



LHO OIL LINE HEATER

OIL-TO-OIL TYPE



WARNING

These instructions are intended for use only by experienced, qualified combustion start-up personnel. Adjustment of this equipment and its components by unqualified personnel can result in fire, explosion, severe personal injury, or even death.

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These instructions are intended to serve as guidelines covering the installation, operation, and maintenance of Hauck equipment. While every attempt has been made to ensure completeness, unforeseen or unspecified applications, details, and variations may preclude covering every possible contingency. **WARNING: TO PREVENT THE POSSIBILITY OF SERIOUS BODILY INJURY, DO NOT USE OR OPERATE ANY EQUIPMENT OR COMPONENT WITH ANY PARTS REMOVED OR ANY PARTS NOT APPROVED BY THE MANUFACTURER.** Should further information be required or desired or should particular problems arise which are not covered sufficiently for the purchaser's purpose, contact Hauck Mfg. Co.



WARNING

This equipment is potentially dangerous with the possibility of serious personal injury and property damage. Hauck Manufacturing Company recommends the use of flame supervisory equipment and fuel safety shutoff valves. Furthermore, Hauck urges rigid adherence to National Fire Protection Association (NFPA) standards and insurance underwriter's requirements. Operation and regular preventative maintenance of this equipment should be performed only by properly trained and qualified personnel. Annual review and upgrading of safety equipment is recommended.

A. GENERAL INFORMATION

Hauck LHO heaters are oil-to-oil heat exchangers designed to raise the combustion oil's temperature to the proper atomizing viscosity of 90 SSU ($1.8 \times 10^{-5} \text{m}^2/\text{sec}$) at the burner, assuming the supply oil is at pumping viscosity of 2000 SSU ($4.3 \times 10^{-4} \text{m}^2/\text{sec}$) maximum. The LHO heaters require an over pressure oil relief valve, a transfer oil temperature regulating valve and a transfer oil strainer. The LHO consists of a multi-pass shell and U-tube heat exchanger. The unit is provided with movable mounting supports. Six connections are provided on the unit: 1) transfer oil inlet, 2) transfer oil outlet, 3) supply oil inlet, 4) supply oil outlet, 5) over pressure relief valve, and 6) oil drain. The temperature regulating valve is installed in the transfer oil inlet line of the LHO. The valve's capillary tube sensing element is tapped into the supply oil outlet line of the LHO.

Fuel oil from the supply pump discharge enters the supply oil inlet of the LHO and emerges from the supply oil outlet on the opposite end of the shell. Transfer oil enters through the temperature regulating valve which automatically varies the flow of transfer oil supplied to the line heater, thereby maintaining the temperature of the oil supplied to the burner. The LHO is normally sized to provide sufficient capacity to heat No. 6 fuel oil from an initial 125°F to 225°F (52°C to 107°C) while cooling the transfer oil from 320°F to 300°F (160°C to 149°C).

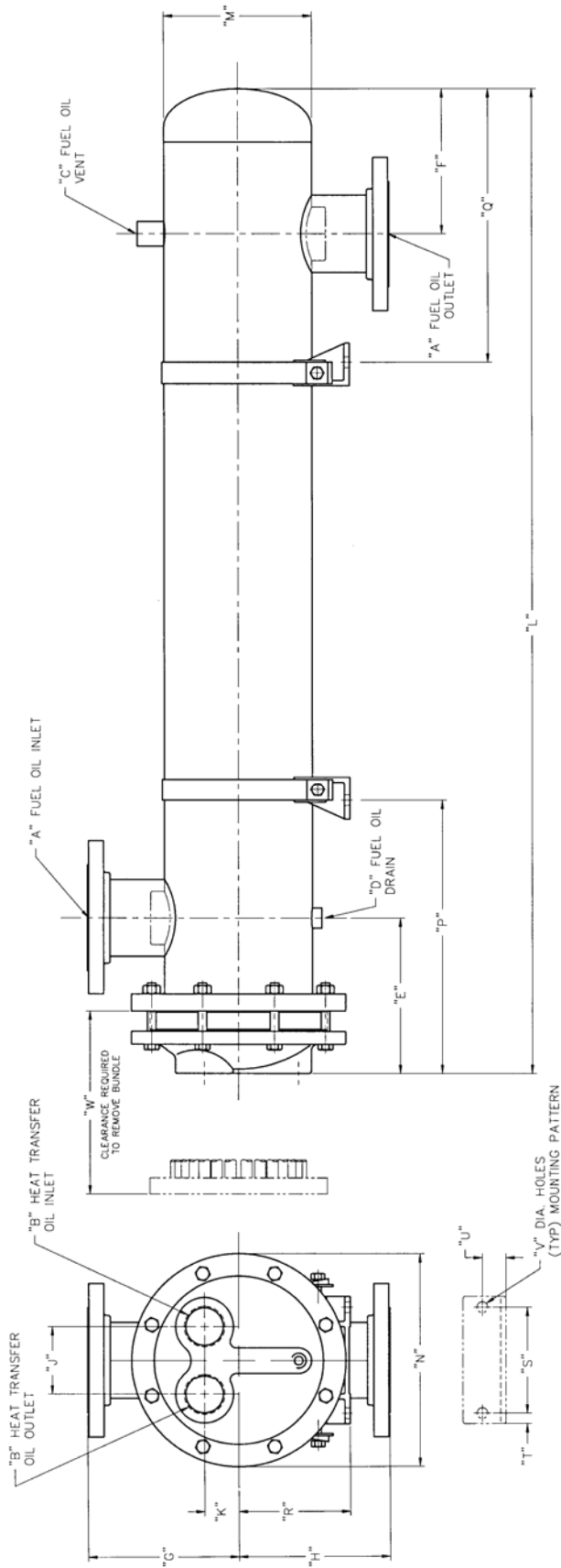
B. RECEIVING AND INSPECTION

Upon receipt, check each item on the bill of lading and/or invoice to determine that all equipment has been received. A careful examination of all parts should be made to ascertain if there has been any damage in shipment.

IMPORTANT

If the installation is delayed and the equipment is stored outside, provide adequate protection as dictated by climate and period of exposure. Special care should be given to all motors and bearings, if applicable, to protect them from rain or excessive moisture.

C. DIMENSIONS

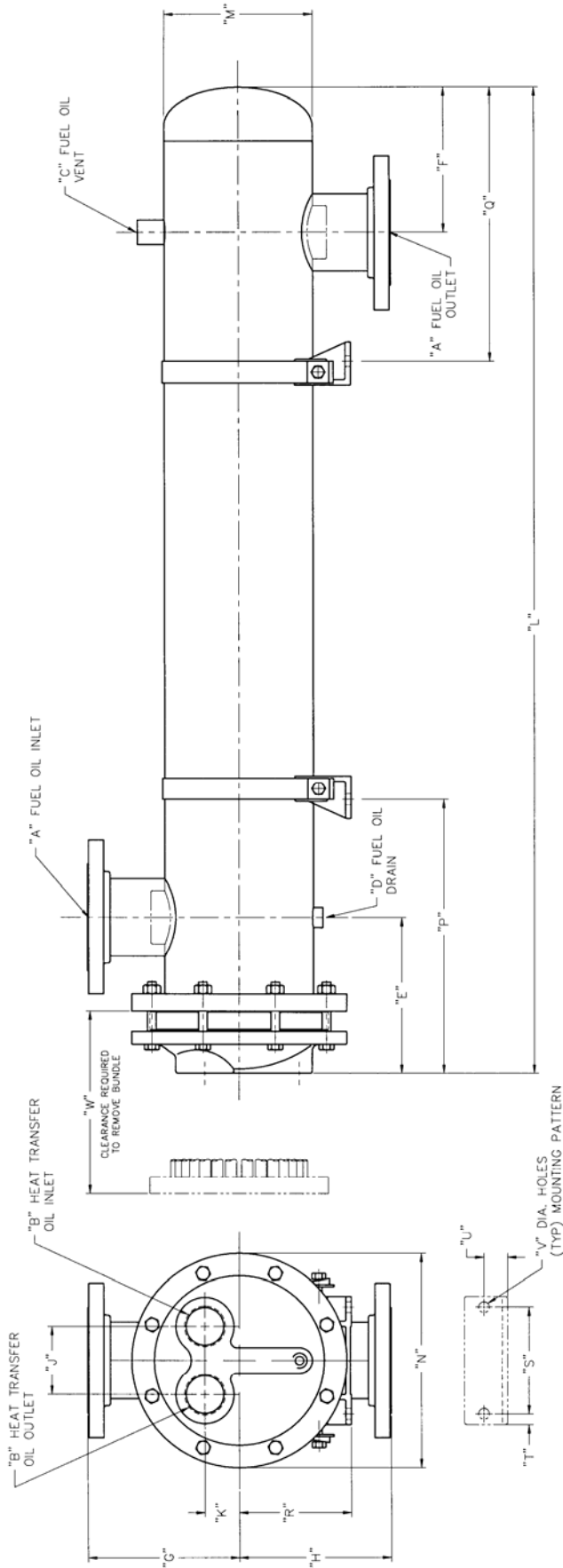


MODEL NO.																	APPROX. NET WT.						
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	W	DRY	WET
LHO 06-060	2 1/2 NPT	1 1/2 NPT	3/4 NPT	1/2 NPT	6 1/8	12 1/4	5 1/8	5 1/8	3 1/8	1 5/8	67 1/4	6 5/8	10 1/2	13	13	5 1/2	4 3/4	5/8	1 1/4	5/8	64	190 LB	260 LB
LHO 08-048	4 FLG	2 NPT	3/4 NPT	1/2 NPT	9 1/8	8 1/2	8 13/16	8 13/16	4	2	57 5/8	8 5/8	12 1/2	16	16	6 1/2	6 1/4	5/8	1 3/8	5/8	52	290 LB	390 LB
LHO 08-060	4 FLG	2 NPT	3/4 NPT	1/2 NPT	9 1/8	8 1/2	8 13/16	8 13/16	4	2	69 5/8	8 5/8	12 1/2	16	16	6 1/2	6 1/4	5/8	1 3/8	5/8	64	330 LB	460 LB
LHO 10-048	4 FLG	3 NPT	3/4 NPT	1/2 NPT	9 3/4	9	9 7/8	9 7/8	4 3/4	2 3/8	59 3/4	10 3/4	14 5/8	17	17	7 1/2	8	3/4	1 5/8	3/4	52	400 LB	570 LB
LHO 10-060	4 FLG	3 NPT	3/4 NPT	1/2 NPT	9 3/4	9	9 7/8	9 7/8	4 3/4	2 3/8	71 3/4	10 3/4	14 5/8	17	17	7 1/2	8	3/4	1 5/8	3/4	64	460 LB	660 LB

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(NOT TO SCALE)

NOTES:
 1. FUEL OIL INLET/OUTLET FLANGES ARE ANSI 150 LB RAISED FACE FLANGES.
 2. CRADLE MOUNTING STRAP LOCATIONS SHOWN ("P" AND "Q") ARE TYPICAL AND CAN BE ADJUSTED UPON INSTALLATION AS REQUIRED.

Figure 1. Dimensions



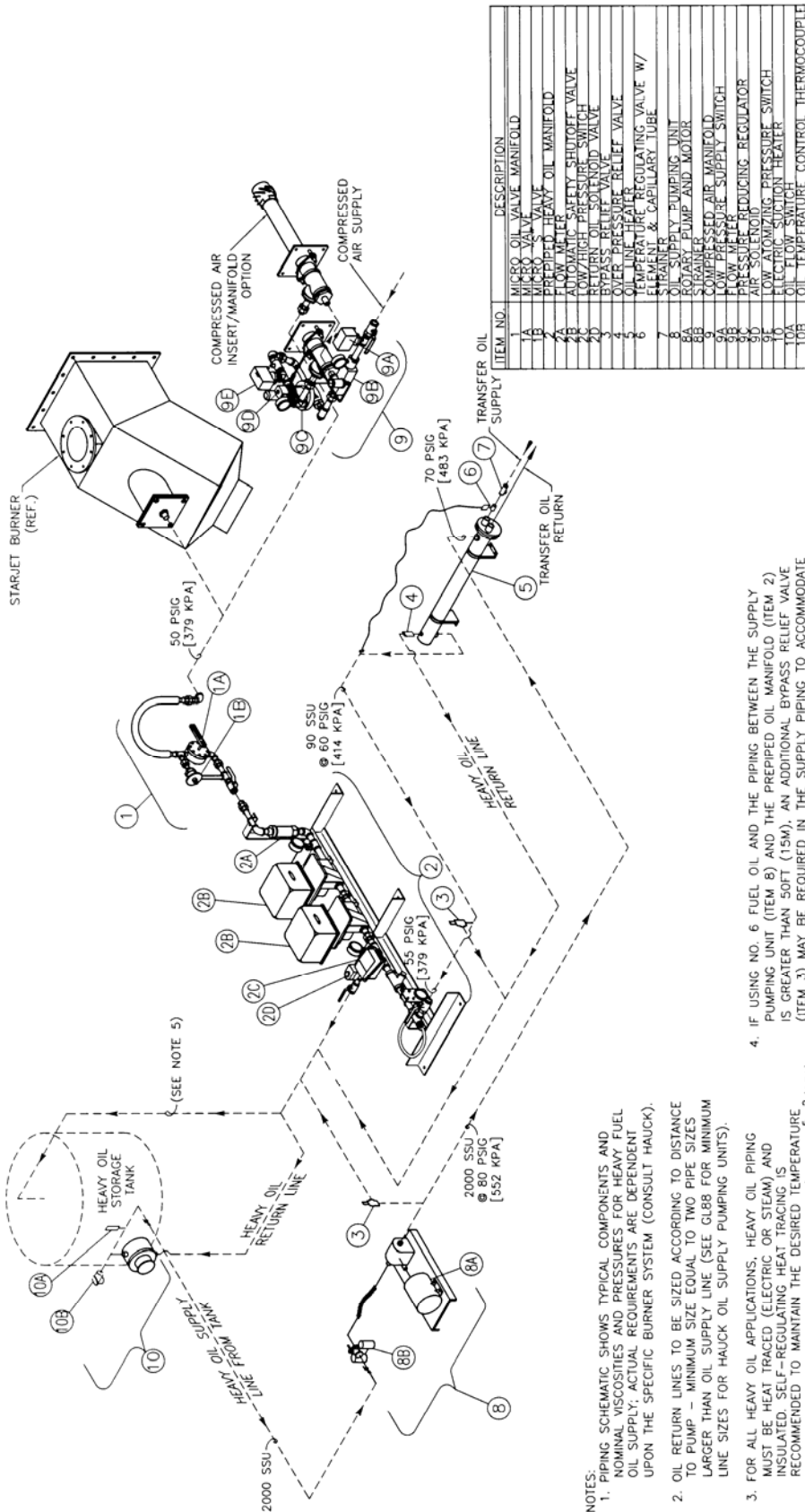
MODEL NO.	APPROX. NET WT.																						
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	W	DRY	WET
LHO 06-060	2 1/2 NPT	1 1/2 NPT	3/4 NPT	1/2 NPT	155	311	130	130	79	41	1708	168	267	330	330	140	120	16	32	16	1625	86 KG	118 KG
LHO 08-048	4 FLG	2 NPT	3/4 NPT	1/2 NPT	232	216	224	224	101	51	1464	219	317	406	405	165	159	16	35	16	1321	132 KG	177 KG
LHO 08-060	4 FLG	2 NPT	3/4 NPT	1/2 NPT	232	216	224	224	101	51	1768	219	317	406	405	165	159	16	35	16	1625	150 KG	209 KG
LHO 10-048	4 FLG	3 NPT	3/4 NPT	1/2 NPT	247	228	251	251	120	60	1517	273	371	432	432	190	203	19	41	19	1321	181 KG	259 KG
LHO 10-060	4 FLG	3 NPT	3/4 NPT	1/2 NPT	247	228	251	251	120	60	1822	273	371	432	432	190	203	19	41	19	1625	209 KG	299 KG

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(NOT TO SCALE)

NOTE:
 1. ALL DIMENSIONS ARE IN MM.
 2. FUEL OIL INLET/OUTLET FLANGES ARE ANSI 150 LB RAISED FACE FLANGES.
 3. CRADLE MOUNTING STRAP LOCATIONS SHOWN ("P" AND "Q") ARE TYPICAL AND CAN BE ADJUSTED UPON INSTALLATION AS REQUIRED.

Figure 2. Metric Dimensions

D. TYPICAL PIPING SCHEMATIC



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Figure 3. Typical Heavy Oil Piping System Utilizing Hauck Oil-To-Oil Line Heater (LHO)

- NOTES:
1. PIPING SCHEMATIC SHOWS TYPICAL COMPONENTS AND NOMINAL VISCOSITIES AND PRESSURES FOR HEAVY FUEL OIL SUPPLY; ACTUAL REQUIREMENTS ARE DEPENDENT UPON THE SPECIFIC BURNER SYSTEM (CONSULT HAUCK).
 2. OIL RETURN LINES TO BE SIZED ACCORDING TO DISTANCE TO PUMP - MINIMUM SIZE EQUAL TO TWO PIPE SIZES LARGER THAN OIL SUPPLY LINE (SEE GL88 FOR MINIMUM LINE SIZES FOR HAUCK OIL SUPPLY PUMPING UNITS).
 3. FOR ALL HEAVY OIL APPLICATIONS, HEAVY OIL PIPING MUST BE HEAT TRACED (ELECTRIC OR STEAM) AND INSULATED. SELF-REGULATING HEAT TRACING IS RECOMMENDED TO MAINTAIN THE DESIRED TEMPERATURE OF A GIVEN FUEL OIL TO ACHIEVE 90 SSU (1.8X10⁻⁵M²/SEC) OR LESS AT THE BURNER. ELECTRICAL HEAT TRACING WITH A NOMINAL RATING OF 12 W/FT (39W/M) COVERED WITH A NOMINAL 2" (50MM) FIBERGLASS TYPE INSULATION IS SUFFICIENT FOR MOST APPLICATIONS.
 4. IF USING NO. 6 FUEL OIL AND THE PIPING BETWEEN THE SUPPLY PUMPING UNIT (ITEM 8) AND THE PREPiped OIL MANIFOLD (ITEM 2) IS GREATER THAN 50FT (15M), AN ADDITIONAL BYPASS RELIEF VALVE (ITEM 3) MAY BE REQUIRED IN THE SUPPLY PIPING TO ACCOMMODATE COLD SYSTEM STARTUP (CONSULT HAUCK).
 5. IF SUCTION HEATER IS NOT UTILIZED, OIL RETURN LINE SHOULD BE PIPED TO THE OIL STORAGE TANK.

E. INSTALLATION

1. Install the LHO oil-to-oil line heater in a horizontal position, locating the LHO as close to the burner as possible to avoid unnecessary heat and pressure losses. The area should be level and flat. The LHO should be mounted on a metal framework base which in turn is secured to concrete. Mount the LHO via the strap cradles to the mounting structure with appropriate bolts and fasteners. Avoid welding the LHO strap cradles to its final location unless impractical. **The location of the LHO should not be above the horizontal centerline of the burner.** The LHO connections should be oriented as shown in Figure 1.

IMPORTANT

Provide sufficient clearance to permit the removal of the tube bundle from the shell of the LHO (see Figure 1).

2. Before piping, inspect all openings in the LHO for foreign material. Remove all wooden plugs, bags of dessicant and shipping covers.

IMPORTANT

All piping must be, at a minimum, at least the same size as the connection on the oil line heater (LHO). A larger size may be required if the lines are long, to avoid excessive pressure losses. The oil return line from the burner to the inlet side of the oil supply pump should be sized according to the distance to the pump. Preferably the return line should be one size larger than the oil supply line. At a minimum, it should be equal to the oil supply line size.

Provide necessary valves and union/flange connections in the oil and transfer oil piping to permit isolation and to ease maintenance of the LHO.

All piping must be accurately aligned with the connections on the LHO and must be properly supported to prevent strains on the equipment. If necessary, use flexible oil hoses.

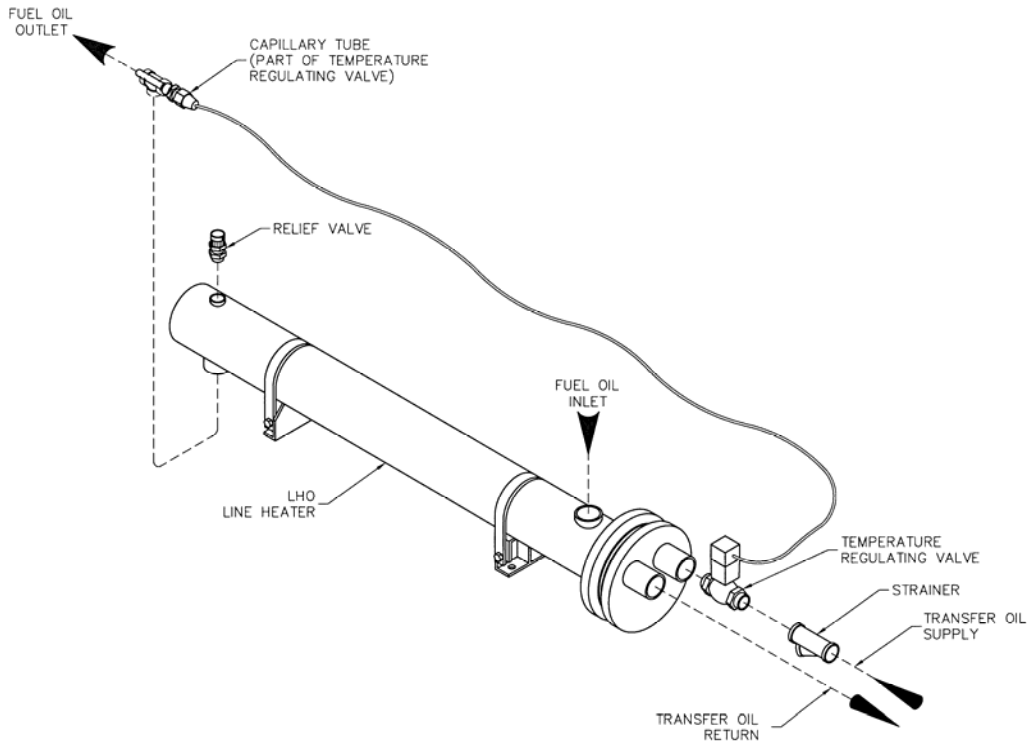
Use clean pipe with good threaded joints. Ensure tight joints by using a sealing compound recommended for oil use and a temperature rating compatible with the oil temperatures involved.

Piping Connections (Refer to Figures 1, 3, and 4)

3. Once the LHO is in place, install and pipe the strainer and temperature regulating valve in the transfer oil inlet line of the LHO. This valve's capillary tube sensing element must be installed into the oil supply outlet line (to the burner) of the LHO via a threaded tee pipe fitting or threaded weld-o-let.

NOTE

Instructions covering installation, adjustment, and operation of the temperature regulating valve are packed with the valve and should be consulted.



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Figure 4. LHO Accessory Components

4. Pipe the transfer oil return line.
5. Install and pipe the over pressure relief valve into the vent connection on the LHO. The over pressure relief valve protects the system from damage which might be caused if the heater outlet is accidentally closed or blocked. **Do not use** a shutoff valve in the over pressure relief return line.
6. Pipe the discharge side of the supply pump to the fuel oil inlet of the LHO.
7. Pipe the fuel oil outlet line from the LHO to the burner oil manifold. Ensure that fuel oil bypass relief valve(s) are installed as required per Figure 3.
8. Pipe the oil return line from the burner to the inlet side of the oil supply pump set.



WARNING

Adjustment of this equipment by unqualified personnel can result in fire, explosion, severe personal injury, or even death.

CAUTION

Do not operate the LHO under pressure and temperature conditions in excess of those specified on the nameplate.

Under no circumstances is the LHO to be operated at a flow rate greater than that shown on the design specifications. Excessive flows can cause vibration and severely damage the LHO tube bundle.

F. OPERATION

1. If applicable, turn on the oil piping heat tracing and allow the oil line to come up to pumping temperature.
2. Using a Hauck Viscometer or other suitable device, determine the temperature to which the oil must be heated to achieve a viscosity of 90 SSU ($1.8 \times 10^{-5} \text{ m}^2/\text{sec}$).
3. Turn on the suction heater (if used) and the oil supply pumping unit and ensure that oil is flowing through the LHO.
4. Start the transfer oil flow to the LHO.
5. Periodically check the temperature of the oil exiting the LHO. The temperature reading is most commonly made on a metal sheathed thermometer that has been tapped into the burner oil manifold. In all cases, the point of measurement should remain fixed and constant to ensure reliable reference readings.
6. After the LHO has reached operating temperatures, re-tighten nuts and bolts on all gasketed joints to prevent leaks and gasket failures.

CAUTION

When shutting down the LHO for an extended period of time, drain all fluids to eliminate possible freezing and consequent damage to the LHO.

G. MAINTENANCE

Very little maintenance is required on LHO oil-to-oil line heaters. They should, however, be periodically cleaned, especially the tube bundle, to prevent excessive sludge or scale build-up and ensure optimum performance.

CAUTION

When removing tube bundles from the LHO for inspection or cleaning, exercise care to ensure that they are not damaged by improper handling. It is recommended that when the LHO is dismantled, new gaskets be used in reassembly.

H. RECOMMENDED SPARE PARTS LIST

Item	Qty.	Part Number	Description
1	1	See Parts List	Head Gasket
2	1	See Parts List	Tank Gasket

Table 1. Recommended Spare Parts List