ABF INSTALLATION DO's and DON'Ts

The following *Do's and Don'ts* address key points to keep in mind during any ABF Installation.

Subjects covered include proper tube cable and fiber bundle reel handling techniques, tube cable installation procedures, tube routing inside TDUs and FTUs, compressed gas safety reminders, tube testing events, Blowing Head set-up, basic blowing operations, and fiber bundle termination procedures.

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TUBE CABLE REEL HANDLING

DO's	DON'Ts
ALWAYS inspect tube cable reels upon receipt or when removed from storage	DO NOT accept tube cable reels with obvious physical damage or if received in a horizontal position
ALWAYS store and transport tube cable reels in vertical position	NEVER store and transport tube cable reels in horizontal position; can result in damage to lower coil tubes
ALWAYS ensure all open tube cable ends are sealed to prevent contamination from entering tubes during storage and transport	DO NOT store indoor rated tube cable reels outdoors unless they are well covered and protected from the sun's UV rays
If tube cable will be installed during cold weather, try to store tube cable reel indoors overnight to let tube cable warm up; it will be easier to install	DO NOT roll tube cable reels for long distances

FIBER BUNDLE REEL HANDLING

DO's	DON'Ts
ALWAYS inspect fiber bundle reels upon receipt	DO NOT accept fiber bundle reels with obvious physical damage
ALWAYS store and transport fiber bundle reels in their FutureFLEX shipping box with plastic protective cover (clamshell) installed on reel	NEVER store fiber bundle reels outdoors
ALWAYS remove, copy, and save Inspection Certificate & Test Report from each fiber bundle reel	DO NOT cut, damage, or lose plastic protective cover (clamshell); it is reusable and designed to protect the fiber bundle

SPECIAL TCXXTP2 PLENUM TUBE CABLE INSTALLATION TECHNIQUES (Ref: SRP SP-F04-029)

DO's	DON'Ts
DO review and follow the special installation techniques associated with the TP2 Plenum-rated Tube Cables; see SRP SP-F04-029	DON'T forget to review and follow the special installation techniques associated with the TP2 Plenum-rated Tube Cables; see SRP SP-F04-029

DURING TUBE CABLE INSTALLATION
(Ref: SRP SP-F04-008)

DO's

ALWAYS ensure all open tube cable ends are properly and positively sealed; zero contamination inside tubes

Use a break away type swivel head pulling grip to avoid spiraling and over-tensioning the tube cable

ALWAYS pay tube cables off top of reel

Use standard pulling lubricants to ease tube cable pulls through conduit

ALWAYS maintain a 20X tube cable OD Minimum Bend Radius (or better) during installation (under tension) to avoid damaging tubes

ALWAYS maintain a Minimum 9-inch Bend Radius (or better) on single tubes during and after installation

ALWAYS install sufficient General Slack Footage in every tube cable run

ALWAYS install sufficient Thermal Slack Footage if tube cable will be subjected to Thermal Expansion & Contraction conditions; see Thermal Formulas in SRP SP-F04-008

Install an extra 3-feet of tube cable length at every TDU entry point; to provide sufficient material for tube cable splicing / coupling purposes

ALWAYS mate Low # End of one tube cable segment to High # End of other tube cable segment for proper in-line tube orientation at in-line splice points; no twists in tubes when coupled

If direct burying tube cable, ALWAYS install tube cable below frost line where tube cable is not subject to ground heaving effects

DON'Ts

DO NOT exceed Tensile Load rating (Maximum Allowable Pulling Tension) of tube cables when installing; refer to Products List for Tensile Load ratings

DO NOT kink tube cables during installation; handle with care

NEVER pull tube cables over sharp points or edges; always provide some kind of protection so tube cable jacket is not damaged

NEVER let tube cable rest on sharp edges (e.g. angle iron, etc.) after installation; danger of kinking tubes

AFTER TUBE CABLE INSTALLATION and WORKING IN TDUs & FTUs

DO's

ALWAYS maintain a 10X tube cable OD Minimum Bend Radius (or better) after installation

ALWAYS maintain a 9-inch Minimum Bend Radius (or better) on single tubes for good blowability

ALWAYS try to route tube cables straight through TDUs; avoid crossovers and 180-degree turns inside TDUs if possible

ALWAYS exercise care and wear appropriate personal safety equipment (gloves, glasses, etc.) when stripping tube cable jackets

Use Liquid-tight Kellems Grips to seal and secure tube cables to proper outdoor NEMA-rated TDUs (boxes) if they are subject to hosing, splashing, or flooding conditions or if tube cable is subject to expansion / contraction movements

Use Strain Relief Kellems Grips to secure tube cables to indoor TDUs (boxes) only where a strain relief application is required and the TDU is not subject to hosing, splashing, or flooding conditions

Apply labels or ID tags to individual tubes and tube cables as soon as possible

ALWAYS use a Tubing Cutter to cut tube ends with a straight clean cut for the best seat and seal in Tube Couplings & Fittings

ALWAYS ensure all tubes are firmly connected to Tube Couplings and other push-pull fittings; push tube in until fully seated & tug back to verify lock

ALWAYS Ground & Bond metallic tube cable elements with appropriate hardware and techniques; in accordance with TIA/EIA 607 and SRP SP-F04-030

ALWAYS practice good tube management techniques when connecting, routing, and storing tubes inside TDUs and FTUs

DON'Ts

NEVER over tighten any clamp or fitting around tube cable

DO NOT install tight bends or tight S-Curves in final tube cable and individual tube routing; impacts blowability

DO NOT use an undersize TDU for a given tube capacity; bigger is better

DO NOT score tube cable's outer sheath too deeply during stripping operations or tubes can be nicked

DO NOT rough-handle individual tubes

DO NOT leave any tube ends open; immediately seal with Tube Caps (indoor / outdoor) or Tube Plugs (indoor)

DO NOT install tight 180-degree tube bends in TDUs if possible; install extra tube length and coil in a loop to alleviate any tight bends and improve blowability (use Expanded Loop technique)

DO NOT install excessive lengths of tubing inside TDUs and FTUs; "Service Loops" are not required nor desired

COMPRESSED GAS SAFETY

DO's

ALWAYS ensure Bottle Safety Cap is installed during storage and transport

ALWAYS ensure Gas Bottles are properly secured to prevent knock-over

ALWAYS ensure Gas Bottles are placed in a stable Dolly and properly secured in place

ALWAYS evaluate fiber bundle entry and exit points for proper / adequate ventilation; set up auxiliary ventilation equipment if necessary

Make sure a Material Safety Data Sheet (MSDS) is on hand and operating personnel are familiar with its contents

DON'Ts

NEVER store or transport Gas Bottles without Bottle Safety Cap installed

NEVER mistreat Gas Bottles; no rough handling, rolling, dropping, etc.

NEVER "play" with high pressure gas; do not point at own skin, at other personnel, or at equipment

TUBE PRESSURE & TUBE OBSTRUCTION TESTING
(Ref: SRP SP-F04-003 and SRP SP-F04-004)

DO's

Pressure and Obstruction Test **all** tubes upon completion of tube cable installation; all Tube Couplings, fittings, and clamps installed and all tube routes set

Pressure and Obstruction Test an **individual** tube span just before blowing in fiber bundle; "Last Minute" testing ensures tube is undamaged / unchanged since last Mandatory testing

ALWAYS exercise caution around tube ends sealed with Tube Plugs; they can be blown out of tube end with minimal pressure and cause serious injury

ALWAYS provide a Safe Catch Device at exit end of tube and wear appropriate personal safety equipment; beads do exit at high velocity

ALWAYS re-seal all open tube ends after Tube Testing is completed

ALWAYS record all Tube Test Results; Sample Test Data Sheets are available in the SRPs

DON'Ts

NEVER stand in front of tubes during Pressure and Obstruction Testing

NEVER point tubes at other personnel or equipment; no "horseplay"

DO NOT exceed recommended 150 psi Pressure Test pressure

DO NOT exceed recommended 60 - 80 psi Obstruction Test pressure

BLOWING HEAD SET UP
(Ref: SRP SP-F04-001)

DO's

ALWAYS position Blowing Head Transit Case to where it makes the most sense and provides easy access to Blowing Head Equipment, Gas Bottle, and Pressure Regulator

ALWAYS set up Blowing Head in accordance with SRP procedures; be careful and deliberate during these important steps

ALWAYS perform Preventative Maintenance Procedures to clean Blowing Head and apply Air Motor Cleaner Fluid to Air Motor; *apply 3-4 drops of Cleaner Fluid before every use*

ALWAYS use care when installing Fiber Bundle Reel into Payoff Stand; reel is heavy and can be awkward to handle

ALWAYS load fiber bundle into Blowing Head carefully using the correct size (2mm and 3mm) Fiber Bundle Drive Wheels, Air Seals, and Blowing Tips

ALWAYS inspect condition of Drive Wheels and change if showing signs of wear;

DON'Ts

DO NOT position Blowing Head where hard or sharp bends will be introduced in the tubing leading to the fiber bundle entry point

NEVER use 2mm Drive Wheels, Air Seals, or Blowing Tips to install 3mm fiber bundle; strong risk of damaging larger 3mm fiber bundle

DO NOT use 3mm Drive Wheels, Air Seals, or Blowing Tips to install 2mm fiber bundle; results in poor blowing performance and excessive leakage at Blowing Head

DO NOT lose or damage Fiber Bundle Reel Protective Cover (Clamshell)

DO NOT pinch fiber bundle when closing Blowing Head halves; be careful and do not hurry

NEVER blow fiber bundle without a Blowing Tip installed; severe risk of damaging fiber bundle

DO NOT under-estimate the importance of using good / unworn Fiber Bundle Drive Wheels

BEFORE INSTALLING FIBER BUNDLE

DO's

If not familiar with tube cable route, walk the line looking for potential trouble spots such as tight bends, uphill runs, etc.; eliminate potential problems before starting blowing operations

Check tube routing inside as many accessible TDUs as possible and look for tight bends; install extra tube length and coil in a loop to alleviate tight bends (use the Expanded Loop technique shown in SRP SP-F04-005)

ALWAYS evaluate fiber bundle exit point; ensure fiber bundle will not be obstructed as it exits tube

If needed, set up 2 Gas Bottles, 2 Pressure Regulators, and the Dual-Tank Isolation Valve Kit to increase gas supply

Be prepared to perform Extended Blowing Techniques if facing long distances and / or tortuous tube span routes; refer to SRPs SP-F04-026, SP-F04-027, and SP-F04-028

DON'Ts

NEVER begin blowing operations until proper and clear communications can be established between fiber bundle entry and exit point personnel

NEVER start blowing operations until good Air Flow is confirmed at exit end of tube; means tube is fully charged

STANDARD FIBER BUNDLE BLOWING DISTANCES USING ONE (1) BLOWING HEAD

2, 4, 6, & 12 FIBER BUNDLES (2mm OD)	APPROX. BLOWING DISTANCE
All OSP tube cables MTX (Mass Transit) tube cables	1500 meters or 5000 feet
TRC (Riser) tube cables	1000 meters or 3300 feet
TGX (General Purpose) tube cables TPX (Plenum) tube cables TP2 (Plenum) tube cables	600 meters or 1950 feet

24-FIBER BUNDLES (3mm OD) See manual for FB above 3mm	APPROX. BLOWING DISTANCE
All OSP tube cables MTX (Mass Transit) tube cables	1200 meters or 4000 feet
TRC (Riser) tube cables	1000 meters or 3300 feet
TGX (General Purpose) tube cables TPX (Plenum) tube cables TP2 (Plenum) tube cables	300 meters or 1000 feet

BEGIN BLOWING OPERATIONS
(Ref: SRP SP-F04-002)

DO's

For tube spans 500+ feet in length, start with operating pressures as follows:

- Air Flow pressure at 85-90 psi (use less pressure if span is shorter); adjust at Pressure Regulator
- Air Motor pressure at 85-90 psi; adjust at Filter / Regulator Assembly

ALWAYS start Air Motor slowly and then increase speed

ALWAYS use proper Blowing Head Operator techniques by keeping:

- 2 hands on Motor Rate Control Valve for quick reaction / shut off if necessary
- 2 eyes on 8mm Clear Tube watching fiber bundle performance; no waving & snaking
- 2 ears open listening to Air Motor performance; good sound & not "lugging" down

Adjust operating pressures and speeds based on fiber bundle blowing performance; increase Air Flow pressure gradually (in 10 psi increments) as necessary to achieve smooth installation performance

Adjust Air Motor speed to match fiber bundle installation speed to prolong life of Fiber Bundle Drive Wheels; decreases wear on Drive Wheels

Watch Payoff Counter during blowing operations; registers fiber bundle installation distance in meters (multiple by "3" to convert to approximate footage)

Watch Gas Bottle Supply Pressure Gauge during blowing operations; Bottle is near empty when Gauge reads about 400 psi

DON'Ts

DO NOT exceed 200 psi Air Flow and 100 psi Air Motor pressures

NEVER start fiber bundle blowing operations until good Air Flow is confirmed at exit point of tube span

NEVER play with or block Air Flow escape at exit end of tube span

DO NOT be in a hurry; begin blowing operations with low pressures and slow speeds for best results

DO NOT use too much pressure; often results in a back-pressure situation that wastes gas and can cause installation speeds to actually decrease

DO NOT waste Gas Bottle Supply; secure when not in use

COMPLETING BLOWING OPERATIONS
(Ref: SRP SP-F04-002)

DO's

At fiber bundle exit point, blow out about 10 - 15 feet of fiber bundle for termination purposes; more or less length if required / desired

At fiber bundle entry point, ALWAYS use care when pulling about 10 - 15 feet of fiber bundle from reel for termination purposes; more or less length if required / desired

ALWAYS unload fiber bundle from Blowing Head carefully

ALWAYS use special care when removing Air Seal from around fiber bundle and uncoupling tubing

ALWAYS handle exposed fiber bundle with utmost care

ALWAYS coil and store exposed fiber bundle in protected areas when blowing operations are complete

ALWAYS seal open end of occupied tubes with 2mm or 3mm Fiber Bushings

ALWAYS re-install Fiber Bundle Reel Protective Cover (clamshell) after blowing operations are complete

DON'Ts

NEVER use excess force to "pull" fiber bundle; possible damage to fiber optic strands can result

DO NOT waste Gas Bottle Supply; secure Bottle when blowing operations are complete

DO NOT lose Fiber Bundle Blowing Tip; leave installed on end of fiber bundle and cut off about a 3 - 6 inch length of fiber bundle for storage

FIBER BUNDLE TERMINATION

DO's

ALWAYS use established safety precautions when handling and working with fiber optic strands; wear appropriate personal safety equipment

ALWAYS strip fiber bundle jacket and nylon sub-units in accordance with SRP SP-F0-006 procedures using proper tools and techniques

ALWAYS strip fiber bundle length to at least 6 - 8 inches beyond that of Field Termination Kit buffer tube length

ALWAYS make sure polyester ripcord is next to Blue strand fiber before pulling sub-unit ripcords in 6-, 18-, and 24-strand fiber bundles; risk of breaking strands otherwise

ALWAYS use a proper work surface and stay organized during fiber termination work

DON'Ts

NEVER "rough handle" fiber bundle or bare strands; use tools carefully, pull ripcords slow and steady, etc.

DO NOT exceed 1.5-inch minimum bend radius on any fiber bundle

DO NOT introduce twisting of the strands inside Field Termination Kit Splitter Box; risk of macro-bending and increased attenuation