

# FireFly Series “D” Fiber Optic Closure Technical Specifications and Test Results

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## 1.0 SCOPE

### 1.01 General

This document provides technical specifications for the WPT FireFly “D” Series Splice Closures utilized for aerial and underground fiber optic cable splices in feeder distribution systems. The splice closures will accommodate up to two incoming and five outgoing cables and can be used on dielectric and non-dielectric cable. Included are the design characteristics and performance requirements for evaluating the closures.

### 1.02 Introduction

Western Pacific Telecommunication’s FireFly “D” Series Closure is a watertight, lightweight, re-enterable splice closure for protecting straight and multiple fiber optic splices of up to 24 fibers.

The FireFly “D” Series Closure can be used for dielectric and non-dielectric, loose buffer tube cable up to 0.6 in diameter (15mm), in aerial or underground watertight feeder and distribution systems. The closure housing is molded from lightweight, tough corrosion resistant plastic. To maintain a watertight seal, an O-ring seal is used around the dome base and a series of grommets is used to seal around the cables.



## 2.0 Design Characteristics

### 2.01 Metal Parts

Metals used in the closure are resistant to general corrosion, various forms of local corrosion, e.g., stress corrosion cracking and pitting. These metals do not produce significant galvanic corrosion effects in wet or humid conditions on other metals likely to be present in the closure’s environment. Secondary corrosion protection is not required

### 2.02 Plastic Materials

The plastic material used in molding the closure housings is a tough, lightweight, high impact, corrosion resistant plastic. This material is resistant to solvent and stress cracking and is compatible with metals and other material used in splicing connectors and cables such as conductor insulation or filling compound. The plastic material is non-corrosive to metals and will resist deterioration when exposed to the ultraviolet rays of the sun for prolonged periods.



## 2.03 Sealing

The sealing system of the FireFly Series “D” closure is a single “O” ring around the base of the dome that is reusable after each re-entry. The grommet used around the main or express cables is split for use on uncut cable and may be re-used if required. The grommets around the drop cable ports are also re-usable.

## 2.04 Identification and Marking

The model numbers are molded in the plastic closure-housing component. Other parts are packaged in boxes or plastic bags and are identified by labels, where necessary, to provide positive identification. FIREFLY ‘D’ SERIES Closure Kits have labels attached to the boxes for easy identification.

## 2.05 Workmanship

All closure housings and complete kits are supplied with all the material necessary to assemble the unit. The only tools required are cable preparation tools and splicing tools.

## 2.06 Inspection and Testing

WPT operates and maintains a complete Quality Assurance and laboratory test facility to monitor the production facility and perform operational tests on production models of the splice closures. The Quality Control and Test Procedures are available for review by approved inspection personnel.

## 3.0 Test Criteria/Performance

### 3.01 Mechanical

#### 3.01.1 Compression

##### (Test Spec/Method WPT-Bellcore)

A FireFly Series “D” Closure can withstand a compression load of 100kg when placed between two parallel flat surfaces without visual damage or causing a change in fiber attenuation greater than 0.05 dB when compared to baseline values.

#### 3.01.2 Impact

##### (Test Spec/Method WPT-Bellcore)

A FireFly Series “D” Closure can withstand an impact of 15Nm at temperatures of -18° C and 38° C without visual damage or causing a change in fiber attenuation greater than 0.05 dB when compared to baseline values.

#### 3.01.3 Cable Pullout

##### (Test Spec/Method WPT-Bellcore)

An axial load of 45kg can be applied to each cable entering the FIREFLY ‘D’ SERIES closure for a period of 30 minutes without causing a change in fiber attenuation greater than 0.05 dB when compared to baseline values or cable movement relative to the cable ends.

### 3.01.4 Cable Clamping

#### (Test Spec/Method WPT-Bellcore)

When installing and securing the fiber cables to the sheath retention system of the FIREFLY ‘D’ SERIES closure, no change in fiber attenuation greater than 0.05 dB occurs when compared to baseline values.

## 3.02 Electrical

### 3.02.1 Dielectric Strength

#### (Test Spec/Method WPT)

The dielectric strength of the closure housing material is greater than 15,000 volts DC.

## 3.03 Environmental

### 3.03.1 Chemical

#### (Test Spec/Method WPT-Bellcore)

Tensile bar samples of the closure housing material can withstand exposure to the following chemicals without experiencing a 10% weight loss or 25% loss of properties per ASTM D412.

3% H<sub>2</sub>SO<sub>4</sub> (Sulfuric Acid)

0.2N NaOH (Sodium Hydroxide)

Kerosene (having a flash point > 160°F (71°C) per ASTM D-56)

10% IGEPAL CO 630

### 3.03.2 Biological (ASTM)

The closure assembly will not support fungus growth per ASTM G-21.

### 3.03.3 Water Immersion

#### Test (Test Spec/Method WPT-Bellcore)

The FIREFLY ‘D’ SERIES Closure can be submerged in 2438mm of water treated with sodium fluorescein dye for 30 days. After 30 days, the dis-assembled closure will show no evidence of water intrusion when examined under an UV light source.

### 3.03.4 Ultra Violet Resistance (ASTM)

Test bar samples of the plastic materials can be subjected to 2160 hours of Xenon arc exposure per ASTM G26 and ASTM D2565, procedure A using BH apparatus. The exposed samples are tested for tensile strength and elongation per ASTM D638 at 2 inches/minute. A comparison of values before and after the exposure is made

### 3.03.5 Corrosion (Salt fog) (ASTM)

FireFly Series “D” Closures can be subjected to 30 days salt fog testing per ASTM B117 without showing any evidence of rust or corrosion

### 3.03.6 Thermal Aging (WPT- ASTM)

A FireFly Series “D” Closure can be subjected to continuous temperatures of 60° C for a period of 7 days. . At the conclusion of the thermal aging it is subjected to and passes the Water Immersion Test as outlined in paragraph 3.03.3.

**3.03.7 Temperature Cycling  
(Test Spec/ Method WPT-Bellcore)**

A FireFly "D" Series Closure can be temperature cycled from -40° C to +60° C for 100 cycles. At the conclusion of the temperature cycling it is subjected to and passes the Water Immersion Test as outlined in paragraph 3.03.3.

**4.0 Reference Documents**

- Bellcore GR-771-CORE Generic Requirements for Fiber Optic Splice Closures
- ASTM D412
- ASTM D 56
- ASTM G-21
- ASTMG-26
- ASTM D2565
- ASTM D638
- ASTM B117

**5.0 Fiber Attenuation Measurements**

Measurement of change in Fiber Attenuation  
Selected fibers from the test samples are spliced to a 1550 nm optical source/optical power meter. Readings of fiber attenuation are recorded prior to the sample being subjected to a test. These readings are referred to in this report as baseline readings. At the conclusion of each test, readings are again recorded. No change in fiber attenuation greater 0.05dB is permissible.



**6.0 Test Specifications/Performance**

<b>Test Description</b>	<b>Test Spec. or Criteria</b>	<b>Test Result</b>	<b>Performance</b>
Cable Bending	GR-771-CORE	Less than 0.05 dB change in attenuation	Meets Spec.
Cable Pullout	GR-771-CORE	Less than 0.05 dB change in attenuation	Meets Spec.
Cable Torsion	GR-771-CORE	Less than 0.05 dB change in attenuation	Meets Spec.
Cable Clamping	GR-771-CORE	Less than 0.05 dB change in attenuation	Meets Spec.
Impact	15Nm at -18° C & 38° C	No visual damage	Meets Spec.
Compression	100kg	No visual damage	Meets Spec.
Water Immersion	2438 mm / 30 days	No evidence of water inside closure	Meets Spec.
Temperature Cycling	-40° C to 60° C / 100cycles	Passes water immersion test	Meets Spec.
Chemical Resistance	ASTM D412	No visual damage	Meets Spec.
UV Stability	ASTM G26 / ASTM D2565	No visual damage	Meets Spec.
Corrosion	ASTM B117	No visual damage	Meets Spec.
Thermal Aging	60° C / 7 days	No visual damage	Meets Spec.
Biological	ASTM G21	No visual damage	Meets Spec.



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