



TOTAL COMBUSTION INC.

Twin Stack Trailer Units Rental Operation Manual



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DESCRIPTION

TCI's line of Twin Stack Trailer Units are patented engineered products designed to burn waste gas from onshore oil and gas wells, pipeline blow downs, and similar applications. The units operate at 99.9% combustion efficiencies with no smoke, odor or visible flame. They will accept waste gas from several different sources and are equipped with valves to control waste streams that vary over time. The units are self-contained and trailer mounted for easy transport.

CAUTIONS AND WARNINGS

The TCI Twin Stack Trailer Unit should be operated in accordance with these instructions and your company's regulations; failure to do so may cause a safety hazard to personnel and damage the unit and other equipment in the area.

- Some surfaces on the unit will become hot during operation. Do not allow any part of your body or other flammable materials to come in contact with these hot surfaces.
- During operation there will be open flames within the unit. These open flames will act as source of ignition. Place the unit away from areas that may contain flammable or explosive atmospheres.
- The hot surfaces of the unit may cause heating of adjacent surfaces. Do not operate the unit on or near flammable or heat sensitive materials.
- Parts of the unit operate under pressure. Ensure that all pressure connections are tight before introducing any gas to the unit. Follow safe operating procedure for pressurized equipment.
- This unit should only be operated by personnel that have been trained by TCI, or equivalent, in the proper operation of the unit.
- Abnormal operation of the unit may cause damage to the unit which may not be immediately obvious. The unit should be inspected by TCI TCI technician after any abnormal operation to ensure continued safe operation.
- Raising or lowering the stack must be done by TCI technicians. Do not attempt to move the stacks without a TCI technician.

GENERAL INFORMATION

TCI Twin Stack Trailer Units come in several capacities and configurations, therefore some details may be different from what is described herein and shown in the figures.

The TCI Twin Stack Trailer Unit has two waste gas inlets. Both the Waste Gas inlet and POP Line inlet are located at the rear end of the trailer, see FIG. #1

The Waste Gas inlet line supplies both stacks. At each stack the manifold is diverted into multiple Main Gas Burner Trains and Ring Burner Trains see FIG. #2. Each burner train

is equipped with a valve so that an operator can maintain the optimal pressure to the burners under varying gas flow rates.

The POP Line is designed to flare gases from pressure safety valves on pressurized tanks. The POP Line leads to an open-ended nozzle in the lower portion of one of the two stacks. The pilot flame on this stack must be burning before any gas enters the POP Line in order to ensure ignition of the gas. The POP Line should only be used for short term emergency use; it is not designed for continuous use.

A Pilot/Fuel Gas Connection is located near the rear of the trailer. Typically there is a Pilot Gas Hose attached, see FIG. #1 . The Pilot/Fuel Gas should be clean and dry with minimum pressure of 10 psig. Typically propane is used.

SET-UP

The Twin Stack Trailer Unit must be placed away from flammable areas, tanks, and other equipment in accordance with local regulations. The unit must be set on stable ground and leveled. The ground under and around the unit must be nonflammable. The flue gas discharge, at top of unit, must be directed away from any flammable or heat sensitive materials. Ensure that all gas connections are tight and made in accordance with local regulations.

Any liquid carryover, water or hydrocarbon, into the unit should be avoided, layout equipment and piping accordingly. Liquid carryover may cause excessive heating and damage to the unit.

NOTE: Rig-in, rig-out, raising or lowering of the stack must be done by TCI technicians. Do not attempt to move the stacks without a TCI technician.

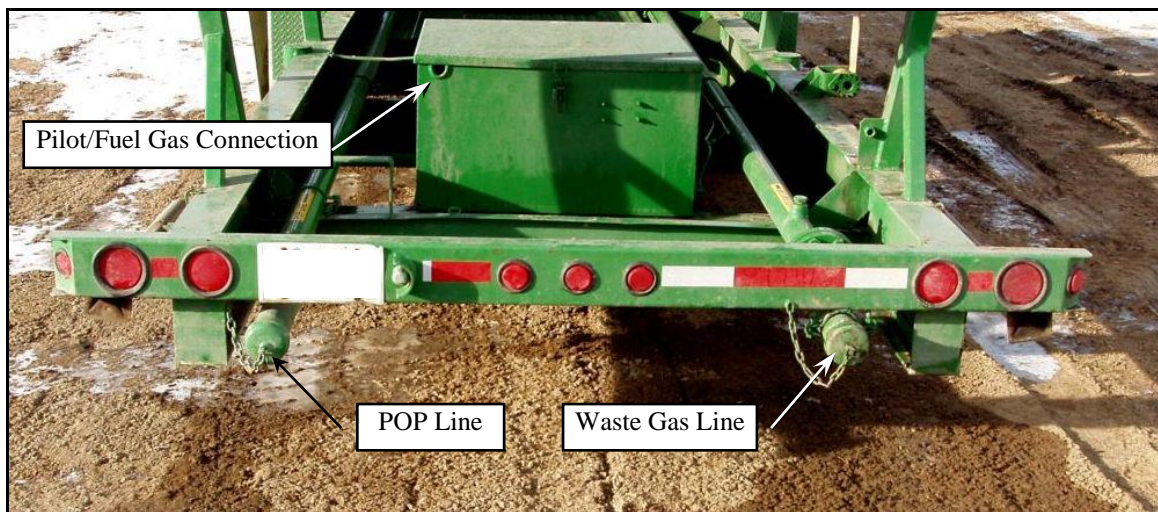


FIG. # 1 TWIN STACK UNIT GAS INLETS

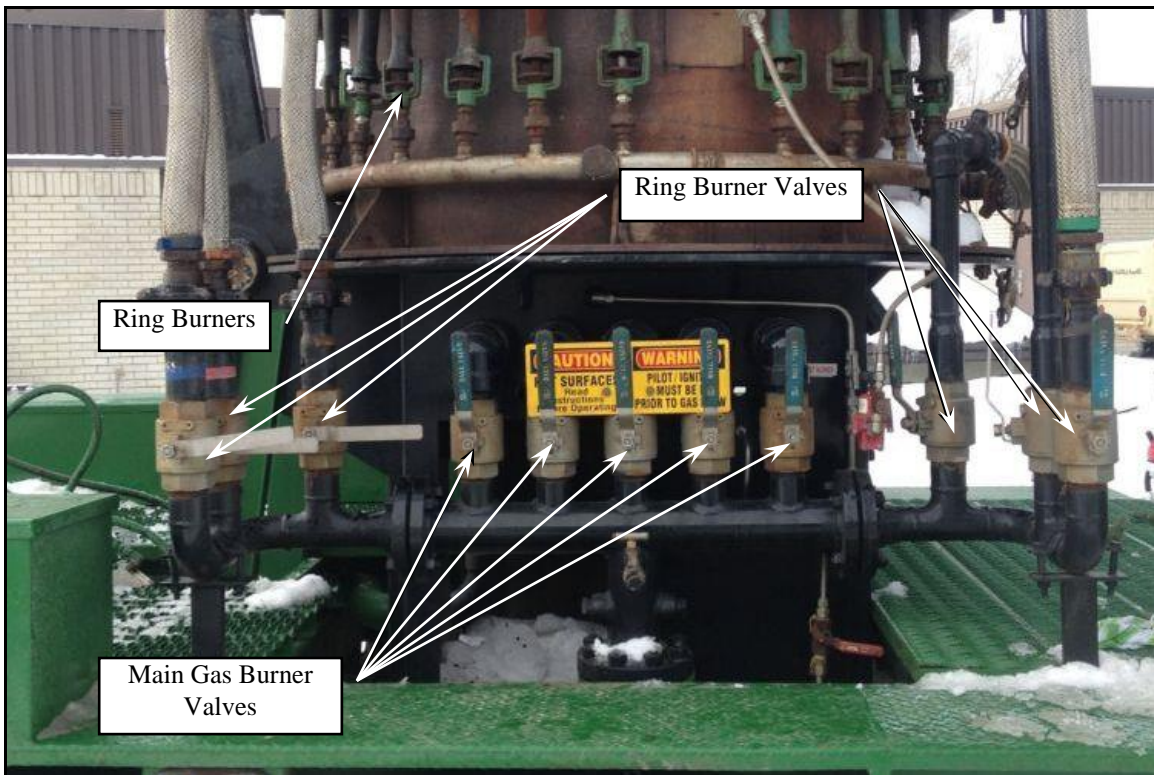


FIG. # 2 TWIN STACK UNIT BURNER VALVES INLETS

START-UP AND OPERATION OF WASTE GAS BURNERS

- 1) Before introducing any gas to the unit the lines connected to the unit should be purged of air. Follow your company's safety practice. Any air in the line may cause flashback into the line.
- 2) Close all gas valves on the unit.
- 3) Connect the waste gas line and pilot gas lines
- 4) Light the pilot burners on both stacks see FIG. # 3 for typical location. To do this on each pilot burner:
 - a. Open the pilot gas valve to the pilot burner.
 - b. Push the piezo ignition button several times to light the pilot burner. If the piezo ignition button fails to light the pilot burner, use a handheld torch.
 - c. Repeat for each pilot burner.
- 5) Open all valves to the Main Gas Burner Trains and Ring Burner Trains.
- 6) Then slowly introduce waste gas into the Waste Gas inlet line. Ensure that burner trains light.
- 7) If there is not sufficient flow to maintain at least 3 psig in the manifold close some valves leading to the Ring Burner Trains, starting with the top most rings.
- 8) If the pressure is still below 3 psig with all the Ring Burner Train valves closed, then the next step is to close the Main Gas Burner Train valves, starting with the train farthest from the pilot burner.
- 9) If the flow increases causing the manifold pressure to rise above 10 psig, open one or more burner train valves. Always open all the Main Gas Burner Train

valves before opening the Ring Burner Train valves. Ring Burner Train valves should be opened starting from bottom to top
10) Do not allow the manifold pressure to rise above 14.9 psig.

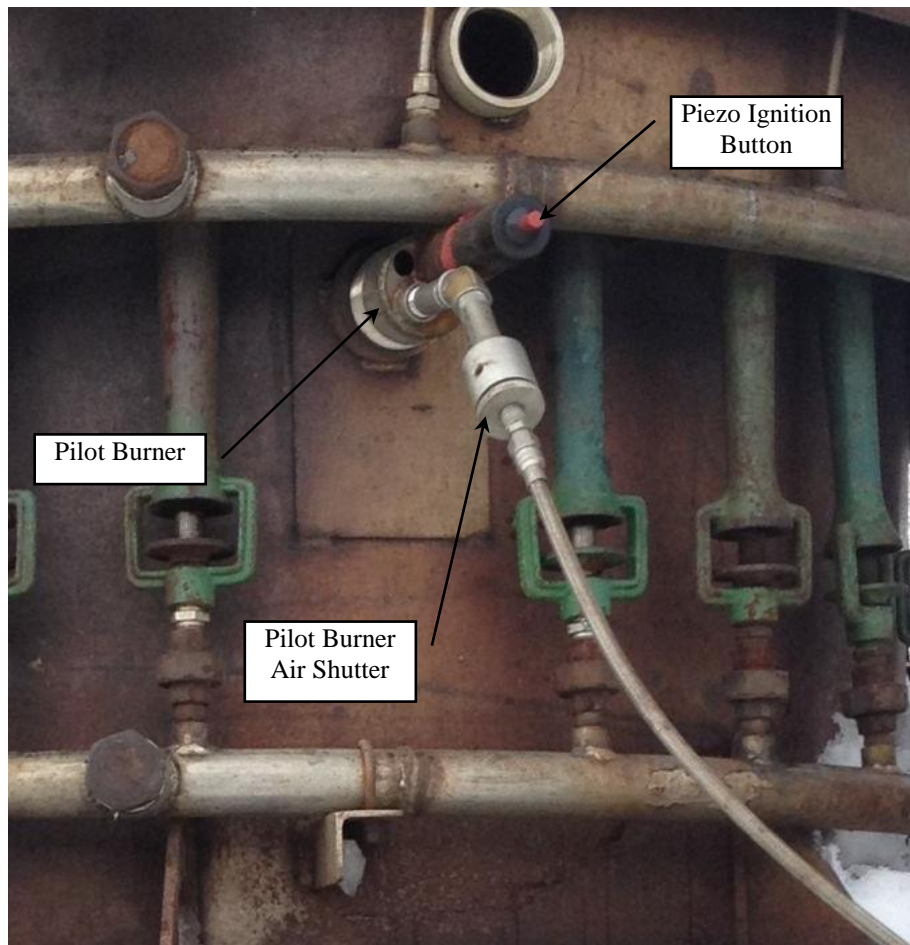


FIG. # 3 PILOT BURNER

NOTE ON BURNER OPERATION

The burners will operate most effectively if the manifold pressure is maintained between 4 and 10 psig. However, the burners can be operated at any pressure between 0.5 and 14.9 psig. Open or close Burner Train and Ring Burner Train valves accordingly. The Ring Burner Trains should only be operated if all Main Burner Train valves are fully opened.

HOT BURNERS

Most Twin Stack Trailer Units are equipped with Hot Burners. These are designed to add supplementary fuel gas to the unit if the waste gas does not have sufficient heating value to burn effectively. If the waste gas flames in the unit do not remain lit and low heating value gas is suspected open the Hot Burner valves, see FIG. # 4.

VENTURI DRIVES

Some Twin Stack Trailer Units are equipped with Venturi Drives. These are designed to increase air induction if operating at low waste gas pressure. The Venturi Drives add higher pressure supplementary fuel gas into the venturi throat, see FIG. # 4.

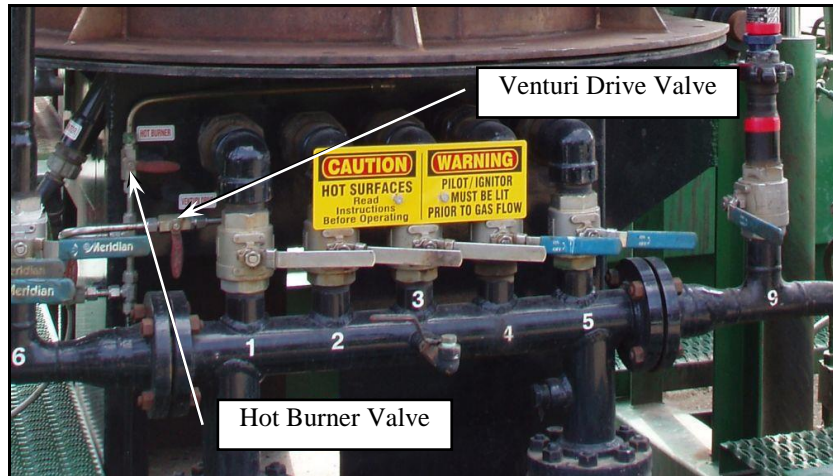


FIG. #4 HOT BURNER AND VENTURI DRIVE VALVES

START-UP AND OPERATION OF POP LINE

- 1) Connect the POP Line.
- 2) Ensure that the flame on the pilot burner burns steadily, if not light the pilot burner as described in the Start-Up and Operation of Waste Gas Burners section of the manual.
- 3) The POP Line is now ready for operation.
- 4) Ensure that the pilot burner continues to burn at all times while the POP Line is connected.

SHUT DOWN

- 1) Ensure that source of waste gas is shut in and all lines from vessels are blocked in, including POP Line.
- 2) Close all Main Gas Burner Trains and Ring Burner Trains valves.
- 3) Close Hot Burner valves, if used.
- 4) Wait until burners are extinguished.
- 5) Then close all pilot burner valves.
- 6) Wait until all pilot burners are extinguished.
- 7) Allow unit to cool down.
- 8) Drained all liquids from piping.

NOTE: Rig-in, rig-out, raising or lowering of the stack must be done by TCI technicians. Do not attempt to move the stacks without a TCI technician.

TROUBLE SHOOTING GUIDE

PROBLEM	POSSIBLE CAUSES AND SUGGESTED ACTIONS
Excessive back pressure	Open more burner valves. Check that waste gas flows are within operation range, see specifications.
Flames are visible above stack	NOTE: This is normal if there is flow into the POP Line. Open more burner valves. Check to ensure that no liquid carryover is entering the unit. Check that waste gas flows are within operation range, see specifications.
Flames are visible below main burners	A liquid carryover may be occurring, shutdown operation. Inspect unit as per maintenance section of this manual. Alter piping or equipment layout to prevent carryovers.
Sidewalls are turning brown	This is normal oxidation of the stainless steel and will not affect the performance of the unit.
Unit is very noisy	Pressure in the burner trains is too high. Open more burner valves. Check that waste gas flows are within operation range, see specifications.
Flammable gas is detected at the unit	Inspect all piping connections for leakage.

Pilot burners do not stay on or burn poorly

Low pilot gas pressure or incorrect pilot gas composition.

Adjust pressure regulator to maintain 7 to 10 psig to the pilot burner.

Inspect, and replace if necessary, the pilot gas filter.

Ensure that clean gas is supplied to the pilot burners

CONTACT INFORMATION

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