Orenco SYSTEMS *Instructions*

M-Series Tank Burial

Before You Begin

Read these instructions before installing Orenco's M-series tanks. These instructions cover tank burial only. They do not address installation of internal tank components. Correct installation is critical for proper function. These tanks are not approved for use with potable water.

***IMPORTANT** — Take all reasonable safety precautions when installing the tank!*

Step 1. Excavation and Installation Planning

***IMPORTANT:** Tank depth is measured from final grade to the top of the tank. Do not set the tank shallower than 12 in. (305 mm) or deeper than 60 in. (1524 mm) without Orenco's written authorization.*

Step 1a: Determine the excavation depth and width based on the dimensions provided in Figure 1 and the factors below:

- **Clearance** – Minimum of 18 in. (460 mm) clearance on all sides of the tank.
- **Slope** – The tank has to be buried at the right depth for the proper fall from the building sewer to the tank inlet and to meet applicable regulations governing slope. Orenco recommends ¼ in. per foot (20 mm per meter) minimum slope.
- **Soil type*** – If the native soil is rocky or unstable (for example, peat, quicksand, muck, landfill, or very soft or highly expansive clay), the hole should be over-excavated and a gravel bed or concrete pad laid in the bottom for stability.
- **Buoyancy** – Things that influence tank buoyancy include ...
  – High groundwater
  – Seasonal high groundwater or flooding
  – Native soil conditions
  – Fill material
  Tank buoyancy can be counteracted by adjusting burial depth, by addition of supplemental ballast, or by a combination of the two.
- **Final grade** – Orenco strongly recommends 3 in. (75 mm) of clearance between the bottom of the installed access riser lid(s) and final grade.

Step 1b: Determine the type of bedding and fill materials needed.

- Bedding – Use compacted 1/2-in. or 3/4-in. minus (12-mm or 19-mm minus) rounded gravel, crushed stone, pea gravel, or sand.
- Fill – Use native material, 1/2-in. or 3/4-in. minus (12-mm or 19-mm minus) rounded gravel, crushed stone, pea gravel, or flowable concrete.

Notes:

- *Don't use sand for fill material.*
- *Don't use sand as bedding material in clay or expansive soils.*
- *Don't use native material for fill if it's primarily sand; very soft or highly expansive clay; or if it contains debris, large rocks (> ¾-in. or 19-mm), sharp rocks, peat, or muck.*

Figure 1, M-Series Tank Dimensions

Dimension	M1000P	M1000G	M1500P	M1500G
Height, in. (mm)	61 (1549)	61 (1549)	72 (1829)	72 (1829)
Tank Outside Diameter, in. (mm)	96 (2438)	96 (2438)	105 (2667)	105 (2667)
Tank Width Flat-to-Flat, in. (mm)	N/A	N/A	105 (2667)	101 (2565)
Invert of Inlet Height, in. (mm)	51.3 (1303)	51.3 (1303)	61 (1549)	61 (1549)
Invert of Outlet Height, in. (mm)	N/A	49 (1245)	N/A	58 (1473)
Weight, lbs (kg)	400 (181)	400 (181)	500 (227)	500 (227)

* As described in OSHA Standards (29 CFR, Part 1926, Subpart P, Appendix A), cohesive soils include clayey silt, sandy clay, silty clay, clay, and organic clay. Cohesive soil does not crumble, can be excavated with vertical sideslopes, is hard to break up when dry, and when moist, can be rolled into threads without crumbling. For example, if at least a 2-in. (51-mm) length of 1/8-in. (3-mm) thread can be held on one end without tearing, the soil is cohesive. Noncohesive soils or granular soils include gravel, sand, or silt with little or no clay content. Granular soil cannot be molded when moist and crumbles easily when dry.

Step 1. Excavation and Installation Planning, cont.

Step 1c: Check the plans for antibuoyancy requirements.

- In areas with seasonally high groundwater, a minimum tank burial depth of 18 in. (457 mm) is recommended.
- Antibuoyancy measures are site specific with respect to soil characteristics and seasonal groundwater conditions.
- Tank buoyancy requirements are based on empty tanks during periods of extreme seasonal groundwater levels (worst case scenario: groundwater level rises above the top of the tank).
- If necessary, consult with an engineer to address soil and groundwater conditions under special soil conditions.

Step 2: Perform Excavation

IMPORTANT: *Follow all local, state, and federal safety regulations when working in or around the tank excavation.*

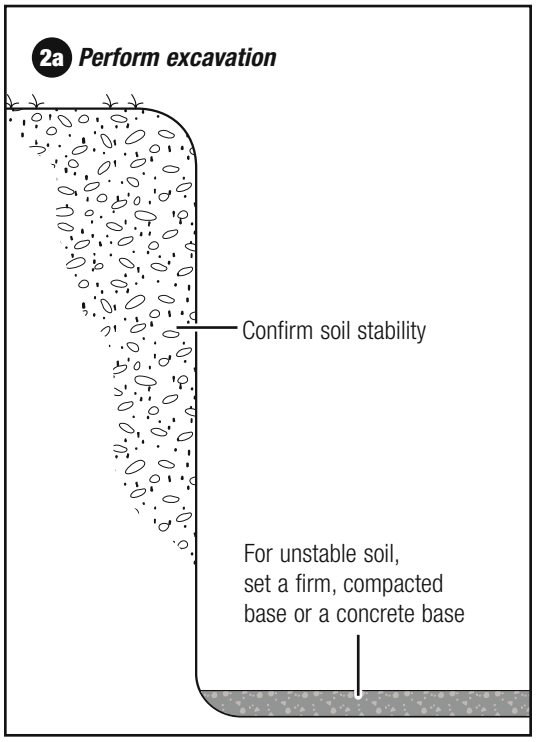
Step 2a: Excavate the hole to the depth and width determined in Step 1.

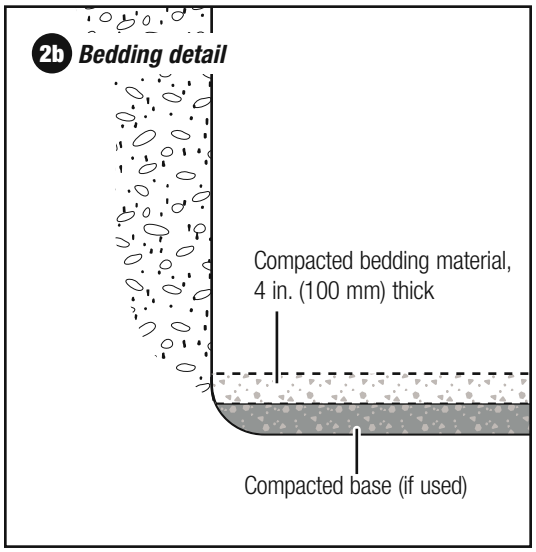
Key Points:

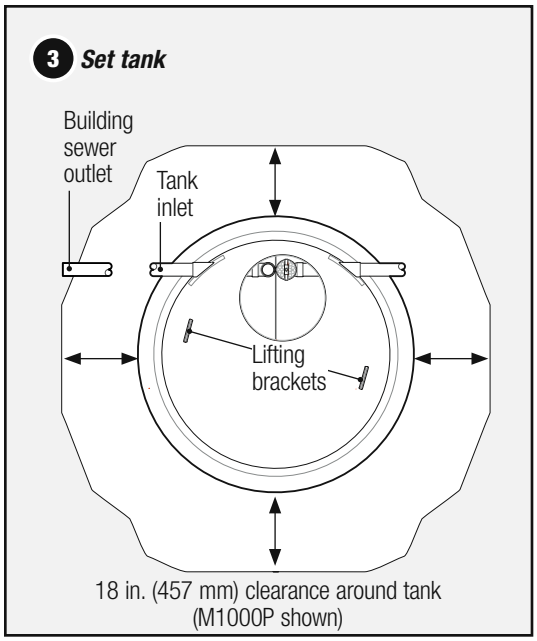
- Excavate deep enough for the required slope between the building sewer line and the tank inlet.
- Orenco recommends a minimum slope of ¼ in. per ft (or 21 mm per meter) between the building sewer line and the tank inlet.
- Account for the necessary bedding depth when excavating.
- Excavate 18 in. (460 mm) beyond all sides of the tank.
- If the base soil is unstable, overexcavate the depth and set a firm, compacted base of ¾-in. (19-mm) crushed rock before placing the bedding.
- In some cases, a concrete base is necessary to stabilize the bottom of the excavation. If you have any doubt about the soil's ability to support the tank, consult with an engineer.

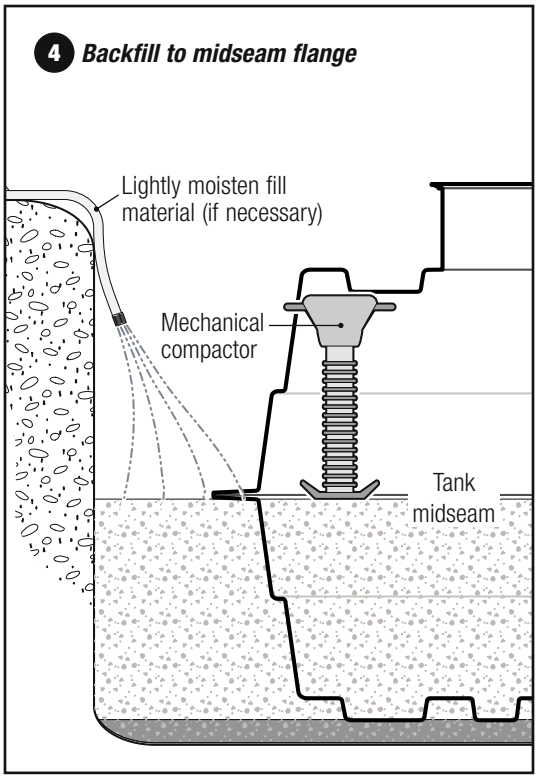
Step 2b: Use a mechanical compactor to make a bed at least 4 in. (102 mm) thick of 1/2-in. or 3/4-in. minus (≤ 19 mm) rounded gravel, crushed stone, pea gravel, or sand.

- Be sure that the compacted bed covers any boulders and rock edges, which can damage a tank when it's full of liquid.
- If using sand for the bedding material, lightly moisten the sand to compact it. Do not saturate it, or the underlying base soil may become unstable.









Step 3: Set Tank

Step 3a: Attach chains or cables to the lifting brackets on the tank's top.

- Use correct lifting equipment; tank weight is about 700 lbs (318 kg).

Step 3b: Carefully lift the tank into position over the excavation and slowly lower it into the excavation.

- Once the tank is resting on the bedding, make sure it's stable and won't shift.

IMPORTANT: *Keep workers away from the excavation while placing the tank.*

Step 3c: Make sure the tank is level and correctly positioned to align the opening of the tank's inlet with the building sewer outlet.

Step 3d: Remove the chains or cables from the tank.

Step 4: Backfill to Midseam Flange

Step 4a: Fill the tank with 12-18 in. (305-457 mm) of water (measured from the tank bottom), to support it from within and to settle it down into the bedding.

Step 4b: Backfill a 12-18 in. (305-457 mm) layer of fill around the tank.

- Don't backfill with sand. Use 3/4-in. minus (19-mm minus) rounded gravel, crushed stone, or pea gravel as fill material. The fill must be free of debris.
- Layering and compacting aren't necessary using flowable concrete, but don't create a buoyant condition for the tank while pouring.

Step 4c: Using a mechanical compactor, thoroughly compact the fill to minimize settlement and provide support for the tank's wall.

Step 4d: Fill the tank with water to the midseam flange.

Step 4e: Continue adding and compacting backfill material in lifts of 12-18 in. (305-457 mm), to a level just below the midseam flange.

- Each lift should be uniform and of equal height around the entire tank.
- Don't backfill above the midseam.

Step 5: Install Risers (If Necessary)

If the access riser(s) have not been installed, install them now.

Step 6: Test for Watertightness

Key Point: Make sure that all adhesives used are cured before performing the test.

Step 6a: Plug the tank inlet and outlet (if present) with a temporary, watertight plug.

Step 6b: Fill the tank with water to 2 in. (50 mm) above the access riser seam.

Step 6c: Wait 30 minutes (or as required by local rules) and inspect for leaks.

- There should be no drop in liquid level and no visual leakage from seams, joints, pinholes, or other imperfections.

Key Point: Do not continue the installation until the tank and seams pass this test.

Step 6d: When the tank passes the test, drop the water level to below the invert of the outlet.

Step 7: Add Antibuoyancy Collar (If Necessary)

Follow these directions to make an antibuoyancy collar. The collar provides sufficient ballast for the tank even if there is groundwater to grade.

- The collar is 18 in. (460 mm) wide × 6 in. (150 mm) thick with a 12-in. (305-mm) width of welded wire fabric in the center.
- The collar requires about 2 cubic yards (1.5 cubic meters) of concrete with a minimum compressive strength of 2500 psi (17.23 MPa).
- The collar width – not weight – provides the necessary antibuoyancy.

Step 7a: Make a backfill dam around the tank to use as a form, 6 in. tall by 18 in. wide (150 mm by 460 mm).

- Width is measured from the tank's wall above the midseam flange.

Step 7b: Pour an even, 3-in. (75-mm) lift of concrete into the form.

Step 7c: Place a continuous 12-in. (305-mm) width of welded-wire fabric on top of the concrete, around the tank.

- Orenco recommends 6×6–W1.4×1.4 WWF (152×152 MW9.1/9.1).

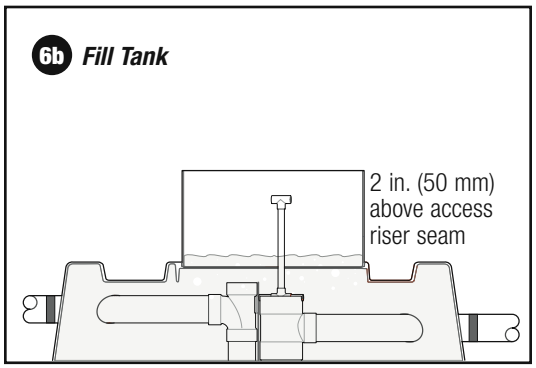
Step 7d: Pour a second 3-in. (75-mm) lift of concrete on top of the welded-wire fabric.

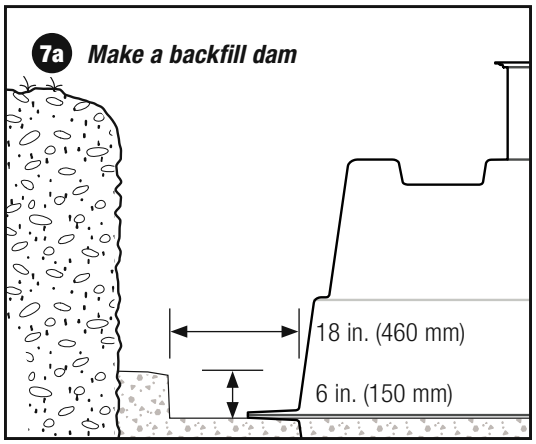
Step 7e: Allow the concrete to cure for a minimum of two hours (or longer, if possible) so that it's hard enough for the final backfill.

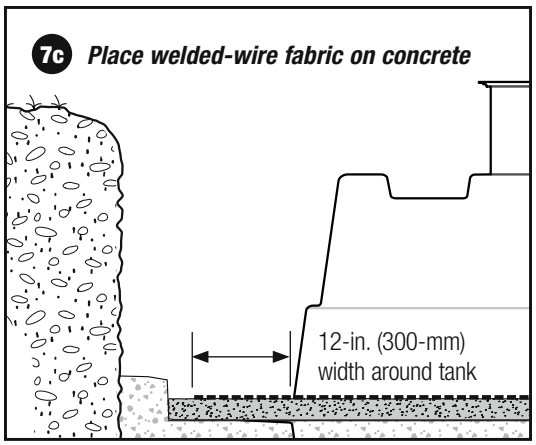
Note: *An 18- × 12-in. thick collar (460 × 305mm) can be used in place of the concrete with welded-wire fabric. This requires about four cubic yards (3 m^3) of concrete.*

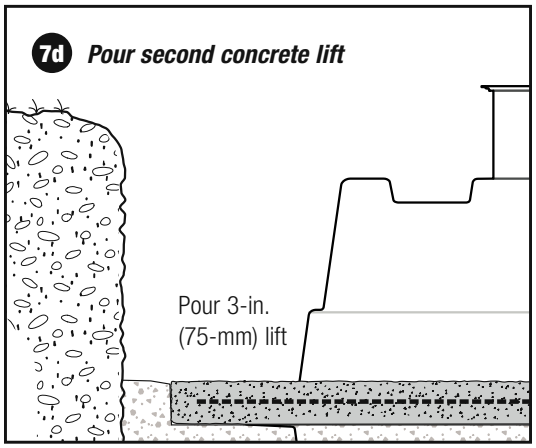
Step 8: Connect Inlet and Discharge Plumbing

Step 8a: If it hasn't already been done, excavate the trenches for the inlet and discharge plumbing lines, according to all applicable regulations.









Step 8: Connect Inlet and Discharge Plumbing, cont.

Step 8b: Dry fit the transport line and any fittings between the building sewer and the inlet of the tank.

- Check for proper fit and alignment before applying adhesive.
- The tank's standard inlet is 4-in. (100-mm) ABS pipe.

Key Point: Confirm that the fall between the building sewer and the tank's invert of inlet meets all applicable regulations.

Step 8c: Glue all of the transport line pieces in place from the building sewer to the tank.

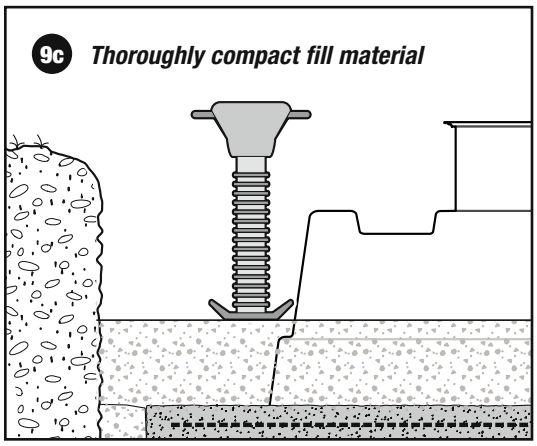
IMPORTANT: *Do not use primer on ABS parts.*

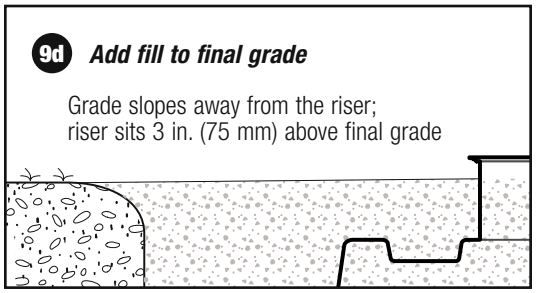
Step 8d: Dry fit the transport line between the tank's discharge and the dispersal point.

- The tank's standard discharge is 1.25-in. (32-mm) Sch. 80 PVC.

Step 8e: Glue all of the transport line pieces in place from the tank's discharge to the dispersal point.

IMPORTANT: *Do not use primer on ABS parts.*





Step 9: Perform Final Backfill and Cleanup

IMPORTANT: *Before beginning the final backfill, make sure the inlet and outlet pipes, as well as all conduit runs, are supported by a compacted base.*

Step 9a: Install and secure the access riser lid(s) before beginning the final backfill.

Step 9b: Backfill a 24-in. (610-mm) layer of fill material around the tank.

- Don't backfill with sand.
- Don't use native material for fill if it's primarily sand; very soft or highly expansive clay; or if it contains debris, large rocks (> ¾-in. or 19-mm), sharp rocks, peat, or muck.
- If native fill material isn't usable, use 3/4-in. minus (19-mm minus) rounded gravel, crushed stone, or pea gravel as fill material. The fill must be free of debris.
- Layering and compacting aren't necessary when using flowable concrete, but be sure not to create a buoyant condition for the tank while pouring.

Step 9c: Use a mechanical compactor to thoroughly compact the fill.

Step 9d: Add and compact additional fill material in 24-in. (610-mm) lifts to final grade.

- Make sure the tank's access riser extends a minimum of 3 in. (75 mm) above final grade to ensure proper drainage away from the risers.

Step 9e: Backfill all plumbing and conduit runs.

- *Do not alter the slope of pipes during backfilling. Brace them or place them on compacted beds and then carefully fill around them.*