

FOA Reference Guide For Fiber Optics



Virtual Hands-On Preparing And Stripping Fiber Optic Cable



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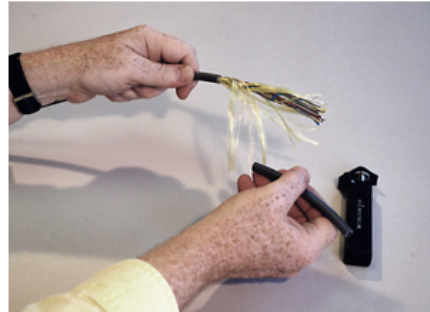
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This FOA virtual hands-on (VHO) tutorial on fiber optics covers fiber optic cable preparation for pulling, splicing and terminating. It is copyrighted by the FOA and may not be distributed without FOA permission.

This VHO covers similar material to the videos on YouTube.

Stripping And Preparing Cable

- Goal: open cable and expose the fibers for splicing or termination without harming them
- Successful splicing or termination relies on first being able to expose the fibers completely and safely



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Stripping And Preparing Cable

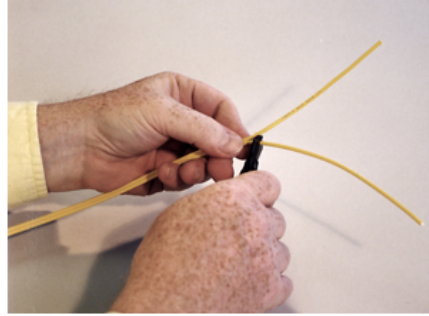
Successful splicing or termination relies on first being able to expose the fibers completely and safely. If the installer cannot do this, splicing or termination is irrelevant.

Goal is to open cable and expose the fibers for splicing or termination without harming them. This involves stripping off the cable jacket, removing strength members and binders, and on OSP loose tube cables, cutting the tubes and removing gel if present.

This process, like termination or splicing, requires knowledge and practice to perform correctly.

Zipcord

- Use wire strippers or fiber jacket strippers
- Don't strip like electric wire - cut almost through jacket, twist the jacket to loosen it and pull off



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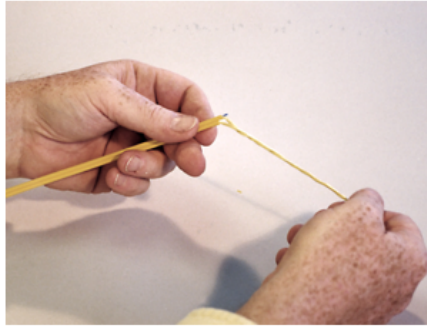
Zipcord

On zipcord or simplex cable, you can use wire strippers or fiber jacket strippers, but you do not strip like electric wire

- cut almost through jacket - not all the way to ensure you do not nick fibers
- twist the jacket to loosen it
- pull off the jacket

Zipcord - Installing Pulling Eye

- All fiber optic cables have strength members which are used to pull the cable with a swivel pulling eye
- Remove jackets, cut fibers at the end of the jacket
- Twist strength members into one bundle



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Zipcord - Installing Pulling Eye

All fiber optic cables have strength members which are used to pull the cable with a swivel pulling eye. The strength members are usually made from aramid fibers like duPont Kevlar.

Remove jackets on the cables, then cut all the fibers off at the end of the jacket - you want to make sure no stress is transferred to the fibers

Twist strength members into one bundle to prepare them for the attachment of the swivel pulling eye.

Zipcord - Installing Pulling Eye

- Slide the pulling eye onto the strength members - about 12 mm (1/2 inch) from the jacket
- Tie a double knot
- This is not adequate - the slick aramid fibers will slip out of the knot!



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Zipcord - Installing Pulling Eye

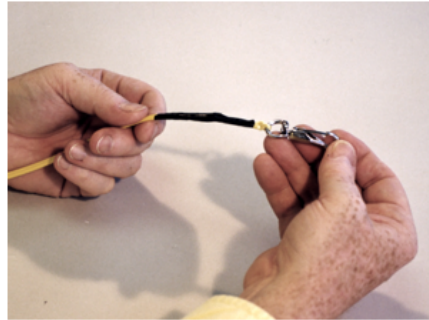
Slide the pulling eye onto the strength members about 12 mm (1/2 inch) from the jacket

and tie it in a double knot.

This knot alone is not adequate - the slick aramid fibers will slip out of the knot!

Zipcord - Installing Pulling Eye

- Pull the strength members back along the cable
- Tape tightly with electrical tape
- This will hold for the maximum pulling tension
- Attach pull rope to swivel



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Zipcord - Installing Pulling Eye

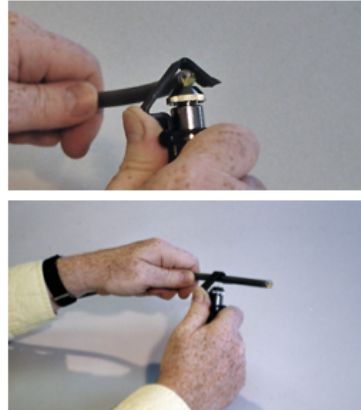
Pull the strength members back along the cable and tape it tightly with electrical tape.

This will hold for the maximum pulling tension.

Attach the pulling rope to the swivel and pull the cable.

Distribution Cable

- Use a cable ringing and slitting tool for jacket cutting
- Set blade to not quite cut through the jacket
- Make several test cuts to check cut depth



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Distribution Cable

Use a cable ringing and slitting tool for jacket cutting on bigger cables.

Set the tool blade to not quite cut through the jacket. Check the depth by comparing it to the cable jacket at the end of the cable.

After setting the blade depth, make several test cuts 3 or 4 inches back from the end to check the jacket cut depth - it should not be cut completely.

Distribution Cable

- Make several rounds of the cable to cut the jacket
- Remember to set the blade to not cut completely through the jacket



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Distribution Cable

Make several rounds of the cable with the tool to cut the jacket.

Remember to set the blade to not cut completely through the jacket to prevent damaging fibers.

Distribution Cable

- Bend the cable slightly to break the jacket
- Pull off the ends
- Use ripcords if jacket is hard to remove



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Distribution Cable

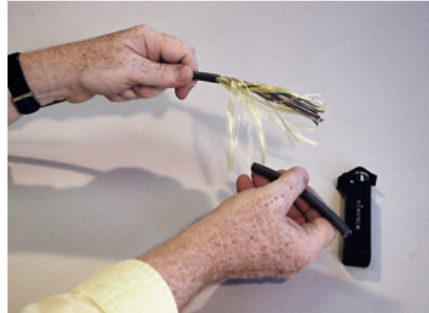
After the cable jacket is cut, bend the cable over your thumb slightly to break the jacket loose all the way around.

Pull off the end of the jacket to expose the fiber.

You will need about 1m (3 feet) of exposed fibers to terminate or splice, so use the cable ripcords if jacket is hard to remove. Details on using ripcords is in the section on armored cable.

Distribution Cable

- Shake the cable to loosen the fibers
- Remove binder tapes
- Gather strength members - bundle if attaching a pulling eye or cut off if terminating



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Distribution Cable

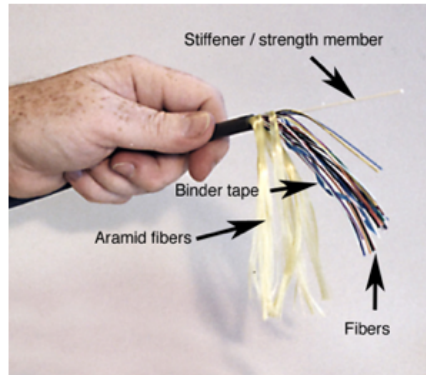
Shake the cable to loosen the fibers from the binder tapes, ripcords and strength members.

Remove binders and any ripcords left.

Gather strength members - bundle them for attaching a pulling eye or cut all of them off with special sharp scissors if terminating the fibers.

Distribution Cable

- Here are all the components of the cable
- Center stiffener and strength member
- Aramid fiber strength members
- Fibers
- Binder tape



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Distribution Cable

Here are all the components of the cable:

Center stiffener and strength member

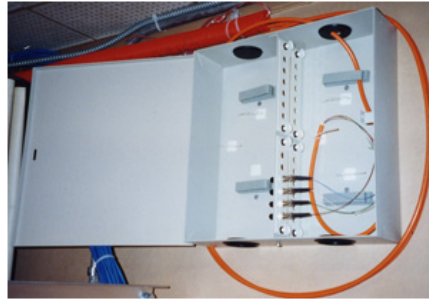
Aramid fiber strength members

Fibers

Binder tape

Distribution Cable

- Depending on the type of enclosure the fibers will be placed in, the exposed fibers must be 0.3-1 m (1-3') long
- Strip all the jacket you need and cut back the strength members to the length needed to secure the cable



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Distribution Cable

Depending on the type of enclosure the fibers will be placed in, the exposed fibers must be 0.3-1 m (1-3') long, perhaps longer for termination.

Strip all the jacket you need and cut back the strength members to the length needed to secure the cable.

Breakout Cable

- Since it's just a bundle of simplex cables inside a common jacket, remove the jacket carefully and treat the individual cables the same as simplex cable



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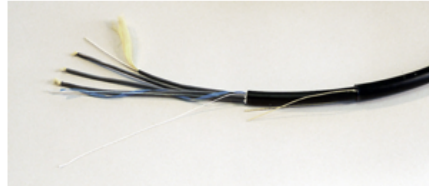
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Breakout Cable

Since breakout cable just a bundle of simplex cables inside a common jacket, remove the jacket carefully and treat the individual cables the same as simplex cable
You may need to remove 2 m (6') of jacket or more for routing and termination.

Breakout Cable

- Here is another variation, double jacketed breakout cable, with a PE jacket for outdoor use
- Again, remove the jacket carefully and treat the individual cables the same as simplex cable



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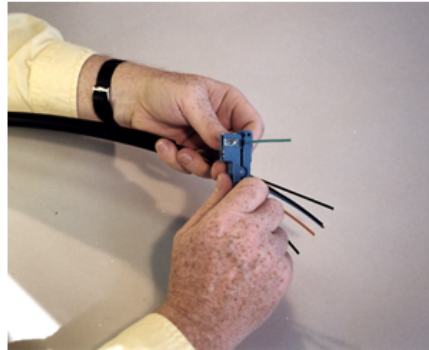
Breakout Cable

Here is another variation, double jacketed breakout cable, with a PE jacket for outdoor use

Again, remove the jacket carefully using the jacket stripper and ripcords and treat the individual cables the same as simplex cable.

Loose Tube

- For loose tube cable, remove the jacket and strength members as required
- Separate the tubes and clean them if necessary
- Use a small coax cable jacket cutter to score the outside of the tube



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Loose Tube

For loose tube cable, remove the jacket and strength members as required, just like with distribution cable. Reserve lengths to attach the cable to splice closures. Usually the central strength member is a hard fiberglass rod that is clamped to the closure just inside the cable entry.

Separate the tubes and clean them if necessary. Some cables are flooded with water-blocking gel that must be removed completely.

Use a small coax cable jacket cutter to score the outside of the tube.

Loose Tube

- Gently bend the tube over your thumb to crack the tube
- If you did not score it enough, do it again



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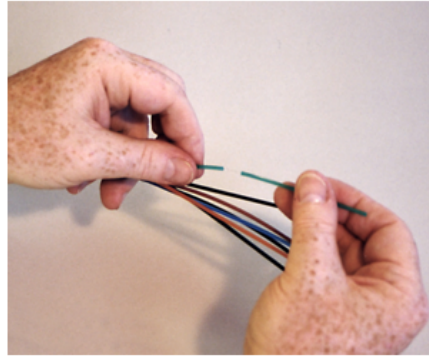
Loose Tube

Gently bend the tube over your thumb to crack the tube

If you did not score it enough, do it again

Loose Tube

- Pull the tube off the fibers gently to expose all the fibers
- Use gel-removing pads to clean the fibers
- You can also use alcohol pads or clean wipes
- Now the fiber is ready to splice



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Loose Tube

Pull the tube off the fibers gently to expose all the fibers

Use gel-removing pads to clean the fibers

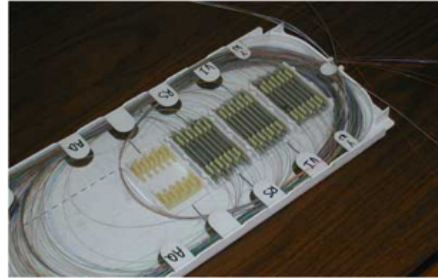
You can also use alcohol pads or clean wipes

You will need about 1 meter of bare fiber and another meter of cleaned buffer tubes for a typical splice closure

Now the fiber is ready to splice

Splice Trays

- Splices are stored in splice trays
- Each tray stores 12 to 24 splices
- Splice trays go into rack or outside plant enclosures



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Fusion splices are stored in splice trays, each tray storing 12 to 24 splices. Multiple splice trays go into rack or outside plant enclosures.

Splice Closures

- Enclosures hold one to dozens of splice trays
- Provide entry for multiple cables
- Seal completely for environment
- Most can be re-entered



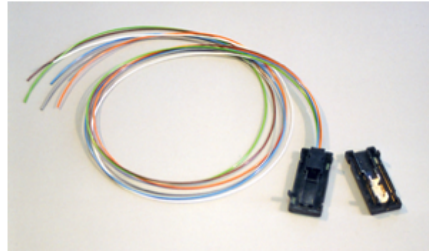
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Enclosures hold one to dozens of splice trays and provide entry for multiple cables. All closures seal completely for environmental protection of the cables and splices but most can be re-entered for testing and troubleshooting or re-splicing.

Breakout Kits For Termination

- For loose tube cables, the 250 micron fibers need protection for termination
- Use a breakout kit
- Each tube has a kit and each fiber has a color-coded tube



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Breakout Kits For Termination

For loose tube cables, the 250 micron fibers need protection for termination

You should use a breakout kit to protect the fibers

Each tube has a kit with an adapter that clamps to it and each fiber has a color-coded tube that the fiber is threaded into

Every fiber needs cleaning completely, drying and powdering before threading through the tube

Armored Loose Tube

- Armored cables are usually a loose tube cable covered with metal armor and a second jacket
- A simple tubing cutter will cut the armor and outside jacket for removal
- Cut to the full cutting depth of the blade near the end of the cable



Armored Loose Tube

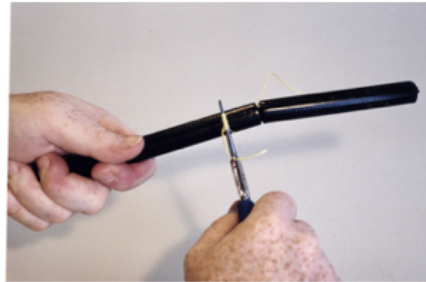
Armored cables are usually a loose tube cable covered with metal armor and a second jacket

A simple tubing cutter will cut the armor and outside jacket for removal

Cut to the full cutting depth of the blade on the tubing cutter - that is usually the correct cutting depth - near the end of the cable - about 10-15 cm or 4-6"

Armored Loose Tube

- Pull off the cut outer jacket if possible
- If not, pull the ripcords out each side and use to split the armor and jacket down the cable
- Roll the ripcords around a pair of needlenose pliers to start cutting the jacket



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Armored Loose Tube

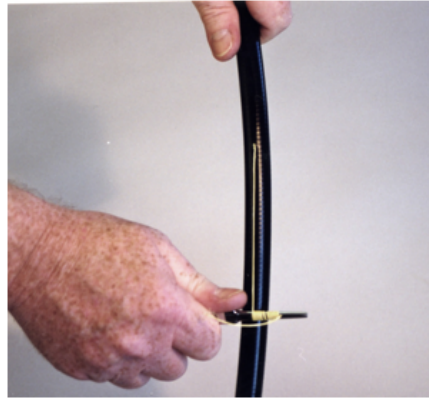
Pull off the cut outer jacket if possible

If not, pull the ripcords out each side and use to split the armor and jacket down the cable

Roll the ripcords around a pair of needlenose pliers to start cutting the jacket

Armored Loose Tube

- When the ripcords are started cutting the jacket, pull back along the cable to slit the jacket and armor
- Slit both sides if necessary
- Do not pull out from the cable - as it is more likely to break the ripcords
- Cut again with the tubing cutter at the point where the jacket must be removed



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Armored Loose Tube

When the ripcords are started cutting the jacket, pull back along the cable to slit the jacket and armor

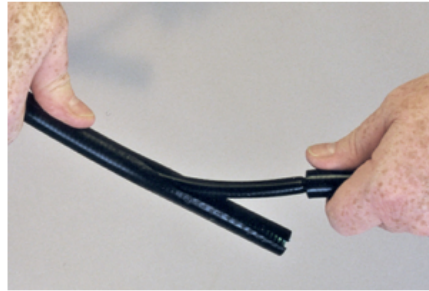
Slit both sides if necessary

Do not pull out from the cable - as it is more likely to break the ripcords

Cut again with the tubing cutter at the point where the jacket must be removed.

Armored Loose Tube

- After splitting the armor and outer jacket, the inner cable can be removed
- Some very rugged cables require splitting the armor on both sides
- After removing the armor, prepare like any loose tube cable



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Armored Loose Tube

After splitting the armor and outer jacket, the inner cable can be removed. Pull it out of the armor making certain that it is not bent too much or kinks

Some very rugged cables require splitting the armor on both sides to remove the inner cable

After removing the armor, prepare like any loose tube cable.

FOA Guide - Virtual Hands-On

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