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Duplex Pump Set or Day Tank Pump Package
Installation, Operation and Maintenance

Notices

Manufacturer makes no warranty of any kind with regard to this publication including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Manufacturer shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance or use of this publication. Manufacturer reserves the right to change system options or features, or the information contained in this publication. This publication contains proprietary information which is protected by copyright.

Damage Claims

Thoroughly examine all components and units as soon as they are received. If damaged, write a complete and detailed description of the damage on the face of the freight bill. The carrier's agent must verify the inspection and sign the description. Immediately notify the delivering carrier of damage or loss. This notification may be given either in person or by telephone. Written confirmation must be mailed within 48 hours. Risk of loss, or damage to merchandise belongs with the buyer. It is the buyer's responsibility to file a claim with the carrier involved. Immediately advise manufacturer of the problem so that we may assist you.

Safety Information

UL Listed – The Pumpset Control Module is UL listed.
Intended Use – The Pumpset Control Module is intended for use with diesel fuel systems for emergency power generators. The control module and any connected sensors or devices are intended for operation only within ordinary electrical areas. Use of the module and connected sensors or devices within hazardous electrical areas is prohibited.

Intellectual Property

The equipment and software described herein are the property of the manufacturer and are protected by various trademarks and patents.

Note: Some duplex pump sets may be equipped with additional equipment pre-installed. Examples include DPS-REC (Duplex Pump Set Filter Polishing System), LMS (Leak Monitoring Systems) or DPS-VFD (Duplex Pump Set Variable Speed Drives). Any additional equipment installed will have an installation manual or be listed in this document.

Safety Notices/Rules

- **Do not exceed** the pump's rated pressure, speed, and temperature, or change the system/duty parameters from those the pump was originally supplied with, without confirming its suitability for the new service.
- **Before operating the pump**, be sure that –
  1. It is clean and free from debris
  2. All valves in the suction and discharge pipelines are fully opened
  3. All solenoid bypass valve handles are fully closed (extended down)
  4. All piping connected to the pump is fully supported and correctly aligned with the pump
  5. Pump rotation is correct for the desired direction of flow
- Install pressure gauges/sensors next to the pump set suction and discharge connections to monitor pressures.
- Use extreme caution when lifting the pump. Suitable lifting devices should be used when appropriate.
- Do not attempt to dismantle a pressure relief valve that has not had the spring pressure relieved or is mounted on a pump that is operating.
- Avoid contact with hot areas of the pump and/or drive. Certain operating conditions, temperature control devices, improper installation, improper operation, and improper maintenance can all cause high temperatures on the pump and/or drive.
- The pump must be provided with pressure protection. This may be provided through a relief valve mounted directly on the pump. Relief valve adjusting screw caps must always point towards suction side of the pump.
- The pump must be installed in a matter that allows safe access for routine maintenance and for inspection during operation to check for leakage and monitor pump operation.

General Description

The Duplex Pump Set is designed for reliable fuel transfer in emergency power systems at critical facilities. Its innovative compact design has a minimal footprint while delivering 5 to 30 GPM of fuel to serve emergency generators and boilers.

The mechanical design is based on Viking positive displacement pumps and is complete with strainers, check valves, ball valves, pressure/vacuum gauges, and relief valves. The unit is mounted on an integral containment with leak detection monitoring.

The Duplex Pump Set includes a motor starter panel, or optional VFD drive, with disconnect switch. The motor starter/drive includes current sensors for performance feedback to the duplex pump controller.

The pumpset controller provides duplex pump operation and monitoring with HOA switches and an emergency stop. The pumpset controller screen provides a summary of operating parameters and allows selection of special operating modes. The Controller networks with other system controllers using Ethernet, and directly to Building Management Systems with an option of BACnet or Modbus.

Start Up

1. Review this entire document before continuing. Only Trained and qualified technicians should startup this equipment for the first time.
2. Prime the suction line. Remove the threaded plug on the pump inlet piping and place diesel fuel into the piping until full. Reinstall the threaded plug. Operate the pump for 60 seconds maximum. Observe the inlet and outlet gauges to confirm pump rotation and progress of eliminating any remaining air from the suction piping. A fully primed suction pipe will be demonstrated by a steady vacuum gauge reading on the pump inlet.
3. Open all inlet and outlet valves and confirm that there is a clear flow path from the fuel source to the destination.
4. Manually start pump to confirm pump prime. Operate the pump for 60 seconds maximum. Observe the inlet and outlet gauges to confirm pump rotation and progress of eliminating any remaining air from the suction piping. A fully primed suction pipe will be demonstrated by a steady vacuum gauge reading on the pump inlet.
5. If the pump still does not deliver, the cause may be one or more of the following:
    - Suction line air leaks
    - Suction line obstructions
    - Suction tube or foot valve in tank is not installed
    - Suction lift is too great or the suction piping is too small
    - Anti-siphon or check valve setting in suction line is excessive
6. Adjust pressure relief valve to required setting. Adjust the pump pressure relief valve to the maximum design pressure of the system. This is done by removing the cap from the valve and adjusting the spring bolt. The valve adjustment should result in the pump being able to operate against closed discharge valves, without overload trip to the motor.
7. Check pressure and vacuum operating ranges. Confirm that the vacuum and pressure gauge readings are in conformance with the design requirements.
8. Check for leaks and correct any loose flanges or threaded fittings.
9. Check motor starter overload settings. Confirm that the motor starter overload settings match the full load amps indicated on the pump motor.
10. Clean inlet strainer. Close the inlet valve to isolate the strainer. Remove the threaded plug.
11. Clean any debris from the strainer screen.

Operation

Pump Controller Operation – Refer to *Controller Manual* for details of duplex pump set operations.

Pump Motor Starter Operation – Refer to *Motor Starter Manual* for details of motor starter operation.

Maintenance

1. Inspect for leaks at regular intervals, weekly as a minimum.
2. Operate pump manually to confirm prime at regular intervals, monthly as a minimum.
3. Check strainers after initial use and clean if required. Check strainers if an increase in vacuum gauge readings is observed.

UL 142 Double and Single Wall Tanks
Installation Instructions

INSTALLATION INSTRUCTIONS

SCOPE
These instructions apply to stationary, factory-assembled, aboveground single and double-wall vertical and horizontal steel tanks for the storage of stable, flammable and combustible liquids at normal atmospheric pressure. Because tank installation is a specialized craft, it is assumed that those using these instructions will have knowledge of, and possess the skills and equipment necessary to, install this type of above ground steel storage tank properly and safely. These instructions concern only the handling and testing of the tank upon arrival at the site and its placement and are not intended to address piping, utility hookup, (etc.) details pertaining to installation of the tank.

INSTRUCTIONS

1.0 TANK SITE

1.1 The foundation for the tank must be designed to support the tank plus 100% of the weight of the maximum amount of product the tank will be storing. The foundation may be comprised of concrete, asphalt, gravel or other stable material and must include provisions in its design to prevent tank movement.

The foundation design must also include provision for draining surface water away from the tank to minimize corrosion.

1.2 For tank installations without cathodic corrosion protection, a static electricity grounding system should be installed for the tank in accordance with applicable electrical and fire code standards. Tanks must be grounded to protect them from lightning damage.

1.3 For tank installation with cathodic corrosion protection, consult applicable standards (i.e., National Association of Corrosion Engineers) to provide the tank with appropriate protection from static electricity without disruption of corrosion protection.

1.4 Tanks located in areas subject to flooding must be protected against floatation.

1.5 Aboveground tanks should not be located above underground utilities or directly beneath overhead power lines.

1.6 The tank shall be protected from vandalism and accidental damage in accordance with all applicable codes.

2.0 TANK HANDLING

2.1 DO NOT HANDLE OR INSTALL TANK WITHOUT HAVING KNOWLEDGE AND EXPERIENCE IN PROCEDURES INVOLVED WITH PROPER AND SAFE INSTALLATION OF AN ABOVEGROUND TANK USED FOR STORAGE OF STABLE, FLAMMABLE AND COMBUSTIBLE LIQUIDS. RELIANCE ON SKILLED, PROFESSIONAL INSTALLERS IS AN IMPORTANT FACTOR IN AVOIDANCE OF TANK DAMAGE AND SYSTEM FAILURES.

2.2 Equipment for handling the tank shall be of adequate size to lift and set the tank. DO NOT DROP OR DRAG THE TANK.

2.3 Tanks shall be carefully handled using cables or chains of adequate length and size attached to the tank lifting lugs provided.

2.4 DO NOT HANDLE OR MOVE THE TANK UNLESS IT IS EMPTY.

2.5 This is a stationary tank. DO NOT USE THIS TANK FOR TRANSPORT OF ANY PRODUCT.

3.0 TESTING

The following air pressure testing does not apply to double-wall tanks equipped with interstitial vacuum monitoring systems.

Vacuum testing of the interstitial space of a dual-wall tank can be used instead of, or in addition to, air pressure testing of the primary tank.

3.1 Air Pressure Test Procedure for Horziontal Cylindrical And Rectangular UL 142 Tanks

3.1.1 Install test piping as shown in Figure C1. Temporarily plug, cap or seal off remaining tank openings to hold pressure. If tank is equipped with a long-bolt manway for emergency venting, replace manway long-bolts with short-bolts; tighten securely and/or if equipped with standard emergency vents, remove emergency vents and cap openings to hold tank pressure as required.
CAUTION: The regulated air supply test pressure used for this test is not to be less than 3 psig (20.7 kPa) nor more than 5 psig (34.5 kPa) for horizontal cylindrical tanks or 3 psig (20.7 kPa) maximum for rectangular tanks. Use only calibrated diaphragm type air pressure gauges with a 0-10 psig (0-68.94 kPa) dial span. Set pressure relief valve in test air supply line at 5.5 psi (38 kPa) for horizontal cylindrical tanks or 3 psig (20.7 kPa) for rectangular tanks.
CAUTION: Do not leave pressurized tank unattended.
WARNING: Do not stand in front of tank heads or fittings when pressurizing tank.

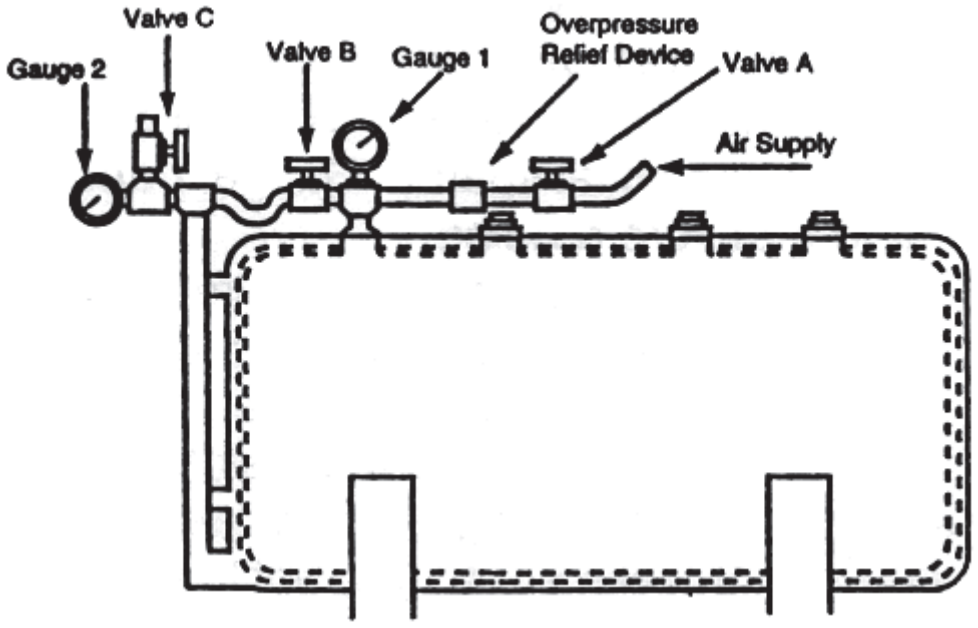

FIGURE C1

3.1.2 Close valves A and B. Open valve C.

3.1.3 Connect regulated test air supply line to test piping as shown in Figure 1.

3.1.4 Slowly open valve to pressurize the primary tank. Pressure gauge 1 should indicate test air pressure of 3 psig (20.7 kPa) minimum to 5 psig (34.5 kPa) maximum for horizontal cylindrical tanks OR 3 psig (20.7 kPa) maximum for rectangular tanks.

3.1.5 Close valve A. Disconnect regulated test air supply line from test piping.

3.1.6 Hold test pressure in primary tank for 1 hour minimum. A steady drop in pressure reading for gauge 1 indicates there may be a leak in the primary tank.

3.1.7 If no leaks are found, then close valve C and slowly open valve B to pressurize the interstitial space between the double walls of the tank.
WARNING: Do not apply air pressure to the interstitial space between the walls of a double-wall tank without air pressure in the primary tank. Do not apply air pressure to the interstitial space that is higher than the air pressure in the primary tank. Damage to the tank may result.
Pressure gauge 1 will indicate a slight drop in test pressure when valve B is opened, but should hold steady at the lower pressure. If test pressure drops below minimum requirements of 3 psi (20.7 kPa), close valve B, reconnect air supply line and slowly open valve A to increase pressure in primary tank, 3 psig (20.68 kPa) minimum and 5 psig (34.5 kPa) maximum for horizontal cylindrical tanks OR 3 psig (20.7 kPa) maximum for rectangular tanks. When the required pressure is indicated on gauge 1 close valve A, disconnect test air supply line. Open valve B to equalize pressure in the primary tank and the interstitial space. Gauge 1 and gauge 2 should have the same pressure reading.

3.1.8 Close valve B. Hold test pressure in interstitial space for 1 hour minimum. A steady drop in pressure gauge 2 indicates there may be a leak in the interstitial space.

3.1.9 Immediately apply approved leak test solution to tank exterior surfaces, welds, fittings, etc. Check for leaks. No leaks are allowed. If leaks are found, notify the tank manufacturer. If no leaks are found, testing of the tank is complete.

3.1.10 Open valve B, then slowly open valve A to release test air pressure from primary tank and interstitial space at the same time.

3.1.11 With tank depressurized, remove test piping, temporary plugs, caps and seals. Reinstall emergency relief vents, etc. If tank is equipped with an emergency vent long-bolt manway, reassemble manway cover with bolts supplied by tank manufacturer as noted below.
WARNING: Remove temporary manway cover short-bolts and reassemble manway cover with proper size and type of long-bolt, with a minimum unthreaded length of 2 inches (51 mm), so that when cover is fully raised, there is a 1 ½ inch (38 mm) minimum space between manway cover and frame.
Failure to properly assemble cover of a long-bolt manway used for emergency venting may make vent inoperable causing tank failure by over-pressurization.

3.2 Air Pressure Test Procedure for Vertical UL 142 Tanks

3.2.1 Install test piping. Temporarily plug, cap or seal off remaining tank openings to hold pressure. If tank is equipped with a long-bolt manway for emergency venting, replace

manway long-bolts with short-bolts; tighten securely and/or if equipped with standard emergency vents, remove emergency vents and cap openings to hold pressure as required.
CAUTION: The regulated test air supply pressure used for this test is not to be less than 1 ½ psig (10 kPa) nor more than 2 ½ psig (17 kPa). Use only calibrated diaphragm type air pressure gauges with a 0-3 psig (0-20.7 kPa) dial span. Set over-pressure relief device in test air supply line at 2 psig (13.8 kPa).
CAUTION: Do not leave pressurized tank unattended.
WARNING: Aboveground vertical tanks may have a "weak shell to roof" seam. Keep away from tank top and fittings when pressurizing tank.

3.2.2 Close valves A and B. Open valve C.

3.2.3 Connect regulated test air supply line to test piping as shown in Figure C2.

3.2.4 Slowly open valve A to pressurize the primary tank. Pressure gauge 1 should indicate test air pressure of 1 ½ psig minimum to 2 ½ psig maximum (10-17 kPa).

3.2.5 Close valve A. Disconnect regulated test air supply line from test piping.

3.2.6 Hold test pressure in primary tank for 1 hour minimum. A steady drop in pressure reading for gauge 1 indicates there may be a leak in the primary tank.

3.2.7 Apply approved leak test solution to tank roof welds, fittings, etc. Check for leaks. No leaks are allowed. If leaks are found, notify the tank manufacturer.

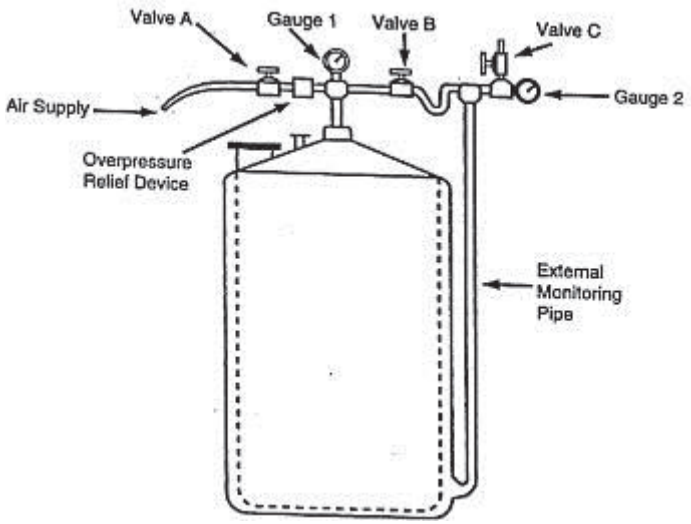

FIGURE C2

3.2.8 If no leaks are found, then close valve C and slowly open valve B to pressurized the interstitial space between the double walls of the tank.
WARNING: Do not apply air pressure to the interstitial space between the walls of a double-wall tank without air pressure in the primary tank. Do not apply air pressure to the interstitial space that is higher than the air pressure in the primary tank. Damage to the tank may result.
CAUTION: Pressurization of large diameter tanks may result in bulging of the bottom of the tank. Should the tank move, immediately relieve the pressure. In large diameter tanks it is possible to lift the tank by pressurizing the inner tank and the space between the bottoms.

Secure tank accordingly before testing.
Pressure gauge 1 will indicate a slight drop in test pressure when valve B is opened, but should hold steady at the lower pressure. If test pressure drops below minimum requirements of 1 ½ psig (10 kPa), close valve B, reconnect air supply line and slowly open valve A to increase pressure in primary tank, 1 ½ psig (10 kPa) minimum and 2 ½ psig (17 kPa) maximum. When the required pressure is indicated on gauge 1 close valve A, disconnect test air supply line. Open valve B to equalize pressure in the primary tank and the interstitial space. Gauge 1 and gauge 2 should have the same pressure reading.

3.2.9 Close valve B. Hold test pressure in interstitial space for 1 hour minimum. A steady drop in pressure gauge 2 indicates there may be a leak in the interstitial space.

3.2.10 Immediately apply approved leak test solution to tank exterior surfaces, welds, fittings, etc. Check for leaks. No leaks are allowed. If leaks are found, notify the tank manufacturer. If no leaks are found, testing of the tank is complete.

3.2.11 Open valve B, then slowly open valve A to release test air pressure from the primary tank and interstitial space at the same time.

3.2.12 With tank depressurized, remove test piping, temporary plugs, caps and seals. REINSTALL EMERGENCY RELIEF VENTS, ETC. IF TANK IS EQUIPPED WITH AN EMERGENCY VENT LONG-BOLT MANWAY, REASSEMBLE MANWAY COVER WITH BOLTS SUPPLIED BY TANK MANUFACTURER AS NOTED BELOW.
WARNING: Remove temporary manway cover short-bolts and reassemble manway cover with proper size and type of long-bolt, with a minimum unthreaded length of 2 inches (51 mm), so that when cover is fully raised, there is a 1 ½ inch (38 mm) minimum space between manway cover and frame. Failure to properly assemble cover of a long-bolt manway used for emergency venting may make vent inoperable causing failure by over-pressurization.

4.0 TANK PIPING AND ACCESSORIES

4.1 Install all permanent piping and fittings using compatible non-hardening thread sealant material.

4.2 All unused tank openings must be properly sealed using metal threaded pipe plugs, flanges or caps using compatible non-hardening thread sealant material.

4.3 DO NOT WELD ON THE TANK. MODIFY OR PENETRATE THE TANK STRUCTURE IN ANY WAY WITHOUT THE EXPRESS WRITTEN PERMISSION OF THE TANK MANUFACTURER.

4.4 All tank accessories shall be installed as required per local codes. Anti-sipon devices overfill shut-offs and alarms, vents gauges, emergency vents, etc. are common requirements for tanks storing motor fuels for the purpose of being dispensed into motor vehicles.

5.0 LABELING

5.1 Tanks shall be labeled in accordance with all applicable codes.

6.0 MAINTENANCE

6.1 Aboveground tanks are subject to basic maintenance requirements during their service life. The tank vessel is subject to accidental damage, vandalism, atmospheric degradation of the coating and damage caused by the collection of water inside the tank.

6.2 The tank operator should perform periodic walk-around inspections to identify and repair areas of damage to the vessel or the coating itself and check for proper drainage around the tank area.

6.3 Periodic repainting of the surface will be required. The frequency of this maintenance procedure will be based upon environmental factors in the geographic area where the tank is located. The operator is responsible for the selection of the paint, surface preparation and coating application. Local codes may require that the tank be relabeled.

6.4 Proper site preparation is vital to ensure drainage of surface water. Should ground conditions change or settlement occur, steps must be taken to maintain proper drainage and prevent standing water near or under the tank area.

6.5 The primary tank should be inspected monthly for the presence of water. Inspection should take place at the lowest possible points inside the primary tank. Remove any water found. Water and sediment in fuel can cause plugging of filters. Also, bacterial growth, originating from the fuel, can cause filters to plug and corrosion of tanks and lines. A report by the US Department of Energy, BNL 48406, provides information on methods to test for and remove water, test for bacterial presence in fuel, tank cleaning and fuel additives. Failure to remove water from the tank may void your warranty.

6.6 Failure to adhere with these maintenance instructions may void your warranty.