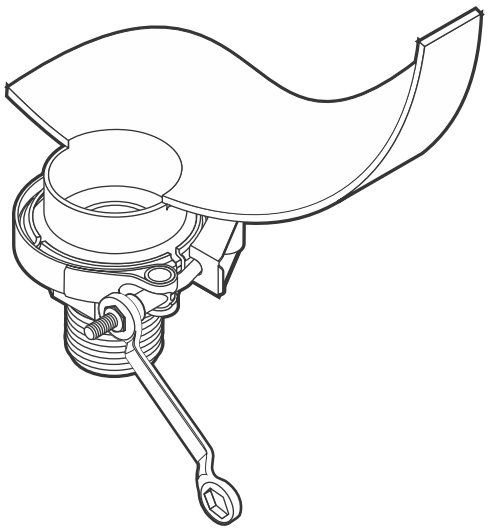

# PSP®

## PermaShield Pipe

Stainless Steel Corrosive Fume Exhaust Systems With PermaShield Fluoropolymer Barrier Coating

## INSTALLATION AND ASSEMBLY GUIDE

Catalog 10/12.8

Fab-Tech, Inc.
A Critical Process Systems Group Company

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## INTRODUCTION:

In 1991, Fab-Tech Incorporated formed a unique partnership with a leading fluoropolymer manufacturer to to develop and manufacture a new generation of corrosive fume exhaust systems. The result of shared technologies was the creation of PermaShield Pipe (PSP®). PSP® is a system that combines the structural integrity of stainless steel with the superior corrosion resistance of PermaShield Fluoropolymer Barrier Coating. PermaShield Pipe was crafted to meet the demanding safety standards of building and fire code officials as well as industry regulators and insurers.

PSP® duct is designed and manufactured to withstand the effects of corrosive environments found in most fume removal systems. The coating process requires that very stringent manufacturing tolerances be maintained and that a high temperature, multi-bake process be used to achieve proper coating thickness and integrity.

PSP® systems provide total ease of installation and maximum flexibility in the field. One of the significant features of PSP® contributing to the ease of installation is that our duct is a FACTORY MUTUAL SYSTEM approved duct for fume and smoke evacuation without the use of sprinkler heads in the duct system. With proper handling and installation, you'll find the reliability of stainless steel with PermaShield Fluoropolymer Barrier Coating and PTFE gaskets will provide long term benefits and years of worry free productivity.

This guide is intended to aid you in the proper handling of our duct and to assist you in the assembly of the various types of joints necessary to maintain system integrity.

## DAMAGE AND LOSS:

Fab-Tech's responsibility for damage, loss or delay on shipments ceases on acceptance of shipment by the freight line. Any claim for such damages, loss or delay must be filed with the freight line by the consignee. Consignee must inspect the shipment upon delivery and note any and all damages or discrepancies on the bill of lading. Consignee has 15 days after receipt to notify the freight line of damage and 9 months to file such claims.

## DUCT JOINING SYSTEMS:

PSP® duct and fittings are manufactured with either a bolted companion ring joining system or with a single fastener band-style clamping system.

The companion ring joining system is available as cast rings in duct sizes from 4" to 14" diameter and as angle rings in duct sizes from 4" to 120" diameter. Duct 4” to 14” diameter are manufactured with stainless steel cast rings as standard.

The band-style joining system ( PSP-EZ™ ) is available in duct sizes from 2" to 14”. All joints use Gore-Tex® 100% fully expanded PTFE gasket technology.

## COATING:

The PermaShield Fluoropolymer Barrier Coating is inspected at the factory. Sharp tools, grinding operations and dirt must be kept away from the duct at all times. PSP® products rely on coated flange faces to provifde a continuous corrosion barrier. Leave the packaging on the duct ends until just before installation.

## DAMAGED COATING:

Extreme care must be taken throughout the entire handling and installation process to protect the coating. During transportation or installation, the PSP® coating may become scuffed and still be acceptable. An unacceptable piece of PSP® is when the coating has been damaged to the extent that the stainless steel has become visible and/or the duct fails at spark test ( refer to the spark test procedure in this guide ). An unacceptable piece can usually, but not always, be repaired in the field. Repair instructions and kits are available by contacting the factory. Repair instructions are also included as part of this guide. Any damaged piece that cannot be field repaired must be either factory repaired or discarded and replaced with new PSP® duct.

## WARRANTY:

Any field installations or post installation operations must be performed using factory authorized procedures and accessories or the Fab-Tech warranty will be void.

## PROTECTION OF THE COATED SURFACE

Proper handling and storage of PSP® duct / fittings is crucial to a successful installation. While the stainless steel body of PSP® can absorb a great amount of abuse, any coated surfaces must be handled with extreme care.

- If possible, transport fitting / control devices to installation site with all transportation packaging intact. All PSP® fittings are shipped with poly sheet over the ends to help prevent contamination and to protect the exposed outer coated surfaces of the flanges.
- Materials should not be stored in an area where the possibility of damage from traffic or debris may occur. If possible, store PSP® duct indoors as additional protection from dirt and debris.
- PSP® must not be stored on its flanges without some type of protective material ( pallets, corrugated cardboard, styrofoam or similar material ) on the coated faces to prevent damage to the coating.
- It is recommended that all coated surfaces be protected up to the point at which the gasket is installed before final fit up.
- Palletized or crated product should not be stacked, impacted, knocked or dropped.
- Pallets / crates containing PSP® product should not be handled when the bolts securing the product to the base have been loosened or removed.
- Pallets are constructed to be lifted by a forklift with forks / fork extensions that are long enough to span the entire skid ( when lifting from the side ) or extend at least 60% of the length of the entire skid / crate ( when lifting from the end ).
- If such equipment is not available, then dragging or pushing the skid / crate slowly on a level surface is acceptable ( out of an enclosed trailer for example ).
- If it is necessary to move larger pieces by hand ( pieces too large to carry ), make sure to roll them on the angle rings to protect the coated flange faces from abrasive surfaces.
- When packaging is removed, extra care must be taken to prevent damage to the exterior surfaces and all coated areas. Avoid direct contact of the flange coating with asphalt or concrete and duct should never be dragged along the ground.
- PSP-EZ™ duct is shipped with tape gasket material pre-installed at the factory. To prevent possible damage to the gasket and the backing rings, this duct should always be staged or stored vertically. Since EZ duct joints use backing rings rather than stronger companion rings, the duct can compress out of round with moderate force which could cause the backing ring to become detached from the tape gasket.
- Take care to prevent contact between cutting tools and coated flanges. Tools should never come in contact with any coated surface.
- Under no circumstances shall welding or a heat source greater than 300°F (150°C) be allowed on the stainless steel surface of the duct.

## HANDLING

### Care must be taken when transporting uncrated PSP® Products

- Estimated weights of fittings can be found in the Installation And Assembly Guide and control device estimated weight will be supplied upon request. Use proper lifting equipment to move larger PSP® products.
- When moving fittings / devices, the part should be properly supported to prevent any bending of flanges, denting and scratches to the body of duct.
- Control devices require special care to avoid damage to housings or support structures.
- When lifting, the fitting or device must be uniformly supported to prevent bending of flanges and racking of control devices.
- Care must be used to prevent mechanical damage to the drive system ( motor or chain wheel, etc. ) on all control devices.
- When installing gear drive blast gates, the gate structure must be supported by the provided support lug or other support structure.
- For control devices equipped with limit switches, the open / closed limits must be re-verified before automated operation.

The joining of PSP® to duct materials other than Fab-Tech's PSP® does not present any problems if handled properly.

**Flanged Joints - All Materials:**

In almost all cases a flange can be added to other products already used for corrosive fume exhaust systems. Wall thickness for various products to be joined may vary. The minimum information required by Fab-Tech to manufacture a matching joint is the inside diameter (I.D.) of the existing duct, and the inside diameter (I.D.) and outside diameter (O.D.) of the flange to which PSP® is to be attached.

Flanges come in many different ratings and styles. When arranged by the buyer, Fab-Tech will make sure that bolt hole circles will match by providing a flange fabricated to the buyer's specifications. (Fig. 1)

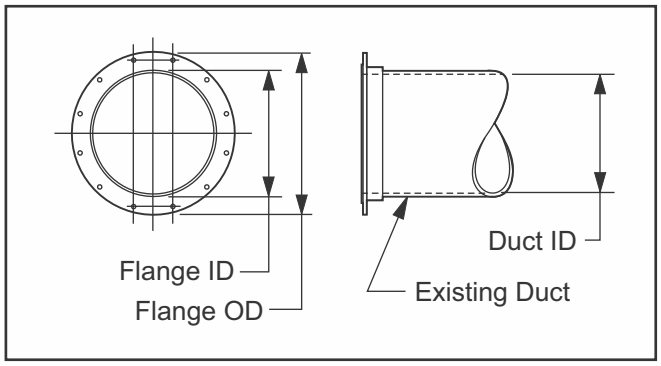



Fig. 1: Joining Dissimilar Flanged Materials

**Unflanged Joints - All Materials:**

Fab-Tech can manufacture a fitting with a specified outside diameter (O.D.) or inside diameter (I.D.) that is to be used in a simple male / female joint. This PSP® fitting will have either one end with an O.D. (male) that will be equal to the I.D. of the "existing" duct; or an I.D. (female) that will be equal to the O.D. of the "existing" duct. If the "existing" duct is FRP, follow the procedures outlined by the FRP manufacturer for this type of connection with the exception that **the PSP® shall not have the end and/or coating roughened.** ( Fig. 2 )

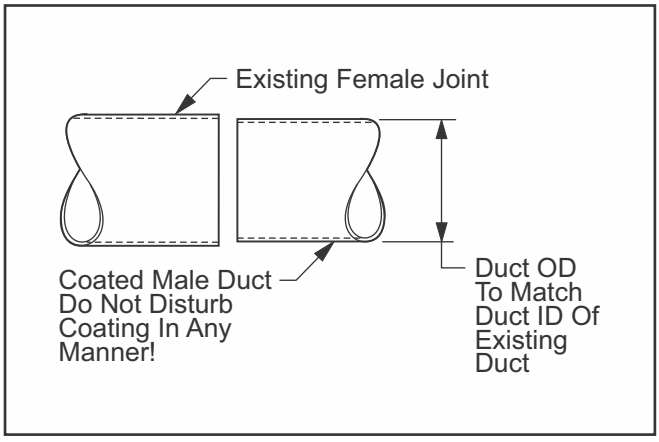



Fig. 2: Joining Dissimilar Unflanged Materials

## GENERAL:

The 4" and larger bolted companion ring system has unique installation requirements. Companion rings are available in sizes from 4" to 120". The minimum number of mounting holes for companion ring connections is one hole for each 4" of duct circumference rounded up to the next higher number of holes. See the catalog for specific ring information. The standard configuration for companion ring joints varies with duct size. They are as follows:

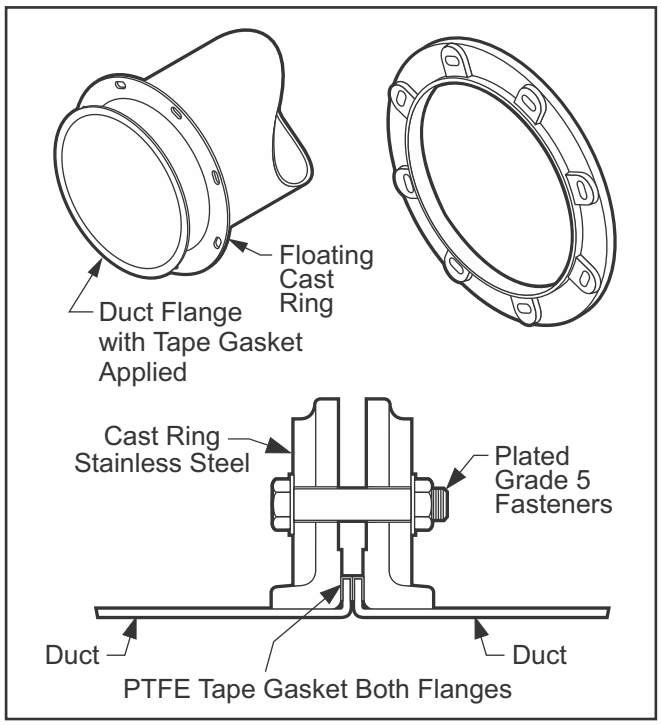



Fig. 3: Floating cast rings 4" - 14"

**4"-14" PSP® Floating Rings:** Duct from 4" to 14" diameter with companion ring joints are manufactured with duct flanges and floating black iron or stainless steel cast rings. ( Fig. 3 )

**16"-30" PSP® Floating Rings:** Duct from 16" to 30" diameter with companion ring joints are manufactured with duct flanges and floating black iron or stainless steel angle rings. ( Fig. 4 )

**32"-106" PSP® Fixed Rings:** Duct in the 32" to 106" diameter range are manufactured with duct flanges and with the black iron or stainless steel angle rings tack welded to the duct. The standard mounting hole locations for fixed angle rings straddle the vertical centerline unless otherwise specified. ( Fig. 5 )

**108"-120" PSP® Welded Rings:** Duct 108" diameter and larger are manufactured with no duct flanges and stainless steel angle rings welded directly to the duct end. The standard mounting hole locations for welded angle rings straddle the vertical centerline unless otherwise specified. ( Fig. 6 )

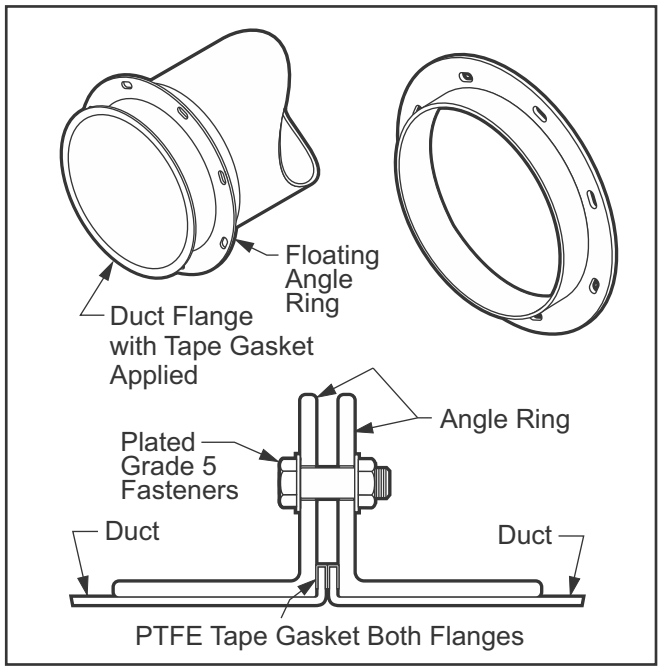



Fig. 4: Floating angle rings 16" - 30"

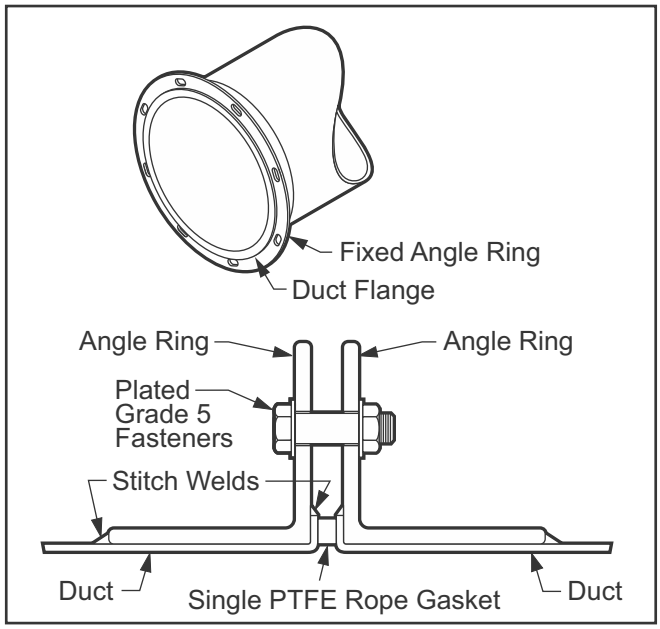



Fig. 5: Fixed angle rings 32" - 106"

## GENERAL ( cont'd ):

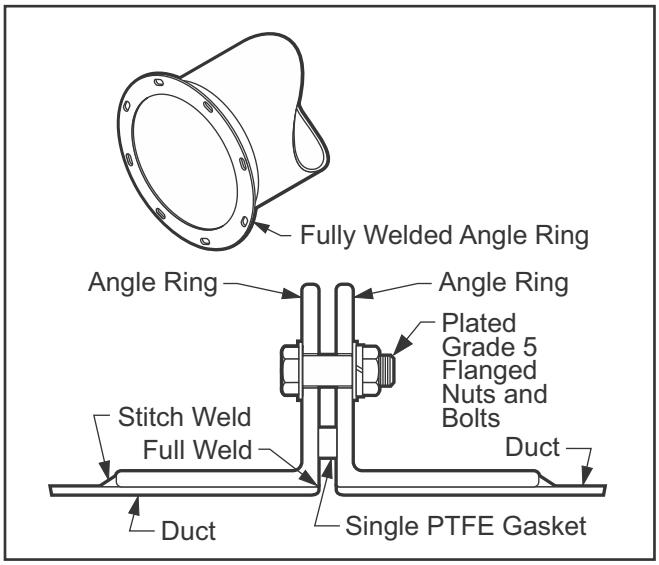



Fig. 6: Welded angle rings 108" - 120"

**Gaskets:** Standard PSP® products are shipped complete with all gaskets to complete the joints. The gasket material shall be a form in place, fully expanded 100% PTFE joint sealant. Use care when matching the gaskets. Substituting other gaskets will void the warranty of the product. If a PSP® duct joint is disassembled for any reason, the gasket has been disturbed and must be replaced.

The gaskets for PSP® companion ring duct joints come in either loose bag lengths or on rolls. Please note that different type gaskets are used for different diameters of PSP® duct. ( Fig. 7 )

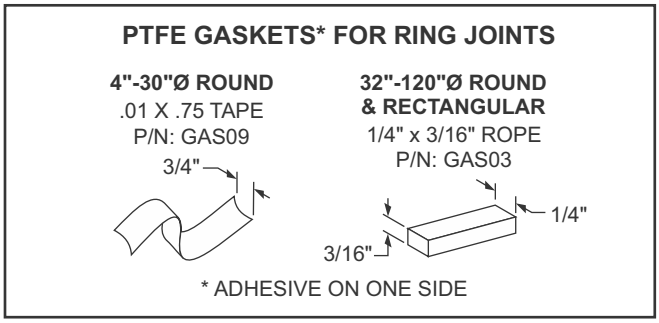



Fig. 7: Gasket size vs duct size

**Hardware:** PSP® products are shipped complete with all hardware to complete the joints. The hardware shall be plated SAE Grade 5 flanged nuts and bolts. Use care when matching the hardware. Substituting other hardware will void the warranty of the product. Stainless steel fasteners are available on request but not recommended. Please note bolt / torque requirements vary with duct diameters. ( Fig. 11 )

## PROCEDURE:

### TOOLS REQUIRED:

Low torque air wrench
Socket wrenches
Box wrenches
Cutting tool
Calibrated torque wrench
Lint free cloth

**1. Inspect Duct:** All companion ring pieces are shipped with poly sheeting over the ends to help prevent contamination and to protect the outer surface of the duct flange / ring. Carefully remove the poly sheeting and inspect the interior coated surface and the outer flange surfaces to insure the integrity of the system. Wipe away any dust and debris using a soft lint free cloth. Do not, under any circumstances, install a piece of duct or fitting that has visible damage. Do not penetrate the coating for any reason except when using approved modification systems. Gasket tape is pre-installed on 4"-14" duct.

**2. Cut Flange Gasket:** If pre-cut gasket lengths are not provided for 32"-100" duct, cut rope gaskets to the correct length by wrapping the gasket around the duct and adding approximately 2" to the length for overlap. Only one gasket is required for each joint.

**3. Install Gasket 4"-30":** If the duct or fitting joint already has gasket tape applied, skip this step. Otherwise, the PTFE gasket is now applied which comes as an adhesive backed tape. Slide the floating ring a comfortable distance away from the duct flange. Peel back the adhesive backing paper. Start ( A ) by firmly pressing the adhesive side of the tape to the flange edge first at an angle tangent to the duct opening. Holding the end of the tape firmly in place, continue applying the tape ( B ) by pulling and tacking it along the edge of the duct flange. There will be enough width to the tape to be able to press the tape about equal amount onto the front and back sides of the flange. To complete this process ( C ), overlap the tape ends 1/2" to 1". Then firmly press the tape onto the flange front and back to guarantee complete adhesion. Ensure about 80% of the front or outward flange surface area is covered with sealant tape for best mating joint. Slide the floating ring back against the flange for duct installation. (Fig. 8)

**PROCEDURE (cont'd):**

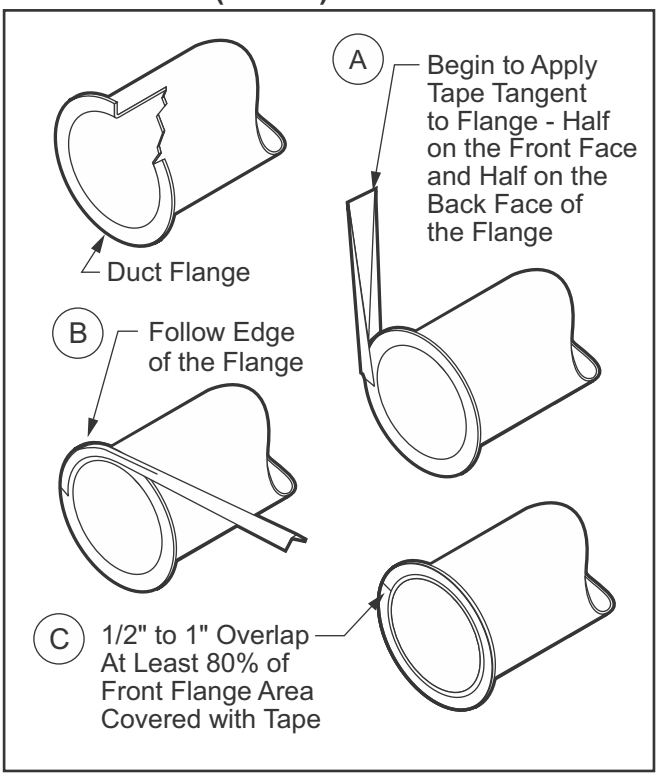



Fig. 8: Apply gasket for 4" to 30” duct

**4. Install Gasket 32"-106":** To start installation, snap the gasket to peel the backing near one end. Press the exposed adhesive side of the gasket firmly onto the duct flange below one of the angle ring holes at the top of the ring. Smoothly adhere the gasket around the outside edge of the 3/8"-3/4" wide duct flange. Overlap the end between 1" and 2". Then run a finger around the gasket to seat the adhesive. (Fig. 9)

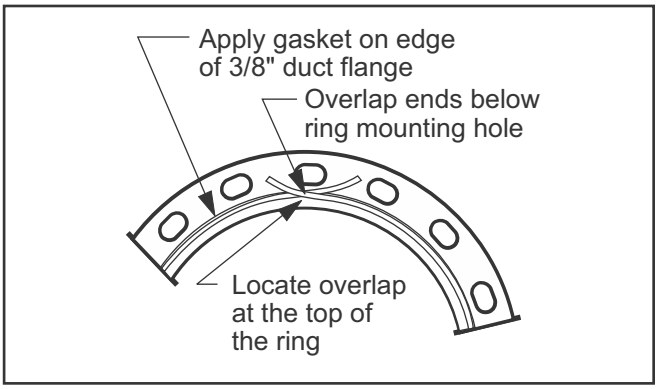



Fig. 9: Gasket installation for fixed rings 32"-100" dia.

**5. Install Gasket 108"-120":** For larger sizes of duct, the angle ring is fully welded to the raw end of the duct thus eliminating the duct flange. On these sizes of duct, install the rope gasket around the face of the angle ring the same as in the previous step approximately half way between the bolt holes and the inside diameter of the duct. Finish by overlapping the gasket just below the beginning bolt hole at the top of the ring and then continue up next to the hole before trimming. Again, run a finger along the gasket to seat the adhesive. (Fig. 10)

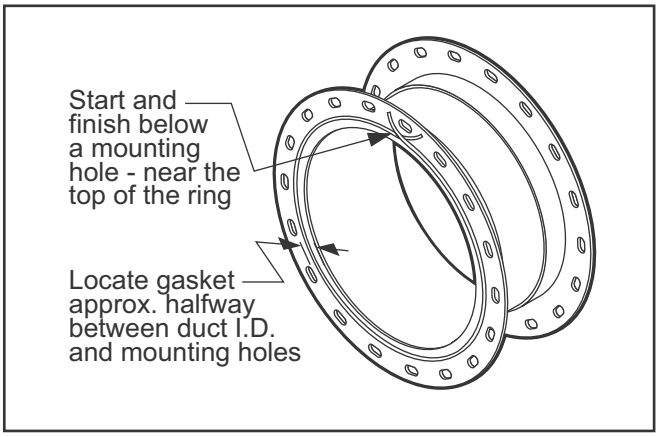



Fig. 10: Gasket installation for welded rings 108"-120" dia.

**6. Install Hardware:** Care must be taken not to disturb the gasket during duct positioning. Bring the duct ends directly into place without shifting side to side and start a few bolts on opposite sides of the ring. Check the alignment of the duct sections and when satisfied, install the remaining fasteners. Each plated Grade 5 flanged bolt should be installed with a plated Grade 5 flanged nut. Tighten all fasteners finger tight. (Fig. 3,4,5, & 6)

**7. Torque Hardware:** Tighten the bolts in an alternating star pattern with a low torque air wrench or by hand. Tighten all bolts with a calibrated torque wrench to the Fab-Tech recommended torque values. (Fig. 11)

**8. End of Procedure:**

Plated SAE Grade 5 fasteners standard for angle rings
Stainless Steel fasteners available on request

| Duct Dia. | Bolt Size | | Torque Specifications: Torque in at least 3 stages | | |
|---|---|---|---|---|---|
| | | | Ft lb | In lb | M kg |
| 4"-10" | 3/8" | Grade 5 | 36 | 432 | 5.0 |
| | | S.S. | 20 | 240 | 2.8 |
| 12"-120" | 1/2" | Grade 5 | 75 | 900 | 10.4 |
| | | S.S. | 45 | 540 | 6.2 |

Fig. 11: Hardware size and torque specifications

# Installing 4"-14" PSP-EZ™ Duct

## GENERAL:

The PSP-EZ™ clamp system has unique installation requirements. PSP-EZ™ duct is available in sizes from 2" to 14" and the standard configuration varies with duct size. The standard configuration for 4" to 14" PSP-EZ™ joints is as follows:

**4"-14" PSP-EZ™:** Duct from 4" to 14" diameter with PSP-EZ™ joints are manufactured with duct flanges, floating EZ backing rings and utilize single fastener band style clamps. The clamps shall provide a minimum compression load to the gasket of 900 PSI. (Fig. 12)

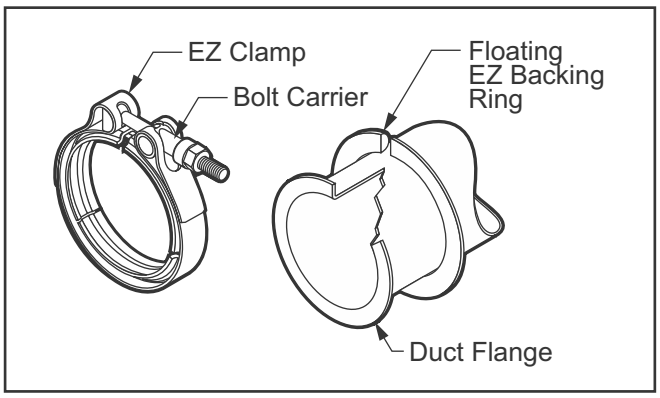



Fig. 12: 4"-14" PSP-EZ™ configuration

**Gasket:** 4" thru 14" PSP-EZ™ duct and fittings are shipped with gasket tape applied at the factory. The gasket material (Gore-Tex®) shall be a form in place, fully expanded 100% PTFE joint sealant. Each joint requires gasket tape on both mating duct and/or fitting flanges. Substituting other gaskets will void the warranty of the product. If a PSP-EZ™ joint is disassembled for any reason, the Gore-Tex® gasket has been disturbed and must be replaced.

## PROCEDURE:

**TOOLS REQUIRED:**

7/16" Box wrench
Low torque power driver
7/16" Deep socket driver
Calibrated torque wrench
Lint free cloth
Locking pliers

**1. Install Gasket:** If the duct or fitting joint already has gasket tape applied, skip this step. To begin, slide the backing ring firmly against the flange. The PTFE gasket is now applied which comes as an adhesive backed tape. Start ( A ) by applying the tape to the flange surface first at an angle tangent to the duct opening. Firmly press the tape onto the flange. There will be enough width to the tape so that you will be able to press the tape onto the back side of the backing ring. Holding the end of the tape firmly in place, continue applying the tape ( B ) by pulling and tacking it along the edge of the backing ring. To complete this process, ( C ) overlap the tape ends 1/2" to 1". Then go back and firmly press the tape onto the flange and backing ring to guarantee complete adhesion. The gasket tape has a secondary function to helping to hold the backing ring firmly against the flange. Make sure that at least 80% of the flange surface area is covered with the sealant tape. (Fig. 13)

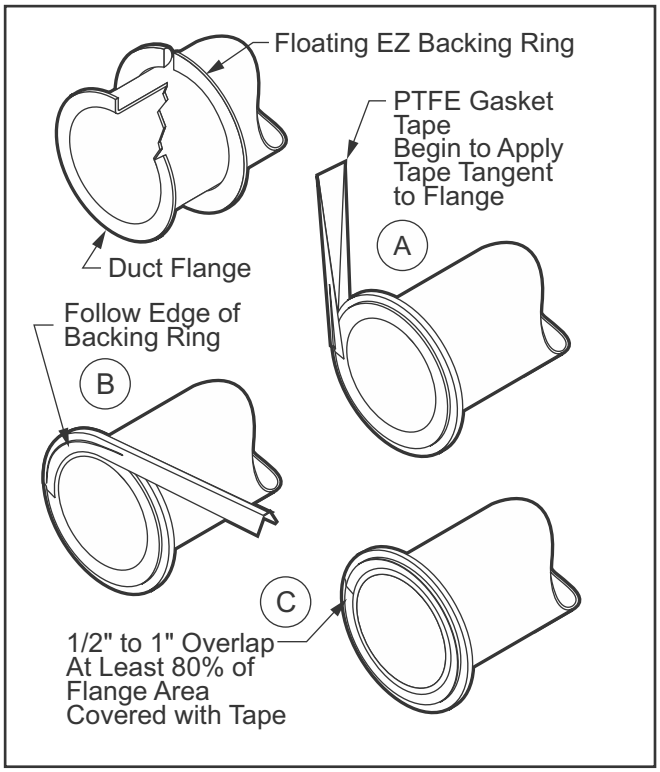



Fig. 13: Apply gasket for 4" to 14" PSP-EZ™ duct

**2. Bring Flanges Together:** Carefully bring together the two flanges to be joined. Duct support hangers are the best method for aligning duct prior to installation. Secure this positioning using special locking pliers. (Fig. 14)

**PROCEDURE (cont'd)**

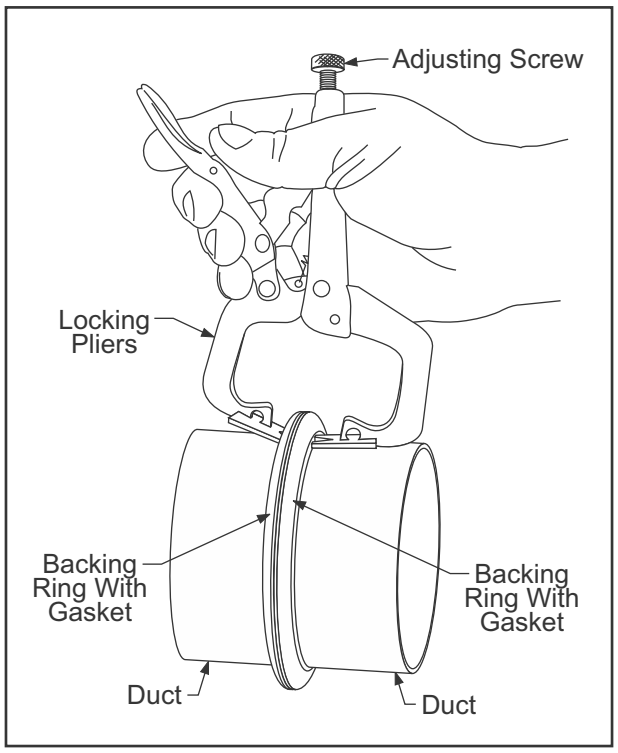


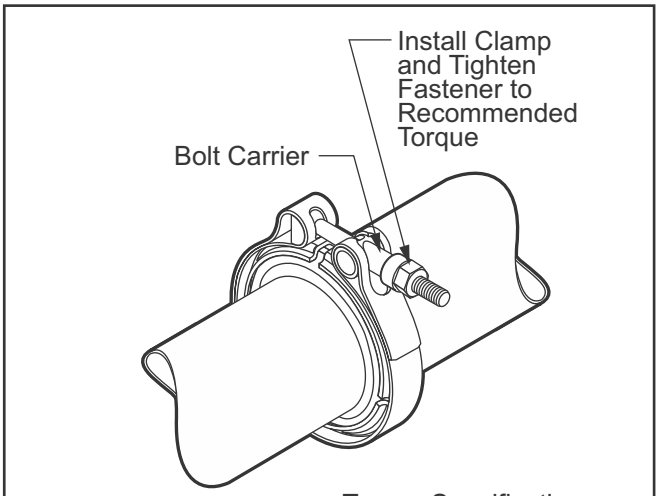

Fig. 14: Secure duct alignment with locking pliers

**3. Install Clamp:** Using both hands, open the clamp and carefully slip the clamp onto the backing rings so that the "V" shaped groove in the clamp accepts each round surface of the backing rings. When the clamp is fully engaged around the entire circumference, insert the clamp bolt through the carrier and start the locknut on the bolt.

**4. Tighten Clamp:** Using a 7/16" wrench or low torque power driver, tighten the clamp by tightening the nut on the clamp fastener until the clamp just starts to grip the gasket. Although this method of joining duct is self aligning, visually inspect the joint to ensure proper alignment of the flanges and proper seating of the backing rings in the clamp. Remove the locking pliers. Tighten the clamp until resistance to further tightening is felt.

**5. Torque Bolt:** When satisfied with the alignment, tighten the clamp bolt to the specified torque with a calibrated torque wrench. (Fig. 15)

**6. End of Procedure:**




| Duct Dia. | Bolt Size | Torque Specifications: Torque in at least 3 stages | | |
|---|---|---|---|---|
| | | lb*ft | lb*in | kg*m |
| 4",6" | 1/4" | 6.25 | 75 | 0.9 |
| 8",10",12",14" | 5/16" | 10 | 120 | 1.4 |

Fig. 15: Hardware size and torque specifications

## GENERAL:

The 2" and 3" sizes of the Fab-Tech EZ clamp system have unique installation requirements. All pieces are shipped in poly sheeting to help prevent contamination and to protect the outer surface of the flange. Remove the pieces from the poly sheeting and inspect the interior coated surface and the outer flange surfaces to insure the integrity of the system. Do not, under any circumstances, install a piece of pipe or fitting that has visible damage. Do not penetrate the coating for any reason except when using approved modification systems.

The standard configuration for 2" & 3" PSP-EZ™ joints is as follows:

**2" & 3" PSP-EZ™:** EZ fittings and Fab-Tech Flange System adapters which utilize the PSP-EZ™ joining system are only manufactured in 2" and 3" diameter sizes. These fittings are manufactured with machined EZ rings welded to the ends of the duct or fitting and utilize single fastener band style clamps. (Fig. 16)

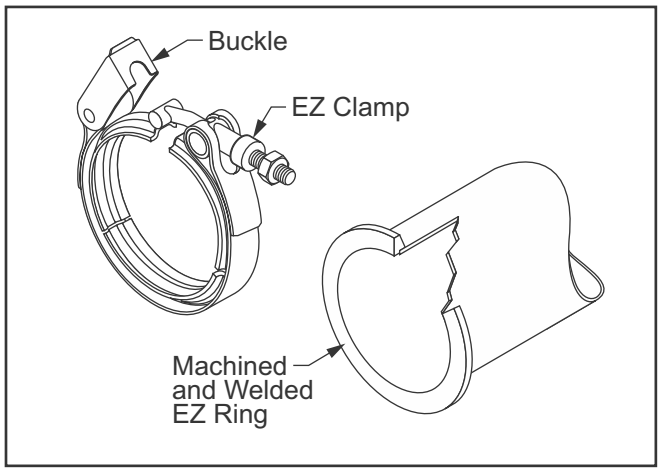



Fig. 16: 2" & 3" PSP-EZ™ configuration

**Gasket:** 2" & 3" PSP-EZ™ duct and fittings are shipped complete with all gaskets to complete the joints. The gaskets used for 2" & 3" PSP-EZ™ are an adhesive backed die-cut type. Only one die-cut gasket is required for each joint. The gasket material (Gore-Tex®) shall be a form in place, fully expanded 100% PTFE joint sealant. Substituting other gaskets will void the warranty of the product. If a PSP-EZ™ joint is disassembled for any reason, the Gore-Tex® gasket has been disturbed and must be replaced.

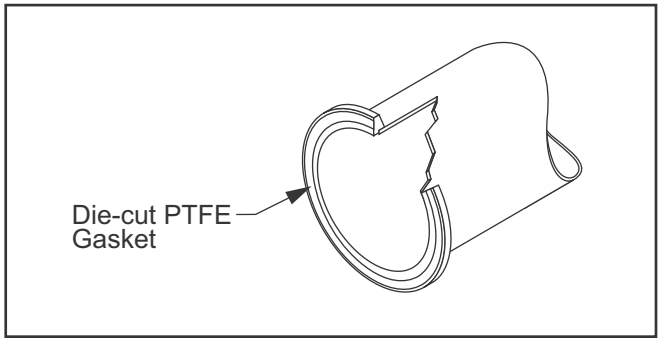



Fig. 17: Apply gasket for 2" & 3" PSP-EZ™ duct

## PROCEDURE:

**TOOLS REQUIRED:**

7/16" Box wrench
Low torque power driver
7/16" Deep socket driver
Calibrated torque wrench
Lint free cloth

**1. Apply Gasket:** Always use a new gasket. Peel the backing from the gasket and adhere it approximately centered to one of the flanges. Adhere the gasket to the flange that is already in the system if possible. Smooth the gasket with a finger to seat the adhesive fully after final positioning. Only apply one gasket per joint. (Fig. 17)

**2. Bring Flanges Together:** Loosen and thread the nut on the clamp to the end of the bolt. Unclasp the buckle on the clamp and slightly pull the clamp apart. Install the clamp on the stationary piece. Then bring the piece you are installing into the clamp. This will take some practice.

**3. Tighten Clamp:** When both angle flanges are trapped under the clamp band, reattach the buckle onto the clamp bolt and tighten the clamp nut until the duct sections stay together.

**4. Torque Bolt:** When satisfied that the alignment of the clamp and pieces are correct, tighten the clamp nut until resistance to further tightening is felt in the bolt. Final tightening must be done with a calibrated torque wrench. The 2" and 3" clamp bolts are 1/4" and are torqued to:

75 in lbs ( 6.25 ft lbs or 0.9 m kg ).

**5. End of Procedure:**

## GENERAL:

PSP® duct can be shortened in the field. Generally this can be done to duct sections that are constructed of 18 gauge material or lighter. For companion ring PSP® duct, the range of sizes able to be shortened is from 4" to 22". For PSP-EZ™ duct, the range of sizes able to be shortened is from 4" to 14".

## PROCEDURE:

**TOOLS REQUIRED:**

Marking Pen
Flexible Ruler
Drill
Center Punch
Double Cut Power Shear
Flat File
Flanging Tool - Pexto model 622
1/8" Drill Bit
Step Drill

**1. Measure The Duct:** Measure the installation for the desired duct section length. (Fig. 18) Transfer this measurement to the duct section to be shortened. Add 3/8" to the measured length to allow for the flange height. Mark this measurement in several places around the duct circumference. Connect these marks using a marking pen and flexible ruler.

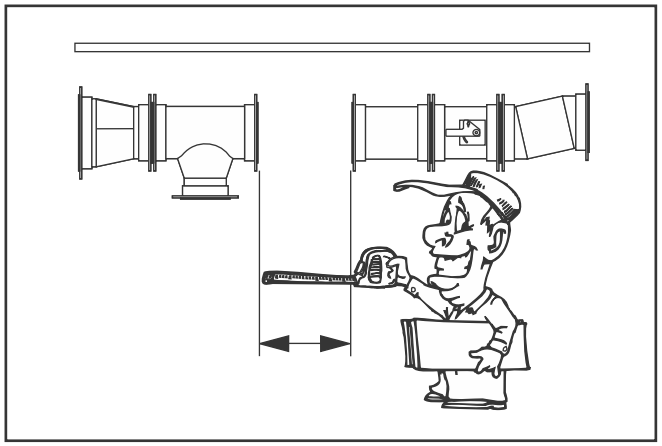


Fig. 18: Measure for modification

**2. Slide Ring:** For companion ring duct, carefully slide the floating ring back along the duct beyond the cutting guide line. For PSP-EZ™ duct, carefully remove the gasket tape from the backing ring and also carefully slide the backing ring back along the duct beyond the cutting guide line. This is to ensure that the companion ring or backing ring doesn't interfere with the cutting and flaring operation.

**3. Cut Duct:** Drill a 3/8" to 1/2" hole just tangent to the scrap side of the cutting line. First, mark the location for the starter hole and center punch the location. Drill a starter hole using the 1/8" drill. Enlarge this pilot hole in small steps using a step drill. Proceed slowly so that a minimum of heat is generated, as excessive heat can damage the coating. Starting at this hole, insert a power shear, double cut recommended. Cut as accurately as is possible on the scrap side of the line.

**4. Smooth Edges:** Using a file, remove all sharp edges from the cut. Be careful that the end of the file does not damage the coating.

**5. Flange Tool Setup:** Assemble tool per the manufacturer's directions. (Fig. 19) The rolls must be clean, undamaged and burr free. Any metal filings, chips, dirt or abrasive material will damage the coating. Roll flanges in a clean work site that is not near any grinding or welding operations. The gold colored rolls are custom rolls supplied by Fab-Tech. These rolls are ground smooth and hardened to provide an accurate and burr free surface to work the coating during the flanging process.

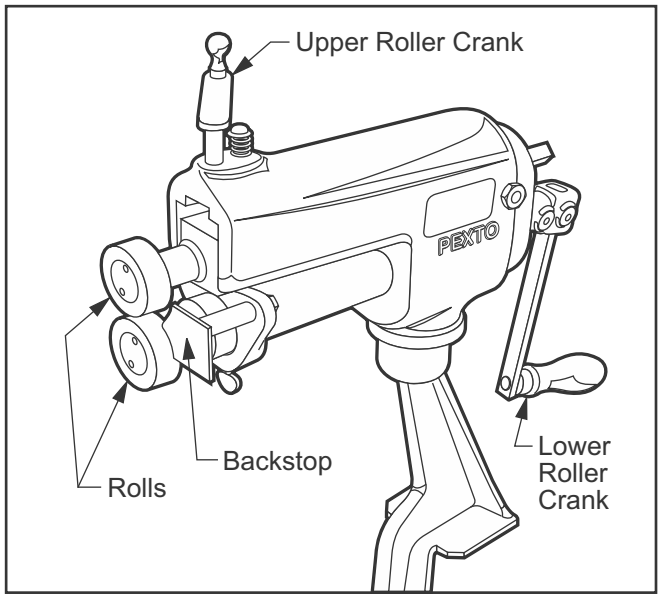



Fig. 19: Flanging Tool Setup

## PROCEDURE (cont'd):

**6. Set Flange Height :** Once the backstop is installed, it should be adjusted to slightly more than 3/8" depth from the roll faces and locked in place. This dimension sets the height of the flange. We recommend that you experiment with some scrap pieces of duct to make sure the setting is producing the flange height desired. Fab-Tech generally uses a 3/8" flange height. The tolerance for this flange height varies for the PSP-EZ™ and PSP® companion ring joint types. If the piece will be used with a ring flange, the tolerance is ±1/16". If the joint has a clamp, the flange should not be higher than 3/8" but it is allowed to be 1/16" less, or 5/16" high. This tolerance is important to the function of the clamped system. A quick check for correct flange height for clamped joints can be done by using an aluminum backing ring as a checking gage. (Fig. 20)

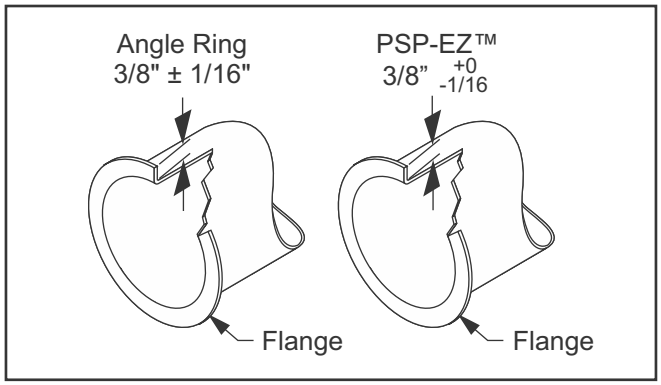



Fig. 20: Flange Height Dimensions & Tolerances

**7. Flange Duct End:** Place the cut end of the duct on the lower roller and slide the duct up against the backstop. Lower the upper roller with the smaller crank located on the top of the tool. Tighten the rolls to slightly pinch the duct between the rollers. Do not over tighten the rollers as this can damage the coating. Crank the large handle with one hand while steadying the duct section with the other hand to flare the duct wall. Slight upward pressure on the duct while cranking will begin to crease the metal at the face of the upper roller. Continue around the duct slowly until the flange is turned to an appropriate degree where the balance can be completed with a clean plastic, rawhide or rubber mallet. Place a clean cloth over the flange before using the mallet to provide added protection for the coating. Loosen the rollers and remove the duct from the tool.

**8. Spark Testing:** Follow the appropriate spark test protocol as noted in this guide.

**9. Install Gasket:** For PSP® duct, slide the companion ring up against the new flange. Apply gasket as required, only one gasket is required per joint for companion ring joints. For PSP-EZ™ duct, slide the backing ring up against the new flange. If installing a new backing ring, make sure that the round face of the ring is positioned away from the duct flange. (Fig. 21) Once the EZ backing ring is in place, apply PTFE gasket as noted in this guide. The shortened duct section is now ready to be installed.

**10. End of Procedure:**

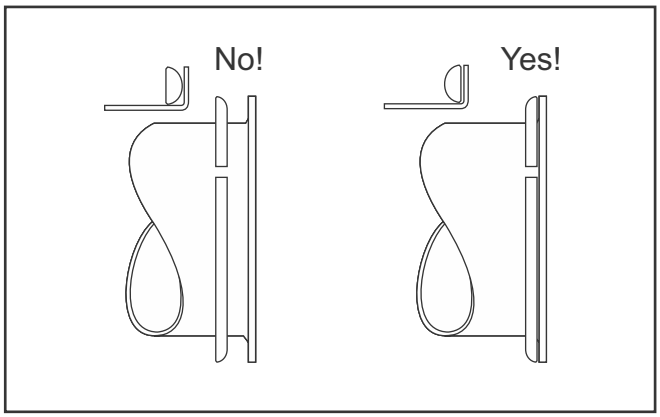



Fig. 21: PSP-EZ™ Backing Ring Position

## PROCEDURE:

**TOOLS REQUIRED:**

Ridgid Pipe Cutter - Size 1"-3"
Rawhide Mallet or "dead blow" hammer
Fab-Tech Part #D0700, pressing wheel adapter
Vice or Pipe Stand
Flat File
Lint Free Cloth

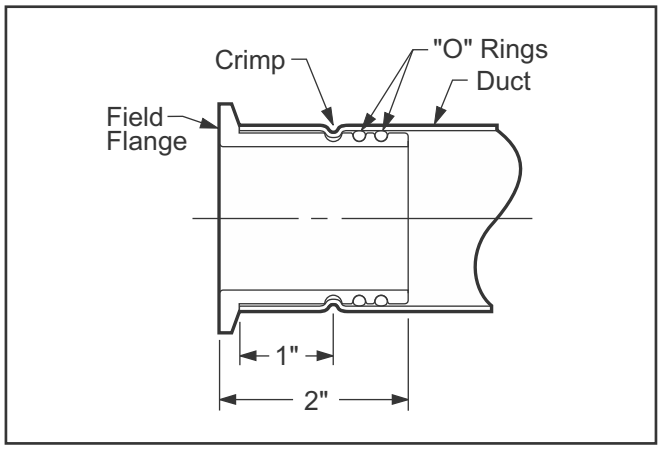



Fig. 22: PSP-EZ™ Field Flange Configuration

**FOR USE ON EZ STRAIGHT DUCT ONLY, NOT DESIGNED FOR USE ON 2" & 3" EZ ELBOWS, TEES OR REDUCERS.**

**1. Measure Duct:** Sometimes it is necessary to shorten a section of 2" or 3" PSP-EZ™ duct at the installation site. Measure the installation for the desired duct section length. To allow for the thickness of the adapter flange, you must subtract 1/4" from this measurement to arrive at the proper cut length. Mark this calculated measurement on the outside diameter of the duct section to be cut. It is recommended that you also mark which end of the duct is to be discarded to avoid confusion later.

**2. Cut the Duct:** Use of a pipe miter box to cut the duct is recommended, cut must be square. Do not use a pipe cutter. Also, do not use power tools to make this cut as the heat generated by the power tool will damage the coating. Use the correct size cutting guide to ensure that the cut will be square and flat. These guides hinge around the duct and then clamp into a vise holding the duct securely. It may help to measure the width of the guide and make a second mark. Make sure that the slot in the cutting guide is positioned on the proper cut length before proceeding. Use a new fine tooth hacksaw blade to cut using the slot in the cutting guide. When complete, remove the duct pieces from the guide and vise.

**3. Smooth Edges:** Smooth the sharp edges of the cut, paying particular attention to smoothing the inside edges. Be careful not to damage the coating with the end of the file. Wipe away filings with a clean cloth.

**4. Install Field Flange:** The flange adapter requires two "o" rings that are installed in the 2 outer grooves in the barrel behind the flange. The inside groove is used for the crimping operation. Insert the adapter into the cut end of the duct. Make sure the adapter, duct and "o" rings are clean and undamaged. Using a clean plastic or leather mallet, gently drive the adapter into the stop at the back of the flange. Use a clean cloth as additional protection on the end of the flange. DO NOT use a steel hammer. (Fig. 23)

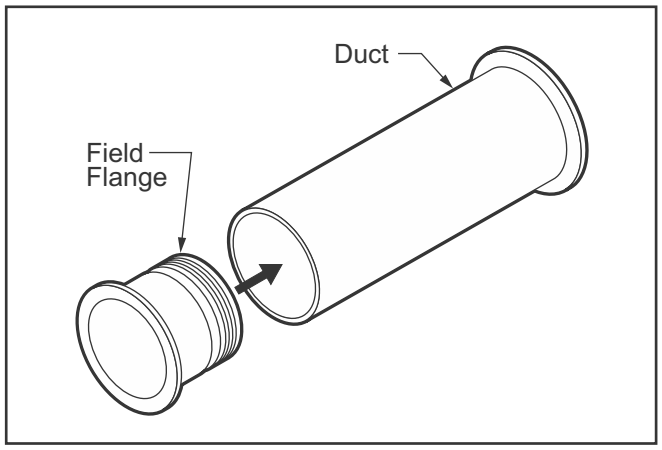



Fig. 23: Install Field Flange

**5. Modify Pipe Cutter:** The pressing tool is a standard pipe cutter with a modified wheel. The Fab-Tech D0700 pressing wheel is installed in place of the standard cutter wheel. This custom roller wheel is installed on a press fit shaft. To change from the cutter wheel to the roller, you must drive the shaft out with a drift pin. Only drive the pin far enough to remove the cutter, then align the roller with the shaft and drive the shaft back into position. The head of the shaft has flats that align with a slot in the casting.

**6. Crimp Duct:** Measure back from the cut end of the pipe at 1". Make several marks around the duct at this measurement. Open the pipe cutter enough so that it fits over the pipe. Align the custom roller with the marks on the duct section. Tighten the pipe cutter using the large clamp screw handle until it just makes an impression in the metal at the tip of the roller.

## PROCEDURE ( cont'd ):

**6. Crimp Duct:** Then rotate the tool around the pipe making a shallow groove. The first pass should be very slight in depth. This operation is to make sure that the roller is following a straight line around the pipe. When a complete crimp impression is made, tighten again with the screw and crank to deepen the crimp. Use multiple passes to form a bead 1/32" deep minimum. When the crimp is complete, the clamp screw will get very difficult to tighten. When complete, loosen the clamp screw and remove the tool. ( Fig. 24 )

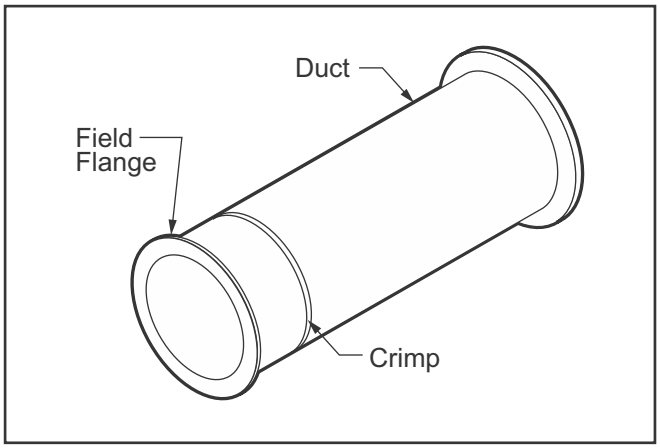



Fig. 24: PSP-EZ™ Field Flange Crimp

**7. End of Procedure:**

## Installing Saddle Tap

### PROCEDURE:

**TOOLS REQUIRED:**

Center Punch
Marking Pen
Power Shear
Calibrated Torque Wrench
Flat File
Lint Free Cloth

It is recommended that two persons are available to do this installation, at the discretion of the project manager, depending on the size of the fitting and the location of the branch line at the host duct. Check that all required material is available at the work location.

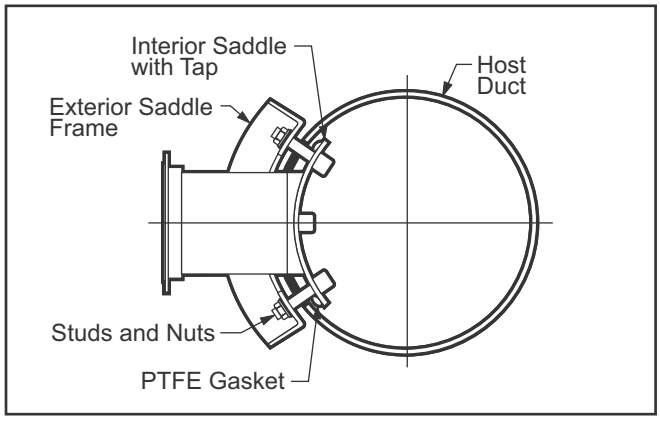



Fig. 25: Saddle Tap Configuration

**1. Cut Opening:** Trace the template which is provided with the saddle tap onto the host duct. Use a center punch to mark the pilot holes which are drilled on each corner of the template. Drill larger holes in each corner to accommodate the power shear. Cut opening in the host duct and carefully file the edges of the cut. If it is necessary to preserve the air pressure in the system, cut a thin sheet of galvanized steel 2" larger than the dimension of the template and place over the hole.

**2. Install Interior Saddle:** Apply PTFE gasket to the outside edge of the interior saddle, as shown. Slip the interior saddle carefully into the opening. With the saddle in place, insert studs finger tight into the two horizontal center holes. ( Fig. 26 )

**3. Install Exterior Frame:** Set the exterior frame over the tap, locating the slots over the two exposed centering studs. Place flat washer, lock washer and nut onto each center stud, lightly tighten. This will position the saddle tap temporarily in place.

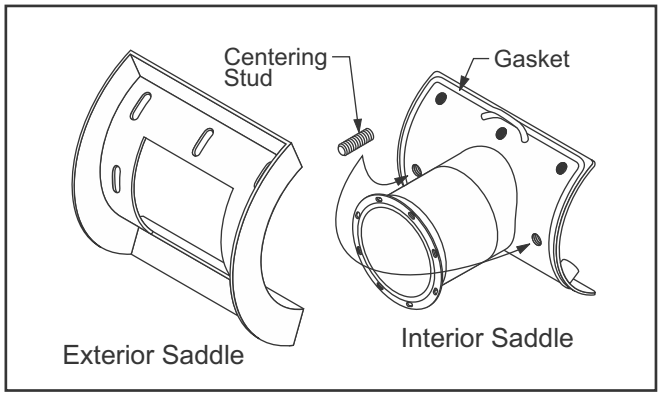



Fig. 26: Interior and Exterior Saddles

**4. Position Tap:** Install studs along the bottom horizontal edge of the interior saddle. Finger tighten. Reposition the tap by gently pulling down on the tap until the bottom studs contact the raw edge of the host duct opening. Now tighten the two horizontal center nuts to draw the saddle halves together.

**5. Install Hardware:** Install studs in all remaining holes of the interior saddle. Finger tighten. Visually inspect that the saddle tap is in proper position and that the gasket can make full contact with the interior of the host duct. Place flat washer, lock washer and nut onto each of the studs, lightly tighten.

**6. Torque Nuts:** Using a calibrated torque wrench, tighten the two center horizontal nuts to recommended torque specifications ( 8 ft lbs minimum for 5/16" bolts, 15 ft lbs minimum for 3/8" bolts, torque in at least 3 stages until specified torque is reached ). Continue tightening all the other nuts to recommended specifications, moving evenly away from the center nuts to prevent distortion of the saddle against the host duct. On larger duct, tighten from the center of all four sides of the saddle. Leave the corner studs as the last ones to tighten. The saddle tap is now ready for use.

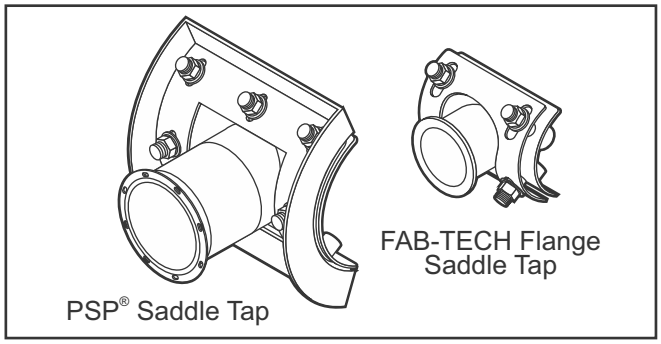



Fig. 27: PSP® and PSP-EZ™ Saddle Taps

## GENERAL:

The field Installed 4" to 24" diameter hot tap is unique in that it allows for a PSP® tap fitting to be installed in a live host duct system ranging in size from 12" diameter and larger without costly shutdown of the system and disruption in production. See the tap to host duct matrix below to find the correct size tap for your system.

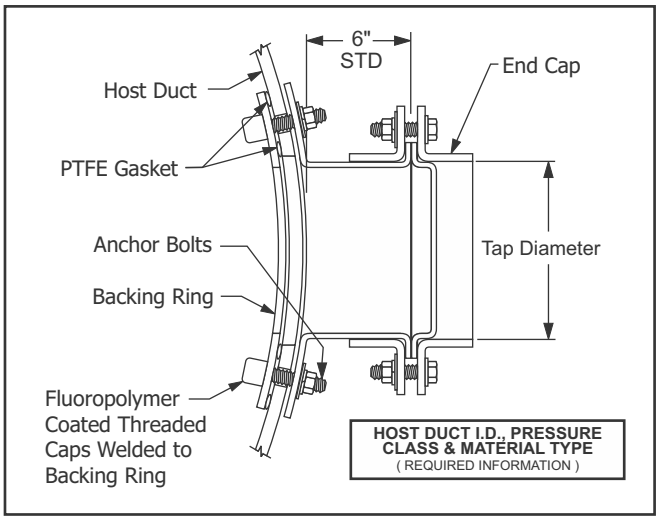



Fig. 28: Hot Tap - Section Through Duct

## PROCEDURE:

### TOOLS REQUIRED:

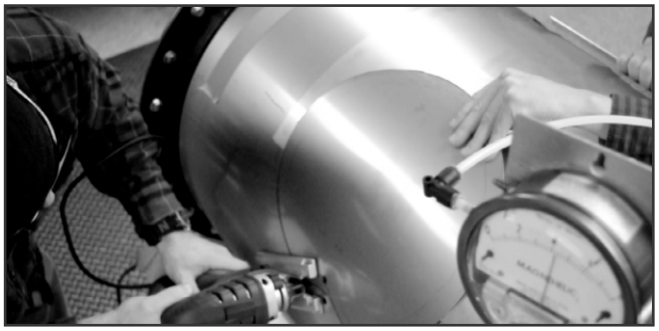
Metal cutting jig saw with carbide saw blade
Electric or pneumatic drill - drill bit 5/16"
Permanent marker
Center Punch
Duct tape
Allen wrench
Glove box (required) with pressure plate
Torque wrench & socket

**1. Position Tap Template :** Place hot tap template on the duct at the desired location for a duct tap. Position template such that the tab and alignment bolt hole are located at the bottom of the desired location.

**2. Trace Template:** Trace the hot tap hole and the alignment bolt hole onto the duct using a permanent marker. Also mark with a line the approximate horizontal centerline position of the hot tap on the duct

**3. Punch:** Center punch and drill the alignment bolt hole and a starter hole just above the tab for cutting the hot tap opening.

**4. Cut Tap Opening:** Use a metal cutting jig saw to cut the hot tap opening. Slide the pressure plate over the hot tap hole and under the hot tap cutout as it is being cut to maintain system pressure.



**5. Position Glove Box:** Using the hot tap horizontal centerline markings from Step 2, position the glove box on the duct over the hot tap pressure plate and hold in place with duct tape.

**6. Position Tap Backing Ring:** Lift the plexiglass viewing window and place the hot tap backing ring and the alignment bolt inside the glove box and close the viewing window. Insert hands into the gloves and hold the backing ring. Have a second person slide the pressure plate out of the way. Position the backing ring inside the duct to align with the curvature of the duct. Also align the bottom bolt hole on the backing ring with the alignment hole on the tab and thread the alignment bolt into the backing ring to temporarily secure the backing ring, use the allen wrench to tighten the bolt.

**PROCEDURE ( cont'd ):**

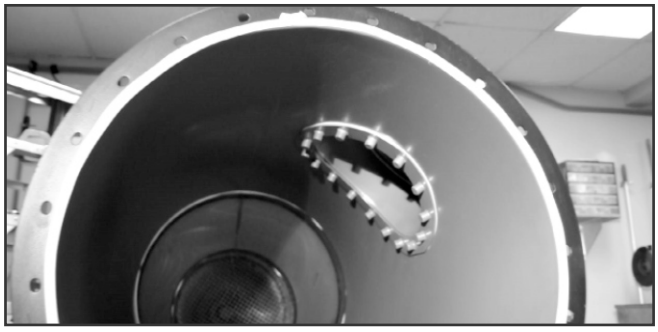
**7. Remove Glove Box:** Slide the pressure plate back over the hot tap opening using the slot at the bottom of the pressure plate to align with the alignment bolt. Remove the glove box from the duct.

**8. Position Hot Tap:** Slide the hot tap with attached end cap onto the alignment bolt using the bottom bolt hole on the tap and carefully remove the pressure plate out from under the hot tap.

**9. Install Anchor Bolts:** Insert 3/8" anchor bolts into the hot tap mounting holes and thread the bolts into the backing ring inside the duct. Slide a flat washer and lock washer onto each anchor bolt and thread a nut finger tight onto each anchor bolt. Use an allen wrench to remove the alignment bolt and replace with an anchor bolt and hardware.

**10. Tighten Bolts:** Torque all bolts to 36ftlbs. Installation is complete.

**11. End of Procedure.**



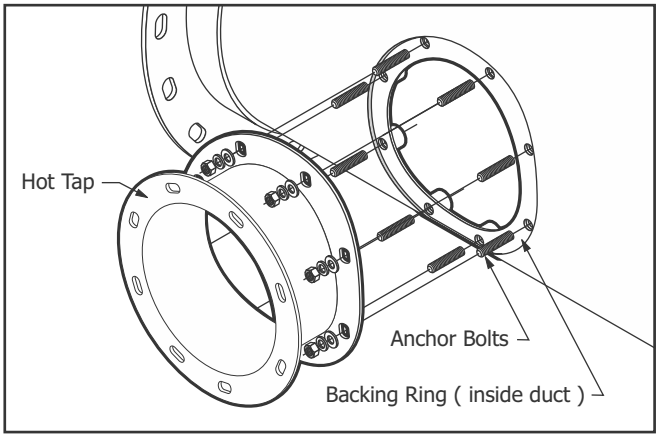



Fig. 29: Hot tap basic assembly.

**View the complete installation video that these screen shots were taken from at: www.fabtechinc.com/literature**

## GENERAL:

The Field Installed 2" Fab-Tech Flange has unique installation requirements. In order for this fitting to be installed, the duct section must be removed from the system or installed before the duct section is placed in the system. This fitting is available in only the 2" size with specific requirements for the host duct as indicated below. Once installed, 2" PSP-EZ™ and 2" modular flange system fittings can be attached to this field installed flange.

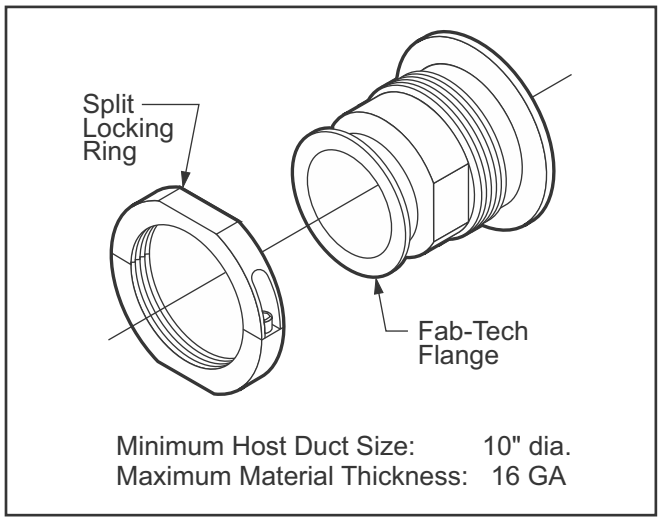



Fig. 30: Field Installed 2" Fab-Tech Flange

## PROCEDURE:

**TOOLS REQUIRED:**

Hydraulic punch kit ( Fab-Tech PN TPS02 )
Electric or pneumatic drill
Drill bit set
Lint Free Cloth

**1. Drill Pilot Hole:** Drill a 3/8" pilot hole in the duct at desired location of test port.

**2. 3/4" Punch:** From the Hydraulic punch kit thread 3/8" stud into end of 3/4" draw stud of the Greenlee hydraulic actuator. Slide the three spacers onto the 3/4" actuator draw stud. Slide the 3/4" die onto the 3/8" stud with the open end of the die facing away from the actuator. Insert the 3/8" stud through the 3/8" pilot hole. From inside the duct thread the matching 3/4" punch onto the 3/8" stud with the cutting surfaces of the punch toward the duct. Continue threading the punch by hand until the die, duct and punch are snug. Operate the hydraulic actuator to draw the punch through the duct material. Remove the punch, die, 3/8" stud and spacers. ( Fig. 29 )

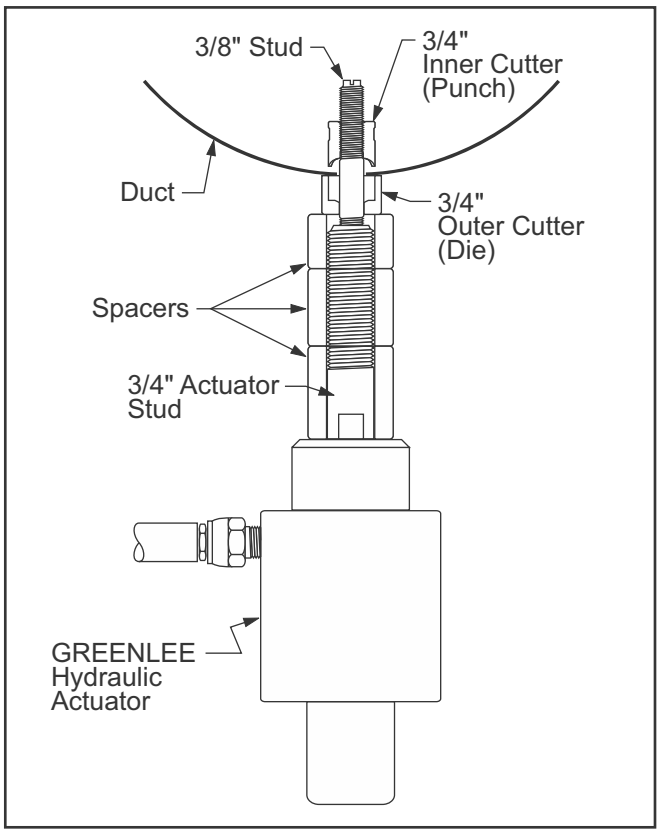



Fig. 31: 3/4" Hydraulic Punch Configuration

**CAUTION:** Support the actuator and punch assembly during this operation. The punch assembly will drop out of the newly formed hole once it breaks through the duct material.

**3. 60mm Punch:** Slide the 60mm die ( for 2" test port ) onto the 3/4" actuator stud with the open end of the die facing away from the actuator. Insert the 3/4" actuator stud into the 3/4" hole. From inside the duct thread the matching 60mm punch onto the 3/4" actuator stud with the cutting surfaces of the punch toward the duct. Continue threading the punch by hand until the die, duct, and punch are snug. Operate the hydraulic actuator to draw the punch through the duct material. Remove the punch and die. ( Fig. 30 )

**PROCEDURE ( cont'd ):**

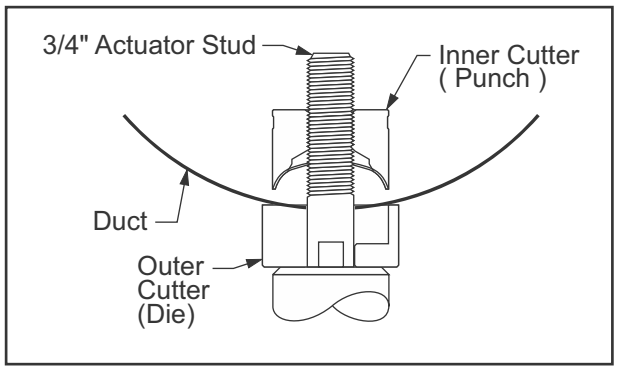



Fig. 32: 60mm Hydraulic Punch Configuration

**4. Swage Hole:** Slide the 60mm outer swage tool onto the 3/4" actuator stud. Insert the actuator stud and outer swage tool into the 60mm hole. From inside the duct slide the matching inner swage tool onto the actuator stud. Invert and thread any one of the three punches onto the actuator stud ( cutting surfaces facing away from the inner swage tool ) until the inner swage tool, the duct and the outer swage tool are snug. Operate the hydraulic actuator to compress the swage tools together to form the swage. Loosen and remove the swage tool. ( Fig. 31 )

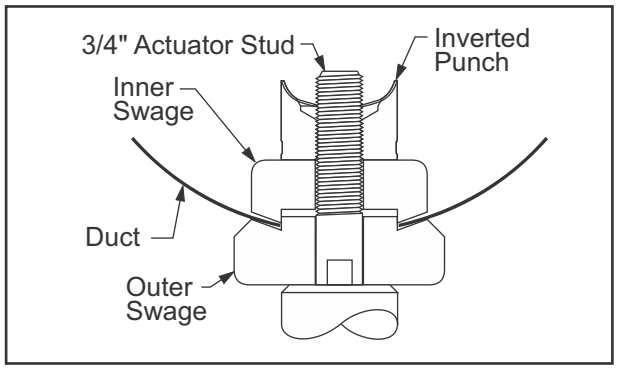



Fig. 33: 60mm Swage Configuration

**5. Install Fab-Tech Flange:** Remove backing and apply die-cut Gortex® gasket to the inside flange of the fitting. Place the fitting in the swaged hole from inside the duct so that the gasket forms a seal between the inside flange and the duct. Thread the matching split locking ring onto the fitting and tighten until snug. Using the appropriate size wrench on the locking ring and the flats on the fitting, tighten the locking ring until there is resistance to further tightening. Installation is complete. ( Fig. 32 )

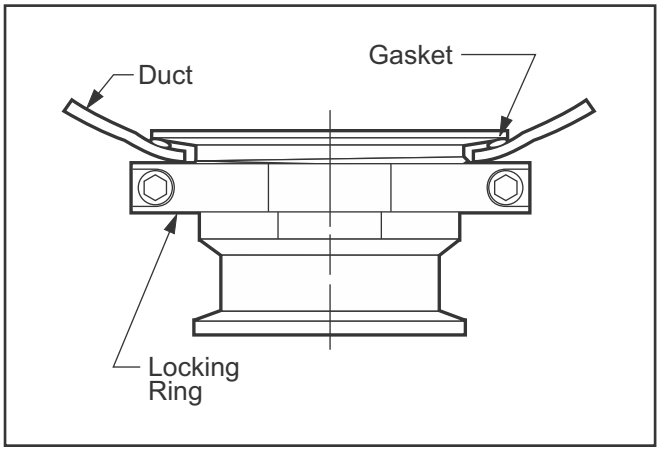



Fig. 34: Field Installed 2" FT Flange Configuration

## GENERAL:

The Field Installed Nipple has unique installation requirements. In order for this fitting to be installed, the duct section must be removed from the system or installed before the duct section is placed in the system. This fitting is available in three sizes with specific requirements for the host duct as indicated in the chart below.

| PART NO.* | DESCRIPTION | MIN HOST DUCT SIZE |
|---|---|---|
| **PRT01** | 1" NPT NIPPLE | 6" DIA. |
| **PRT15** | 1-1/2" NPT NIPPLE | 8" DIA. |
| **PRT02** | 2" NPT NIPPLE | 10" DIA. |

*PART NO. INCLUDES: ( 1 ) NIPPLE, ( 1 ) JAM NUT & ( 1 ) GASKET

**MAXIMUM MATERIAL THICKNESS**

16 GA MAX FOR ALL 3 SIZES OF NIPPLE

## PROCEDURE 1" NPT NIPPLE:

**TOOLS REQUIRED:**

Hydraulic punch kit ( Fab-Tech PN TPS02 )
Mechanical punch kit ( Fab-Tech PN TPS01 )
Electric or pneumatic drill
Drill bit set
Lint Free Cloth

**1. Drill Pilot Hole:** Drill a 3/8" pilot hole in the duct at the desired location of test port.

**2. 1-5/16" Punch:** From the Hydraulic punch kit thread the 3/8" stud into end of 3/4" draw stud of the Greenlee hydraulic actuator. Slide the three spacers onto the 3/4" actuator draw stud. Slide the 1-5/16" die onto the 3/8" stud with the open end of the die facing away from the actuator. Insert the 3/8" stud through the pilot hole in the duct. From inside the duct thread the matching 1-5/16" punch onto the 3/8" stud with the cutting surfaces of the punch toward the duct. Continue threading the punch by hand until the die, duct and punch are snug. Operate the hydraulic actuator to draw the punch through the duct material. Remove the punch, die and 3/8" stud. (Fig. 33)

**CAUTION:** Support the actuator and punch assembly during this operation. The punch assembly will drop out of the newly formed hole once it breaks through the duct material.

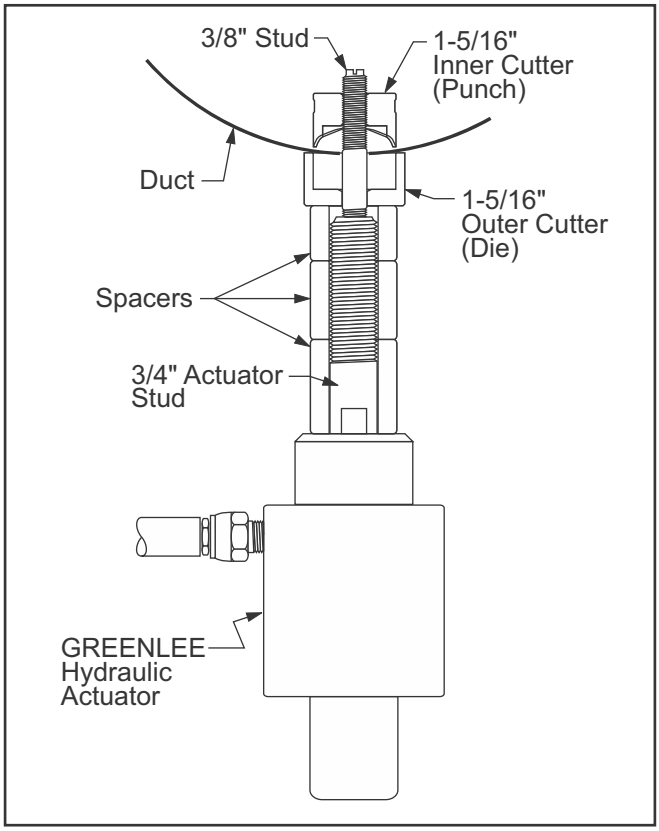



Fig. 35: 1-5/16" Hydraulic Punch Configuration

**3. Swage Hole:** Slide the 1-5/16" outer swage tool onto the 3/4" actuator stud. Insert the actuator stud and outer swage tool into the 1-5/16" hole. From inside the duct slide the matching inner swage tool onto the actuator stud. Invert and thread the 1-5/16" punch onto the actuator stud ( cutting surfaces facing away from the inner swage tool ) until the inner swage tool, the duct and the outer swage tool are snug. Operate the hydraulic actuator to compress the swage tools together to form the swage. Loosen and remove the swage tool. (Fig. 34)

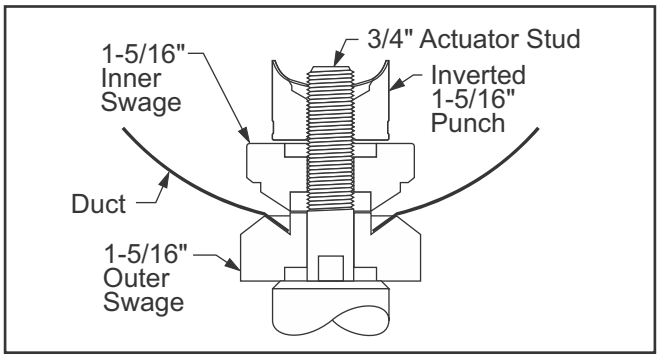



Fig. 36: 1-5/16" Swage Configuration

## PROCEDURE 1" NPT NIPPLE ( cont'd ):

**4. Install Nipple:** Remove backing and apply die-cut Gortex® gasket to the inside flange of the test port. Place the 1"Ø test port in the swaged hole from inside the duct. Thread the matching jam nut onto the test port and tighten until snug. Using the appropriate size wrench on the jam nut and the flats on the test port, tighten the jam nut until there is resistance to further tightening. Installation is complete. ( Fig. 35 )

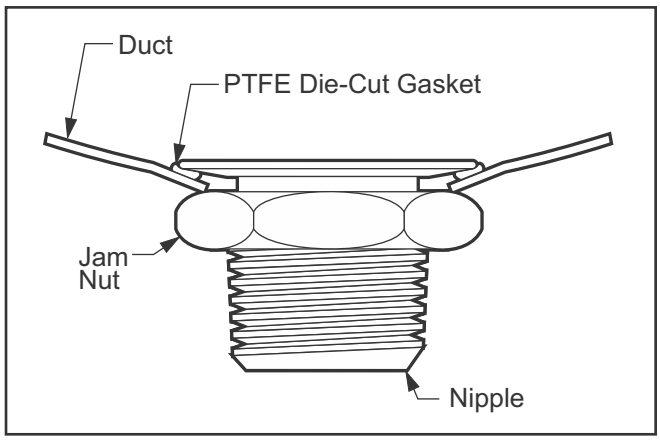



Fig. 37: Field Installed Nipple Configuration

duct thread the matching 3/4" punch onto the 3/8" stud with the cutting surfaces of the punch toward the duct. Continue threading the punch by hand until the die, duct and punch are snug. Operate the hydraulic actuator to draw the punch through the duct material. Remove the punch, die, 3/8" stud and spacers. ( Fig. 36 )

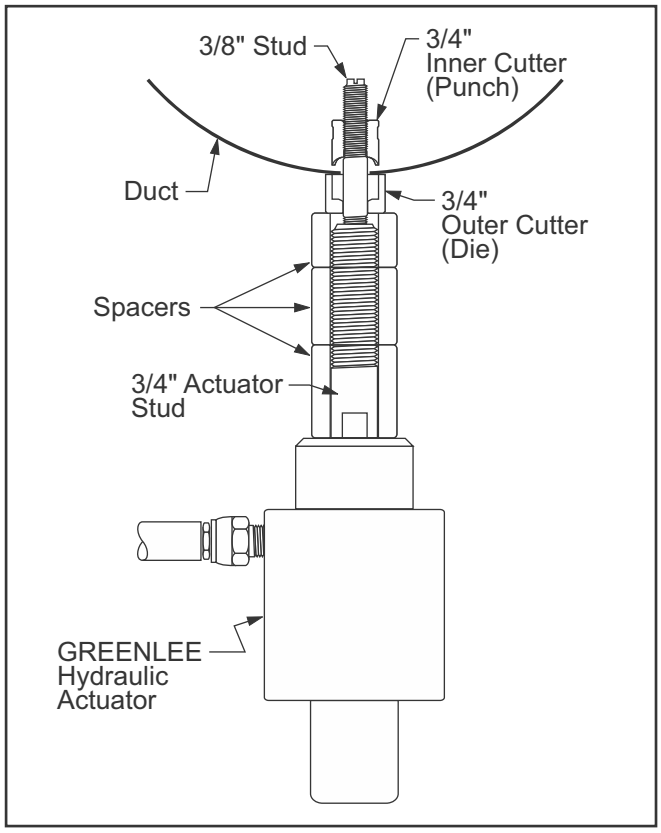



Fig. 38: 3/4" Hydraulic Punch Configuration

## PROCEDURE 1-1/2" & 2" NPT NIPPLE:

**TOOLS REQUIRED:**

Hydraulic punch kit ( Fab-Tech PN TPS02 )
Electric or pneumatic drill
Drill bit set
Lint Free Cloth

**1. Drill Pilot Hole:** Drill a 3/8" pilot hole in the duct at desired location of test port.

**2. 3/4" Punch:** From the Hydraulic punch kit thread 3/8" stud into end of 3/4" draw stud of the Greenlee hydraulic actuator. Slide the three spacers onto the 3/4" actuator draw stud. Slide the 3/4" die onto the 3/8" stud with the open end of the die facing away from the actuator. Insert the 3/8" stud through the 3/8" pilot hole. From inside the

**CAUTION:** Support the actuator and punch assembly during this operation. The punch assembly will drop out of the newly formed hole once it breaks through the duct material.

**3. 1-7/8 Punch:** Slide the 1-7/8" die ( for 1-1/2" test port ) or the 60mm die ( for 2" test port ) onto the 3/4" actuator stud with the open end of the die facing away from the actuator. Insert the 3/4" actuator stud into the 3/4" hole. From inside the duct thread the matching 1-7/8" or 60mm punch onto the 3/4" actuator stud with the cutting surfaces of the punch toward the duct. Continue threading the punch by hand until the die, duct, and punch are snug. Operate the hydraulic actuator to draw the punch through the duct material. Remove the punch and die. (Fig. 37)

## PROCEDURE 1-1/2" & 2" NPT NIPPLE ( cont'd ):

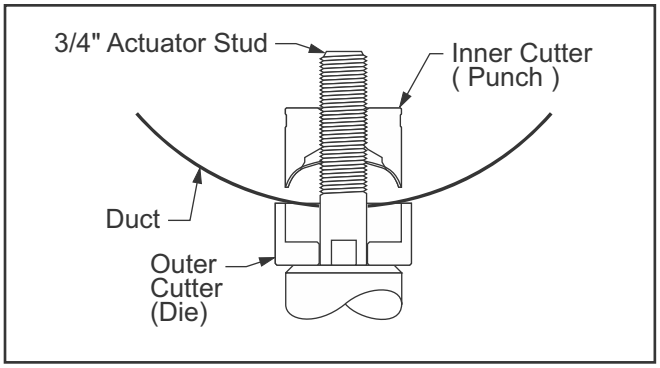



Fig. 39: 1-7/8" Hydraulic Punch Configuration

**4. Swage Hole:** Slide the 1-7/8" outer swage tool ( for 1-1/2" test port ) or the 60mm outer swage tool ( for 2" test port ) onto the 3/4" actuator stud. Insert the actuator stud and outer swage tool into the 1-7/8" hole ( for 1-1/2" test port ) or the 60mm hole ( for 2" test port ). From inside the duct slide the matching inner swage tool onto the actuator stud. Invert and thread any one of the three punches onto the actuator stud ( cutting surfaces facing away from the inner swage tool ) until the inner swage tool, the duct and the outer swage tool are snug. Operate the hydraulic actuator to compress the swage tools together to form the swage. Loosen and remove the swage tool. ( Fig. 38 )

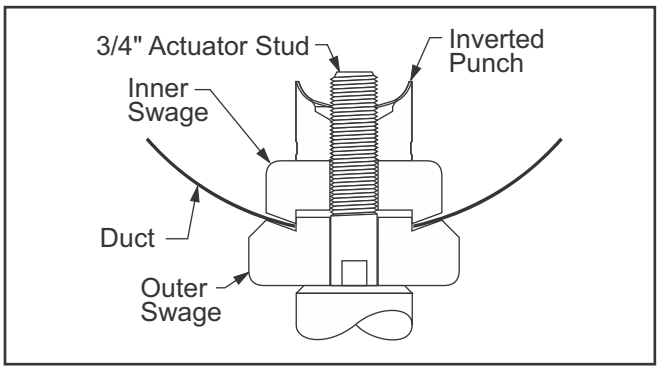



Fig. 40: 1-7/8" Swage Configuration

**5. Install Nipple:** Remove backing and apply die-cut Gortex® gasket to the inside flange of the test port. Place the test port in the swaged hole from inside the duct. Thread the matching jam nut onto the test port and tighten until snug. Using the appropriate size wrench on the jam nut and the flats on the test port, tighten the jam nut until there is resistance to further tightening. Installation is complete. ( Fig. 39 )

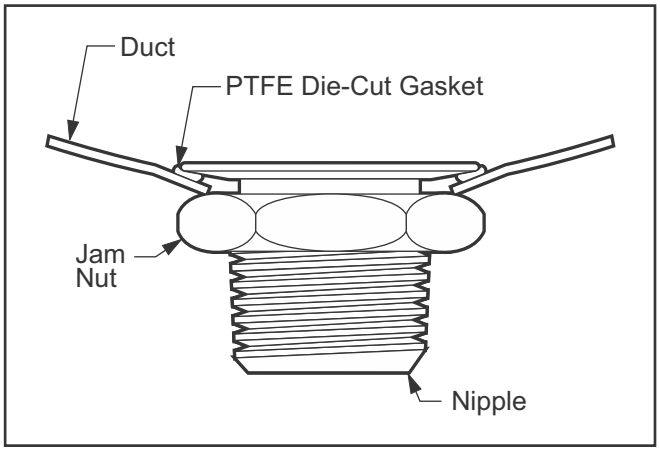



Fig. 41: Field Installed Nipple Configuration

## Installing 3/8", 3/4" & 2" Test Port (Lollipop)

### PROCEDURE 3/8" TEST PORT:

**TOOLS REQUIRED:**

Electric, pneumatic, or battery powered drill
Drill bit set and step drill to 3/4" ( 19mm ) min dia.
Center punch
Half round and flat file ( fine )
Calibrated torque wrench

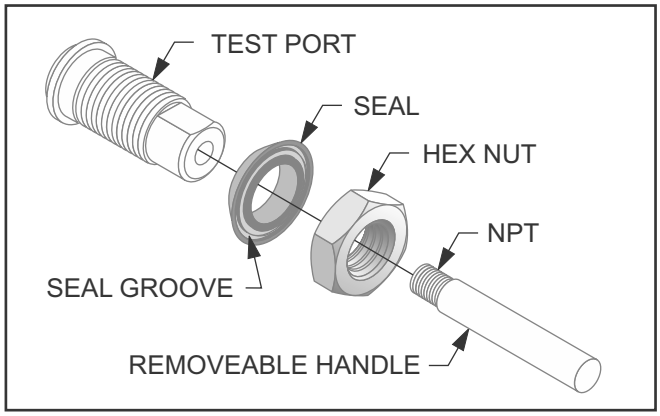



Fig. 42: 3/8" Test Port Configuration

**1. Drill Hole in Duct:** For this procedure, the duct does not need to be removed from the system and the port can be installed in duct as small as 2" diameter. Mark the desired location for the test port and center punch. Drill a 1/8" starter hole at the center punch location. Slowly enlarge the hole with a step drill to .750" ( 19mm ) diameter hole in the duct.

**2. Debur the Hole:** Carefully debur the hole removing all metal and coating debris.

**3. Apply Accrolube to Seal:** Take the tube of Accrolube and use the tab ears to rip and twist the tip off. Hold the seal with the flared side toward you and apply a generous bead of Accrolube in the seal groove.

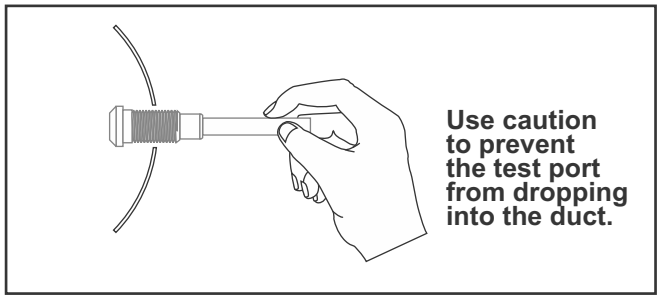



Fig. 43: Insert Test Port into duct

**4. Insert Test Port:** Work the test port into the hole until just the handle is showing outside the hole. ( Fig. 43 )

**5. Install Seal:** Slide the seal, flared side away from the hole, onto the handle. Using thumb and forefinger, squeeze the seal together and work it into the hole around the handle. ( Fig. 44 )

**6. Seat the Seal:** With the seal inside the duct and positioned on the test port shoulder, seat the seal lip in the hole by firmly pulling the handle so that the test port threads slide through the seal and protrude from the duct hole. Ensure that the seal lip is still seated in the hole. ( Fig. 45 )

**7. Install Nut:** Next, slide the nut onto the handle and thread the nut until it contacts the duct. Final tightening is with a calibrated torque wrench to 15 in lbs. ( Fig. 46 )

**8. Remove Handle:** The removable handle may be left in place as a temporary plug. Remove the handle to access a 1/16" NPT tapped hole for installing a fitting of choice. The 3/8" Test Port may be counter drilled to a maximum bore of 3/8" ID for other installations. ( Fig. 46 )

**9. End of Procedure:**

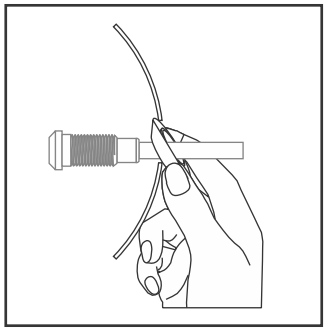


Fig. 44: Install Seal

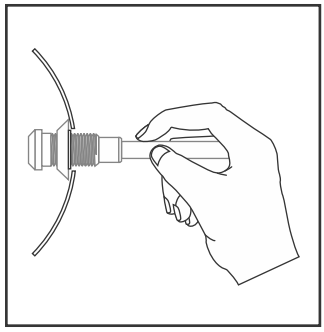


Fig. 45: Seat the Seal

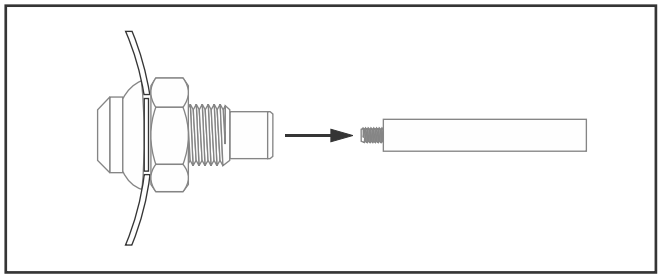


Fig. 46: Install Nut and Remove Handle

## Installing 3/8", 3/4" & 2" Test Port (Lollipop)

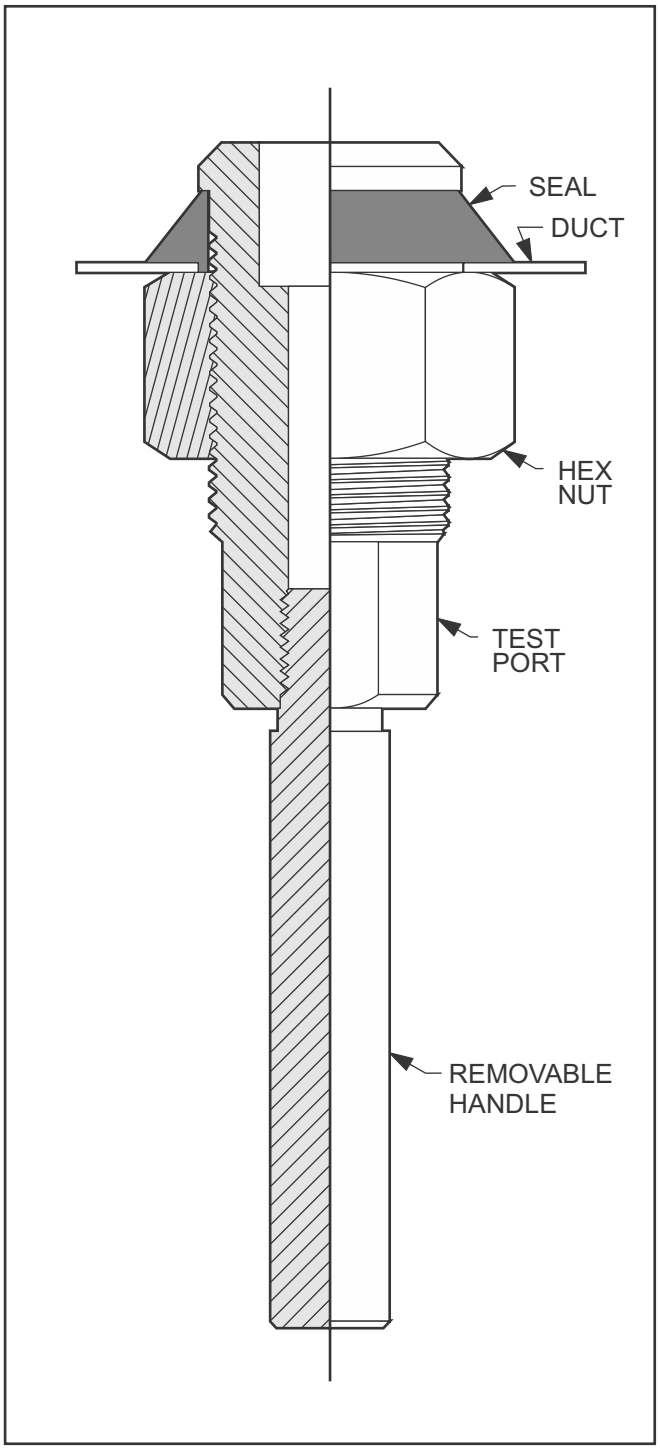



Fig. 47: 3/4" Test Port Cut-away

### PROCEDURE 3/4" TEST PORT:

**TOOLS REQUIRED:**

Electric, pneumatic, or battery powered drill
Drill bit set and step drill to 1-3/8" ( 35mm ) min dia.
Center punch
Half round and flat file ( fine )
Calibrated torque wrench

**1. Drill Hole in Duct:** Can be installed in duct as small as 6" diameter. Slowly enlarge the hole with a step drill to 1-3/8" ( 35mm ) diameter hole in duct.

**2. Debur the Hole:** Carefully debur the hole removing all metal and coating debris.

**3. Apply Accrolube to Seal:** Take the tube of Accrolube and use the tab ears to rip and twist the tip off. Hold the seal with the flared side toward you and apply a generous bead of Accrolube in the seal groove.

**4. Insert Test Port:** Work the test port into the hole until just the handle is showing outside the hole. ( Fig. 43 )

**5. Install Seal:** Slide the seal, flared side away from the hole, onto the handle. Using thumb and forefinger, squeeze the seal together and work the seal into the hole around the handle. ( Fig. 44 )

**6. Seat the Seal:** With the seal inside the duct and positioned on the test port shoulder, seat the seal lip in the hole by firmly pulling the handle so that the test port threads slide through the seal and protrude from the duct hole. Ensure that the seal lip is still seated in the hole. ( Fig. 45 )

**7. Install Nut:** Next, slide the nut onto the handle and thread the nut until it contacts the duct. Final tightening is with a calibrated torque wrench to 250 in lbs. ( Fig. 46 )

**8. Remove Handle:** The removable handle may be left in place as a temporary plug. Remove the handle to access a 1/4" NPT tapped hole for installing a fitting of choice. The 3/4" Test Port may also be drilled to a maximum bore of 3/4" I.D. for other installations.(Fig.46)

**10. End of Procedure:**

## PROCEDURE 2" TEST PORT:

**TOOLS REQUIRED:**

Electric, pneumatic, or battery powered drill
Hole saw Arbor with pilot bit ( be sure the arbor fits hole saw sizes 1-1/4" and 2-5/8" )
Bi-metal hole saw 1-1/4" dia.
Bi-metal hole saw 2-5/8" dia.
Center punch
Half round and flat file ( fine )
Calibrated torque wrench

**1. Drill Hole in Duct:** For this procedure, the duct does not need to be removed from the system and the port can be installed in duct as small as 12" diameter. Mark the desired location for the test port and center punch. Drill a starter hole at the center punch location using the arbor pilot bit. Attach the 1-1/4" hole saw onto the arbor. Using the starter hole as a guide, slowly drill a hole with the 1-1/4" hole saw. Add the 2-5/8" hole saw onto the arbor with the 1-1/4" hole saw. Position the 1-1/4" hole saw into the previously drilled hole using this as a guide, slowly drill a hole with the 2-5/8" hole saw.

**2. Debur the Hole:** Carefully debur the hole removing all metal and coating debris.

**3. Apply Accrolube to Seal:** Take the tube of Accrolube and use the tab ears to rip and twist the tip off. Hold the seal with the flared side toward you and apply a generous bead of Accrolube in the seal groove.

**4. Insert Test Port:** Work the test port into the hole until just the handle is showing outside the hole. ( Fig. 43 )

**5. Install Seal:** Slide the seal, flared side away from the hole, onto the handle. Using thumb and forefinger, squeeze the seal together and work the seal into the hole around the handle. ( Fig. 44 )

**6. Seat the Seal:** With the seal inside the duct and positioned on the test port shoulder, seat the seal lip in the hole by firmly pulling the handle so that the test port threads slide through the seal and protrude from the duct hole. Ensure that the seal lip is still seated in the hole. ( Fig. 45 )

**7. Install Nut:** Next, slide the nut onto the handle and thread the nut until it contacts the duct. Final tightening is with a calibrated torque wrench to 400 in lbs. ( Fig. 46 )

**8. Remove Handle :** The removable handle may be left in place as a temporary plug. Remove the handle to access a 3/8" NPT tapped hole for installing a fitting of choice. The 2" Test Port may also be drilled to a maximum bore of 1-3/4" ID for other installations.(Fig.46)

**10. End of Procedure:**

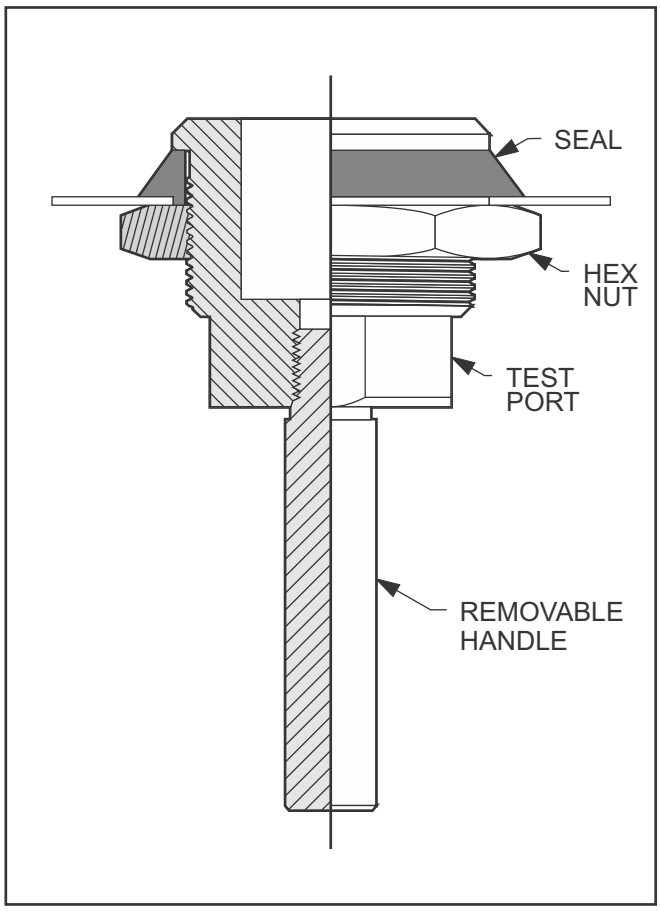



Fig. 48: 2" Test Port Cut-away view

## PROCEDURE:

**TOOLS REQUIRED:**

Lint free cloth
Scissors and/or utility knife
Socket Set with Deep Sockets
Calibrated Torque Wrench

This procedure is intended to assist you in the proper assembly of our 2" and 3" Fab-Tech flange joint. All pieces are shipped in poly sheeting to help prevent contamination and to protect the outer coated surface of the flange. Remove the pieces from the poly sheeting and inspect the interior coated surface and the outer flange surfaces to insure the integrity of the system. Do not, under any circumstances, install a piece of pipe or fitting that has visible damage. Do not penetrate the coating for any reason except when using approved modification systems.

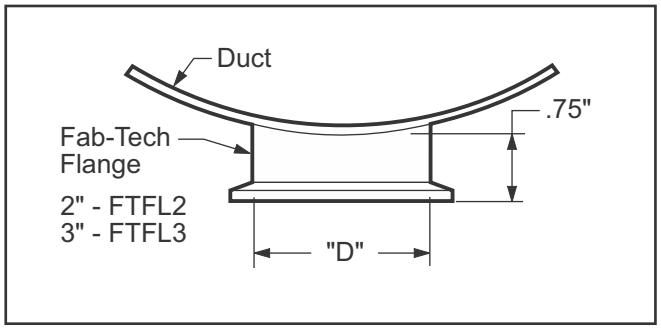



Fig. 49: Fab-Tech Flange Configuration

**1. Position Clamp:** To begin, clean the outside flange surfaces to be joined with a soft damp cloth. Loosen and thread the clamp nut to the end of the bolt. Unclasp the buckle on the clamp. In this configuration the clamp has some flexibility. With moderate force, open the clamp until you are able to slip the clamp onto the flange welded to the duct.

**2. Apply Gasket:** Always use a new gasket. Peel the backing from the die-cut PTFE gasket to expose the adhesive. Adhere the gasket approximately centered to one of the flange faces adhesive side down. Only one gasket required per joint. Firmly run your finger over the joint sealant to guarantee complete adhesion.

**3. Bring Flanges Together:** Carefully bring the piece to be installed into the clamp already positioned in step 1. This will take some practice.

**4. Tighten Clamp:** When both flanges are trapped under the clamp band, reattach the buckle onto the clamp bolt and tighten the clamp nut until the joint sections stay together. Although this method of joining duct is self aligning, visually inspect the joint to ensure proper alignment of the flanges and proper seating of the flanges in the clamp. When satisfied that the alignment of the clamp and flanges are correct, tighten the clamp nut using a 7/16" wrench until resistance to further tightening is felt.

**5. Torque Clamp Nut:** Final tightening must be done with a calibrated torque wrench. The recommended torque for 2" & 3" EZ clamps is 75 in lbs ( 6.25 ft lbs or 0.9 m kg ). ( Fig. 48 )

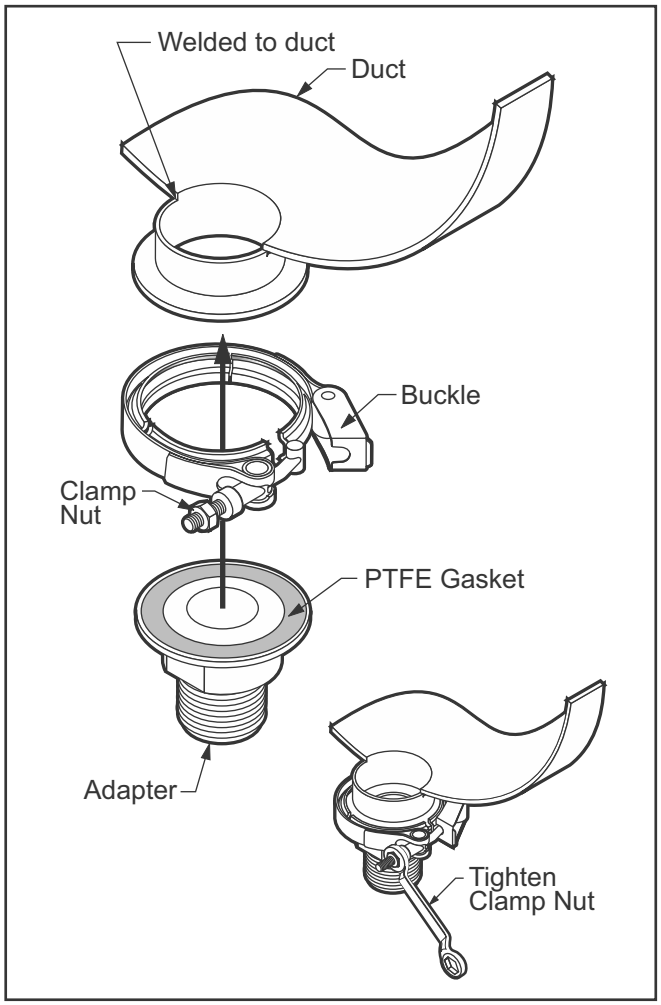



Fig. 50: Fab-Tech Flange Assembly

## GENERAL:

Fab-Tech's standard PSP® dampers are manufactured in all sizes with a manual actuator. Pneumatic or electric actuators are also available as an option for all sizes of dampers. However, customer supplied actuators are also an option. This procedure covers the steps required to modify each of the type of dampers in the field to accept a customer supplied actuator. Since this procedure covers the full range of dampers from 4" to 120" diameter, the steps described below are general in nature.

## PROCEDURE:

**TOOLS REQUIRED:**

Custom Actuator Kit
- Blank Actuator Mounting Plate
- Blank Actuator Shaft

Assorted Box Wrenches
Assorted Allen Wrenches

**1. Remove Manual Actuator:** For all sizes of dampers, reference the appropriate illustration to remove the manual actuator, mounting plate and actuator shaft. ( Fig. 56, 57, 58, 59 ) Set these items aside.

**2. Machine Blank Actuator Shaft:** Take the blank actuator shaft and have it machined to mate with the customer supplied actuator.

**3. Modify Blank Actuator Mounting Plate:** Take the blank actuator mounting plate and have it drilled with the correct size and number of holes to mount the customer supplied actuator.

**4. Actuator Assembly:** Attach the customer supplied actuator onto the modified actuator mounting plate. Install the new actuator, actuator mounting plate and shaft onto the damper. Reuse the hardware removed in step 1 to install the actuator mounting plate and reuse the setscrew to attach the modified actuator shaft to the damper blade shaft.

**5. Test Actuator:** Test new actuator to insure that the damper operates properly.

**6. End of Procedure:**

## TECHNICAL ASSISTANCE:

For technical assistance, contact the Fab-Tech Engineering Department at (802) 655-8800.

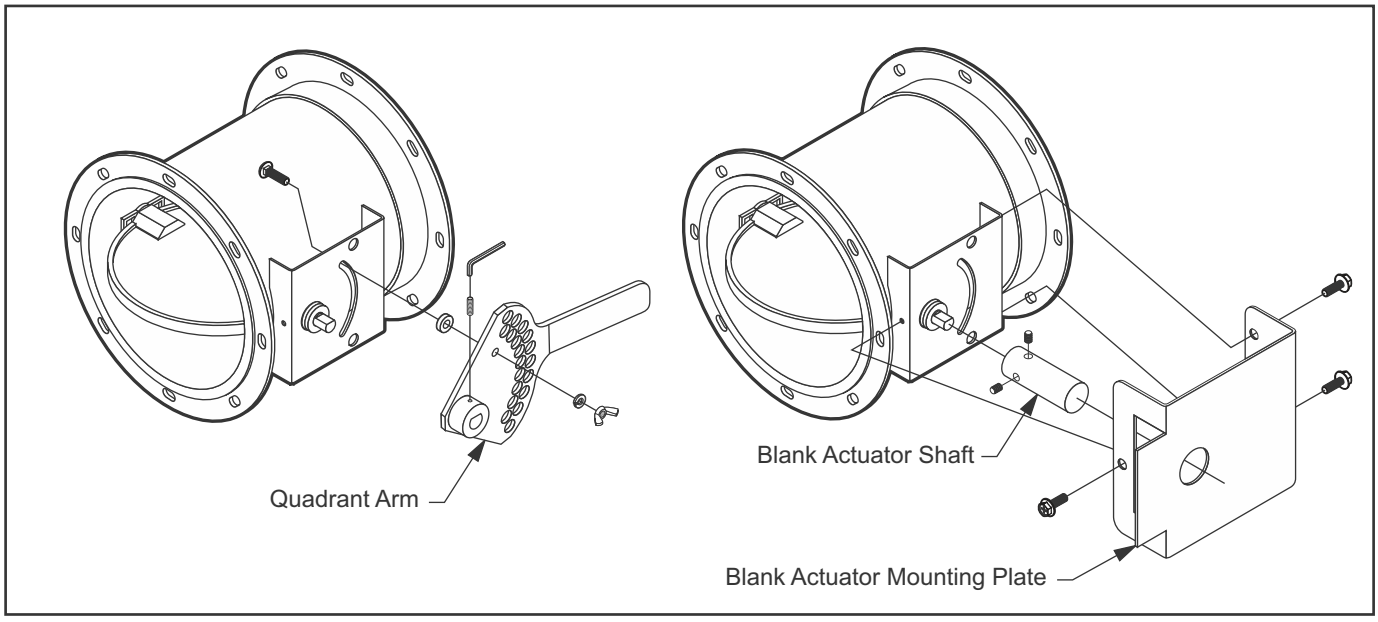



Fig. 51: 4" - 14" Industrial Damper Actuator Removal for Customer Supplied Actuator.

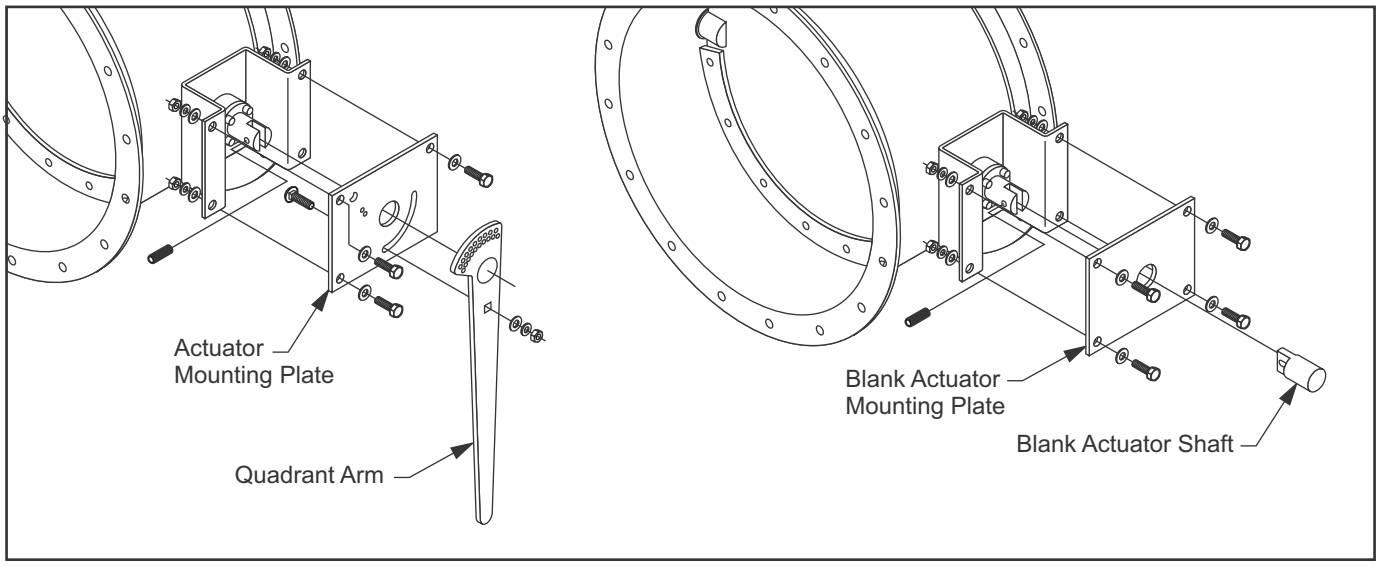



Fig. 52: 16” - 34” Heavy Duty Industrial Damper Actuator Removal for Customer Supplied Actuator.

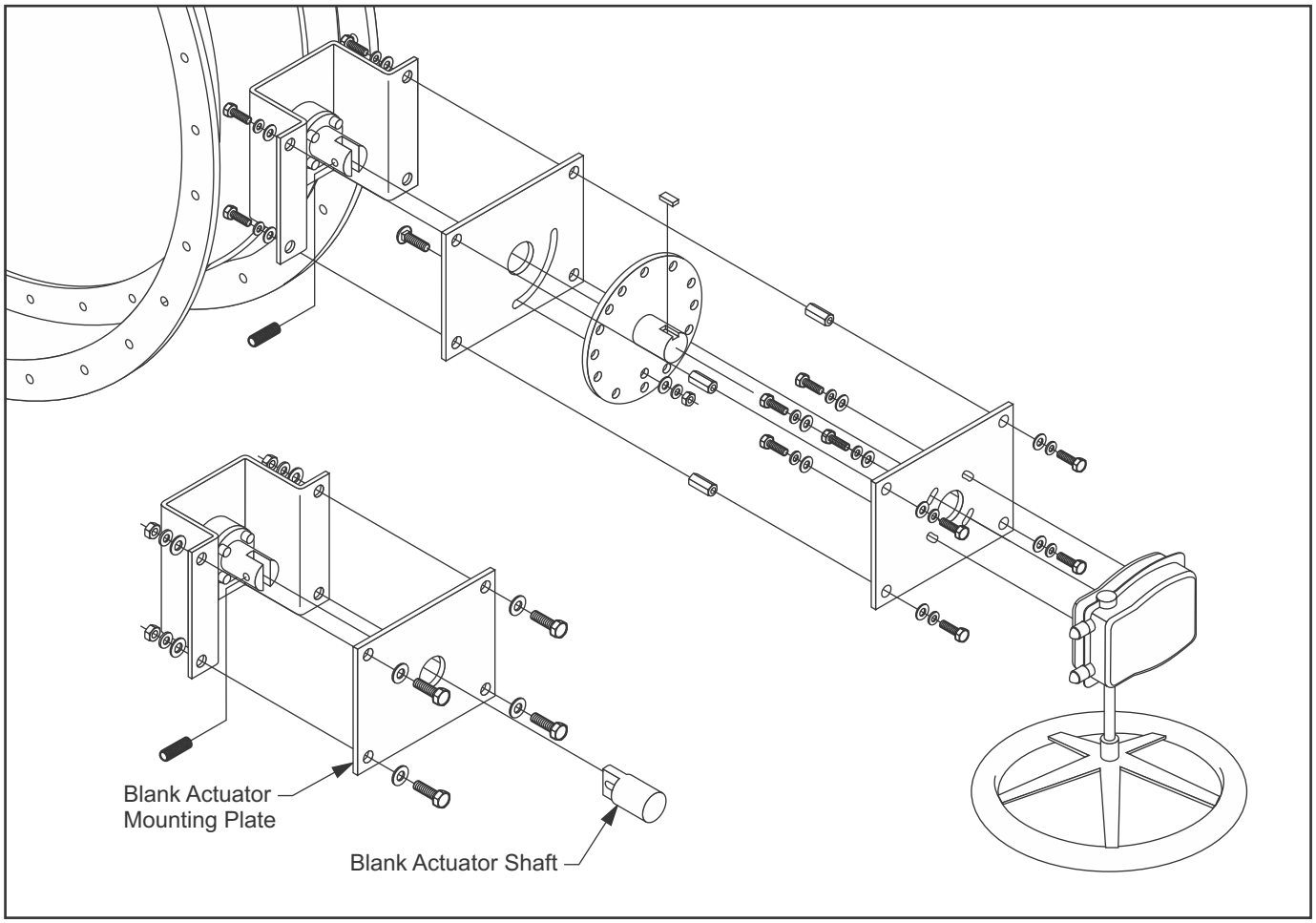



Fig. 53: 36” - 48” Heavy Duty Industrial Damper Actuator Removal for Customer Supplied Actuator.

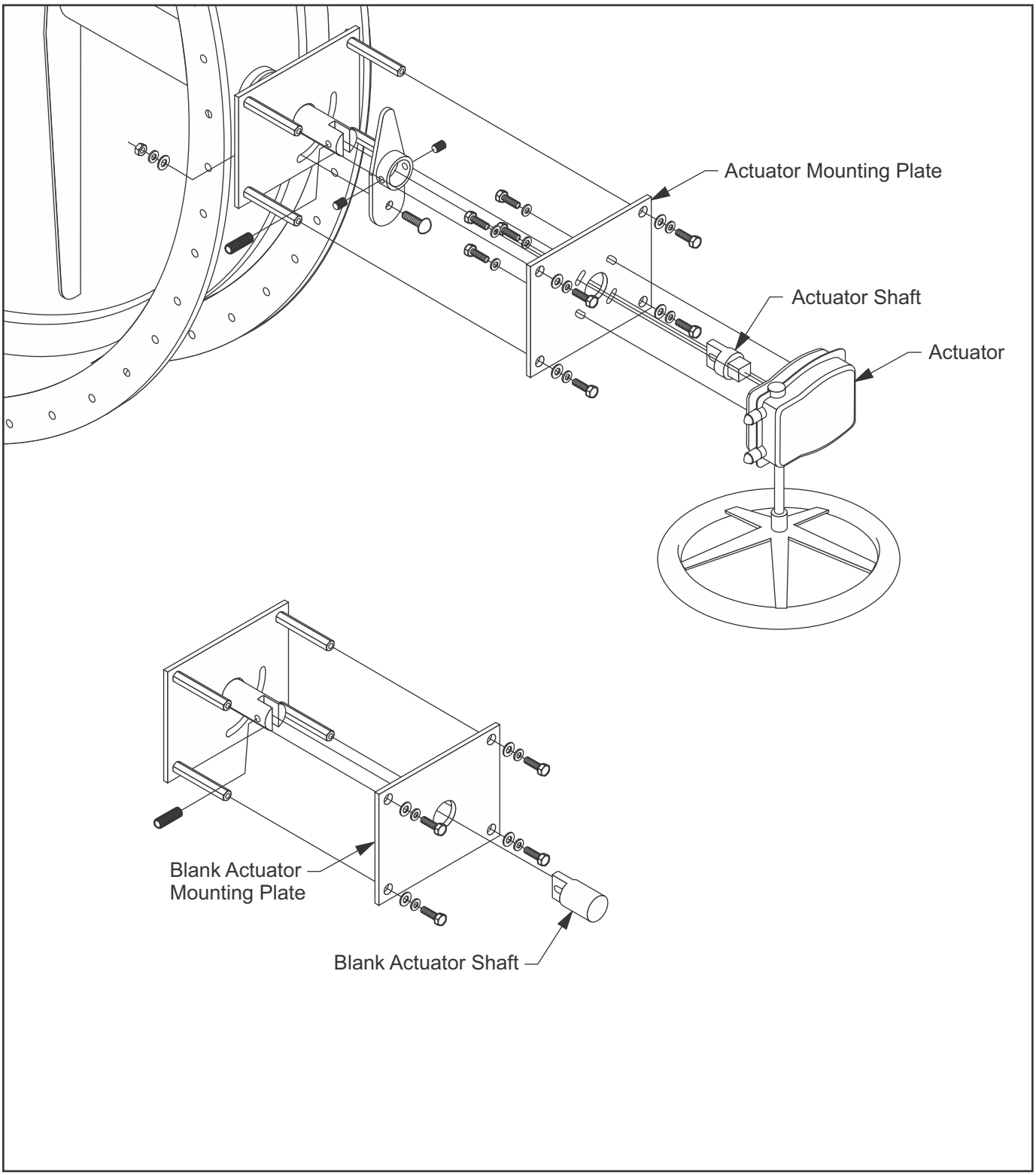



Fig. 54: 50” and Larger Reinforced Heavy Duty Industrial Damper Actuator Removal for Customer Supplied Actuator.

## DESCRIPTION:

Repair of small pinholes, abrasions, and lesions on the fluoropolymer coated surface of Fab-Tech's PSP® PermaShield material may be accomplished in the field, if done with care. This Field Repair protocol is appropriate for repairs no larger than a dime ( 3/4" diameter ). Please contact Fab-Tech Engineering for specific restoration protocol for larger repairs.

## PERSONAL PROTECTION:

Work only in a well ventilated area, as fumes will be generated. If working in a confined area, follow your corporate confined area precautions, remembering that a heat source will be used. An NIOSH-approved respirator, not a dust mask, should be used if ventilation is marginal. Work only with excellent light. Safety glasses are required. Read carefully the Material Safety Data Sheets (MSDS) for the PermaShield repair film.

**MATERIALS NEEDED:**

1 Repair patches of fluoropolymer film ( Available directly from Fab-Tech, 802-655-8800 )
1 Electric Heat Gun equal to: Milwaukee Veritemp Model #8977 with Concentrator Accessory with Concentrator Accessory #49-80-0297 or Bosch Heat Gun Model #1943LED with Concentrator #HG020
1 Pt. Denatured Alcohol ( or Alcohol Prep Pads )
6 1/8" x 8" Taper Punch, or equal
1 Scissors
1 Tweezers
1 #220 grit Aluminum Oxide (A/O) Sandpaper
1 Safety Glasses
1 NIOSH approved Respirator with Hepa/Charcoal combination cartridge filter

## TRAINING VIDEO:

Fab-Tech's PSP® Training Video has a short section on field repair. Call Fab-Tech for your VHS or PAL copy.

## SELECT THE PATCH MATERIAL:

Before proceeding, trim an oversized "patch" that will cover the entire repair area, and will provide an overlap of 1/4" around the entire perimeter. Cut the material in a circle or with rounded corners. Remember: only use PermaShield repair film stock.

## CLEAN THE IMMEDIATE AREA:

Normally the patch area does not need to be sanded. However, if the area requiring repair is caused by an abrasion ( for example, as may be caused by dragging along the floor ) then it may be necessary to locally lightly sand with 220 grit aluminum oxide paper, removing all embedded soil and contamination. All foreign material must be removed from patch area. In all cases, wipe the entire area with an alcohol moistened lint free towel. Repeat using another clean lint free towel. The patch should also be cleaned with alcohol.

## MAKE THE REPAIR:

The repair is completed in several continuous, but distinct steps. As this is a heat application process, please make certain that all tools and materials are "ready-to-go". The patch area must not be allowed to cool from start to finish. Practice this patching technique on a piece of scrap PSP®, if available. If requested, Fab-Tech will send a coated coupon for practice. The three steps:

**1. Preheat to Glaze:** Using the Heat Gun set to 820-850°F, uniformly preheat in and around the area to be patched. Heavier gauge substrates require more preheat time. Sharp "edges" or bumps should be flattened out. Stop preheating at the time when the area becomes glazed over.

**2. Tacking the Patch:** While maintaining the heat and glaze, using tweezers, center the patch carefully over the area. Hint: If circumstances allow, heat can continue to be applied during this step from the "back" of the patched area. Using a tapered pin punch or center punch, press the patch into softened coating. Remember: The patch should have a minimum 1/4" overlap around the repaired edge.

**3. Final Reheat to Flow:** Using the heat gun in even circular motion, heat the affected area until no gaps or voids are present. The properly repaired area should be free of bubbles, folds and raised edges. Caution: Avoid overheating which can burn the coating.

## TESTING THE PATCH:

After the patch has cooled, follow the approved "spark" testing protocol to assure that the area is "holiday" free. ( Refer to Spark Testing Protocol included with this guide. )

## TECHNICAL ASSISTANCE:

If you need technical assistance, call the Fab-Tech Engineering Department at (802) 655-8800. Additional copies of the MSDS are available.

## GENERAL:

PSP® products are 100% QC tested at the factory for coating defects. However, there are times when field spark testing is recommended. Inspect any duct that may have been damaged during transport or installation, or has been field shortened or modified.

**Spark Tester:** The spark tester is a battery operated high voltage, low amperage, voltage source. It is recommended that a D.E. Stearns Holiday tester be used for this procedure. On the face of the unit is a large black on/off switch. Below and to the left and right of this switch are the electrode and ground connections. The ground cable has a copper colored cable molded into the end. The electrode cable has connectors on each end. Connect the ground and electrode cables to the appropriate cable connection. The connectors are quarter turn style. Insert and rotate the connector until the slotted end engages. Moderate insertion force is normal. Turn the connector clockwise to lock. The insulated wand and brush fixtures attach to the other end of the electrode cable using the same connector style. ( Fig. 54 )

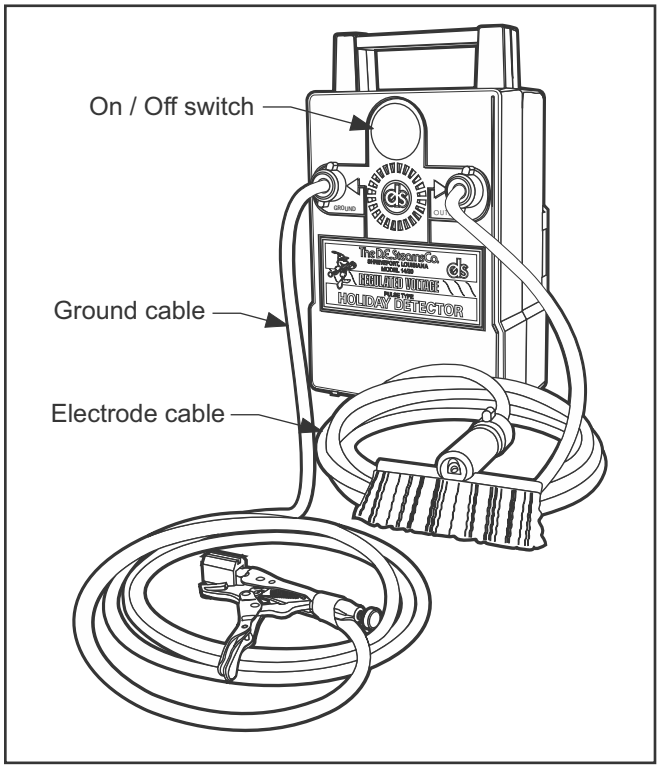



Fig. 55: D.E. Sterns Spark Tester

## PROCEDURE:

**1. Set the Tester:** On the back of the unit are two black, slotted screw caps. ( Fig. 55 ) Remove these caps to expose the adjusting screws underneath. Set the spark tester to achieve 2500 volts. Set the High/Low selector to Low and set the numeric selector to eight. Test the unit by switching it on and grounding the electrode brush against the ground strap. The resulting audible tone should become noticeably louder.

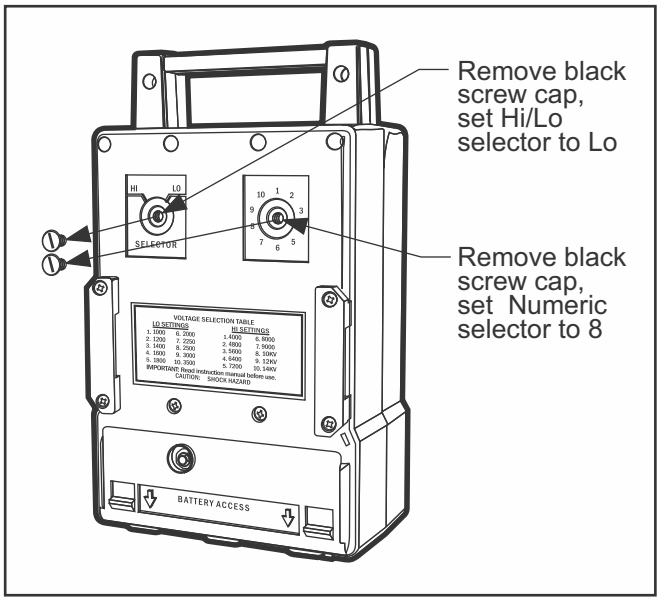



Fig. 56: Rear View of Spark Tester

**Caution:** This device will bite. Although the amperage of the device is not dangerous, it will create an uncomfortable shock. Make sure that you do not create a ground path with your body.

**2. Ground Strap:** Make sure the ground strap is in contact with ONLY the base metal of the duct to be tested ( do not use loose rings or painted surfaces as ground ). Then check that the tester works by touching the duct metal with the brush. A good spark and an increase in tone tells you that it is connected properly.

**3.Inspect Duct:** Inspect the duct coating. Make sure the area to be tested is clean and dry. Be careful to draw the brush toward you; do not push the tips of the brush into the coating. The long brush can be used to inspect large areas of the inside of the duct in a sweeping motion.

## PROCEDURE ( cont'd ):

**3. Inspect Duct ( cont'd ):** The smaller brass brush can be used to inspect the coating that may have been damaged, modified, or to inspect very near the flange edge. Watch very closely for sparks near the edge to make sure it is not a result of bringing the brush too close to the sheet metal.

**4. Pass / Fail:** If there is no detection of voids in the coating, the piece or modification "passes". If a void in the coating is detected the piece "fails" ( a detectable visual spark / crackling sound and an audible sound from the tester will be heard ). Approach a suspect spot to isolate the source of the spark. Use tape or a marker to identify the location of the defect. It is imperative NOT to use this piece until corrected.

**5. Final Disposition:** Visually inspect the "failed" area; a repair may be possible using a Fab-Tech Repair Kit and follow the appropriate repair procedure. If the piece is "rejected", it MUST NOT be placed in service. Contact Fab-Tech for repair or replacement.

**Holiday Detector:** The Model 14/20 Holiday Detector from D.E. Sterns shown in this procedure is no longer in production. The new Model 14/20 unit is shown below for your reference.


Fig. 57: D.E. Sterns new Model 14/20 Holiday Detector.

# Recommended Tooling

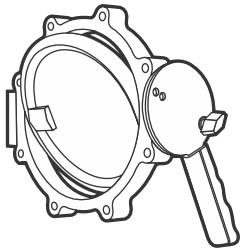
## Standard

Electric double cut shears ( Milwaukee 6850 or equiv. )
Flexible metal ruler and/or tape measure
Marking pen and/or scribe
Calculator and writing pad
Protective gloves
Electric or pneumatic drill
Center punch
Drill bit set and step drill to 1/2" ( 13mm ) min diameter
Hacksaw with blades ( 32 or 40 teeth per inch )
Socket set with deep sockets for EZ clamp bolts
Torque wrench ( 0-50 lb*ft )
Half round and flat file ( fine )
Hard rubber or leather mallet ( must be clean and new )
Scissors and/or utility knife
Large adjustable wrenches ( tighten adapter locknuts )
Allen wrenches for assembling split colars
Soft cloths for cleaning
Alcohol for cleaning

## Special

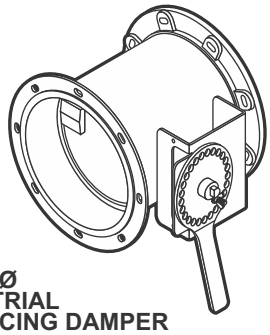
Hydraulic punch kit ( Fab-Tech PN TPS02 )
Mechanical punch kit ( Fab-Tech PN TPS01 )
EZ pliers ( Fab-Tech PN ezpliers )
Saw guides for cutting 2" & 3" EZ duct
( Tri-Clover 2" model #07-1014-2A and
3" model #07-1014-3A )
Ridgid model S3 heavy duty pipe cutter
( Fab-Tech PN D0700 custom roller )
Hand flanger - Pexto model 622 or equivilent
( Custom rolls for hand flanger )

# Round Damper Chart



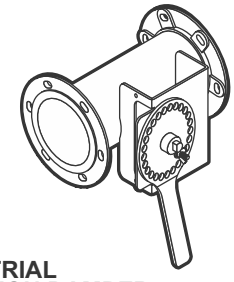
## 4" - 14"Ø WAFER ISOLATION DAMPER

**BODY:** COATED SOLID ALUMINUM BODY
**BODY LENGTH:** 1"
**COATING:** PERMASHIELD FLUOROPOLYMER BARRIER COATING
**BLADE:** COATED 10GA STAINLESS STEEL WITH FULLY WELDED DRIVE AXLE
**4"Ø BLADE:** MACHINED PTFE
**EDGE SEALS:** VITON EXTRUDED RUBBER
**BLADE HOLDERS:** MOLDED 25% GLASS FILLED PTFE
**AXLE:** DUAL SHAFT 1/2"Ø STAINLESS STEEL
**AXLE SEALS:** LIQUID TIGHT - POS & NEG SYSTEM PRESSURE
**BEARINGS:** NYLON
**COATING:** FLUOROPOLYMER BARRIER COATING
**QUADRANT:** MANUAL LOCKING HANDLE
**LOCKOUT:** 1/2° INTERVALS
**BLADE OPENS:** CW
**OPEN/CLOSE TORQUE:** 250 in-lb RECOMMENDED MINIMUM



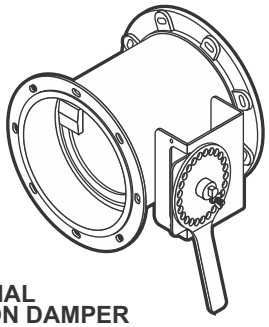
## 4" - 14"Ø INDUSTRIAL BALANCING DAMPER

**BODY:** COATED 20GA STAINLESS STEEL
**BODY LENGTH:** 9-1/4"
**OPTION:** *CUSTOM LENGTH*
**COATING:** PERMASHIELD FLUOROPOLYMER BARRIER COATING
**JOINING SYSTEM:** FLOATING CAST STAINLESS STEEL RINGS
**OPTION:** *PSP-EZ™ JOINING SYSTEM 4"-14"*
**OPTION:** *FLOATING BLACK IRON ANGLE RINGS 4"-14"*
**OPTION:** *CUSTOM HOLE PATTERN*
**PTFE BLADE:** 4"Ø DAMPER ONLY
**BLADE:** COATED 10GA STAINLESS STEEL
**BLADE HOLDERS:** MOLDED PTFE
**AXLES:** DUAL SHAFT 1/2"Ø STAINLESS STEEL
**AXLE SEALS:** LIQUID TIGHT
**ACTUATOR:** MANUAL LEVER
**OPTION:** *ELECTRIC ACTUATOR*
**OPTION:** *PNEUMATIC ACTUATOR*
**LOCKOUT:** 1/2° INTERVALS
**BLADE OPENS:** CCW
**OPEN/CLOSE TORQUE:** 250 in-lb RECOMMENDED MINIMUM



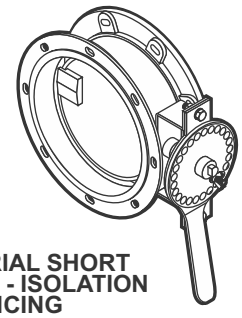
## 4"Ø INDUSTRIAL ISOLATION DAMPER

**BODY:** COATED 20GA STAINLESS STEEL
**BODY LENGTH:** 9-1/4"
**OPTION:** *CUSTOM LENGTH*
**COATING:** PERMASHIELD FLUOROPOLYMER BARRIER COATING
**JOINING SYSTEM:** FLOATING CAST STAINLESS STEEL RINGS
**OPTION:** *PSP-EZ™ JOINING SYSTEM 4"*
**OPTION:** *CUSTOM HOLE PATTERN*
**BLADE & BLADE HOLERS:** VIRGIN TEFLON
**EDGE SEALS:** FLUOROELASTOMER
**AXLES:** DUAL SHAFT 1/2"Ø STAINLESS STEEL
**AXLE SEALS:** LIQUID TIGHT
**ACTUATOR:** MANUAL LEVER
**OPTION:** *ELECTRIC ACTUATOR*
**OPTION:** *PNEUMATIC ACTUATOR*
**LOCKOUT:** 1/2° INTERVALS
**BLADE OPENS:** CCW
**OPEN/CLOSE TORQUE:** 250 in-lb RECOMMENDED MINIMUM



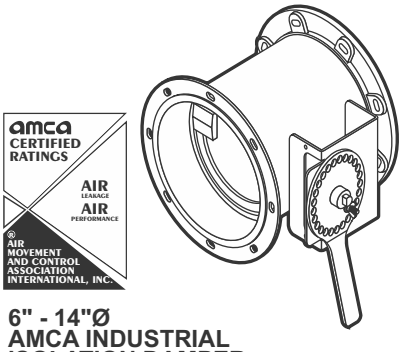
## 6" - 14"Ø INDUSTRIAL ISOLATION DAMPER

**BODY:** COATED 20GA STAINLESS STEEL
**BODY LENGTH:** 9-1/4"
**OPTION:** *CUSTOM LENGTH*
**COATING:** PERMASHIELD FLUOROPOLYMER BARRIER COATING
**JOINING SYSTEM:** FLOATING CAST STAINLESS STEEL RINGS
**OPTION:** *PSP-EZ™ JOINING SYSTEM 6"-14"*
**OPTION:** *FLOATING BLACK IRON ANGLE RINGS 6"-14"*
**OPTION:** *CUSTOM HOLE PATTERN*
**BLADE:** 10GA COATED STAINLESS STEEL
**EDGE SEALS:** FLUOROELASTOMER
**BLADE HOLDERS:** MOLDED PTFE
**AXLES:** DUAL SHAFT 1/2"Ø STAINLESS STEEL
**AXLE SEALS:** LIQUID TIGHT
**ACTUATOR:** MANUAL LEVER
**OPTION:** *ELECTRIC ACTUATOR*
**OPTION:** *PNEUMATIC ACTUATOR*
**LOCKOUT:** 1/2° INTERVALS
**BLADE OPENS:** CCW
**OPEN/CLOSE TORQUE:** 250 in-lb RECOMMENDED MINIMUM



## 4" - 14"Ø INDUSTRIAL SHORT DAMPER - ISOLATION & BALANCING

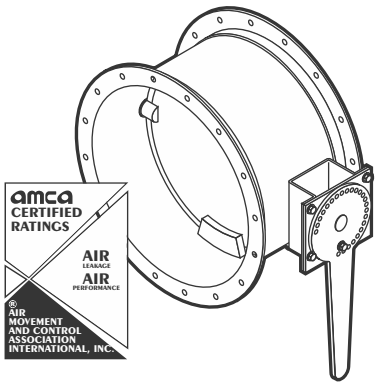
**BODY:** COATED 20GA STAINLESS STEEL
**BODY LENGTH:** 4" MINIMUM
**OPTION:** *CUSTOM LENGTH*
**COATING:** PERMASHIELD FLUOROPOLYMER BARRIER COATING
**JOINING SYSTEM:** FLOATING CAST STAINLESS STEEL RINGS
**OPTION:** *FLOATING STAINLESS STEEL FLAT RINGS 4"-14"*
**OPTION:** *FLOATING BLACK IRON FLAT RINGS 4"-14"*
**OPTION:** *PSP-EZ™ JOINING SYSTEM 4"-14"*
**OPTION:** *CUSTOM HOLE PATTERN*
**BLADE:** 4": VIRGIN TEFLON
6"-14":10GA COATED STAINLESS STEEL
**EDGE SEALS:** FLUOROELASTOMER
**BLADE HOLDERS:** MOLDED PTFE
**AXLES:** DUAL SHAFT 1/2"Ø STAINLESS STEEL
**AXLE SEALS:** LIQUID TIGHT
**ACTUATOR:** MANUAL LEVER
**LOCKOUT:** 1/2° INTERVALS
**BLADE OPENS:** CCW
**OPEN/CLOSE TORQUE:** 250 in-lb RECOMMENDED MINIMUM




## 6" - 14"Ø AMCA INDUSTRIAL ISOLATION DAMPER

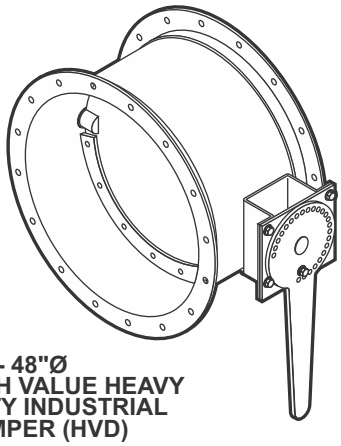
**BODY:** COATED 20GA STAINLESS STEEL
**BODY LENGTH:** 9-1/4"
**OPTION:** *CUSTOM LENGTH*
**COATING:** PERMASHIELD FLUOROPOLYMER BARRIER COATING
**JOINING SYSTEM:** FLOATING CAST STAINLESS STEEL RINGS
**OPTION:** *PSP-EZ™ JOINING SYSTEM 6"-14"*
**OPTION:** *FLOATING BLACK IRON ANGLE RINGS 6"-14"*
**OPTION:** *CUSTOM HOLE PATTERN*
**BLADE:** 10GA COATED STAINLESS STEEL
**EDGE SEALS:** FLUOROELASTOMER
**BLADE HOLDERS:** MOLDED PTFE
**AXLES:** DUAL SHAFT 1/2"Ø STAINLESS STEEL
**AXLE SEALS:** LIQUID TIGHT
**ACTUATOR:** MANUAL LEVER
**OPTION:** *ELECTRIC ACTUATOR*
**OPTION:** *PNEUMATIC ACTUATOR*
**LOCKOUT:** 1/2° INTERVALS
**BLADE OPENS:** CCW
**OPEN/CLOSE TORQUE:** 250 in-lb RECOMMENDED MINIMUM

# Round Damper Chart



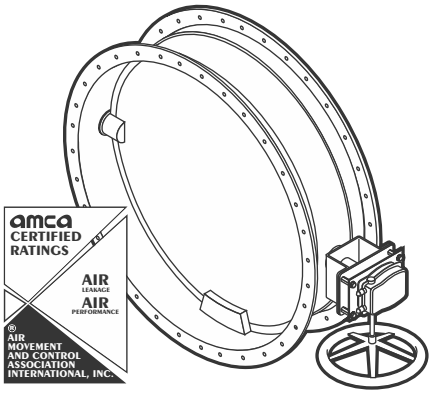

## 16" - 34"Ø AMCA HIGH VALUE HEAVY DUTY INDUSTRIAL DAMPER

**BODY:** COATED 12GA STAINLESS STEEL
**BODY LENGTH:** 10"
**COATING:** PERMASHIELD FLUOROPOLYMER BARRIER COATING
**JOINING SYSTEM:** STITCH WELDED COATED BLACK IRON VAN STONE RINGS
*OPTION: CUSTOM HOLE PATTERN*
**MOUNTING HOLES:** STRADDLE VERTICAL CENTERLINE
**BLADE:** 1/4" COATED STAINLESS STEEL WITH VITON EDGE SEAL
**BLADE STOPS:** WELDED
**AXLES:** DUAL SHAFT 1.38Ø STAINLESS STEEL
**AXLE SEALS:** LIQUID TIGHT
**SLEEVE BEARINGS:** THERMOPLASTIC
**ACTUATOR:** MANUAL LEVER
*OPTION: MANUAL GEAR BOX W/ LOCK OUT*
*OPTION: CUSTOM ACTUATOR MOUNTING KIT*
*OPTION: ELECTRIC ACTUATOR*
*OPTION: PNEUMATIC ACTUATOR*
**LOCKOUT:** 1/2° INTERVALS
**BLADE OPENS:** CCW
**OPEN/CLOSE TORQUE:** 1000 in-lb RECOMMENDED MINIMUM



## 16" - 48"Ø HIGH VALUE HEAVY DUTY INDUSTRIAL DAMPER (HVD)

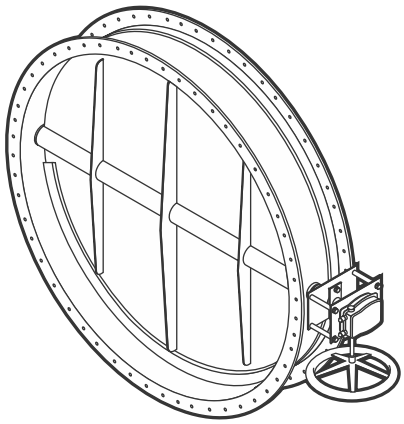
**BODY:** COATED 12GA STAINLESS STEEL
**BODY LENGTH:** 10"
**COATING:** PERMASHIELD FLUOROPOLYMER BARRIER COATING
**JOINING SYSTEM:** STITCH WELDED COATED BLACK IRON VAN STONE RINGS
*OPTION: CUSTOM HOLE PATTERN*
*OPTION: STITCH WELDED STAINLESS STEEL VAN STONE RINGS*
**MOUNTING HOLES:** STRADDLE VERTICAL CENTERLINE
**BLADE:** 1/4" COATED STAINLESS STEEL
**BLADE STOPS:** WELDED W/ VITON BLADE SEAL
**AXLES:** DUAL SHAFT 1.38Ø STAINLESS STEEL
**AXLE SEALS:** LIQUID TIGHT
**SLEEVE BEARINGS:** THERMOPLASTIC
**ACTUATOR:** MANUAL LEVER
*OPTION: MANUAL GEAR BOX W/ LOCK OUT*
*OPTION: CUSTOM ACTUATOR MOUNTING KIT*
*OPTION: ELECTRIC ACTUATOR*
*OPTION: PNEUMATIC ACTUATOR*
**LOCKOUT:** 1/2° INTERVALS
**BLADE OPENS:** CCW
**OPEN/CLOSE TORQUE:** 1000 in-lb RECOMMENDED MINIMUM




## 36" - 48"Ø AMCA HIGH VALUE HEAVY DUTY INDUSTRIAL DAMPER

**BODY:** COATED 12GA STAINLESS STEEL
**BODY LENGTH:** 10"
**COATING:** PERMASHIELD FLUOROPOLYMER BARRIER COATING
**JOINING SYSTEM:** STITCH WELDED COATED BLACK IRON VAN STONE RINGS
*OPTION: CUSTOM HOLE PATTERN*
**MOUNTING HOLES:** STRADDLE VERTICAL CENTERLINE
**BLADE:** 1/4" COATED STAINLESS STEEL WITH VITON EDGE SEAL
**BLADE STOPS:** WELDED
**AXLES:** DUAL SHAFT 1.38Ø STAINLESS STEEL
**AXLE SEALS:** LIQUID TIGHT
**SLEEVE BEARINGS:** THERMOPLASTIC
**ACTUATOR:** MANUAL GEAR BOX W/ LOCK OUT
*OPTION: CUSTOM ACTUATOR MOUNTING KIT*
*OPTION: ELECTRIC ACTUATOR*
*OPTION: PNEUMATIC ACTUATOR*
**LOCKOUT:** 1/2° INTERVALS
**BLADE OPENS:** CCW
**OPEN/CLOSE TORQUE:** 1000 in-lb RECOMMENDED MINIMUM

# Round Damper Chart



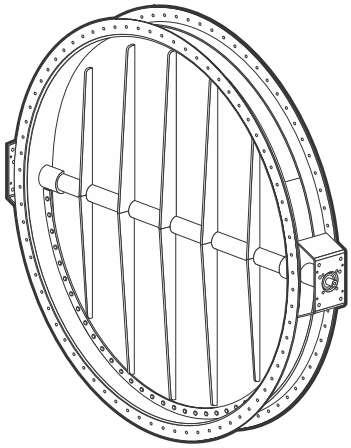
## 50"Ø & LARGER REINFORCED HEAVY DUTY INDUSTRIAL DAMPER

**BODY:** COATED 1/4" STAINLESS STEEL
*OPTION: AVAIL TO 120" DIA W/ ENGINEERING REVIEW*
**BODY LENGTH:** 10"
**COATING:** PERMASHIELD FLUOROPOLYMER BARRIER COATING
**JOINING SYSTEM:** FULLY WELDED STAINLESS STEEL VAN STONE RINGS
*OPTION: CUSTOM HOLE PATTERN*
**MOUNTING HOLES:** STRADDLE VERTICLE CENTERLINE
**BLADE:** 3/8" COATED REINFORCED STAINLESS STEEL
**BLADE STOPS:** WELDED
**AXLES:** DUAL SHAFT 1.85Ø STAINLESS STEEL
**AXLE SEALS:** LIQUID TIGHT
**SLEEVE BEARINGS:** THERMOPLASTIC
**ACTUATOR:** GEAR ACTUATOR W/ LOCK OUT
*OPTION: CUSTOM ACTUATOR MOUNTING KIT*
*OPTION: ELECTRIC ACTUATOR*
*OPTION: PNEUMATIC ACTUATOR*

**PNEUMATIC ACTUATED DAMPERS HYTORK ACTUATOR STANDARD**

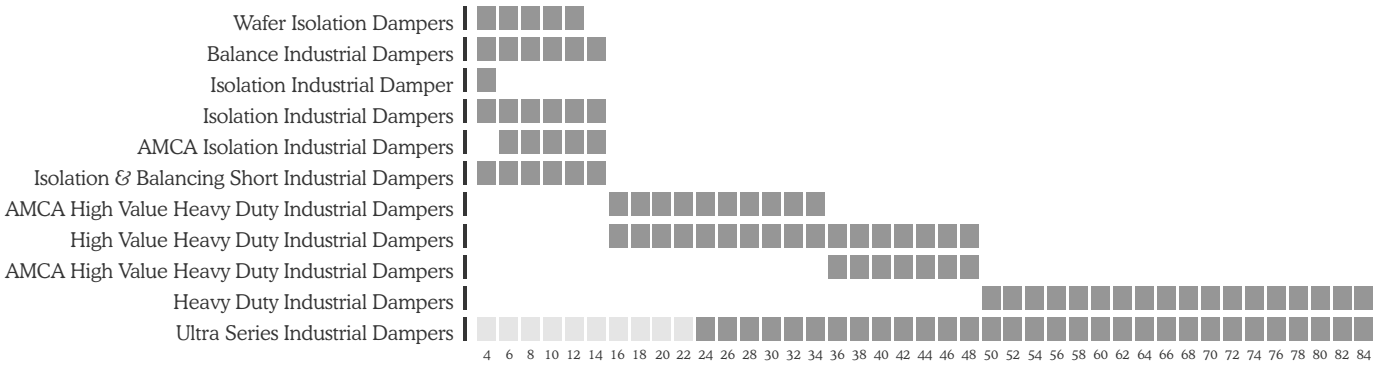
XL45 - UP TO 20"
XL280 - 21" TO 48"
XL425 - 49" TO 94"

**LOCKOUT:** 1/2° INTERVALS
**BLADE OPENS:** CCW
**OPEN/CLOSE TORQUE:** 1600 in-lb RECOMMENDED MINIMUM

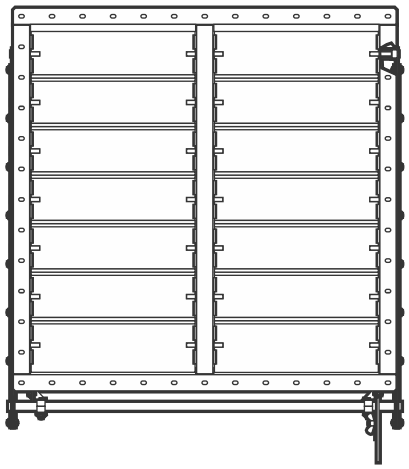


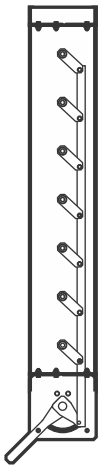
## 24" - 84"Ø ULTRA SERIES INDUSTRIAL DAMPER

**BODY:** COATED 24"-40" DIA. 10GA STAINLESS STEEL
COATED 42"-84" DIA. 1/4" STAINLESS STEEL
*OPTION: AVAIL TO 120" DIA W/ ENGINEERING REVIEW*
**BODY LENGTH:** 10"
**COATING:** PERMASHIELD FLUOROPOLYMER BARRIER COATING
**JOINING SYSTEM:** FULLY WELDED STAINLESS STEEL VAN STONE RINGS
*OPTION: CUSTOM HOLE PATTERN*
**MOUNTING HOLES:** STRADDLE VERTICAL CENTERLINE
**BLADE:** COATED REINFORCED
24"-58" DIA. 1/4" STAINLESS STEEL
60"-84" DIA. 3/8" STAINLESS STEEL
**BLADE STOPS:** WELDED
**AXLES:** 24"-44" DIA. DUAL SHAFT 1.20Ø SS
46"-58" DIA. DUAL SHAFT 1.85Ø SS
60" DIA. & UP DUAL SHAFT 2.45Ø SS
**AXLE SEALS:** LIQUID TIGHT
**SLEEVE BEARINGS:** BRONZE
**ACTUATOR:** STANDARD ROTORK HIGH SPEED SI-1-Q SERIES INTERFACE
*OPTION: CUSTOM ACTUATOR MOUNTING KIT*
*OPTION: ELECTRIC ACTUATOR*
*OPTION: PNEUMATIC ACTUATOR*
**LOCKOUT:** 1/2° INTERVALS
**BLADE OPENS:** CCW



# Rectangular Damper Chart





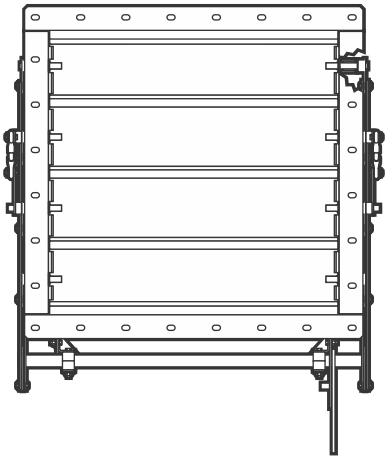
## INDUSTRIAL PARALLEL BLADE CONTROL DAMPER

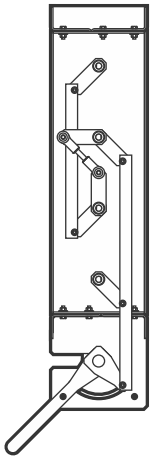
Frame 8" STD Length with 2" Flanges - 10 GA Stainless Steel
Center Support as Required
Mounting Holes ( .44" x .69" slot ) Equal to or less than 4" on Center
Blades - 10 GA Stainless Steel
Axles - .50" Diameter Stainless Steel
Liquid Tight Shaft Seals
Linkages Located Outside the Airstream - 10 GA Stainless Steel
Twin Drive as Required
Quadrant Plates - 10 GA Stainless Steel
Quadrant Lever - .25" Stainless Steel
Full Open / Full Close Lockouts
PTFE Frame Seals
Sizes Available: 8" x 8" to 36" x 36"

**OPTIONS**

Actuator Mounting Kits
Pneumatic Actuator
Electric Actuator
Gear Drive with Locking Damper Shaft

**HEAVY DUTY RECTANGULAR DAMPERS AVAILABLE FOR SIZES 36" X 36" TO 120" X 120"**





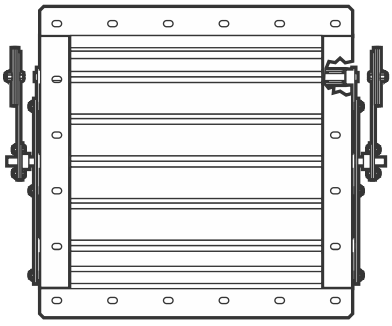
## INDUSTRIAL OPPOSED BLADE CONTROL DAMPER

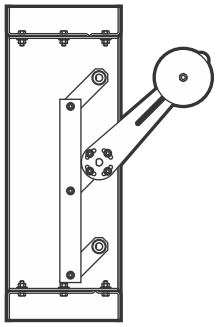
Frame 8" STD Length with 2" Flanges - 10 GA Stainless Steel
Center Support as Required
Mounting Holes ( .44" x .69" slot ) Equal to or less than 4" on Center
Blades - 10 GA Stainless Steel
Axles - .50" Diameter Stainless Steel
Liquid Tight Shaft Seals
Linkages Located Outside the Airstream - 10 GA Stainless Steel
Twin Drive as Required
Quadrant Plates - 10 GA Stainless Steel
Quadrant Lever - .25" Stainless Steel
Full Open / Full Close Lockouts
PTFE Frame Seals
Sizes Available: 8" x 8" to 36" x 36"

**OPTIONS**

Actuator Mounting Kits
Pneumatic Actuator
Electric Actuator
Gear Drive with Locking Damper Shaft

**HEAVY DUTY RECTANGULAR DAMPERS AVAILABLE FOR SIZES 36" X 36" TO 120" X 120"**





## INDUSTRIAL BACKDRAFT DAMPER

Frame 8" STD Length with 2" Flanges - 10 GA Stainless Steel
Center Support as Required
Mounting Holes ( .44" x .69" slot ) Equal to or less than 4" on Center
Blades - 14 GA Stainless Steel
Axles - .50" Diameter Stainless Steel
Liquid Tight Shaft Seals
Linkages Located Outside the Airstream - 10 GA Stainless Steel
Twin Drive as Required
Sizes Available: 8" x 8" to 120" x 120”
Adjustable Counterweights
PTFE Frame Seals

PSP®

## Metric Conversion Chart

### DUCT DIA

| Order Size | English Equivalent | Actual Size |
|---|---|---|
| 50mm | 2" | 50.8mm |
| 100mm | 4" | 101.6mm |
| 150mm | 6" | 152.4mm |
| 200mm | 8" | 203.2mm |
| 250mm | 10" | 254.0mm |
| 300mm | 12" | 304.8mm |
| 350mm | 14" | 355.6mm |
| 400mm | 16" | 406.4mm |
| 450mm | 18" | 457.2mm |
| 500mm | 20" | 508.0mm |
| 550mm | 22" | 558.8mm |
| 600mm | 24" | 609.6mm |
| 650mm | 26" | 660.4mm |
| 700mm | 28" | 711.2mm |
| 750mm | 30" | 762.0mm |
| 800mm | 32" | 812.8mm |
| 850mm | 34" | 863.6mm |
| 900mm | 36" | 914.4mm |
| 950mm | 38" | 965.2mm |
| 1000mm | 40" | 1016.0mm |
| 1050mm | 42" | 1066.8mm |
| 1100mm | 44" | 1117.6mm |
| 1150mm | 46" | 1168.4mm |
| 1200mm | 48" | 1219.2mm |
| 1250mm | 50" | 1270.0mm |
| 1300mm | 52" | 1320.8mm |
| 1350mm | 54" | 1371.6mm |
| 1400mm | 56" | 1422.4mm |
| 1450mm | 58" | 1473.2mm |
| 1500mm | 60" | 1524.0mm |

### DUCT DIA

| Order Size | English Equivalent | Actual Size |
|---|---|---|
| 1550mm | 62" | 1574.8mm |
| 1600mm | 64" | 1625.6mm |
| 1650mm | 66” | 1676.4mm |
| 1700mm | 68" | 1727.2mm |
| 1750mm | 70" | 1778.0mm |
| 1800mm | 72" | 1828.8mm |
| 1850mm | 74" | 1879.6mm |
| 1900mm | 76" | 1930.4mm |
| 1950mm | 78" | 1981.2mm |
| 2000mm | 80" | 2032.0mm |
| 2050mm | 82" | 2082.8mm |
| 2100mm | 84" | 2133.6mm |
| 2150mm | 86" | 2184.4mm |
| 2200mm | 88" | 2235.2mm |
| 2250mm | 90" | 2286.0mm |
| 2300mm | 92" | 2336.8mm |
| 2350mm | 94" | 2387.6mm |
| 2400mm | 96" | 2438.4mm |
| 2450mm | 98" | 2489.2mm |
| 2500mm | 100" | 2540.0mm |
| 2550mm | 102" | 2590.8mm |
| 2600mm | 104" | 2641.6mm |
| 2650mm | 106" | 2692.4mm |
| 2700mm | 108" | 2743.2mm |
| 2750mm | 110" | 2794.0mm |
| 2800mm | 112" | 2844.8mm |
| 2850mm | 114" | 2895.6mm |
| 2900mm | 116" | 2946.4mm |
| 3950mm | 118" | 2997.2mm |
| 3000mm | 120" | 3048.0mm |

☐ METRIC CONVERSIONS ARE ROUNDED TO THE MOST APPROPRIATE EVEN INCH UNLESS OTHERWISE SPECIFIED
☐ DUCT AND FITTINGS GREATER THAN 84" DIAMETER REQUIRES ENGINEERING REVIEW AND APPROVAL

# Weight Chart - PSP® Coated EZ Duct / Miscellaneous Fittings

| DUCT DIA | Single Van Stone Ring | Damper w/ Van Stone Rings Manual Operation | Blastgate w/ Van Stone Rings Manual Operation | End Cap w/ Van Stone Ring |
|---|---|---|---|---|
| 4 | 1.0 | 4.9 | 9.8 | 1.3 |
| 6 | 1.8 | 8.2 | 14.3 | 2.4 |
| 8 | 2.3 | 10.8 | 18.2 | 3.2 |
| 10 | 2.9 | 13.7 | 22.4 | 4.2 |
| 12 | 6.9 | 22.1 | 32.1 | 8.7 |
| 14 | 7.1 | 26.3 | 37.5 | 9.4 |
| 16 | 8.0 | 100 | 42.8 | 15.1 |
| 18 | 8.9 | 109 | 58.6 | 17.6 |
| 20 | 9.8 | 118 | 65.2 | 20.2 |
| 22 | 10.8 | 128 | 72.6 | 22.9 |
| 24 | 11.7 | 138 | 80.2 | 25.8 |
| 26 | 17.4 | 158 | 98.3 | 33.6 |
| 28 | 18.7 | 170 | 107 | 37.2 |
| 30 | 19.9 | 182 | 117 | 40.8 |
| 32 | 21.2 | 194 | 127 | 44.6 |
| 34 | 22.5 | 234 | 136 | 48.5 |
| 36 | 23.8 | 221 | 146 | 60.0 |
| 38 | 25.0 | 235 | 326 | 64.6 |
| 40 | 26.3 | 249 | 337 | 69.4 |
| 42 | 27.6 | 264 | 353 | 74.3 |
| 44 | 28.9 | 280 | 370 | 79.4 |
| 46 | 30.1 | 296 | 385 | 84.6 |
| 48 | 31.4 | 314 | 406 | 89.9 |
| 50 | 41.4 | 517 | 460 | 120 |
| 52 | 43.1 | 544 | 483 | 126 |
| 54 | 44.6 | 573 | 505 | 133 |
| 56 | 46.3 | 602 | 530 | 140 |
| 58 | 47.8 | 633 | 553 | 147 |
| 60 | 79.5 | 725 | 652 | 207 |
| 62 | 82.0 | 757 | 672 | 216 |
| 64 | 84.6 | 791 | 696 | 225 |
| 66 | 87.1 | 826 | 720 | 235 |
| 68 | 89.7 | 861 | 750 | 244 |
| 70 | 92.9 | 897 | 800 | 254 |
| 72 | 94.8 | 936 | 816 | 263 |
| 74 | 97.4 | 972 | 832 | 273 |
| 76 | 100 | 1010 | 848 | 283 |
| 78 | 102 | 1051 | 864 | 293 |
| 80 | 105 | 1089 | 885 | 304 |
| 82 | 108 | 1129 | 902 | 314 |
| 84 | 110 | 1171 | 923 | 325 |
| 86 | 113 | | | 336 |
| 88 | 115 | | | 347 |
| 90 | 118 | | | 358 |
| 92 | 120 | | | 369 |
| 94 | 123 | | | 380 |
| 96 | 171 | | | 437 |
| 98 | 174 | | | 450 |
| 100 | 178 | | | 463 |
| 102 | 181 | | | 475 |
| 104 | 185 | | | 488 |
| 106 | 188 | | | 502 |
| 108 | 192 | | | 515 |
| 110 | 195 | | | 528 |
| 112 | 199 | | | 542 |
| 114 | 202 | | | 555 |
| 116 | 206 | | | 569 |
| 118 | 209 | | | 583 |
| 120 | 213 | | | 598 |

**NOTES:**

1. ALL WEIGHTS ARE CALCULATED, HARDWARE NOT INCLUDED.
2. SOME WEIGHTS FOR FITTINGS LARGER THAN 20" DIAMETER HAVE BEEN ROUNDED TO THE NEAREST POUND.
3. TO CALCULATE THE APPROXIMATE WEIGHT FOR CUSTOM LENGTH DUCT OR FOR FITTINGS SUCH AS REDUCERS, USE THE PER FOOT WEIGHT FOR STRAIGHT DUCT IN THE PROPER PRESSURE CLASS.

## EZ Duct Weight Charts

| DUCT DIA | Duct Per Foot | 4' Duct | Single Clamp |
|---|---|---|---|
| 4 | 1.8 | 7.2 | 0.4 |
| 6 | 2.7 | 10.9 | 0.6 |
| 8 | 3.6 | 14.5 | 1.2 |
| 10 | 4.5 | 18.1 | 1.4 |
| 12 | 5.4 | 21.7 | 1.8 |
| 14 | 6.3 | 25.5 | 2.0 |

| DUCT DIA | 90° Elbow | | 60° Elbow | |
|---|---|---|---|---|
| | R=1.5D | R=1D | R=1.5D | R=1D |
| 4 | 2.2 | 1.5 | 1.2 | 0.8 |
| 6 | 4.5 | 3.5 | 2.4 | 1.7 |
| 8 | 8.3 | 6.4 | 4.0 | 2.9 |
| 10 | 11.9 | 9.0 | 6.0 | 4.3 |
| 12 | 15.1 | 10.9 | 8.5 | 6.0 |
| 14 | 21.7 | 16.0 | 11.3 | 7.9 |

| DUCT DIA | 45° Elbow | | 30° Elbow | |
|---|---|---|---|---|
| | R=1.5D | R=1D | R=1.5D | R=1D |
| 4 | 0.9 | 0.6 | 0.7 | 0.4 |
| 6 | 1.9 | 1.4 | 1.4 | 1.0 |
| 8 | 3.1 | 2.3 | 2.3 | 1.7 |
| 10 | 4.7 | 3.8 | 3.4 | 2.7 |
| 12 | 6.6 | 4.7 | 4.7 | 3.4 |
| 14 | 8.8 | 6.2 | 6.3 | 4.5 |

| DUCT DIA | Damper | Blastgate | End Cap |
|---|---|---|---|
| 4 | 3.1 | 7.0 | 1.0 |
| 6 | 4.8 | 9.5 | 1.6 |
| 8 | 6.4 | 12.7 | 2.6 |
| 10 | 8.1 | 15.0 | 3.5 |
| 12 | 10.3 | 17.9 | 4.4 |
| 14 | 12.6 | 21.0 | 5.4 |

## Weight Chart - PSP® Coated Straight Duct & Elbows:
## -6 Pressure Class

| DUCT DIA | Per Foot 1' - 4' | 4' Duct w/ Van Stone Rings | Per Foot 4' - 8' | 8' Duct w/ Van Stone Rings | 30° Elbow R=1.5D | 30° Elbow R=1D | 45° Elbow R=1.5D | 45° Elbow R=1D | 60° Elbow R=1.5D | 60° Elbow R=1D | 90° Elbow R=1.5D | 90° Elbow R=1D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 1.7 | 9.0 | 3.5 | 32.9 | 2.6 | 2.1 | 2.8 | 2.3 | 3.0 | 2.6 | 3.4 | 2.9 |
| 6 | 2.6 | 14.2 | 4.4 | 41.3 | 5.0 | 4.6 | 5.5 | 4.9 | 6.0 | 5.3 | 7.0 | 5.9 |
| 8 | 3.5 | 18.8 | 5.3 | 56.5 | 7.4 | 6.4 | 8.2 | 6.9 | 9.2 | 7.7 | 10.7 | 8.9 |
| 10 | 4.4 | 23.6 | 6.2 | 64.1 | 9.7 | 8.4 | 10.9 | 9.0 | 12.3 | 10.1 | 14.4 | 11.9 |
| 12 | 5.3 | 35.2 | 7.1 | 73.1 | 17.7 | 15.8 | 19.6 | 16.8 | 21.5 | 18.5 | 25.3 | 21.0 |
| 14 | 6.2 | 39.2 | 8.0 | 82.1 | 22.0 | 19.2 | 24.8 | 20.7 | 27.6 | 23.2 | 33.2 | 26.8 |
| 16 | 7.1 | 44.6 | 8.9 | 91.1 | 26.4 | 22.4 | 30.0 | 24.6 | 33.7 | 27.9 | 41.1 | 32.6 |
| 18 | 8.0 | 50.0 | 9.8 | 100.3 | 30.7 | 26.0 | 35.2 | 28.5 | 39.8 | 32.7 | 49.0 | 38.4 |
| 20 | 8.9 | 55.4 | 10.6 | 108.0 | 35.1 | 29.7 | 40.4 | 32.4 | 45.9 | 37.4 | 56.9 | 44.2 |
| 22 | 9.8 | 61.0 | 11 | 126 | 39.4 | 33.6 | 45.6 | 36.3 | 52.0 | 42.1 | 64.8 | 50.0 |
| 24 | 10.6 | 65.7 | 12 | 136 | 44.7 | 37.8 | 52.0 | 42.7 | 59.4 | 47.6 | 74.5 | 57.6 |
| 26 | 11 | 81 | 13 | 146 | 60 | 51 | 69 | 57 | 77 | 63 | 95 | 75 |
| 28 | 12 | 87 | 18 | 187 | 67 | 57 | 77 | 63 | 87 | 70 | 107 | 84 |
| 30 | 13 | 93 | 19 | 198 | 73 | 62 | 85 | 70 | 96 | 78 | 120 | 93 |
| 32 | 14 | 99 | 20 | 211 | 93 | 76 | 111 | 85 | 128 | 101 | 164 | 123 |
| 34 | 15 | 105 | 21 | 222 | 102 | 83 | 122 | 93 | 141 | 111 | 181 | 135 |
| 36 | 16 | 111 | 22 | 232 | 111 | 90 | 133 | 101 | 154 | 121 | 198 | 147 |
| 38 | 17 | 117 | 23 | 243 | 120 | 97 | 144 | 109 | 167 | 131 | 215 | 159 |
| 40 | 18 | 124 | 24 | 253 | 125 | 101 | 152 | 119 | 179 | 137 | 234 | 174 |
| 42 | 19 | 130 | 25 | 264 | 135 | 109 | 165 | 128 | 195 | 148 | 256 | 189 |
| 44 | 20 | 137 | 26 | 274 | 146 | 116 | 178 | 138 | 211 | 161 | 278 | 205 |
| 46 | 21 | 143 | 27 | 302 | 156 | 125 | 191 | 149 | 227 | 173 | 300 | 222 |
| 48 | 22 | 150 | 44 | 440 | 167 | 133 | 206 | 159 | 245 | 185 | 325 | 238 |
| 50 | 27 | 190 | 46 | 459 | 197 | 160 | 239 | 188 | 281 | 216 | 368 | 274 |
| 52 | 28 | 197 | 48 | 478 | 209 | 185 | 255 | 199 | 301 | 230 | 394 | 292 |
| 54 | 29 | 204 | 50 | 497 | 249 | 197 | 310 | 229 | 373 | 279 | 498 | 364 |
| 56 | 30 | 211 | 52 | 577 | 264 | 208 | 329 | 242 | 397 | 296 | 530 | 387 |
| 58 | 31 | 218 | 54 | 598 | 279 | 220 | 350 | 267 | 421 | 315 | 567 | 412 |
| 60 | 32 | 286 | 56 | 619 | 356 | 292 | 431 | 342 | 508 | 393 | 664 | 497 |
| 62 | 33 | 295 | 58 | 640 | 374 | 306 | 454 | 360 | 536 | 414 | 703 | 525 |
| 64 | 34 | 304 | 60 | 661 | 392 | 320 | 478 | 377 | 565 | 435 | 743 | 553 |
| 66 | 35 | 313 | 62 | 684 | 412 | 334 | 503 | 395 | 596 | 457 | 785 | 583 |
| 68 | 36 | 322 | 64 | 703 | 432 | 349 | 529 | 414 | 627 | 480 | 828 | 613 |
| 70 | 37 | 333 | 69 | 746 | 451 | 364 | 554 | 432 | 658 | 502 | 871 | 643 |
| 72 | 38 | 340 | 71 | 768 | 472 | 418 | 581 | 452 | 691 | 525 | 916 | 675 |
| 74 | 39 | 350 | 73 | 788 | 564 | 445 | 707 | 524 | 859 | 634 | 1159 | 834 |
| 76 | 40 | 359 | 75 | 810 | 588 | 463 | 738 | 546 | 898 | 661 | 1213 | 871 |
| 78 | 41 | 367 | 77 | 832 | 612 | 481 | 769 | 568 | 937 | 688 | 1267 | 908 |
| 80 | 56 | 434 | 79 | 852 | 636 | 499 | 800 | 590 | 976 | 715 | 1321 | 945 |
| 82 | 58 | 448 | 81 | 874 | | | | | | | | |
| 84 | 60 | 460 | 83 | 894 | | | | | | | | |
| 86 | 62 | 474 | 85 | 916 | | | | | | | | |
| 88 | 64 | 486 | 87 | 936 | | | | | | | | |
| 90 | 66 | 500 | 89 | 958 | | | | | | | | |
| 92 | 68 | 512 | 91 | 1070 | | | | | | | | |
| 94 | 70 | 526 | 93 | 1092 | | | | | | | | |
| 96 | 72 | 630 | 95 | 1116 | | | | | | | | |
| 98 | 74 | 644 | 97 | 1138 | | | | | | | | |
| 100 | 76 | 660 | 99 | 1162 | | | | | | | | |
| 102 | 78 | 674 | 101 | 1184 | | | | | | | | |
| 104 | 80 | 690 | 103 | 1208 | | | | | | | | |
| 106 | 82 | 704 | 149 | 1578 | | | | | | | | |
| 108 | 84 | 720 | 152 | 1610 | | | | | | | | |
| 110 | 86 | 734 | 155 | 1640 | | | | | | | | |
| 112 | 88 | 750 | 158 | 1672 | | | | | | | | |
| 114 | 90 | 764 | 161 | 1702 | | | | | | | | |
| 116 | 92 | 780 | 164 | 1734 | | | | | | | | |
| 118 | 110 | 858 | | | | | | | | | | |
| 120 | 112 | 874 | | | | | | | | | | |

# Weight Chart - PSP® Coated Straight Duct & Elbows:
## -10 Pressure Class

| DUCT DIA | Per Foot 1' - 4' | 4' Duct w/ Van Stone Rings | Per Foot 4' - 8' | 8' Duct w/ Van Stone Rings | 30° Elbow R=1.5D | 30° Elbow R=1D | 45° Elbow R=1.5D | 45° Elbow R=1D | 60° Elbow R=1.5D | 60° Elbow R=1D | 90° Elbow R=1.5D | 90° Elbow R=1D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 1.7 | 9.0 | 3.5 | 32.9 | 2.6 | 2.1 | 2.8 | 2.3 | 3.0 | 2.6 | 3.4 | 2.9 |
| 6 | 2.6 | 14.2 | 4.4 | 41.3 | 5.0 | 4.6 | 5.5 | 4.9 | 6.0 | 5.3 | 7.0 | 5.9 |
| 8 | 3.5 | 18.8 | 5.3 | 56.5 | 7.4 | 6.4 | 8.2 | 6.9 | 9.2 | 7.7 | 10.7 | 8.9 |
| 10 | 4.4 | 23.6 | 6.2 | 64.1 | 9.7 | 8.4 | 10.9 | 9.0 | 12.3 | 10.1 | 14.4 | 11.9 |
| 12 | 5.3 | 35.2 | 7.1 | 73.1 | 17.7 | 15.8 | 19.6 | 16.8 | 21.5 | 18.5 | 25.3 | 21.0 |
| 14 | 6.2 | 39.2 | 8.0 | 82.1 | 22.0 | 19.2 | 24.8 | 20.7 | 27.6 | 23.2 | 33.2 | 26.8 |
| 16 | 7.1 | 44.6 | 8.9 | 91.1 | 26.4 | 22.4 | 30.0 | 24.6 | 33.7 | 27.9 | 41.1 | 32.6 |
| 18 | 8.0 | 50.0 | 12.6 | 122.4 | 30.7 | 26.0 | 35.2 | 28.5 | 39.8 | 32.7 | 49.0 | 38.4 |
| 20 | 8.9 | 55.4 | 13.7 | 133.4 | 35.1 | 29.7 | 40.4 | 32.4 | 45.9 | 37.4 | 56.9 | 44.2 |
| 22 | 9.8 | 61.0 | 15 | 154 | 39.4 | 33.6 | 45.6 | 36.3 | 52.0 | 42.1 | 64.8 | 50.0 |
| 24 | 10.6 | 65.7 | 16 | 163 | 44.7 | 37.8 | 52.0 | 42.7 | 59.4 | 47.6 | 74.5 | 57.6 |
| 26 | 11 | 81 | 17 | 177 | 60 | 51 | 69 | 57 | 77 | 63 | 95 | 75 |
| 28 | 12 | 87 | 18 | 187 | 67 | 57 | 77 | 63 | 87 | 70 | 107 | 84 |
| 30 | 13 | 93 | 19 | 198 | 73 | 62 | 85 | 70 | 96 | 78 | 120 | 93 |
| 32 | 14 | 99 | 28 | 273 | 93 | 76 | 111 | 85 | 128 | 101 | 164 | 123 |
| 34 | 15 | 105 | 30 | 292 | 102 | 83 | 122 | 93 | 141 | 111 | 181 | 135 |
| 36 | 20 | 126 | 32 | 310 | 111 | 90 | 133 | 101 | 154 | 121 | 198 | 147 |
| 38 | 21 | 133 | 34 | 329 | 120 | 97 | 144 | 109 | 167 | 131 | 215 | 159 |
| 40 | 22 | 139 | 36 | 348 | 125 | 101 | 152 | 119 | 179 | 137 | 234 | 174 |
| 42 | 23 | 146 | 38 | 366 | 135 | 109 | 165 | 128 | 195 | 148 | 256 | 189 |
| 44 | 24 | 153 | 40 | 385 | 146 | 116 | 178 | 138 | 211 | 161 | 278 | 205 |
| 46 | 25 | 159 | 42 | 421 | 156 | 125 | 191 | 149 | 227 | 173 | 300 | 222 |
| 48 | 26 | 166 | 44 | 440 | 167 | 133 | 206 | 159 | 245 | 185 | 325 | 238 |
| 50 | 27 | 190 | 49 | 481 | 197 | 160 | 239 | 188 | 281 | 216 | 368 | 274 |
| 52 | 28 | 197 | 51 | 500 | 234 | 186 | 291 | 216 | 349 | 262 | 466 | 341 |
| 54 | 29 | 204 | 53 | 519 | 249 | 197 | 310 | 229 | 373 | 279 | 498 | 364 |
| 56 | 30 | 211 | 55 | 599 | 264 | 208 | 329 | 242 | 397 | 296 | 530 | 387 |
| 58 | 46 | 279 | 57 | 620 | 279 | 220 | 350 | 267 | 421 | 315 | 567 | 412 |
| 60 | 48 | 351 | 59 | 641 | 356 | 292 | 431 | 342 | 508 | 393 | 664 | 497 |
| 62 | 50 | 364 | 61 | 662 | 374 | 306 | 454 | 360 | 536 | 414 | 703 | 525 |
| 64 | 52 | 377 | 63 | 683 | 392 | 320 | 478 | 377 | 565 | 435 | 743 | 553 |
| 66 | 54 | 390 | 65 | 705 | 412 | 334 | 503 | 395 | 596 | 457 | 785 | 583 |
| 68 | 56 | 403 | 67 | 725 | 432 | 349 | 529 | 414 | 627 | 480 | 828 | 613 |
| 70 | 58 | 418 | 69 | 746 | 451 | 364 | 554 | 432 | 658 | 502 | 871 | 643 |
| 72 | 60 | 429 | 71 | 768 | 540 | 427 | 676 | 502 | 820 | 607 | 1105 | 797 |
| 74 | 62 | 443 | 101 | 1008 | 564 | 445 | 707 | 524 | 859 | 634 | 1159 | 834 |
| 76 | 64 | 456 | 104 | 1038 | 588 | 463 | 738 | 546 | 898 | 661 | 1213 | 871 |
| 78 | 66 | 468 | 107 | 1068 | 612 | 481 | 769 | 568 | 937 | 688 | 1267 | 908 |
| 80 | 68 | 482 | 110 | 1096 | 636 | 499 | 800 | 590 | 976 | 715 | 1321 | 945 |
| 82 | 70 | 496 | 113 | 1126 | | | | | | | | |
| 84 | 76 | 524 | 116 | 1154 | | | | | | | | |
| 86 | 78 | 538 | 119 | 1184 | | | | | | | | |
| 88 | 80 | 550 | 122 | 1212 | | | | | | | | |
| 90 | 82 | 564 | 125 | 1242 | | | | | | | | |
| 92 | 84 | 576 | 128 | 1362 | | | | | | | | |
| 94 | 86 | 590 | 131 | 1392 | | | | | | | | |
| 96 | 88 | 694 | 134 | 1424 | | | | | | | | |
| 98 | 90 | 708 | 137 | 1454 | | | | | | | | |
| 100 | 92 | 724 | 140 | 1486 | | | | | | | | |
| 102 | 94 | 738 | 143 | 1516 | | | | | | | | |
| 104 | 96 | 754 | 146 | 1548 | | | | | | | | |
| 106 | 98 | 768 | 149 | 1578 | | | | | | | | |
| 108 | 100 | 784 | 152 | 1610 | | | | | | | | |
| 110 | 102 | 798 | 155 | 1640 | | | | | | | | |
| 112 | 104 | 814 | 158 | 1672 | | | | | | | | |
| 114 | 106 | 828 | 161 | 1702 | | | | | | | | |
| 116 | 108 | 844 | 164 | 1734 | | | | | | | | |
| 118 | 110 | 858 | | | | | | | | | | |
| 120 | 112 | 874 | | | | | | | | | | |

# Weight Chart - PSP® Coated Straight Duct & Elbows:

## -14 Pressure Class

| DUCT DIA | Per Foot 1' - 4' | 4' Duct w/ Van Stone Rings | Per Foot 4' - 8' | 8' Duct w/ Van Stone Rings | 30° Elbow R=1.5D | 30° Elbow R=1D | 45° Elbow R=1.5D | 45° Elbow R=1D | 60° Elbow R=1.5D | 60° Elbow R=1D | 90° Elbow R=1.5D | 90° Elbow R=1D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 1.7 | 9.0 | 3.5 | 32.9 | 2.6 | 2.1 | 2.8 | 2.3 | 3.0 | 2.6 | 3.4 | 2.9 |
| 6 | 2.6 | 14.2 | 4.4 | 41.3 | 5.0 | 4.6 | 5.5 | 4.9 | 6.0 | 5.3 | 7.0 | 5.9 |
| 8 | 3.5 | 18.8 | 5.3 | 56.5 | 7.4 | 6.4 | 8.2 | 6.9 | 9.2 | 7.7 | 10.7 | 8.9 |
| 10 | 4.4 | 23.6 | 6.2 | 64.1 | 9.7 | 8.4 | 10.9 | 9.0 | 12.3 | 10.1 | 14.4 | 11.9 |
| 12 | 5.3 | 35.2 | 7.1 | 73.1 | 17.7 | 15.8 | 19.6 | 16.8 | 21.5 | 18.5 | 25.3 | 21.0 |
| 14 | 6.2 | 39.2 | 8.0 | 82.1 | 22.0 | 19.2 | 24.8 | 20.7 | 27.6 | 23.2 | 33.2 | 26.8 |
| 16 | 7.1 | 44.6 | 11.4 | 111.2 | 26.4 | 22.4 | 30.0 | 24.6 | 33.7 | 27.9 | 41.1 | 32.6 |
| 18 | 8.0 | 50.0 | 12.6 | 122.4 | 30.7 | 26.0 | 35.2 | 28.5 | 39.8 | 32.7 | 49.0 | 38.4 |
| 20 | 8.9 | 55.4 | 13.7 | 133.4 | 35.1 | 29.7 | 40.4 | 32.4 | 45.9 | 37.4 | 56.9 | 44.2 |
| 22 | 9.8 | 61.0 | 15 | 154 | 39.4 | 33.6 | 45.6 | 36.3 | 52.0 | 42.1 | 64.8 | 50.0 |
| 24 | 10.6 | 65.7 | 16 | 163 | 44.7 | 37.8 | 52.0 | 42.7 | 59.4 | 47.6 | 74.5 | 57.6 |
| 26 | 11 | 81 | 22 | 218 | 60 | 51 | 69 | 57 | 77 | 63 | 95 | 75 |
| 28 | 16 | 10 | 24 | 236 | 75 | 62 | 89 | 69 | 102 | 81 | 130 | 99 |
| 30 | 17 | 107 | 26 | 255 | 84 | 69 | 100 | 77 | 115 | 91 | 147 | 111 |
| 32 | 18 | 113 | 28 | 273 | 93 | 76 | 111 | 85 | 128 | 101 | 164 | 123 |
| 34 | 19 | 120 | 30 | 292 | 102 | 83 | 122 | 93 | 141 | 111 | 181 | 135 |
| 36 | 20 | 126 | 32 | 310 | 111 | 90 | 133 | 101 | 154 | 121 | 198 | 147 |
| 38 | 21 | 133 | 37 | 351 | 120 | 97 | 144 | 109 | 167 | 131 | 215 | 159 |
| 40 | 22 | 139 | 39 | 369 | 125 | 101 | 152 | 119 | 179 | 137 | 234 | 174 |
| 42 | 23 | 146 | 41 | 388 | 135 | 109 | 165 | 128 | 195 | 148 | 256 | 189 |
| 44 | 24 | 153 | 43 | 406 | 146 | 116 | 178 | 138 | 211 | 161 | 278 | 205 |
| 46 | 34 | 196 | 45 | 442 | 178 | 138 | 221 | 161 | 267 | 198 | 357 | 259 |
| 48 | 36 | 207 | 47 | 462 | 191 | 147 | 237 | 172 | 287 | 212 | 384 | 278 |
| 50 | 38 | 235 | 49 | 481 | 219 | 175 | 272 | 203 | 325 | 245 | 434 | 318 |
| 52 | 40 | 246 | 51 | 500 | 234 | 186 | 291 | 216 | 349 | 262 | 466 | 341 |
| 54 | 42 | 257 | 53 | 519 | 249 | 197 | 310 | 229 | 373 | 279 | 498 | 364 |
| 56 | 44 | 268 | 55 | 599 | 264 | 208 | 329 | 242 | 397 | 296 | 530 | 387 |
| 58 | 46 | 279 | 77 | 776 | 279 | 220 | 350 | 267 | 421 | 315 | 567 | 412 |
| 60 | 48 | 351 | 80 | 806 | 356 | 292 | 431 | 342 | 508 | 393 | 664 | 497 |
| 62 | 50 | 364 | 83 | 835 | 374 | 306 | 454 | 360 | 536 | 414 | 703 | 525 |
| 64 | 52 | 377 | 86 | 864 | 392 | 320 | 478 | 377 | 565 | 435 | 743 | 553 |
| 66 | 54 | 390 | 89 | 894 | 412 | 334 | 503 | 395 | 596 | 457 | 785 | 583 |
| 68 | 60 | 420 | 92 | 922 | 492 | 391 | 614 | 458 | 742 | 553 | 997 | 723 |
| 70 | 62 | 434 | 95 | 951 | 516 | 409 | 645 | 480 | 781 | 580 | 1051 | 760 |
| 72 | 64 | 446 | 98 | 980 | 540 | 427 | 676 | 502 | 820 | 607 | 1105 | 797 |
| 74 | 66 | 459 | 101 | 1008 | 564 | 445 | 707 | 524 | 859 | 634 | 1159 | 834 |
| 76 | 68 | 472 | 104 | 1038 | 588 | 463 | 738 | 546 | 898 | 661 | 1213 | 871 |
| 78 | 70 | 484 | 107 | 1068 | 612 | 481 | 769 | 568 | 937 | 688 | 1267 | 908 |
| 80 | 72 | 498 | 110 | 1096 | 636 | 499 | 800 | 590 | 976 | 715 | 1321 | 945 |
| 82 | 74 | 516 | 113 | 1126 | | | | | | | | |
| 84 | 76 | 524 | 116 | 1154 | | | | | | | | |
| 86 | 78 | 538 | 119 | 1184 | | | | | | | | |
| 88 | 80 | 550 | 122 | 1212 | | | | | | | | |
| 90 | 82 | 564 | 125 | 1242 | | | | | | | | |
| 92 | 84 | 576 | 128 | 1362 | | | | | | | | |
| 94 | 86 | 590 | 131 | 1392 | | | | | | | | |
| 96 | 88 | 694 | 134 | 1424 | | | | | | | | |
| 98 | 121 | 832 | 137 | 1454 | | | | | | | | |
| 100 | 124 | 852 | 140 | 1486 | | | | | | | | |
| 102 | 127 | 870 | 143 | 1516 | | | | | | | | |
| 104 | 130 | 890 | 146 | 1548 | | | | | | | | |
| 106 | 133 | 908 | 174 | 1780 | | | | | | | | |
| 108 | 136 | 928 | 178 | 1820 | | | | | | | | |
| 110 | 139 | 946 | 182 | 1858 | | | | | | | | |
| 112 | 142 | 966 | 186 | 1898 | | | | | | | | |
| 114 | 145 | 984 | 190 | 1936 | | | | | | | | |
| 116 | 148 | 1004 | 194 | 1976 | | | | | | | | |
| 118 | 151 | 1022 | | | | | | | | | | |
| 120 | 154 | 1042 | | | | | | | | | | |

# Weight Chart - PSP® Coated Straight Duct & Elbows:
## -18 Pressure Class

| DUCT DIA | Per Foot 1' - 4' | 4' Duct w/ Van Stone Rings | Per Foot 4' - 8' | 8' Duct w/ Van Stone Rings | 30° Elbow R=1.5D | 30° Elbow R=1D | 45° Elbow R=1.5D | 45° Elbow R=1D | 60° Elbow R=1.5D | 60° Elbow R=1D | 90° Elbow R=1.5D | 90° Elbow R=1D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 1.7 | 9.0 | | | 2.6 | 2.1 | 2.8 | 2.3 | 3.0 | 2.6 | 3.4 | 2.9 |
| 6 | 2.6 | 14.2 | | | 5.0 | 4.6 | 5.5 | 4.9 | 6.0 | 5.3 | 7.0 | 5.9 |
| 8 | 3.5 | 18.8 | 3.5 | 32.9 | 7.4 | 6.4 | 8.2 | 6.9 | 9.2 | 7.7 | 10.7 | 8.9 |
| 10 | 4.4 | 23.6 | 4.4 | 41.3 | 9.7 | 8.4 | 10.9 | 9.0 | 12.3 | 10.1 | 14.4 | 11.9 |
| 12 | 5.3 | 35.2 | 5.3 | 56.5 | 17.7 | 15.8 | 19.6 | 16.8 | 21.5 | 18.5 | 25.3 | 21.0 |
| 14 | 6.2 | 39.2 | 6.2 | 64.1 | 22.0 | 19.2 | 24.8 | 20.7 | 27.6 | 23.2 | 33.2 | 26.8 |
| 16 | 7.1 | 44.6 | 9.1 | 72.80 | 26.4 | 22.4 | 30.0 | 24.6 | 33.7 | 27.9 | 41.1 | 32.6 |
| 18 | 8.0 | 50.0 | 10.3 | 100.2 | 30.7 | 26.0 | 35.2 | 28.5 | 39.8 | 32.7 | 49.0 | 38.4 |
| 20 | 8.9 | 55.4 | 11.4 | 111.2 | 35.1 | 29.7 | 40.4 | 32.4 | 45.9 | 37.4 | 56.9 | 44.2 |
| 22 | 9.8 | 61.0 | 12.6 | 122.4 | 39.4 | 33.6 | 45.6 | 36.3 | 52.0 | 42.1 | 64.8 | 50.0 |
| 24 | 13.7 | 78.1 | 13.7 | 133.4 | 49.9 | 41.7 | 59.7 | 46.0 | 69.5 | 54.4 | 89.5 | 67.7 |
| 26 | 15 | 94 | 18 | 181 | 66 | 55 | 78 | 61 | 89 | 71 | 113 | 87 |
| 28 | 16 | 100 | 20 | 199 | 75 | 62 | 89 | 69 | 102 | 81 | 130 | 99 |
| 30 | 17 | 107 | 22 | 218 | 84 | 69 | 100 | 77 | 115 | 91 | 147 | 111 |
| 32 | 18 | 133 | 24 | 236 | 93 | 76 | 111 | 85 | 128 | 101 | 164 | 123 |
| 34 | 19 | 120 | 26 | 255 | 102 | 83 | 122 | 93 | 141 | 111 | 181 | 135 |
| 36 | 20 | 126 | 31 | 295 | 111 | 90 | 133 | 101 | 154 | 121 | 198 | 147 |
| 38 | 21 | 133 | 33 | 314 | 120 | 97 | 144 | 109 | 167 | 131 | 215 | 159 |
| 40 | 28 | 164 | 35 | 332 | 139 | 111 | 173 | 128 | 207 | 156 | 276 | 202 |
| 42 | 30 | 175 | 37 | 351 | 152 | 120 | 189 | 139 | 227 | 170 | 303 | 221 |
| 44 | 32 | 186 | 39 | 369 | 165 | 129 | 205 | 150 | 247 | 184 | 330 | 240 |
| 46 | 34 | 196 | 41 | 388 | 178 | 138 | 221 | 161 | 267 | 198 | 357 | 259 |
| 48 | 36 | 207 | 43 | 406 | 191 | 147 | 237 | 172 | 287 | 212 | 384 | 278 |
| 50 | 38 | 235 | 45 | 442 | 219 | 175 | 272 | 203 | 325 | 245 | 434 | 318 |
| 52 | 40 | 246 | 62 | 579 | 234 | 186 | 291 | 216 | 349 | 262 | 466 | 341 |
| 54 | 42 | 257 | 65 | 606 | 249 | 197 | 310 | 229 | 373 | 279 | 498 | 364 |
| 56 | 44 | 268 | 68 | 633 | 264 | 208 | 329 | 242 | 397 | 296 | 530 | 387 |
| 58 | 50 | 296 | 71 | 660 | 317 | 246 | 405 | 293 | 494 | 364 | 676 | 485 |
| 60 | 52 | 367 | 74 | 747 | 396 | 319 | 490 | 370 | 586 | 445 | 781 | 575 |
| 62 | 54 | 380 | 77 | 776 | 420 | 337 | 521 | 392 | 625 | 472 | 835 | 612 |
| 64 | 56 | 394 | 80 | 806 | 444 | 355 | 552 | 414 | 664 | 499 | 889 | 649 |
| 66 | 58 | 407 | 83 | 835 | 468 | 373 | 583 | 436 | 703 | 526 | 943 | 686 |
| 68 | 60 | 420 | 86 | 864 | 492 | 391 | 614 | 458 | 742 | 553 | 997 | 723 |
| 70 | 62 | 434 | 89 | 894 | 516 | 409 | 645 | 480 | 781 | 580 | 1051 | 760 |
| 72 | 64 | 446 | 92 | 922 | 540 | 427 | 676 | 502 | 820 | 607 | 1105 | 797 |
| 74 | 66 | 459 | 95 | 951 | 564 | 445 | 707 | 524 | 859 | 634 | 1159 | 834 |
| 76 | 68 | 472 | 98 | 980 | 588 | 463 | 738 | 546 | 898 | 661 | 1213 | 871 |
| 78 | 70 | 484 | 101 | 1008 | 612 | 481 | 769 | 568 | 937 | 688 | 1267 | 908 |
| 80 | 72 | 498 | 104 | 1038 | 636 | 499 | 800 | 590 | 976 | 715 | 1321 | 945 |
| 82 | 74 | 512 | 107 | 1068 | | | | | | | | |
| 84 | 100 | 620 | 110 | 1096 | | | | | | | | |
| 86 | 103 | 638 | 113 | 1126 | | | | | | | | |
| 88 | 106 | 654 | 116 | 1154 | | | | | | | | |
| 90 | 109 | 672 | 119 | 1184 | | | | | | | | |
| 92 | 112 | 688 | 122 | 1212 | | | | | | | | |
| 94 | 115 | 706 | 142 | 1380 | | | | | | | | |
| 96 | 118 | 814 | 146 | 1508 | | | | | | | | |
| 98 | 121 | 832 | 150 | 1546 | | | | | | | | |
| 100 | 124 | 852 | 154 | 1586 | | | | | | | | |
| 102 | 127 | 870 | 158 | 1624 | | | | | | | | |
| 104 | 130 | 890 | 162 | 1664 | | | | | | | | |
| 106 | 133 | 908 | 166 | 1702 | | | | | | | | |
| 108 | 136 | 928 | 170 | 1742 | | | | | | | | |
| 110 | 139 | 946 | 174 | 1780 | | | | | | | | |
| 112 | 142 | 966 | 178 | 1820 | | | | | | | | |
| 114 | 145 | 984 | 182 | 1858 | | | | | | | | |
| 116 | 148 | 1004 | 186 | 1898 | | | | | | | | |
| 118 | 151 | 1022 | 190 | 1936 | | | | | | | | |
| 120 | 154 | 1042 | 194 | 1976 | | | | | | | | |