DESCRIPTION OF MATERIALS

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INDEX

1. INTRODUCTION

In this document the materials that can be used in the deployment are described.

1.1 REVISIONS

EDITION	DATE	REVISED SECTIONS	CHANGES	OBSERVATIONS
1st	MAY 2023			
2nd	DECEMBER 2023	All	New codification of the document	The document is codified with the document code: TEF-NORM-00011. The logo of UGG is updated in the page header.
		All	Simplification of the structure of the document	
		10. Optical splice closure	Updated characteristics	
		19. Electromagnetic markers	Included new suppliers for end-cap markers	
		20. Centralized Distribution Point	Mini-POP is changed to CDP	
		21. Street cabinet for DP-96	Updated schemes	
		22. Feeder Point 23. Urban DP-96 24. OTB4-S and OTB8-S	New sections are created	

2. OPTICAL DISTRIBUTION FRAMES DESCRIPTION

The optical distribution frame (ODF) is the point in which UGG will finish all the optical fibers of the outside plant cables of the FTTH network.

The dimensions of the ODF are 2200 x 2100 x 300 mm (height x wide x deep).

The ODFs are fully modular and could be equipped with different modules according to the necessities of each installation.

The maximum capacity of each ODF is 2.688 optical fibers (access network). The ODF is also the point in which the optical splitters needed for a point to multipoint network (GPON, for example) are going to be installed.

The ODF is based in two verticals, one with the prime destination to be used to finish the optical fiber cables of the outside plant (access network), and other vertical to install different components as can be, for example: optical splitters. The cross-connection between both verticals is the base of the functionality of the ODF.

Each vertical has 56 positions to install different modules.

Between both verticals, there are a space for the patch-cord fiber management.

There are two different models of ODF (from different manufacturers: Commscope and Reichle & De-Massari) that could be used in the deployment. Each manufacturer has their own components, and they are not compatibles between them.

The functionality and the capacity of both ODFs are the same. In the following sections a detailed description of each one is made to present the main components.

2.1 COMMSCOPE'S ODF

The next picture shows a front view of the FACT ODF from Commscope:

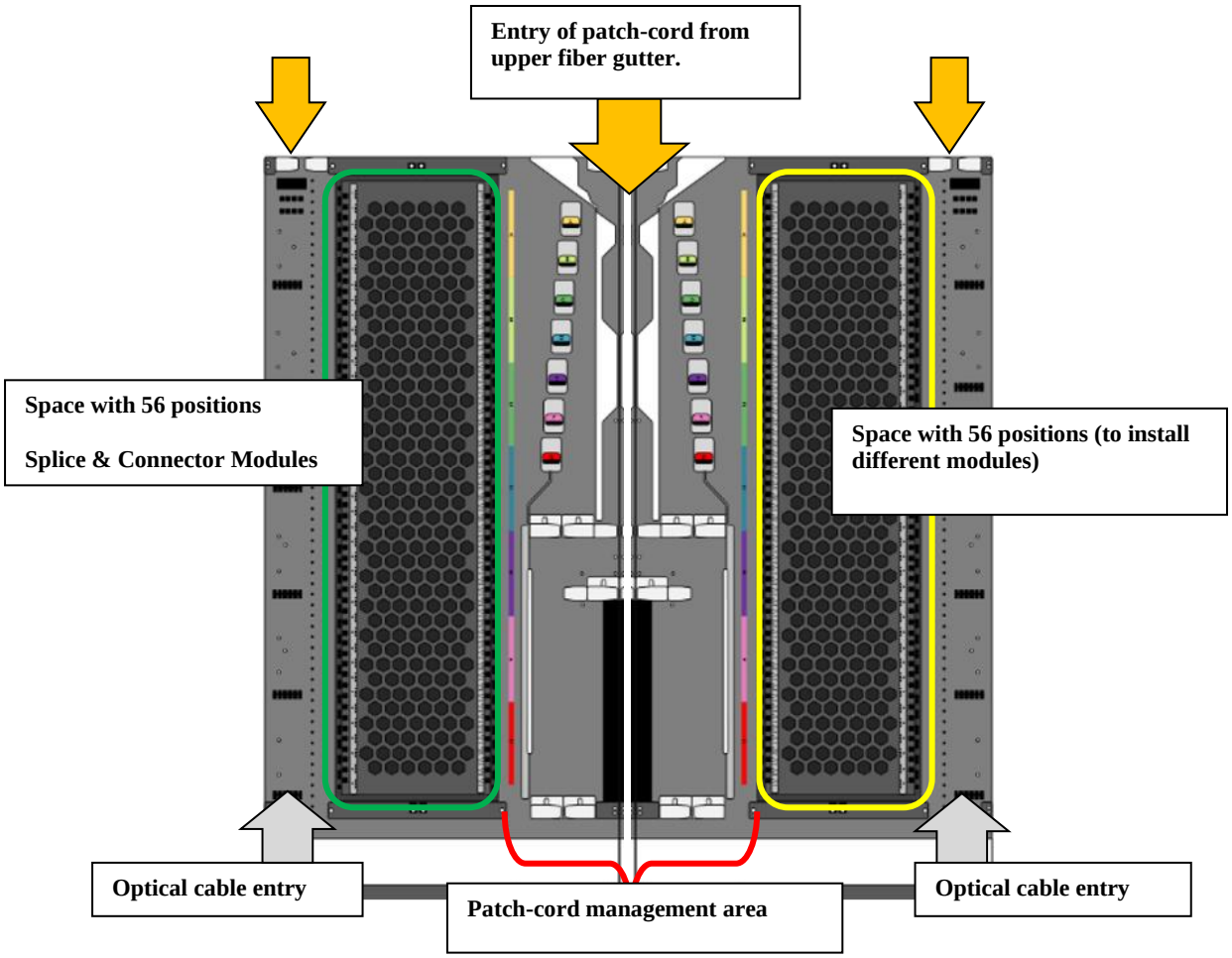


Figure 1. View of the (empty) ODF of Commscope.

The frames are empty structures that has the space with the necessary means to fix the different modules.

2.2 COMMSCOPE'S SPLICE AND CONNECTOR MODULES

Commscope has several splice and connector modules in its FACT catalogue. The smallest module occupies only one position in the ODF frame, and the largest one, occupies 6 positions.

The following splice and connector modules are available for fiber cable termination:

- 48 fo splice and connector module. Occupies one position in the ODF frame.
- 96 fo splice and connector module. Occupies two positions in the ODF frame.
- 144 fo splice and connector module. Occupies three positions in the ODF frame.
- 192 fo splice and connector module. Occupies four positions in the ODF frame.
- 288 fo splice and connector module. Occupies six positions in the ODF frame.

The basic module is the 48 fo capacity one. The other modules with more capacity are formed adding 48 fo splice and connector modules up to the capacity required. The module formed works as one block.

The following image is a real picture of a 96 splice and connector module (formed by 2 sub-modules of 48 fiber capacity).

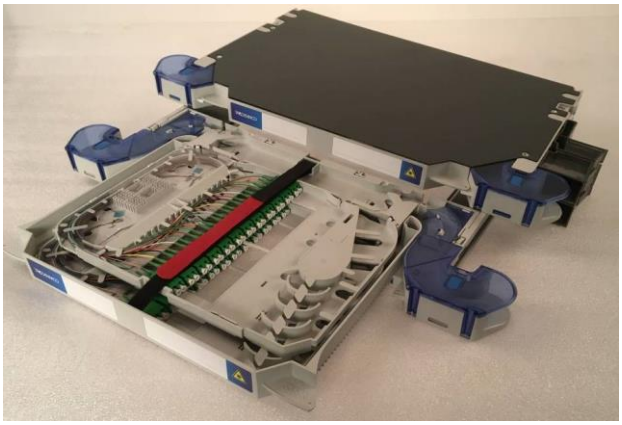


Figure 2. Picture of a 96 fo splice and connector module.

Internally, the module, has 2 trays with space to store the fusion splices and the optical fibers, and the patch panel in which the pigtails are connected. Each tray has a capacity of 24 fibers and connectors.

IMPORTANT: Internally, each module has identified each port from the number 1 to 48.

The modules are prepared to fix to them directly the optical cable using a cable termination unit. In the following picture, could be saw a picture, in which a cable of 288 fo is fixed to the module, and their fiber are distributed between the individual modules.

Figure 3. Picture of a 288 fo splice and connector module.

IMPORTANT: It is very important to consider, that all the splice and connector modules from CommScope have hand (left-hand or right-hand), depending in which vertical are going to be installed.

This kind of modules have no hand and is valid for installation int both verticals (left or right).

2.3 COMMSCOPE'S SPLITTER 1:64 MODULE

CommScope has several types of splitters modules in its FACT but for the deployment of UGG only a new one developed for this ad-hoc is going to be used.

The capacity of this module is one splitter 1:64, formed internally by one splitter 1:2 followed by two splitters 1:32.

The 1:2 splitter is attached to one side of the module, and each 1:32 splitters are installed in two independent trays inside the module. The connection between the 1:2 splitter outputs and the 1:32 splitter input, will come already done from the factory.

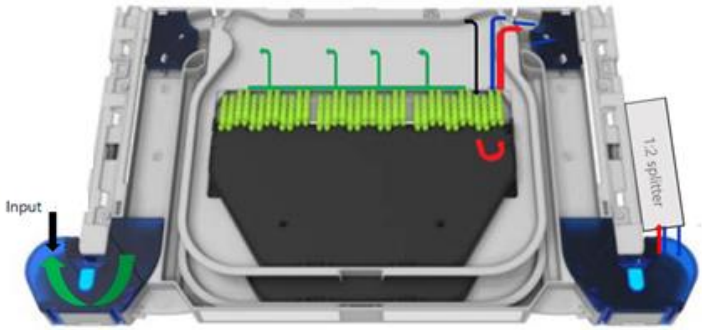


Figure 4. Detail of the 1:64 splitter module configuration.

Figure 5. Detail of the 1:64 splitter module (tray open).

This configuration of splitter allows the change of the splitting level of the network to 1:32 easily, retiring the 1:2 splitter if it is needed in the future.

IMPORTANT: It is very important to consider, that this splitter module has hand and that always must be installed in the Internal Plant Vertical of the ODF (the vertical of the right).

2.4 REICHLE AND DE MASSARI'S ODF

The ODF that could be used in the deployment from Reichle and De Massari (R&M) is the PRIME ODF model.

The dimensions of the ODF with 2 verticals installed are 2200mm (H) x 2100mm (W) x 300mm (D). It is formed by three sub-frames of 900 mm, 300 mm and 900 mm wide each.

There are right-hand and left-hand modules. All the routes for the patching are signalized with letters.

The next picture shows a front view of the PRIME ODF from R&M configured for this deployment:

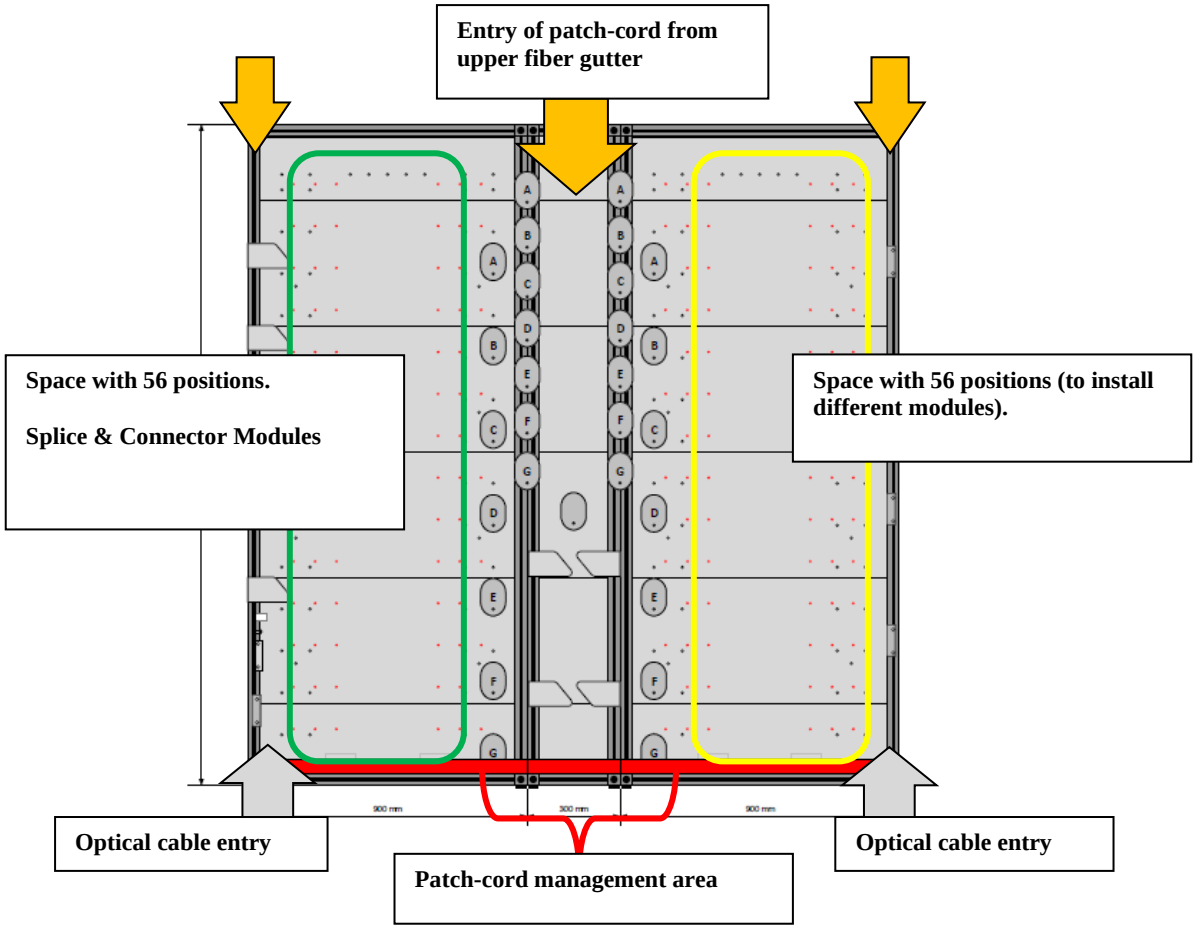


Figure 6. View of the (empty) ODF of R&M.

The frames are empty structures that has the space with the necessary means to fix the different sub-racks in which could be possible to install different modules.

IMPORTANT: The R&M Prime ODF requires an additional element (a sub-rack) to install the different modules in the structure

2.5 R&M'S SUB-RACK

To install different modules on the Prime ODF of R&M it is necessary to install a sub-rack on it before.

The sub-rack can be fixed directly to the back-panel of the ODF chassis and occupies 4 positions from the 56 positions available on it.

This sub-rack has internally 4 sliding rails on which up to 4 different modules can be installed.

The following picture represent the sub-rack:

Figure 7. Detail of the sub-rack of R&M.

2.6 R&M'S SPLICE AND CONNECTOR MODULE

R&M has several splice and connector modules in its PRIME catalogue. All the models occupy only one position in the ODF frame (only one position inside the sub-rack).

The module that are going to be used in the deployment has a capacity of 48 fibers.

If more fibers are needed to terminate in the ODF, it is possible to achieve adding more modules to the ODF.

The following image is a real picture of a 48 splice and connector module.

Figure 8. Picture of a R&M splice and connector module of 48 fo.

Internally, the module, has 2 splice trays with space to store the fusion splices and the optical fibers. Each tray has a capacity of 24 fibers.

In the R&M ODF, the cables are not fixed directly to the splice and connectors modules. It is necessary to fix the cables to the ODF main structure (frame) and make a transition to corrugated tubes to guide the fibers to the splice and connectors modules. For this reason, there is

no limit in the fiber count of the cables, since once make the transition it is possible to guide the fibers by distributing them to different modules 48 by 48.

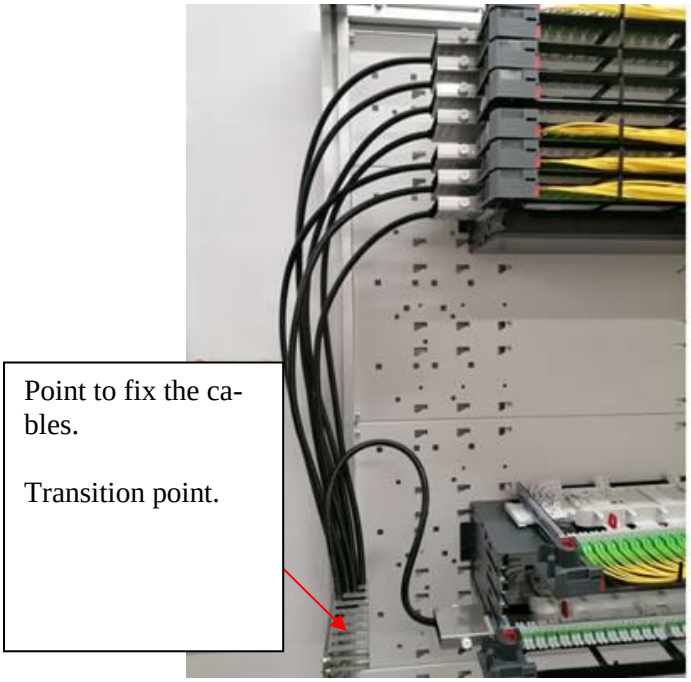


Figure 9. Detail of the transition point for the cable termination.

IMPORTANT: It is very important to consider, that all the splice and connector modules from R&M have hand (left-hand or right-hand), depending in which vertical are going to be installed.

2.7 R&M'S SPLITTER 1:64 MODULE

R&M has several types of splitters modules in its catalogue but for the deployment of UGG only a new one developed ad-hoc is going to be used.

The module used for this application is a sub-equipped module of 96 connectors, in which internally have been added the splitters needed to have a splitter of 1:64.

Figure 10. Detail of the splitter module of R&M (for splitter 1:64 formed by one splitter 1:2 followed by two splitters 1:32).

3. DUCTS AND MICRO-DUCTS DESCRIPTION

The ducts and micro-ducts that will be laid into the trenches for the deployment will be prepared for blowing installation techniques allowing adequate blowing pressures for the diameters of each type of micro-duct.

All the micro-ducts have a ribbed inner layer inside to minimize the friction between the cable and the duct.

Figure 11. Detail of the ribbed inner layer of the micro-ducts.

Depending on the section of the network, the following types could be used:

- 50/40 mm duct with an outer diameter of 50 mm, and an inner diameter of 40,8 mm (valid for direct buried installations. This duct will be used only in the "backhaul network".
- 16/12 micro duct with an outer diameter of 16 mm, and an inner diameter of 12 mm (valid for direct buried installations). This duct will be used mainly in the "local backbone" section of the network, to connect different PoPs.
- 14/10 micro-duct with an outer diameter of 14 mm and an inner diameter of 10 mm (valid for direct buried installations). This duct will be used mainly in the feeder section of the network, to connect the POPs with the DPs (Distribution Points).
- 12/10 micro-duct with an outer diameter of 12 mm and an inner diameter of 10 mm (valid for direct installations (subducting)).
- 7/4 micro-duct with an outer diameter of 7 mm and an inner diameter of 4 mm (valid for direct buried installations). This duct will be used mainly in the distribution network section to connect the Distribution Points (street cabinets) with the customer premises.

Figure 12. Example of micro-ducts with different colors.

The micro-ducts will be deployed in bundles of different ducts counts. The micro-ducts 16/12, 14/10 could be used in bundles of 2, 4 or 7 units.

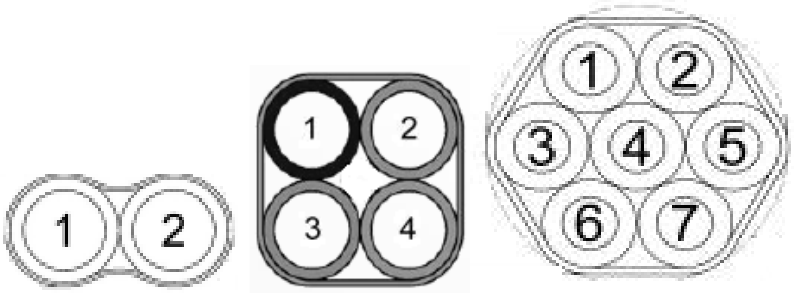


Figure 13. Bundles configurations for 16/12 and 14/10 micro-ducts.

The micro-ducts 7/4 could be used in bundles of 7, 12 or 24 units.

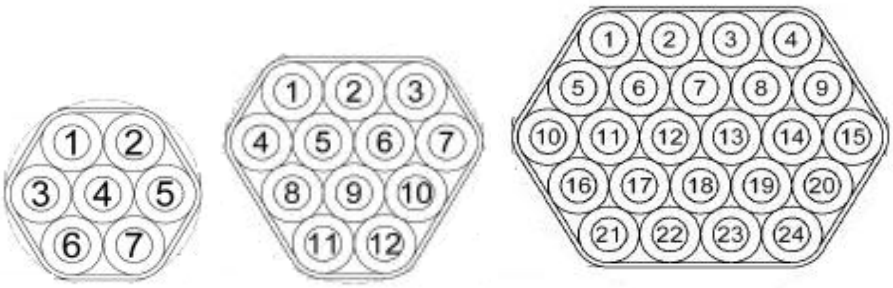


Figure 14. Bundles configurations for 7/4 micro-ducts.

The micro-tubes inside the bundle will follow the color coding VDE 0888.

Number	1	2	3	4	5	6	7	8	9	10	11	12
Color	Red	Green	Blue	Yellow	White	Grey	Brown	Violet	Turquoise	Black	Orange	Pink

Figure 15. Color coding VDE 0888.

For bundles from 13 to 24, the color coding will be the previous one, complemented by 4 striped marks that must be distinguishable from the tube color.

4. MICRO-DUCTS FITTINGS (CONNECTORS, END CAPS, AND GAS-BLOCKERS)

The microducts connectors and endcaps that must be used in the deployment must be valid for direct buried installation. Also, both elements must assure a high-quality connection and sealing performance to maintain the pipelines quality over the years.

In the following picture could be seen some of the connectors and endcaps approved to be installed in the network.

Figure 16. Connectors and End-caps of the manufacturer Gabocom.

The gasblocker needed to seal the optical cables against the micro-duct through the cable have been installed are also needed in the deployment.

There are different types of gas blockers in the market, but due to its flexibility and install ability in this moment **the divisible type** are the only ones approved.

For the different micro-ducts diameters and the optical cables diameters, there are different gasblockers approved.

The following pictures shows the gas-blockers approved to Gabocom and Emtelle for the deployment:

It is approved all the family of gas-blockers for microducts and cables for the following sections of the network:

- Backhaul.
- Local backbone
- Feeder network.

Figure 17. Gasblocker for 14 mm duct from the manufacturer FILOFORM (Supplied by Emtelle).

Figure 18. Gas-blocker for 14 mm duct from the manufacturer Gabocom.

The gas-blockers approved for the distribution network, and for the drop section must comply with the following characteristics:

- Shape and dimensions:
  - Shape: Cylinder.
  - Length (maximum): 22 mm
  - Diameter (maximum): 11 mm.
- FU cable range: 1 – 1,7 mm

Figure 19. Example of gas-blockers for 7 mm ducts.

IMPORTANT: Only is allowed the use of this kind of gas blocker because there is a space limit in the OTB that do not allow the use of other type of gas-blockers.

5. POP PIPES ENTRY SEALING SYSTEMS

The entrances of the POP must be sealed properly. For each type of duct or micro-duct that reach the POP a different sealing system must be used.

For the ducts of 50 mm, it is necessary to use a sealing system for up to 3 tubes, and this entry will occupy the HSI150 entry completely.

For the microducts of 16 mm and 14 mm outer diameter, is necessary to install different segments with the holes adapted to each diameter. These segments occupy 1/3 of the HSI 150 entry and can be combined. Each segment has a capacity depending on the micro-ducts diameter.

The correct components of Hauff Technik that must be used are the followings:

- HSI150 DG 3x24-54 (for up to 3 ducts of 50 mm outer diameter).
- HSI150 S3 (to allow the installation of 3 segments in the HSI150 entry).
- SEG 6x21 (to seal the micro-ducts of 16 mm outer diameter, valid up to 6 micro-ducts).
- SEG 8x15 (to seal the micro-ducts of 14 mm outer diameter, valid up to 8 micro-ducts).

In the next images, can be see the sealing systems that must be used.

			
For ducts of 50 mm. HSI150 DG 3x24-54	Piece to allow the installation of segments HSI150 S3	For ducts of 16 mm SEG 6x21	For ducts of 14 mm SEG 8x15
Manufacturer: HAUFF TECNHIK			

Figure 20. Sealing systems to be used in POPs.

6. HOUSE PIPES ENTRY SEALING SYSTEMS

Depending on the situation of the drilling, different sealing systems could be needed: underground or overground scenarios.

6.1 HOUSE PIPES ENTRY SEALING SYSTEMS FOR UNDERGROUND SITUATIONS.

For the sealing of the pipeline entry to the house in the underground scenarios, a specific system must be used. These systems normally are composed by 3 main elements: outside cap, sealing component and internal cover. The sealing system is normally based in a silicone mixture or resin-based mixture must be used to guarantee this requirement.

Outside cover	Sealing component (resin)	Internal cover

Figure 21. Example of components of a kit of "house entry sealing system" for underground scenarios.

There are several types of "house entry sealings systems" depending on the quantity and the size of the microducts to be installed:

- For 1 micro-duct of 7 mm.
- For 2 micro-ducts of 7 mm.
- For 1 micro-duct of 10 mm.
- For 2 micro-ducts of 10 mm.
- For 1 micro-duct of 14 mm.

NOTE: in the case of 2 micro-duct of 14 mm, 2 borings and 2 sealings entries systems are needed to install.

6.2 HOUSE PIPES ENTRY SEALING SYSTEMS FOR OVERGROUND SITUATIONS

For the sealing of the pipeline entry to the house in the overground scenarios, a specific system must be used. In this case, sealing requirements are less restricted than in the underground situation, so different sealing components could be used. In this case, the sealing mechanism could be based on a resin or in a sealing mechanism formed by different rubbers.

As the micro-duct access to the building over the ground, these systems should include a protection tube.

There are several types of "house entry sealings systems" depending on the size of the microducts to be installed:

- For 1 micro-duct of 7 mm.
- For 2 micro-ducts of 7 mm.
- For 1 micro-duct of 10 mm.
- For 1 micro-duct of 14 mm.

NOTE: in the cases in which 2 micro-duct (bigger than 7 mm) are needed to pass through the wall (2 borings and 2 sealings entries systems are needed to install adapted to the diameter of the microducts.

Internal and external covers | Sealing compound | Protecction tube (50 cm)

Figure 22. Example of a "house entry sealing system (for overground scenario)".

7. MANHOLES

The manholes will be used in underground applications, designed to be placed in green areas, pedestrian areas, or streets.

The models that should be used in the deployment in the exceptional cases in which need to be used are the:

- OC model:
    - Internal dimensions (approx.): 550 x 1165 mm.
- TC model:
    - Internal dimensions (approx.): 800 x 1165 mm.

The cover of the manhole is made of cast iron or concrete. The resistance of the cover must be chosen depending on the situation in which the manhole is installed. There are two main types:

- Type B-125 (kN).
- Type D-400 (kN).

There are several manufacturers authorized for the deployment: Langmatz, Romold and Filoform.

7.1 LANGMATZ MANHOLES

- OC (model EK338 from Langmatz):
    - Internal dimensions: 550 x 1165 mm.
    - External dimensions: 750 x 1300 mm.
- TC (model EK508 from Langmatz):
    - Internal dimensions: 800 x 1165 mm.
    - External dimensions: 995 x 1164 mm.

The body of this manhole is made by plastic (polycarbonate) and has all the entries predefined from factory (to be open in the field, by breaking the plastic).

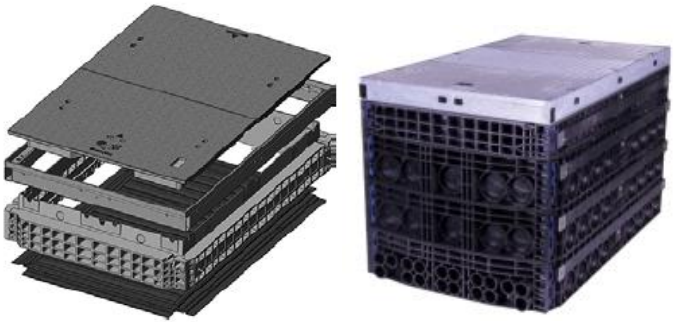


Figure 23. Illustrative images of Langmatz modular maholes.

7.2 ROMOLD MANHOLES

- OC (model ROM-BOX 57 115 from ROMOLD):
  - Internal dimensions: 569 x 1165 mm.
  - External dimensions: 649 x 1245 mm.
- TC (model ROM-BOX 75 115 from ROMOLD):
  - Internal dimensions: 755 x 1165 mm.
  - External dimensions: 835 x 1245 mm.

The body of this manhole is made by plastic (polypropylene).

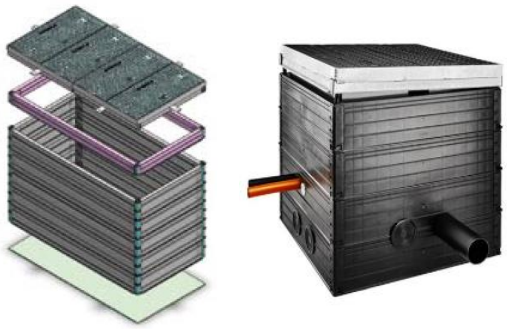


Figure 24. Illustrative images of ROMOLD modular manholes.

7.3 FILOFORM MANHOLES

- OC (model from FILOFORM):
  - Internal dimensions: 600 x 1200 mm.
  - External dimensions: 818 x 1348 mm.
- TC (model from FILOFORM):
  - Internal dimensions: 800 x 1200 mm.
  - External dimensions: 1018 x 1348 mm.

The body of this manhole is made by Glass Reinforced Polyester Resin (GRP), is a composite material, made of a polyester resin reinforced with glass fibers.

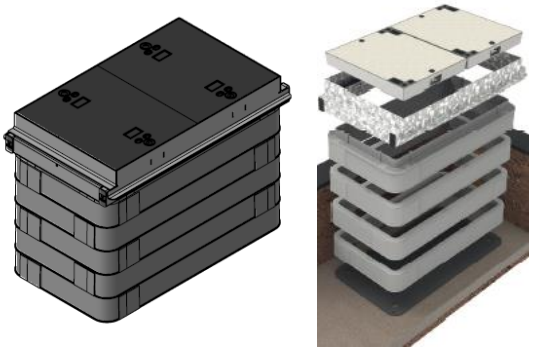


Figure 25. Illustrative images of Filoform modular maholes.

NOTE: Filoform is only authorized in D400 class covers.

8. OPTICAL CABLES DESCRIPTION

The optical cables that will be used in the deployment will be suitable for blown installation in micro-ducts.

These cables are fully dielectric, and its optical core is constituted by loose tubes around a central element. The central element is a glass fiber reinforced plastic rod (FRP) and the loose tubes are helically arranged with SZ step around the FRP.

Figure 26. Example of the structure of a mini cable for blowing.

Each loose tube inside the cable (see next figure) includes 12 or 24 optical fibers. The optical fiber must comply with the recommendations ITU G.652.D.

The material used for the outer sheath is a high-density linear polyethylene (HDPE), colored black, stable against UV radiation and weatherproof.

The cable includes 1 red ripcord under the outer sheath for easy cable opening. The cables have a fully watertight construction with a dry core.

8.1 CABLE STRUCTURE

The cables that will be used are defined from 12 to 288 optical fibers. Depending on the number of optical fibers, the cables must comply with the following structures:

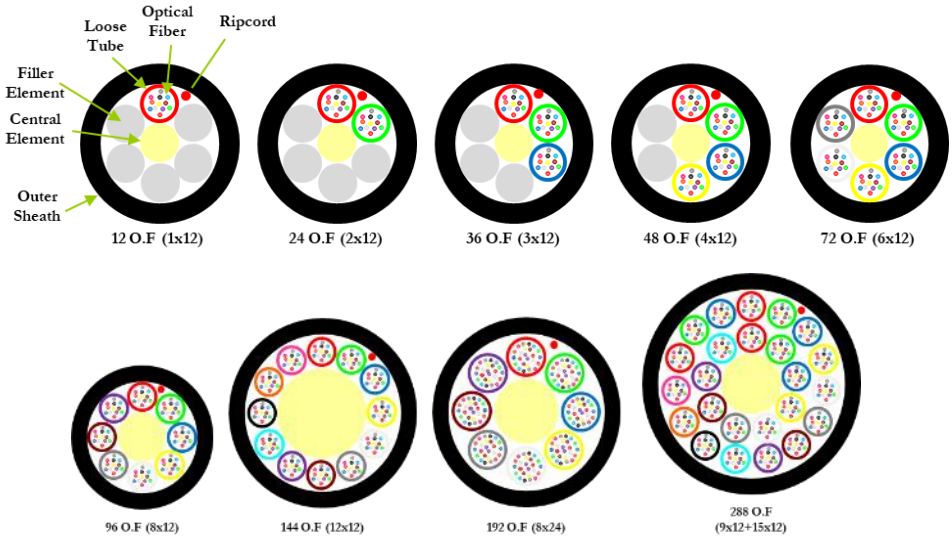


Figure 27. Cable structure (transversal sections).

This table, resume the main characteristics:

OPTICAL FIBER	**Type**	G.652.D							
	No. Fibers	**12**	**24**	**36**	**48**	**72**	**96**	**144**	**192**	**288**
	No. Fiber/tube	12							24	12
LOOSE TUBE	**No.**	1	2	3	4	6	8	12	8	9+15
	Wiring	SZ								
	Material	Thermoplastic								
CENTRAL ELEMENT	**Material**	Glass fiber reinforced plastic								
FILLER ELEMENT	**No.**	5	4	3	2	0	0	0	0	0
	Material	Thermoplastic								
	Color	Uncolored (natural)								
RIPCORD	**No.**	1								
	Color	Red								
OUTER SHEATH	**Material**	High density linear polyethylene (HDPE) Stable against UV and weatherproof								
	Color	Black								
CABLE	**Diameter** (mm)	≤ 6,5						≤ 8,2		≤ 9,5
	Weight (Kg/Km)	35 ± 5					40 ± 5	55 ± 5		75 ± 5
BLOWING DISTANCE		At least 1500 m								

Table 1. Main characteristics of the optical cables.

8.2 FIBER COLORS

Inside each loose tube the optical fibers will follow this color coding:

No.	1	2	3	4	5	6	7	8	9	10	11	12
Color	Red	Green	Blue	Yellow	White	Grey	Brown	Violet	Turquoise	Black	Orange	Pink

No.	13	14	15	16	17	18	19	20	21	22	23	24
Color	Red	Green	Blue	Yellow	White	Grey	Brown	Violet	Turquoise	Natural	Orange	Pink
	-	-	-	-	-	-	-	-	-		-	-

Figure 28. Fiber color coding (DIN - VDE 0888).

When the loose tubes have more than 12 optical fibers, the next fibers shall include a ring identification mark on their acrylate every 5 cm.

8.3 LOOSE TUBE COLORS

The loose tubes will follow this color coding:

No.	1	2	3	4	5	6	7	8	9	10	11	12
Color	Red	Green	Blue	Yellow	White	Grey	Brown	Violet	Turquoise	Black	Orange	Pink

Figure 29. Loose tubes color coding (DIN - VDE 0888).

For 288 optical fibers cable, the cable is constructed in two layers of loose tube according to the following color coding:

- Inside layer

No.	1	2	3	4	5	6	7	8	9
Color	Red	Green	Blue	Yellow	White	Grey	Brown	Violet	Turquoise

- Outside layer

No.	1	2	3	4	5	6	7	8	9	10	11	12
	13	14	15									
Color	Red	Green	Blue	Yellow	White	Grey	Brown	Violet	Turquoise	Black	Orange	Pink
	-	-	-									

Figure 30. Loose tubes color coding (DIN - VDE 0888) (for cable with 288 of).

9. FIBER UNITS DESCRIPTION

The optical fiber units defined are suitable for blowing installation techniques in micro-ducts and allow a blowing of at least 800 m in one operation.

These fiber units are fully dielectric, that is composed by a resin around the optical fibers and a yellow low friction sheath optimized for blowing.

The optical fiber used in the fiber units must comply with the ITU-T Recommendation G.657.A2.

9.1 FIBER UNITS STRUCTURE

The fiber units that could be used in the deployment has from 2 to 12 optical fibers. Depending on the number of optical fibers should follow these structures:

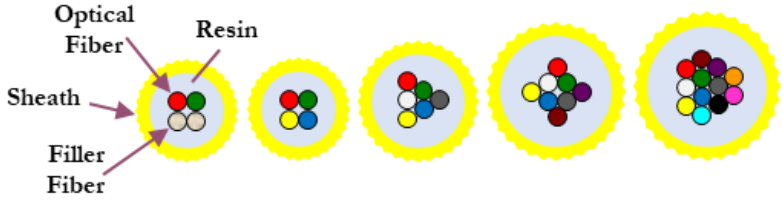


Figure 31. Fiber Units structure (transversal section).

OPTICAL FIBER	**Type**	G.657.A2				
	No. Fibers	**2**	**4**	**6**	**8**	**12**
OUTER SHEATH	**Material**	Thermoplastic low friction				
	Color	Yellow				
FILLER FIBER	**No.**	2	0			
	Color	Uncolored				
CABLE	**Diameter Max.** (mm)	1,15 ± 0,05		1,35± 0,05	1,50± 0,05	1,65± 0,05
	Weight Max. (Kg/Km)	1		1,6	1,8	2,2
BLOWING DISTANCE		At least 800 m				

Table 2. Main characteristics of the Fiber Units.

10. OPTICAL SPLICE CLOSURE

The optical splice closure are devices that allow to give continuity to optical cables and perform optical cable segregations (or branch-offs) between large cables to smaller ones to distribute the network according to the network designs. The optical closure allows to:

- Restore the integrity of the external cable sheath, including mechanical continuity of traction elements, when necessary.
- Direct entry of optical cables and its fixation.
- Protect the optical fibers, splice protectors and optical devices inside.
- Facilitate the organization of fiber splices, passive devices and the storage of the excess of fiber.

The main characteristics of the optical closures that will be used are the following:

- Dimensions (approx.): 700 mm (large) x 300 mm (diameter). Cylindrical shape.
- At least 6 cable entries.
- IP rate. The closures are watertight to prevent water or dust entry. The IP grade that the closures achieve is IP 68. The seal of the closures is carried out by mechanical procedures.
- Fusion splicing capacity:
    - One model equipped with splice trays for up to 288 fusion splices.
    - Other model equipped with splice trays for up to 96 fusion splices.
- The fusion splice trays allow to store up to 12 fusions per tray. It is possible to change the fiber direction inside the tray.
- It is possible to guide any fiber to any splice tray through the routing guide system of the box.

Figure 32. Example of an optical splice closure.

11. STREET CABINET FOR DP-48 (CENTRALIZED SPLITTING ARCHITECUTRE)

The dimensions of the cabinet are less than (approximately): 550 x 1700 x 320 mm (Width x Height x Depth). **Note:** The height dimension includes the depth that will be buried into the ground.

The cabinet could be constituted by different parts (upper part of the cabinet, plinth, and underground part to fix it to the ground).

The scheme structure of the cabinet is as follow:

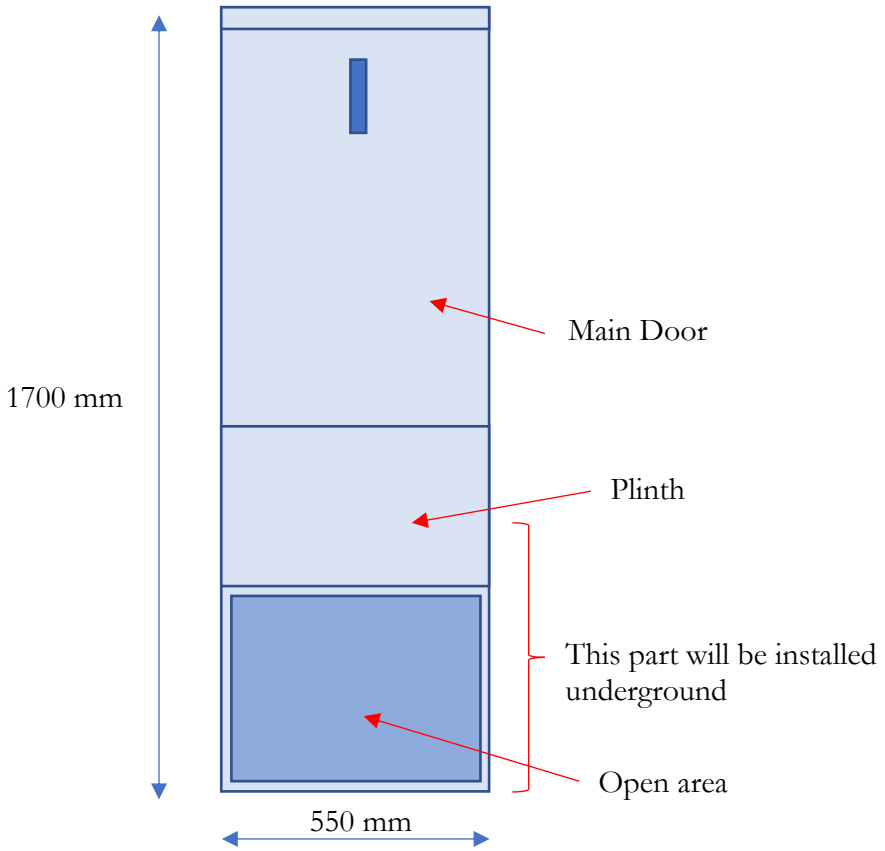


Figure 33. Structure scheme of the street cabinet (type 2).

Internally, the cabinet has two different areas, one dedicated to managing the ducts entrance, and other dedicated to the fiber management system.

The ducts entrance has all the elements needed to fix (and guide) the cables and micro-ducts coming into the cabinet.

- 2 mini tubes of 14 mm outer diameter
- 48 micro-tubes of 7 mm outer diameter.

The dedicated area for fiber management system includes all the elements needed to guide the fibers from the termination of the ducts to the entrance of the fiber management system, where the splice trays are installed.

The internal configuration of the type 2 street cabinet could be as follow:

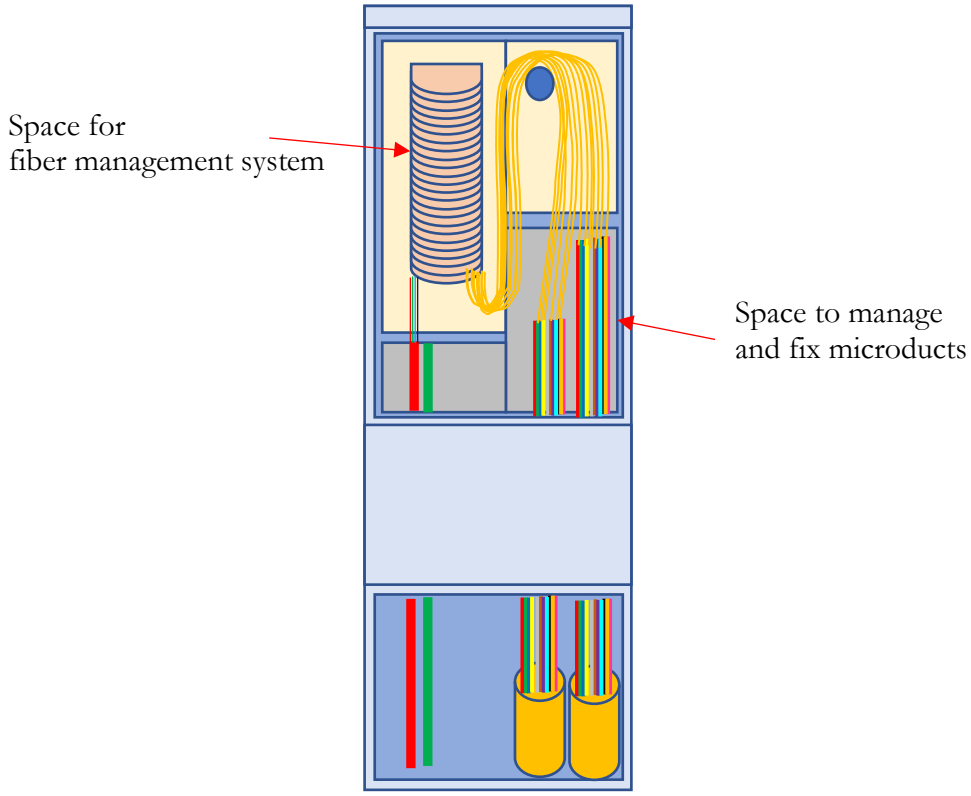


Figure 34. Internal configuration of the street cabinet (for 48 HP -standard capacity).

The street cabinet includes 54 splice trays, in order to dedicate an individual splice tray for each customer (48 trays) and to have a reservation for different uses (6 trays).

The splice trays must have a capacity that complies with the modularity of 6. The splice protectors' housings are designed for heat shrinkable splice protectors (45 mm in length and 2.6 mm in diameter once contracted).

12. OPTICAL BOX FOR INDOOR DISTRIBUTION POINT (CENTRALIZED SPLITTING ARCHITECTURE)

In the centralized splitting architecture, the indoor DP is a plastic box, designed to be used in MDU scenarios with up more than 12 customers in the centralized splitting architecture of UGG.

The box is prepared to be installed on a wall with dowels and screws.

The indoor DP is equipped to manage:

- The installation of up to 2 optical cables with an external diameter up to 6,5 mm.
- The installation of up to 24 bi-fiber cables figure 8 shape, with 3x6 mm section.
- The installation of up to 4 riser cables with a diameter of up to 8 mm.

The indoor DP is equipped internally with:

- 28 splice trays, with capacity to store up to 6 fusion splices each one (in one row).
- Other accessories like cable ties, foam tape, dowels and screws, user manual, etc, are also included.

Figure 35. Example of optical Box for indoor DP.

13. CONNECTORIZED OPTICAL BOX FOR INDOOR DISTRIBUTION POINT OR GF-GV

This element is a plastic box that can be used in MDU scenarios with more than 12 customers (indoorDP on-demand scenarios) or as Gf-Gv (or BTB) to terminate the building network.

The box is prepared to be installed on a wall with dowels and screws. The box must be valid to manage:

- The installation of up to 2 optical cables with an external diameter up to 6,5 mm. **Note:** including the possibility of a pass-through cable installation.
- The installation of up to 24 bi-fibre cables figure 8 shape, with dimensions of 3x6 mm, LC/APC connectorized.
- The installation of up to 24 micro-ducts with a diameter of 7 mm.
- The installation of up to 4 riser cables with a diameter of up to 8 mm.

The indoor DP is equipped internally with:

- A fibre management system.
- A panel with 24 duplex LC/APC adapters. The panel must have a good access to allow an easy connection.
- 48 LC/APC pre-connectorized with 900 µm fibre optic cable.
- 28 splice trays, each one with at least capacity for 6 fusion splices
- Entries accessories to allow the cable combination to manage, with the appropriate sealing performance for indoor application.
- The fixing mechanism needed for the retention of all the cables or micro-ducts installed in the box.
- Other accessories like cable ties, foam tape, dowels and screws, user manual, etc, are also included.

Figure 36. Connectorized optical box for indoor distribution point or Gf-Gv.

14. OPTICAL TERMINAL BOX FOR MDUS WITH UP TO 4 CUSTOMERS/ UPGRADABLE TO 6 (CENTRALIZED SPLITTING ARCHITECTURE)

In the centralized splitting architecture of UGG, the Optical Termination Box (OTB) is a plastic box, designed to be used in MDU scenarios with up to 6 customers (served directly from the box).

The box is prepared to be installed on a wall with dowels and screws.

The OTB allows the installation of an optical drop cable or a micro-duct with an external diameter up to 7 mm. There is space enough internally to make possible the installation of the corresponding Gas-Blockers in case of micro-ducts.

The OTB is equipped internally with:

- 1 splice tray, with capacity to store up to 24 fusion splices (in two rows of 12).
- 4 LC/APC duplex adapters.
- 8 LC/APC pigtails.
- Other accessories like cable ties, foam tape, dowels and screws, user manual, etc, are also included.

NOTE: The OTB is equipped with the elements needed to serve up to 4 customers. Nevertheless, it is possible to add in the field more LC/APC duplex adapters and LC/APC pigtails to increase the capacity.

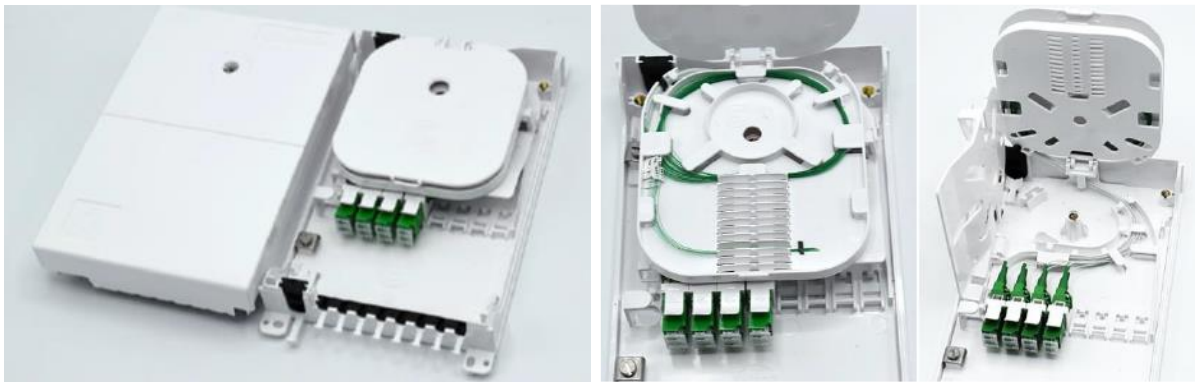


Figure 37. OTB for up to 4 customers (upgradable up to *6* customers).

15. FLOOR DISTRIBUITION BOX (FOR RISER ARCHITECTURE 4 CUSTOMERS/ UPGRADABLE TO 8)

The Floor Distribution Box (FDB) **is the same element** that is used as OTB in the MDU scenarios up to 6 customers in the centralized splitting architecture of UGG.

The box could be used in MDU scenarios with RISER architecture, as a floor distribution box **with a capacity up to 8 customers** (served directly from the box).

NOTE: the capacity is increased compared with the use of the box as OTB due that in this case is not limited by the fiber count of the fiber units drops.

The box is prepared to be installed on a wall with dowels and screws.

The FDB allows the installation of an optical riser cable with a diameter up to 8 mm.

The FDB is equipped internally with:

- 1 splice tray, with capacity to store up to 24 fusion splices (in two rows of 12).
- 4 LC/APC duplex adapters.
- 8 LC/APC pigtails.
- Other accessories like cable ties, foam tape, dowels and screws, user manual, etc, are also included.

NOTE: The FDB is equipped with the elements needed to serve up to 4 customers. Nevertheless, it is possible to add in the field more LC/APC duplex adapters and LC/APC pigtails to increase the capacity up to 8 customers.

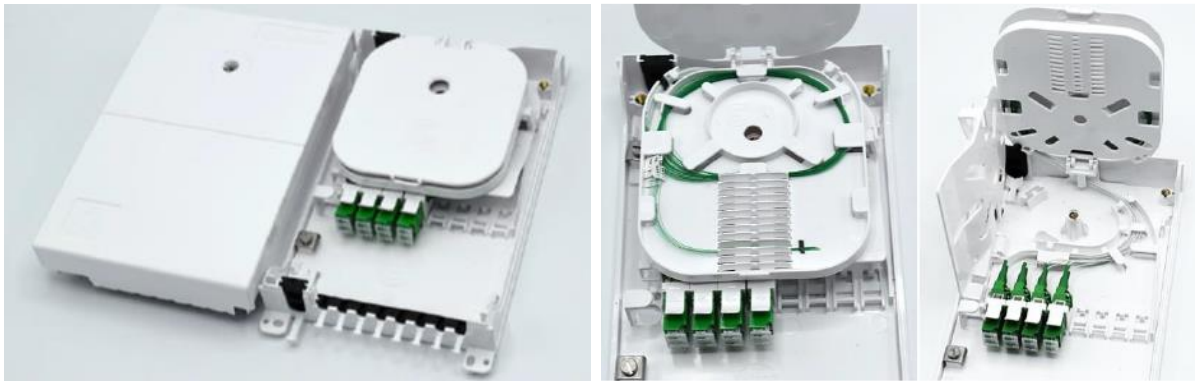


Figure 38. FDB box. (The OTB of up to 4 customers, upgradable up to 8 customers).

16. OPTICAL TERMINAL OUTLET (WITH PIGTAILS)

The Optical Termination Outlet (with pigtails) is a plastic box, designed to be used in SFU as an OTB, and as a final termination outlet in MDU scenarios.

The box is prepared to be installed on a wall with dowels and screws.

The outlet allows the installation of an optical drop cable or a micro-duct with an external diameter up to 7 mm. There is space enough internally to make possible the installation of the corresponding Gas-Blockers in case of micro-ducts.

The outlet is equipped internally with:

- 1 splice tray, with capacity to store up to 4 fusion splices (in two rows of 2).
- 1 LC/APC duplex adaptor.
- 2 LC/APC pigtails.
- Other accessories like cable ties, foam tape, dowels and screws, user manual, etc, are also included.

Figure 39. Optical Terminal Outlet (with Pigtails).

17. OPTICAL TERMINAL OUTLET (WITHOUT PIGTAILS)

The Optical Termination Outlet (without pigtails) is a plastic box, designed to be used in some scenarios as a final termination outlet inside the customer home.

The box is prepared to be installed on a wall with dowels and screws.

The outlet allows the installation of an optical drop cable and connect internally directly to the LC/APC adapter included.

The outlet is equipped internally with:

- 1 splice tray, with capacity to store up to 4 fusion splices (in two rows of 2).
- 1 LC/APC duplex adaptor.
- Other accessories like cable ties, foam tape, dowels and screws, user manual, etc are also included.

Figure 40. Optical Terminal Outlet (without Pigtails).

18. LABELS MODELS AND INK TAPES FOR FIELD LABELING

The labels, inks tapes and field printers authorized to be used in the deployment to mark cables, patch-cords, and different equipment's in the deployment are defined in this annex.

All the labels authorized are from the manufacturer BRADY.

The portable printer that is recommended and authorized to be used in the deployment (valid for all the labels included in this annex) is the following model: BRADY MBP61.

FLAG TYPES LABELS:

Labels to identify optical patchcords in the ODF and the RACKS:

• **Label model: PTLFP-01-425.**
  • Characteristics:
  • Color: White.
  • Dimensions: 30 x 20 mm.
  • Printable height: 10 mm.
  • Supplied in rolls: 250 labels/roll.
• **Ink tape: M61-R4310**
	
	PTLFP-01-425

Labels to identify Fiber Units in the Distribution Points (between micro-ducts and splice trays).

• **Label model recommended: PTLFT-01-425.**
• **Label model alternative: PTLFP-01-425.**
  • Characteristics (both models):
  • Color: White.
  • Dimensions: 30 x 20 mm.
  • Printable height: 10 mm.
  • Supplied in rolls: 250 labels/roll.
• **Ink tape: M61-R4310**
	
	PTLFT-01-425

LABELS FOR CABLES (CABLE TIES FIXATION):

The label recommended to identify cables and microducts in the singular points is a model that should be fixed to the cables with 2 cable ties.

• **Label model: BM71-10x60-7643-WT** Characteristics: Color: White. Dimensions: 60 x 10 mm. • **Ink tape: M61-R6010**	

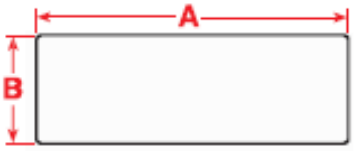
NOTE: The recommended label is from the B-7643 series which is for indoors (zero halogens), that is enough for the UGG network, which no leaves cables exposed to solar radiation).

ADHESIVE LABELS FOR OPTICAL COMPONENTS (ODF MODULES, CLOSURES, DP, OTB, OTO …):

• **Label model: M61C-375-422.** Characteristics: Color: White: Continuous roll. Length adjustable. Width 9,53 mm. • **Ink tape: M61-R6010**	

This type of label should be cut to the adequate length according to the space in the element (described in the normative).

Exception for the ODF modules of R&M:

• **Label model (recommended): PTL-16-422** Characteristics: Color: White: Length: 25,4 mm. Width 9,53 mm. • **Ink tape: M61-R6010**	 25,4 x 9,53 mm

19. ELECTROMAGNETIC MARKERS

The electromagnetic markers are totally passive, with no power or active components, these markers must derive its energy only from the magnetic field of the detector or locating device. The marker is only detectable at a frequency of 101,4 kHz (Telecommunications frequency for buried electromagnetic markers) and they must be compatible with any locating device.

The color of all the electromagnetic markers must be orange.

There are two main types defined: ball type, and end-cap markers. The preferred solution to be used is the end-cap markers.

	
Ball type	End caps type

Figure 41. Two types of electromagnetic markers.

There are several manufacturers **authorized and awarded** for the end-cap type solution.

Manufacturer	Images
HEXATRONIC	
EMTELLE	
ELECTROSON	
KYO	

Figure 42. Different suppliers of end-cap markers.

20. CENTRALIZED DISTRIBUTION POINT (CDP)

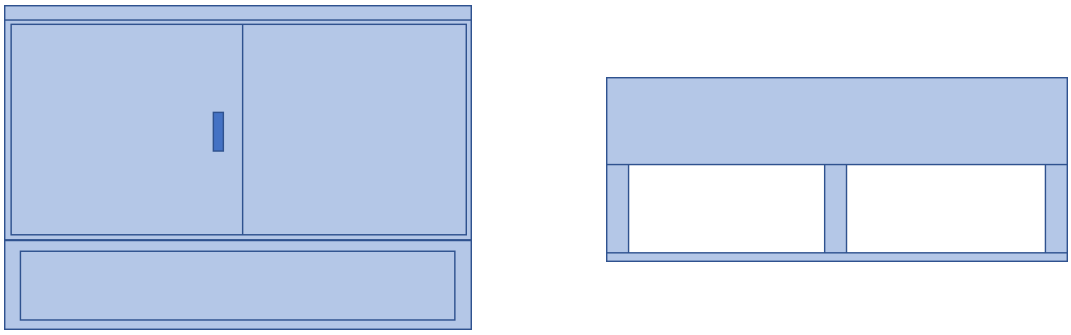
The CDP is based on a street cabinet platform that will have a strong structure with 2 doors lockable. Inside it will include an ODF (Optical Distribution Frame). The dimensions of the complete cabinet are (approximately): 2000 x 1600 x 500 mm (Width x Height x Depth).

NOTE: The height dimension doesn't not include the plinth part that will be buried into the ground.

The cabinet is constituted by different parts:

- a cabinet body with accessible plinth, and
- an underground plinth base to fix it to the ground.

The constitution scheme of the cabinet is as follow:

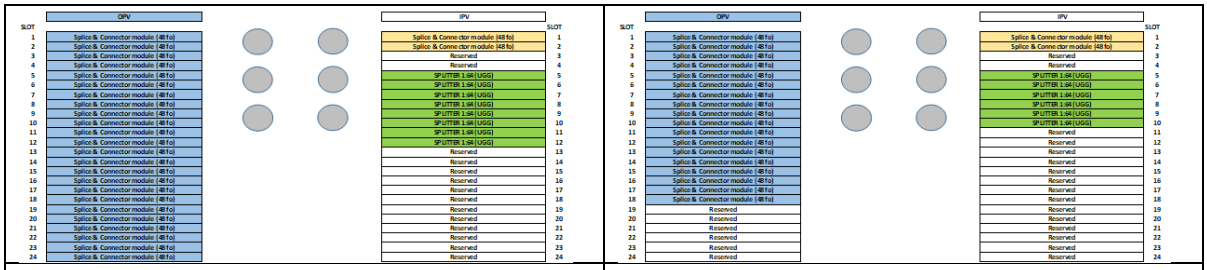


Street cabinet upper part. Underground plinth base

Figure 43. CDP street cabinet scheme.

The CDP includes inside an Optical Distribution Frame (ODF) formed by 2 verticals of 24 positions each.

Depending on the equipment installed inside there are defined two configurations (at 100%, and 75%).



CDP configuration at 100% CDP configuration at 75%

Figure 44. Two internal configurations of the CDPs.

There are two providers authorized for the deployment: Commscope and R&M.

20.1 COMMSCOPE CDP

In the next images the CDP (Configuration with 100% of equipment) of Commscope can be seen:

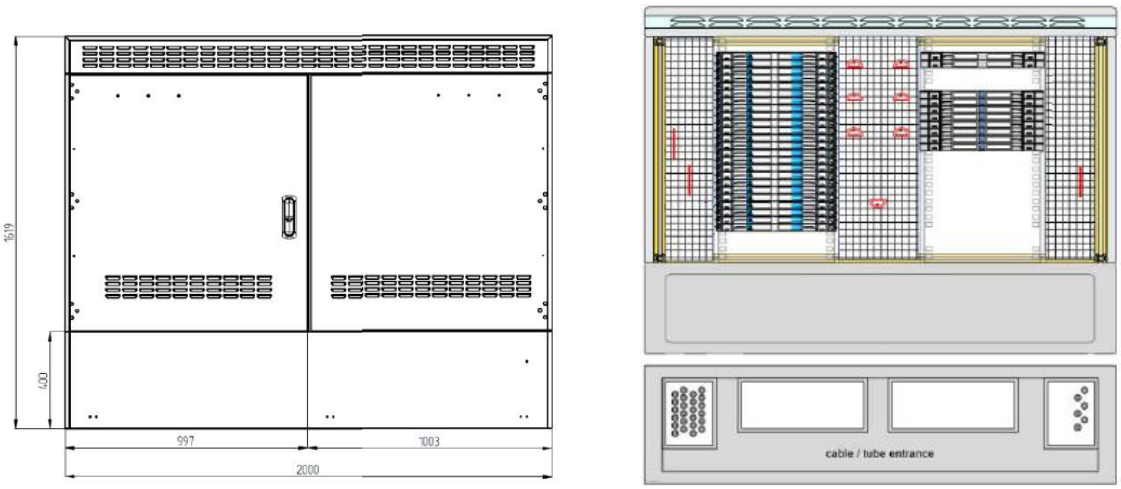


Figure 45. Scheme of Commscope CDP.

20.2 REICHLE AND DE-MASSARI (R&M) CDP

In the next images the CDP (Configuration with 100% of equipment) of R&M can be seen:

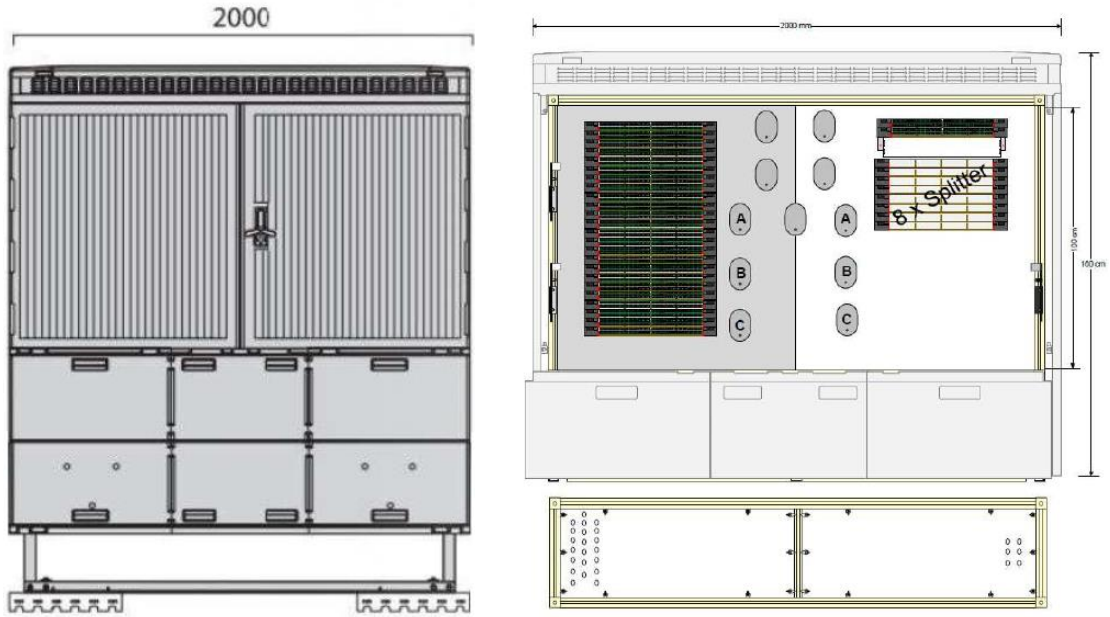
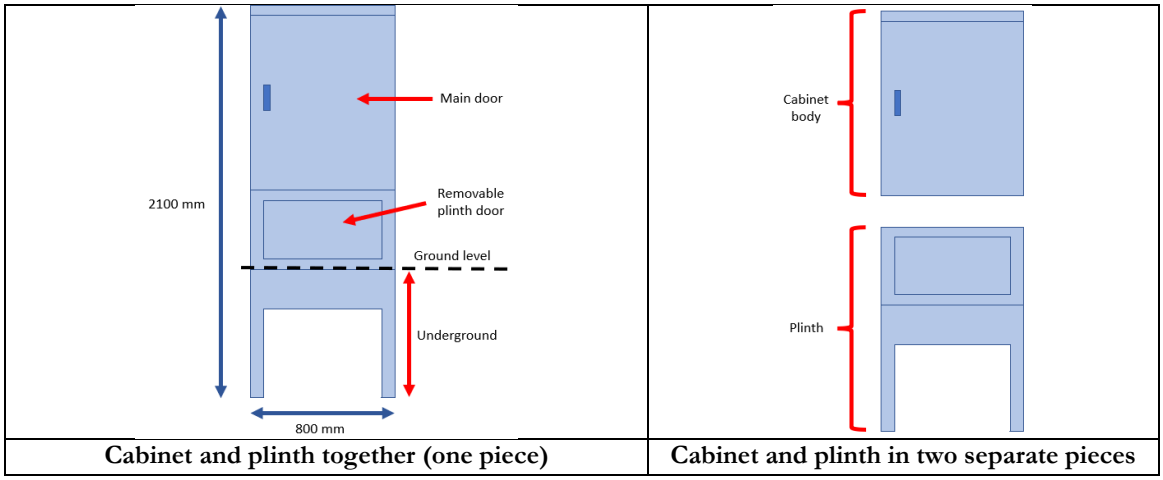


Figure 46. Scheme of R&M CDP.

21. STREET CABINET FOR DP-96 (CENTRALIZED SPLITTING ARCHITECTURE)

The dimensions of the complete cabinet for the DP96 are (approximately): 800 x 2100 x 320 mm (Width x Height x Depth).

The DP96 will be formed by two main parts: plinth base + cabinet upper part. The plinth base has a door registrable.



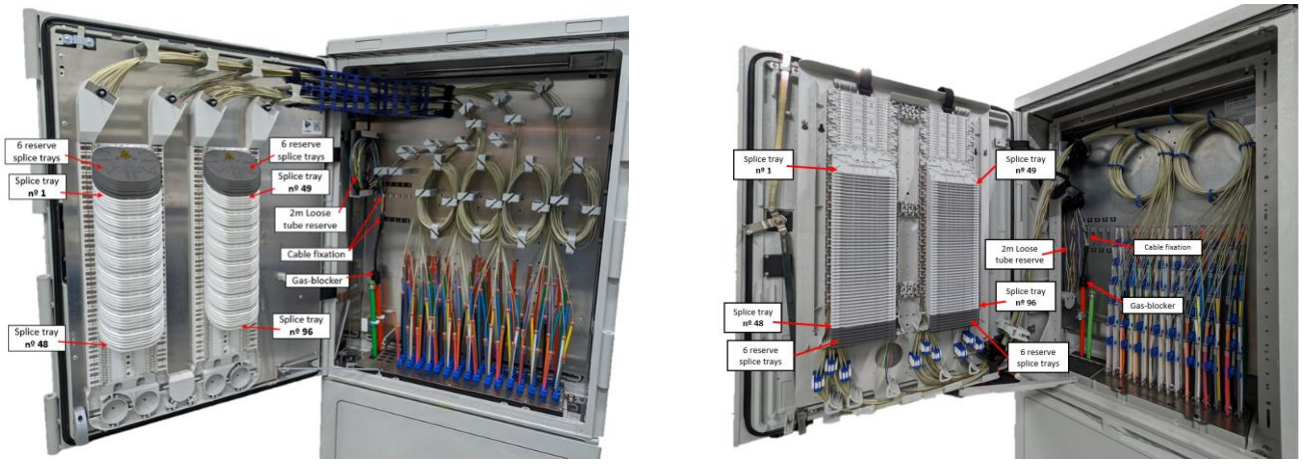
Cabinet and plinth together (one piece)	Cabinet and plinth in two separate pieces

Figure 47. Scheme of the street cabinet DP-96.

The ducts entrance has all the elements needed to fix (and guide) the cables and micro-ducts coming into the cabinet.

- Up to 8 mini tubes of 14 mm outer diameter
- Up to 96 micro-tubes of 7 mm outer diameter.

The following images show an example of the internal distribution of the street cabinets for the DP96:



Sichert Electroson

Figure 48. DP-96 internal distribution.

22. FEEDER POINT (DISTRIBUTED SPLITTING ARCHITECTURE)

The Feeder Point optical splice closure is a device that allows to perform optical cable segregations (or branch-offs) between large cables to smaller ones going to the Urban-DPs in the distributed splitting architecture of UGG, distributing the network according to the network designs. The Feeder Point optical splice closure allows to:

- Restore the integrity of the external cable sheath, including mechanical continuity of traction elements, when necessary.
- Direct entry of optical cables and its fixation.
- Protect the optical fibers, splice protectors and optical devices inside.
- Facilitate the organization of fiber splices, passive devices and the storage of the excess of fiber.

The main characteristics of the Feeder Points optical splice closures that will be used are the following:

- Dimensions (approx.): 700 mm (large) x 300 mm (diameter). Cylindrical shape.
- Double input for feeder cables with a diameter between 5 and 8 mm and the possibility of installing a pass-through cable configuration (mid-span).
- At least 12 outputs for cables with a diameter between 5 and 8mm.
- IP rate. The closures are watertight to prevent water or dust entry. The IP grade that the closures achieve is IP 68. The seal of the closures is carried out by mechanical procedures.
- Splice trays for up to 288 fusion splices.
- The fusion splice trays allow to store up to 12 fusions per tray. It is possible to change the fiber direction inside the tray.
- It is possible to guide any fiber to any splice tray through the routing guide system of the box.

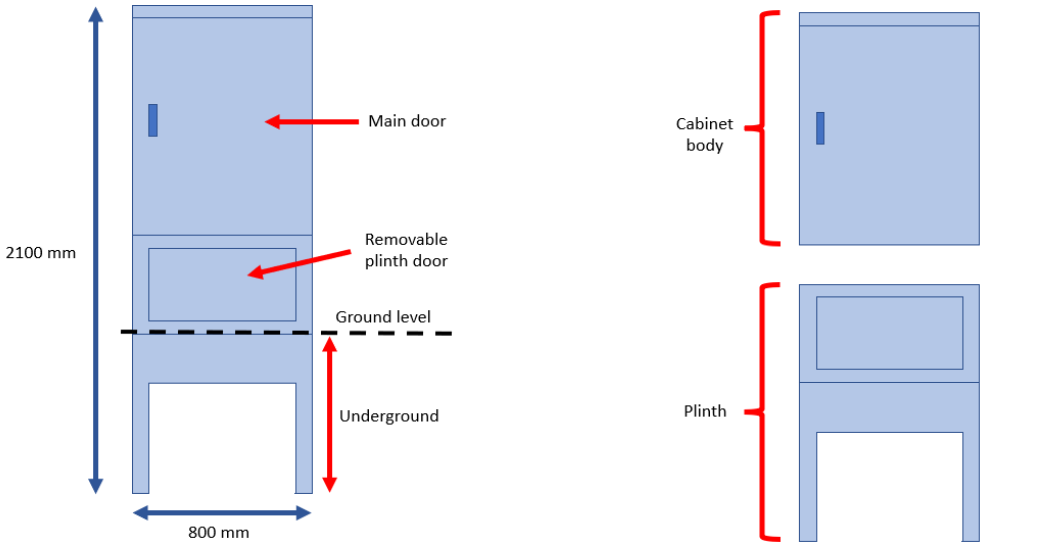
Figure 49. Example of a Feeder Point optical splice closure.

23. STREET CABINET FOR URBAN-DP96 (DISTRIBUTED SPLITTING ARCHITECTURE)

In the Distributed Splitting Architecture of UGG, these street cabinets are the Urban Distribution Points (Urban-DPs) for 96 buildings where UGG finish all the optical cables that come from the Feeder Points, as well as the beginning of the Distribution Network.

The dimensions of the complete cabinet are (approx..): 800 x 2100 x 320 mm (Width x Height x Depth).

The Urban-DP96 will be formed by two main parts: plinth base + cabinet upper part. The plinth base has a door registrable.



Cabinet and plinth together (one piece) **Cabinet and plinth in two separate pieces**

Figure 50. Scheme of the street cabinet for Urban-DP96.

The ducts entrance has all the elements needed to fix (and guide) the cables and micro-ducts coming into the cabinet.

- Up to 4 micro-ducts of 14 mm outer diameter.
- Up to 96 micro-ducts of 7 mm outer diameter.

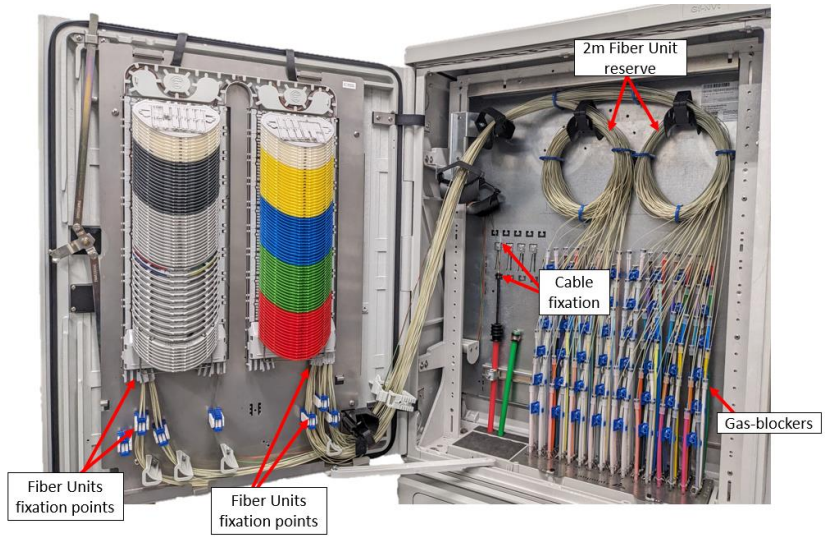
The Urban-DP96 includes the following optical splitters pre-installed from factory:

- 2 splitters 1:4.
- 6 splitters 1:16.

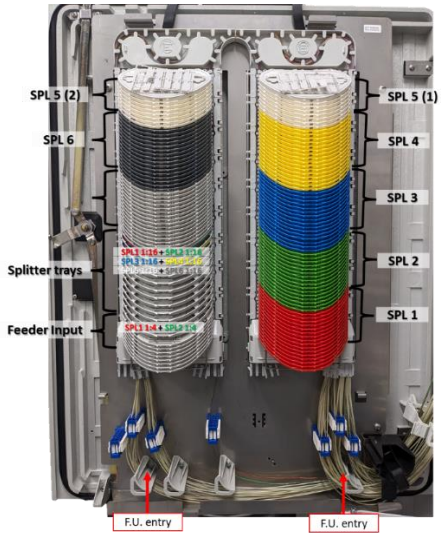
In the case of the splitters 1:16, their outputs are distributed from factory to the different building trays.

The Urban-DP96 can be used as first level of splitting or as first and second level of splitting depending on how the installer configures it on the field.

The following images shows an example of the internal distribution of the street cabinet for the DP96:



General view



Detail of the splice trays system

Figure 51. Internal configuration of the Urban-DP96.

24. OTB4-S AND OTB8-S (DISTRIBUTED SPLITTING ARCHITECTURE)

In the distributed splitting architecture of UGG, the OTB4-S and the OTB8-S are plastic boxes located in MDU building and equipped with optical splitters as a second level of splitting (1:4). In these cases, the first level of splitting (1:16) is installed in the Urban-DP.

The boxes are prepared to be installed on a wall with dowels and screws.

The OTB4-S and the OTB8-S allow the installation of an optical drop cable or a micro-duct with an external diameter up to 7 mm. There is space enough internally to make possible the installation of the corresponding Gas-Blockers in case of micro-ducts.

The OTB4-S is equipped internally with:

- 1 fiber storage tray.
- 2 splice trays, with capacity to store up to 2 splitters 1:4 and 2 optical fusion splices.
- 1 splitter 1:4 with pre-connectorized outputs in LC/APC.
- 4 LC/APC duplex adapters.
- Other accessories like cable ties, foam tape, dowels and screws, user manual, etc, are also included.

The OTB8-S is equipped internally with:

- 1 fiber storage tray.
- 2 splice trays, with capacity to store up to 2 splitters 1:4 and 2 optical fusion splices.
- 2 splitters 1:4 with pre-connectorized outputs in LC/APC.
- 8 LC/APC duplex adapters.
- Other accessories like cable ties, foam tape, dowels and screws, user manual, etc, are also included.

OTB4-S

OTB8-S

Figure 52. OTB4-S and OTB8-S configurations.