

SIMPLEX[®]

Insight  Onsite



SPS/SKS SKID PUMP SET

PACKAGED PUMP SET

Last Revision Date: June 8, 2021

For the most up-to-date information for this product and others, please contact Simplex, Inc. at (800) 637-8603 or visit us on the web at <http://www.simplexdirect.com>.

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1 WARNINGS AND CAUTIONS

SAFETY INFORMATION SYMBOLS

The following images indicate important safety information:



This General warning symbol points out important information that, if not followed, could endanger personal safety and/or property.



This Explosion warning symbol points out potential explosion hazards.



This Fire warning symbol points out potential fire hazards.



This Electrical warning symbol points out potential electrical shock hazards.

CAUTIONS



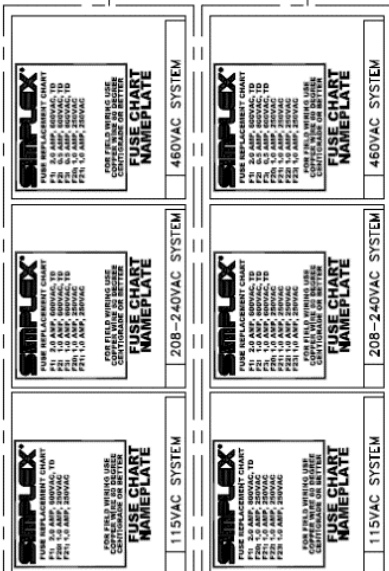
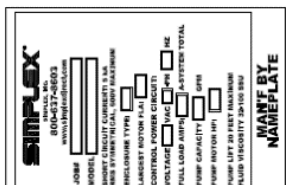
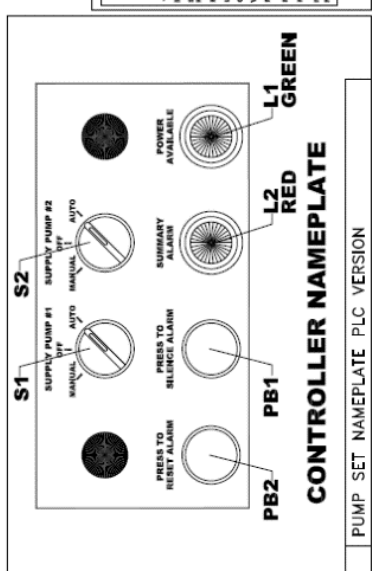
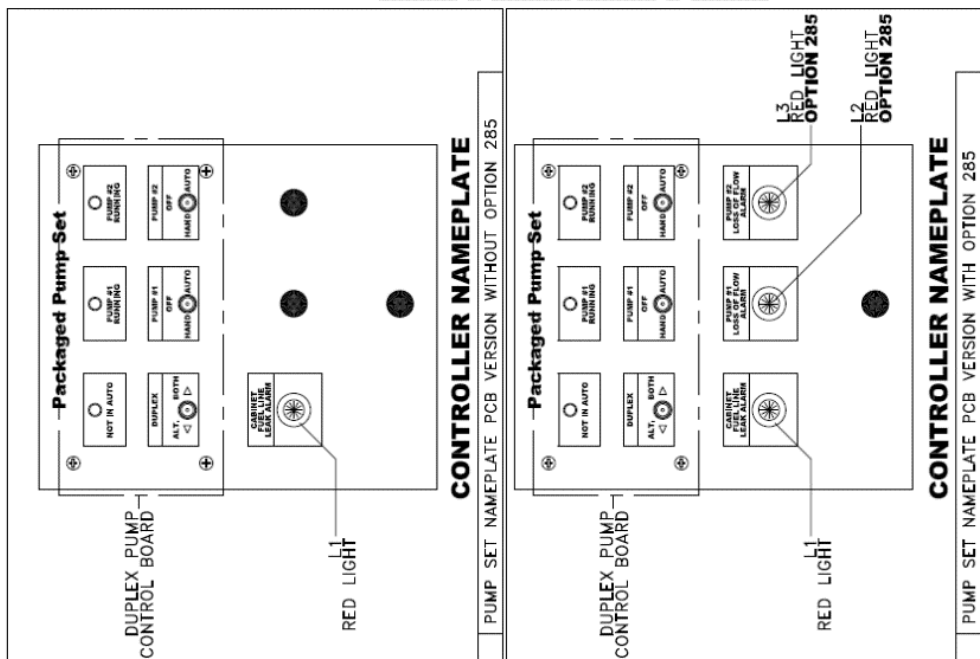
- Improper operation of this equipment such as neglecting its maintenance or being careless can cause possible injury or death. Permit only responsible and capable persons to install, operate, and/or maintain this equipment.
- Potentially lethal voltages and amperages are present in these machines. Ensure all steps are taken to render the machine safe before attempting to work on the equipment.
- All hardware covered by this manual have dangerous electrical voltages and can cause fatal electrical shock. Avoid contact with bare wires, terminals, connections, etc., on the hardware, if applicable. Ensure all appropriate covers, guards, grounds, and barriers are in place before operating the equipment. If work must be done around an operating unit, stand on an insulated dry surface to reduce shock hazard.
- Do not handle any kind of electrical device while standing in water, while barefoot, or while hands or feet are wet. **DANGEROUS ELECTRICAL SHOCK MAY RESULT.**
- If trained personnel must stand on metal or concrete while installing, servicing, adjusting, or repairing this equipment, place insulative mats over a dry wooden platform. Work on the equipment only while standing on such insulative mats.
- The National Electrical Code (NEC), Article 250 requires the frame of the equipment to be connected to an approved earth ground and/or grounding rods. This grounding will help prevent dangerous electrical shock that might be caused by a ground fault condition or by static electricity. Never disconnect the ground wire.
- Wire gauge sizes of electrical wiring, cables, and cord sets must be adequate to handle the maximum electrical current

(ampacity) to which they will be subjected.

- Before installing or servicing this (and related) equipment, make sure that all power voltage supplies are completely turned off at their source. Failure to do so will result in hazardous and possibly fatal electrical shock.
- In case of accident caused by electric shock, immediately shut down the source of electrical power. If this is not possible, attempt to free the victim from the live conductor. **AVOID DIRECT CONTACT WITH THE VICTIM.** Use a nonconducting implement, such as a dry rope or board, to free the victim from the live conductor. If the victim is unconscious, apply first aid and seek immediate medical attention.
- Never wear jewelry when working on this equipment. Jewelry can conduct electricity resulting in electric shock or may get caught in moving components causing injury.
- Keep a fire extinguisher near the hardware at all times. Do NOT use any carbon tetra-chloride type extinguisher. Its fumes are toxic, and the liquid can deteriorate wiring insulation. Keep the extinguisher properly charged and be familiar with its use. If there are any questions pertaining to fire extinguishers, please consult the local fire department.
- The illustrations in this manual are examples only and may differ from your unit.



2 NAMEPLATES AND PLACARDS



NON-PLC SYSTEMS

PLC SYSTEMS

3 DESCRIPTION AND SPECIFICATION

Description

Packaged as a pre-engineered, integrated system of pumps, pump motors, controls and accessories, pre-plumbed and pre-wired, Simplex Packaged Pump Sets and Skid Pump Sets provide the user with the reliability of job engineered, system matched components, and factory assembled systems. These pump sets are intended for use with fuel oil, lube oil (class II or class III combustible liquids having a fl ash point of 100°F or higher).

Simplex Packaged Pump Sets are totally enclosed units suitable for wall or pad mounting. All devices, wiring and plumbing are contained within the weatherproof enclosure. Isolated compartments are provided for mechanical and electrical devices. External ports are provided for connection of field plumbing. The pump sets include a catch basin with a leak detector.

Due to design layout, Simplex Skid Pump Sets offer the customer a greater variety and quantity of options but because of its open catch basin they are suitable for indoor installation only.

WARNING

Do not fill with gasoline. This Pump Set is not meant for use with gasoline nor with other flammable liquids having a flash point less than 100°F. Use with gasoline or use with any flammable liquids at a temperature exceeding the flash point of that liquid, presents an immediate explosion and fire hazard. Do not use the Pump Set at a temperature exceeding the flash point of its contents.

Primary Inspection

Preventative visual inspection of the shipping crate, Remote Pump Unit, and accessories must be performed before installation. Physical or electrical problems due to handling and vibration may occur during shipment.

WARNING

If the pressure relief line is plumbed back to the pump suction line, the pump suction line between the pressure relief manifold and main tank cannot contain a foot valve or a check valve or damage to the pump will occur.

WARNING

Ground must be connected as shown in the wiring drawing. Failure to properly ground the unit will result in a fire and personnel safety hazard.

Installation

1. If the packing crate shows signs of damage inspect the SPS cabinet for damage. Check the entire outside of the cabinet for damage which could cause internal mechanical or electrical problems.
 2. Check main disconnect switch, door and hinge operation.
 3. Check pump/motor hardware for tightness. Rotate motor shaft by hand and check for smooth operation. Check pump/motor coupler for proper alignment and spacing. The coupler should have approximately 1/8" clearance between coupler halves. If this clearance is reduced or the pump and motor are not properly aligned excessive noise and pump/motor wear will occur.
 4. Check all electrical terminals and connections for tightness.
1. Properly mount and attach all components as shown in the dimensional drawings using the mounting feet/holes and plumbing provided. The pressure relief manifold should be plumbed back to the main fuel tank.
 2. Connect all components to earth ground at ground studs provided as shown on the electrical drawings. Unit must be grounded for operator safety.
 3. If equipped, install level and alarm indication accessories as shown on dimensional drawing and connect them to the Pump Unit as shown on the electrical drawings.
 4. If equipped, connect dry alarm contacts for customer use per specifications on the electrical drawings.
 5. Connect pump motor/control power to the Remote Pump Unit per specifications on the electrical drawings.

If any problems are observed during Primary Inspection call the Simplex Service Manager at 217-483-1600 (24hrs.)

4 PRIMING THE SYSTEM

Priming Overview

The pumps supplied with Simplex Pump Set are not self-priming. If a pump is allowed to run without fuel, pump damage will occur. Pump Sets are shipped from the factory filled with #30 oil to facilitate system priming. On systems that contain a hand pump the hand pump may be utilized to lift the fuel into the pump set cabinet. This will not eliminate the need to prime the system at the pump.

WARNING

Care must be taken when connecting control power to a system requiring three-phase control power. If the system is not properly wired the motor rotation will be reversed and damage to the pump shaft seal may occur. Standard pump rotation is clockwise as viewed from the motor end. Any pump which has been allowed to run in reverse must be checked for fuel leaks around the pump shaft. If the pump is leaking around the shaft the seals must be re-seated or replaced.

The Pump Set may be primed by installing a priming tee on the inlet side of the pump. An alternative is to disconnect the inlet line at the pump and fill the line with fuel. If the system contains a fuel strainer the strainer must be disassembled, filled with fuel, and reassembled.

Priming Procedure

1. Ensure the Pump is filled with #30 priming oil.
2. Ensure that all ball valves are in the open position.
3. Use hand pump to lift fuel to fuel manifold level.
4. Open the pump inlet line or priming tee, fill the line with fuel, close the line (it is recommended that a foot valve be installed at the main fuel tank to hold the fuel column.)
5. If the system contains a fuel strainer, fill the strainer with fuel.
6. Energize the pump and observe fuel flow. If it is a duplex system, operate both pumps simultaneously.

If the system contains a vacuum gauge on the input side of the pump, the gauge should read 15" vacuum maximum under normal conditions (15" vacuum = 20' vertical lift). Vacuum gauge readings greater than 15" vacuum indicate excessive vertical lift demands or line restrictions.

If the system contains a pressure gauge on the output side of the pump the gauge should read 5 PSI minimum pressure 65psi maximum pressure under normal conditions (.433psi = 1' vertical head pressure). Pressure gauge readings greater than 65 PSI pressure indicate excessive line restrictions and/or friction. Pump Set flow switches have a 5 PSI minimum set point and system pressure lower than 5 PSI will initiate a loss of flow failure. Pressure relief valves have a 65 PSI set point. System pressure greater than 65 PSI will cause the pressure relief valve to open and vent fuel back to the main storage tank.

WARNING

If the pump is allowed to run dry, the priming oil shipped in the pump will be depleted and it may be necessary to disconnect the plumbing at the pump input to re-prime the pump.

Single Pump Operation

Apply control power to unit. If equipped, place the Main Disconnect Switch in the “On” position.

AUTOMATIC

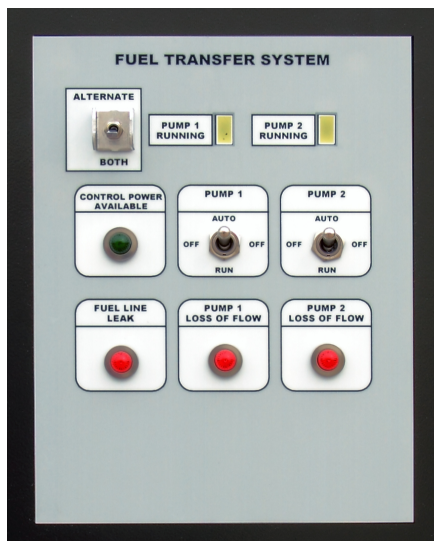
Place the Pump Selector Switch in the Auto position. When the call for fuel contacts close, the pump will start and run until the call for fuel contacts are opened.

MANUAL

Place the Pump Selector Switch in the Manual Mode. The pump motor will run until the switch is returned to the “Off” or “Auto” mode positions or when the Overload Relay trips

Duplex Pump Operation

Duplex pump units are used to increase the reliability of a pumping system through the addition of a second, backup pump and level control. In a duplex system, one pump is designated the “lead” pump and the other is the “lag” pump. The lead pump automatically refills the tank over the tank’s normal operating range of 50% to full. Normally, once the tank has been initially filled, the fuel level should never drop below 50%. Less than 50% is indicative of either a failure of the lead pump or consumption in excess of pump capacity. The lag pump and its separate level controller, acting as a backup senses a drop in fuel level below 50% and starts the lag pump, which then continues to run, along with the lead pump, until the tank is full. To begin operation, apply control power to unit and place the Main Disconnect Switch in the “On” position.



Alternate

Place the Duplex Pump Mode Switch in the Alternate position. When the call to transfer fuel contacts close, Pump #1 will start and run until the call to transfer fuel contacts are opened. When the call to transfer fuel contacts close again Pump #2 will start and run until the call to transfer fuel contacts are opened. Repeated operation will continue to alternate the pumps.

Both Run

Place the Duplex Pump Selector Switch in the Both position. When the call to transfer fuel contacts close both pumps will start and run until the call to transfer fuel contacts are opened. No lead/lag alternation occurs in the both mode.

Fuel Line Leak

If fuel is detected in the catch basin, the floats witch will close, activating the fuel line leak alarm illuminating the leak indicator.

Note: A fuel line leak disables the fill pumps in the Auto mode.

Loss of Flow

An adjustable time delay relay is wired in parallel with the motor starter circuit through a normally closed flow switch. The time delay relay, set to 30 seconds by Simplex, allows the pump time to establish positive flow and prevent false alarms. If the pump does not develop sufficient flow before the time delay relay picks up, or if flow is lost during operation, the lag pump will be signaled to start in duplex systems, the failed pump will be stopped and the pump fail indicator will light. Alarm contacts rated 10A @ 125/250VAC, 10A @ 30VDC.

5 MAINTENANCE

Simplex Pump Sets should be visually inspected for maintenance purposes every six months during light duty cycles. Pumps sets used daily for long hours should be inspected every month.

- Prior to performing the maintenance procedure ensure that the optional main disconnect switch illustrated above is operating properly, the user supplied circuit breaker is in the **OFF** position, and that all sources of power are isolated from the Pump Set. Proceed only after this is verified.
- Check main disconnect switch, door and hinge operation.
- Check cabinet mounting hardware at feet and wall mounting flange. Tighten as necessary.
- Test pumps in duplex pump sets. Ensure both pumps are operating normally, test each pump individually, test simultaneous operation, test alternating operation.
- Check pump/motor hardware for tightness. Pump/motor hardware will loosen after normal operation due to vibration. This hardware is double nuted, check all bolts for double nuts.
- Rotate shaft by hand and check for smooth operation. Check pump/motor coupler shown at left for proper alignment and spacing. The Lovejoy coupler should have approximately 1/8" clearance between coupler halves. If this clearance is reduced or the pump and motor are not properly aligned excessive noise and pump/motor wear will occur. Loosen pump motor mounting hardware to realign motor/coupler. Loosen one end of pump coupler to adjust for necessary coupler clearance.



- Check all electrical terminals and connections for tightness.
- All motors are permanently lubricated and do not require any lubrication
- All pumps are self-lubricating and do not require any maintenance.
- Check all plumbing joints for leaks. Tighten fittings and joints as necessary. Drain accumulated fuel in catch basin as necessary by removing catch basin plug.
- Inspect all fuel strainers. Disassemble strainer and clean strainer element, replace as necessary. Re-assemble unit and check for leaks.
- Test hand pump operation, check for fuel leaks, tighten as necessary

6 TROUBLESHOOTING

No Fuel Delivered

1. Pump not primed.
2. Lift is too high.
3. Rotation direction incorrect.
4. Check valve installed backwards.

Insufficient Fuel Delivered

1. Air leak at inlet.
2. Defective solenoid valve or check valve.
3. Lift too high.
4. Pump worn.
5. Inoperative foot valve.
6. Piping improperly installed.
7. Fuel strainer plugged.

Rapid Pump Wear

1. Dirt or grit in fuel.
2. Pipe strain on pump causing bind.
3. Worn pump/motor coupler.
4. Pump has been run dry or with insufficient fuel.

Pump Delivers For Short Period And Quits

1. Leak at inlet.
2. End of inlet not deep enough.
3. Air or gas in fuel.
4. Supply exhausted.
5. Vaporization of fuel at inlet.
6. Air or gas in inlet line.
7. Sand or abrasives in fuel.

Pump Requires Too Much Power

1. Air in plumbing lines.
2. Liquid heavy or too viscous.
3. Bent pump shaft, binding rotating element.
4. Misalignment of pump/motor coupler.

Noisy Operation

1. Insufficient fuel supply.
2. Air leaks in the inlet pipe.
3. Air or gas at inlet connection.
4. Pump and motor out of alignment.
5. Worn out spider coupling.
6. Pump coupler out of balance.

**Pump
Requires
Frequent Re-
Priming**

1. Inoperative foot valve.
2. Inoperative check valve.
3. Inoperative solenoid valve.
4. Pump cavitation.
5. Plumbing air leaks.
6. Lift too high.
7. Pump seal leaking.

**Motor Does
Not Turn Or
Turns
Intermittently**

1. Control power not available.
2. Motor thermal overload condition.
3. Pump failed and seized.
4. Motor failure.

**Pump Leaks
Fuel**

1. Loose pump plumbing fittings.
2. Worn pump shaft seal.
3. Pump pressure relief valve failure.
4. Fuel leak elsewhere running towards pump area.
5. Excessive head from overhead storage tank.
6. Worn pump O-rings.

7 DRAWINGS AND PARTS LIST

The drawings included in this manual are the most accurate source of part numbers for your Pump Set. When ordering replacement parts for Simplex Pump Sets, always consult the Parts Legend Drawing. When contacting the Simplex Service Department always have your work order and drawing number ready for reference. The Work Order Number and the Drawing Numbers are also located on each drawing legend. *A typical drawing legend and parts list is illustrated below.*

SIMPLEX™		SPRINGFIELD, ILLINOIS	
SCALE : ~	APPROVED BY :	DRAWN BY : RLL	
DATE :21-27-2010		REVISED :	
REMOTE PUMP UNIT		SKS-30-SD WIRING DIAGRAM	
115VAC,1Ø,60HZ		OPT:768,399,345,340,286,260,191, 100,095,087,070,062	
W.O. # 75050-10-55/1		DRAWING NUMBER 217628	

ASSEMBLY					
ITEM	QTY.	PART #	DESIG.	DESCRIPTION	
1	1	217626	RPU	REMOTE PUMP UNIT SKS-30-SD 2 GPM, .50 H.P.	
2	2	24630000A	MOT1, 2	PUMP MOTOR 0.50HP, 115VAC, 1PH, 60HZ, DDP 1800 RPM OPTION-700	
3	2	24741020	PUMP1, 2	PUMP 2 G.P.M. SUPER XL OPTION-507	
4	1	30049555	FSR	DUPLEX FUEL OIL STRAINER 1" NPT, W/BASKETS OPTION-062	
5	4	24010050	BV4, BV3	BALL VALVE UNION END VITON SEAL, SHORT HANDLE 1.00" x 1.00"	
6	2	24010106	[BV4]	TAIL PIECE 0.75" NPT. MALE	
7	2	24010108	[BV3]	TAIL PIECE 0.50" NPT. MALE	
8	1	25256660	DPS	DIFFERENTIAL PRESSURE 0-10PSI OPTION-286	
9	4	24010090	BV1	BALL VALVE, ISOLATION 0.25"	
10	2	15050510	PG	PRESSURE GAUGE, 0-200PSI 2.0" DIAL, BOTTOM MOUNT OPTION 100	
11	2	22925001	SCV	SWING CHECK .75" NPT. BRONZE OPTION-070	

Abbreviation Index

Listed below are abbreviations of terms found on Fuel Supply Systems. When following a drawing utilize this guide to define abbreviated system and component names. As this is a master list, drawings and text pertaining to your equipment may not contain all these terms.

AC -Alternating Current	MOT -Motor
AHR -Alarm Horn Relay	N.C. -Normally Closed
AR -Alarm Horn	NEC -National Electric Code
BPRV -Back Pressure Regulating Valve	NEMA -National Electric Manufacturers Association
BRK -Motor/Pump Bracket	NFPA -National Fire Protection Association
BV -Ball Valve	N.O. -Normally Open
C -Contactor	NP -Nameplate
CB -Circuit Breaker	NPT -National Pipe Thread
CSR -Check Strainer Relay	O.D. -Outside Diameter
CV -Check Valve	OLR -Over Load Relay
DC -Direct Current	OPT -Option
DPDT -Double Pole Double Throw	PCB -Printed Circuit Board
F -Fuse	PCRX -Pump Control Relays
FLS -Flowswitch	PG -Pressure Gauge
FS -Floatswitch	PLR -Pipe Leak Relay
FSR -Simplex Fuel Strainer	PRV -Pressure Relief Valve
GA -Gauge	PS -Pressure Switch
GAL -Gallons	PSI -Pounds Per Square Inch
GPM -Gallons Per Minute	PSR -Pressure Switch Relay
HFL -High Fuel Level Relay	PRR -Pump Running Relay
HG -Mercury	SC -Swing Check Valve
HP -Horsepower	SOL -Solenoid
HZ -Hertz	SST -Simplex Super Tank
I.D. -Inside Diameter	TB -Terminal Block
JB -Junction Box	T -Control Transformer
Hz -Hertz	TDR -Time Delay Relay
INHG -Inches of Mercury	TEFC -Totally Enclosed, Fan Cooled
L -Lamp	THR -Tank Heater Control Relay
L.E.D. -Light Emitting Diode	TS -Transducer Pressure Switch
LAFD -Los Angeles Fire Department	V -Voltage
LFF -Loss of Flow Relay	VAC -Voltage, Alternating Current
LFL -Low Fuel Level Relay	VDC -Voltage, Direct Current
LPR -Low Pressure Relay	VG -Vacuum Gauge
MDB -Main Distribution Block	
MDS -Main Disconnect Switch	

Technical Data

Pipe Friction- Fuel Oil 2

Pressure Drop in PSI per 100 feet of Pipe and Tube

NOMINAL SIZES - INSIDE DIAMETERS								
Pipe Size, In.	2.0 GPM	7.0 GPM	10.0 GPM	17.0 GPM	23.0 GPM	30. GPM	40.0 GPM	50.0 GPM
.50	2.337	24.65	56.10	148.75	233.75	408.00		
.75		3.61	7.31	21.25	39.53	64.6	93.5	182.75
1.00	.306	2.00	4.16	11.70	19.55	31.87	54.40	80.75
1.25	.10	.51	1.00	2.55	5.10	8.50	14.88	22.10
1.5		.23	.425	1.10	2.04	3.27	5.70	8.33
2.00			.13	.34	.60	.96	3.10	2.38
2.50			.10	1.62	.30	.51	.94	1.275
3.00					.10	1.74	3.06	4.93

NOTE: Pipe sizes shown apply to standard weight schedule 40 pipe.
Tube is standard copper tubing

Specific Gravity and Viscosity of Oils

Oils	*Specify Gravity At 60°F	Viscosities In SSU at Various Temperatures							
		30°F	60°F	80°F	100°F	130°F	170°F	210°F	250°F
Auto Lubricating S.A.E.-									
10 Max.	.880 to .935	4,400	1,090	430	240	120	66		
20 Max.	.880 to .935	6,900	1,650	750	400	185	90	57	
30 Max.	.880 to .935	13,000	2,700	1,200	580	255	120	66	49
40	.880 to .935	25,000	4,850	2,000	950	380	150	80	55
50	.880 to .935	58,000	10,000	3,700	1,600	600	220	105	67
60	.880 to .935	100,000	15,000	5,300	2,300	800	285	128	78
70	.880 to .935		22,000	7,500	3,100	1,050	342	150	86
10W	.880 to .935								
20W	.880 to .935								
Fuel Oil-									
Diesel No. 2D	.82 to .95	138	70	53.6	45.5	39			
Diesel No. 3D	.82 to .95	390	145	92	65	48	39		
Diesel No. 4D	.82 to .95	4,400	700	280	140	70	44.2		
Diesel No. 5D	.82 to .95	16,500	3,500	1,500	750	320	136	76.5	54
No. 1	.82 to .95				35				
No. 2	.82 to .95	104	56	45.5	40				
No. 3	.82 to .95	126	68	53	45	39			
No. 5A	.82 to .95	1,480	420	215	125	72	48		
No. 5B	.82 to .95	850	600	490	400	315	235	178	141
No. 6	.82 to .95		72,000	21,500	7,800	2,150	590	225	110
Navy Spec.	.989 Max.	3,300	1,100	600	360	190	100	66	50.2
Navy II	1.0 Max.		24,000	8,600	3,500	1,150	370	160	89
Turbine-									
Heavy	.91 Avg.	4,800	1,280	625	350	170	86	57	
Light	.91 Avg.	770	330	208	138	87	58.8		

FLAMMABLE LIQUIDS FLASH POINTS

Excerpts from NFPA 325, "Fire Hazards Properties of Flammable Liquids..."

	Flash Points °F(°C)
Diesel Fuel Oil No. 1-D	100 Min. (38) or Legal
Diesel Fuel Oil No. 2-D	125 Min. (52) or Legal
Diesel Fuel Oil No. 4-D	130 Min. (54) or Legal
Fuel Oil No. 1 (Kerosene) (Range Oil) (Coal Oil)	100-162 (43-72)
Fuel Oil No.2	126-204 (52-96)
Fuel Oil No. 4	142-240 (61-116)
Fuel Oil No. 5 Light Fuel Oil No. 5 Heavy	156-336 (69-169) 160-250 (71-121)
Fuel Oil No. 6	150-270 (66-132)
Jet Fuels Jet A and A-1	110-150 (43-66)
Jet Fuels Jet B	-10 to +30 (-23 to -1)
Jet Fuels JP-4	-10 to +30 (-23 to -1)
Jet Fuels JP-5	95-145 (35-63)

Conversion Factors

1HP = 33,000 ft. lbs. per minute

1HP = 42.4 btu per minute

1HP = 0.746 kw/hr (kilowatt hours)

1 U.S. gallon= 231 cubic inches

Pipe Volume varies as the square of the diameter; volume in gallons = 0.0034 D² L where:

D=inside diameter of pipe in inches;

L=length in inches

Velocity in feet per sec.= $\frac{0.408 \times \text{flow (gpm)}}{D^2}$

where:

D=inside diameter of pipe in inches

Atmospheric pressure at sea level = 14.7PSI

Atmospheric pressure decreases

approximately 0.41PSI for each one thousand feet of elevation up to 23,000 feet.

Pressure (PSI) = feet head x 0.433 x specific gravity

Specific gravity of oil is approximately 0.85.

Thermal expansion of oil is approximately 1 cubic inch per 1 gallon per 10°F rise in temperature.

Hydraulic Formulas

Horsepower = $\frac{\text{GPM} \times \text{PSI}}{1714}$

Torque (lb. in.) = $\frac{\text{CU IN./REV.} \times \text{PSI}}{2}$

Torque (lb. in.) = $\frac{\text{HP} \times 63025}{\text{RPM}}$

Flow (gpm) = $\frac{\text{CU IN./REV.} \times \text{RPM}}{231}$

Head and Pressure Equivalents

When converting pressure from feet of water to P.S.I., the specific gravity of the liquid must be considered.

Here are some typical conversion figures:

1 P.S.I.=2.30 feet of water
(specific gravity 1.0)

1 P.S.I.=2.88 feet of oil
(specific gravity 0.8)

PRESSURE AND CONVERSION TABLE		
Feet Water	PSI Oil	PSI Water
1	.35	.43
2	.70	.87
3	1.05	1.3
4	1.4	1.73
5	1.75	2.17
10	3.5	4.33
15	5.2	6.5
20	7.0	8.66
25	8.7	10.8
30	10.5	13.0
35	12.2	15.2
40	14.0	17.3
45	15.7	19.5
50	17.5	21.7
55	19.2	23.9
60	21.0	26.0
65	22.7	28.1
70	24.5	30.5
75	26.2	32.5
80	28.0	34.6
85	29.7	36.8
90	31.5	39.0



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