

Installation and maintenance manual

Shell & Tube Heat Exchangers

OPERATION

START-UP

- Prior to start-up all nuts should be checked to prevent leaks and blown gaskets.
- Open cold side first, then gradually start hot side, bringing unit to operating condition.
- **CAUTION:** Start-up gradually to avoid temperature shock.

SHUT-DOWN

- Shut-down hot side first.
- In the event that the cold side must be stopped, always cut off flow of hot water first by closing valves or by-passing.

INSTALLATION

- Allow sufficient clearance at end of unit for removal of tube bundle.
- Install unit so that pipe connections can be made without forcing.
- Make sure unit is supported in order to prevent piping strains.
- Appropriate valves and by-passes should be installed to permit both the shell and tube bundle to be shut off for inspection, repairs and cleaning.
- Tubing must be full of water before introducing steam or hot water into shell, otherwise flashing or noise may occur.

CLEANING

- Periodically flush out the shell and tube bundle.
- Remove head and bundle to clean inside of shell and outside of tubes.
- Replace gaskets if necessary.
- Commercially available cleaners may also be used.
- Drain off and flush thoroughly with clean water.
- Re-assemble unit.

HARD WATER APPLICATIONS:

- Close water connections, plug bottom opening.
- Fill tubes with solution: 1 part muriatic acid, 10 parts water (let stand for two hours - **CAUTION:** A longer period may cause damage to the copper tubing.)

REPLACING PARTS

TO ORDER REPLACEMENT PARTS, PLEASE SPECIFY:

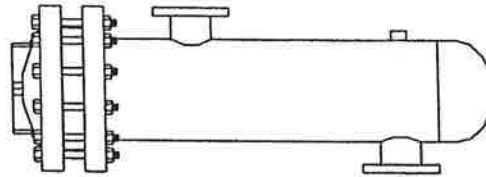
1. Complete Model Number
2. Date of manufacture
3. Specific materials if required

COMMON REPLACEMENT PARTS INCLUDE:

1. Tube Bundles
2. Gasket Sets

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FLO FAB Heat exchanger has been carefully assembled and factory tested to provide years of trouble-free service. In order to assure the service intended, the following information is provided to enable proper installation, operation and maintenance.

LOCATION

The heat exchanger should be located in a clean, open area, where it is easily accessible for inspection, service and repair. Allowance should be made for the clearance required to remove the tubebundle.

PIPING

Long radius elbows should be used in place of standard elbows wherever possible, because of their superior flow characteristics. Liberal use of shut off valves is recommended to enable inspection and service.

INSTALLATION

1. To move or lift the heat exchanger, place a sling around the unit's inlet and outlet connections.
2. Verify that all equipment, including the sling, are certified to handle the total weight of the heat exchanger.
3. Install unit level and square in order to minimize strain on any connections.
4. Adequately support unit.
5. Provide sufficient clearance for removal and replacement of tubebundle. (Minimum clearance = one length of the shell.)
6. Provide positive shut off valves and by-pass to permit both shell and tubeside to be isolated from system for inspection and service.
7. After installation and prior to startup, all head flange bolts should be re-tightened.
(see chart for torque requirements)

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OPERATION

START-UP

Introduce hot side fluid slowly. Bring unit from ambient temperature up to operating temperature gradually. Do not introduce hot or cold fluids suddenly, damage may result.

SHUT DOWN

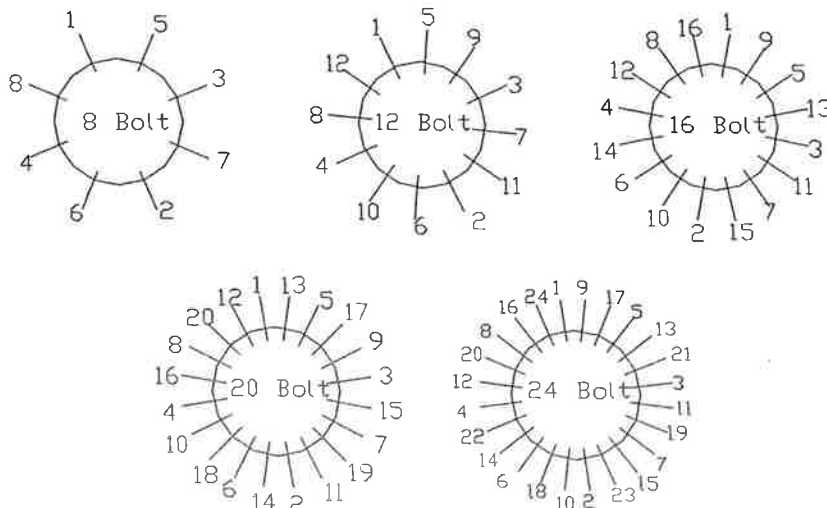
Always close off flow of hot fluid first.

Gasket Creep is inherent to most gasket joints. The greater the operating temperature and pressure, the greater the problem can become. It is recommended that the head bolts be torqued after installation.

BOLT SIZE AND TORQUE REQUIREMENTS

HEAT EXCHANGER SIZE	BOLT SIZE	NUMBER OF BOLTS	BOLT SPECIFICATIONS	TORQUE FT/LBS	
				min	max
4"	0.62 - 11	8	SA 325 TP1	15	30
6"	0.75 - 10	8	SA 325 TP1	25	50
8"	0.75 - 10	8	SA 325 TP1	25	50
10"	0.87 - 9	12	SA 325 TP1	40	80
12"	0.87 - 9	12	SA 325 TP1	40	80
14"	1.00 - 8	12	SA 325 TP1	60	120
16"	1.00 - 8	16	SA 325 TP1	60	120
18"	1.12 - 7	16	SA 325 TP1	80	180
20"	1.12 - 7	20	SA 325 TP1	80	180
22"	1.25 - 7	20	SA 325 TP1	120	260
24"	1.25 - 7	20	SA 325 TP1	120	260
26"	1.25 - 7	24	SA 193 B7	115	125

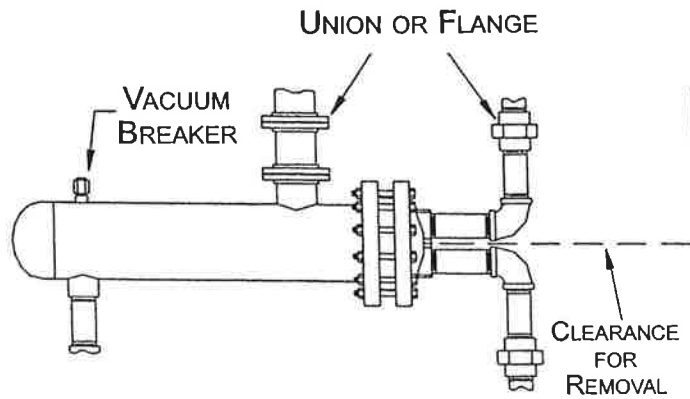
SEQUENTIAL ORDER OF BOLT TORQUE AT VALVES OF 30%, 60% AND 100%



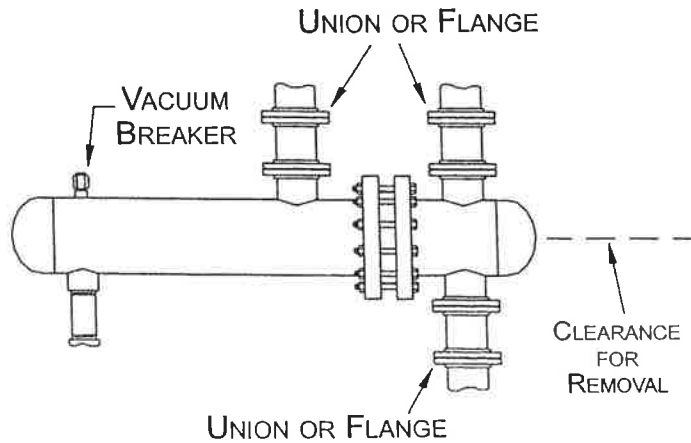
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TYPICAL PIPING

(TUBESIDE HEAD)
STANDARD DESIGN



FABRICATED DESIGN



NOTE: LOOSEN UNIONS/FLANGES ON TUBESIDE HEADS PRIOR TO RETORQUING HEAD BOLTS.