loop diameter: 50 mm at 20°C  No kink
Temperature cycling	IEC-60794-1-2 F1		10 cycles 1 cycle/day -20°C / +60°C Att. var. ≤ 0.1 dB/km -40°C / +70°C Att. var. reversible
Water penetration	IEC-60794-1-2 F5b		Duration: 10 days Length: 3 m  No trace of water at the end of the cable
Blowing			Blowing loop length: 500 m duct dimensions: 10/8.0 mm cable fiber count: 72 fibers Blowing distance: 1750 m Blowing duration < 60 min

## 5. Compatibility with microducts

The bidder will recommend a list of compatible microducts suppliers (minimum 2)

<b>Approved By:</b>	<b>Originator</b>	<b>Project Manager</b>	<b>Hardware/Software Manager</b>
<b>Signature:</b>			
<b>Name:</b>			
<b>Date:</b>			

### Customer Approval

<b>Title</b>	
<b>Name:</b>	
<b>Signature:</b>	
<b>Date:</b>	

Technical Specification

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