

SUMITOMO RECOMMENDED PROCEDURE

SRP: SP-F04-007



BE300 BLOWING HEAD EQUIPMENT SET-UP PROCEDURE

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1.0 General

1.1 This procedure describes the necessary steps to set up the Blowing Head Equipment in preparation for installing FutureFLEX® Air-Blown Fiber (ABF) Fiber Bundles in FutureFLEX tube cables.

Note: If installing FP48PVS, FP72PVS/PV3/PV4, Fiber Bundles, follow the procedures found in **SRP: SP-F04-053** for pre-lubrication of tube routing before installing a Fiber Bundle. Also reference **SRP: SP-F04-009** Fiber Bundle Installation Procedure.

1.2 A source of pressurization i.e. (Nitrogen Cylinder, Compressed Air Cylinder, or Air Compressor), a Blowing Head Equipment Kit, and an Air Blown Fiber Bundle/Reel must be set up at one end of a tube span. The pressure source is connected in close proximity to the Blowing Head which enables pressurization of the tube span. The Blowing Head Equipment Kit accepts mounting of the fiber reel.

- One person can perform this procedure; SEL recommends two (2) trained personnel.
- Various preventive and corrective maintenance procedures associated with the Blowing Head are also described herein.

2.0 Safety Precautions

2.1 Pressurized Nitrogen - The use of inert (non-flammable) 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 non-flammable pressurized compressed air (Atmospheric Air), either from a cylinder/Tank or air compressor, presents no safety concerns.

2.2.1 Air is non-toxic and necessary to support life. There are no ventilation concerns.

2.2.2 Compressed Air at high pressure 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. (*Always Practice Safety*)

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/Tanks - Transporting and handling pressurized gas cylinders presents several safety concerns.

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

2.3.2 A full size 300 cubic foot volume gas Tank weighs approx. 160 lbs. Two personnel should work together to accomplish any manual lifting or moving of a Tank. Always exercise with caution and use proper lifting techniques.

2.4 Blowing Head Equipment Transit Case - transporting/handling the Blowing Head Equipment Transit Case presents several safety concerns.

2.4.1 The Blowing Head Equipment Transit Case weighs approximately 55 lbs. Normal transport is accomplished by pushing/pulling the Transit Case using its retractable handle and built-in wheels. Always exercise with caution and use proper lifting techniques.

3.0 Reference Documents

3.1 Sumitomo Recommended Procedure,
FutureFLEX Fiber Bundle Installation Procedure,
SRP: SP-F04-009

3.2 Sumitomo Recommended Procedure,
*Procedure For Lubricating Tubes For 72 Count
PVDF Air Blown Fiber Installation*
FP72PVS/PV3/PV4 **SRP: SP-F04-053**

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 (non-flammable) gas
- Dry or with no more than 4 ppm moisture content (H₂O)
- Oil/Contaminant Free output
- 300 cu. ft. (approx.) volume Tank size
- 2200-to-2500 psi (approx.) pressure charge

Note: Typically, one 300 cu. ft. Tank of Nitrogen will be required to install approximately 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.

4.2 Blowing Head Equipment Kit (BE300)
includes Transit Case and Toolbox

4.2.1 Transit Case

- One (1) Pressure Regulator with male quick-release 8mm Tubing Adapter (BEREG02 Single-Stage)
- One (1) Filter/ Regulator Assembly (*includes*)
 - One (1) Lockout Valve
 - One (1) Filter Regulator
 - One (1) Lubricator
- One (1) 1-foot length of 8mm Clear Tube
- One (1) 3-foot length of 8mm Clear Tube
- One (1) 10-foot length of 8mm Black Tube
- One (1) 1/2" x 14" Steel Reel Shaft
- One (1) 2-foot length of 8mm Red Tube
- Blowing Head/Air Motor Assembly
- Payoff Stand
- Sumitomo Recommended Procedures (SRP)

4.2.2 Toolbox

- One (1) Motor Rate Control Valve (8mm fittings)
- Two (2) Reel Payoff Cams
- Two (2) Fiber Bundle Guides (2-Pcs.)
- One container of Lubricant (*Air-Motor Oil*)
 - Refills must be purchased from SEL.

- Two (2) each/one (1) set Fiber Bundle Drive Wheels for installing 2mm OD Fiber Bundles (BE02DW); Consumable
- Two (2) each/one (1) set Fiber Bundle Drive Wheels for installing 3mm OD Fiber Bundles (BE03DW); Consumable
- One (1) Air Seal for installing 2mm OD Fiber Bundles (BE02SL); Consumable
- One (1) Air Seal for installing 3mm OD Fiber Bundles (BE03SL); Consumable
- One (1) Air Seal for installing 3.7mm OD 48-Fiber Bundles and 4.0mm OD 72-Fiber Bundles (BE04SL); Consumable
- One (1) Fiber Bundle Blowing Tip for installing 2mm OD Fiber Bundles (BE2MFT); Consumable
- One (1) Fiber Bundle Blowing Tip for installing 3mm OD Fiber Bundles (BE3MFT); Consumable
- One (1) Fiber Bundle Blowing Tip for installing 3.1 & 3.7mm OD FB's (BE35MFT); Consumable
- One (1) Fiber Bundle Blowing Tip for installing 4.1mm (72MM) OD FB's (BE4MFT); Consumable
- One (1) Tubing Cutter (BETC001)
- Two (2) Tee Couplers (DE08MT); Consumable
- Two (2) Allen Wrenches (3/32" and 7/64")
- Extra Tube Caps and Plugs Consumables
Kit Instructions & Inventory sheet included.

Note: Items with SEL Part Numbers can be obtained from FutureFLEX Distributors

4.3 Large Adjustable Wrench (Installer Provided);
10-inch Recommended

4.4 8-mm tubing (any type) for miscellaneous connections (Installer Provided)

4.5 Tube Couplers (DE08MC2) (Installer Provided)

4.6 Pressure Regulator Assembly with 8mm Tubing Adapter (BEREG02) (Installer Provided and only necessary if using the Dual Tank Isolation Kit set-up)

4.7 Dual-Tank Isolation Valve Kit (BEISOV1) (Installer Provided and Optional)

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

4.9 Reel of FutureFLEX ABF Fiber Bundle\ (Installer Provided)

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 “may be used as an alternate pressure source”.

4.11 Compressed Air Cylinder (Installer Provided)

- Compressed Air “Dry Grade” Only
- Nonflammable gas (Atmospheric Air)
- Dry Grade or with no more than 10 ppm moisture content (H₂O)
- Oil/Contaminant free
- 300 cu. ft. (approx.) volume Tank 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, “Dry Grade” 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. Tank of “Dry Grade” Compressed Air will be required to install approximately 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 Tank fitting (CGA-590). Pressure Regulator BEREG02 supplied in the Blowing Head Equipment Kit has a Male right-hand threaded Nut (CGA-580). A CGA-590 Industrial Air Cylinder-to-CGA-580 Nitrogen Regulator Cylinder Adapter is required to connect the Pressure Regulators to the Tank fitting. One (1) Cylinder Adapter is required for each Pressure Regulator used. **See Fig. 1 and Fig. 2**

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, additional Air and Coalescer Filters and a secondary Desiccant-type Dryer are strongly recommended. They must also be of compatible output flow and pressure ratings with the Air Compressor. Before Using an Air Compressor, Please Consider the following:

- Power Source/Requirements?
- Physical Size of the Compressor?
- Noise Considerations - When used Indoors?
- Compressor Proximity to the Blowing Head?
- Compressor to Regulator Fittings (Connectivity)?
- Ease of Portability?

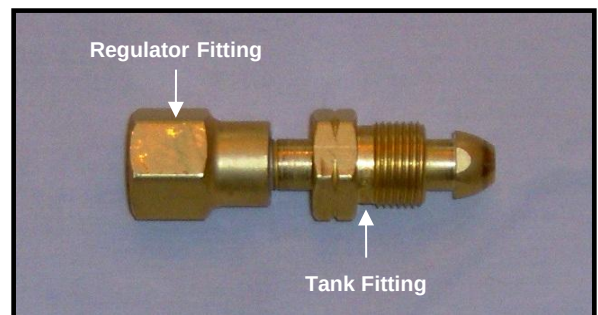


Figure 1
CGA-590 Industrial Air Cylinder-to-CGA-580
Regulator Cylinder Adapter

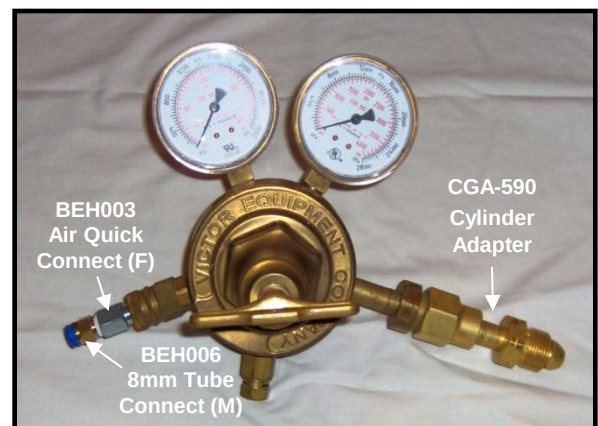
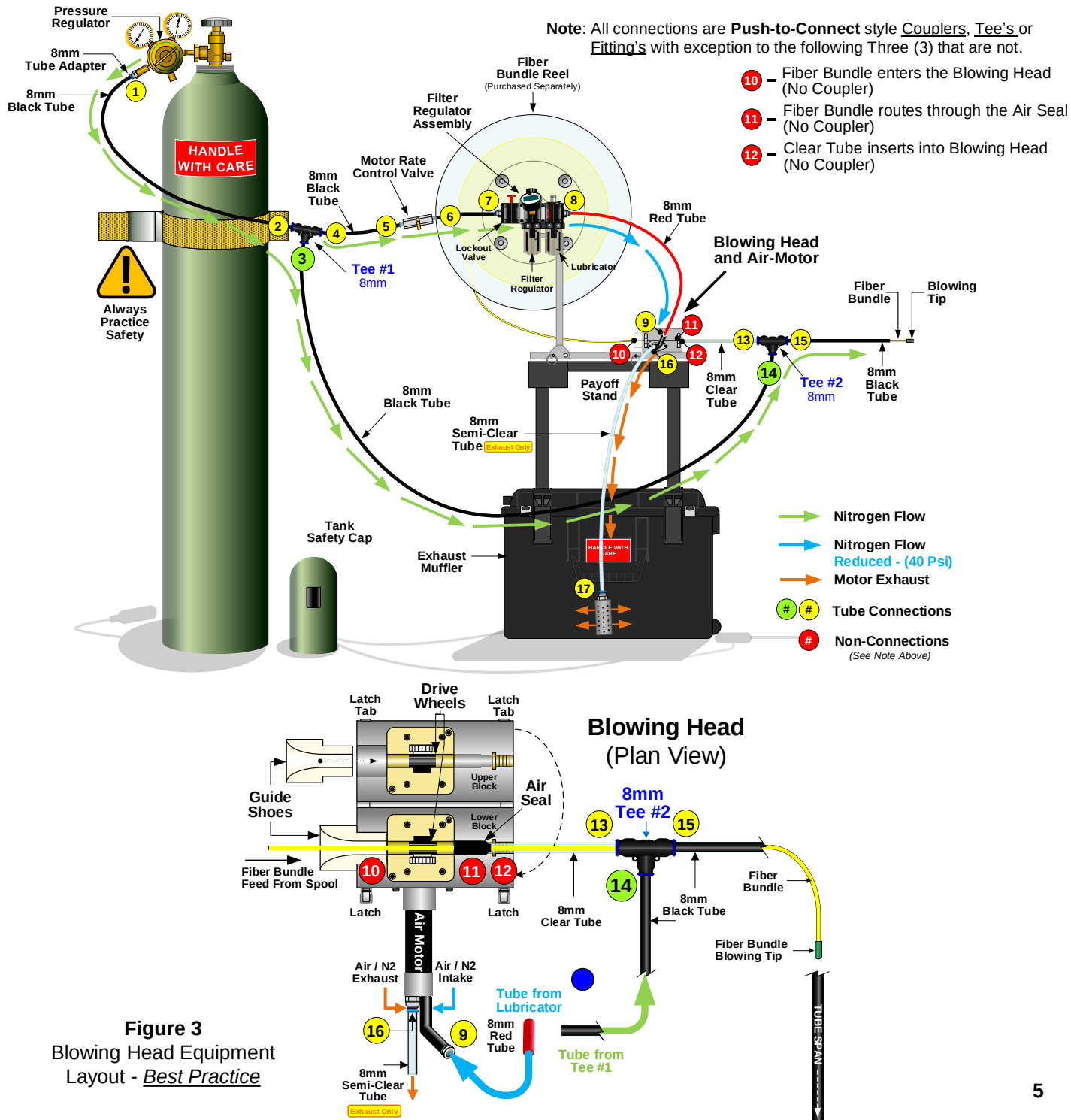


Figure 2
Cylinder Adapter needed to connect Pressure
Regulator to a **Compressed Air** Cylinder

5.0 Equipment Layout

5.1 See Fig. 3 for Blowing Head Equipment Layout and Connectivity Details

There are 17 points where the Tube Cables are connected to fully establish operational connectivity. The associated numbering applied in this diagram does not indicate the order in which they must be installed and are only to help identify each of the connections. Typically the tube section between **Tee #1** Connection # **3** and **Tee #2** Connection # **14** is connected first and it is up to the installers discretion as to what order the remaining connections occur.



6.0 Transit Case Set-up

6.1 Use Handle to position the Blowing Head Equipment Transit Case in approximate location where Fiber Bundle installation operations will be performed. **See Fig. 4**

6.2 Release the four (4) latches and open the hinged top lid of the Transit Case. **See Fig. 5**

6.3 Remove the Payoff Stand with the Blowing Head Assembly, four pegs, steel shaft and all documents. Now Flip the Payoff Stand over.



Figure 4
Transit Case Handle Extended



Figure 5
Transit Case Lid Open

6.4 Remove All Kit Items remaining inside Transit Case.

6.5 Close and latch the top lid of Transit Case.

6.6 Manually screw-in each of the 4 pegs into the predesignated threaded holes located on the Transit Case lid. Set the Payoff Stand (Blowing Head Assembly) onto the 4 pegs located on top of the Transit Case to create a conveniently elevated work platform. **See Fig. 6**

Don't Forget - The Blowing Head should be positioned facing the entry point of the span being installed. **See Fig. 7**

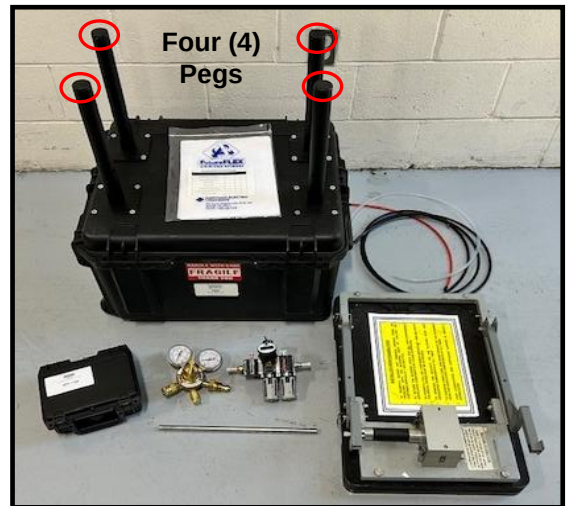


Figure 6
All BH Kit contents removed from the case. Pegs/Supports installed on the top of the Transit Case lid into predesignated holes.

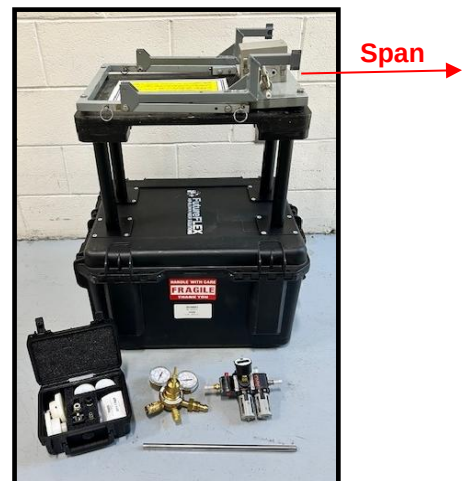


Figure 7
Blowing Head Facing Right. The BH should always face the direction of the blow.

7.0 Pressure Source Set-Up (One Gas Tank)

7.1 Ensure the pressurized gas Tank is securely chained/strapped into place, remove the Safety Cap. **See Fig. 8**

7.2 Thread the Pressure Regulator fitting into the Tank valve housing and tighten with a large adjustable wrench. **See Fig. 9**

Note: Do not use serrated jaw tools (e.g. pipe wrench, vise grips, channel locks, etc.) to tighten brass nut of Pressure Regulator.

7.3 With the Pressure Regulator Valve open, open the Tank/Tank Supply Valve and check for any leaks around the fitting. If leaking is detected, close the Tank Supply Valve and re-tighten with the wrench. This step ensures no leaks exist while getting setup to blow. **See Fig. 9a**



Figure 8 - Safety Cap Installed

7.4 Close Tank Supply Valve.

7.5 Install assembled BEH003 + BEH006 Air Quick-Connect and 8mm Tubing Adapter into the Female Quick-Disconnect fitting on the Pressure Regulator. **See Fig. 9a / Fig. 10**

Note: If Fiber Bundle blowing distance will exceed the normal capacity of one 300 cu. ft. Tank of gas (approximately 3000'-4000'), two (2) Tanks can be connected together to double the supply volume. Forward to **Section 13.0 - Dual-Tank Set-Up** for details.

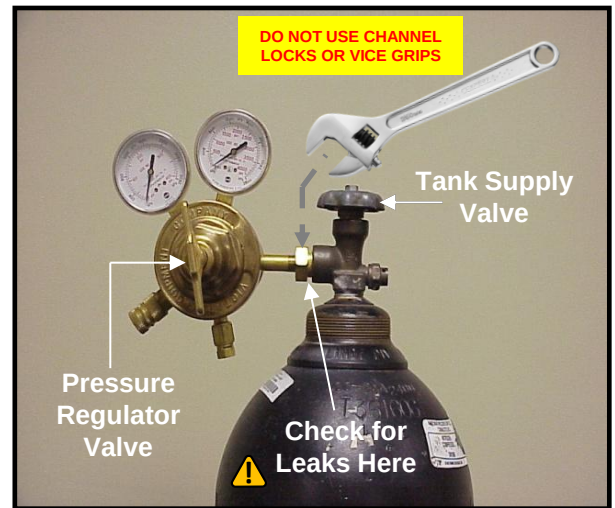


Figure 9
Pressure Regulator Connected to Gas Tank

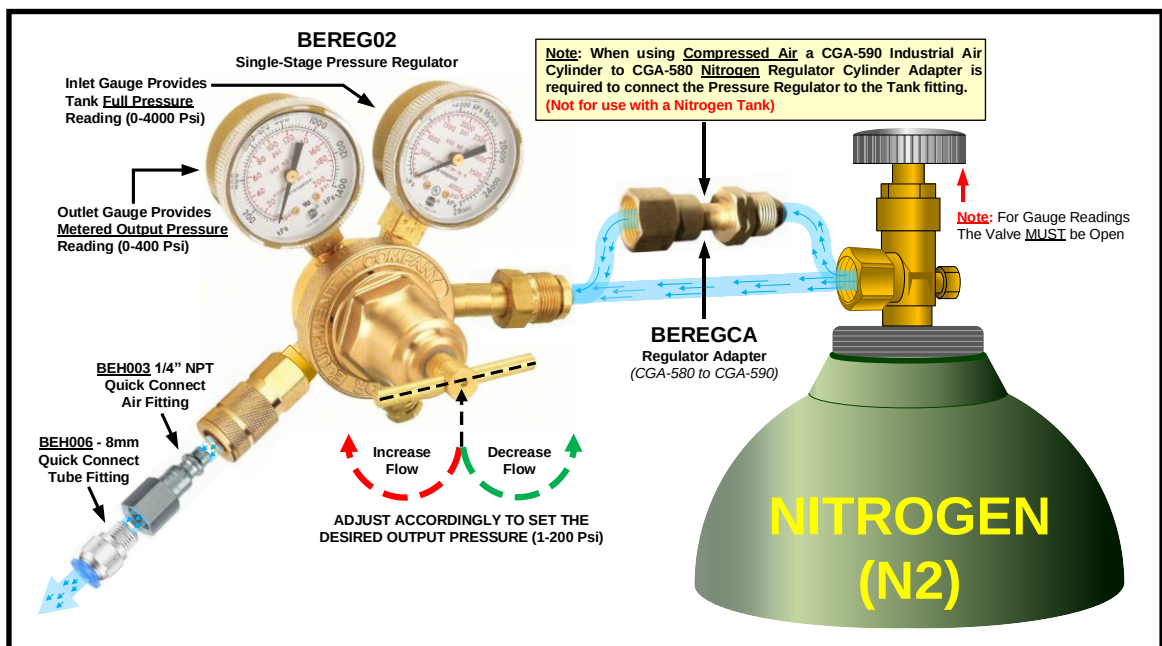
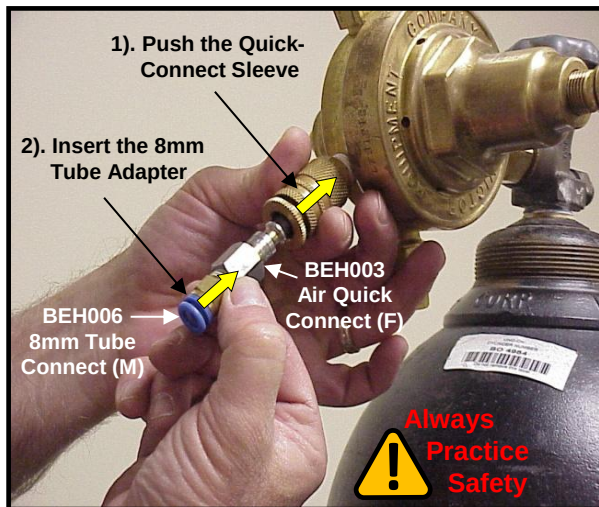


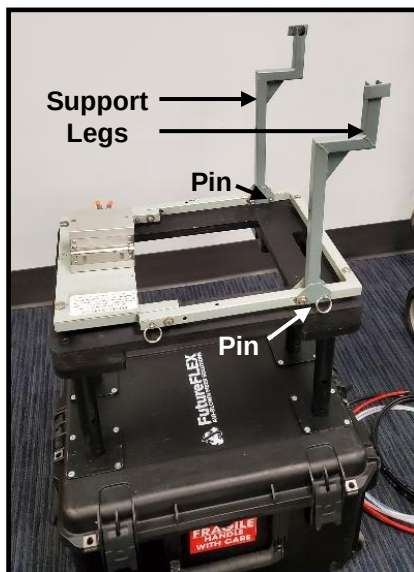
Figure 9a
Pressure Regulator - (Connections and Operation Overview)

**Figure 10**

8mm Tube Adapter Installed Into the Quick-Connect Fitting on the Pressure Regulator

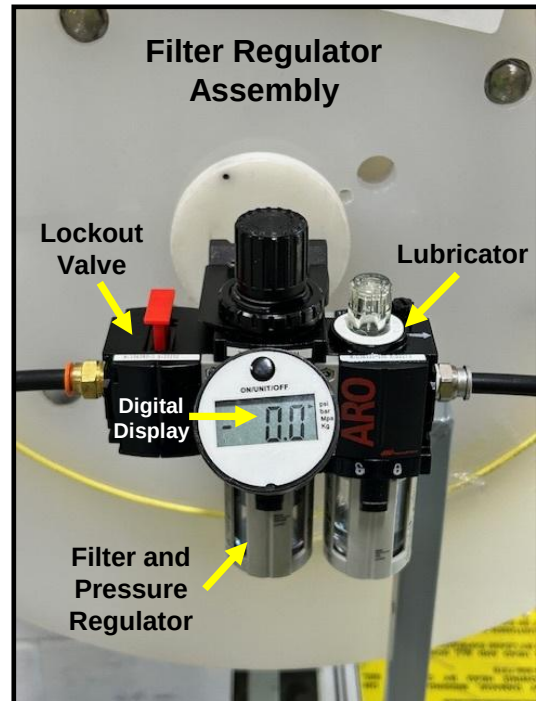
8.0 Blowing Head Equipment Set-Up

8.1 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. 11

**Figure 11**

Payoff Stand w/Raised Support Legs and Pins

8.2 Mount Filter/Regulator Assembly on fiber reel support leg. Locate Assembly on same side of Payoff Stand as Blowing Head Air Motor. See Fig. 12

**Figure 12**

Filter/Regulator "Assembly" Installed

Note: Always inspect tubing ends before connecting the push-fit Couplers. Use the Tube Cutter provided in Blowing Head Equipment Kit to trim tubing ends with a straight, clean cut for best seat and to Properly seal All push-fit Connections.

Note: Press the ON/OFF button on the Filter/Regulator before starting a blow. If "Lob" shows on the screen, Replace the battery with a CR2450 battery.

Note: The following steps establish the "air connections" to the Blowing Head Air Motor.

8.3 Remove Storage Plugs from (L-R) Air Motor Fittings and from the Filter/Regulator Assembly Fittings - (left side-Lockout Valve Fitting and right side-Lubricator Fitting). Store the Plugs in the provided Plastic Bag located inside the Blowing Head Equipment Tool Box. These Plugs prevent debris build-up from accumulating inside the Air Motor which can lead to Air Motor failure (seizing or freezing up). Always replace these plugs when not in use.

8.4 Push-fit length of 8mm Black tubing between Pressure Regulator's 8mm Tubing Adapter and the First Tee Coupler (2' length recommended.)
See Fig. 13

8.5 Push-fit length of 8mm Black tubing from the First Tee Coupler to the Motor Rate Control Valve (2' length recommended.) See Fig. 13

8.6 Push-fit 8mm Black tubing between the Motor Rate Control Valve and the Filter Regulator Assembly-(Lockout Valve Fitting, Inlet Port) (2' length recommended.)
See Fig. 13

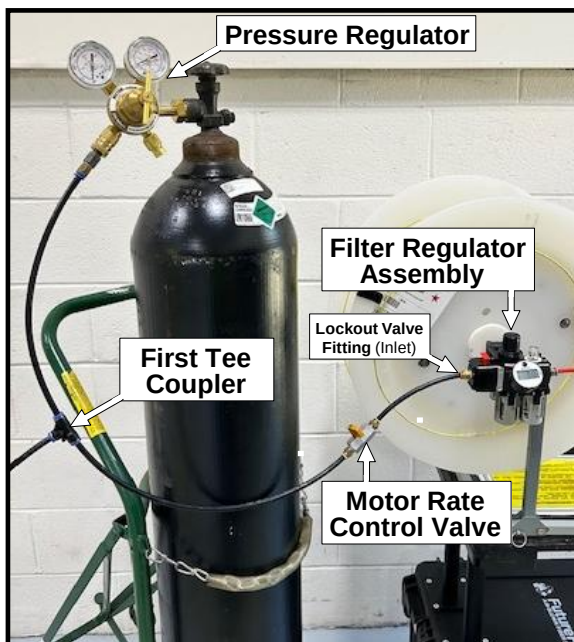


Figure 13

8mm Tube Installation Process

Pressure Regulator to Filter Regulator Assembly

From the **Pressure Regulator** to the **First Tee-Coupler**, from the Tee-Coupler to the **Motor Rate Control Valve** from the Motor Rate Control Valve to the **Filter Regulator Assembly** with connection to the "Lockout Valve" Inlet Fitting.

8.7 The final tube segment to the Air Motor utilizes a "Kit Provided" 8mm Red Tube that goes between the Outlet Port of the Filter Regulator Assembly-"Lubricator" and the 8mm air intake fitting on the Motor. See Fig. 14

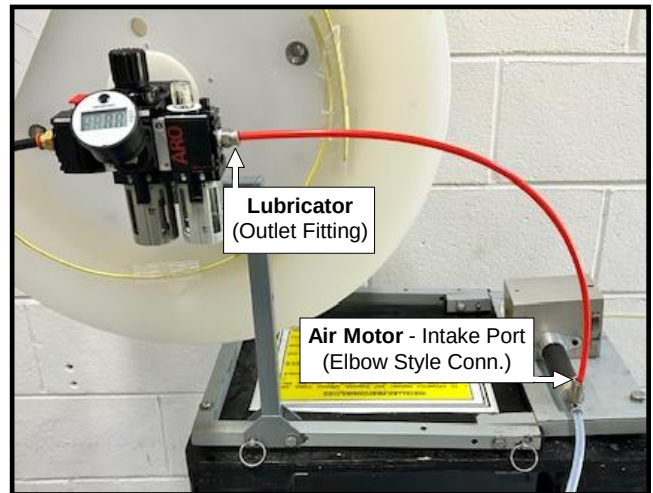


Figure 14

Tube Installation from the Outlet Port of the **Lubricator** to the Inlet Port of the **Air Motor**

Important Note: The **Red Tube** is dedicated to supplying the Air Motor with lubricated air and should Never be used to install "Blow" a Fiber Bundle. The residual oil inside of the Red Tube could potentially contaminate the Fiber Bundle and degrade blowing performance. This same rule applies to the Clear Exhaust Tube that connects to the Air Motor exhaust port and to the Exhaust Muffler.

Note: The following procedures establish the Air Connection “Air Supply” to the tube span.

8.8 Install Push-fit “Installer Provided” length of 8mm Black tubing between the branch leg of the First Tee Coupler and branch leg of the Second Tee Coupler. (3'- 4' suggested and should place the Second Tee Coupler about 1-foot in front of the Blowing Head) **See Fig. 15**

8.9 Install Push-fit “Kit Provided” 8mm Clear-Tube into one side of the Second Tee Coupler. **See Fig. 15**

8.10 If necessary, re-position the Transit Case to where it best fits in the work area with a focus on; (maneuverability, visibility and workability). Two (2) Key considerations:

1) Maintain easy and convenient access to Blowing Head Equipment, Gas Tank and the Pressure Regulator during blowing operations.

2) Create No hard or sharp bends in the jumper tube leading to the Fiber Bundle entry point.

8.11 To span the distance between the Blowing Head and the entry point, connect an appropriate length of “Installer Provided” 8mm jumper tube and a Tube Coupler between the Second Tee Coupler and the tube/tube cable scheduled to receive the Fiber Bundle. The jumper tube length must be determined on site. **See Fig. 15 & 16**

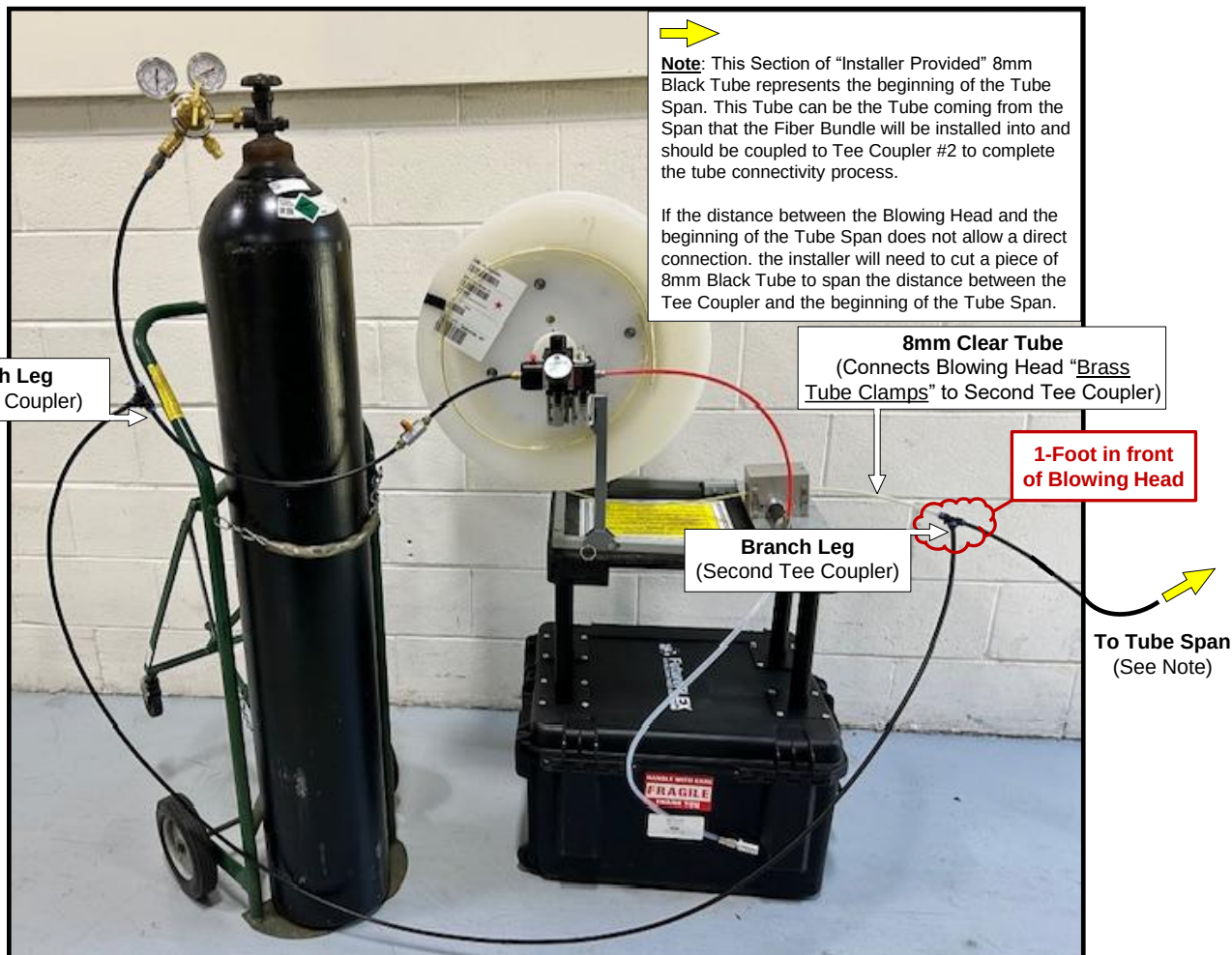
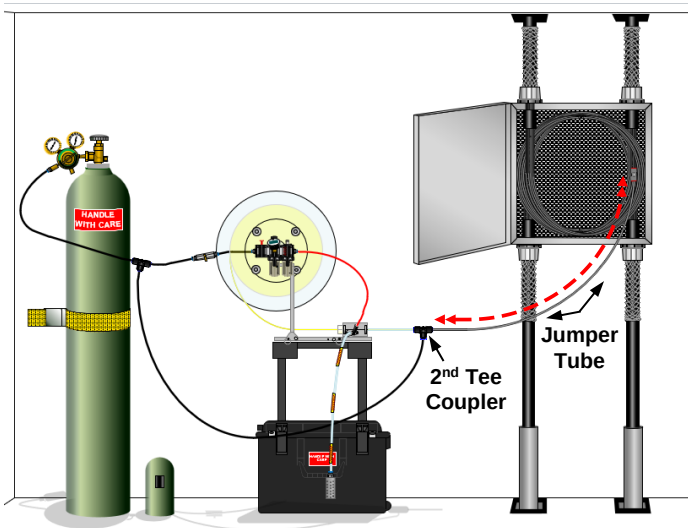


Figure 15

Connect 8mm Tubing from First Tee Coupler to Second Tee Coupler and 8mm Clear Tube from Second Tee Coupler to Blowing Head

**Figure 16**

Create a Smooth Transition (No sharp bends) in the 8mm Jumper Tube leading from the Blowing Head to the Fiber Bundle Entry Point.

9.0 Adding Oil to the Lubricator

9.1 Remove the canister from the lubricator by sliding the locking mechanism down then rotate the canister toward the unlock symbol.

See Fig. 17

9.1.1 Pull down on the canister to remove it from the Lubricator housing.

9.1.2 Fill the canister with SEL provided oil to desired level. **Do Not Over-Fill or Top-Off**

Note: Be sure to fill past the minimum fill level

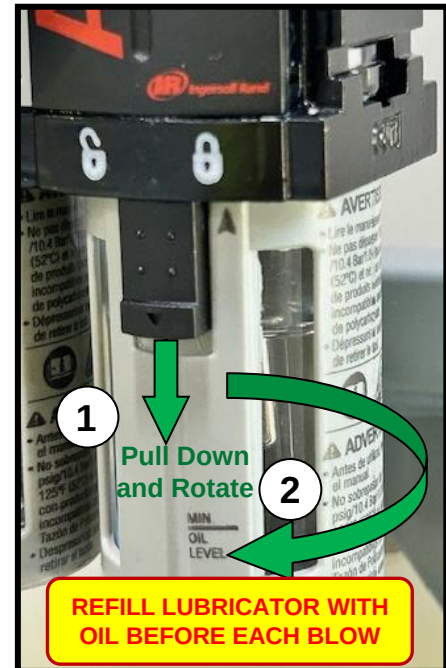
9.1.3 SEL recommends having a shop rag or paper towels in hand prior to removing the cap and refilling the oil reservoir in the event spilling or leaking does occur.

9.2 The preferred method of maintaining an adequate supply of oil in the reservoir is by following the practice of refilling the reservoir before starting any new blowing operation.

Important Note: Most Blowing Operations (Based on typical Tube Span Lengths) will not require refilling the oil reservoir during an active blow if the reservoir was full at the start.



One (1)
4oz. Container
included in kit.
Refills must be
purchased from
SEL.

**Figure 17**

Slide the locking mechanism down then rotate the canister towards the unlock symbol, the canister can then be pulled down-and-out.



WARNING

BOWL REMOVAL HAZARD THE BOWL MUST BE SECURELY LOCKED INTO POSITION BEFORE EXPOSING THE UNIT TO THE LINE PRESSURE.

9.3 The preferred method for cleaning the Lubricator Oil Reservoir is to use soap and warm water. **Do Not Use** chemical cleaning agents or degreasers. **See Fig. 18**

**Figure 18**

Use Soap & Water to Clean Oil Reservoir

10.0 Fiber Bundle Reel Set-up

10.1 Remove the plastic protective cover (Clamshell) "Protective Wrapping" from the fiber reel. Do Not Cut, Damage or Discard the protective cover. Always Save the Clamshell for Re-Use or Storage. **See Fig. 19.**

Note: SEL offers an empty 490 Bobbin Reel, Protective Clamshell Cover and Shipping Carton P/N: BE495PK – (Call Customer Support)

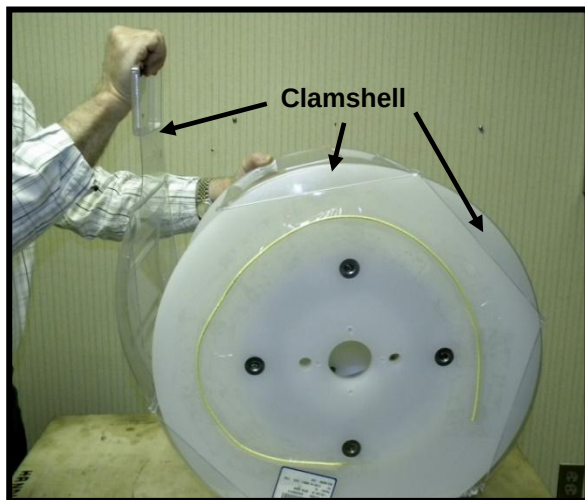


Figure 19

Opening the Fiber Bundle Reel "Clamshell" The Clamshell is Reusable: **DO NOT DAMAGE** To open, use the design specific built-in Flap to grab and pull to release.

Important Note: Except during an active Blowing Operation the Fiber Bundle should always be protected from Dust and Debris by using the Clamshell. More Importantly the Fiber Bundle must always be secured to the Reel so that it cannot become wrapped or tangled during transit. Never transit or store the Fiber Bundle reel-side down.

Note: Make sure the Payoff Reel Cams sit flat on the reel flanges by aligning and inserting an Allen Screw Head into one of the four (4) small pre-drilled holes located on the reel flange.

See Fig. 20

10.2 Install two Reel Payoff Cams into the fiber reel bushings and insert the Steel Shaft through center of Payoff Cams. **See Fig. 20**

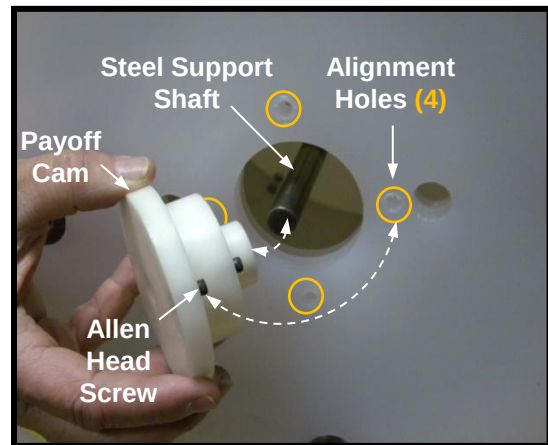


Figure 20

Fiber Bundle Reel Payoff Cam and Reel Shaft install.

10.3 Position the fiber bundle reel so the Fiber Bundle pays off from bottom of reel towards the motor. Carefully lift the reel and guide the Steel Shaft ends into Payoff Stand support arms. Exercise caution and use proper lifting techniques when loading fiber bundle reel onto Payoff Stand.

11.0 Prepare to Load Blowing Head

All Tubes, Couplers and the Fiber Bundle Reel should now be in place. Next you must load the fiber into the Blowing Head.

11.1 Open the hinged top half of the Blowing Head by releasing both draw and toggle style latches. **See Fig. 21.**



Figure 21

Blowing Head Latches Released

11.2 Verify the installed Fiber Bundle Drive Wheels are the correct type/size for the Fiber Bundle being installed, inspect both wheels closely for wear and replace if needed. To change/replace the Fiber Bundle Drive Wheels; Forward to **Section 14.3 - Change Fiber Bundle Drive Wheels**.

11.3 Select the correct type/size Fiber Bundle Air Seal for the Fiber Bundle to be installed and inspect it for wear. There should be a 3mm Air Seal already Installed in your Blowing Head. (SEL refurbishes each BE300 Kit prior to shipping to each LFI) **See Fig. 22**

<u>Fiber Bundle Strand Count</u>	<u>Drive Wheel P/N</u>	<u>Air Seal P/N</u>	<u>Blowing Tip P/N</u>
6 Strand PEF FB's = 2mm	BE02DW/ Red	BE02SL/Blk	BE2MFT/ Red
12 Strand PEF FB's = 2mm	BE02DW/ Red	BE02SL/Blk	BE2MFT/ Red
24 Strand PEF FB's = 3mm	BE03DW/Blk	BE03SL/Blk	BE3MFT/ Blk
48 Strand PEF FB's = 3.7mm	BE03DW/Blk	BE04SL/Blk	BE35MFT/ Grn
48 Strand PVS FB's = 3.1mm	BE03DW/Blk	BE03SL/Blk	BE3MFT/ Blk
72 Strand PVS FB's = 3.7mm	BE03DW/Blk	BE04SL/Blk	BE35MFT/ Grn
72 Strand PV3/4 FB's = 4.1mm	BE04DW/Blk	BE041SL/Blk	BE4MFT/ Blu

CAUTION: Only use the correct size Drive Wheels and Air Seals to install different Fiber Bundle sizes. **Do Not** attempt to install 2mm OD Fiber Bundle with 3mm OD components and vice versa. Excessive Blowing Head air-leaking and possible Fiber Bundle damage may result if incorrect components are used.

Note: All Air Seals are black in color and a visual inspection is necessary to determine the correct size. The 2mm Air Seal used to install 2mm OD; 6F- and 12-Fiber Bundles has a small opening in the front tip. The 3mm Air Seal 'slightly larger hole' is used to install 3mm OD 24- Fiber Bundles. The largest 4.0mm Air Seal is used to install both (PEF & PVS/3/4) 48 and 72- Fiber Bundles

Note: **The Red Drive Wheels:** (small groove) are used to install 2mm OD, 6F- and 12F-Fiber Bundles. **The Black Drive Wheels:** (large groove) are used to install 3mm OD 24F, 3.1mm / 3.7mm OD 48F, and 3.7mm OD 72F-Fiber Bundles. (See Chart Above)

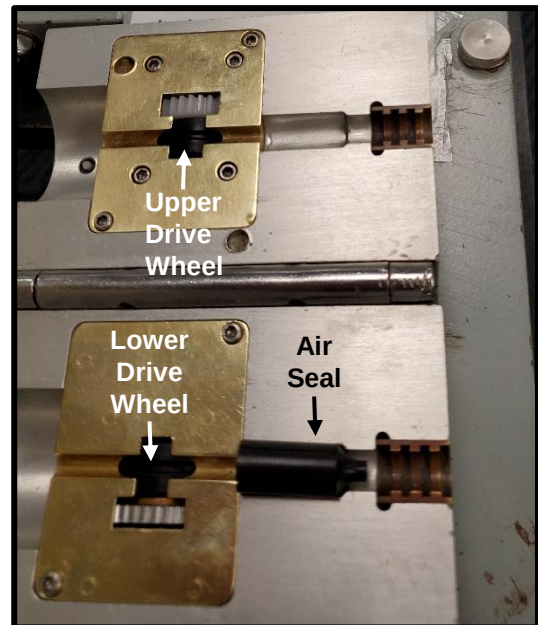


Figure 22
3mm Air Seal and 3mm Drive Wheels (Black)

12.0 Loading Fiber Bundle into Blowing Head

12.1 Remove the Fiber Bundle end from the holes in the reel. Cut off the first 6" - 10" of Fiber Bundle to eliminate any bent ends.

12.2 Screw the correct type/size Fiber Bundle Blowing Tip onto end of Fiber Bundle. Ensure Blowing Tip is threaded on straight and firmly attached. See Figures 23 & 23a

Note: The Small Red Blowing Tip is used on 2mm OD Fiber Bundles. The Black Blowing Tip is used on 3mm OD Fiber Bundles. The Green Blowing Tip is used for 3.1 & 3.7mm OD Fiber Bundles. The Blue Blowing Tip is used for 4.1mm OD Fiber Bundles. See Figure 23a

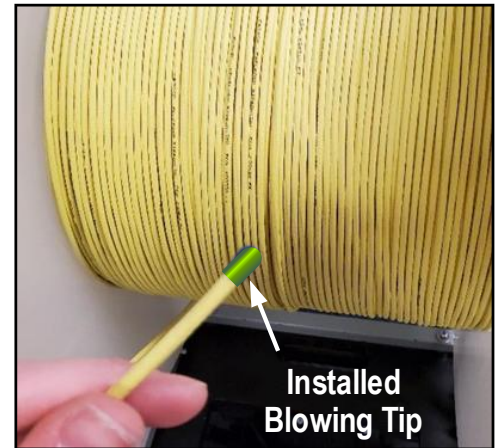


Figure 23a

3.5mm Blowing Tip (Green) Threaded onto a 48F (PEF Jacket) Fiber Bundle

Important Note: Before attempting to load the Fiber Bundle into the Blowing Head it is very important to make sure that the Fiber Bundle has not overlapped itself and is wound evenly across the spool. If the Fiber Bundle is overlapped prior to starting the blowing operations, the overlap can cause the Fiber Bundle to become tangled on the Reel and at some point during the blow will create a binding condition that may prevent the Fiber Bundle from freely feeding off the Reel. For this reason the Blowing Head Operator must ensure the Fiber Bundle has not become looped around itself. Failure to perform this step could result in Damage to the Fiber Bundle, Halting the Blowing Operations and impacting the cost of materials and labor while creating delays to the project schedule. Do not begin blowing operations without ensuring the Fiber Bundle has not overlapped onto itself.

6F,12F 2mm PEF BE2MFT LOOSE TUBE PEF FB06-FB12 - 2mm Loose Tube Fiber TIP: Full Jacket	24F 3mm PEF BE3MFT LOOSE TUBE PEF FB24xxx 3mm Loose Tube Fiber TIP: Full Jacket	48F 3.1mm PVDF BE3MFT RIBBON FIBERS PVDF FP48PVS 3.1mm Ribbonized Fiber TIP: Full Jacket
48F 3.7mm PEF BE35MFT LOOSE TUBE w/ NYLON SUBUNITS PEF FB48xxx 3.7mm Loose Tube Fiber TIP: Full Jacket Diagonal Cut Required	72F 3.7mm PVDF BE35MFT RIBBON FIBERS PVDF FP72PVS 3.7mm Ribbonized Fiber TIP: Full Jacket Diagonal Cut Required	72F 4.1mm PVDF BE4MFT RIBBON FIBERS PVDF FP72PV3 / PV4 - 4.1mm Ribbonized Fiber TIP: Full Jacket Diagonal Cut Required

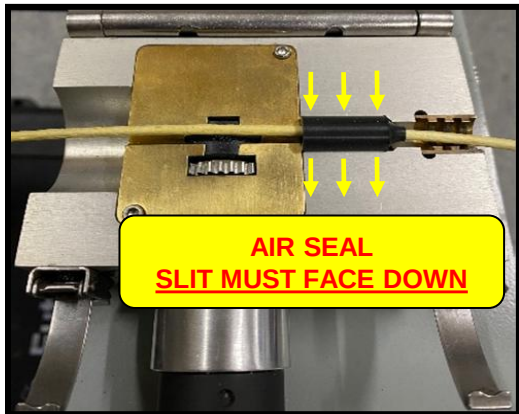
Figure 23

Fiber Bundle Tip Preparation/Installation Details

Note: For PEF 48-Fiber Bundles and all 72-Fiber Bundles cut the end of Fiber Bundle at a slight angle and screw the appropriate blowing tip onto the bundle.

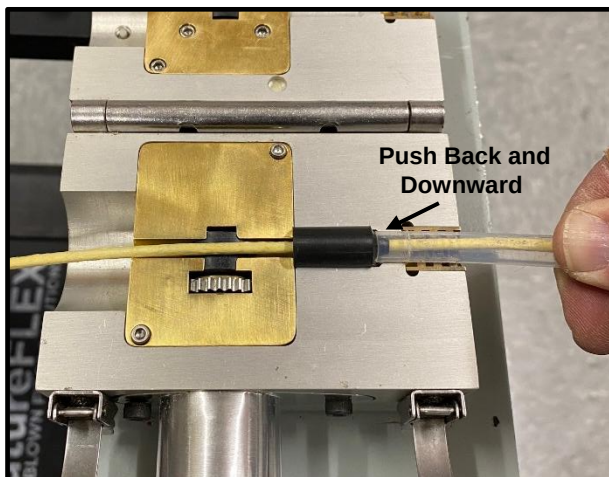
12.3 Insert the Fiber Bundle through the large opening (Back) of the Air Seal. Insert the small opening 'Tapered-End' of the Air Seal into the 8mm Clear Tube. Manually feed the Fiber Bundle through the tube until it travels about 1' - 2' past the Second the Tee Coupler.

12.4 Carefully place the Air Seal and 8mm Clear Tube into front of lower Blowing Head section. Install the Air Seal with it's slit positioned in a vertical plane **with the SLIT DOWN** direction. This is a mandatory technique that reduces any potential air leakage from the Blowing Head. See Figures 24 and 25.

**Figure 24**

Fiber Bundle pushed through the Air Seal and into the Clear Tube. Take extra time to make sure that the Air Seal SLIT is Face Down and the Tapered-End of the Air Seal mates to the Clear Tube. The Clear Tube **Must** be 'Cut to an Absolute 0-Degree Angle' to prevent air from escaping during the blow.

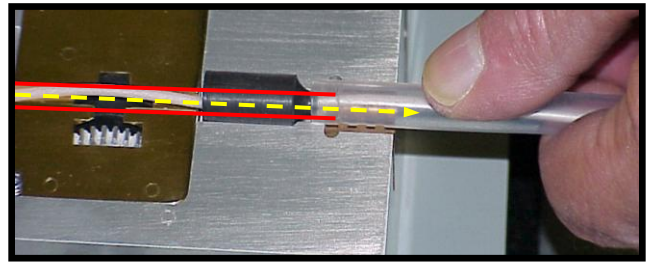
12.5 Place the 8mm Clear Tube end onto the narrow end of the Air Seal. Push Back and slightly downward against the Air Seal, so that the end of the Clear Tube is fully seated onto the Air Seal. Hold both 'tube & seal' in position by holding the 8mm Clear Tube steadily in place. Do not push so hard to cause the Air Seal to be pinched when closing the block. **See Fig. 25**

**Figure 25**

Install the Air Seal

SLIT MUST ALWAYS FACE DOWN

12.6 Verify the Fiber Bundle is positioned in the center of the lower Brass Plate (in the groove) and also aligned with the lower Fiber Bundle Drive Wheel. **See Fig. 26.**

**Figure 26**

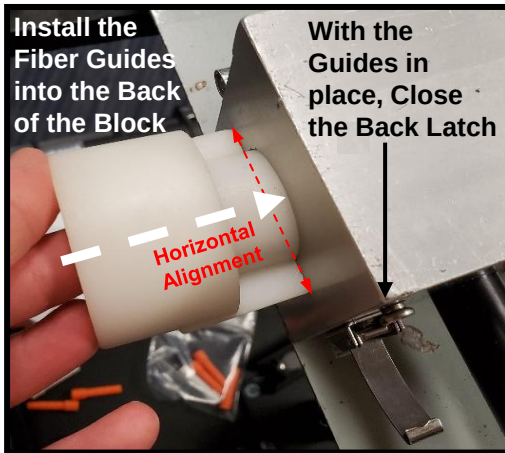
Fiber Bundle installed properly.
(Centered, Aligned and In-the-Groove)

12.7 Slowly close the upper Blowing Head section being careful to not pinch or damage the Fiber Bundle and Air Seal. Push down on the upper Blowing Head section and engage/close the front latch only. **See Fig. 27.**

**Figure 27**

Slowly Close Front Latch to prevent pinching, displacement or cutting into the Air Seal.

12.8 Insert and seat the Fiber Bundle Guides into the back of Blowing Head. (*Both Guides Identical*) Install each with their joint in the horizontal plane. Install the Lower Guide first followed by the Upper Guide then close the Rear Latch. **See Fig. 28.**

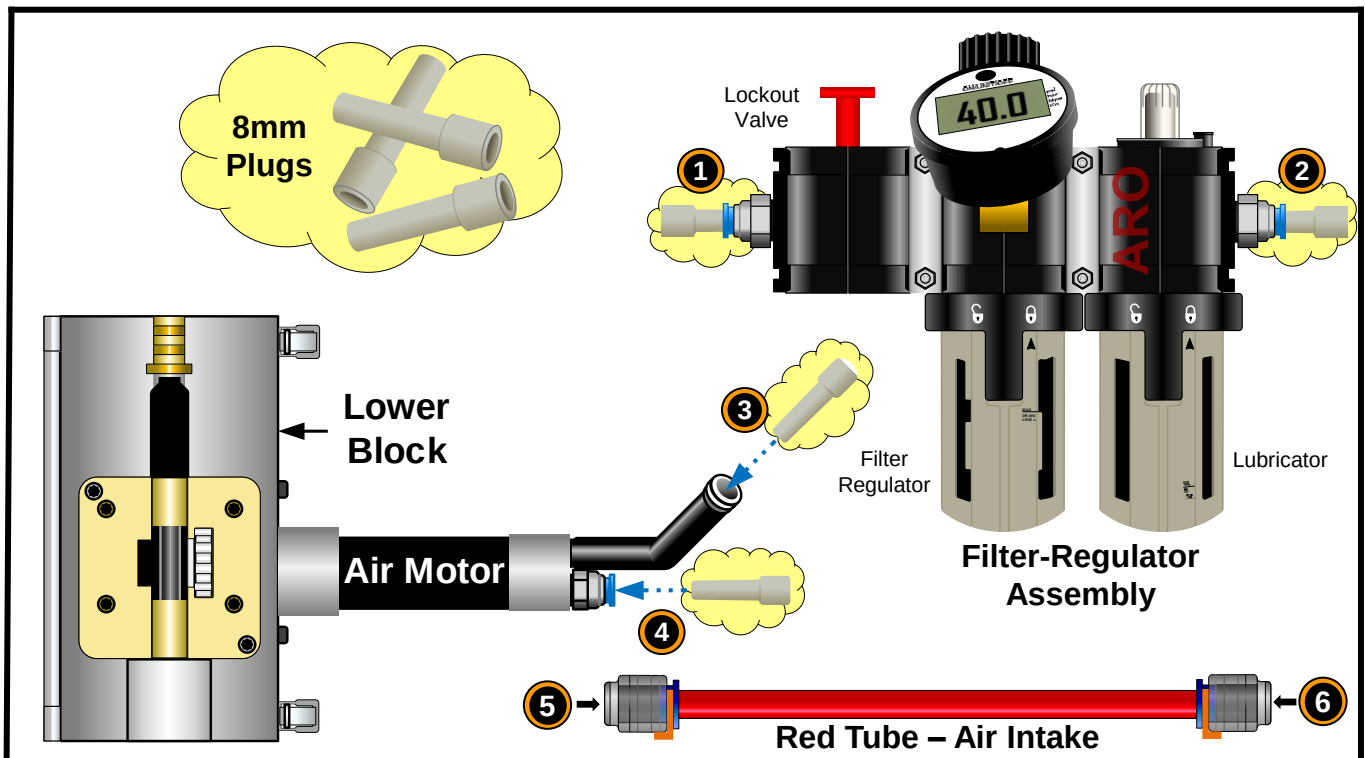
**Figure 28**

Install Fiber Guides - Both Joints Align Horizontally then Close the Rear Latch.

12.9 Carefully remove any Fiber Bundle slack between the Reel and the Blowing Head by hand-rotating the Reel slowly. **Be Sure** that you do not pull the installed Fiber Bundle out of the Blowing Head, Only Remove the Slack between the Blowing Head and the Reel.

12.10 This completes the basic Blowing Equipment Set-up process. See Sumitomo Recommended Procedure SRP: SP-F04-009 to install the Fiber Bundles into the Tube Cable.

Important Note: When storing the Blowing Head Equipment, **ALWAYS** Re-Install the Plugs back into the Air Motor Intake Fitting, Air Motor Exhaust Fitting and the Filter-Regulator Assembly, both "Lockout Valve and Lubricator", (all of which had to be removed during the set-up procedures). These Plugs prevent the accumulation of debris and dust "contaminants" from building up in the interior of these components both in transit or storage. Failure to adhere to these steps will contribute to Air Motor failures or, cause the Air Filter to become clogged and restrict pressure to the Air Motor. See Fig. 29.

**Figure 29**

(Plugs & Caps **Must** be re-installed when not in use)

13.0 Dual Tank Set-up (Two Gas Tanks)

Note: Typically, one 300 cu. ft. gas Tank will be required to install approximately 3000' - 4000' of Fiber Bundle and last about 35-45 minutes. This "conservative estimate" can vary depending upon the Tube Route Orientation, Fiber Bundle Size, Tube Cable Type, and Operating Practices.

13.1 If the Fiber Bundle blowing distance will exceed the normal capacity of one (1) gas Tank, two (2) Tanks may be connected together to Double the Available Volume of Air. The "Installer Provided" equipment requirement; two (2) gas Tanks, two (2) Pressure Regulators (BEREG02), and a Dual-Tank Isolation Valve Kit (BEISOV1). See Fig. 30.

Note: If using Compressed Air Cylinders instead of Nitrogen Cylinders as the source of pressure, two (2) Cylinder Adapters will be required to connect the Pressure Regulators to the Compressed Air Cylinder fittings.

13.2 Begin setting-up by ensuring the pressurized gas tanks are securely chained in place and remove the valve caps.

13.3 Thread the Pressure Regulator fittings into the tank valve housings and tighten with large adjustable wrench

Note: Do Not use serrated jaw tools (i.e., pipe wrench, vise grips, channel locks, etc.) to tighten the brass fittings on the Pressure Regulators.

13.4 Open each Tank Supply Valve and check for leaks around the fitting. If leaking is detected, close the Tank Supply Valve and Refer to Para. 13.0 Maintenance Procedures.

13.5 Close the Tank Supply Valves.

13.6 Install the male quick-disconnect 8mm Tubing Adapters into female quick-disconnect fittings on both Pressure Regulators.

13.7 Push-fit the "Installer Provided" lengths of 8mm tubing between Pressure Regulators #1 and #2, Tube Adapters-(8mm) and the Tee-Couplers supplied in the Dual Tank Isolation Valve Kit. (3' - 4' length suggested.) See Fig. 30 & 31

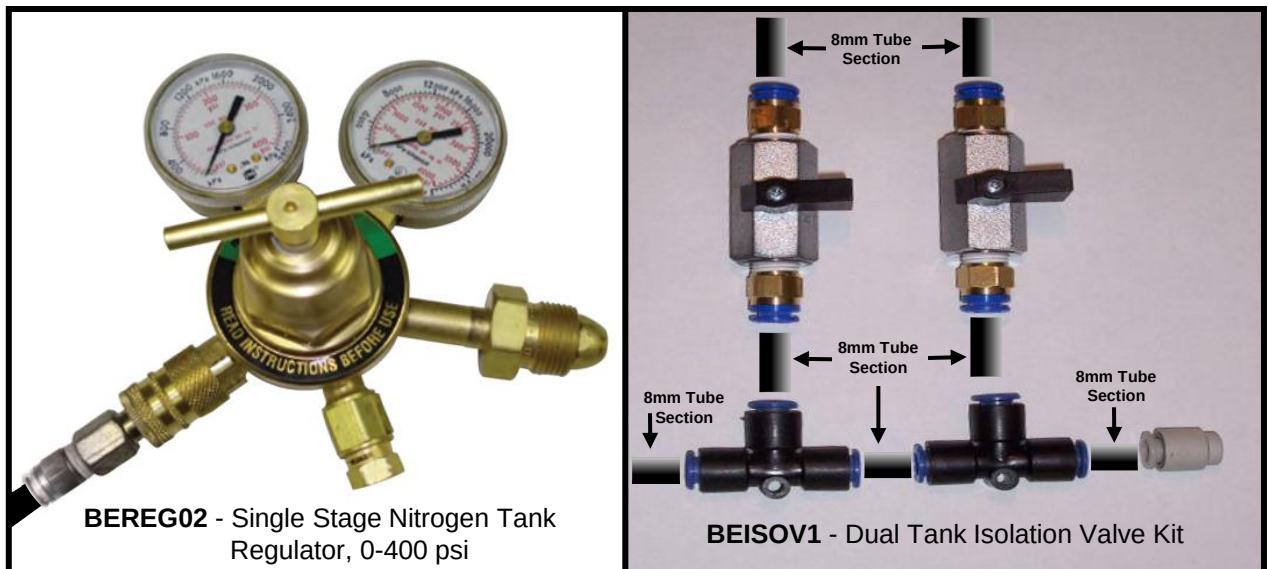


Figure 30

BEREG02 Tank Air Regulator

BEISOV1 - Dual Tank Isolation Valve Kit

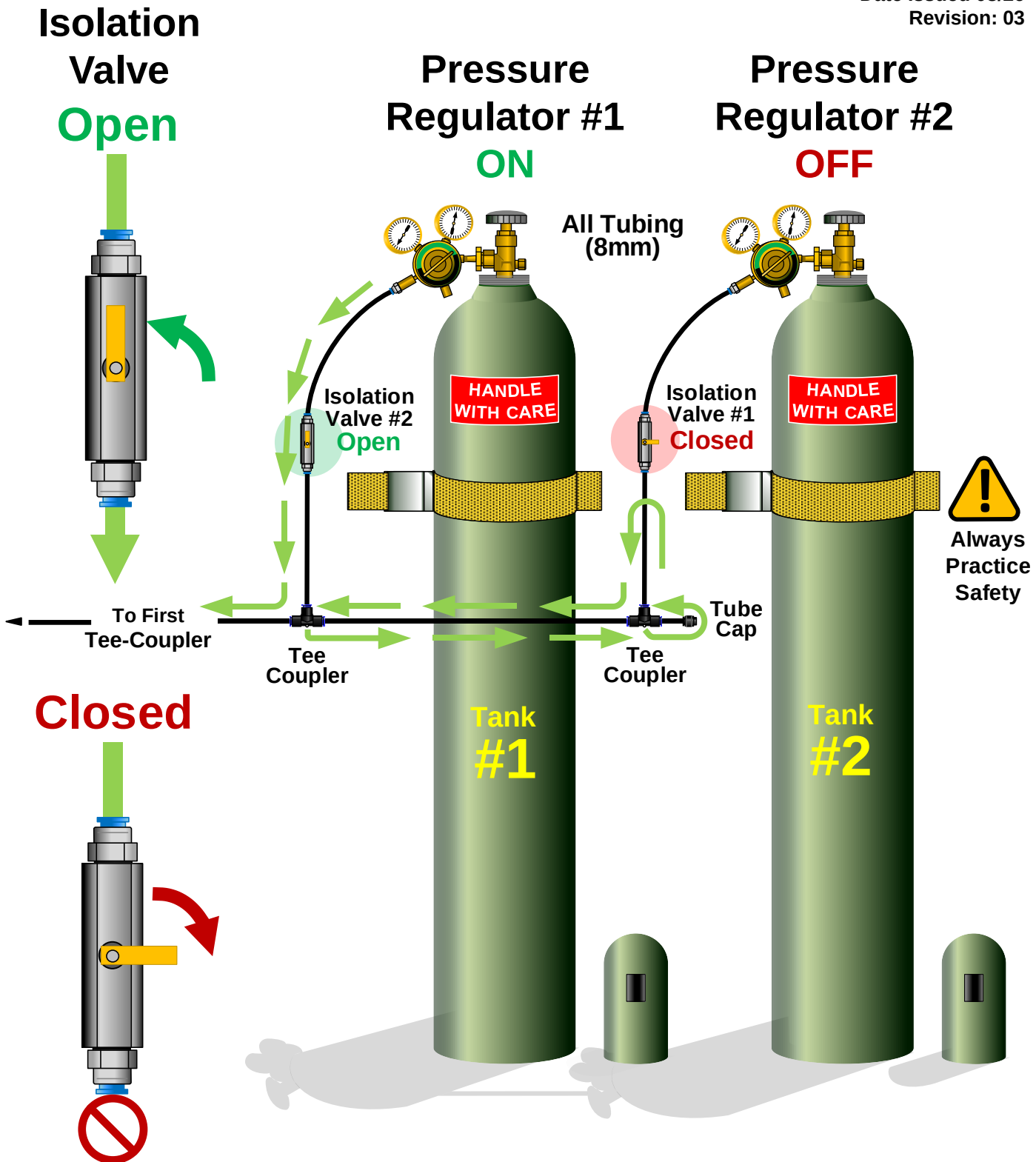


Figure 31
Dual-Tank Isolation Valve Set-up

Best Practice

Setup and Install all tubes and equipment in a neat and organized manner as shown above making sure you maintain easy accessibility to the Isolation Valves.

13.8 Push-fit the “Installer Provided” length of 8mm tube between the Tee-Couplers supplied in Dual Tank Isolation Valve Kit. (1’-2’ length suggested.) **See Fig. 30 & 31**

13.9 Push-fit the “Installer Provided” length of 8mm tube between Tank #2 Tee-Coupler and the Tube Cap supplied in the Dual-Tank Isolation Valve Kit. (3”- 4” suggested.) **See Fig. 30 & 31**

13.10 Push-fit the “Installer Provided” length of 8mm tube between Tank #1 Tee Coupler and the First Tee Coupler at the Blowing Head. (3’-4’ length suggested.) **See Fig. 30 & 31**

13.11 (See Sumitomo Recommended Procedure **SP-F04-009**) for Dual-Tank operating procedures.

Tip: *It is best to set up Dual Tank equipment in configuration/arrangement as shown in **Fig. 31**. Excess tubing lengths are not desired. Keep things organized to improve access to both Isolation Valves later.*

14.0 Maintenance Procedures

14.1 Blowing Head General and Routine Cleaning Procedures

Perform general cleaning with a soft, clean, dry cloth. Perform routine/more extensive cleaning with a soft, clean cloth and denatured alcohol (i.e. a damp wipe). Remove Fiber Bundle Drive Wheels to clean inside the upper and lower Blowing Head drive mechanism areas.

See Fig. 32

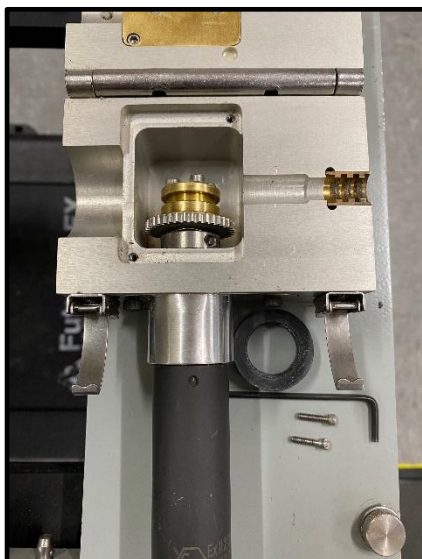


Figure 32 - Cleaning the Blowing Head

14.2 Gas Tank/Pressure Regulator Leaks

If leaking is detected at the Gas Tank/Pressure Regulator connection when the Tank Supply Valve is opened, stop operations and repair the leak before proceeding. Typically, the fitting is just not tight enough.

14.2.1 Ensure Tank Supply Valve is closed.

14.2.2 Vent the Pressure Regulator pressure to zero by inserting male quick-disconnect 8mm Tubing Adapter into female quick-disconnect fitting on Pressure Regulator and verify Tank supply gauge reads zero.

Note: *Do Not tighten fitting while it is under pressure.*

14.2.3 Firmly re-tighten Pressure Regulator fitting with large adjustable wrench or a 1-1/8” open end wrench and re-check for leaks.

Note: *Use of thread sealing tape (e.g. Teflon tape) is not recommended on High Pressure Brass Fittings.*

14.2.4 If leaking continues, inspect contact surfaces on Gas Tank and Pressure Regulator connection/mating points.

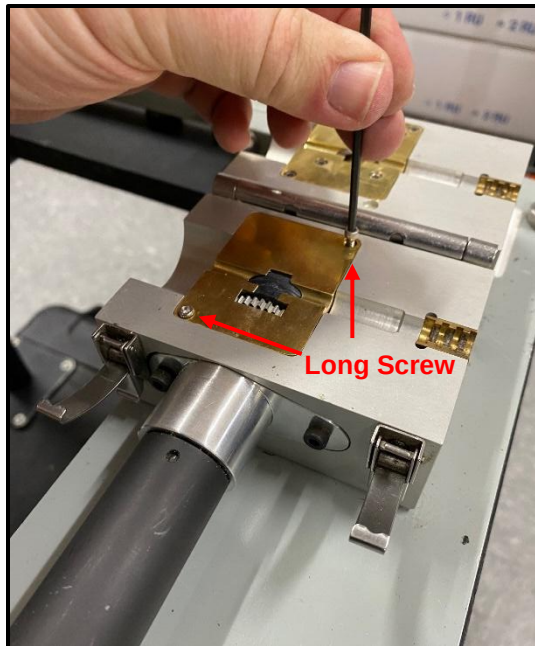
14.3 Change Fiber Bundle Drive Wheels

The Fiber Bundle Drive Wheels must be changed whenever their centerline grooves show signs of excessive wear (will cause Fiber Bundle slip) or when switching from installing one Fiber Bundle size to another (i.e. 2mm OD to 3mm OD and vice-versa).

14.3.1 Change Lower Drive Wheel Procedure

14.3.1.1 Open hinged top of Blowing Head by releasing two draw and toggle latches.

14.3.1.2 Use small 3/32” Allen wrench to remove two (2) long machine screws that secure Lower Brass Plate to lower Blowing Head section. **See Fig. 33**

**Figure 33**

Remove 2 Long Machine
Screws from Lower Brass Plate

14.3.1.3 Carefully remove Lower Brass Plate. Do not force it. If a tight fit is encountered, very gently pry the plate out being extremely careful not to gouge, scratch or damage the brass plate. See Fig. 34

**Figure 34**

Remove Lower Brass Plate

14.3.1.4 Remove Drive Wheel by peeling it away/off of the Hub. See Fig. 35

**Figure 35**

Remove the Lower Drive Wheel from the Hub.

14.3.1.5 Push replacement Drive Wheel onto the Hub. See Fig. 36

**Figure 36**

Install Lower Drive Wheel onto the Hub

14.3.1.6 Manually rotate the hub/metal gear and continue seating the Drive Wheel. Proper wheel fit and Fiber Bundle groove alignment is obtained when the raised ridge on the inside of the Drive Wheel is fully seated in the Hubs groove.

14.3.1.7 Replace the Lower Brass Plate and lightly tighten the two (2) long machine screws.

CAUTION: Use care when installing machine screws. Do not cross-thread. Do not over tighten /over torque. Lightly tighten to a “snug” fit only.

14.3.1.8 Important Note: When properly assembled, the heads of the two (2) long machine screws that secure the Lower Brass Plate to the lower Blowing Head section will protrude above the brass plate by about 1/16” (i.e. Not Flush with brass plate). This is correct. Do Not attempt to tighten the machine screws any further. Protruding screw heads fit into the recesses located in the upper Blowing Head section and act as aligning pins when the Blowing Head is closed. **See Fig. 37**

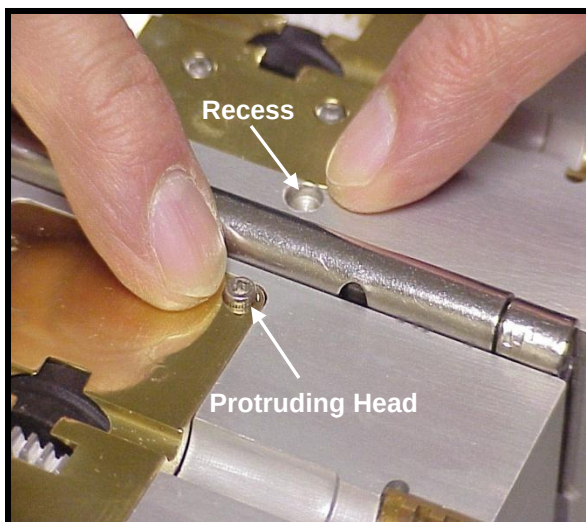


Figure 37

Correct Height for Lower Brass Plate Screws
DO NOT OVER TIGHTEN

14.3.2 Change Upper Drive Wheel Procedure

14.3.2.1 Use small 3/32" Allen wrench to remove two (2) long machine screws that secure Upper Brass Plate & Drive Assembly to Upper Blowing Head section. **See Fig. 38.**

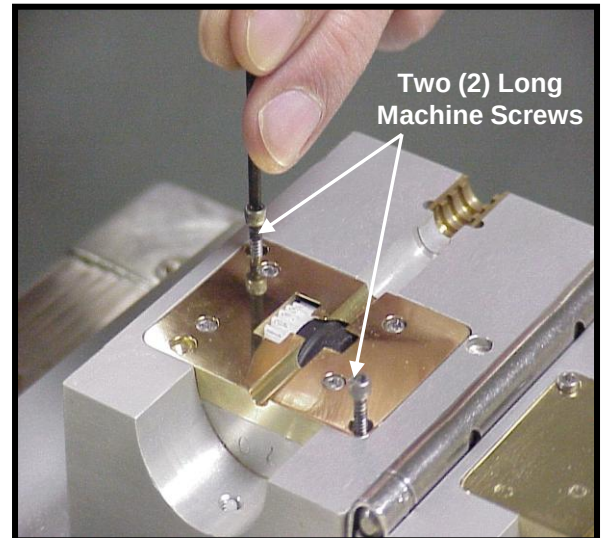


Figure 38

Remove 2 Long Machine
Screws from Upper Brass Plate

14.3.2.2 Carefully remove Upper Brass Plate & Drive Assembly. Do not force it. If a tight fit is encountered, very gently pry plate out being extremely careful not to gouge brass plate.

14.3.2.3 Use small 3/32" Allen wrench to remove four (4) short machine screws that secure Bearing Hangers. **See Fig. 39**

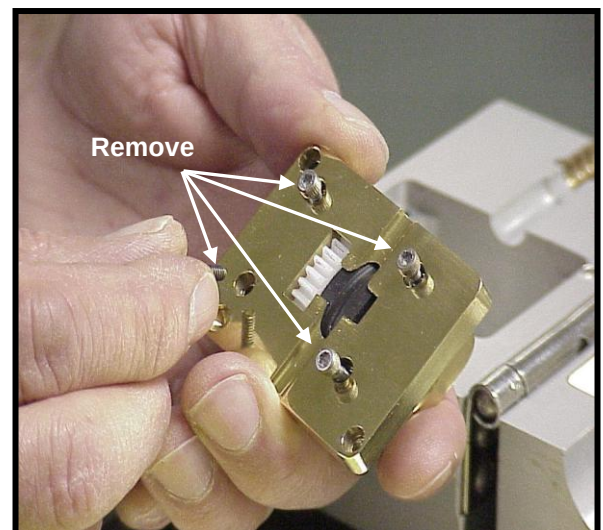


Figure 39

Remove 4 Short Machine Screws
from Bearing Hanger Assembly

14.3.2.4 Separate Bearing Hanger Assembly from the Upper Brass Plate. **See Fig. 40**

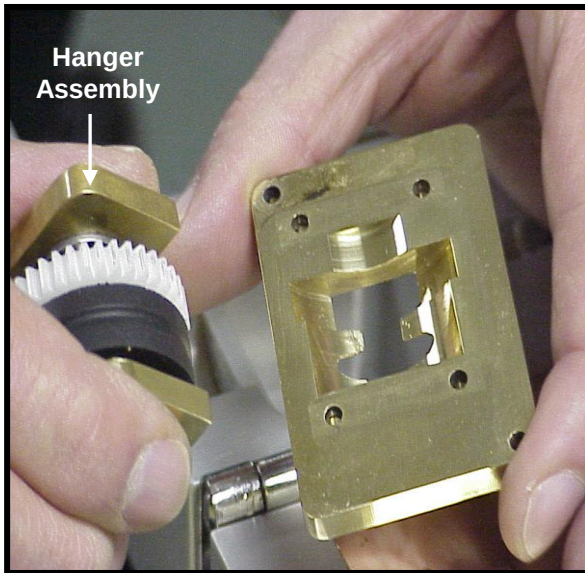


Figure 40
Remove Bearing Hanger
Assembly from Upper Brass Plate

14.3.2.6 Slide Drive Wheel-side Bearing Hanger off the hub shaft. **See Fig. 42.**

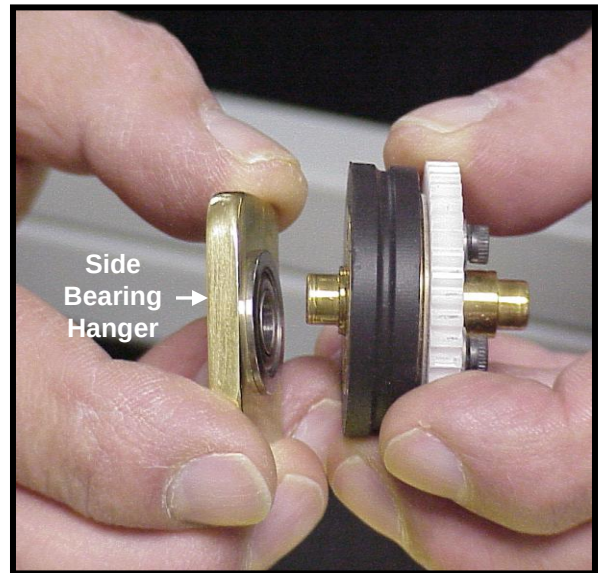


Figure 42
Remove Drive Wheel-side Bearing Hanger

14.3.2.5 Slide Gear-side Bearing Hanger off the hub shaft. **See Fig. 41**

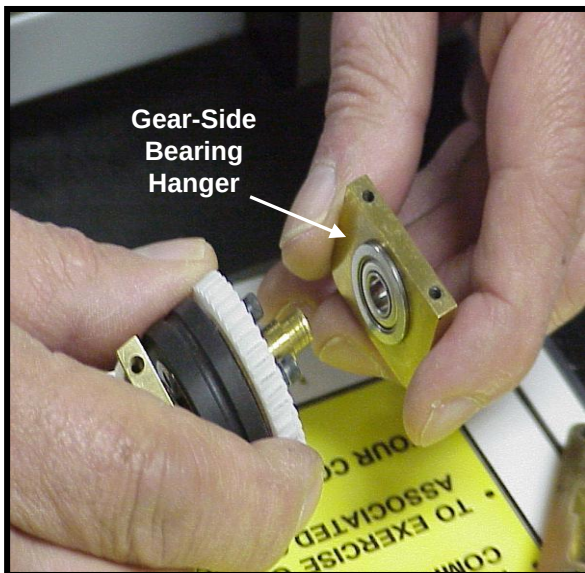


Figure 41
Remove Gear-side Bearing Hanger

14.3.2.7 Remove Upper Drive Wheel by peeling it away from the hub. **See Fig. 43**



Figure 43
Remove Upper Drive Wheel from Hub

14.3.2.8 Push replacement Drive Wheel onto the hub making sure it is properly fitted onto the hub. See Fig. 44



Figure 44

Install the Upper Drive Wheel onto the Hub

14.3.2.9 Manually rotate the hub/plastic gear and continue seating the Drive Wheel. Proper wheel fit and Fiber Bundle groove alignment is obtained when the raised ridge on the inside of the wheel is fully seated in the hubs groove.

Note: Both Bearing Hangers are identical and interchangeable. However, if not installed correctly, the bolt hole alignment will be off between the Bearing Hangers and the Upper Brass Plate.

14.3.2.10 Slide the Drive Wheel-side Bearing Hanger back onto hub shaft with the raised Bearing pointing inward toward the Drive Wheel. See Fig. 45

14.3.2.11 Side Plastic Gear-side Bearing Hanger back onto hub shaft with raised Bearing pointing inward toward Gear. See Fig. 46

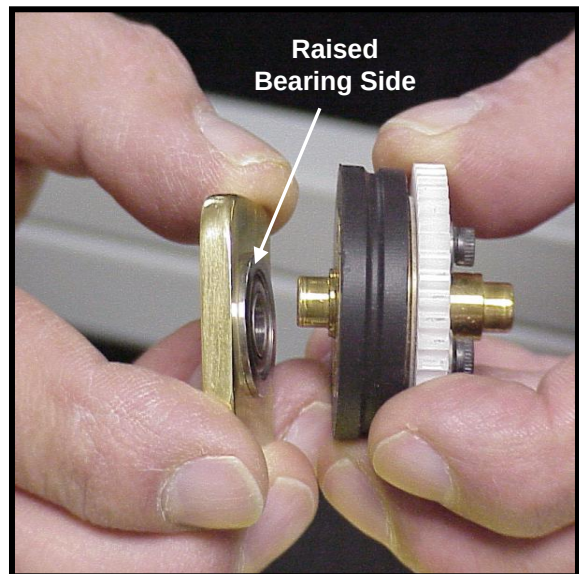


Figure 45

Install the Bearing Hanger with the Raised Bearing Inward Towards the Drive Wheel

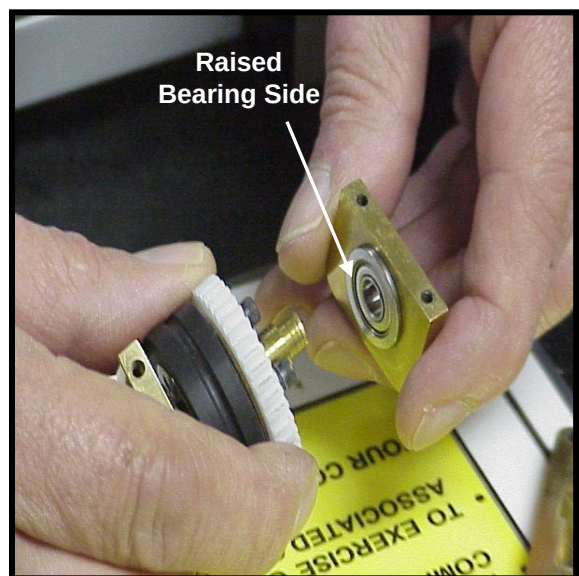


Figure 46

Install Bearing Hanger with the Raised Bearing Inward Toward the Plastic Gear

14.3.2.12 Replace the four (4) short machine screws to secure the Bearing Hanger Assembly to the Upper Brass Plate and lightly tighten. When properly assembled, the heads of the four (4) short machine screws will be flush with the Upper Brass Plate. **See Fig. 47**

CAUTION: Use care when installing machine screws. Do Not cross-thread. Do Not over tighten/over torque. Lightly tighten to a “snug” fit only.

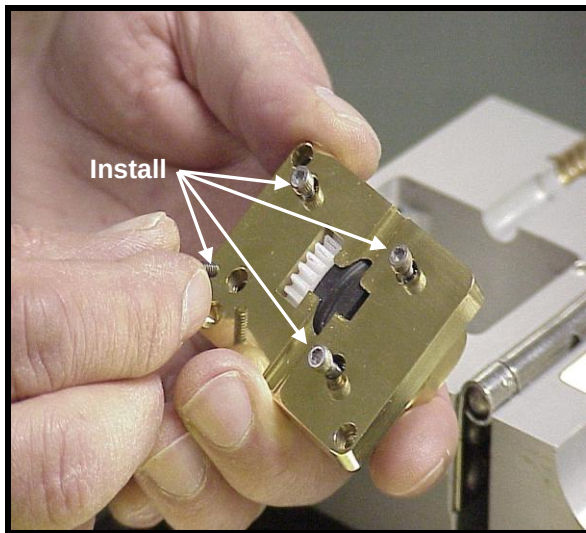


Figure 47

Install 4 Short Machine Screws
DO NOT OVER TIGHTEN

14.3.2.13 Replace two (2) long machine screws to secure Upper Brass Plate and lightly tighten. When properly assembled, the heads of the two (2) long screws will be flush with the Upper Brass Plate. **See Fig. 48**

CAUTION: Use care when installing machine screws. Do Not cross-thread. Do Not over tighten/over torque. Lightly tighten to a “snug” fit only.

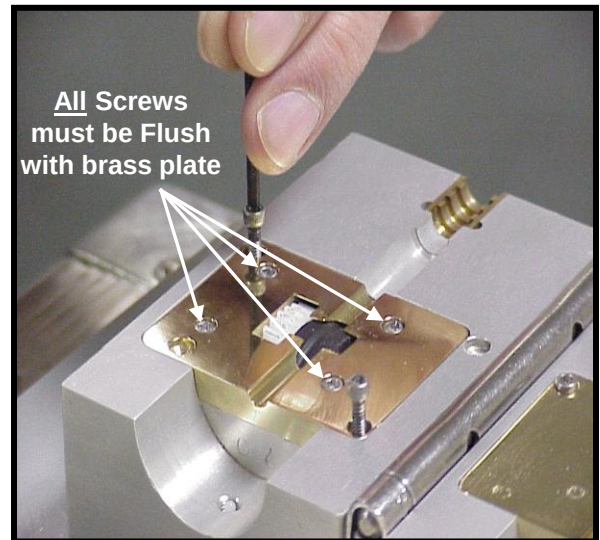


Figure 48

Install 2 Long Machine Screws
DO NOT OVER TIGHTEN

14.4 Replace Plastic Drive Gear

If the teeth on the Plastic Drive Gear in the upper Blowing Head section become worn, field replacement of the gear is authorized. Contact SEL to obtain the replacement part.

14.4.1 Remove Upper Brass Plate & Drive Assembly and both Bearing Hangers.

14.4.2 Use small 3/32" Allen wrench to remove three (3) machine screws securing Plastic Gear to hub. (Be careful with small washers.)

14.4.3 Install replacement Plastic Gear and re-install three (3) machine screws.

14.4.4 Re-install Bearing Hangers and Upper Brass Plate & Drive Assembly.

14.5 Adjusting Fiber Guide Tension Set Screw

The Fiber Guide Tension Set Screw consists of a spring-loaded plunger that applies tension on the installed Fiber Guides. The head of the Tension Set Screw is located on top of upper Blowing Head section. The spring-loaded plunger is located so it comes in contact with the installed Fiber Guides. The screw's tension is adjusted at the factory. However, field adjustment is authorized if it is required.

Note: *The set-screw tension is too loose if the Fiber Guides fall out when air pressure is applied to the Tube Span/Blowing Head. The set-screw tension is too tight if the Blowing Head latches become difficult to close or creates a gap between the upper and lower Blowing Head Block sections.*

14.5.1 To adjust, use a 1/16" Allen wrench (Installer Provided) and turn the set screw clockwise (CW) to increase plunger tension or counter-clockwise (CCW) to decrease plunger tension on the Fiber Guides. **See Fig. 49**

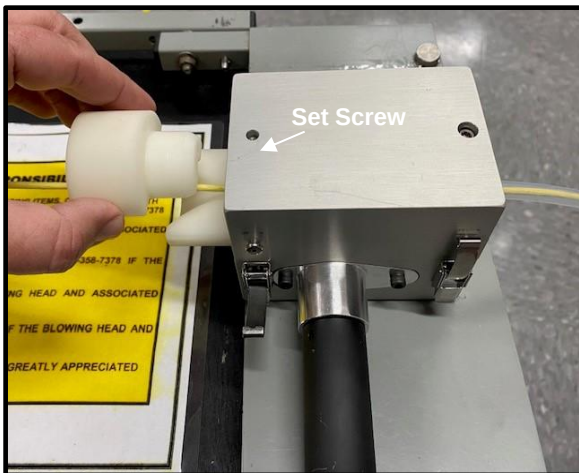


Figure 49

Fiber Guide Tension Set Screw

14.5.2 Make set screw adjustments in small increments and test-fit Fiber Guides; it is a trial-and-error adjustment. Repeat until desired tension is obtained.

14.6 Tighten Metal Gear/Hub Assembly

A Metal Gear/Hub Assembly is attached to the Air Motor output shaft with a Split-Die Clamp. Should the Clamp become loose, the Metal Gear/Hub Assembly will spin on the output shaft and the Fiber Bundle Drive Wheels will not function properly.

14.6.1 Use small 3/32" Allen wrench to remove two (2) long machine screws that secure the Lower Brass Plate to the lower Blowing Head section and remove the Brass Plate.

14.6.2 Remove the Drive Wheel by peeling it away from the hub.

14.6.3 Use the supplied large 7/64" Allen Wrench to loosen the Split Die Clamp machine screw. **See Fig. 50**

14.6.4 Slide and hold the Metal Gear/Hub Assembly in tight on the Air Motor output shaft. This places the lower Metal Gear/Hub Assembly in proper alignment with upper drive components (Plastic Gear, Upper Hub, and Upper Drive Wheel).

14.6.5 Use the supplied 7/64" Allen wrench to re-tighten the Split Die Clamp machine screw and be sure to tighten firmly.

14.6.6 Reinstall Drive Wheel and Lower Brass Plate.

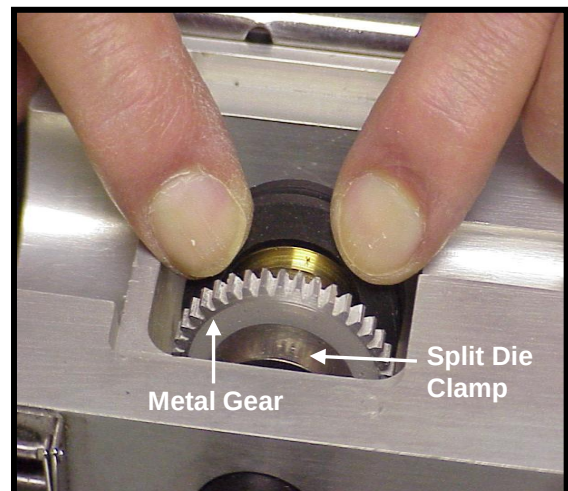


Figure 50

Metal Gear/Hub Assembly
and Split Die Clamp

14.7 Remove the Blowing Head from the Stand.

The Blowing Head may be removed from the Payoff Stand Shelf for cleaning or to support Fiber Bundle installation efforts where it is not practical to set up the Transit Case (e.g. in a Maintenance Hole, in a ceiling or other obscure or confined area). Step 1 - **See Fig 51**

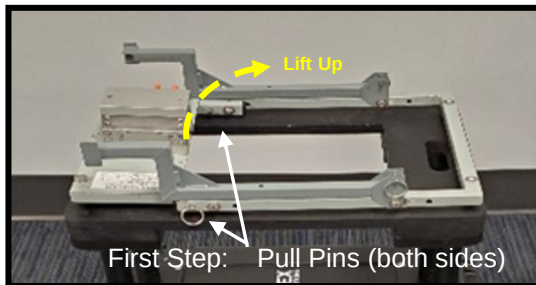


Figure 51
Blowing Head Removal Procedures

14.7.1 Remove two (2) fasteners (knurled-head bolts) that secure front of Payoff Stand Shelf to the Inner Case. Lift the hinged Shelf to gain access to the two (2) thumb screws under the Blowing Head. **See Fig. 52**

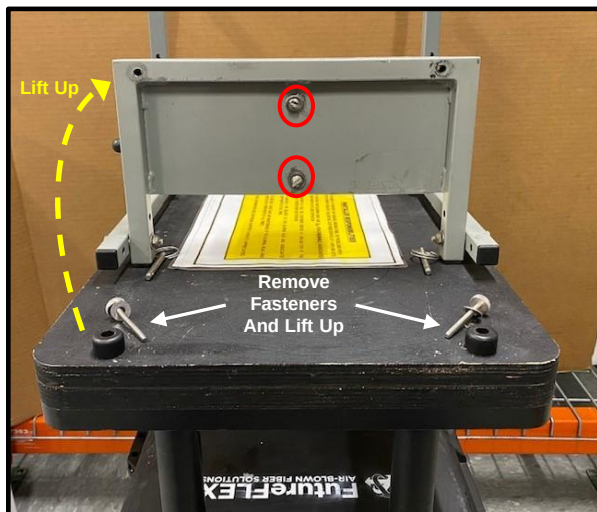


Figure 52
Payoff Stand Shelf shown Lifted for
Access to the Blowing Head Fasteners

14.7.2 Remove Thumbscrews by Hand and separate the Blowing Head from the Shelf. **See Fig. 53**

14.7.3 Reassemble in the reverse order.

Note: When re-installing the Blowing Head, ensure it aligns with the fiber reel so the Fiber Bundle feeds into the “Back” of the Blowing Head.



Figure 53
Blowing Head Shown Removed from the
Payoff Stand Shelf

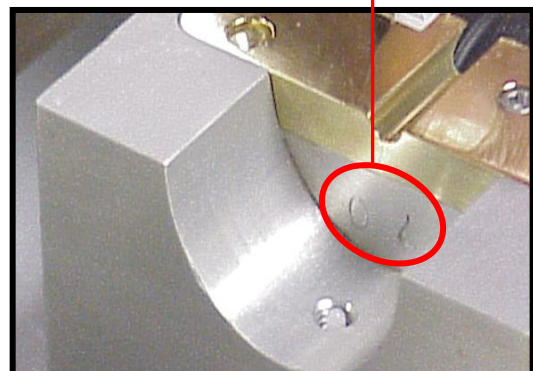
14.8 Replacement of a Blowing Head Air Motor

If the Blowing Head Air Motor operation becomes erratic or the metal Drive Gear inside the Blowing Head cannot be rotated, the Air Motor may have become defective (frozen/seized).

14.8.1 Field replacement of the individual Air Motor is Not authorized.

14.8.2 Contact SEL to obtain a replacement Blowing Head/Air Motor Assembly. (P/N - BE300)

Note: The defective Blowing Head Serial Number must be provided to SEL. (Stamped inside the Fiber Guide Areas)



15.0 BE300 Equipment Design and Layout

Note: All equipment is packaged to fit neatly inside the Transit Case. SEL ask's that each technician pays close attention to the way the equipment is organized inside the case prior to unpackaging. Please re-package the complete kit the same way it was delivered to avoid any Damages that may be Incurred during Shipment. **See Fig. 54**

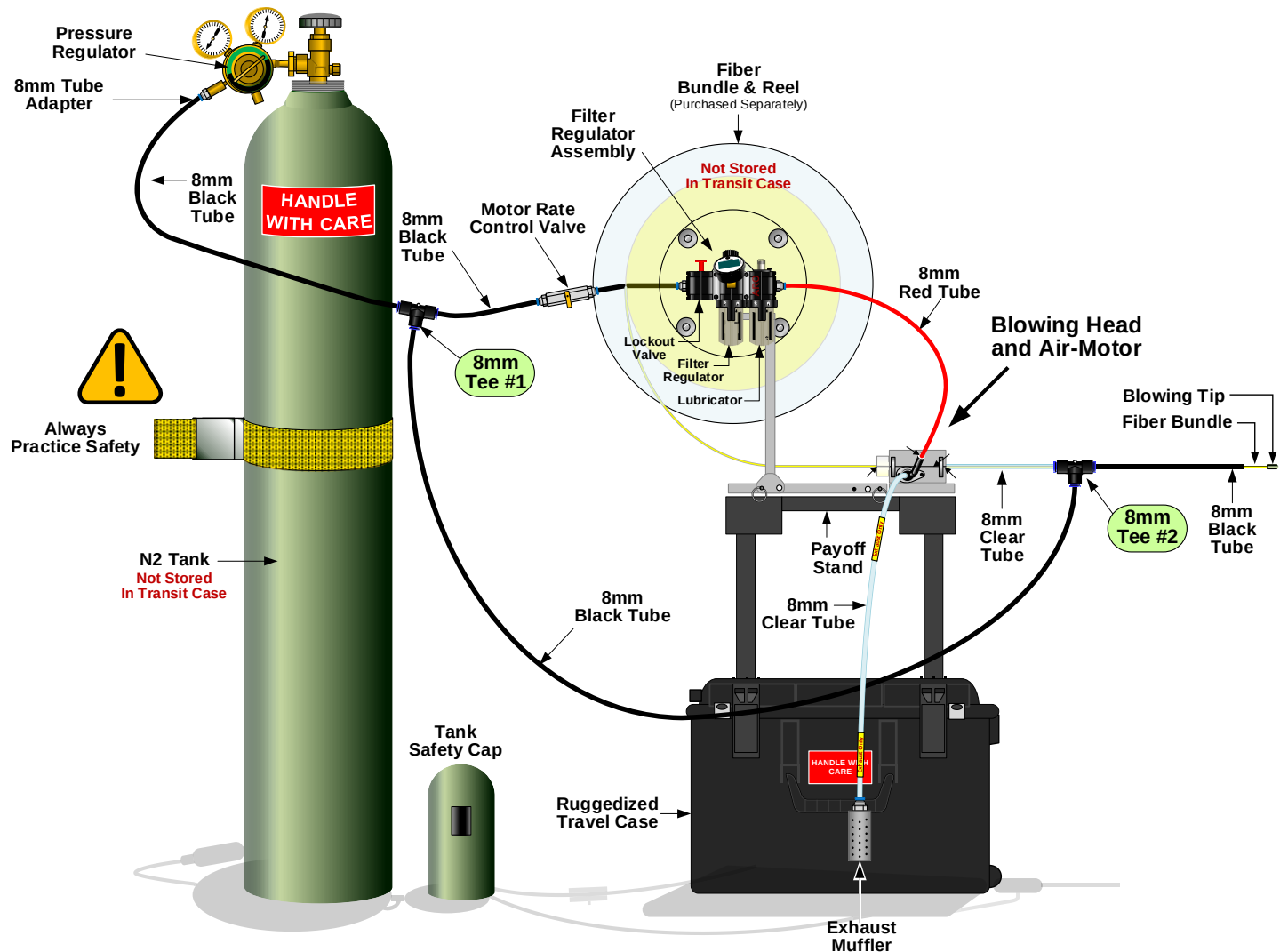


Figure 54
Transit Case Design and Layout