



## 1. BUTT FUSION WELDING PROCEDURE

### 1.1. **Definition**

- 1.1.1. Butt Fusion Welding is defined as heating two pipe (duct) surfaces to an appropriate temperature, changing the resin's molecular structure to an amorphous (pliable state, and then fuse them together by application of prescribed force until cooling occurs, returning the material to a crystalline state and creating one homogeneous pipe.
- 1.1.2. When pressure is applied at the designated temperature and prescribed force, the molecules from each pipe surface end mix.
- 1.1.3. As the joint cools, the molecules return to their crystalline form and the two duct lengths have become one continuous length.
- 1.1.4. The end result is a fusion joint that is as strong as or stronger than the duct itself, creating a leak-free joint.

### 1.2. **GTI Plastic Duct**

- 1.2.1. Occasionally, required duct lengths in a project exceed the possible shipping lengths available for GTI Round Plastic Duct.
- 1.2.2. Butt Fusion Welding of GTI Round Plastic Duct is an acceptable practice for attaching multiple lengths of duct when performed in accordance with these instructions.
- 1.2.3. All sizes of GTI Round Plastic Duct may be Butt Fusion Welded.

### 1.3. **Process**

- 1.3.1. GTI Plastic Duct is Butt Fusion Welded using a "fusion welder".
- 1.3.2. Fusion welders vary depending upon the outside diameter of the duct to be welded.



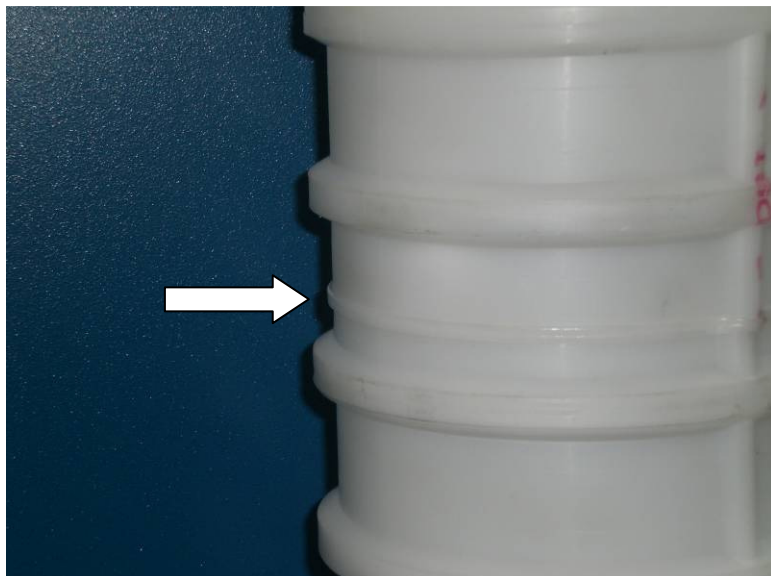
- 1.3.3. The duct ends are "faced" to establish clean, parallel mating surfaces, perpendicular to the centerline of each duct.



- 1.3.4. The duct lengths are held axially by a clamping device to allow subsequent operations to take place.



- 1.3.5. A heating plate is inserted between the faced duct ends and the duct is drawn together against the heating plate.  
1.3.6. A melt pattern that penetrates into the duct ends is formed around both duct pieces.  
1.3.7. Once the correct melt temperature is reached, the heating plate is quickly removed, and the melt ends are drawn together with a specified force.  
1.3.8. The specified force on the joint must be continuous, and held until the joint cools.  
1.3.9. A small melt bead forms at the joint.



- 1.3.10. At completion, the fused pipe is removed from the welding machine.
- 1.4. **Procedure**
- 1.4.1. Confirm that work place is safe and protected from weather influences.  
1.4.2. Check that fusion welder is working properly.  
1.4.3. Cut duct to proper lengths.



**BONDED TENDONS  
INSTALLATION MANUAL**

Document No.: BTInstall 1. Rev.: 2

Date of Issue: 12/6/13

Replaces: 4/10/12

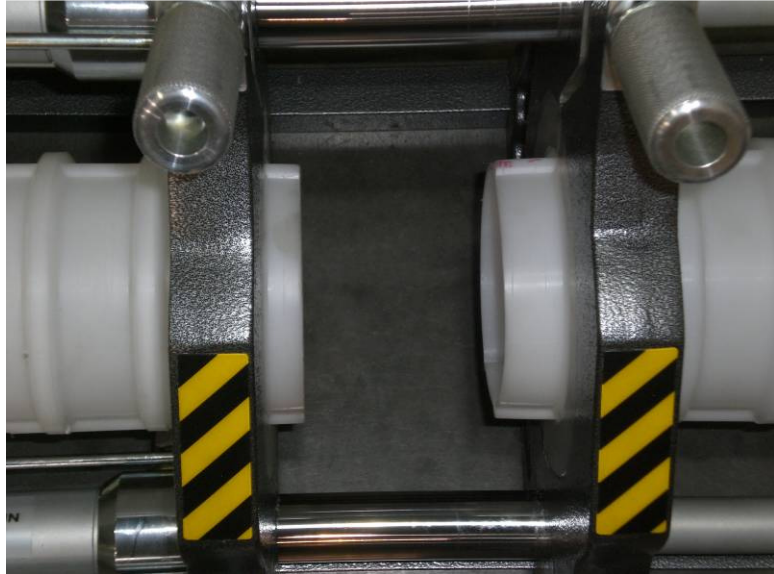
**BUTT FUSION WELDING PROCEDURE**

Issued By: LBK

Approved By: FS

Page 3 of 7

1.4.4. Properly align and fix duct with clamping elements.



1.4.5. Use a planning device to “face” the mating surfaces.





**BONDED TENDONS  
INSTALLATION MANUAL**

Document No.: BTInstall 1. Rev.: 2

Date of Issue: 12/6/13

Replaces: 4/10/12

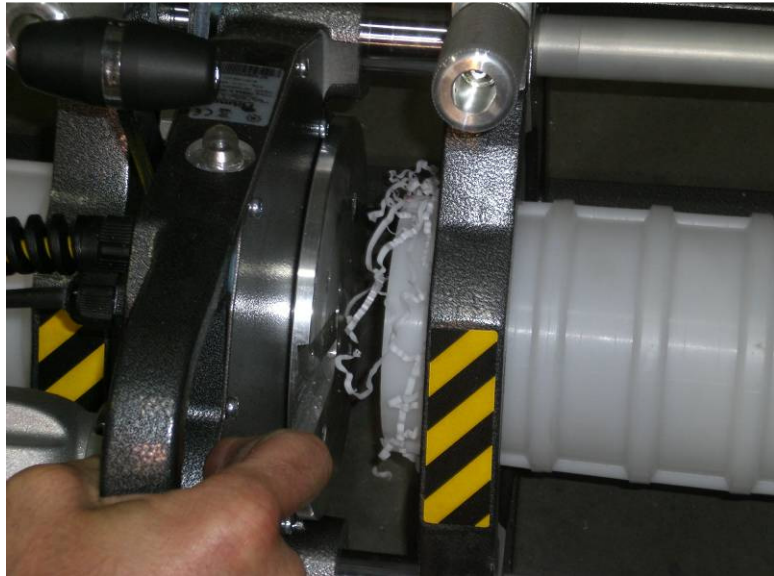
**BUTT FUSION WELDING PROCEDURE**

Issued By: LBK

Approved By: FS

Page 4 of 7

1.4.6. Remove debris/clean-up surfaces to be fused.







## BONDED TENDONS INSTALLATION MANUAL

Document No.: BTInstall 1. Rev.: 2

Date of Issue: 12/6/13

Replaces: 4/10/12

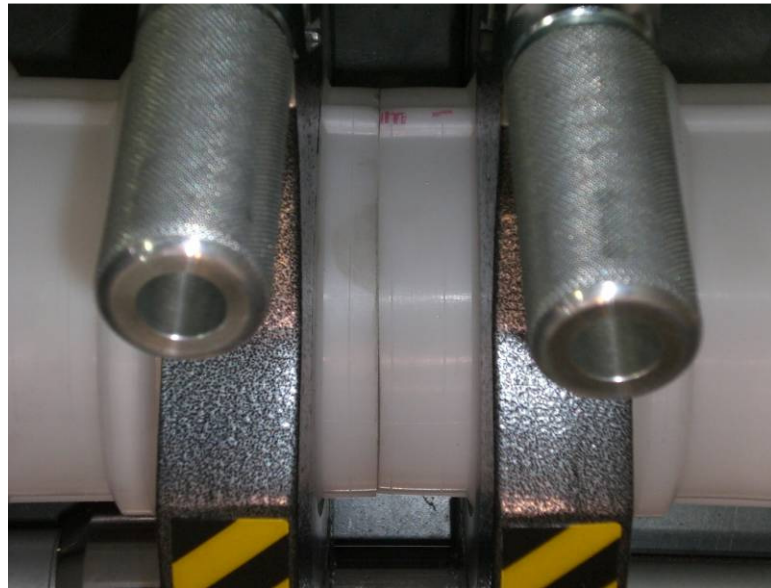
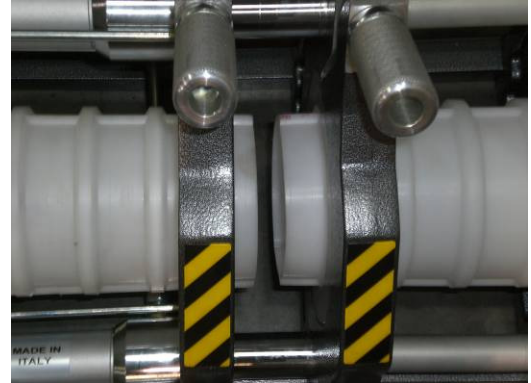
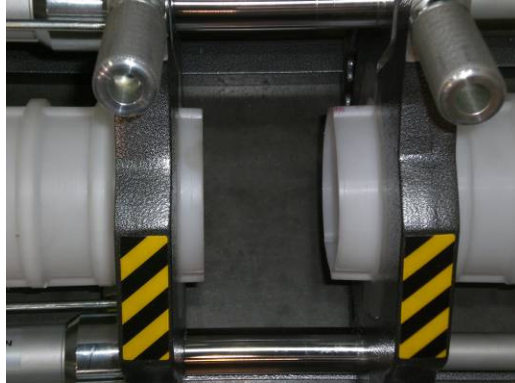
### BUTT FUSION WELDING PROCEDURE

Issued By: LBK

Approved By: FS

Page 5 of 7

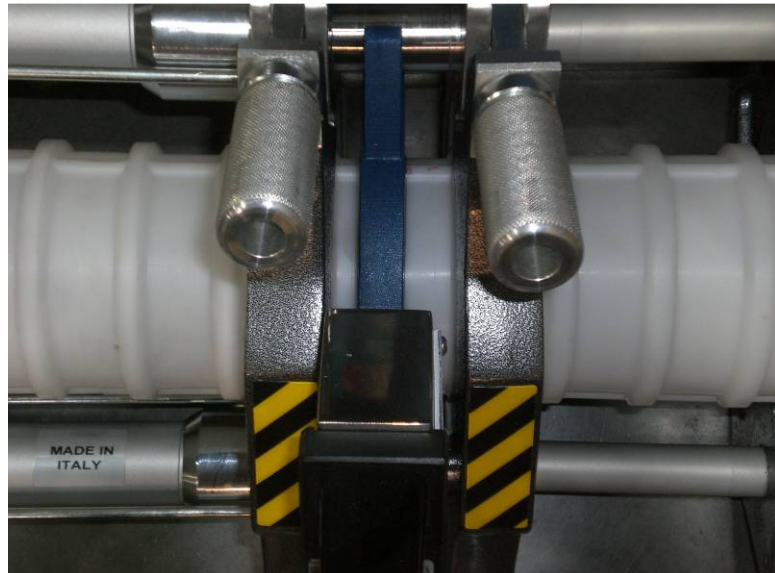
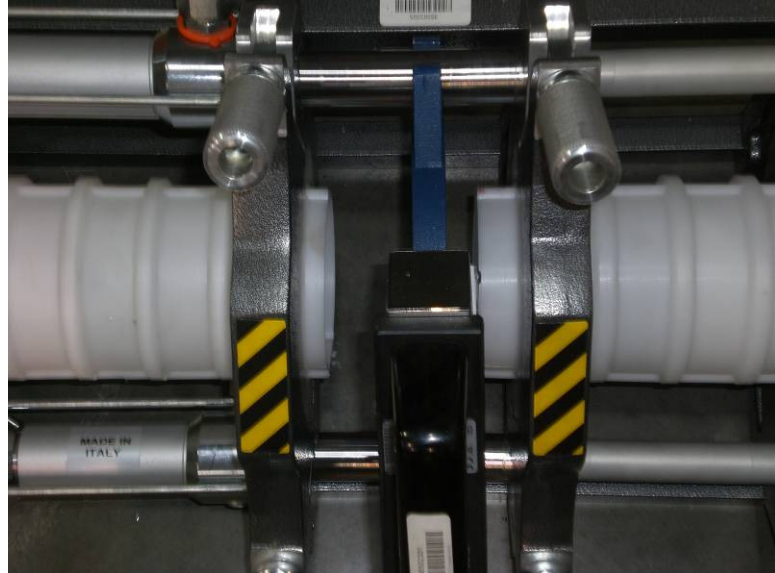
- 1.4.7. Check if duct surfaces match (parallel and perpendicular to centerline of each duct).  
*Allowance is 10% of wall thickness, gap less than 0.5 mm.*




- 1.4.8. Turn on heating element.  
1.4.9. Prior to welding, ensure that the heating element has reached operating temperature.  $210^{\circ} C \pm 10^{\circ} C$ .  
1.4.10. Clean the heating element.



- 1.4.11. Place the heating element between duct ends and apply initial pressure (0.1 N/mm<sup>2</sup>).



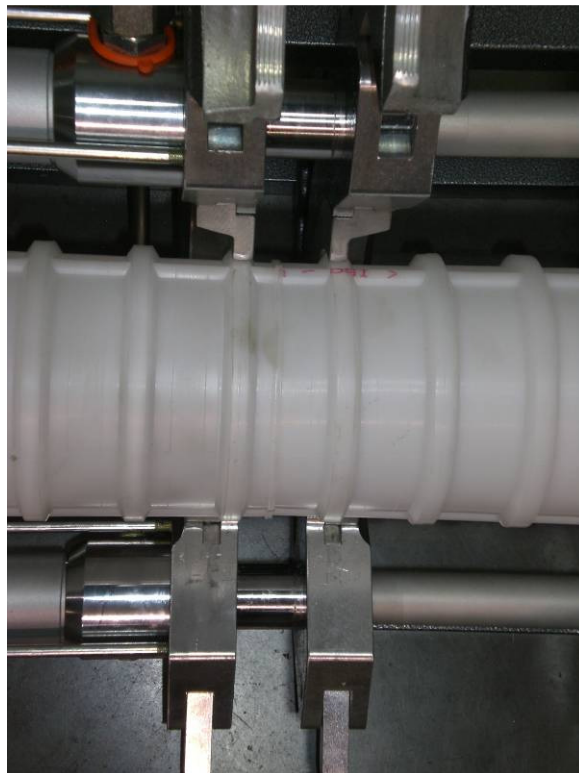
- 1.4.12. When the bead has reached a height of 0.5 mm (approximately 30-45 seconds), reduce pressure, open the device, remove heating element quickly (within 5 seconds), and join the duct ends together (within 5 seconds).

 <b>BONDED TENDONS INSTALLATION MANUAL</b>	Document No.: BTInstall 1. Rev.: 2
	Date of Issue: 12/6/13 Replaces: 4/10/12
<b>BUTT FUSION WELDING PROCEDURE</b>	Issued By: LBK Approved By: FS
	Page 7 of 7

- 1.4.13. The pipes are fused by applying the required welding pressure ( $0.1 \text{ N/mm}^2$ ) for approximately 5 seconds.



- 1.4.14. Cool down time is started and the duct is allowed to cool down under minimal pressure (approximately one minute).
- 1.4.15. Upon completion of cool down time, the duct lengths can be unclamped.



- 1.4.16. The welding process is completed.