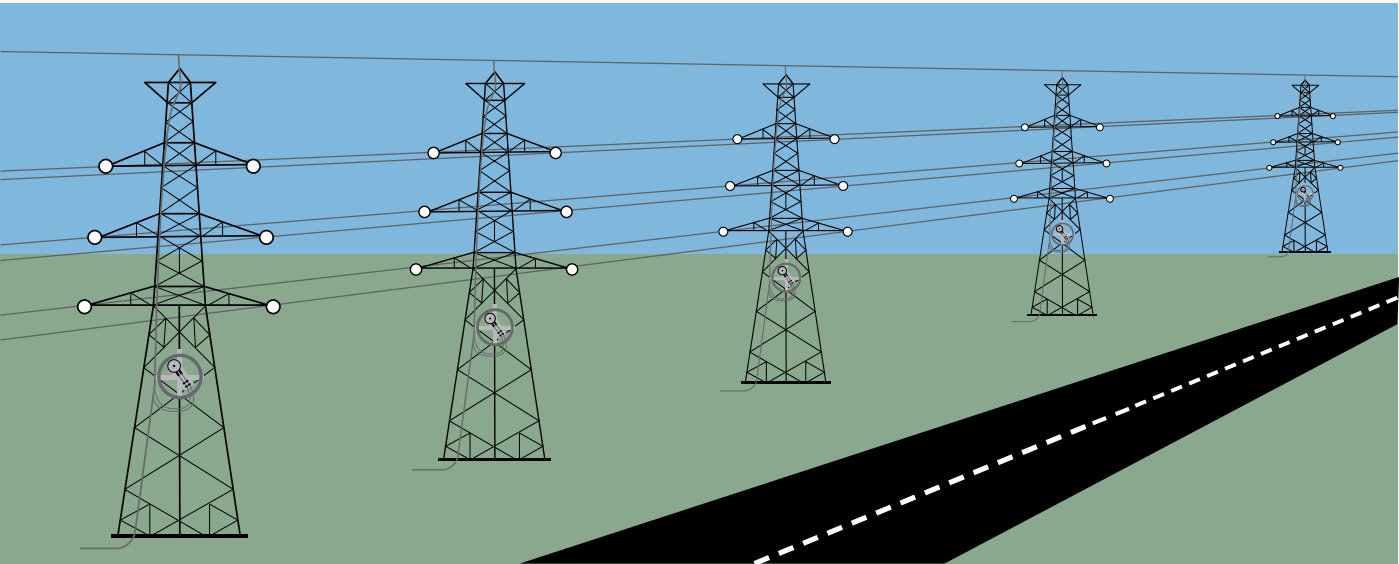




Closures for OPGW and ADSS applications

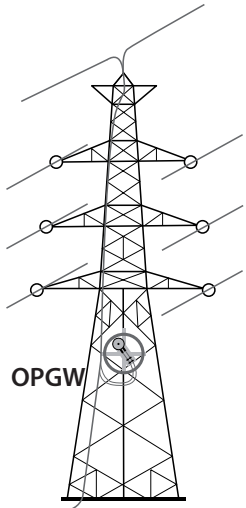
— used all over the world





OPGW – critical aspects

OPGW is an optical ground wire (OPGW) is a type of cable that is used in the construction of electric power transmission and distribution lines. The cable combines the functions of grounding and fibre communication. An OPGW cable has a tubular structure with one or more optical fibres inside, surrounded by layers of steel and aluminium wire. The conductive part connected to earth in towers, shields the high-voltage conductors from lightning. The optical fibre itself is dielectric and not affected by power in transmission lines, lightning induction, external noise or crosstalk. Typically, OPGW cables contain single-mode fibre with low transmission loss, allowing long distance transmission at high speed.



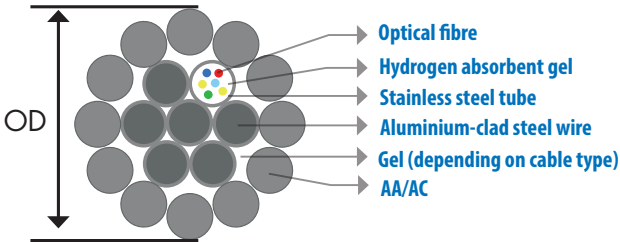
ADSS

ADSS is a self supporting fibre cable used for aerial installations, on pole structures. The optical fibre itself is dielectric and not affected by power in transmission lines, lightning induction, external noise or crosstalk. Typically ADSS cables contain single-mode fibres with low transmission loss, allowing long distance transmission at high speed.



Cable clamps

The OD (overall diameter) of the cable, determines the size of the cable clamps to be selected. The cable can be 0-0,5 mm bigger than the dimension of the cable clamp. Aluminum clamps are recommended for OPGW cables.



OPGW

There are brackets for storing overlength of cable and attachment for steel towers, steel poles and wood poles. It is of the outmost importance that for example cable clamps are the right size for the cable diameter to avoid compression that can cause transmission failures.

Cable specification

A precise cable specification is necessary for the choice of OPGW closure, see extract from Tykoflex Catalogue on page three. Get the full Tykoflex Catalogue by sending an e-mail to info@tykoflex.se

Installation instructions for OPGW

There is a generic installation instruction for OPGW cables available on our website. And we also supply a written instruction with the closure. We can also supply customer tailored instruction for a specific OPGW cable, in which case we need a sample of the cable.

OPGW Design
Ref: SFPOC/SFSJ-J-8069
Cable 48 F OPGW

Key Design Data – Complete Cable:		
Nominal Cross Sectional area	mm ²	125
Center- Aluminum Clad Steel Wires(20%) –No./Dia.	mm	1/3.3
L1- Aluminum Clad Steel Wires(20%) –No./Dia.	mm	4/3.3
L1- Aluminum Alloy Wires –No./Dia.	mm	1/3.3
L1- Stainless Steel Tube –No./Inner Dia./Outer Dia.	mm	1/2.9/ 3.3
L2- Aluminum Alloy Wires –No./Dia.	mm	15/2.5
Lay Direction-Outer Layer		RIGHT HAND
General Design Data (For Information Only)		
Nominal Overall Diameter	mm	14.9
Ultimate Conductor Tensile Strength	kN	77.7
Approximate Total Mass	Kg/km	536
Electrical Resistance at 20° C	Ω/km	0.332
Modulus of Elasticity	N/mm ²	96,501
Coefficient of Linear Expansion	×10 ⁻⁶ /°C	17.2
Short Circuit Current Capacity (Ambient = 30 °C)	kA2 s	119.6 10.9kA in 1s

Choice of cable clamp			
Part No.	Cable clamp plastic, for cable diameter	Part No.	Cable clamp aluminium, for cable diameter
11 218 210	Cable clamp 1x25 mm PA	11 218 269	Cable clamp AL 25.0 mm
11 218 212	Cable clamp 2x25 mm PA		
11 218 214	Cable clamp 3x25 mm PA		
11 218 216	Cable clamp 4x25 mm PA		
11 218 218	Cable clamp Ø 6.0 mm PA	11 218 253	Cable clamp AL 6.0 mm

OPGW closure checklist

To your left, an example of an OPGW specification and the corresponding points of selection in the Tykoflex Catalogue. Depending on the type of cable, you will be guided through the options that are available. In this example of an OPGW cable with stainless steel Tube ID 2.9 mm and OD 3.3 mm. The overall diameter is 14.9 mm. The OPGW design is 48 F. Cable in and out with possibility to branch. Get the Tykoflex Catalogue from info@tykoflex.se or via www.tykoflex.se

Choice of FIMT			
Part No.	SS tube ID	Nr. of fibres	Type of FIMT
11 218 700	1.93-2.33		FIMT Kit S-tube 1.93-2.33 mm
11 218 702	2.4-2.8		FIMT Kit S-tube 2.4-2.8 mm
11 218 704	2.7-3.4		FIMT Kit S-tube 2.4-3.4 mm
11 218 706	3.2-3.9		FIMT Kit S-tube 3.2-3.9 mm
11 218 708	4.1-5.2		FIMT Kit S-tube 4.1-5.2 mm

Choice of bracket	
Part No.	Type of bracket
11 214 106	Pole bracket 800 OPGW wood pole
11 214 110	Pole bracket 800 for OPGW steel tower
11 214 114	Mounting plate power line Fzb
11 214 116	Mounting plate power line, Fzb
11 214 120	Mounting plate stainless steel

Choice of cable bushing	
Part No.	Type of cable bushing
11 212 134	Cable bushing 1x24 OPGW
11 212 135	Cable bushing 1x24 OPGW AFL
11 208 010	End plug PG21 SS
11 212 132	Cable bushing 1x24mm
11 212 100	Cable bushing 2x18mm

OPGW Joint Closure OPGW 3H

The Joint Closure OPGW 3H (Optical Ground Wire) model has three open holes for customer adaptation. The closure is suitable for use above ground, attached to high voltage towers, poles, walls or other support structures. The closure comes with three holes for optional and/or cable bushings which are selected separately. The closure is equipped with cable strength member clamps, splice protection and casettes. The number of fibres will determine the number of casettes. Please choose a suitable joint closure for your fibre cable as specified in the table below. Depending on the cable type that will be used, the closure will need to be equipped with a choice of accessories, i.e. bracket, clamp and FIMT.

The tables on the opposite page will help you to determine the necessary accessories for the OPGW 3H. The OPGW 3H is always equipped with the articles specified in the table on the opposite page (basic configuration). If your cable specification is not covered by the tables, please contact Tykoflex.

OPGW 3 Holes for 24 or 36 fibres per Multicassette

Part No.	Type	No. of fibres	Estimated diameter (mm)	Weight (kg)	Included	Necessary accessories				
11 160 631	Cable OPGW 3H 24x24F	24	21.0x14.0x1.0	1	25	0	x	x	x	x
11 160 632	Cable OPGW 3H 48x24F	48	21.0x14.0x1.0	2	50	0	x	x	x	x
11 160 634	Cable OPGW 3H 96x24F	96	21.0x14.0x1.0	4	100	0	x	x	x	x
11 160 637	Cable OPGW 3H 192x24F	192	21.0x14.0x1.0	8	190	0	x	x	x	x

OPGW 3 Holes for 36 fibres per Multicassette

Part No.	Type	No. of fibres	Estimated diameter (mm)	Weight (kg)	Included	Necessary accessories				
11 160 641	Cable OPGW 3H 36x36F	36	21.0x14.0x1.0	1	40	0	x	x	x	x
11 160 642	Cable OPGW 3H 72x36F	72	21.0x14.0x1.0	2	75	0	x	x	x	x
11 160 644	Cable OPGW 3H 144x36F	144	21.0x14.0x1.0	4	150	0	x	x	x	x
11 160 647	Cable OPGW 3H 288x36F	288	21.0x14.0x1.0	8	300	0	x	x	x	x

Accessories & tools

Article	Part No.	Article
Multicassette fibre splices 2-p	11 212 010	Splice protector 1.0 mm steel tubes
End plug PG21	11 208 010	End plug for cable bushing
Cable bushing 1x24	11 212 134	End plug for cable bushing
Cable bushing 1x24mm	11 212 132	End plug for cable bushing

Ordering example of T240 OPGW 3H Joint Closure

Quantity	Choice of closure	Quantity	Choice of bracket	Quantity	Choice of cable clamp	Quantity	Choice of FIMT	Quantity	Choice of cable bushing
1	11 160 632	1	11 214 110	2	11 218 259	2	11 218 704	2	11 212 134
								1	11 208 010

Ordering example of T240 OPGW 3H Joint Closure

OPGW, 48 fibre, cable OD 14,9 mm, SS tube 3.6/3.2 mounted on a steel lattice tower

Quantity	Choice of Closure * Delivery content	Quantity	Choice of bracket	Quantity	Choice of cable clamp	Quantity	Choice of FIMT	Quantity	Choice of cable bushing
1	11 160 632	1	11 214 110	2	11 218 259	2	11 218 704	2	11 212 134
								1	11 208 010



Joint Closure OPGW 3H



The **Joint Closure OPGW 3H** (Optical Ground Wire) model has three open holes for customer adaptation. The closure is suitable for use above ground, attached to high voltage towers, poles, walls or other support structures. The closure comes with three holes for optional end plugs and or cable bushings which are selected separately. The closure is equipped with cable strength member clamps, splice protectors and cassettes. The number of fibres will determine the number of cassettes. Please choose a suitable joint closure for your fibre cables as specified in the table below. Depending on the cable type that will be used, the closure will need to be equipped with a choice of accessories, i.e. bracket, clamp and FIMT.

The tables on the opposite page will help you to determine the necessary accessories for the OPGW 3H. The OPGW 3H is always equipped with the articles specified in the table on the opposite page (basic configuration).

If your cable specification is not covered by the tables, please contact Tykoflex.

Joint Closure OPGW 4H



The **Joint Closure OPGW 4H** model has four open holes for customer adaptation. The closure is suitable for use above ground, attached to high voltage towers, poles, walls or other support structures. The closure comes with four holes for optional end plugs and or cable bushings which are selected separately. The closure is equipped with cable strength member clamps, splice protectors and cassettes. The number of fibres will determine the number of cassettes, please choose a suitable joint closure for your fibre cables as specified in the table below. Depending on the cable type that will be used, the closure will need to be equipped with a choice of accessories, i.e. bracket, clamp and FIMT.

The tables on the opposite page will help you to determine the necessary accessories for the OPGW 4H. The OPGW 4H is always equipped with the articles specified in the table on the opposite page (basic configuration).

If your cable specification is not covered by the tables, please contact Tykoflex.

Joint Closure OPGW 3H+2P



The **Joint Closure OPGW 3H+2P** model has three open holes for customer adaptation and two pre-sealed ports. The closure is suitable for use above ground attached to high voltage towers, poles, walls or other support structures. The closure comes with two fixed 16mm pre-sealed ports intended for ground cables and three holes for optional end plugs/ and or cable bushings which are selected separately. The closure is equipped with cable strength member clamps, splice protectors and cassettes. The number of fibres will determine the number of cassettes to be used. Please choose a suitable joint closure for your fibre cables as specified in the table below. Depending on the cable type that will be used, the closure will need to be equipped with a choice of accessories, i.e. bracket, clamp and FIMT.

The tables on the opposite page will help you to determine the necessary accessories for the OPGW 3H+2P. The OPGW 3H+2P is always equipped with the articles specified in the table on the opposite page (basic configuration).

If your cable specification is not covered by the tables, please contact Tykoflex.



Accessories & tools

R Recommended

Article		Article	
11 202 202	Multicassette fibre organizer, 2-p	11 216 131	Tube cutter 3-16mm steel tubes
11 216 020	Tool kit T240 R	11 218 056	Locking cap for padlock
11 216 100	Cassette holder R	11 216 115	Pressure test kit T240
11 218 346	Splice protectors, pack of 25		



We recommend that you use the Tykoflex Tool kit T240 for the OPGW joint closure.

Spa entrance kit

Part No.	Description	Packaging
11 218 340	SPA Entrance Kit Fibremanifolder, 4x Protective sleeve3,0x4,0 L=800 mm Oetiker 7-13, Drawbar fibre, hose 20 mm	1
11 218 341	SPA Entrance Kit 10/1,2 10x Fibremanifolder, 50m Protective sleeve3,0x4,0 L=800 mm, 10x Oetiker 7-13, Drawbar fibre	1
11 218 358	SPA Entrance Kit 4-way Fibremanifolder, 2x Protective sleeve3,0x4,0 L=800 mm, Oetiker 11-13, 2cm Protective Tube5x7, 40cm Protective TubePel 3,5x5,0, 5cm Heatshrink Tube W5C 9/3, Splice protector2,4-2,8 samt 2,7-3,4	1
11 218 805	SPA Entrance Kit 5mm Tube 4-way Fibremanifolder, 2x Protective sleeve3,0x4,0 L=800 mm, Oetiker 13-15, 2cm siliconetube unarmoured. 7x10mm, 40cm Protective Tube PA 5x7, 5cm Heatshrink Tube W5C 9/3, Splice protector3,5-4,4	1
11 218 808	SPA Entrance Kit 7,4mm Tube 4-way Fibremanifolder, 2x Protective sleeve3,0x4,0 L=800 mm, Oetiker 13-15	1



Down lead cushion

Down lead cushion for routing cable/cables downwards on steel/ concrete/ hardwood poles where SS band is used for mounting.

Cable dimension	Part No.	Type	Part No.	Type
8.00-10.00	11 218 295	For two cables	11 218 298	For one cable with spacer
10.01-12.50	11 218 282	For two cables	11 218 283	For one cable with spacer
12.51-15.50	11 218 296	For two cables	11 218 299	For one cable with spacer
15.51-19.50	11 218 297	For two cables	11 218 301	For one cable with spacer

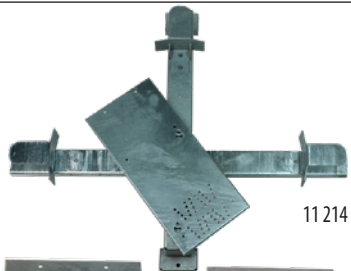
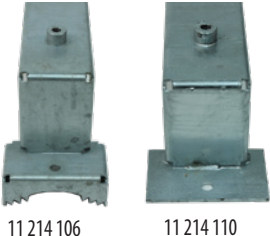




Down lead clamp

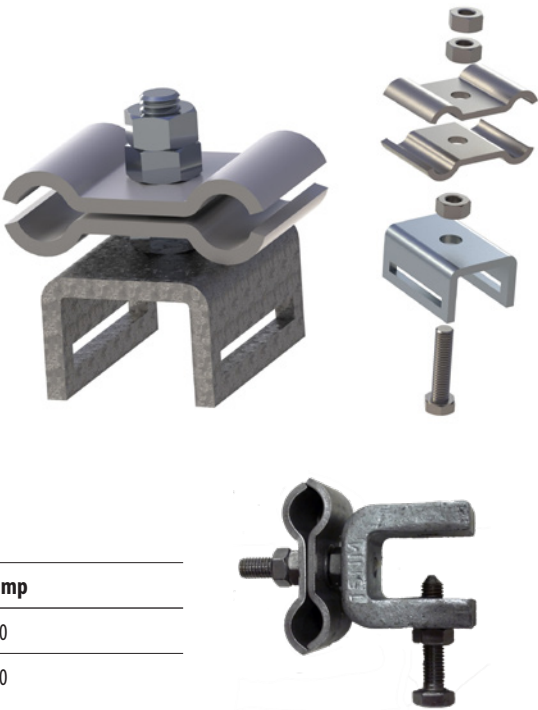
Down lead clamp for mounting of cable/cables downwards on lattice towers. It can also be used to fix pole bracket 800 (11 214 106 or 110), or for mounting plate.

Part No.	Type of down lead clamp	Part No.	Type of down lead clamp
11 218 191	Cable diameter 8.00-10.00	11 218 279	Cable diameter 12.51-15.50
11 218 192	Cable diameter 10.01-12.50	11 218 193	Cable diameter 15.51-19.50



Brackets and mounting

	Part No.	Description		Pack
	11 214 106	Pole bracket 800 OPGW for wooden pole. Including mounting plate (11 214 114). Bulldog bracket for reliable grip on pole.		1
	11 214 107	Pole bracket 800AU OPGW. Wood/concrete/steel pole. Incl mounting plate		1
	11 214 110	Pole bracket 800 OPGW for lattice tower. Incl mounting plate.		1
	11 214 114	Mounting plate, power line Fzb.		1
	11 214 116	Mounting plate Fzb for OPGW 4H		1
	11 214 120	Mounting plate, power line in stainless steel. (same as 11 214 114)		1
	11 216 131	Tube cutter 3-16 mm for steel tubes.		1
	11 216 133	Spare blades for tube cutter.		Pack of 10



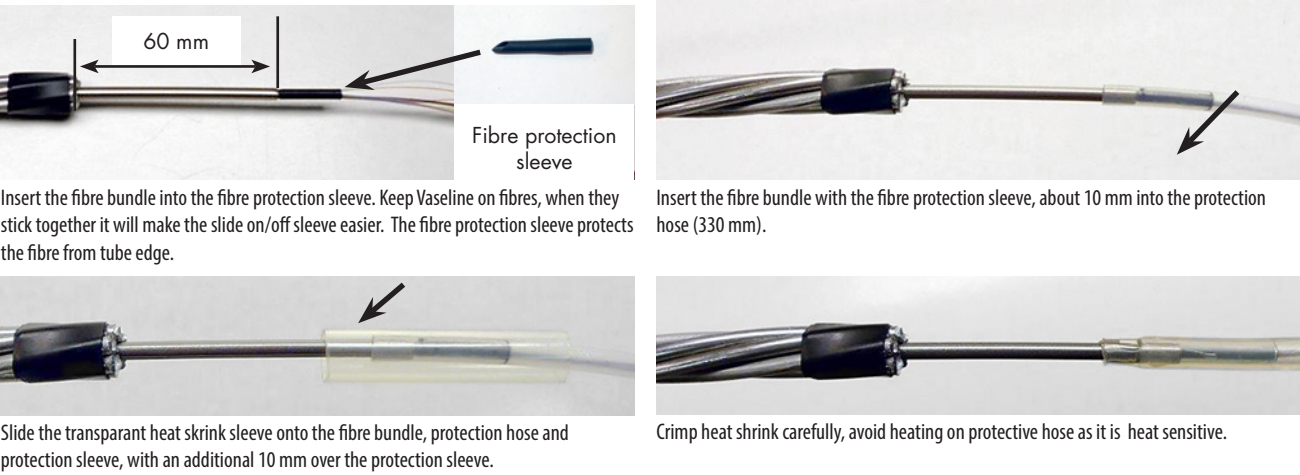
Cable bushings

Part No.	Description	Pack
11 212 134	A kit of cable bushing 1x24 OPGW contains: Heat shrink 16/5-160, 34/8-200, 50/16-200 mm, Mastic 12FB and bushing 1x24.	1
11 212 135	A kit of cable bushing 1x24 OPGW AFL contains: Heat shrink 28/8-160, 34/8-70, 50/16-200 mm, Locktite 5922 (60 ml), glue tape and bushing 1x24.	1
11 212 132	A kit of cable bushing 1x24 FOC contains: Heat shrink 34/8-200 mm and bushing 1x24.	1

The advantage with a screwable cable bushing is the possibility to prepare and mount the cable into the bushing before entering the closure. It makes the whole process of preparation and mounting of bus-

hings much easier. When finished, the bushing fits perfectly into the holes of the closure. A maximum cable diameter of 24 mm and a minimum of 8 mm is applicable for all cables.

FIMT kit, fibre in metal tube (instruction sample)



When cutting the steel tube, make sure it is straight. Use the tube cutter 11 216 131. Never cut the whole way through. Bend and snap off the tube. Normal

thickness of tube is 0.2 mm and use the table below to determine the right sleeve size.

FIMT kits

Part No.	Type of FIMT	Fibre protection sleeve	Crimp	Hose	SS tube thickness 0.2 mm
11 218 700	FIMT Kit S-tub 1.93-2.33	FPS 1.92-2.33	Crimp 6.0-2.0	PEL 2.5x3.8	OD 2.23-2.63 mm
11 218 702	FIMT Kit S-tub 2.4-2.8 mm	FPS 2.4-2.8	Crimp 9/3	PEL 3.0x4.0	OD 2.8-3.2 mm
11 218 704	FIMT Kit S-tub 2.7-3.4 mm	FPS 2.7-3.4	Crimp 9/3	PEL 3.5x5.0	OD 3.1-3.8 mm
11 218 705	FIMT Kit S-tube 3.0-3.3 m	FPS 3.0-3.3	Crimp 9/3	PEL 3.5-5.0	OD 3.4-3.7 mm
11 218 706	FIMT Kit S-tub 3.2-3.9 mm	FPS 3.2-3.9	Crimp 9/3	PEL 4.0-x5.6	OD 3.6-4.3 mm
11 218 708	FIMT Kit S-tub 4.1-5.2 mm	FPS 4.1-5.2	Crimp 9/3	PA 6.0x8.0	OD 4.4-5.6 mm

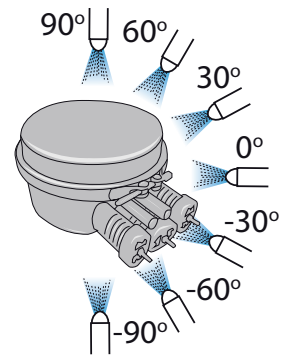
Joint Closure T240 – OPGW



Tightness for overpressure and vacuum

Closures installed in manholes or direct buried can be exposed of flooding and stay under water for months. Tykoflex closure therefor tested and certified for IP68 (2 bar/24 h) IP69 and IP69K.

Closure under test with high pressure water jet, 100 bar, 80°C, 0° to 180° angle.



Australia, OPGW in the field



Tykoflex has delivered closures for LNG projects in Australia. The T240 OPGW is used for connection of wellheads in remote rural areas in North Queensland.

- 193 well heads to be commissioned With Tykoflex joint closures and Mil Spec FRP (Fibre glass yarn) optical fibre cable assemblies utilising COTS ruggedised 12 channel connectors, a solution with the following is achieved:
- A reliable and ruggedised connection
- Fast and easy installation of well head
- Resistant to human, bovine or bird activity

Made to guarantee reliable jointing in very demanding conditions



About Tykoflex in OPGW applications

Tykoflex is the leading Scandinavian manufacturer of fibre optic splice closures. Meeting the requirements from the national Swedish Operator Telia and the global supplier Ericsson, we developed the first closures for copper cables in 1977 and in 1985, we started with closures for fibre optic cables.

In 1990, Ericsson asked us to make a special version for the then new OPGW technology, in cooperation with their OPGW cable manufacturer FOCAS (this company was acquired by AFL in year 2000). This product was first used for SkyWrap applications then also developed to be used with all types of OPGW cables (FIMT for 1, 2 and 4 tubes, slotted core, loose tube, center tube etc.)

Globally, many thousands of Tykoflex OPGW closures are in use, guaranteeing the total protection of the fibre splices.



T240 fulfils international and European standards for outdoor closures.
IEC 61753-111-7
IEC 61753-111-8
IEC 61753-111-9
EN 60529:1991 + A1:2000 + A2:2013
IEC 60529:1989 + A1:1999 + A2:2013
ISO 20653:2013
IP68 (2.0 bar/24 h)/IP69, IP69K



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