

SUMITOMO RECOMMENDED PROCEDURE**SRP SP-F04-025****FIBER BUNDLE REMOVAL PROCEDURE**

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1.0 General

1.1 This procedure describes the steps necessary to remove a previously installed FutureFLEX Air-Blown Fiber (ABF) fiber bundle from a FutureFLEX tube span.

1.2 A pressure source (Nitrogen Cylinder, Compressed Air Cylinder, or Air Compressor) must be set up at one end of a tube span. A Blowing Head Equipment Kit and an empty ABF fiber reel must be set up at the other end of the tube span. The Blowing Head and Air Motor are not used to “pull” the fiber bundle from the tube span. Instead, a moving Air Flow of pressure is used to blow the fiber bundle from the designated entry point Fiber Termination Unit (FTU) to the designated exit point FTU. As the fiber bundle exits the tube span, it is manually rewound onto the empty fiber reel.

1.3 If proper care and caution are used, fiber bundles removed by this procedure can be re-used in other ABF applications.

1.4 A minimum of two personnel are required to perform this procedure.

2.0 Safety Precautions

2.1 Pressurized Nitrogen – The use of inert (nonflammable) pressurized nitrogen (N₂) gas presents several safety concerns.

2.1.1 N₂ is a simple asphyxiate. If large amounts of nitrogen are released into a confined area, the nitrogen can displace the amount of oxygen in air necessary to support life. This can result in a loss of balance, dizziness, rapid reduction in the ability to perform movements, reduced consciousness of surroundings, as well as other symptoms that are included in the MSDS (Material Safety Data Sheet) available upon request from the Gas Supplier. It is recommended that pressurized nitrogen only be released into a well-ventilated area.

2.1.2 When using pressurized nitrogen, there are no risks related to fire, reactivity, or other special hazards. Nitrogen is not listed as a carcinogen by NTP, IARC, or OSHA.

2.2 Compressed Air – The use of nonflammable pressurized compressed air (Atmospheric Air), either from a cylinder / bottle or air compressor, presents no safety concerns.

2.2.1 Air is nontoxic and necessary to support life. There are no ventilation concerns.

2.2.2 Compressed Air at high pressures does present an unusual fire and explosive hazard in that it will accelerate the burning of materials to a greater rate than they would burn at normal atmospheric pressure.

2.2.3 When using pressurized air, there are no risks related to fire, reactivity, or other special hazards. Air is not listed as a carcinogen by NTP, IARC, or OSHA. An MSDS (Material Safety Data Sheet) is available upon request from the Gas Supplier.

2.3 Pressurized Gas Cylinders / Bottles – Transporting and handling pressurized gas cylinders presents several safety concerns.

2.3.1 Any pressurized gas cylinder is dangerous if damaged. Gas bottles must be properly capped when being transported and stored. Gas bottles must be secured in a stable bottle dolly or chained to structure when uncapped for use.

2.3.2 A full size 300 cubic foot volume gas bottle weighs approximately 160 lbs. Two personnel should accomplish any manual lifting or moving of a bottle. Exercise care and use proper lifting techniques.

2.4 Blowing Head Equipment Transit Case – Transporting and handling the Blowing Head Equipment Transit Case presents several safety concerns.

2.4.1 The Transit Case weighs approximately 70 lbs. Normal transport is accomplished by pushing / pulling the Transit Case using its retractable handle and built-in wheels.

2.4.2 It is recommended that two personnel accomplish any manual lifting or moving of the Transit Case. Exercise care and use proper lifting techniques.

3.0 Reference Documents

3.1 Sumitomo Recommended Procedure, *FutureFLEX Fiber Bundle Blowing Equipment Set-up Procedure*, SRP SP-F04-001.

4.0 Equipment / Tools Required

The following equipment and tools are required to complete this procedure.

4.1 Nitrogen Cylinder (Installer provided)

- Industrial Grade Nitrogen; preferred pressure source
- Inert (nonflammable) gas
- Dry or with no more than 4 ppm moisture content (H₂O)
- Oil / contaminant free output
- 300 cu. ft. (approx.) volume bottle size recommended
- 2200-to-2500 psi (approx.) pressure charge

4.2 One Blowing Head Equipment Kit (BE200RM, BE200RS, or BE200RY). See Sumitomo Recommended Procedure SRP SP-F04-001 for details.

4.3 Large Adjustable Wrench (Installer provided); at least 10" suggested.

4.4 8mm tubing (any type) for miscellaneous "jumper" connections (Installer provided); 10' - 20' suggested.

4.5 Tube Couplings (DE08MC2) (Installer provided).

4.6 Empty ABF Fiber Bundle reel(s). Obtain empty reels from authorized FutureFLEX Distributors. (BE495PK – reel; clamshell; and carton)

4.7 Soft, clean cotton gloves or similar.

4.8 Cylinder Adapter (BEREGCA) (Installer provided); required if using Compressed Air Cylinders as pressure source.

4.9 Means of communicating across tube span (e.g.: two-way radios or similar).

4.10 Alternate Pressure Source – Although bottled nitrogen is the preferred pressure source because of its cleanliness, general convenience, inexpensive cost, and ease of portability, compressed air from either a Compressed Air Cylinder or an Air Compressor can be used as an alternate pressure source.

4.11 Compressed Air Cylinder (Installer provided)

- "Dry Grade" Compressed Air
- Nonflammable gas (atmospheric air)
- Dry or with no more than 10 ppm moisture content (H₂O)
- Oil / contaminant free
- 300 cu. ft. (approx.) volume bottle size recommended
- 2200-to-2500 psi (approx.) pressure charge

Note: *Different types or "grades" of Compressed Air are available. The "purer" grades with such names as Zero Grade, Vehicle Emission Grade, Scientific Grade, and Accurate Grade undergo additional refining processes so they contain fewer impurities (hydrocarbons) and have less moisture content. It is not necessary to use these "purer" grades of air for blowing operations.*

Note: *Performance-wise, Compressed Air supplied in a Cylinder performs the same as Nitrogen. There are no differences in the blowability of fiber bundle.*

Important Note: *Compressed Air Cylinders are supplied with a Female left-hand thread Bottle fitting (CGA-590). Pressure Regulators BEREG01 or BEREG02 supplied in the Blowing Head Equipment Kit have a Male right-hand thread Nut (CGA-580). A CGA-590 Industrial Air Cylinder-to-CGA-580 Nitrogen Regulator Cylinder Adapter is therefore required to connect the Pressure Regulators to the Bottle fitting. One (1) Cylinder Adapter is required for each Pressure Regulator used. **See Fig. 1.***

4.12 Air Compressor (Installer provided)

- Output dry or with no more than 10 ppm moisture content (H₂O); often requires use of a Secondary Dryer
- Output oil / contaminant free
- Output flow rate (capacity) at least 12 scfm
- Output pressure at least 200 psi

Note: If an Air Compressor is to be used, consider the following potential issues first. Power source / requirements? Physical size of Compressor? Portability? Distance Compressor must be set up from Blowing Head? Fittings necessary to connect Compressor output to a Pressure Regulator? Noise if use indoors?

5.0 Equipment Layout

5.1 See Fig. 2 for Blowing Equipment Layout for Fiber Bundle Removal.

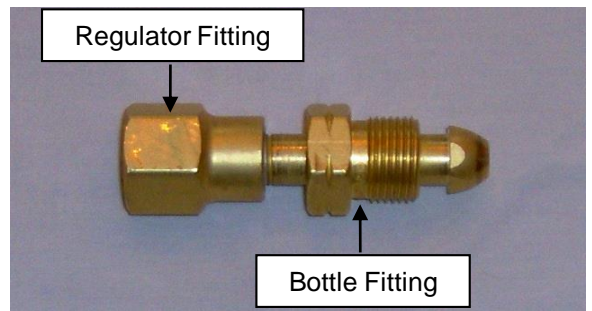


Figure 1
CGA-590 Industrial Air Cylinder-to-CGA-580 Nitrogen Regulator Cylinder Adapter

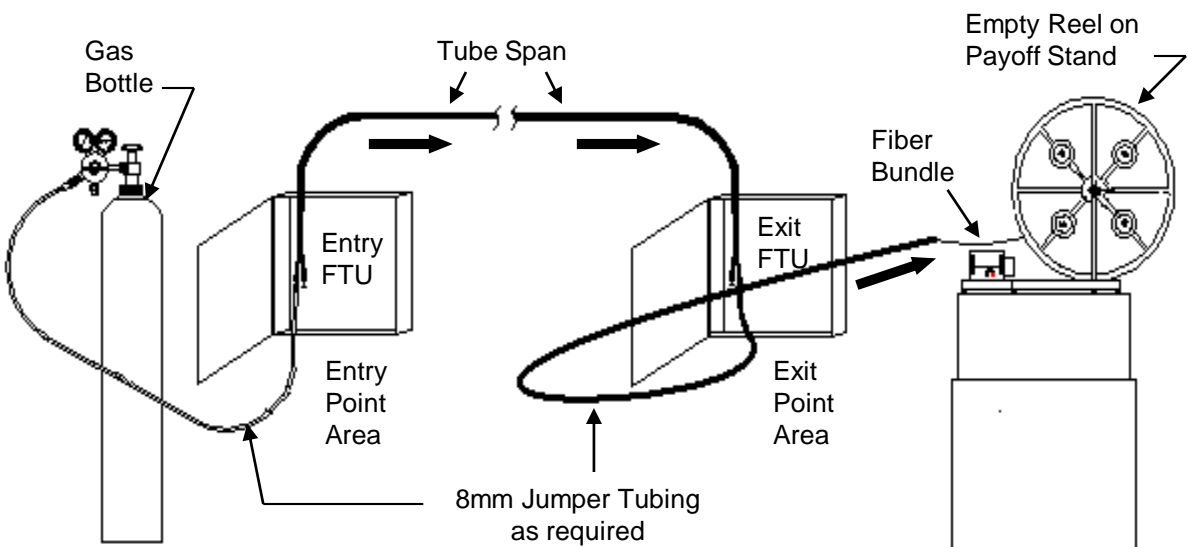


Figure 2
Equipment Layout for Fiber Bundle Removal

6.0 Equipment Set-Up

6.1 Begin removal procedures with both Installers at exit point FTU location.

6.2 Position Blowing Head Equipment Transit Case near exit point FTU.

6.3 Release two (2) latches and open hinged top of Transit Case.

6.4 Remove Inner Case (Payoff Stand and Blowing Head Assembly) by lifting up and setting aside.

6.5 Remove following items from Transit Case:

- Steel Shaft
- Two Reel Payoff Cams (Figure 5)
- Pressure Regulator (Figure 6)
- Male quick-release 8mm Tubing Adapter

Note: The Filter / Regulator Assembly's Payoff Counter can be used to display rewind distance / progress during a fiber bundle removal process if desired. If Payoff Counter will be used, remove Filter / Regulator Assembly from Transit Case at this time.

6.6 Installer #2 transports Nitrogen Bottle, Pressure Regulator, male quick-release 8mm Tubing Adapter, Installer-provided large adjustable wrench, Tube Couplings, and 8mm jumper tubing to entry point FTU location.

6.7 Installer #1 continues Blowing Head Equipment Kit set-up. Close and latch top of Transit Case.

6.8 Set Inner Case (Payoff Stand and Blowing Head Assembly) onto 4 pegs that screw conveniently into the top of Transit Case to create a convenient work area. Blowing Head should be pointed toward exit point FTU.

6.9 Raise Payoff Stand fiber reel support legs to vertical position and insert quick-release pins (provided on Payoff Stand) to lock legs in place. **See Fig. 3.**

Note: If Payoff Counter will be used to monitor rewind distance / progress, mount Filter / Regulator Assembly on desired fiber reel support leg at this time. See Sumitomo Recommended Procedure SRP SP-F04-001.

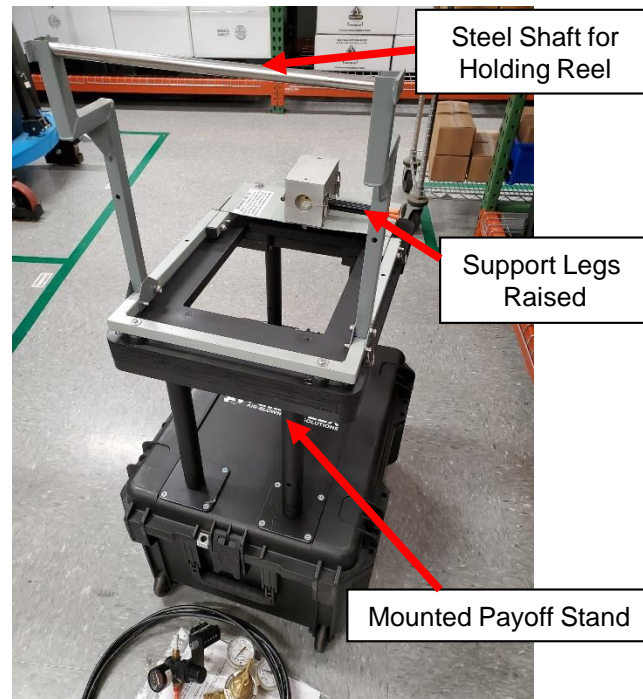


Figure 3

Raise Payoff Stand Support Legs and steel shaft placed for holding reel
Optional: Install Filter / Regulator Assembly with Payoff Counter

Note: Payoff Counter indicates fiber bundle payoff distance in “meters” not “feet.” This measurement is an approximate value and should be used for reference only. To convert the Counter reading to feet, simply multiple displayed number by three (3) and average out.

6.10 Remove protective cover (clamshell) if you have a 490 sized Bobbin from an empty ABF fiber reel. Larger reels do not have clamshell covering. Do not cut, damage, or discard protective cover. Save for re-use during fiber reel storage. **See Fig. 4.**



Figure 4

Opening Fiber Bundle Reel Clamshell on 490 Bobbins.

Do NOT Cut ... Open at Flap

6.11 Install two Reel Payoff Cams into fiber reel bushings and insert Steel Shaft through center of Payoff Cams. **See Fig. 5.**

Note: Cam pieces and shaft will fit all ABF fiber reels types; old small, old large, and new large styles.

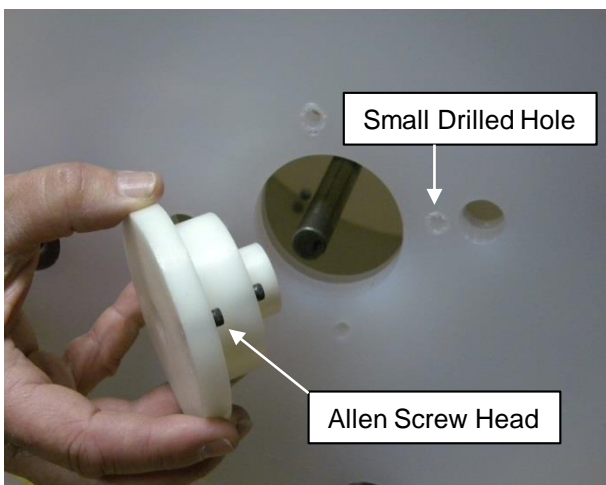


Figure 5

Installing Fiber Bundle Reel Payoff Cams and Reel Shaft

6.12 Lift empty fiber reel and guide Steel Shaft ends into Payoff Stand support legs.

7.0 Pressure Source Set-up

7.1 At entry point FTU, ensure pressurized gas bottle is securely chained in place and remove valve cap.

7.2 Thread Pressure Regulator fitting onto bottle valve housing and tighten with large adjustable wrench.

7.3 Open Bottle Supply Valve and check for leakage around fitting. If leakage is detected, close Bottle Supply Valve and see Sumitomo Recommended Procedure SRP SP-F04-001. Regulator likely needs to be retightened.

7.4 Close Bottle Supply Valve.

7.5 Install male quick-disconnect 8mm Tubing Adapter into female quick-disconnect fitting on Pressure Regulator. **See Fig. 6.**



Figure 6

8mm Tubing Adapter Installed to Pressure Regulator

8.0 Removal Preparations

8.1 Establish communications between Installers located at both ends of tube span.

8.2 Evaluate fiber bundle entry and exit point locations. Ensure they are well ventilated to disperse nitrogen gas released during blowing operations. If necessary, relocate Blowing Equipment to a ventilated area and use jumper tubing to reach exit point FTU. If required, provide auxiliary means of ventilation.

8.3 At both entry and exit point FTUs, locate and identify correct fiber bundle scheduled for removal.

8.4 At both entry and exit point FTUs, cut fiber bundle and remove it and any associated fiber termination hardware. **See Fig. 7.**

Note: It is recommended that the first 10' - 15' of fiber bundle be cut off to eliminate the bundle's worst bends / memory typically found inside FTUs after long term storage.

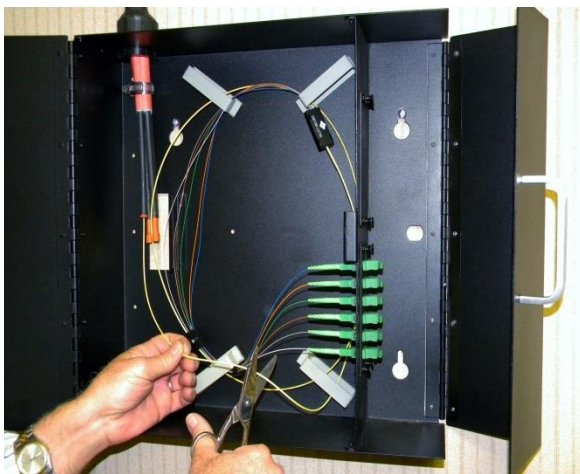


Figure 7
Remove Fiber Termination Hardware
at both FTUs

8.5 At entry point FTU, push-fit an appropriate length of Installer-provided 8mm jumper tubing and a Tube Coupling between Pressure Regulator's 8mm Tubing Adapter and tube containing fiber bundle to be removed. **See Fig. 8.**



Figure 8
Ready Gas Bottle at Entry Point FTU

8.6 At exit point FTU, push-fit a Tube Coupling and an appropriate length of Installer-provided jumper tubing to tube containing fiber bundle to be removed. Position open end of jumper tubing toward empty fiber reel area. **See Fig. 9.**



Figure 9
Ready Tubing and Empty Reel
at Exit Point FTU

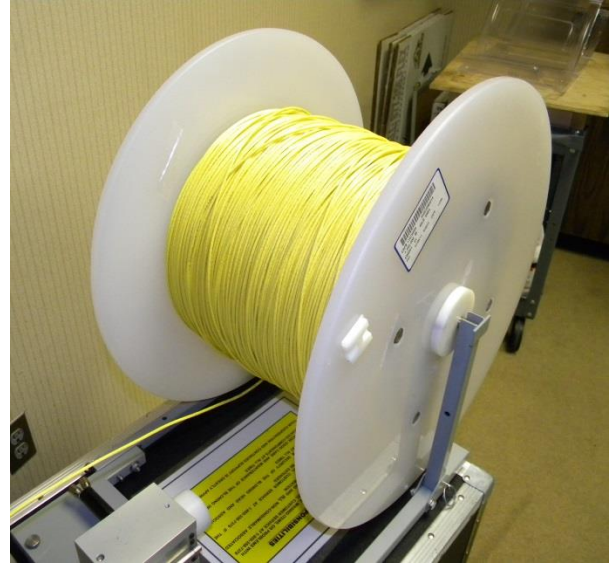


Figure 10
Secure / Tape Fiber Bundle to Reel Drum

9.0 Removal Operations

9.1 At entry point FTU, when directed, open Bottle Supply Valve and adjust Pressure Regulator Valve to supply Air Flow pressure into tube span. Slowly increase pressure until fiber bundle begins to move.

9.2 At exit point FTU, be prepared to receive fiber bundle as it moves out of tube span.

9.3 After about 5' - 10' length of fiber bundle exits tube span, momentarily stop removal operations by closing Bottle Supply Valve at entry point FTU.

9.4 Guide fiber bundle onto reel and secure end of bundle to reel. You are not using the blowing head, only the arms to hold the fiber reel will hold the fiber in the tube for later use. **See Fig. 10.**

9.5 Resume operations by opening Bottle Supply Valve at entry point FTU to re-start Air Flow pressure.

9.6 Wear clean, soft, cotton gloves or similar protection to avoid contaminating fiber bundle jacket.

9.7 Hold moving fiber bundle between thumb and forefinger to control its movement. Do not use excessive force (i.e.: squeeze hard) or fiber bundle may be damaged. Let Air Flow pressure "move" the fiber bundle.

9.8 As fiber bundle exits tube, manually rotate reel to take up bundle. Use a light touch and do not use rotating reel to pull fiber bundle out of tube. **See Fig. 11.**

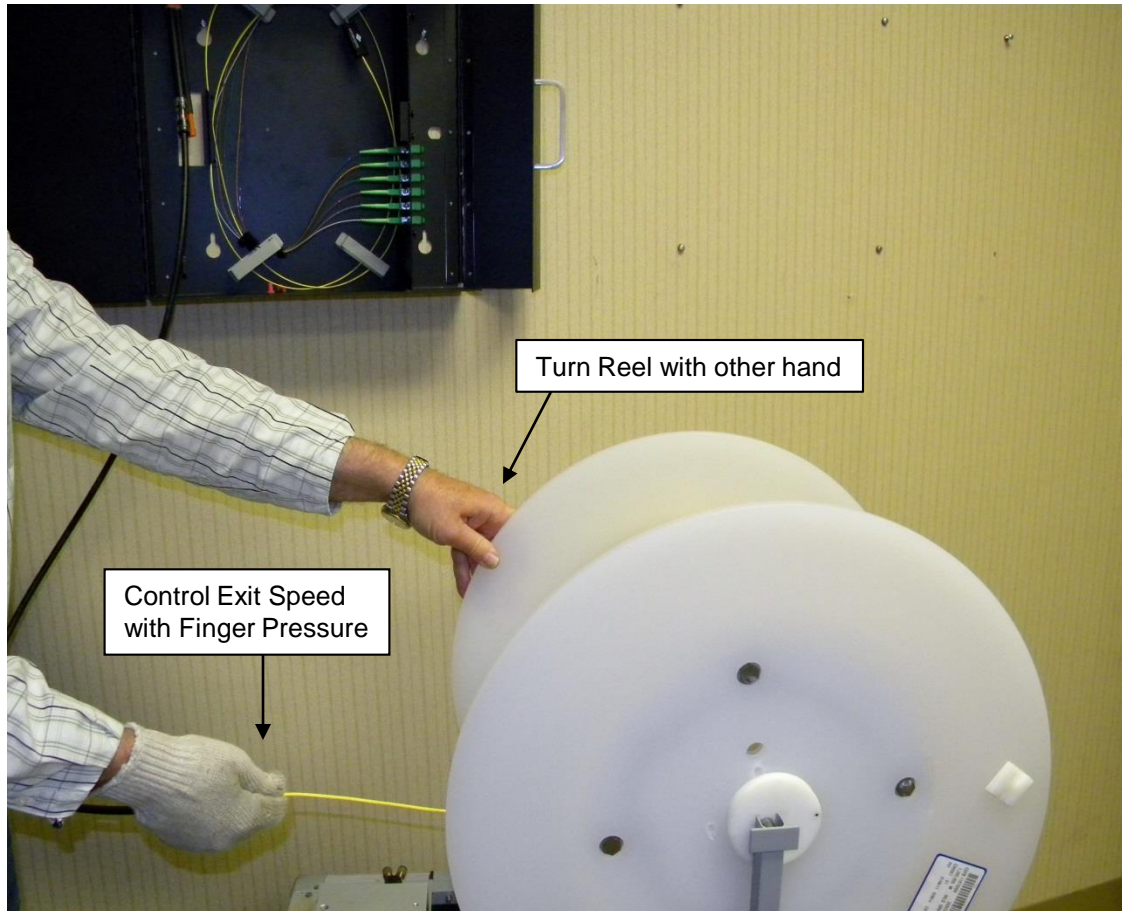


Figure 11

Let Air Flow Pressure Move Fiber Bundle and Neatly Guide Fiber Bundle onto Reel

9.9 Slowly and neatly guide / wind fiber bundle onto reel drum. Exercise care in re-winding operation. If fiber bundle will be reused, it must be rewound so it pays nicely / straight off reel (i.e.: no tangles).

9.10 Be prepared to adjust Air Flow pressure to increase or decrease fiber bundle exit speed. More pressure will be required to move fiber bundle at first. Decrease pressure if fiber bundle is moving well and as it nears end of tube span.

CAUTION: Maximum Safe Working Pressure Rating is 200 psi.

10.0 Completing Removal Operations

10.1 When fiber bundle is completely removed from tube span, close Bottle Supply Valve and allow tube span to de-pressurize.

10.2 Secure outer end of fiber bundle to reel and install reel's protective cover.

10.3 Disconnect, disassemble, and store all Blowing Head Equipment.

10.4 This completes the basic fiber bundle removal process.