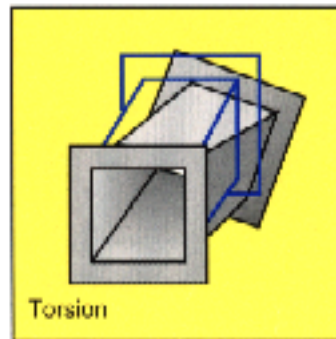
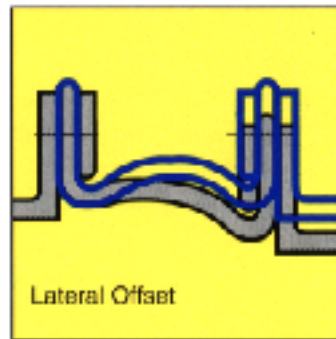
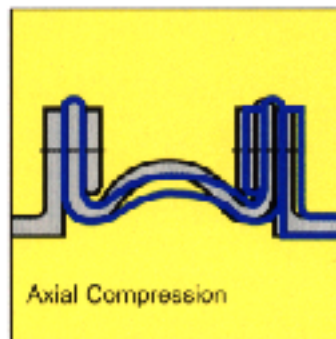
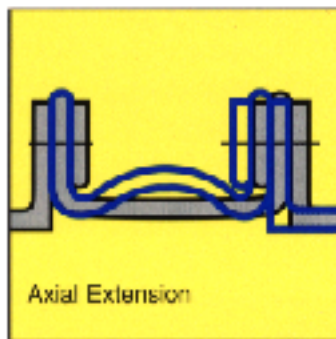


A. STORAGE

1. Store in original containers.
2. Store in an area where they are protected from physical damage or abuse.
3. Store in a dry area where the temperature will not exceed 150° F (65° C).
4. Notify Senior Flexonics immediately if any unusual appearances are noticed when receiving, unpacking or installing the expansion joints.

B. PRE-INSTALLATION REQUIREMENTS

1. Check that the duct flanges of the breach opening are aligned correctly. Lateral displacement, angular motion (torsion) and the flange-to-flange dimensions should not exceed the figures shown on the project drawings. Deviations are allowed up to $\pm 3/8"$ (10mm) Axial and $\pm 1/4"$ (6mm) Lateral.
2. Flange faces of the ductwork should be smooth, uniform and flat.
3. Clear work area of all sharp objects or protrusions.
4. Provide protection against weld splatter at or around the expansion joint installation area. Shields and/or welding blankets should be used to protect the flexible element of the expansion joint from any weld splatter or slag contact. All shields and/or welding blankets must be removed when welding is completed, or damage to the expansion joint may occur during operation.
5. Ensure that all the necessary hardware (nuts, bolts and washers) are available.

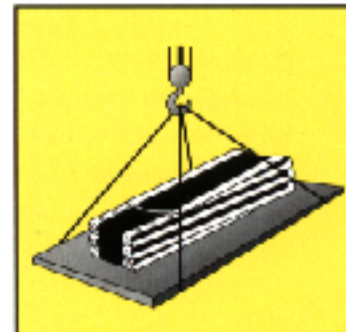


INSTALLATION, MAINTENANCE & STORAGE MANUAL FOR NON-METALLIC FLUE DUCT EXPANSION JOINTS

C. INSTALLATION

The proper installation of the expansion joint is dependent of following correctly the procedures listed below.

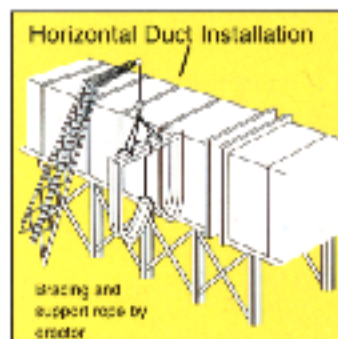
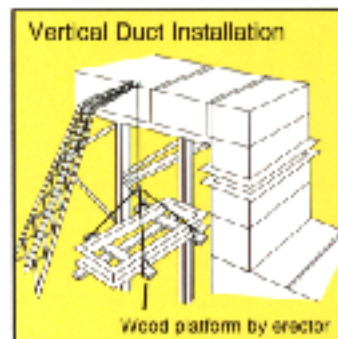
Erection of scaffolding around the work area will greatly facilitate installation.



Large and heavy expansion joint belts must rest on a supporting base (plywood sheet) during installation and should be lifted to the work area with proper lifting devices such as a crane or block and tackle. Do not drag the belt across any abrasive surfaces such as plant floors, stair wells, walkways etc...

C1. INTEGRAL FLANGED TYPE EXPANSION JOINTS

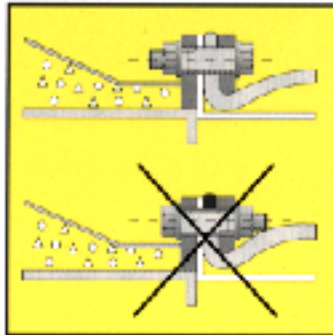
- Compress the expansion joint by squeezing the flanges together and securing in the compressed state with nylon or glass reinforced tape. The compressed length should be at least 1" (25mm) less than the breach opening dimension to allow clearance for positioning.
- If field-welded liners are part of the installation, place them inside the ductwork prior to installing the expansion joint, but do not weld in place. **NOTE: Flow liners must be installed if the gas velocity exceeds 35 ft/sec. (10m/sec.).**
- Lift or slide the expansion joint and support bracing into the breach opening and align the expansion joint holes with the ductwork flange holes. Install some of the backup bars loosely along with several positioning bolts to hold the expansion joint in place yet allowing for the removal of the platform.
- Remove taping and bracing, taking care not to damage the expansion joint.



C1. INTEGRAL FLANGED TYPE EXPANSION JOINTS CONT'D...

- Install balance of backup bars and erection bolt sets and tighten down to 35 to 40 ft./lbs. (50 to 55 N•m) of torque, going twice around each flange periphery.

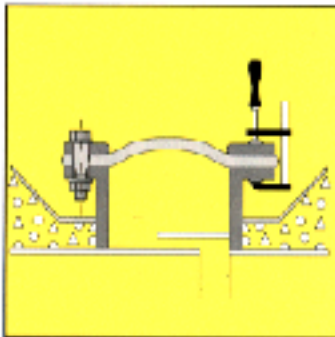
NOTE: Bolt sets must be installed with the nuts on the outside of the ductwork flanges. (see sketch)



- Install field-welded flow liner (if required) exercising extreme care to protect the expansion joint from weld splatter or slag.

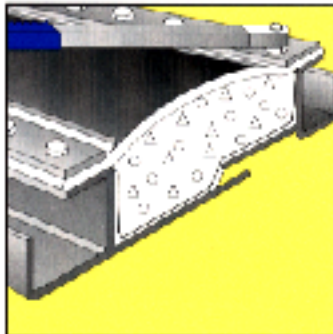
C2. BELT TYPE JOINTS WITH HOLES PREPUNCHED

- If the expansion joint is supplied with holes prepunched by Senior Flexonics, position the belt with the backup bars to the metal frame and hold in place with several bolts, and/or "C" clamps.



- All backup bars, including the fasteners must be in place before tightening the bolts. For rectangular/square expansion joints, tighten the bolts in all radius corners first; then install every fourth bolt down along the straight sides. For circular expansion joints, install the backup

bars with every fourth bolt-fastened loosely to the frame. When finished, install balance of bolts and torque to 35 to 40 ft.-lbs. (50 to 55 N•m) going twice around the periphery of each flange.



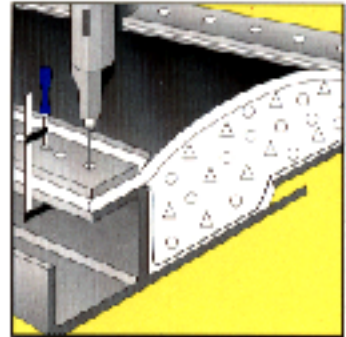
NOTE: Do not punch/drill extra holes without consulting Senior Flexonics or change the existing holes as this will result in leakage in the flange area and will therefore void the Senior Flexonics warranty.

C3. BELT TYPE EXPANSION JOINTS SUPPLIED WITHOUT HOLES

- Place the expansion joint belt on the metal frame, then position the mating backup bar to the expansion joint belt flange with several screw clamps.

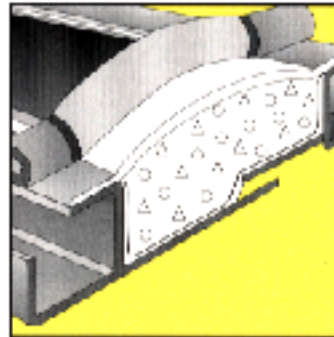
- Drill holes in the expansion joint belt flanges using the backup bars and metal frame flanges as a template.

Important Note: Make sure that the screw clamps are tightened around the expansion joint belt flange or the material will unravel around the drill bit.



- Perform the assembly procedures as described in section C2.

C4. CAVITY PILLOW/INSULATION BAG



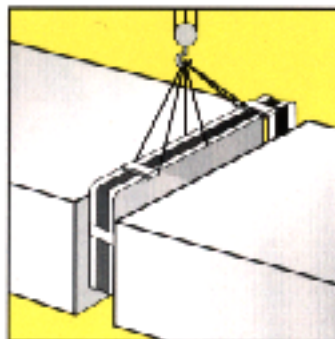
- If the cavity pillow/insulation bag is supplied with flanges, it should be installed at the same time and in the same manner as the expansion joint belt. (Install the cavity pillow/insulation bag first, then fit the expansion joint belt over the top.)

- If the cavity pillow/insulation bag is supplied without flanges, it should be installed on the flow liner section of the metal frame before the expansion joint belt is fitted onto the metal frame. The cavity pillow/insulation bag should be fixed to the flow liner with metal studs which are fixed to the liner.
- If the cavity pillow/insulation bag is supplied as an open band, stagger the layers of insulation (min. 18" intervals) when overlapping them, then sew the ends of each outer retainer layer together with the needle and thread provided.

Note: The cavity pillow/insulation bag must be wide enough to fill the cavity between the inlet and outlet sides of the metal frame. If it does not, please contact Senior Flexonics for instructions.

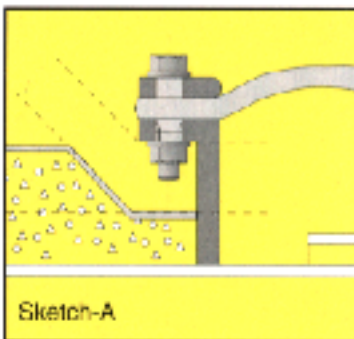
C5. EXPANSION JOINT ASSEMBLIES

- Before installing the expansion joint assembly, it is important to check that the frame dimensions mate to the duct dimensions and that the breach opening is 1" larger than the preset face to face dimension of the expansion joint assembly.



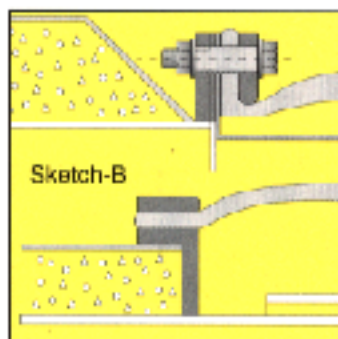
- Erection of scaffolding around the installation site will ease installation.
- Hoist the expansion joint assembly with the shipping bars in place and slide into the prepared breach opening. Install fasteners and tighten down to hold the expansion joint assembly in position. Senior Flexonics recommends using positioning bolts on 4'-0" centers on one flange only, once the expansion joint assembly is in place, install the rest of the bolts.
- Once the expansion joint assembly is bolted on one side and the duct flange has been moved to meet the other flange, bolt into place using the same method as the previous flange. **NOTE: Shipping bars and protective cover must be removed before plant start up.**

D. INSULATING OF THE EXPANSION JOINT



- In general, it is not good practice to insulate over the fabric element of the expansion joint assembly. Insulating over the fabric element is allowed on single layer fabric elements if the operating temperature does not exceed 300° F (150° C) for LPDM belts, 400° F (205° C) for fluoroelastomer belts, 500° F (260° C) for PTFE coated fiberglass belts.

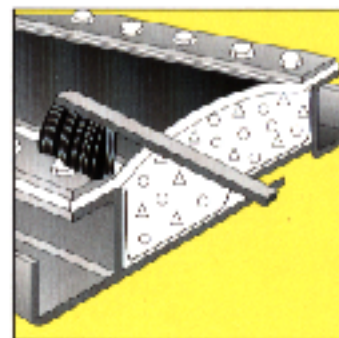
- If the operating temperature in the ducts exceed 750° F (400° C), the thickness of the insulation must be approximately 50% of the distance from the duct surface to the fixed expansion joint flange (see sketch A).
- If the operating temperature in the ducts are below 750° F (400° C), the insulation can be fixed immediately under the fixed flange (see sketch B).



E. INSPECTION AND MAINTENANCE

Regular maintenance programs are essential to provide optimum life expectancy for flue duct expansion joints. A standard maintenance schedule should include:

1. Inspection for any foreign debris (coal dust/fly ash) that may have accumulated on the external top leg of expansion joints located in horizontal ductwork. Collection of debris can insulate the external cover, causing premature failure as well as being a source of external combustion (coal dust) on the expansion joint.
2. The accumulation of fly ash and unburned coal dust in the bottom cavity of expansion joints, located in horizontal ducting, should be removed on a regular basis. Fly ash accumulation in the joint cavity can severely inhibit the movement capabilities of the expansion joint and can cause premature failures, especially when the fly ash has reached a cemented condition. Unburned coal dust in the bottom cavity of expansion joints, located in horizontal ducting, should be removed on a regular basis, or it can cause internal duct fires and damage the expansion joint.

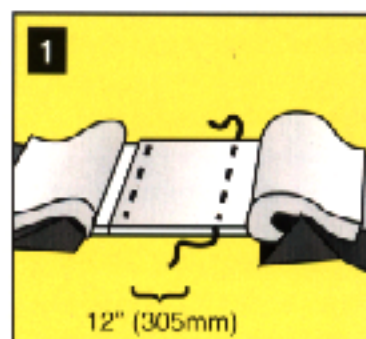


3. Ductwork mating flanges and expansion joint hardware should be inspected for leaks which could allow hot flue gas to damage the external cover of the expansion joint when temperatures of exiting gas exceeds the designed operating temperature of the flexible element.
4. Actual duct movements should be observed and duct work support systems checked against original design criteria. Excessive ducting movements can cause damage or premature failure of the expansion joint. Consult SENIOR FLEXONICS for specific recommendations.



E. FIELD SPLICING AND REPAIR:

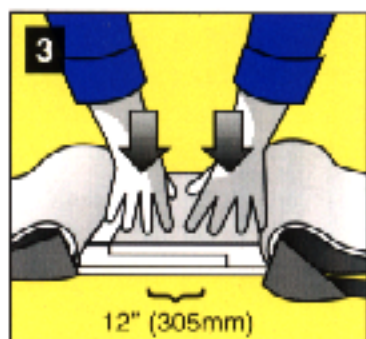
TYPICAL FIELD SPLICE OF A DARLYN 1100 OR 1100CB COMPOSITE BELT



- Overlap the high temperature cloth layers.
- Hand stitch the layers with the needle and thread provided with the splice kit.

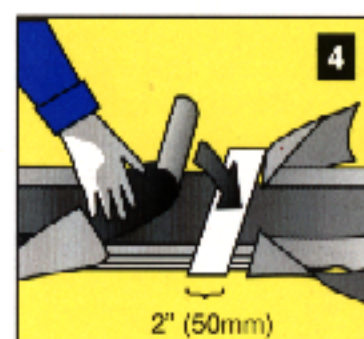


- Overlap the wire mesh layers.
- Fasten the layers together using hog ring fasteners or stainless steel staples.

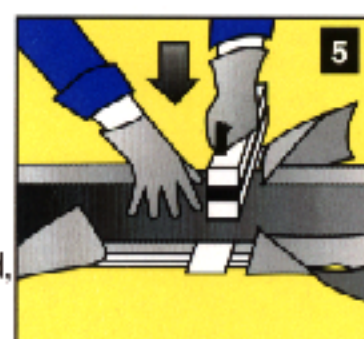


- Split/Step overlap the insulation layers.

- Position splicing film between the Darlyn 1100 or 1100 CB outer cover.

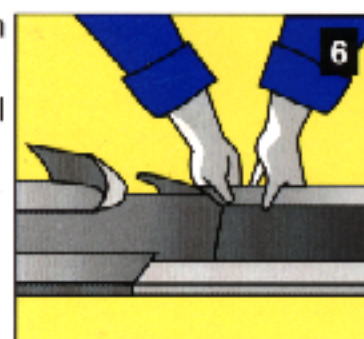


- Preheat the splicing iron to a set point temperature of 750° F (400°C).
- Once set point temperature is reached, heat seal the layers together for 4-5 minutes when surrounding ambient air is 70° F (longer at colder temperatures).



- Remove iron and check for proper bonding/sealing.

- Position the insulation cloth cuff prior to clamping belt to metal frame.



NOTE: Contact SENIOR FLEXONICS with any questions.

NOTE: Other examples available on a individual basis.

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