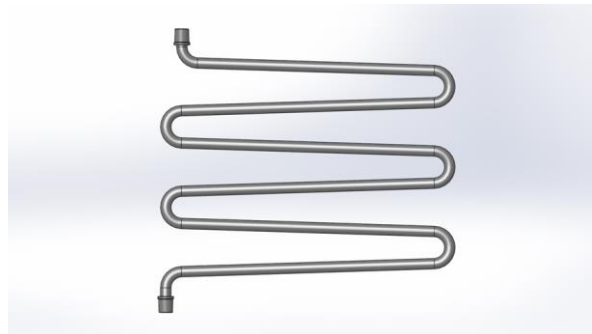


Bryan "Flexible Water Tube"

Removal and Replacement of Flexible Water Tubes

Bryan Steam, the originator and leader in the production of flexible tube water and steam boilers for over 90 years, is pleased to provide you with the technical and service information you need to keep your Bryan Boiler running. This Removal and Replacement of Flexible Water Tubes instruction will give you the information you need to remove and replace tubes on all models of Bryan Steam Boilers.



Instructions cover both:



Welded-Ferrule



End-Form

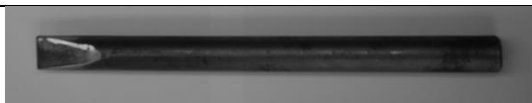


Originators of the "Flexible Water Tube" design

1 Removal and Replacement of Flexible Water Tubes

Follow this easy step-by-step procedure to remove or replace the flexible water tubes in Bryan Boilers. This process requires no rolling or welding. Follow the steps as outlined for the most efficient and least time consuming procedure. We have changed to end-formed tubes for the following boilers, DR, AB, RV, and RW. End-formed tubes are interchangeable and can be mixed with welded ferrule tubes on the same boiler.

Tools Required

Required tools for tube replacement may vary depending on the type of tube being removed or replaced.

Hammer		For 1" tubes use 2 pound hammer For 1 1/2" tubes use 4 pound hammer
Socket Wrench		9/16" Deep Well
Tube Puller (Available from Bryan)		For 1" tubes use P/N 28905 For 1 1/2" tubes use P/N 28910
Tube Driver (Available from Bryan)		For 1" tubes use P/N 28906.1 The driver shown is used to drive all 1" end-formed or welded tubes and is an alternate driver for 1 1/2" tubes.
		For 1 1/2" tubes use P/N 28903 The driver with curved end shown is the preferred driver for all 1 1/2" end-formed or welded tubes.

Bryan Boilers is currently supplying boilers with product enhancements to our flexible tubes. Most flexible tubes will no longer have a separate ferrule welded to each end. We have developed a way to form the ferrule from the tube material directly on the bent tube see figure 1. We identify these tubes as "End-Formed".

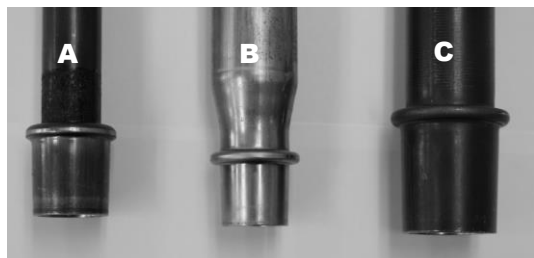


Figure 1

- A. 1" End-Formed Tube.
- B. Triple-Flex 1 1/2" End-Formed Tube.
- C. 1 1/2" End-Formed Tube.

If you have an old driver that looks like Figure 2-B, your driver will need to be modified by grinding to match Figure 2-A before using on end-formed tube.

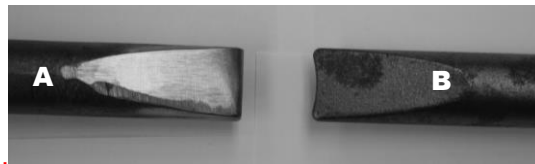


Figure 2

The new drivers and current tube pullers will work for all tubes regardless if end-formed or welded ferrule.

1.1 Removal of Flexible Water Tubes

 **CAUTION:**

GOGGLES OR SAFETY GLASSES SHOULD BE WORN TO PREVENT INJURY. Before removing tube(s), boiler must be completely drained of water. If boiler outlet and return are equipped with shutoff valves, close both to avoid draining the entire system.

Begin by removing the insulated jacket side panels or doors, exposing the inner tube access panels. On some models (L, LM, and RW Series) tube access is from both sides.



1. **Remove lower tube clamps.** On most models a stud and clamp are required over the tube flange. Remove the retaining nut and clamp before attempting to remove tube(s). To facilitate removal, you may need to soak with a good penetrating fluid.



2. **Remove upper tube clamps.** Follow the same procedure as step 1 above.
3. **Loosen tube-ends.** Insert tube puller between the tube-end and header. Apply pressure to the puller and strike the side of the tube two or three times with a hammer to help loosen the tube-end in the upper and lower header.



4. **Pull lower tube-end (outer row of tubes).** Wedge the tube puller under the flange of the tube. Drive the tube puller with several blows with a hammer on the end of handle. Alternate with downward blows to lift tube-end. Hold the leverage and repeat to drive the wedge further.



5. **Clear tube-end from the header.** Continue driving wedge under and leveraging flange up until it pops the end of the tube free from the hole in the header.



6. **Pull upper tube-end.** Repeat the procedure to pull the tube-end of the same tube from the upper header.



7. **Remove outer row tube.** Remove the tube and repeat with the other outer row tubes to gain access to rear tube, two adjacent outer tubes must be removed first to access the inner tube removal.



8. **Pull inner row tube-ends.** Repeat the procedure in steps 4 through 7 to remove inner tube(s).

1.2 Installation of Flexible Water Tubes



CAUTION:

DO NOT OVERDRIVE TUBES! Overdriving tubes can cause damage to tubes and boiler header holes. Use only approved Bryan Steam tube driver and specified hammer. The end-formed tube fitting is designed to deform if overdriven to minimize damage to vessel tube hole.

NOTE: Before placing a new tube into the headers, clean the holes by wiping gently with emery cloth to be sure that there are no burrs. If replacement tube has been sitting for a long period of time and shows rust, repeat the cleaning procedure on the tube-end. With a small brush, apply a thin coating of gray pipe dope around the inside of the hole. Pipe dope may also be applied to tube-end. Pipe dope is not used to seal the tube in the tube hole. Pipe dope is used as a lubricant to prevent galling between the tube-end and tube hole surfaces. Cutting oil may be mixed with the pipe dope for easier application.

No! No! Yes!



Figure 1-1
INCORRECT! Two person team using an oversized driver and an oversized hammer.



Figure 1-2
INCORRECT! Two person team using the correct driver and an oversized hammer



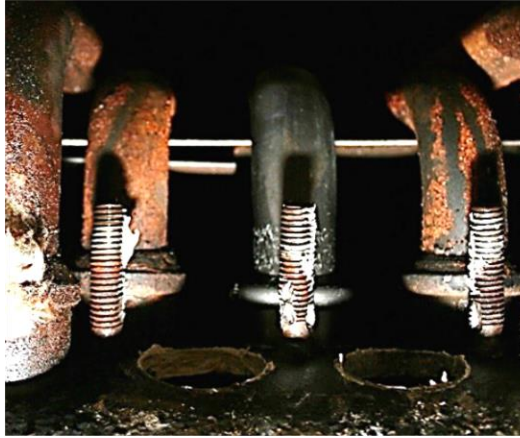
Figure 1-3
CORRECT! One person with correct driver and specified hammer.

Incorrect- This is an overdriven tube. The flange has bottomed out.



Figure 1-2

Correct- This tube is not overdriven. The flange has not bottomed out.



1.

To replace tubes, start with the inner tube. Insert the lower tube-end in the bottom header first then the top tube-end in the top header. Replace all tubes before driving.



2.

Drive upper and lower tube-end(s). DO NOT DRIVE THE TUBE-END DOWN TO THE FLANGE. With a driver tool positioned on the flange, strike the end of the driver with the hammer. After a few hits, the feel of the strike will change to a solid feeling. The tone will also change from a "ting" sound to more of a "tong" sound. This indicates the tube has seated.



CAUTION: End-formed tubes will not require as much force as a welded ferrule to seat properly. Damage to the end-form may result.



3.

Replace the tube clamps. If your unit is equipped with studs and clamps, reinstall the tube clamps and secure with nuts. Tighten the nut only till snug. Do not try to compress the tube-ends into the holes with the clamps, because the clamps might break or the studs might shear.

NOTE: A spacer is needed if intermixing the welded-ferrule 1 1/2" with end-formed 1 1/2" tubes. The flange on the end-form tube will require a 3/8" tube-retaining nut placed sideways between the flange and the clamp.

4. **Refill the boiler with water.** Fill until pressure is slightly under the relief valve set pressure. Inspect all tube-ends for leaks.



CAUTION: If a leak is detected, pressure in the boiler must be reduced to zero before adjusting tube(s). Adjusting tubes under pressure could result in personal injury.

Adjust leaking tube by striking the flange once or twice with the driver and hammer as shown in step 2. Refill the boiler with water. If leaking continues, remove leaking tube and inspect tube-end and hole for defects. Replace tube if necessary.