

## HDPE TUBE BUNDLE 2-WAYS 14/10mm With PE Outer Sheath 1.2mm

### 1. General Description

The product are composed by 2 ways 14/10mm inner micro ducts, with low friction performance. The outer sheath is HDPE material with a thinner colored sheath making the product suitable for direct bury.

### 2. Raw Materials

|   | Characteristic                                | Test Method                       | Acceptance Criteria |
|---|-----------------------------------------------|-----------------------------------|---------------------|
| 1 | Bundles is manufactured with 100% virgin HDPE |                                   |                     |
| 2 | Melt Flow Index                               | ASTM D1238<br>190°C @ 2.16Kg Load | ≤ 0.40 g/10min      |
| 3 | Density                                       | ASTM D792                         | 0.940~0.958 g/cm3   |
| 4 | Environmental stress crack resist<br>(F50)    | ISO 4599                          | Min. 96h            |

### 3. Inner micro duct

#### 3-1 Dimension

|         | Outer diameter (mm) |           | Wal thickness (mm) |           | Inner diameter (mm) | Pressure |
|---------|---------------------|-----------|--------------------|-----------|---------------------|----------|
|         | Nominal             | Tolerance | Nominal            | Tolerance | Min.                | (bar)    |
| 14/10mm | 14.0                | ±0.1      | 2.0                | ±0.1      | 9.8                 | 25       |

#### 3-2 Marking

The inner micro duct marking include the following information and repeated every one meter:

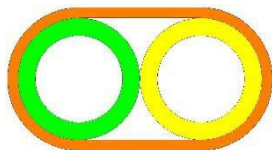
- Product spec.
- Coil number
- Manufactured date
- Length marking (e.g. =1234m)
- Other markings are available upon customer requests.

### 3-3 Mechanical Performance – Inner micro duct 14/10mm

| Items                    | Standards              | Test method                                                                                                                                                                                    | Performance                                                                                                     |
|--------------------------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Inner diameter clearance | IEC 60794-5-10 Annex E | Pressure: 12 bar<br>Max. sphere size: 85% of nom. ID                                                                                                                                           | Pass through the micro duct                                                                                     |
| Tensile strength         | IEC 60794-5-10 & 20    | Rate of extension: 100mm/min                                                                                                                                                                   | ≥ 465N                                                                                                          |
| Elongation               | IEC 60794-5-10 & 20    | Rate of extension: 100mm/min                                                                                                                                                                   | ≥ 500%                                                                                                          |
| Crush                    | IEC 60794-5-10 & 20    | Sample length: 250mm<br>Load: 1400N<br>Duration of Max. load: 1 min<br>Recovery time: 1 hour                                                                                                   | Under visual examination there is no damage to the micro duct, and inner diameter clearance test can be passed. |
| Impact                   | IEC 60794-5-10 & 20    | Striking surface radius: 20mm<br>Impact energy: 1.5 J<br>Recovery time: 1 hour                                                                                                                 | Under visual examination there is no damage to the micro duct, and inner diameter clearance test can be passed. |
| Kink                     | IEC 60794-5-10 & 20    | -                                                                                                                                                                                              | ≤10x outer diameter                                                                                             |
| Min. Bend Radius         | IEC 60794-5-10 & 20    | Number of turns: 5<br>Number of cycles: 1<br>Mandrel diameter: 20 x outer diameter                                                                                                             | Under visual examination there is no damage to the micro duct, and inner diameter clearance test can be passed. |
| Friction                 | Optowire               | Mandrel diameter: 750mm<br>Cable diameter: 2.8mm<br>Load: 5.0Kg<br>The sample duct is secured with 450° wrap around the mandrel. A 5.0kg weight shall be pulled at 500mm/min and travel 200mm. | ≤0.1                                                                                                            |

## 4. Tube bundle

### 4-1 Configuration & Dimension



|                             |                                 |
|-----------------------------|---------------------------------|
| <b>Sheath:</b>              | Orange color                    |
| <b>Thickness of sheath:</b> | 1.2mm ± 0.2mm                   |
| <b>Ripcord:</b>             | Available upon customer request |
| <b>Tracing wire:</b>        | Available upon customer request |

|             | Outer diameter (mm) | Wal thickness (mm) |           |
|-------------|---------------------|--------------------|-----------|
|             | Nominal             | Nominal            | Tolerance |
| Tube bundle | 30.4*16.4           | 1.2                | ± 0.2     |

### 4-2 Mechanical Performance

| Items                                        | Standards              | Test method                                                                                  | Perfomance                                                                                                       |
|----------------------------------------------|------------------------|----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| <b>Inner diameter clearance</b>              | IEC 60794-5-10 Annex E | Pressure: 12 bar<br>Max. sphere size: 85% of nom. ID                                         | Pass through the each inner micro duct                                                                           |
| <b>Tensile strength at yield (sheathing)</b> | IEC 60794-5-10 & 20    | Rate of extension: 100mm/min                                                                 | ≥ 21.0Mpa                                                                                                        |
| <b>Elongation (Sheathing)</b>                | IEC 60794-5-10 & 20    | Rate of extension: 100mm/min                                                                 | ≥ 500%                                                                                                           |
| <b>Crush</b>                                 | IEC 60794-5-10 & 20    | Sample length: 250mm<br>Load: 2000N<br>Duration of Max. load: 1 min<br>Recovery time: 1 hour | Under visual examination there is no damage to the tube bundle, and inner diameter clearance test can be passed. |
| <b>Impact</b>                                | IEC 60794-5-10 & 20    | Striking surface radius: 200mm<br>Impact energy: 5.0 J<br>Recovery time: 1 hour              | Under visual examination there is no damage to the tube bundle, and inner diameter clearance test can be passed. |
| <b>Min. Bend Radius</b>                      | IEC 60794-5-10 & 20    | Number of turns: 3<br>Number of cycles: 1<br>Mandrel diameter: 24 x outer diameter           | Under visual examination there is no damage to the micro duct, and inner diameter clearance test can be passed.  |

## 5. Packing

Optowire tube bundle are delivered on iron drum. The drums protected with black plastics foil and both end of the bundle are sealed with end cap to ensure that the inner micro duct will not be affected by water and dust.

## 6. Remarks

Completed packages of the HDPE micro duct on drum can be stored outdoor max. 6 months upon the date of production.

|                           |       |   |       |
|---------------------------|-------|---|-------|
| Storage temperature:      | -40°C | ~ | +70°C |
| Installation temperature: | -30°C | ~ | +50°C |
| Operating temperature:    | -40°C | ~ | +70°C |