

SUMITOMO RECOMMENDED PROCEDURE

SRP SP-F04-028



SEGMENT BLOWING WITH A FIGURE 8 PROCEDURE

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SUMITOMO ELECTRIC LIGHTWAVE CORP.

201 South Rogers Lane, Suite 100, Raleigh, NC 27610
(919) 541-8100 or 1-800-358-7378

www.sumitomoelectriclightwave.com

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1.0 General

1.1 There are three (3) recommended Extended Blowing techniques that can be used to install FutureFLEX Air Blown Fiber (ABF) fiber bundles beyond their standard blowing distances or through difficult tube routes (i.e.: those with numerous tight bends).

- Tandem Blowing
- Mid-Span Blowing with a Figure 8
- Segment Blowing with a Figure 8

1.2 **Table I** provides information on *Standard Blowing Distances Using One (1) Blowing Head*. This data can be very helpful in determining if an Extended Blowing technique will be required or should be considered.

1.3 This Sumitomo Recommended Procedure (SRP) describes the steps necessary to perform the Segment Blowing with a Figure 8 Procedure.

1.4 Overview - A Segment Blowing with a Figure 8 operation requires one (1) Blowing Head Equipment Kit.

1.4.1 The Blowing Head, with fiber reel, is set up at one end of a tube span (Point A).

1.4.2 The Blowing Head is activated to install fiber bundle from Point A to an intermediate point in the tube span (Point B).

1.4.3 When the fiber bundle arrives at Point B and exits the tube, blowing operations continue and the moving fiber bundle is made into a Figure 8 pile.

1.4.4 When enough fiber bundle length has been blown out to cover the distance from Point B to the other end of the tube span (Point C), blowing operations are stopped.

1.4.5 The fiber bundle reel is then removed from the Blowing Head Payoff Stand. Do not cut the fiber bundle off the reel at this time.

1.4.6 The Blowing Head Equipment and Gas Bottle are then disassembled, repacked, and transported from Point A to the Point B location.

1.4.7 After the Blowing Head Equipment and

Gas Bottle are set up at Point B, the Figure 8 pile is turned (flipped) over and the fiber bundle loaded into the Blowing Head.

1.4.8 When ready, the Blowing Head is activated to move the fiber bundle from the Figure 8 pile at Point B to Point C.

1.5 A Segment Blowing with a Figure 8 operation can effectively double the standard fiber bundle blowing distances.

1.5.1 The need to relocate the Blowing Head Equipment and Gas Bottle does increase the time and labor it takes to complete this procedure.

1.5.2 Additionally, more gas is required since it is used to blow the fiber bundle out of the tube span and into the Figure 8 pile.

1.5.3 Because the fiber bundle must be made into a Figure 8 pile, this procedure also requires extensive handling and exposure of the fiber bundle. Special care must be taken to protect the fiber bundle from contamination and damage at all times.

1.6 Segment Blowing with a Figure 8 can be performed with various pressure sources; Nitrogen Cylinder, Compressed Air Cylinder, or Air Compressor.

1.7 A minimum of three (3) personnel are required to perform this procedure:

- Blowing Head Operator (at Point A and then Point B)
- Blowing Head Assistant (at Point B)
- Installer (at Point B and then Point C)

1.8 Before installing a fiber bundle, the tube span must successfully pass the Tube Pressure and Tube Obstruction Tests. See Sumitomo Recommended Procedures SRP SP-F04-003 and SRP SP-F04-004.

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.

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

2.3.1 The Transit Case weighs approximately 65 lbs. Normal transport is accomplished by pushing / pulling the Transit Case using its retractable handle and built-in wheels.

2.3.2 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 Blowing Equipment Set-up Procedure* SRP SP-F04-001.

3.2 Sumitomo Recommended Procedure, *FutureFLEX Fiber Bundle Installation Procedure* SRP SP-F04-002.

3.3 Sumitomo Recommended Procedure, *FutureFLEX Tube Pressure Testing Procedure* SRP SP-F04-003.

3.4 Sumitomo Recommended Procedure, *FutureFLEX Tube Obstruction Testing Procedure* SRP SP-F04-004.

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

Note: Typically, one 300 cu. ft. bottle of nitrogen will be required to install (approx.) 3000' - 4000' of ³ fiber bundle and last about 35-45 minutes. This

“conservative estimate” can vary depending upon tube route orientation, fiber bundle size, tube cable type, and operating practices.

4.1.1 Special Note: The total number of Bottles required to accomplish Segment Blowing with a Figure 8 operation must be considered. Typically, two (2) bottles minimum (maybe more) will be needed at Point A and one (1) bottle (maybe two) at Point B location; total three (3) bottles minimum. Very long or tortuous tube span routes may require more.

4.1.2 Special Note: The use of a Dual Tank Set-up, especially at Point A Blowing Head location, is strongly recommended to support uninterrupted extended blowing operations. Depending on total tube span length, a Dual Tank Set-up may also be beneficial at Point B Blowing Head location. See Sumitomo Recommended Procedures SRP SP-F04-001 and SRP SP-F04-002 for details.

4.2 Pressure Regulator Assembly with 8mm Tubing Adapter (BEREG01 Two-Stage or BEREG02 Single-Stage) (Installer provided and strongly recommended).

4.3 Dual-Tank Isolation Valve Kit (BEISOV1) (Installer provided and strongly recommended).

4.4 One (1) Blowing Head Equipment Kit (BE200RM, BE200RS, or BE200RY). See Sumitomo Recommended Procedure SRP SP-F04-001 for details.

4.5 Tube Couplings (DE08MC2) (Installer provided).

4.6 Tee Couplings (DE08MT) (Installer provided).

4.7 Tube Cap (DE08MA) (Installer provided).

4.8 Fiber Bushings (FT2MFB or FT3MFB) (Installer provided); two required.

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

4.10 Clean tarp, plastic sheet, or similar ground cover; to protect fiber bundle from contamination while in Figure 8 pile (Installer provided).

4.11 Traffic cones or similar; to organize fiber bundle in Figure 8 pile (Installer provided).

4.12 Soft, clean cotton gloves or similar.

4.13 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.

4.14 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 more expensive and “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 nor operation of the Blowing Head.

Note: Typically, one 300 cu. ft. bottle of compressed air will be required to install (approx.) 3000' - 4000' of fiber bundle and last about 35-45 minutes. This “conservative estimate” can vary depending upon tube route orientation, fiber bundle size, tube cable type, and operating practices.

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.**

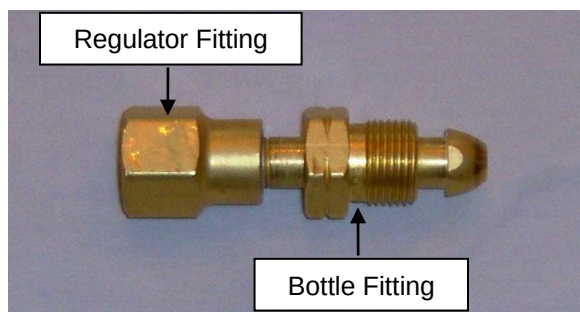


Figure 1

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

4.15 Air Compressor (Installer provided)

- Output dry or with no more than 10 ppm moisture content (H_2O); 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, additional Air and Coalescer Filters and a secondary Desiccant-type Dryer are strongly recommended and must be of compatible output flow and pressure ratings with the Air Compressor. Also 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 and Fig. 3 for a typical Segment Blowing with a Figure 8 Blowing Equipment layout.

6.0 First Blowing Head Equipment Set-Up

Note: The steps below assume a tube span that begins at Point A, runs through Point B, and terminates at Point C. Point A contains the entry point Fiber Termination Unit (FTU). Point B contains a mid-span Tube Distribution Unit (TDU). Point C contains the exit point FTU.

CAUTION: Before installing fiber bundle, verify Tube Pressure and Tube Obstruction Test Procedures (Sumitomo Recommended Procedures SRP SP-F04-003 and SRP SP-F04-004) have been successfully accomplished from Point A to Point C.

6.1 Establish communications between Blowing Head Operator located at Point A and Installer and Assistant stationed at Point B.

6.2 Evaluate fiber bundle entry and exit point locations. Ensure they are well ventilated to disperse nitrogen gas released during installation operations. If necessary, relocate Blowing Equipment to a ventilated area and use jumper tubing to reach entry point FTU and mid-span TDU. If necessary, use jumper tubing at exit point TDU and extend tube span to a ventilated area. If required, provide auxiliary means of ventilation.

6.3 At Points A and B, locate and identify correct tube cable and tube scheduled for fiber bundle installation.

6.4 At Point A, set up Blowing Head and fiber reel in accordance with Sumitomo Recommended Procedure SRP SP-F04-001. **Refer to Fig. 2.**

6.5 At Point B TDU, uncouple tube span and perform the following steps. **See Fig. 4.**

6.5.1 Install jumper tubing between incoming tube from Point A and future Blowing Head area.

6.5.2 **Critical Step.** Verify a Tube Coupling is installed on end of incoming jumper tubing from Point A. This step must be done before blowing operations begin.

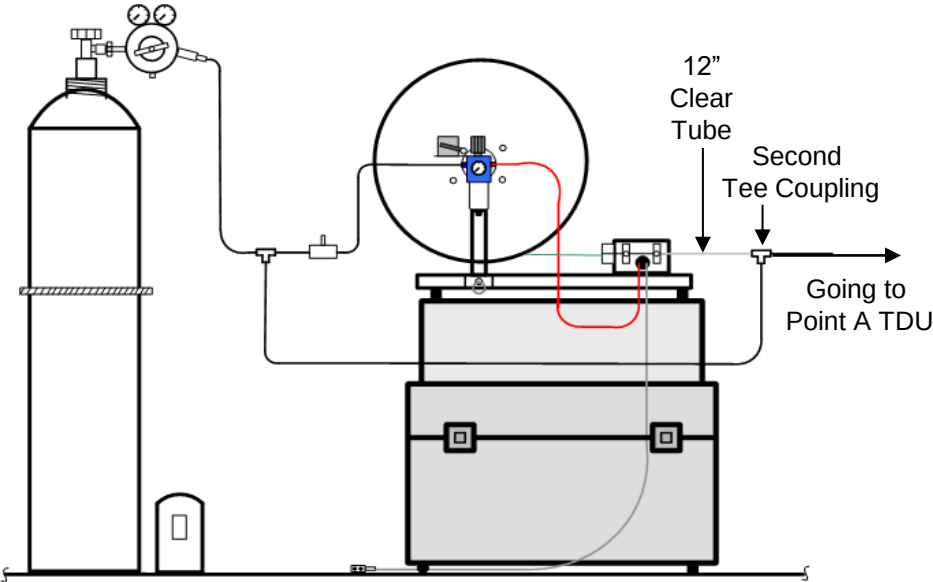


Figure 2
Blowing Equipment Layout at Point A
for First Segment Blow (a Standard Blowing Head Set-up)

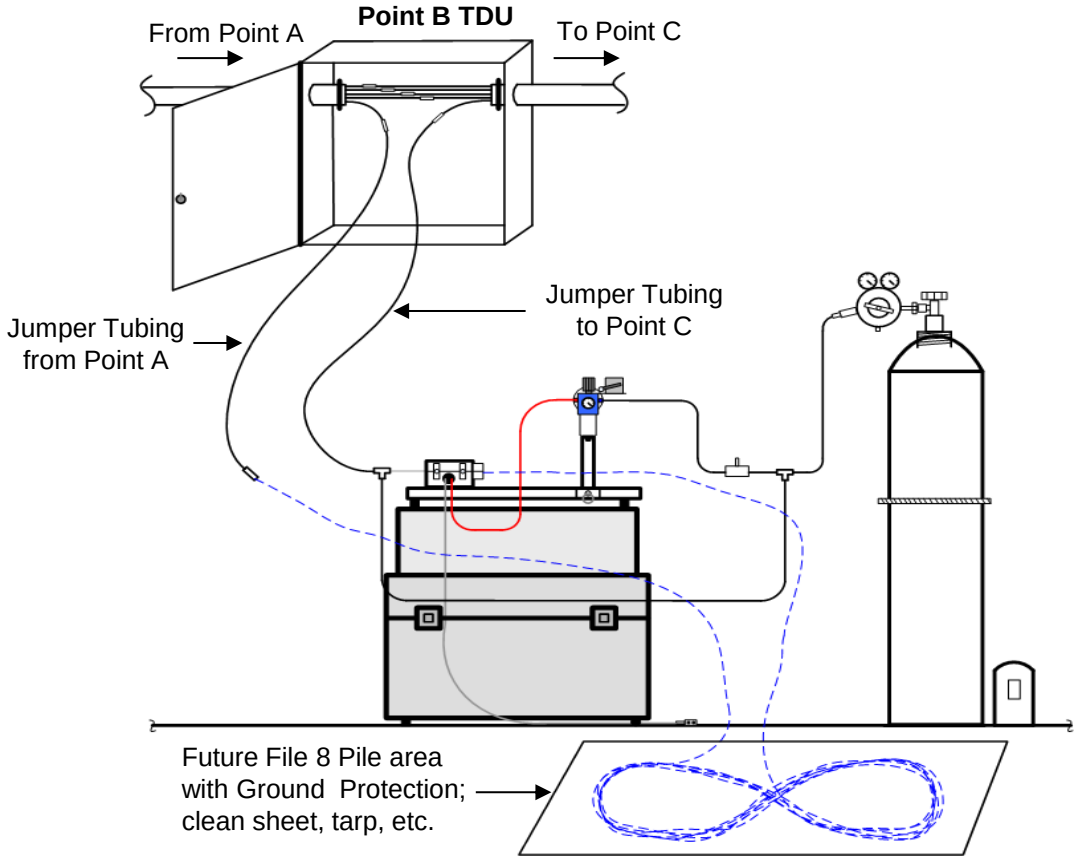


Figure 3
Blowing Equipment Layout at Point B
for Second Segment Blow off Figure 8

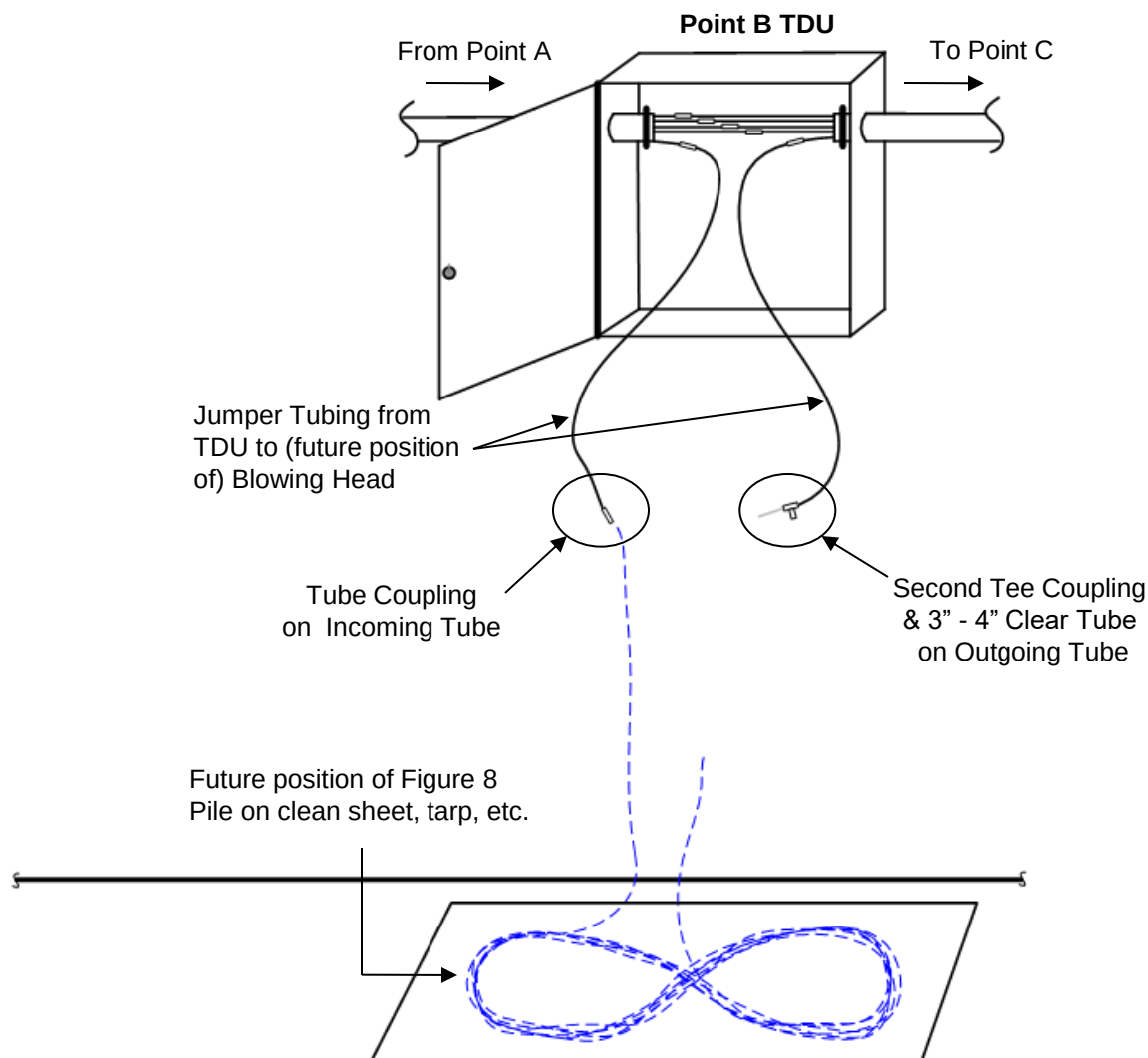


Figure 4

Prepare Point B TDU and Adjacent Area to Receive Fiber Bundle in Figure 8 Pile

6.5.3 Install jumper tubing between (future) Blowing Head area and outgoing tube to Point C.

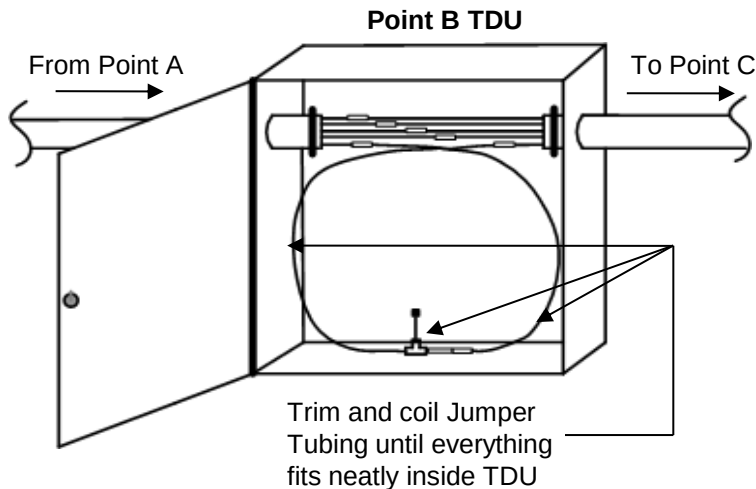
6.5.4 **Key Step.** Test fit and verify all jumper tubing used can be coiled and stored neatly inside TDU interior. This step must be done before blowing operations begin. **See Fig. 5.**

6.5.5 After the Jumper Tubing test fit is done, uncouple tubes and get ready to receive fiber bundle.

6.6 Prepare Point B work area to receive fiber bundle and make Figure 8 pile.

6.6.1 Lay down clean tarp, plastic sheet, or similar ground cover to prevent contaminating fiber bundle jacket.

6.6.2 Set up traffic cones to keep fiber bundle organized in Figure 8 pile.

**Figure 5**

Test Fit all Jumper Tubing inside Point B TDU
before beginning blowing operations

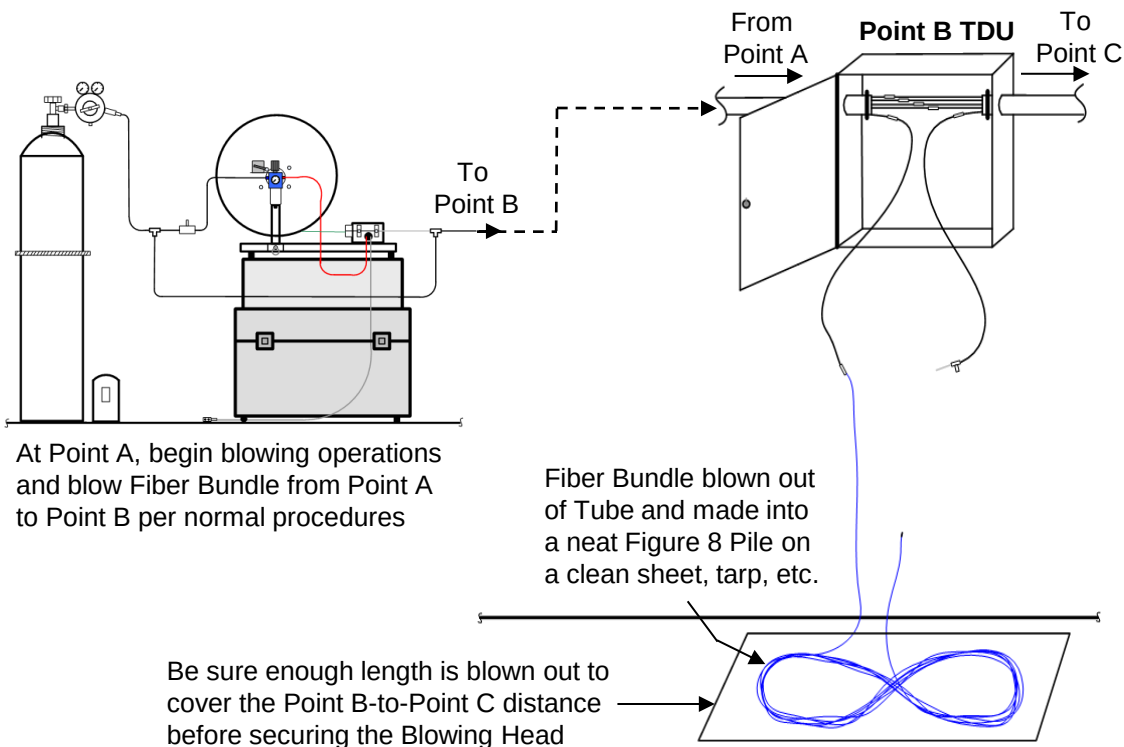
7.0 First Blowing Operation

7.1 Blowing Head Operator opens Bottle Supply Valve, sets initial operating pressures, pressurizes Point A-to-Point B tube segment, and obtains verification that airflow exists at Point B TDU. See Sumitomo Recommended Procedure SRP SP-F04-002.

7.2 When ready, install fiber bundle from Point A to Point B in accordance with Sumitomo Recommended Procedure SRP SP-F04-002.

8.0 Making Figure 8 Pile

8.1 When fiber bundle reaches Point B TDU, Installer informs Blowing Head Operator who continues to install fiber bundle. **See Fig. 6.**

**Figure 6**

First Segment Blow from Point A TDU to Point B TDU and into a Figure 8

CAUTION: Handle exposed fiber bundle with care and wear soft, clean cotton gloves or similar protection to avoid contaminating fiber bundle jacket.

8.2 Installer and Assistant guide moving fiber bundle to protected area and begin making Figure 8 pile.

CAUTION: Blowing Head Operator must be prepared to adjust fiber bundle installation speed as directed by personnel making Figure 8 pile.

8.3 When sufficient fiber bundle length is available in Figure 8 pile to cover the remaining distance from Point B to Point C, Installer informs Blowing Head Operator.

8.4 Blowing Head Operator then closes Motor Rate Control Valve to stop fiber bundle payoff from reel. Close Bottle Supply Valve and wait for tube span to de-pressurize before opening Blowing Head.

8.5 When tube span has de-pressurized, open Blowing Head and carefully remove Fiber Bundle Air Seal from fiber bundle.

Note: Do not cut fiber bundle from reel at this time. In the event the length of fiber bundle in the Figure 8 pile is "short," recovery is still possible.

8.6 **Critical Step.** Carefully remove fiber bundle reel from Blowing Head Payoff Stand. Pay attention to exposed fiber bundle. Set reel aside in protected area. **See Fig. 7.**

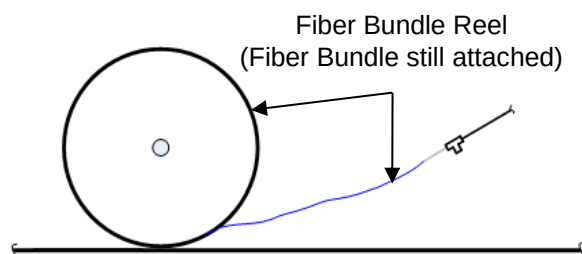


Figure 7

Set Fiber Bundle Reel Aside
(Do Not Cut Fiber Bundle off the Reel Just Yet)

8.7 Disassemble and repack Blowing Head Equipment into Transit Case, secure Gas Bottle, and prepare all equipment (except fiber reel) for transport from Point A to the Point B location.

9.0 Second Blowing Head Equipment Set-up

9.1 At Point B, set up Blowing Head in accordance with Sumitomo Recommended Procedure SRP SP-F04-001 with the following exceptions. **See Fig. 8.**

9.1.1 Do not install fiber reel.

9.1.2 Push-fit a 3" - 4" length of 8mm Clear Tube into one side of Second Tee Coupling.

Note: For this procedure, the Figure 8 pile must be turned over (flipped) to expose front end of fiber bundle and Fiber Bundle Blowing Tip.

CAUTION: Exercise extreme care when turning (flipping) Figure 8 pile to avoid damaging fiber bundle or getting loops tangled.

9.2 **Critical Step.** Carefully turn (flip) Figure 8 pile over to gain access to Fiber Bundle Blowing Tip. **See Fig. 8.**

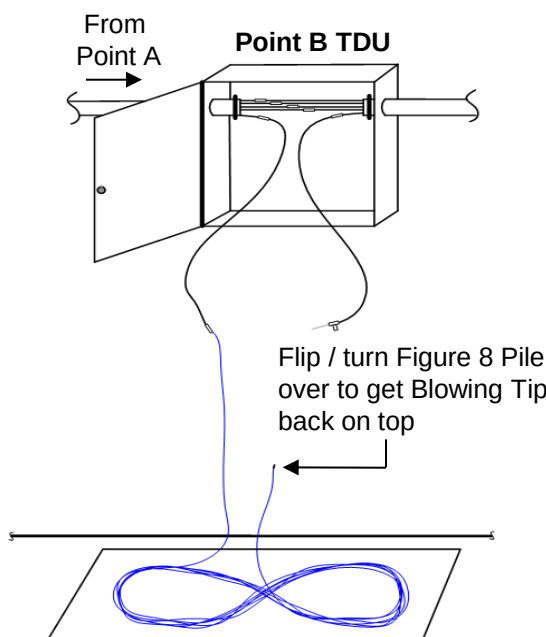


Figure 8

Flip / turn Figure 8 Pile Carefully

9.3 Load fiber bundle into Blowing Head in accordance with Sumitomo Recommended Procedure SRP SP-F04-001.

10.0 Second Blowing Operation

10.1 Installer proceeds to Point C FTU location.

10.2 Establish communications between Blowing Head Operator and Assistant located at Point B and Installer now stationed at Point C.

10.3 At exit point FTU, locate and identify correct tube cable and tube scheduled for fiber bundle installation.

10.4 Evaluate fiber bundle exit point location. Ensure it is well ventilated to disperse nitrogen gas released during installation operations. If necessary, use jumper tubing at exit point FTU and extend tube span to a ventilated area. If required, provide auxiliary means of ventilation.

10.5 Blowing Head Operator opens Bottle Supply Valve, sets initial operating pressures, pressurizes Point B-to-Point C tube segment, and obtains verification that airflow exists at Point C FTU. See Sumitomo Recommended Procedure SRP SP-F04-002.

10.6 When ready, install fiber bundle from Point B to Point C in accordance with Sumitomo Recommended Procedure SRP SP-F04-002. **See Fig. 9.**

10.7 Assistant guides exposed fiber bundle from Figure 8 pile into back of Blowing Head during blowing operations.

CAUTION: Be very careful when taking fiber bundle off Figure 8 pile. The thin bundles can tangle very quickly. Be alert and prepared to stop blowing operations if problems occur.

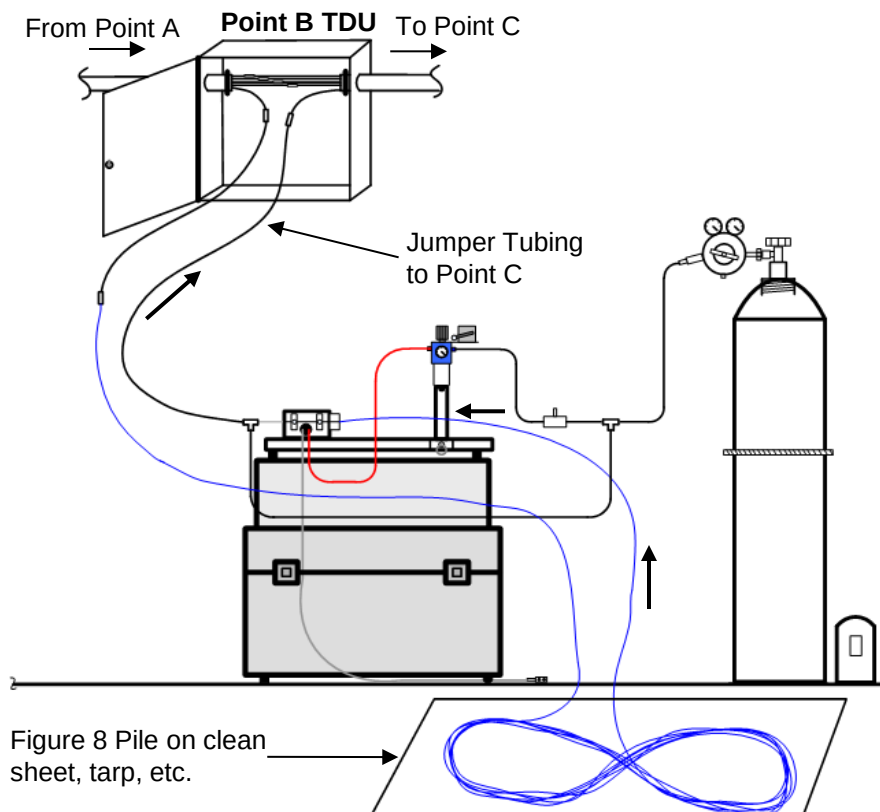


Figure 9
Second Blowing Operation From Point B Figure 8 to Point C

11.0 Completing Blowing Operations

11.1 Installer at Point C FTU informs Blowing Head Operator when fiber bundle reaches exit point.

11.2 Blowing Head Operator must continue to install fiber bundle until Figure 8 pile is depleted. Installer at Point C FTU must coil, organize, and protect fiber bundle from damage until the Figure 8 pile is depleted.

11.3 A 10' - 15' exposed length of fiber bundle is recommended for fiber termination purposes; more or less if required / desired. Installer at Point C FTU informs Blowing Head Operator when enough fiber bundle length is available at Point C FTU.

11.4 When Figure 8 pile is depleted, Blowing Head Operator adjusts Motor Rate Control Valve to slow fiber bundle movement while decreasing exposed length. Assistant continues to help guide fiber bundle and jumper tubing toward back of Blowing Head.

11.5 **Key Step.** Blowing Head Operator closes Motor Rate Control Valve and stops fiber bundle movement when Tube Coupling is about 1 foot behind back of Blowing Head. **See Fig. 10A.**

11.6 Do not close Bottle Supply Valve. Maintain Air Flow pressure in Point B-to-Point C tube segment. Work quickly to complete next step.

11.7 Release rear latch on Blowing Head, remove Fiber Guides, and re-engage rear latch.

CAUTION: During next step, go slowly to avoid damaging fiber bundle.

11.8 Blowing Head Operator slowly opens Motor Rate Control Valve and moves fiber bundle and Tube Coupling into back of Blowing Head. **See Fig. 10B.**

11.8.1 Blowing Head Operator and Assistant must work together to avoid damaging fiber bundle during this step.

11.8.2 **Critical Step.** Try to draw Tube Coupling into back of Blowing Head as far as possible but do not "jam" tubing and fiber bundle.

11.9 Blowing Head Operator closes Motor Rate Control Valve and stops fiber bundle movement when Tube Coupling is drawn into back of Blowing Head.

11.10 Close Bottle Supply Valve. Work quickly to complete next step.

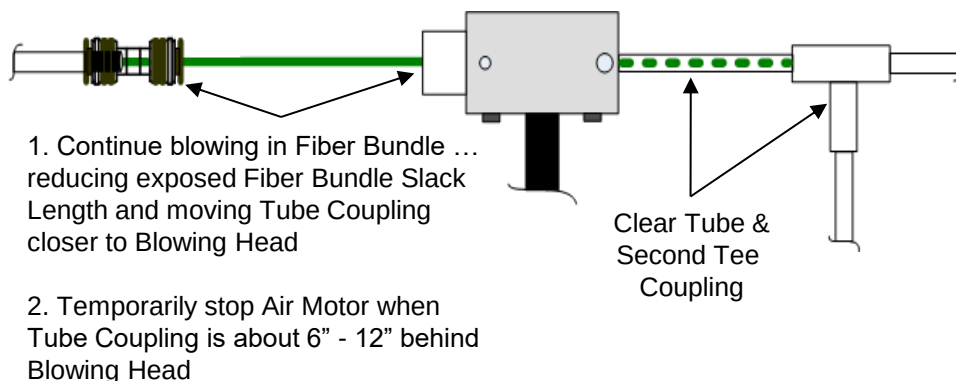
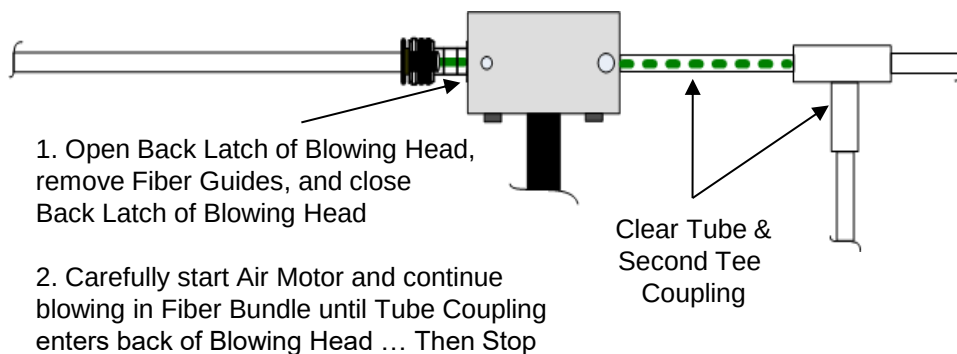


Figure 10A

Bring Jumper Tubing up to About 1-Foot Behind Back of Blowing Head

**Figure 10B**

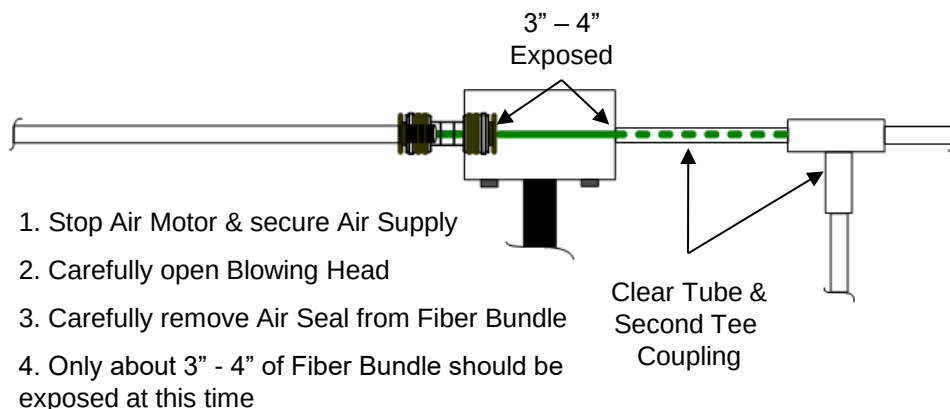
Remove Fiber Guides and Draw Tube Coupling into Back of Blowing Head

11.11 Do not wait for Point B-to-Point C tube segment to fully de-pressurize. Be aware that residual Air Flow pressure still exists in tube segment. Carefully open Blowing Head #2 as soon as possible. Work quickly to complete next step.

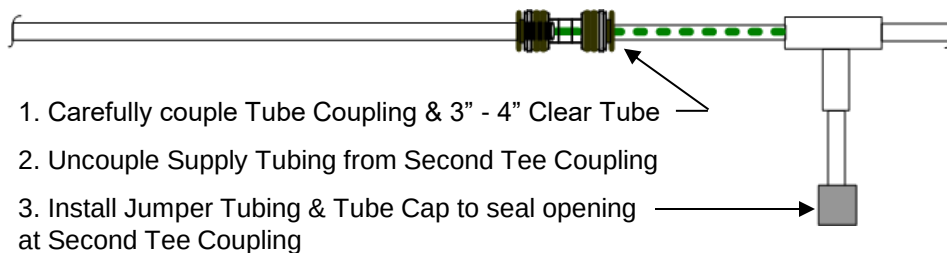
11.12 Carefully remove Fiber Bundle Air Seal

from fiber bundle. Approximately 3" - 4" of fiber bundle will be exposed. **See Fig. 10C.**

11.13 **Key Step.** Carefully bring Tube Coupling and 3" - 4" length of 8mm Clear Tube together and couple. Any fiber bundle slack may wave or snake inside 8mm Clear Tube as connection is made. **See Fig. 10D.**

**Figure 10C**

Open Blowing Head and Remove Air Seal

**Figure 10D**

Carefully Couple Tube Coupling and Clear Tube

12.0 Completing Installation – At Point B TDU

12.1 At Point B TDU, allow Point B-to-Point C tube segment to de-pressurize / vent.

12.2 Carefully uncouple Supply Tubing from Branch Leg of Second Tee Coupling.

12.3 Push-fit a short length of tubing into Branch Leg of Second Tee Coupling. Push-fit a Tube Cap onto end of short tubing to seal Second Tee Coupling. **Refer to Fig. 10D.**

12.4 Carefully coil all jumper tubing and store inside Point B TDU. **See Fig. 11.**

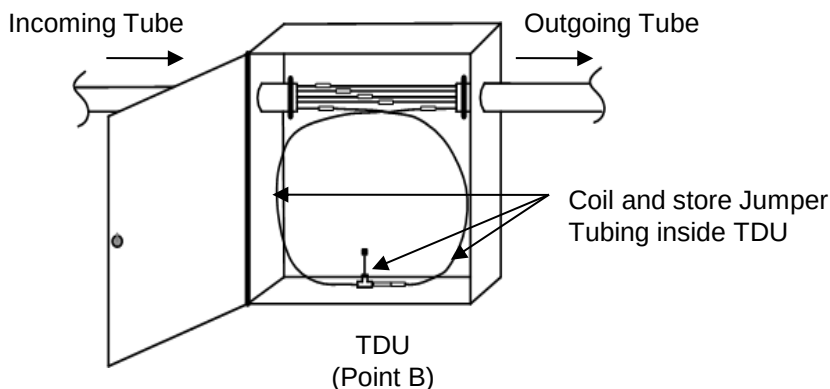


Figure 11
Store Jumper Tubing inside TDU

13.0 Completing Installation – At Point C FTU

13.1 At Point C FTU, coil and organize fiber bundle. Protect from damage by storing inside FTU. Remove and retain reusable Fiber Bundle Blowing Tip.

Note: *It is recommended to leave Blowing Tip installed on fiber bundle and simply cut off first 2" - 3" of fiber bundle. This technique will help prevent the small Blowing Tip from being lost.*

13.2 Carefully install a Fiber Bushing around fiber bundle and seat it in open end of tube to seal opening.

13.3 Installer returns to Point A location.

14.0 Completing Installation – At Point A FTU

14.1 Manually pay off 10' - 15' of fiber bundle from reel for fiber termination purposes; more if required / desired. When enough length is available, cut fiber bundle from reel.

14.2 Carefully uncouple Supply Tubing from Branch Leg of Second Tee Coupling.

14.3 Carefully uncouple Second Tee Coupling and 8mm Clear Tube from tube span.

14.4 Carefully slide Second Tee Coupling and 8mm Clear Tube off cut end of fiber bundle and retain.

14.5 Coil and organize fiber bundle and protect it from accidental damage by storing inside FTU.

14.6 Carefully install a Fiber Bushing around fiber bundle and seat it in open end of tube to seal opening.

14.7 Secure loose end of fiber bundle to reel. Remove fiber bundle reel from Payoff Stand and install reel's protective cover (Clamshell).

14.8 This completes the Segment Blowing with a Figure 8 Blowing Procedure.

TABLE I**STANDARD FIBER BUNDLE BLOWING DISTANCES**

(APPROXIMATE DISTANCES LISTED ARE BASED ON USING ONE (1) BLOWING HEAD)

➤ **Non-Ribbonized Fiber Bundles** - (PEF *Polyethylene Extruded Foam* Jacket)

6 and 12 FIBER BUNDLES (2mm O.D.)	APPROXIMATE BLOWING DISTANCE
All OSP Tube Cables	1500 meters or 5000 feet
All MTIO Tube Cables	1500 meters or 5000 feet
TRC (Riser) Tube Cables	1000 meters or 3300 feet
TGX (General Purpose) Single Tube and TP2 (Plenum) Tube Cables	600 meters or 1950 feet 600 meters or 1950 feet

➤ **Non-Ribbonized Fiber Bundles** - (PEF *Polyethylene Extruded Foam* Jacket)

24-FIBER BUNDLES (3mm O.D.)	APPROXIMATE BLOWING DISTANCE
All OSP Tube Cables	1800 meters or 6000 feet
All MTIO Tube Cables	1800 meters or 6000 feet
TRC (Riser) Tube Cables	1000 meters or 3300 feet
TGX (General Purpose) Single Tube and * TP2 (Plenum) Tube Cables	300 meters or 1000 feet 300 meters or 1000 feet

* **Note:** (24f Bundles in Tube Cables with Seven (7) or Greater Tube Count Only)➤ **Non-Ribbonized Fiber Bundles** - (PEF *Polyethylene Extruded Foam* Jacket)

48-FIBER BUNDLES (3.7mm O.D.)	APPROXIMATE BLOWING DISTANCE
All OSP Tube Cables	1500 meters or 5000 feet
All MTIO Tube Cables	1500 meters or 5000 feet
TRC (Riser) Tube Cables	1000 meters or 3300 feet
TGX (General Purpose) Single Tube and * TP2 (Plenum) Tube Cables	228 meters or 750 feet 228 meters or 750 feet

* **Note:** (48f Bundles in Tube Cables with Seven (7) or Greater Tube Count Only)

Internal Reference Only (Source Document Master File)

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TABLE I (Cont)**STANDARD FIBER BUNDLE BLOWING DISTANCES** (Cont.)

(APPROXIMATE DISTANCES LISTED ARE BASED ON USING ONE (1) BLOWING HEAD)

➤ **Ribbonized Fiber Bundles** - (PVDF *Polyvinylidene Fluoride* Jacket)

48 & 72PVS - FIBER BUNDLES (3.1 & 3.7mm O.D.)	APPROXIMATE BLOWING DISTANCE
OSP Tube Cables (without lubricant)	700 meters or 2300 feet
OSP Tube Cables (with lubricant)	1220 meters or 4000 feet
TRC (Riser) Tube Cables	800 meters or 2600 feet
TGX (General Purpose) Single Tube and * TP2 (Plenum) Tube Cables	228 meters or 750 feet 228 meters or 750 feet

* **Note:** (48f & 72f Bundles in Tube Cables with Seven (7) or Greater Tube Count Only)➤ **Ribbonized Fiber Bundles** - (PVDF *Polyvinylidene Fluoride* Jacket)

72PV3 and 72PV4 - FIBER BUNDLES (4.1 mm O.D.)	APPROXIMATE BLOWING DISTANCE
OSP Tube Cables (without lubricant)	650 meters or 2100 feet
OSP Tube Cables (with lubricant)	1200 meters or 3900 feet
TRC (Riser) Tube Cables	750 meters or 2450 feet
TGX (General Purpose) Single Tube and * TP2 (Plenum) Tube Cables	200 meters or 650 feet 200 meters or 650 feet

* **Note:** (72f Bundles in Tube Cables with Seven (7) or Greater Tube Count Only)

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- All distances given are approximate values
- Several factors heavily influence actual blowing distances:
 - The location, number, and severity of bends in a tube cable run
 - The fiber bundle size installed (2mm OD or 3mm OD)
 - The tube cable type or types being blown through
- Since 24-fiber Bundles contain four (4) nylon Sub Units and a Central Member, they are stiffer than and not as flexible as 12- and 18-Fiber Bundles. Consequently, 24-fiber bundle blowing distances may be slightly less than the approximate distances noted above if installed in tube cable routes with numerous tight bends.