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Double Wall Safety Fuel Oil Storage Tanks

Installation Instructions

For single and Multiple Tank Applications



Listed under SU2258

Meets the requirements of NFPA 31 (2001) and CSA B-139-04

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1. General Warnings

Please read and observe these warnings! Failure to comply may void the tank warranty!

- Roth Double Wall Safety Fuel Oil Storage Tanks must be installed by a person who has successfully completed Roth-certified DWT installation training and the tank(s) must be installed according to these instructions.
- All Roth tanks (both inner and outer) are pressure tested at the factory according to UL[®] standards and do not require additional field testing. If local codes require pressure testing of the piping, it should be done with the pipes disconnected from the tank. Further information is available in this manual.
- Do not stand on or store heavy objects on the top of these tanks.
- Do not install this tank if there is physical damage which may affect the integrity of either the inner tank or outer containment tank. Further information is available in this manual.
- Do not remove the Leak Detector from the tank.
- All tanks must be installed with an approved vent alarm (Roth Vent Alarm #335000999, or equivalent sized UL listed whistle vent) in order to maintain warranty requirements.
- Roth Suction Assemblies are an *optional* accessory and are not recommended for all installations. Further information on acceptable and unacceptable applications for the Suction Assembly is included in this manual.
- All tanks installed outside must have a Roth approved cover as specified in this manual.
- All multiple tanks must be installed with the Roth Expansion Kits or with separate fill lines for each tank as described in this manual. A field constructed manifold for the vent piping may be used on multiple tanks with separate fill lines if permitted by local codes.
- Multiple tank installations using the Roth Expansion Kits must have a tight-fitting connection for the delivery truck hose. These tanks must be “pressure filled” at 40-85 gpm (150-325 lpm) and 85 psi (586 kPa) maximum pressure. “Cascade” filling of multiple tanks is not permitted under any circumstances. If “pressure filling” systems are not available on either the delivery truck or the fill connection point all tanks must have separate fill lines.
- The warranty for the steel containment tank is reduced from ten (10) years to five (5) years for tanks installed outdoors within 300’ (92 m) of the high water level of a salt water body.
- The tank warranty is only valid if one copy of the warranty card is completed and returned to the manufacturer within ten (10) days of installation. The second copy must be left with the customer. If the warranty card is not registered as above, the warranty period will begin on the date of manufacture.
- The tank warranty applies to the original installation address only. Reinstallation of the tank at a new location will void the warranty.
- All Roth Safety Tanks should be inspected by the homeowner, a qualified service technician or the fuel oil supplier at the beginning and end of the heating season to verify that the entire system is free of leaks. This is a minimum requirement. Some locations may require the fuel delivery driver to check the system before and after each delivery. Check local codes for requirements.

2. Technical Installation Instructions

General Information

The Roth Double Wall Safety Fuel Oil Storage Tanks are UL[®] listed in the United States and Canada under SU2258 and approved under NFPA 31 (2001) and CSA B-139-04 as non-metallic fuel oil storage tanks. Other codes may be in effect in your area and may impose additional restrictions. If you have any questions regarding these requirements, please contact your local building or fire official for more information.

The Roth DWT's are available in five (5) sizes. Approximate dimensions and capacities are:

Tank Model	DWT 400L	DWT 620L	DWT 1000L	DWT 1000LH	DWT 1500L
Nom. Capacity US gal (liters)	110 (400)	165 (620)	275 (1000)	275 (1000)	400 (1500)
Length inches (cm)	29 (74)	29 (74)	43 (110)	51 (130)	64 (163)
Width inches (cm)	28 (72)	28 (72)	28 (72)	30 (76)	30 (77)
Height Inches (cm)	44 (112)	61 (155)	61 (155)	54 (137)	68 (173)
Min Height Req'd inches (cm)	49 (125)	66 (168)	66 (168)	60 (152)	76 (193)
Tank Weight lbs. (kg)	106 (48)	132 (60)	167 (76)	208 (94)	333 (151)
Shipping Weight lbs. (kg)	115 (52)	143 (65)	185 (84)	230 (104)	358 (162)

Approx. Footprint for Multiple DWT Installations

Tank Model	DWT 400L	DWT 620L	DWT 1000L	DWT 1000LH	DWT 1500L
2 Tanks (Side by Side)	29 x 60 (74 x 152)	29 x 60 (74 x 152)	43 x 60 (110 x 152)	51 x 63 (130 x 160)	64 x 63 (163 x 160)
3 Tanks (Side by Side)	29 x 92 (74 x 234)	29 x 92 (74 x 234)	43 x 92 (110 x 234)	51 x 96 (130 x 244)	64 x 96 (163 x 244)
4 Tanks (Side by Side)	29 x 124 (74 x 315)	29 x 124 (74 x 315)	43 x 124 (110 x 315)	51 x 129 (130 x 328)	N/A
5 Tanks (Side by Side)	29 x 156 (74 x 397)	29 x 156 (74 x 397)	43 x 156 (110 x 397)	51 x 162 (130 x 411)	N/A
2 Tanks (End to End)	N/A	N/A	28 x 90 (72 x 229)	N/A	N/A

Only technicians who have successfully completed an installation training course given by Roth representatives are permitted to install these tanks using the installation tools and guidelines described in this manual. Roth will maintain records of individuals who have successfully completed this training. Proper installation of each tank shall be acknowledged when one copy of the Warranty Certificate is completed and signed by the installing technician.

Inspection of Tank and Contents

Unpacking and Damage Evaluation

Do not remove any protective packaging until the DWT has been delivered to the installation location. After unpacking, each tank should be visually inspected for "unacceptable" damage of the base support, the containment tank, the primary (inner) tank, rolled metal seams, fittings and accessories. Unacceptable damage is defined as any material, component or product defects such as holes, cuts or permanent deformation of the structural or fluid confining parts which could cause leakage, excessive

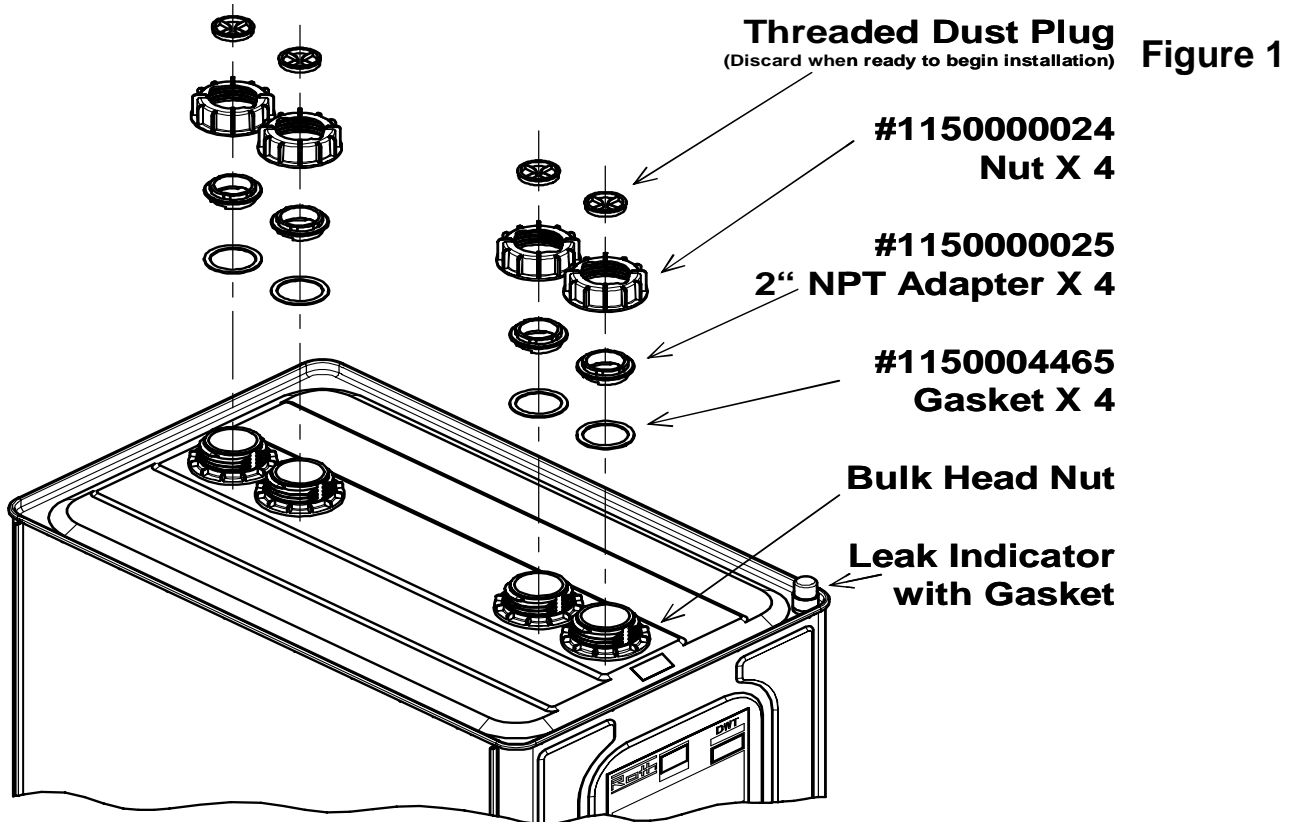
corrosion or other mechanical and fire safety hazards. Minor deformations and dents are acceptable except at the bottom of the dike.

Be sure to use care when you cut the shrink wrap and remove the base and Styrofoam. Properly dispose of all packing materials.

Supplied With All Tanks

All Roth UL Listed tanks are supplied with:

- 4 - # 1150000024 Cap Nut
- 3 - # 1150000025 2" Plastic Adapters
- 4 - # 1150000031 #3 Gaskets
- 4 - # Threaded Dust Plugs (Discard when ready to start installation if all connections are used)
- 4 - Bulkhead Nuts (Do not remove)
- 1 - Leak Indicator (Do not remove)
- 1 - #3350000025 2" Die Cast Adapter (installed in one of the tank connections)
- Warranty Forms (2), Installation Instructions (under packing on top of the tank)



All parts shown in Figure 1 are preinstalled to prevent dirt from entering the tank during shipment. Be sure to inspect for damage and count all parts that come with the Roth DWT prior to installation.

General Installation Instructions

Location Selection

The tank shall be placed into service in accordance with local codes and the listed use (indoor or outdoor) on a flat, level and stable surface, away from heat sources, corrosive atmospheres or fluids, potential mechanical damage or rapid temperature changes. The final location must have the tank label visible after installation.

A minimum of 2" (50 mm) from all walls or obstructions is recommended for normal tank expansion and visual inspection. The integral base support shall not be removed and raising the tank height is not allowed except on a continuous concrete platform at least 6" (150 mm) wider than the tank base at all sides. All local fire code set-backs for fuel oil storage tanks must be observed.

Tanks installed indoors shall not be exposed to direct sunlight on any plastic parts. Tanks installed outdoors shall be assembled with the required cover (Roth #3335100749 for the 400L and 620L, Roth #3335100747 for the 1000L, #1135003721 for the 1000LH and Roth #1135002054 for the 1500L). These covers are purchased separately and are not included with the basic tank.

Piping Connections

Connect the fill, vent, burner fuel supply piping and other accessories in accordance with local codes using only the provided transition or blank fittings and accessories. Only vent alarms specified by the manufacturer (Roth Vent Alarm #335000999, or equivalent sized UL[®] listed vent whistle) shall be used in the tank before connection with the vent pipe. Care should be taken to ensure proper position of all gaskets and threaded connections to avoid damage or leakage. All pipe and fittings should be hand tightened and inspected for proper alignment prior to final tightening. Tighten the plastic fittings with the Roth Tank Fitting Wrench (#3335100191) or similar device. Plastic fittings should be tightened to approximately 18 ft-lb (2.5 kg-m) initially. You may use approximately 1.5x this torque, if needed. **Pipe sealants or Teflon tape are not allowed on any of the threaded plastic connections.** Bending of the pipes beyond 15° during assembly, placing stress on the transition fittings or other distortion of fittings is not allowed. Metal threaded connections should be installed in the normal manner with thread sealant, pipe wrenches, etc. All fill, vent and fuel supply piping shall be secured and supported by fire resistant hangers to prevent stress loading of the tank or fittings. The vent and fill piping shall be inspected to verify there are no blockages and terminated outside the building with acceptable fittings and in a location allowed by local codes.

Tanks used in outdoor locations shall be assembled only with the required covers (#3335100749 for the 400L and 620L, #3335100757 for the 1000L, #1135003721 for the 1000LH and 1135002054 for the 1500L) with the fill, vent and fuel gauge located inside the cover. For connection to the burner fuel piping, open a knockout for the tubing to exit the cover and replace it only with a UL[®] listed outdoor rated bushing matching that tubing size to ensure a liquid-tight fit.

Testing & Approval for Commissioning

Both inner and outer tanks are pressure tested at the factory during assembly according to UL[®] standards and do not require further field testing. If local codes require a pressure test for the piping, this test should be performed with the piping disconnected from the tank(s). After the assembly is completed, the final connections at the tank may be air tested at 0.5 psi (3.5 kPa) using a leak detection solution on the fittings. It is not necessary to use pressures in excess of 0.5 psi (3.5 kPa) for this purpose. If leaks are found at the plastic connections you may use additional torque of up to approx. 27 ft-lbs (3.7 kg-m) to seal the leak. If the fitting does not seal or is defective it should be replaced. Following the check of the final connections, verify that the Leak Indicator is properly seated. A final visual inspection shall be done at this time including verification that all of the required labels are visible and instructions are available for the user. If all required installation items described above are accepted, the technician shall provide contact information (installing company's name and phone number) on the owner's copy of the Warranty Certificate, sign and date the manufacturer's copy of the Warranty Certificate and then send the manufacturer's copy to the office of the manufacturer. The manufacturer shall keep this copy on file as proof of proper installation.

Flood, Wind & Earthquake Protection

If tanks are installed in areas subject to earthquakes, high winds or floods, good engineering practices should be observed for tank location, piping support and connections. Local codes may require the installation of particular restraint devices, limit the placement of tanks or impose other installation

requirements. You should contact your local building department for further information. We suggest the use of the Roth Tie Down Kit (#3335100749 for the 400L, #3335100222 for the 620L and 1000L, #3335400222 for the 1000LH and #3335400222 for the 1500L) in these areas. Earthquake bands may also be available from your local supply house. These bands secure the tank to a structural wall to limit movement during earthquakes or high winds. When using these bands it is important not to screw the band to the outer containment tank as this will destroy the containment tank integrity and possibly damage the inner tank and void the warranty!

3. Single Tank Installation Instructions (see Figure 2)

Beginning Installation

Insure that all of the General Installation Instructions have been followed.

Set the base on the floor in the desired location. The location should provide a stable, level area capable of supporting the weight of the tank you will be using. Local codes may impose restrictions on the material and construction methods of the base material. Observe all clearances for building and fire code requirements for your area.

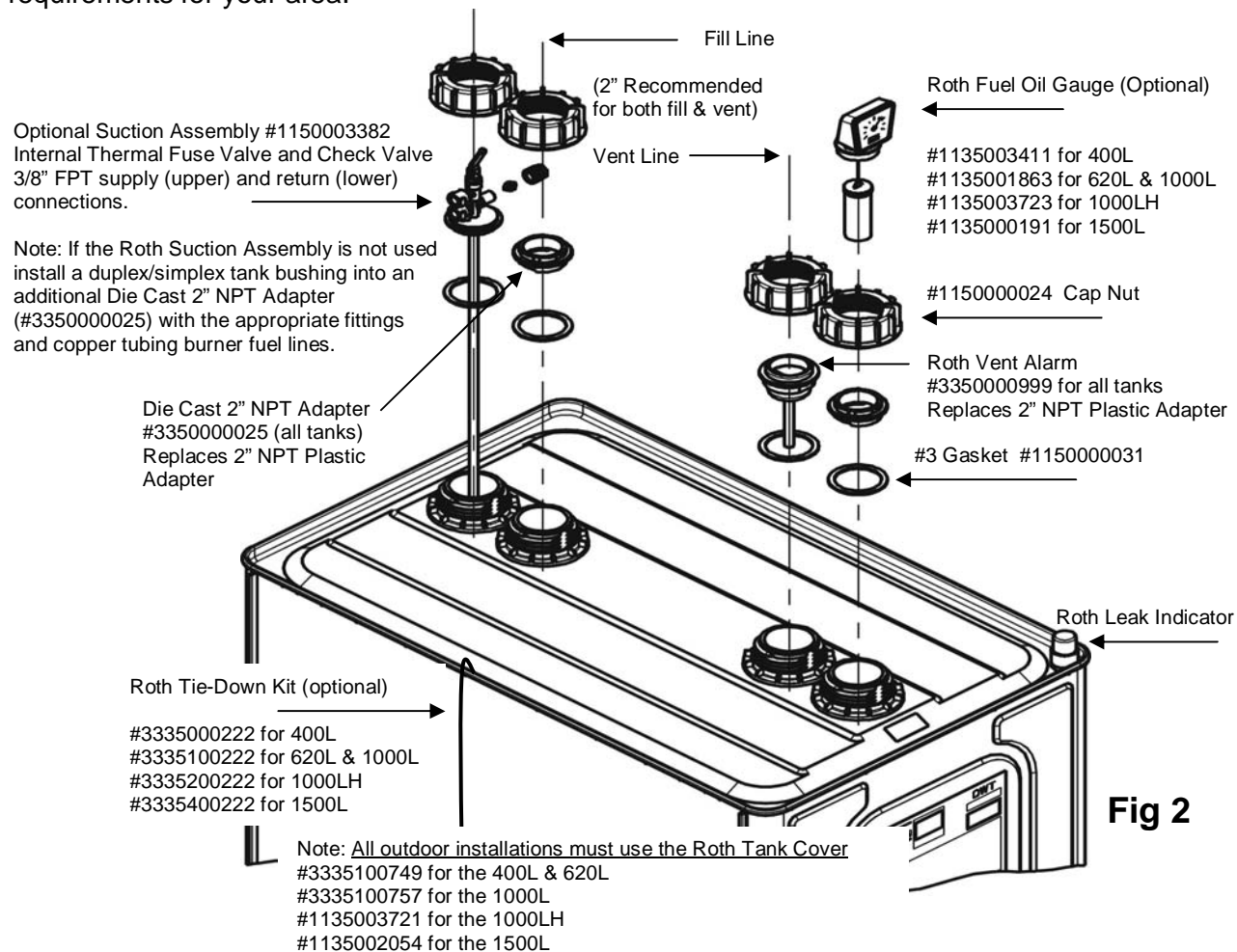


Fig 2

Determine which of the tank openings will be used for the fill, vent, fuel supply/suction assembly and gauge (if used) based on your installation requirements. Figure 2 is a suggested connection diagram only and other connection patterns may better suit your installation requirements. It is strongly suggested that if you use the optional fuel gauge that you install it at the opposite end of the tank from the fuel supply suction. This will ensure that the gauge float does not get tangled in the suction line.

Piping Connections

Remove dust plugs from the tank only when you are ready to use that connection. It is recommended that you assemble all fill and vent lines prior to connecting them to the tank. All piping must be properly supported and aligned with its connection point to the tank. Do not try to straighten the pipe by tightening the plastic cap nut. **DO NOT USE THE TANK TO SUPPORT THE PIPE.** The tank is not designed to support the weight of the piping and will not tolerate the torque of misaligned pipe.

All piping should be air pressure tested prior to final connection with the tank. Every tank is factory tested. Do not air test the Roth DWT in the field at pressures in excess of 0.5 psi (3.4 kPa) as this will void the tank warranty. If local codes require a piping pressure test higher than 0.5 psi (3.4 kPa), the test must be performed with the piping disconnected from the tank. After a successful piping pressure test make the final connections and perform a final air test on all the connections at no more than 0.5 psi (3.4 kPa) using a leak detection solution on all of the fittings. Do not use any pipe thread sealant or Teflon tape on any plastic threaded connections.

Fill Piping

Each fitting on the top of the tank is a swivel connection. **Do not use Teflon tape or pipe joint compound on any plastic threaded connection or on the gaskets.** Slide the large cap nut over the fill pipe connection and then tighten the 2" die cast adapter onto the end of the pipe. Place the #3 gasket on the sealing face of the adapter and place the adapter on the tank connection. Check the piping for proper alignment and length and adjust as needed prior to the final tightening. Be sure that the gasket is properly seated between the adapter and the tank and tighten the cap nut onto the tank. Firm hand tightening is all that should be needed for a good seal. An optional wrench (#1135002121) is also available. 18-27 ft-lbs (2.5 -3.7 kg-m) is the maximum required torque for this fitting.

Vent Piping

ALL TANKS MUST BE VENTED. Unless another UL[®] approved system for fill level detection is used, all tanks must have a vent alarm (whistle) installed. We require the use of our proprietary vent alarm (#3350000999) in each tank. This vent alarm also provides a 2" NPT adapter for easy connection of your vent piping to the tank. The Roth Vent Alarm is installed in place of one of the plastic adapters in the top of the tank. Use the cap nut and a #3 gasket to secure the vent alarm in the manner described above.

Vent lines must not be trapped in any way that could reduce the venting capacity of the line. Roth strongly recommends the use of a 2" vent line in all applications; however, local codes may allow some variation. You should contact your local building department or refer to the current edition adopted in your area of NFPA 31 (US) or CSA B-139 (Canada) if you have any questions.

Fuel Supply Piping

When replacing an existing fuel oil storage tank it is the installer's responsibility to check the condition of the existing fuel lines to the burner and determine if they are serviceable or need to be replaced. Consult your local codes to determine the requirements for your area if the lines need to be replaced. Follow the normal piping practices for supplying oil from top feed storage tanks.

There are two (2) options for the fuel supply piping to the burner: the optional Roth Suction Assembly (#1150003382 for all tank sizes) or a conventional duplex or simplex tank bushing with copper tubing.

Roth Suction Assembly

The Roth Suction Assembly (#1150003382 for all tank sizes) is a combination assembly with burner supply and return connections (3/8" fem NPT), a flexible suction hose and built-in check valve and thermal fuse valve. This unit is easily installed in place of one of the plastic adapters in the top of the tank. It is secured with the Cap Nut and sealed with a #3 gasket. The cap nut is tightened in the manner described above. There is no need for an additional check valve in the burner supply line. Your local codes may require an additional thermal fuse valve at the burner. On 1-pipe systems (burner supply only) the Roth Suction Assembly will increase the vacuum on the line to 1.7" Hg. When using the Suction Assembly on 1-pipe systems we strongly recommend using an oil de-aerator such as a TigerLoop to ensure proper burner operation. Please note that the Suction Assembly will add additional line loss to the system. It is important not to exceed the burner fuel pump manufacturer's recommendations for maximum lift, distance to burner and tubing size. Exceeding these recommendations will cause nuisance burner outages due to lack of fuel. With this in mind, we recommend that burner fuel supply piping be routed only as high as necessary between the tank and the burner. Please refer to the pump installation manual for additional information. You can install a 2-pipe system (burner supply and return) to meet lift or distance requirements when using the Suction Assembly on single tank, indoor installations.

The Suction Assembly may be used in the following applications:

- Indoor installations of a single tank serving a single residential burner with a firing rate less than 3.0 gph (11.4 l/hr) and/or a residential water heater using either a 1-pipe or 2-pipe system
- Indoor installations of a multiple tank system serving a single residential burner with a firing rate of less than 3.0 gph (11.4 l/hr) using a 1-pipe system. *Do not use the Suction Assembly when using a 2-pipe system and multiple tanks.*

The Suction Assembly *should not* be used in the following applications:

- Supplying burners with firing rates greater than 3.0 gph (11.4 l/hr) – these are considered “commercial” burners
- Supplying any system in which the vacuum exceeds 2.9" Hg (-10 kPa)
- Systems using a transfer pump or pump supplying multiple burners with standpipes or day tanks
- Systems supplying emergency equipment, such as power generators, etc. (these are considered “commercial applications” and should be “hard-piped”)
- Supplying multiple burners, except a residential heating appliance and water heater meeting the above criteria
- Outdoor installations where the temperature can be expected to be at or below +10°F (-12°C) for prolonged periods
- Areas where it is common to use tank treatments which contain naphtha. High concentrations of naphtha may cause damage to the suction hose. Oil additives added by the distributor in bulk (before loaded into the delivery truck) usually do not result in high enough concentrations of naphtha to cause problems.

“Hard Pipe” Fuel Supply

Fabricating your own fuel supply line of copper tubing and duplex/simplex tank bushings is always an option with the Roth DWT. This is done in a similar manner to piping any standard top connection fuel tank. Install the tank bushing with the appropriate fittings for the tubing using in a Die Cast Adapter (#3350000025). Please note that only one (1) Die Cast Adapter (for the fill piping) is included with each tank and you will need to purchase a second Die Cast Adapter for this application. Flare fittings are always recommended for all joints in fuel oil lines to ensure proper vacuum seal. Install the suction line to a level that is a minimum of 1" (2.5 cm) above the bottom of the tank to prevent drawing dirt into the fuel line. If a return line is used in your application it should be terminated as customary. If the return line is terminated above the lowest expected fuel level in the tank a check valve will be required to maintain prime during burner off cycles.

Local regulations and good piping practices may require the installation of accessory items in the supply line, such as fire valves, check valves filters, etc. It is the installer's responsibility to know of and comply with these regulations and practices.

“Hard Pipe” fuel lines should always be used in the following applications:

- Burners with firing rates greater than 3.0 gph (11.4 l/hr) in single or multiple tank applications (these are considered “commercial” burners and should always be hard-piped)
- Any system supplying emergency equipment such as generators, etc.
- Any system using transfer pumps supplying day tanks or standpipes
- When supplying multiple burners
- Any system with vacuum requirements exceeding 2.9” Hg (-10 kPa)
- Outdoor tank installations where the temperature can be expected to be at or below +10°F (-12°C) for prolonged periods
- Areas where tank treatments containing naphtha are commonly used
- Multiple tank installations where 2-pipe fuel supply systems are used, either indoor or outdoor

Fuel Level Gauge

Roth has an optional fuel level gauge that can be installed in the DWT. These are sealed gauges and have 2” threaded connections with “O” ring seals and cord style floats. Part #113500191 fits the 1500L (400 gal) DWT, #1135001863 fits both the 1000L (275 gal) and 620L (165 gal) DWT and #1135003411 fits the 400L (110 gal) DWT. They are installed into one of the plastic adapters included with the tank. Remove the dust plug from one of the 2” plastic adapters and install the fuel gauge into the adapter. Hand tightening is all that is required because the gauge has an “O” ring seal for the threaded connection. Install a #3 gasket on the seating surface and place the unit into one of the tank connections. The cap nut is used to secure the unit to the tank and is tightened in the same manner as mentioned above. We recommend that the fuel gauge not be installed in a port adjacent to the fuel suction line to avoid tangling the float with the suction line.

Outside Installation (Single Tank)

All conditions of the General Installations and Single Tank Installation Instructions apply. Be sure to comply with all local building and fire codes concerning location, clearances and setbacks. A proper cement pad must be provided for the tank base. This base should meet the requirements of the current edition adopted in your area of NFPA 31 (US) or CSA B-139 (Canada) and any other local codes. At a minimum, it should extend 6” (15 cm) beyond the edge of the tank, as described earlier. Consult your local building department if you have any questions regarding these requirements.

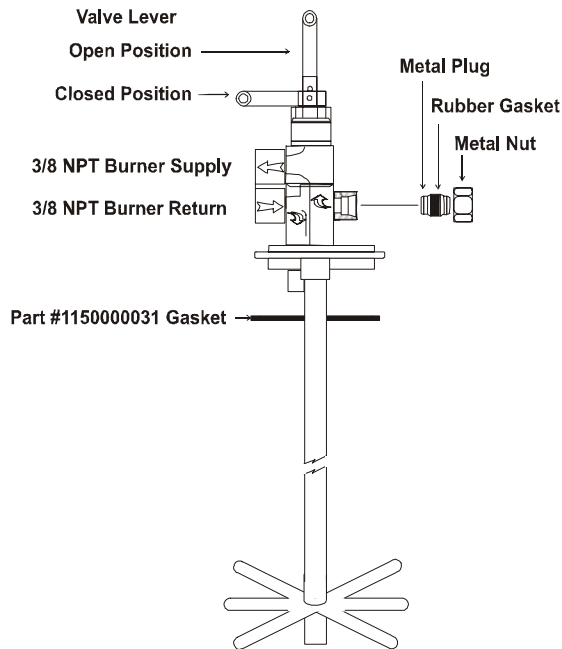
All tanks installed outside must use a Roth Approved Tank Cover. Part #1135002054 fits the 1500L (400 gal) DWT, #3335100757 fits the 1000L (275 gal) DWT and #3335100749 fits both the 620L (165 gal) and 400L (110 gal) tanks. The fill pipe, vent pipe and fuel level gauge (if used) are to be located inside the cover. *The Roth Suction Assembly (#1150003382) should not be used in outdoor tank installations if you can expect temperatures at or below +10°F (-12°C) for prolonged periods.* We recommend that outdoor installations have the fuel supply lines “hard piped” using a duplex/simplex tank bushing and copper tubing as described above. The fuel supply line (and return line, if used) must exit the cover through one of the knock-outs provided in the cover and a UL[®] approved, outdoor rated bushing installed to ensure a liquid-tight seal. All fuel piping to the burner must be properly supported and protected. Some areas also require the use of jacketed containment tubing for both above and below ground fuel lines. Be sure to comply with all local codes and observe good piping practices.

No tank cover is need if the DWT is installed in a garage or shed. A shed must provide protection from rain and snow and prevent water from standing on the top of the tank. Improper protection may allow water to enter the containment tank and freeze. This will damage the inner polyethylene tank and void the warranty.

4. Installation Accessories

Suction Assembly (Fuel Supply Valve) Fig 3

#1150003382 for all tanks



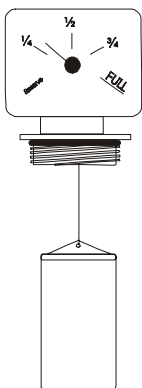
- Built in thermal fuse valve
- Built in check valve
- 3/8" Female IPS connections for burner supply and return (if used) piping
- Can be connected to a 2-pipe system if used with a single DWT
- Can be used with burners that have a firing rate up to 3.0 gph (11.4 l/hr)
- Flexible suction line is easy to install in low overhead clearance applications

Because this valve increases the vacuum to 1.7" (43 mm) Hg, we strongly recommend the use of an oil de-aerator, such as a Flow Control, at the burner when using a 1-pipe system. You can also use a 2-pipe system in single DWT applications.

The plugged port in the rear of the valve is for connecting multiple tanks (1-pipe system only) with the Roth Expansion Kits.

Note: This unit has an internal check valve. You cannot "blow back" on it to clear the line

Fuel Level Gauge



#1135003411 for the 400L
 #1135001863 for the 620L & 1000L
 #1135003723 for the 1000LH
 #1135000191 for the 1500L

- 2" NPT connection has an O-ring seal and only requires hand tightening
- 30 psi pressure rating

Fig 4

Vent Alarm

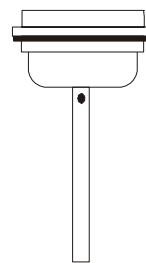


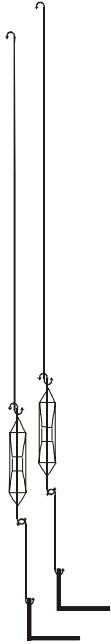
Fig 5

#33350000999 (all tank models)

- Specific for Roth DWT
- All metal construction
- 2" FPT adapter is built in for easy connection of the vent piping

Tie Down Kit

- #335000222 for the 400L
- #335100222 for the 620L & 1000L
- #335200222 for the 1000LH
- #335400222 for the 1500L



- Clips over top rim of tank
- Base bolts to floor/concrete
- Turnbuckles adjust tension
- 2 tie downs per kit
- Anchor/lag bolts supplied by installer
- Use one kit in low risk areas
- Use multiple kits in high risk areas

Note: Tighten each side evenly in an alternating pattern. Do not over tighten. Make sure that the tank remains level while tightening the tie downs

Fig 6

Roth Tank Covers

- #3335100749 for the 400L & 620L
- #3335100757 for the 1000L
- #1135003721 for the 1000LH
- #1135002054 for the 1500L

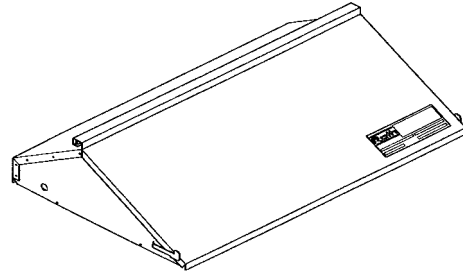
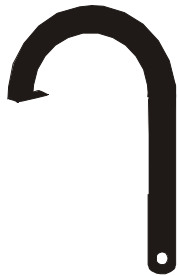


Fig 7

- Assembles and installs quickly with stainless steel screws provided
- Fastens to tank lip with self-tapping screws provided
- Knock-outs on both ends and back (total of 4) for fuel oil supply lines
- Required for outdoor tank installations
- May be used for multiple tank installations with separate fill and vent lines when fuel oil supply lines are manifolded outside the covers.



Tank Fitting Wrench

#335100191 (all tank models)

Optional tool for tightening the Cap Nut on all Roth DWT

- Durable painted steel
- Pre-drilled hanger hole

Fig 8

Roth Fuel Oil De-Aerator

#3335100191



Die Cast 2" NPT Tank Adapter

#3350000025 (all tank models)



Fig 9

- Provides 2" female NPT connection point
- One (1) adapter included with each tank
- For connecting the fill pipe to the tank in single tank or "separate fill & vent" multiple tank applications
- For connecting a duplex tank bushing when "hard piping" fuel supply lines (*this requires the purchase of a second adapter in many cases*)

5. Multiple Tank Installations

Initial Considerations

The same considerations for location, setbacks, clearances, etc. that apply to single tank installations also apply to multiple tank installations. In general, the maximum number of tanks that can be installed in a location is five (5) 400L, 620L or 1000L, 1000LH and three (3) 1500L tanks. Be sure to check your local codes to determine what is allowed in your area.

When installing multiple tanks in tandem, all tanks must be the same model, at the same height, level and plumb. You cannot manifold different models without a risk of unequal draining or filling.

Indoor Installations (see Fig 10)

Roth offers easy to install Expansion Kits to manifold multiple indoor tanks. All tanks can be installed in a side by side configuration as shown in Fig 10. Additionally, the 1000L DWT can be installed two (2) tanks end to end. The end to end configuration is only available for two (2) 1000L tanks. These kits provide a common vent, fill and fuel oil supply connection. The Roth Expansion Kits may only be used with a 1-pipe fuel supply system and with a single burner firing less than 3.0 gph (11.4 l/hr) and/or a residential water heater when the Roth Suction Assembly is used.

Note: When using the Roth Expansion Kits, the tanks must be pressure filled! A tight seal connection is required between the delivery truck hose and the fill fitting. The fill rate must be 40 to 85 gpm (150 to 325 lpm) at a pressure not to exceed 85 psi (586 kPa). Failure to fill the tanks within these parameters may result in an overflow of one or more tanks. If a pressure fill connection is not available the tanks must be piped with separate fill lines.

The Roth Expansion Kits are available in the following configurations:

- Kit #1 #115007012 For the first two 400L, 620L or 1000L tanks side by side ¹
- Kit #2 #115007013 For the 3rd, 4th and 5th 400L, 620L or 1000L tanks side by side
- Kit #3 #115005343 For two (2) 1000L tanks in end to end configuration ¹
- Kit #4 #115006910 For the first two 1000LH and 1500L tanks side by side ²
- Kit #5 #115006911 For the 3rd 1000LH and 1500L tank in side by side configuration ²

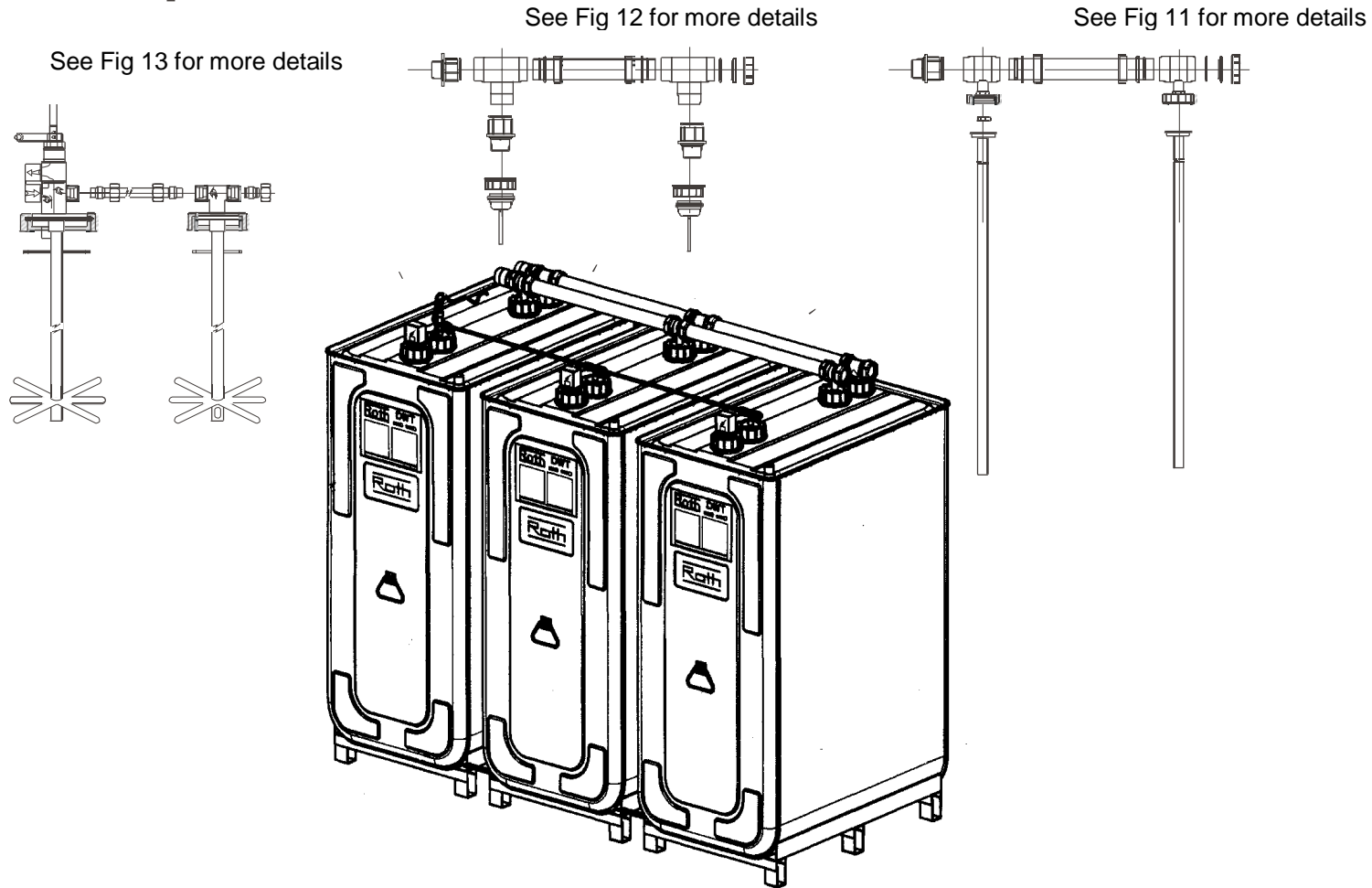
Notes: ¹ The Roth Suction Assembly for the 1st tank (if used) is purchased separately

² **The Roth Suction Assembly is not used with multiple 1500L tanks. No fuel supply piping is included with Kits #4 or #5. Hard pipe fuel supply lines must be used with multiple 1500L tanks. 4th and 5th tanks are not permitted with the 1500L tank.**

Fill Piping (Important! Do not install tanks without reading this section!)

As noted above, when the Roth Expansion Kits are used to manifold the tanks with a single fill connection, the tanks must be pressure filled at between 40-85 gpm (150-325 lpm) and at no more than 85 psi (586 kPa). This requires a tight fitting connection between the delivery truck nozzle and the fill fitting. If the proper fill connection or delivery truck hose connection is not available in your area you must use individual fill pipes. Please see the note above. Failure to pressure fill tanks using the Roth Expansion Kit fill piping will result in possible over-pressurization or overflow of one or more tanks. This condition will void the warranty. Some areas do not allow common fill pipes and require individual fill pipes for each tank. Please check your local codes to determine the requirements for your area.

Multiple Tank Side by Side Installation

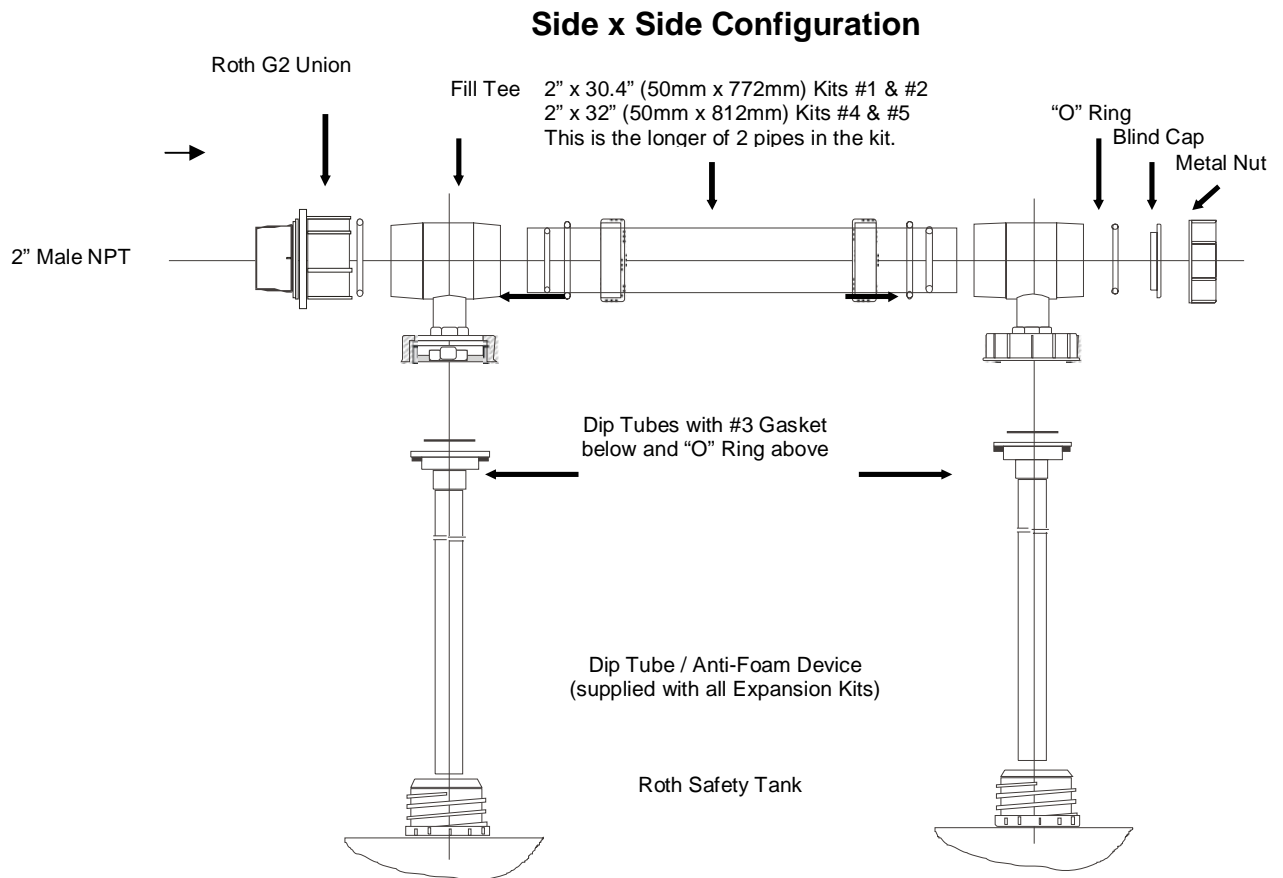


**All multiple tanks must be the size and at the same height.
All tanks must be level and plumb for proper function.
All tanks using the Roth Expansion Kits must be filled at
40-85 gpm (150-325 lpm) at no more than 85 psi (586 kPa).**

Fig 10

The fill piping for the Roth Expansion Kits (side by side configuration) #1, #2, #4 and #5 are installed according to Fig 11 (see below).

Multiple Tank Installation - Fill Pipe



WARNING: TANKS MUST BE FILLED BY A TRUCK AT A RATE NO LOWER THE 40 GPM.

Fig 11

if you are using separate fill pipes for each tank they are piped in the same manner as a single tank installation.

Vent Piping

Each tank in a multiple tank installation must have a separate Vent Alarm (#3335000999) or an equivalent sized UL[®] listed vent whistle/device to detect the proper fill level of each tank. The Roth Vent Alarm has a built-in 2" NPT female adapter. You must use the G2 union included with the Expansion Kits to connect the Vent Alarm to the Vent Tee. Do not connect the Vent Tee directly to the Vent Alarm. This combination will not seal correctly and will result in nuisance oil odors or possible leaks. Most areas will allow a common vent pipe for multiple tanks even if they require separate fill pipes. Be sure to check your local codes to verify. The Roth Expansion Kit vent piping for side by side tanks is installed as shown in Fig 12 below.

Multiple Tank Installation - Vent Pipe

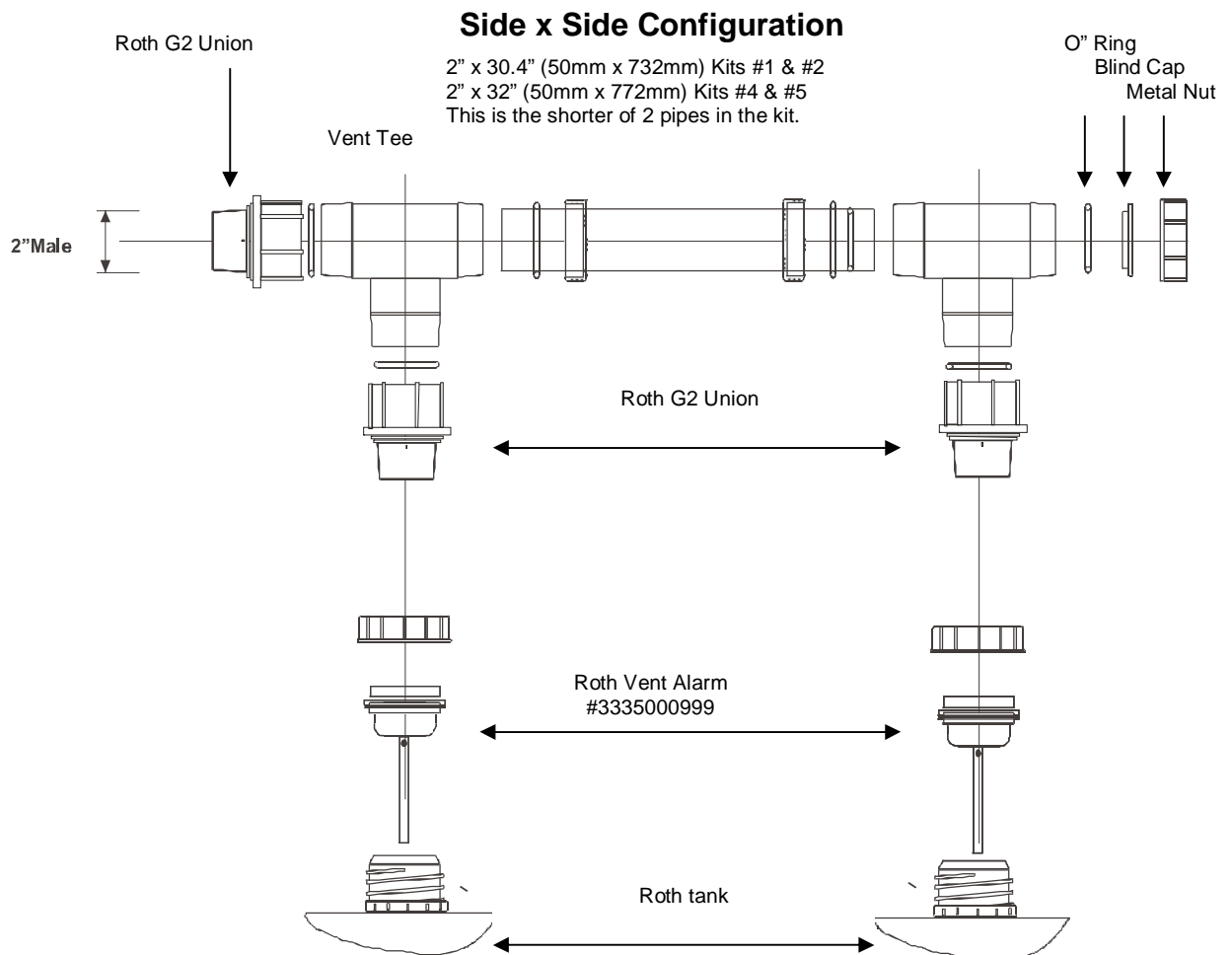


Fig 12

Fuel Supply Piping

There are two options for piping the fuel supply for your burner(s). Depending on the tank size and application you will use both the Roth Suction Assembly and the fuel supply parts included with the Expansion Kit(s) or "hard pipe" the fuel supply lines using tank bushings and copper tubing. The decision is based on the DWT model used and the application.

Roth Suction Assembly and Fuel Supply Parts included with the Expansion Kits

You may only use the Roth Suction Assembly and the fuel supply parts included with the Expansion Kits in the following application:

- Indoor multiple tank applications serving a single burner with a firing rate less than 3.0 gph (11.4 l/hr) and/or a residential size oil fired water heater using a 1-pipe fuel supply system. It is strongly recommended that an oil de-aerator be used on the burner(s) when using the Suction Assembly. The Suction Assembly for the 1st tank must be purchased separately. It is not included in the kits.

You should not use the Roth Suction Assembly and fuel supply parts in the following applications:

- Multiple tank installations serving a burner with a firing rate greater than 3.0 gph (11.4 l/hr)
- Multiple tank applications using a 2-pipe fuel supply system
- Outdoor installations where the temperature can be expected to be at or below +10°F (-12°C) for prolonged periods
- Multiple tanks serving a burner that can be expected to run for prolonged periods (such as a pool heater at the beginning of the season) that may not provide enough "burner off" time to allow for proper tank level equalization.

- Applications where the use of tank treatments containing naphtha are commonly used
- Any 1500L multiple tank installation

The Roth Expansion Kits include the fuel supply assemblies for the 2nd through 5th (depending on configuration and tank size) tanks only. A Roth Suction Assembly must be purchased separately for the 1st tank.

The Roth suction Assembly and fuel supply parts included with the Expansion Kits are installed as shown in Fig 13 below.

Multiple Tank Installation Side by Side Configuration Suction Line Assembly

The optional suction line assembly (part #1150003382 MUST have been purchased separately from the extension kit in order to complete this installation

1. Put suction line of T-fitting to the corresponding tank opening of each separate tank with a tank gasket on the bottom of the adapter and a large plastic tank nut. Do not tighten the latter.
2. On the port alone on the suction line assembly on the first tank, introduce one end of the extension oil line with a metal nut and gasket. Do not tighten the latter. (Note: save the original nut, plug and gasket)
3. At the other end of the extension oil line, introduce the metal nut, gasket and T-fitting.
4. Steps 1 and 3 must be repeated each time an additional tank is installed. (Maximum of 5 tanks may be installed in one battery. Check local applicable codes for restrictions)
5. The remaining end of the aluminum tee must be plugged using the nut, plug and gasket from the original suction line assembly.
6. Tighten all large plastic tank nuts and the nuts on the suction line assemblies with supplied wrench.
7. Connect burner supply and return lines to the oil valve using 3/8IP adapters.

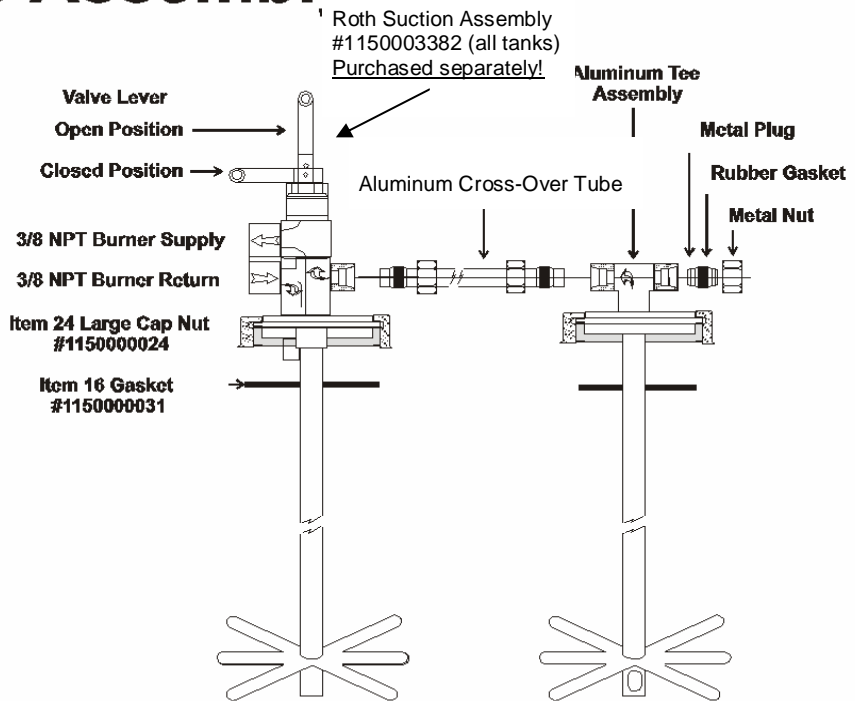


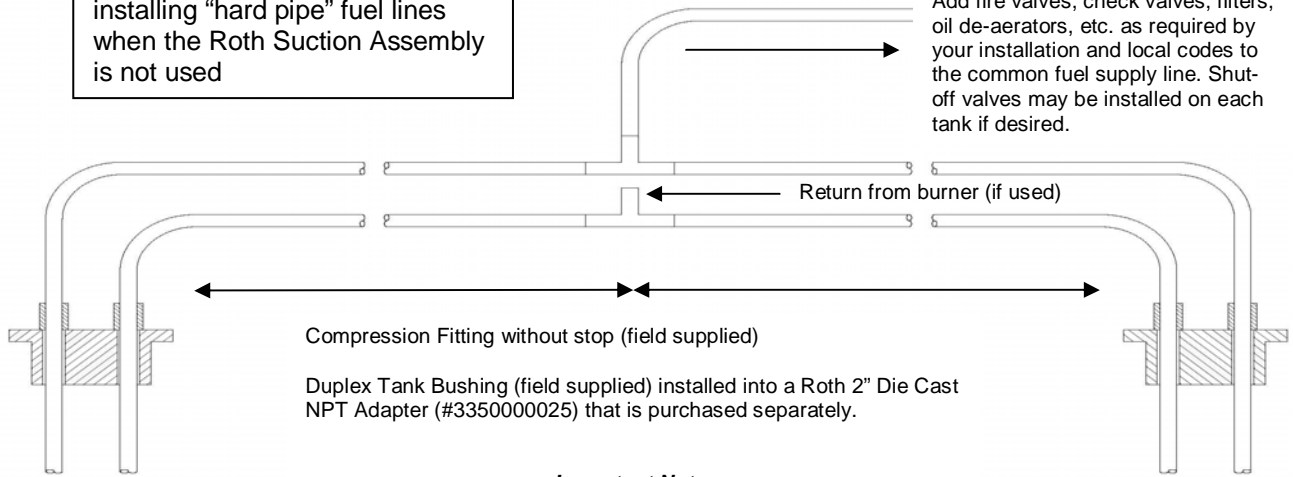
Fig 13

“Hard Pipe” Fuel Supply Piping

“Hard Piping” the fuel supply line(s) is allowed in all applications and configurations of any size Roth DWT. In applications where the Suction Assembly can not be used or is not used by choice, fuel supply piping is field fabricated using standard duplex/simplex 2” tank bushings with copper tubing (sized for the application) in an “Equal Manifold” configuration. This method applies to a 1-pipe or 2-pipe fuel system. The tanks return piping, if used, must also be an “equal manifold” configuration the same as the supply. It is important to make the manifold parts as close to equal as possible to ensure equal draw from all tanks (1-pipe systems) and equal return to all tanks (2-pipe systems). When connecting the fuel supply piping with a tank bushing and copper tubing and using the Roth Expansion Kits, use the Die Cast 2” NPT Adapter (#3350000025) included with each tank to install the tank bushing. This part is not needed to connect the fill pipe because the fill tee included with the kit connects directly to the tank. Fig 14 shows the basic assembly of the tank bushing and fuel supply piping with two tanks and also the manifold construction with up to five tanks.

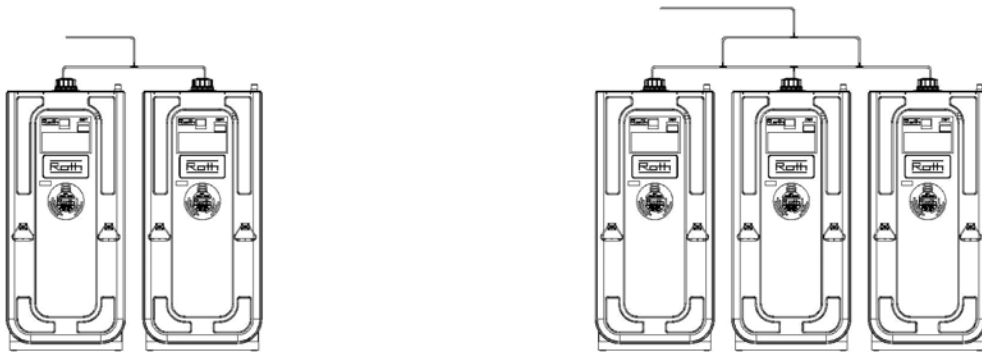
Typical piping diagram for installing "hard pipe" fuel lines when the Roth Suction Assembly is not used

Fuel supply pipe to the burner(s)
Add fire valves, check valves, filters, oil de-aerators, etc. as required by your installation and local codes to the common fuel supply line. Shut-off valves may be installed on each tank if desired.



Important Note:

Tees are to be installed as close as possible to the center of the pipe run between the two tanks to insure equal draw and return to all tanks.



The maximum lift available from the bottom of the tank to the highest point of the piping is determined by the performance of the burner fuel pump. Please refer to the pump manufacturer's instructions for maximum available lift. *In most cases a 1-pipe system has 8' (2.4m) max lift regardless of whether there is single stage or two-stage fuel pump.*

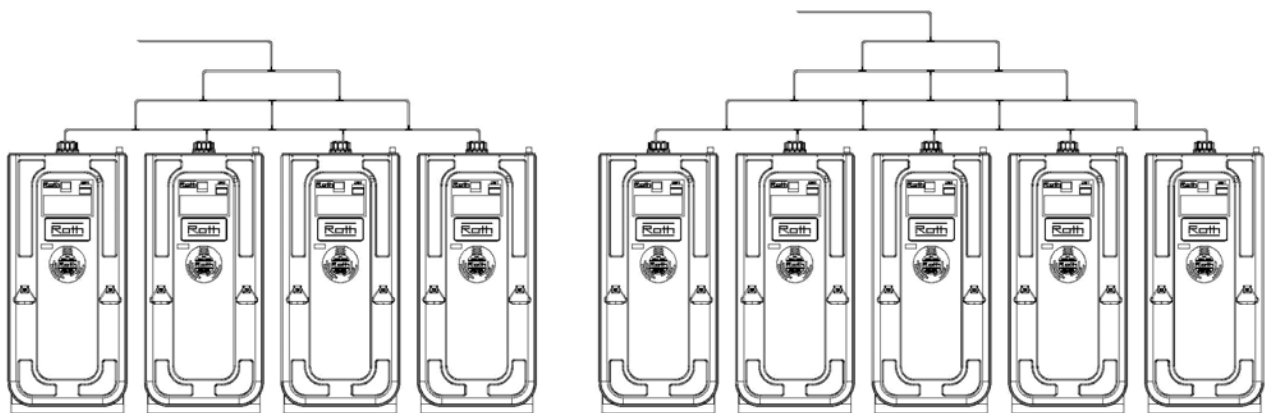


Fig 14

End to End Installations

Roth offers an Expansion Kit #3 (#115005343) for indoor installation of two (2) 1000L tanks. End to end kits are not available for any other model tank or for more than two (2) 1000L tanks. Installation is similar to the side by side kits. The following illustrations show the assembly of this kit.

End to End Multiple Tank Installation

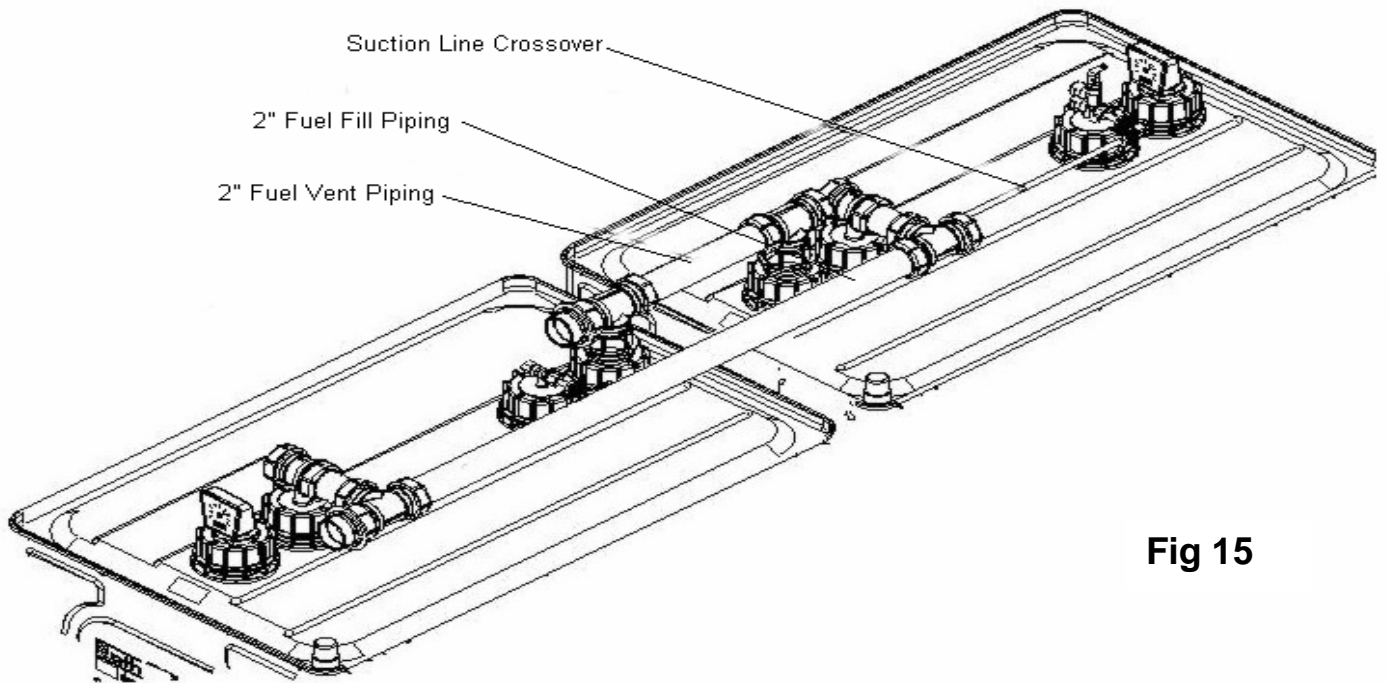


Fig 15

Note: All multiple tank installations using the Roth Expansion Kits must be filled at a rate of 40-85 gpm (150-325 lpm) at no more than 85 psi (586 kPa) with a tight fitting connection between the truck nozzle and fill fitting!

Multiple Tank Installation - End to End Suction Line Assembly

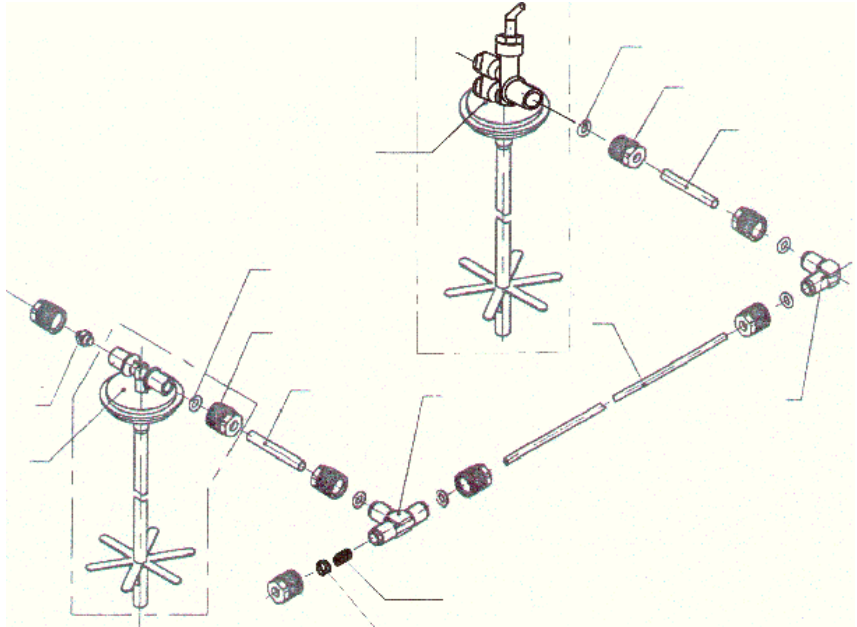


Fig 16

All conditions for multiple tank side by side installations must be observed for end to end multiple tanks installations. These include the acceptable uses for the Roth Suction Assembly, requirement for a Vent Alarm for each tank. use of the 2" NPT Transition Adapter between any NPT connection and the compression connection at the vent and fill tees, piping instructions for field assembled "hard pipe" fuel supply lines, etc.

Outdoor Installations of Multiple Tanks

The Roth Expansion Kits cannot be used with outdoor tank installations. The tanks are to be installed in the same manner as single tank outdoor installations. Each tank requires a separate fill pipe, vent pipe and Roth Vent Alarm (#335000999) or equivalent sized UL[®] listed vent whistle for accurate indication of the fill level.

All outdoor tank installations require the use of the Roth Tank Cover for each tank (purchased separately). Roth Tank Cover #3335100749 fits the 400L & 620L, #3335100757 fits the 1000L, #1135003721 fits the 1000LH and #1135002054 fits the 1500L. The fill pipe, vent pipe and fuel gauge (if used) must be located under the cover. The fuel supply piping must exit the cover at one of the knock-outs and be sealed with a UL[®] listed outdoor rated bushing to provide a water-tight seal. Tanks located in a garage or fully-enclosed shed are not required to use the Tank Cover.

In most cases the Roth Suction Assembly will not be acceptable for these installations (refer to the conditions listed in Indoor Multiple Tank Installations, Fuel Supply Piping earlier in the instructions). The

tanks will need to be hard piped as in Fig 14 with the manifold assembled on the outside of the cover. All conditions listed for multiple tank indoor installations using hard pipe fuel supply lines also apply to outdoor installations.

If you have any questions regarding any installation please contact the Roth office for your area at the numbers listed on the cover of these instructions.

6. Final Completion

Upon completion of any installation the tank installer shall verify that all conditions of the project are in compliance with these instructions and any local code requirements. The installer shall then complete one of the Warranty Certificates for each installed tank and leave this copy with the owner. Contact information for the installer is to be included on this form. The second copy of the Warranty Certificate is to be completed with date and location of the tank installation, customer contact information, name & address of the installing contractor and installer's signature. The installer's signature is verification that the installation conforms to all Roth instructions and meets the requirements of local codes. The form is then to be returned to the Roth office in your area for warranty registration. Upon receipt of the completed Warranty Certificate Roth will enter this information into its records for future reference. *This information is for warranty purposes only and will not be shared with any other company for reasons other than warranty maintenance.*

Notes

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