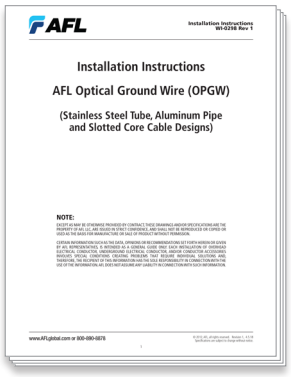
INSTALLING OPGW—QUICK REFERENCE GUIDE

This Quick Reference Guide is intended to provide highlights of OPGW installation instructions needed in the field. AFL provides detailed installation instructions on proper techniques for installing OPGW cable. Please review the document (WI-0298 Rev 1) before proceeding with installation. **To receive the detailed OPGW installation instructions, please email sales@AFLglobal.com.**


AFL

Installation Instructions

AFL Optical Ground Wire (OPGW)

(Stainless Steel Tube, Aluminum Pipe and Slotted Core Cable Designs)

Stringing Setup

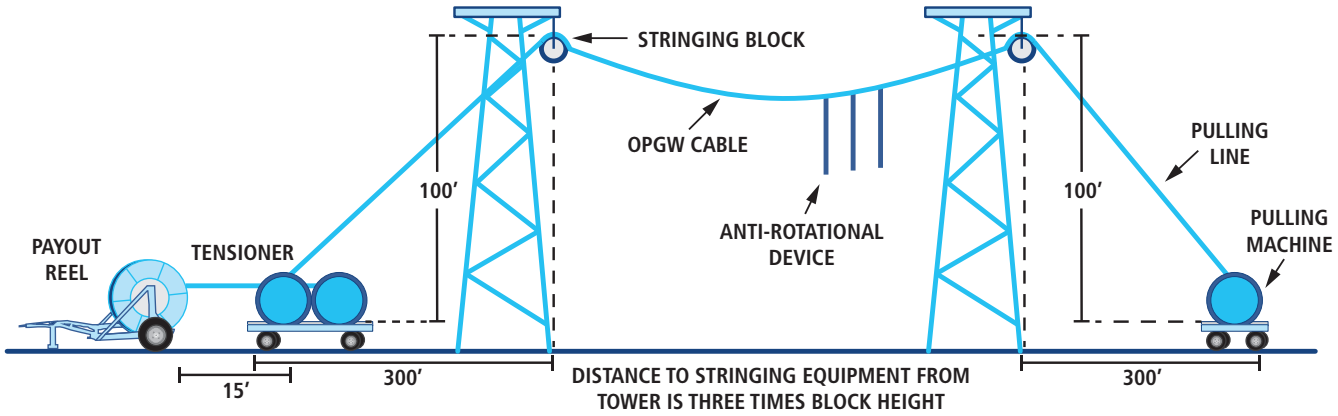


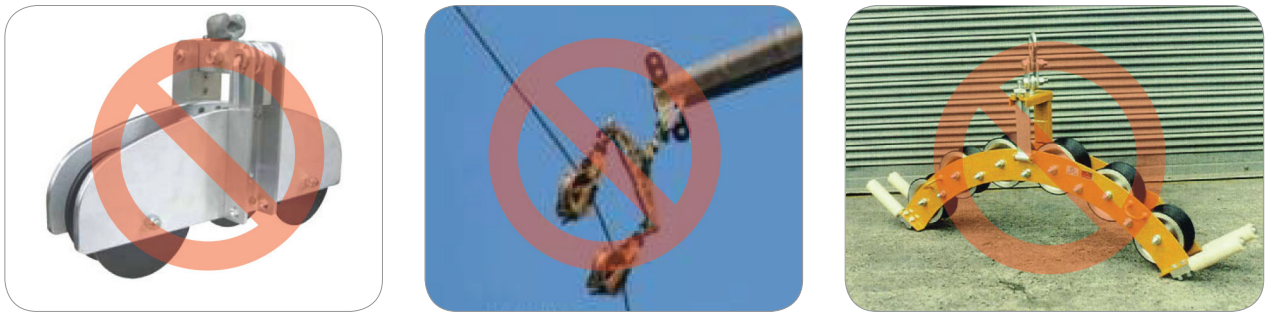
Figure 1—Typical Stringing Setup

Table 1—Recommended Values for Safe OPGW Installation

PARAMETER		VALUE	
Minimum Bull Wheel Diameter		70 x OPGW diameter	
		For larger diameter OPGW cables where 70 x OD exceeds 60" (~1.5 m), a 60" (~1.5 m) bull wheel may be used. Please consult AFL in such cases.	
Stringing Sheave (Root) Diameter		40 x OD of OPGW	
		Based on a sheave through angle of 45° and maximum stringing tension (at tensioner) of 20% of the rated strength of the OPGW.	
		NOTE: Refer to Table 2 for additional information on minimum diameters of the stringing blocks for other conditions.	
Minimum Cable Bending Radius		After Installation (Static):	15 x OD of OPGW
		During Installation (Dynamic):	20 x OD of OPGW
		NOTE: Based on actual OPGW size, etc., care must be taken when bending the OPGW to avoid kinking the strands and damaging the optical fibers contained within the central pipe.	
Maximum Stringing Tension		20% of the Rated Breaking Strength of OPGW	
		The stringing tension is always measured at the tensioner side. In general, the maximum stringing tension should be a half of the maximum sagging tension and never should exceed 20% RBS of the OPGW.	
Pulling Speed		60 meters (195 feet) per minute OR 3.6 km (2.2 miles) per hour	
Minimum Distance from Puller and Tensioner to the Stringing Block		3:1 Ratio	
Temperature Ranges	Storage	-50°C to +85°C (-58°F to +185°F)	
	Installation	-30°C to +85°C (-22°F to +185°F)	
	Operating	-40°C to +85°C (-40°F to +185°F)	

Stringing Setup (cont.)

"Radius Blocks," "Banana Blocks" or "Array Travelers" as shown below in Figures 2A-C are strictly prohibited during the installation of OPGW. The decreased surface area in contact with the OPGW is sufficient to damage the OPGW at typical stringing tensions.



A *B* *C*

Figures 2A-C—These types of array installation blocks should NOT be used to string OPGW.

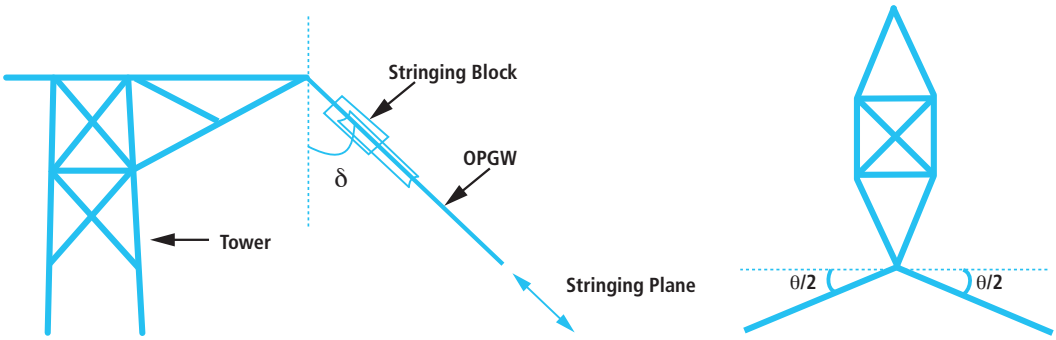


Figure 3—Stringing angles and sheave size diagram

Table 2—Sheave Sizes for Different Stringing Angles

STRINGING OR LINE ANGLE		SHEAVE SIZE (x OPGW OD)
Bull Wheel Diameter		70x
First and Last Structures		40x
Tangent Structures	Θ < 20° Stringing Angle	30x
	20° < Θ < 45° Stringing Angle	40x
	45° < Θ < 60° Stringing Angle	50x
	60° < Θ < 90° Stringing Angle	60x
	90° < Θ Stringing Angle	No Go

* Refer to Appendix 1 in full AFL OPGW Installation Instructions for additional sheave information.

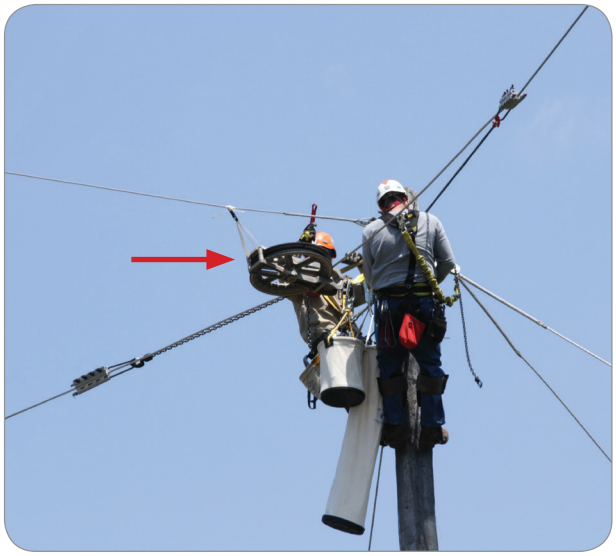


Figure 4—Tying a support rope to the sheave keeps it suspended to the stringing block.

Table 3—Recommended Values for Handling OPGW

PARAMETER	VALUE	
Inspection of Reels	Upon receiving the shipment, the purchaser should conduct an acceptance inspection. A cable acceptance inspection should include several simple and inexpensive steps including but not limited to the following: Visual Inspection for Damage During Shipment, Inspection of Reel Tags, and Optical Attenuation Inspection.	
Handling of Cable Reels	When moving cable reels, care should be taken to ensure that material handling equipment does not come into contact with the cable surface.	
Short-term Storage	For short-term storage, which is defined loosely as four months or less, steel or wood reels are suitable.	
Long-term Storage	When long-term storage is a possibility or anticipated (i.e., spare reels), steel reels should be used.	
Minimum Permanent Bending Radius	OPGW:	15 x OD of OPGW
	Stainless Steel Tube:	45 x OD of stainless steel tube
	Plastic Buffer Tubes:	3 in. (8 cm)
	Optical Fibers:	1.5 in. (3.8 cm)
Swinging Angle of Stringing Block	Shall be controlled corresponding to the swinging angle of the OPGW stringing plane to help prevent the cable from riding out of the traveler or excessive twisting during installation.	
	The cable should travel through the lowest part of the groove.	
	At angle structures, this is done by tying a support rope to the sheave to keep it suspended as shown in Figure 4.	

Reeving Method

The OPGW must be reeved (threaded) through the bull-wheel tensioner properly. Left hand lay OPGW (typical USA) is reeved from right to left, as shown in Figure 5. Right hand lay OPGW (typical International), is reeved from left to right. A thorough explanation of the reeving process can be found in the latest revision of IEEE Std 524. This arrangement is necessary to avoid any tendency to loosen the outer layer of strands and to avoid induced torque during installation.

Figure 5—Left Hand Lay Reeving direction

Dead Ending and Clipping In

In general, the rule for hardware use is the following:

- Single Suspension to be used at structures with line angles between 0 and 30 degrees.
- Double Suspension to be used at structures with line angles between 30 and 60 degrees.
- Double Dead End to be used at structures with line angles over 60 degrees.

Dead ends can be used starting from line angles of 30 degrees in lieu of double suspensions.

In order to diminish the probability of motion-induced damages and creep rate change, AFL recommends that tensioning and anchoring of the OPGW to the structure and removal of the stringing blocks be completed no later than 48 hours after pulling in the cable.

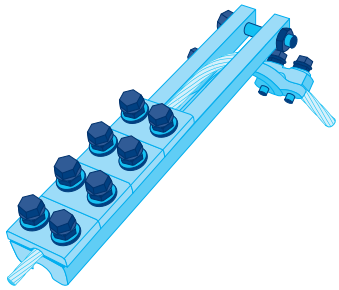


Figure 6—OPGW Dead end (Bolted Type)

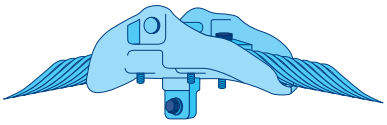


Figure 7—OPGW Suspension Unit

Vibration Dampers

If vibration dampers are required for this span, these should be placed on the OPGW immediately after clipping in. Dampers may not be required at every structure; their locations will be specified by the utility or AFL.

Gripping Devices

A temporary grip is installed on the OPGW for tensioning. The grip must be designed to fit the cable. AFL can provide a come-along, sometimes called a pocketbook grip, that can be attached anywhere along the length of an OPGW. Figure 9 illustrates a satisfactory come-along design. Some types of gripping devices that might induce crushing damage the OPGW such as Chicago grip or Kito grip are strictly prohibited to use for OPGW, as shown in Figures 10A and 10B.

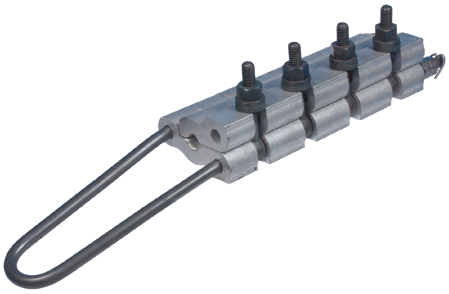
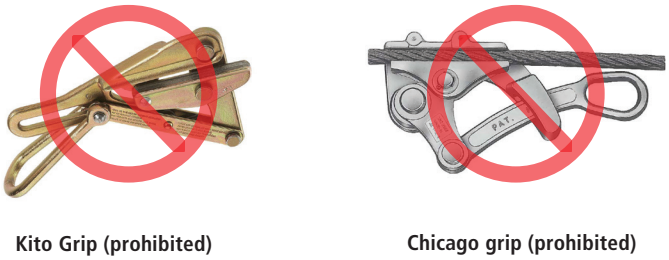
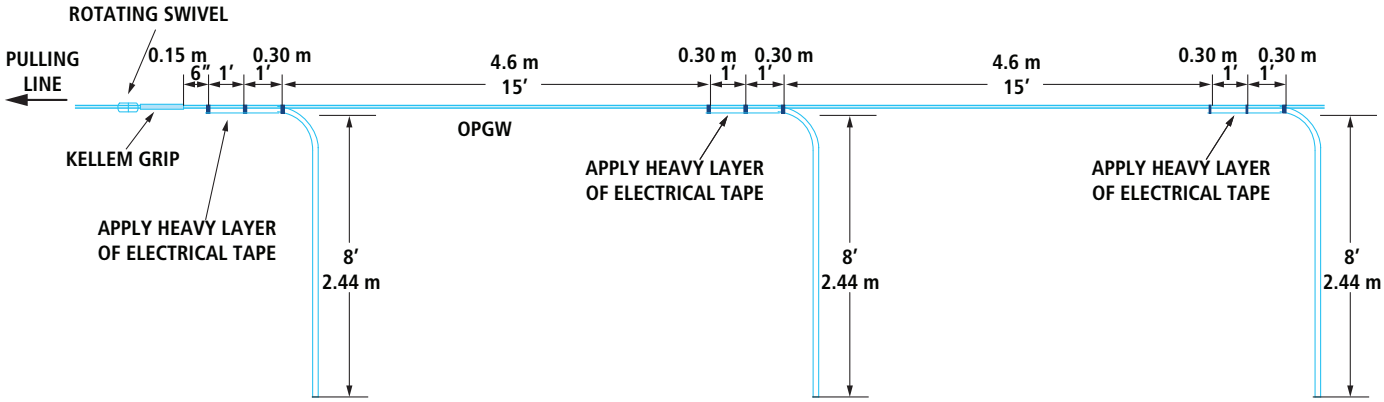


Figure 9—Come-along (Pocketbook Grip)



Figures 10A and 10B—Types of prohibited grips used to tension OPGW.

Anti-Rotational Device (ARD)



The use of an ***Anti-Rotational Device*** depends largely upon the construction of the optical ground wire. Such a device is used to prevent the OPGW from twisting while being pulled. Variations of these devices have been successfully used. Please consult AFL for any inquiries regarding a particular form of anti-rotation device.

For cables with helically stranded stainless steel tubes, an anti-rotational device may or may not be required. To confirm whether one is needed for your particular application, contact AFL. When in doubt, the conservative approach is to conduct the installation with the use of an anti-rotational device. For cables constructed with an un-stranded stainless steel tube in the center of the cable or single layer cables, an **anti-rotational device is always a requirement**.