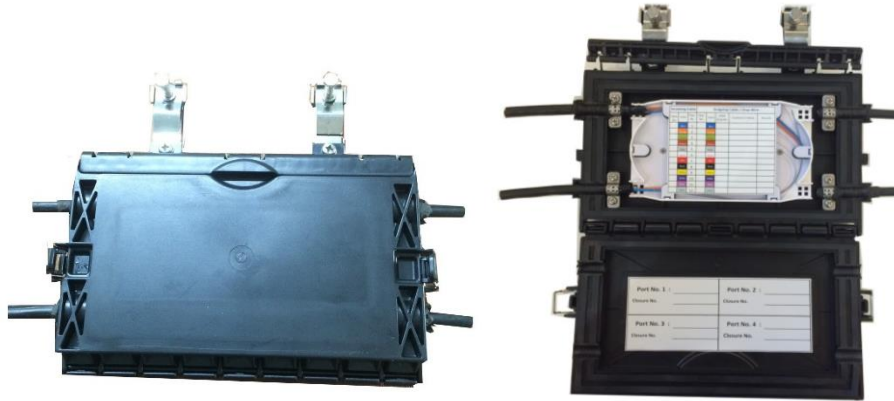


## Drop Wire Optic Closure

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# **R**e-Enterable Fiber Optic Splice Closure (Re-Enterable Aerial Closure for Access Service)



Optical Fiber Drop wire Closure Model FOC-CB1612-24DW. Available with optical fiber cable from 12 up to 24 fibers This closure can water protection proof, Weatherproof, Designed for quick installation and easy to use, Thus saving time in the workplace, Greater use of rubber Sealing tape between bolt lid, Can be used this closure is Straight Joint, Branch Joint and Butt Joint.

### Features

- Made of plastic ABS that is resistant to the weather. Resistant acid and alkali, vibration. Durable pull and bend of cable
- Easy to used and install fast time
- Used gasket rubber allows of closure able open-closed it easily, without used the special tools and save cost more. Do not rely on the expertise of practitioners.
- Design by Clip Lock the bold lid stick together without nut for easy to used, if nut not easy to used maybe loss during installation and maintenance activities.
- Prepare successful accessories, easily installed and reduce the time of installation.
- Provide hanging clamp Stainless SUB 304 and disconnect from cable stand, convenient fast install and can be mounted on pole.
- Can be used this closure install in stand mount or pole mount.
- Designed front cover with space for company name or sprayed or painted stripes Logo is permanently attached to the plastic.
- Splice Tray and lid made from Polycarbonate and white ABS.
- Protective Sleeve length 60 mm and core made of Stainless Steel.
- Size: 35 x 220 x 150 mm.
- Weight 0.528 kg with 4 holes for cable in-out.

Brand : Chamber, Products made in Thailand.

# Drop Wire Optic Closure

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## 1. INTERODUCTION

- 1.1 This specification covers requirement of re-enterable fiber optic splice closure used for covering the spliced fibers of aerial optical fiber cable for access service in TOT Public Company Limited.
- 1.2 The closure used for the aerial optical fiber cable for access service, shall be applicable to the cable range of 2 fibers up to 12 fibers (maximum) as specified in TOT specification OES-004-032-xx, latest issue, TOT specification OES-004-044-xx, latest issue or equivalent.
- 1.3 Full details of this following information shall be provided in bidding document by bidder.
  - Product specification issued by product manufacturer.
  - The material and grade of material used as per Section 3 in this specification.
  - Test method and test report issued by manufacturer or third party laboratory or TOT to certify the product offered meeting the requirements as specified herein or meeting international standard.

## 2. General Requirements

- 2.1 The configuration of the fiber cable closure should allow for easy splice assembly and installation as follows: straight joint (or in-line), branch joint and butt joint.
- 2.2 The closure kit shall be easy for handling and installation. The closure shall allow easy fiber access during installation and maintenance. The closure, when re-entry, shall require neither sealing materials nor re-entry kit.
- 2.3 The closure shall be sealed with high quality grade rubber gasket or silicon gasket or better.
- 2.4 All hardware used to attach and secure the closure to aerial messenger wire and/or cable, or all hardware and gasket used to assemble the closure cover, such as nuts and bolt etc, shall be captivated to prevent accidental loss during installation and maintenance activities.
- 2.5 The closure shall at least accommodate 4 cable ports. The cable ports shall allow the installation of cable outer diameter (exclude messenger wire) 5.0 mm up to 10.0 mm according to TOT specification “Optical Fiber Cable for Access Service, (Compact OFC)” OES-004-032-xx, latest issue, TOT specification “Optical Fiber Cable for Access Service (Drop wire Twisted)” OES-004-044-xx, latest issue or equivalent. Unused cable ports shall be closed with plugs.
- 2.6 The closure shall be capable of accommodating splice organizer which accept fusion splice method. The other splice methods that extremely difference from fusion splicing are not allowable in this closure. The splice closure shall have provisions, for storing fiber splices in an orderly and identifiable manner, mountings for splice organizer assembly, and space for fiber access.
- 2.7 All fiber cable elements shall be routed in such a way that no transmission degradation is seen after accessing these cable elements. The minimum bend radius of the fibers after installation shall be 30 mm throughout the whole closure system.
- 2.8 The closure organizer shall accommodate single fusion splices up to 12 fibers.
- 2.9 Installation of the closure by clip lock.

## Drop Wire Optic Closure

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2.10 The closure shall provide a robust mechanism for clamping the cable sheath such as teeth clamp etc. to prevent the cable sheath slipping or pullout and closure swing caused by surrounding environments for instance :- strong wind in aerial network. Cable tie shall not be allowable for wrapping, tightening the cable sheath to cable port.

2.11 The closure shall be ready to provide two self supporting aerial messenger wire clamps which shall be designed for clamping both messenger wire jacket and cable jacket of cable specified without separating the messenger wire, the reason is to be convenience for installer.

2.12 The closure shall have no sharp edges, corners, burrs or other hazardous features that could result in injury to splicer or craftsman.

2.13 The closure kit shall at least consist of the following components :

- a) Closure housing (closure cover) 1 set
- b) Fiber splice organizer 1 set
- c) Clamping for mounting on cable. 2 sets
- d) Adhesive label for fiber record guidance 2 sheet
  - One sheet of label form for fiber closure record guidance (Fig.2) and one sheet of label form for fiber splicing plan (Fig.3) shall be securely adhered inside upper cover of closure and inside upper cover of closure and inside upper tray cover respectively and shall have enough space for splicer or craftsman to record detail as described in Figure 2 and 3.
- e) Heat shrink splice protector with glue (sleeve size 60 mm) 12 pcs.
- f) Sealing gasket
- g) Buffer tube or transportation tube, if necessary depending on each manufacturer product design.
- h) Alcohol tissue
- i) Abrasive paper
- j) Installation Instruction in Thai or English language.
  - Installation Instruction
  - Include also description how to manage or arrange the fiber inside Closure, and showing example of fiber record guidance filling up as per Figure 2 and 3.

### 3. Materials

3.1 Housing or Covers shall be fabricated from black durable high density thermoplastic or ABS , which resists to solvents and stress cracking and be compatible with chemicals and other materials used in the various closure

## Drop Wire Optic Closure

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applications. This plastic also resists deterioration when exposed to the ultraviolet ray of the sun for long life.

- 3.2 All gaskets shall be fabricated from high quality grade rubber or equivalent.
- 3.3 Splice tray made from white color ABS and tray cover shall be fabricated from polycarbonate (PC) with UV absorber in white color.
- 3.4 Self supporting aerial clamp shall be made of stainless steel grade SUB 304. Clamp lock, Nut, Screw used in the assembly of the closure made of stainless steel grade SUB 304.
- 3.5 All parts of metallic materials shall be made of stainless steel grade SUB 304. Which resistance and protected against general corrosion and various forms of localized corrosion (e.g., stress corrosion, cracking, pitting, etc.) and shall not be capable of inducing significant galvanic corrosion effects when in contact with other metals likely to be present in the closure's environment.

### 4. Technical Requirements

Since this specification concerns the optical transmission carrier path so that if optical measurements are required on testing, an optical wavelength of 1550 nm  $\pm$  20 nm should be used to measure performing on a minimum of 10 individual fibers. And if there is no specified in some testing procedure, the test method should be done in practical way based on TOT application.1.

#### 4.1 Mechanical Tests

##### 4.1.1 Bending (Flexure Test)

Mount assembled closure in a horizontal test fixture. Clamp cable at a distance of 250 mm from the edge of closure. Measure and record the initial baseline value of the optical attenuation of the fibers monitored in the cable. Bend either side of center position to 45°C for 5 cycles at room temperature 25 +/- 2°C. A cycle is defined as to bend cable, dwell for 5 minutes, bend in opposite direction and dwell for 5 minutes and then straight out. Repeat the optical measurements.

There is no change in fiber attenuation greater than 0.05 dB for any fibers when compare with the initial baseline values and shall be no mechanical damage to either the cable sheath or closure clamping hardware.

##### 4.1.2 Cable retention

Mount the assembled closure in a fixture which allows the application of an axial deadweight. Measure and record the initial baseline value of the optical attenuation of the fibers monitored in the cable. Then apply an axial load of 20 kg at 500 mm from the edge of closure at room

## Drop Wire Optic Closure

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temperature 25 +/- 2°C for a period of 8 hours. Repeat the optical measurements while the load applied.

There is no change in fiber attenuation greater than 0.05 dB for any fibers when compare with the initial baseline values and shall be no mechanical damage to either the cable sheath or closure clamping hardware.

### 4.1.3 Torsion

Mount the assembled closure in the cable flex test in a fixture which restrains the closure and permits rotation of cable at distance 1 m +/- .03 m from the edge of closure. Measure and record the initial baseline value of the optical attenuation of the fibers monitored in the cable. Twist the cable for a total of 10 cycles at room temperature 25 +/- 2°C. A cycle is defined as a clockwise twist 90° followed by a 180° twist counter clockwise followed by a 90° clockwise twist back to the starting position. Repeat the optical measurements.

There is no change in fiber attenuation greater than 0.05 dB for any fibers when compare with the initial baseline values and shall be no mechanical damage to either the cable sheath or closure clamping hardware.

### 4.1.4 Compression

Place the assembled closure on a flat, rigid surface that has clearance for closure protrusions. Apply a uniformly distributed weight of 45 kg. for 15 minutes at room temperature 25 +/- 2°C, using a square platform having a surface area of 50 x 50 mm<sup>2</sup> at the center of the closure. Repeat the procedure at the other side.

After removal of the load, the closure shall not have permanently deformed more than 10%. There shall be no mechanical damage to the closure or its contents after being compressed.

### 4.1.5 Impact

Mount the assembled closure on a flat, rigid surface. Cable shall be secured following normal practices. Impact the closure using a drop tube with a hemisphere of 25 mm radius weights 1 kg, at the height of 1 m, at the center of the closure, at room temperature 25 +/- 2°C. Repeat the procedure at the other side.

There shall be no mechanical damage to the closure or its contents after being impacted

### 4.1.6 Vibration

Place and secure the assembled closure on a vibration apparatus. Clamp both ends of the cable at 250 mm from the edge of closure. The closure will be subjected to a forced vibration at frequency of 10 Hz on a

## Drop Wire Optic Closure

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horizontal plane, with amplitude of 3 mm at the center of the closure for a period of 72 hours at room temperature 25 +/- 2°C.

The closure shall be retested in paragraph 4.2.1. Water Resistance.

### 4.2 Environmental Requirements

#### 4.2.1 Water Resistance.

Mount the assembled closure in a test fixture such that it is oriented in its normal operating position. The test shall be performed in accordance with following parameters:

- Rain rate 150 mm/hr
- Drop size 0.4 – 4.5 mm
- Wind velocity 33 m/sec

Direct the wind horizontally through the water spray such that it impacts the closure in the side. Expose each surface of the closure for 30 minutes.

Dry the external surfaces of the closure. Open the closure and examine for the presence of water.

The closure shall show no evidence of water intrusion.

#### 4.2.2 Ultraviolet Resistance

The samples cut from non-metallic materials of closure shall be subjected to 700 hours exposure per ASTM G-26 and ASTM D-2565, procedure A, using type BH apparatus. The exposed samples shall be tested for tensile strength and elongation per ASTM D-638 at 2 inches/minute. A comparison of values after the test shall be made.

A drop of 20% or more in properties constitutes failure.

#### 4.2.3 Carbon Black Content

The samples cut from non-materials of terminal shall be tested the content of carbon black in accordance with ASTM D- 1603 latest issue.

The content of carbon black shall not be less than 2% by weight.

#### 4.2.4 Temperature Cycling

The assembled closure shall be exposed to a temperature cycle from 40°F (4.4°C) to 140°F (60°C) at 95% relative humidity as per Fig. 2 for 30 days. Allow the terminal to stabilize at room temperature for a minimum of 2 hours. After complete temperature cycles (end of 30 days) See Fig. 1.

There shall be no visible deterioration, deformation, melting or cracking of the aged samples. The aged components shall be used on the closures subjected to the environmental tests (4.2.5 and 4.2.1 respectively).

# Drop Wire Optic Closure

## 4.2.5 Re-entry Test

The assembled closure shall be re-entered. The test shall include the removal of the cover, simulate an addition splicing operation. The closures shall be re-assembled as per the instruction.

The closure shall be subjected to the water resistance test as described in paragraph 4.2.1.

## 4.2.6 Salt fog spray test

The assembled closure shall be exposed to a salt fog spray in accordance with ASTM B-117 for 30 days.

After testing, remove out the closure from the chamber and wash with warm, clean water. All metallic components of the closure shall be examined with naked eye. There shall be no evidence of corrosion of metallic components.

## 5. Marking

5.1 The closure shall be identifiable and permanently marked by the manufacturer's name or trade mark. The month and year of manufacture shall be clearly located on the closure to provide traceability.

5.2 The closure shall show a permanent customer's trademark or logo, if specified in commercial condition

## 6. Packing

Each fiber optic closure kit shall be packed in a cardboard box and clearly labeled to show the description, TOT code and name of the supplier.

Temperature (°F)

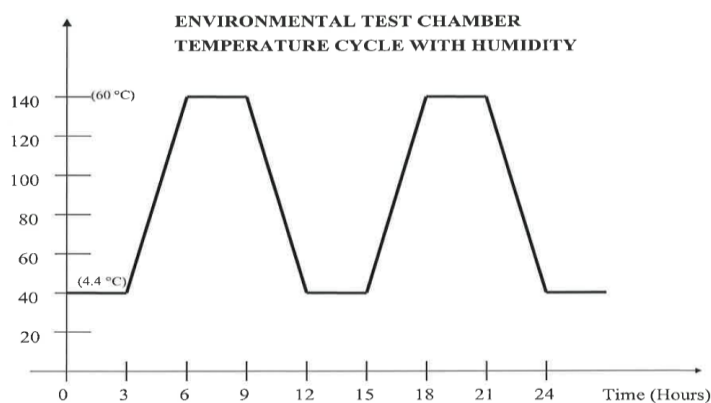


Fig. 1 Temperature Cycling

Form of Adhesive label for fiber Closure record guidance.

## Drop Wire Optic Closure

Port # 1 : _____ _____ _____ _____ _____ _____	Port # 2 : _____ _____ _____ _____ _____ _____
Port # 3 : _____ _____ _____ _____ _____ _____	Port # 4 : _____ _____ _____ _____ _____ _____

Example of fiber record Closure guidance

Port # 1 : Optic Cable For Access  CWT-หัวต่อ # 8  OFC-SM/AC(12)PE(8)/03 OFC AC # 01: 1-12	Port # 2 : Optic Drop Wire  หัวต่อ # 8 - ธนาคารกรุงไทย สาขา แจ้งวัฒนะ OF Drop-SM(6)PE(8)/03 OF Drop # 01: 1- 4(2xD)
Port # 3 : Optic Drop Wire  หัวต่อ # 8 - บ้านเลขที่999 ถ.แจ้งวัฒนะ OF Drop-SM(4)PE(8)/03 OF Drop # 01: 1- 2(2xD)	Port # 4 : Optic Drop Wire  หัวต่อ # 8 - DLC # 111 หมู่บ้านยิ่งรวยฯ OF Drop-SM(12)PE(8)/03 OF Drop # 01: 1- 4(8xD)

Description:

OF Drop-SM(4)PE(8)/03 = Optical Fiber Drop Cable (optic drop wire), single mode, 4 fibers(cores), Polyethylene sheath, Figure 8 structure, and construct in 2003.

OF Drop # 01 : 1-2 (2xD) = Optical Fiber Drop Cable (optic drop wire) number 01, Fiber count 1-2 connected to customer and remains 2 fibers availability.

Figure 2 The label form for fiber closure record guidance.

Form of Adhesive label for Fiber Splicing Plan.



## Drop Wire Optic Closure

Incoming Cable			Outgoing Cable / Drop wire				Remark
Cable No	Color	Fiber No.	Fiber No.	Color	Cable / Drop cable	Customer's name	
	Blue	1					
	Orange	2					
	Green	3					
	Brown	4					
	Slate	5					
	White	6					
	Red	7					
	Black	8					
	Yellow	9					
	Violet	10					
	Pink	11					
	Aqua	12					

### Example of Fiber Splicing Plan

Incoming Cable			Outgoing Cable / Drop wire				Remark
Cable No	Color	Fiber No.	Fiber No.	Color	Cable / Drop cable	Customer's name	
01	Blue	1	1	Blue	01	ช.กรุงเทพฯ แจ้งวัฒนะ	
01	Orange	2	2	Orange	01	ช.กรุงเทพฯ แจ้งวัฒนะ	
01	Green	3	3	Green	01	ช.กรุงเทพฯ แจ้งวัฒนะ	
01	Brown	4	4	Brown	01	ช.กรุงเทพฯ แจ้งวัฒนะ	
01	Slate	5	1	Blue	01	บ้านเลขที่ 999 ต.แจ้งวัฒนะ	VIP
01	White	6	2	Orange	01	บ้านเลขที่ 999 ต.แจ้งวัฒนะ	VIP
01	Red	7	1	Blue	01	DLC #111 หมู่บ้านอิมรอมฯ	
01	Black	8	2	Orange	01	DLC #111 หมู่บ้านอิมรอมฯ	
01	Yellow	9	3	Green	01	DLC #111 หมู่บ้านอิมรอมฯ	
01	Violet	10	4	Brown	01	DLC #111 หมู่บ้านอิมรอมฯ	
01	Pink	11					Spare
01	Aqua	12					Spare

**Figure 3** The label form for fiber splicing plan.

- End of Specification -

## Drop Wire Optic Closure

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