Orenco® M-Series Tank

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.

Step 1. Tank Burial Planning

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

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

- 18in (457mm) minimum clearance on all sides of the tank.
- Slope must meet applicable regulations governing slope from the building sewer to the tank inlet. Orenco recommends a minimum slope of 1⁄4in per ft (~20mm per m).
- Soil type* – For rocky or unstable native soil (for example, peat, quicksand, muck, landfill, very soft or highly expansive clay), over-excavate the hole and lay a gravel bed or concrete pad in the bottom for stability.
- Buoyancy – Tank buoyancy can be addressed by adjusting burial depth, adding supplemental ballast, or a combination of the two. Things that influence tank buoyancy include:
  - High groundwater, seasonal high groundwater, or flooding
  - Cohesive or non-cohesive soil conditions
  - Fill material
- 3in (76mm) 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 – Compacted rounded gravel, crushed stone, pea gravel, or compacted sand.
- Fill – Native material, rounded gravel, crushed stone, pea gravel, or flowable concrete.
- Do not use rounded gravel, crushed stone, or pea gravel larger than 3/4in (19mm) in size.

Notes

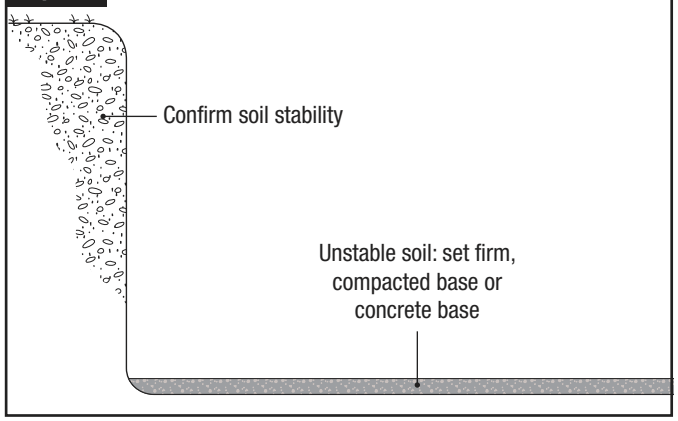
- *Don't use sand for fill material.*
- *Don't use sand as bedding material in clay or expansive soils.*
- *Don't use native fill material if it's primarily sand; very soft or highly expansive clay; or if it contains debris, large rocks (> 3/4in or 19mm), sharp rocks, peat, or muck.*

Table 1. M-Series Tank Dimensions

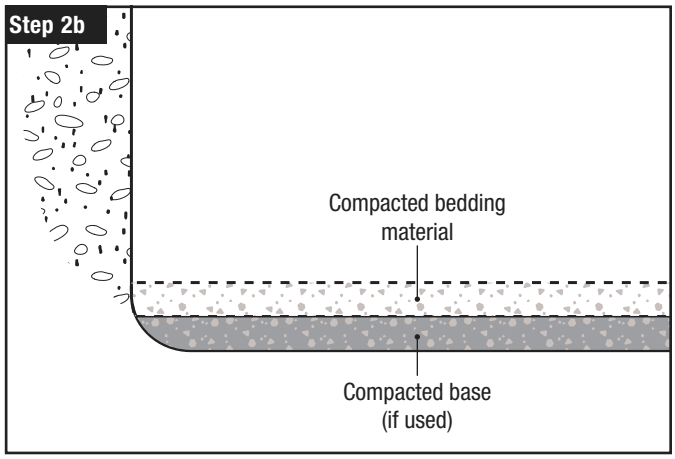
Dimension	M1000P	M1000G	M1500P	M1500G
Height, riser, minimum in (mm)	15 (381)	15 (381)	15 (381)	15 (381)
Height, riser, maximum in (mm)	63 (1600)	63 (1600)	63 (1600)	63 (1600)
Height, tank, in (mm)	61 (1549)	61 (1549)	72 (1829)	72 (1829)
Height, invert of inlet, in (mm)	51.3 (1303)	51.3 (1303)	61 (1549)	61 (1549)
Height, invert of outlet, in (mm)	N/A	49 (1245)	N/A	58 (1473)
Outer diameter, in (mm)	96 (2438)	96 (2438)	105 (2667)	105 (2667)
Width, flat-to-flat, in (mm)	N/A	N/A	101 (2565)	101 (2565)
Weight, dry (tank only), lbs (kg)	400 (181.4)	400 (181.4)	500 (226.8)	500 (226.8)

** 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 2in (50mm) length of 1/8in (3mm) thread can be held on one end without tearing, the soil is cohesive. Non-cohesive 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.*

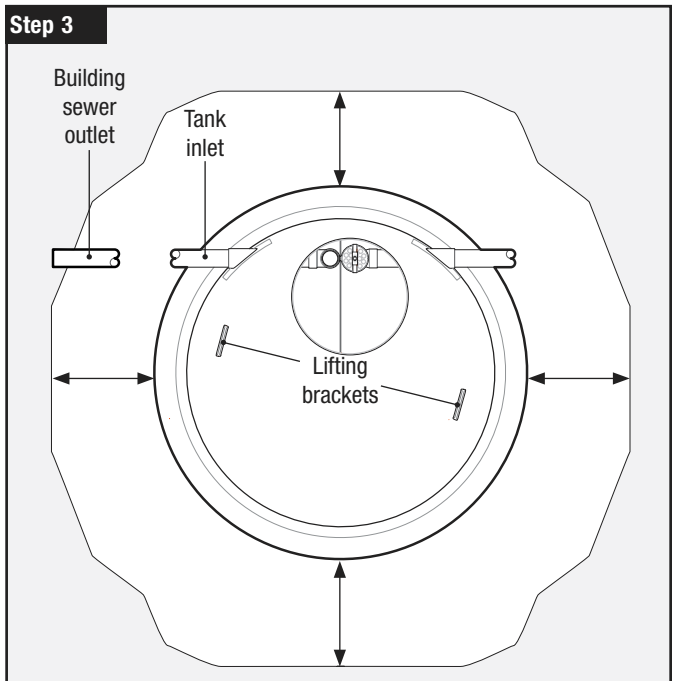
Step 2a



Step 2b



Step 3



18in (457mm) clearance around tank (Orenco M1000G tank shown)

Step 1. Tank Burial Planning, cont.

Step 1c. Determine the need for antibuoyancy.

- In areas with seasonally high groundwater, a minimum tank burial depth of 18in (457mm) 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 a 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 1/4in per ft (~20mm per m) slope between the building sewer line and the tank inlet.
- Account for the necessary bedding depth when excavating.
- Excavate 18in (457mm) beyond all sides of the tank.
- For unstable base soil, over-excavate the depth and set a firm, compacted base of 3/4in (19mm) 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 a soils engineer.

Step 2b. Use a mechanical compactor to make a bed at least 4in (102mm) thick of no larger than 3/4in (19mm) 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; the weight of the tank depends on the equipment installed in the tank.

Step 3. Set Tank, cont.

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

IMPORTANT — Keep workers away from the excavation while placing the tank.

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

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

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

- Don't backfill with sand. Use 3/4in minus (19mm 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 12-18in (305-457mm), to a level just below the midseam flange.

- Make each lift uniform and of equal height around the entire tank.

Key Point — Don't backfill above the tank's midseam.

Step 5. Install Risers (If Necessary)

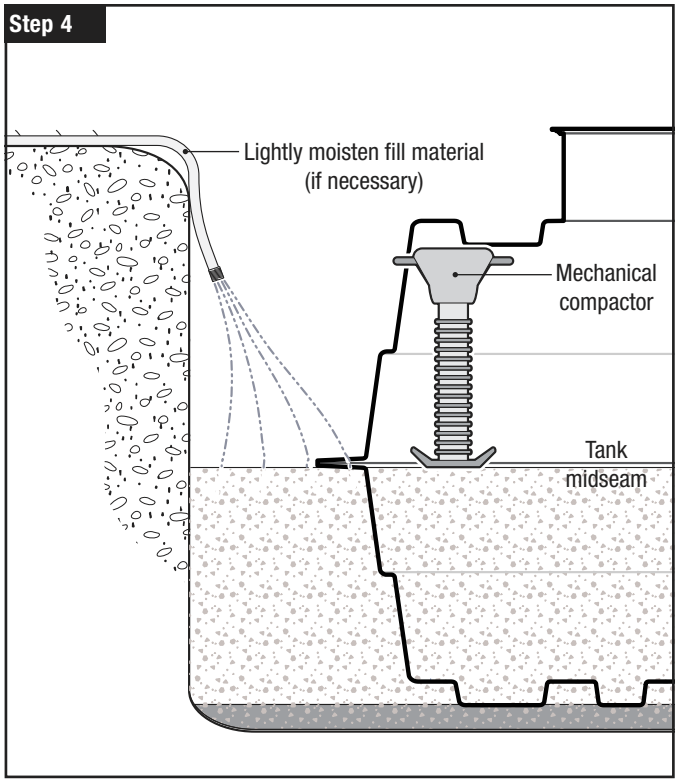
If the access riser(s) have not been installed, install them now.

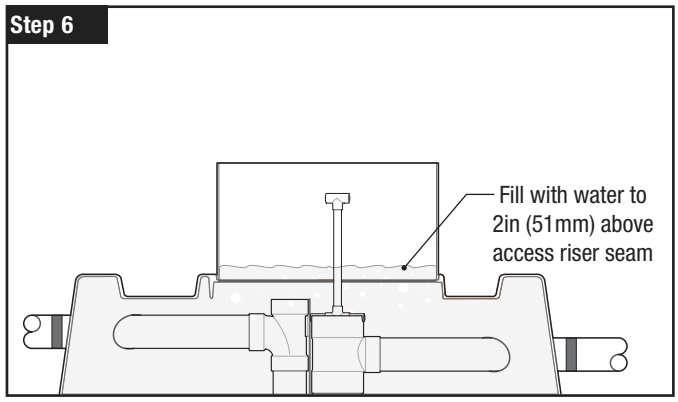
Step 6. Test for Watertightness

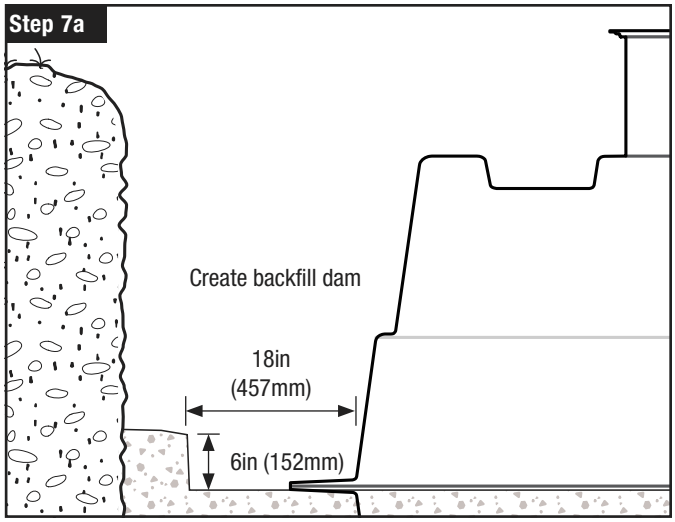
Key Point — Make sure that all adhesives used are cured before performing the test.

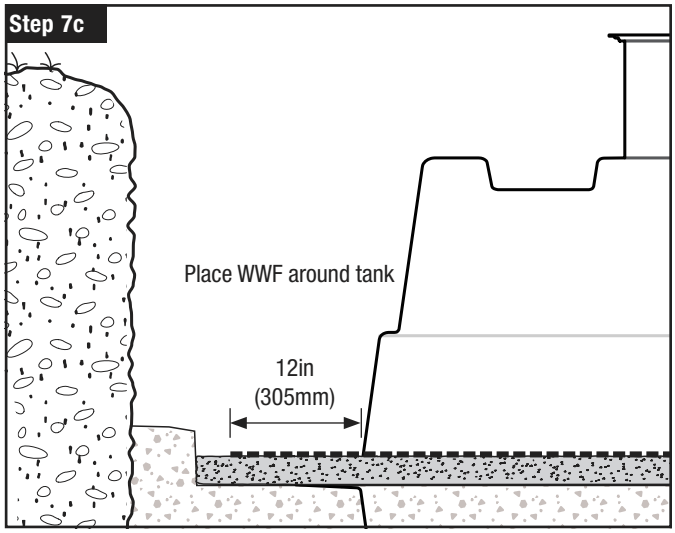
Step 6a. Plug the tank inlet and outlet (if present) with a temporary, watertight plug.

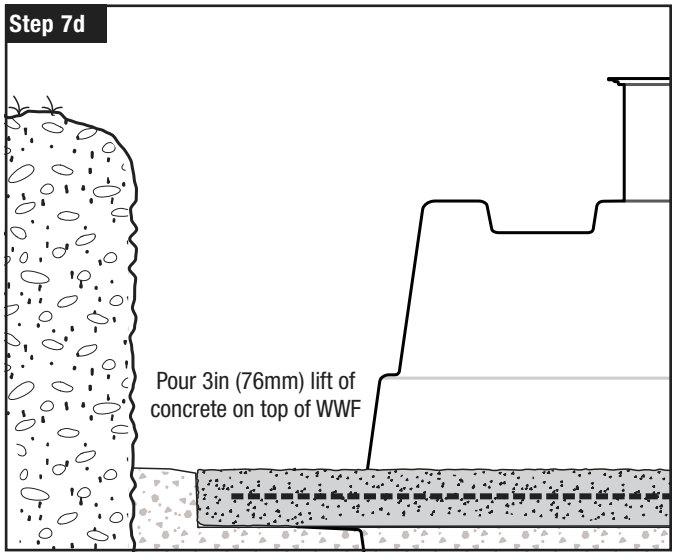
Step 6b. Fill the tank with water to 2in (51mm) above the riser seam.











Step 6. Test for Watertightness, cont.

Step 6c. Wait 30min (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 even if there is groundwater to grade.

- The collar is 18in (457mm) wide × 6in (152mm) thick with a 12in (305mm) width of welded-wire fabric (WWF) in the center.
- The collar requires about 2yd^3 (1.5m^3) of concrete with a minimum compressive strength of 2500psi (17.24MPa).
- Collar width – not weight – provides the necessary antibuoyancy.

Step 7a. Make a backfill dam around the tank to use as a form, 18in wide by 6in tall (457mm by 152mm).

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

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

Step 7c. Place a continuous 12in (305mm) width of WWF on top of the concrete, around the tank.

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

Step 7d. Pour a second 3in (75mm) lift of concrete on top of the WWF.

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 × 12in thick collar (457 × 305mm) can be used in place of the concrete with WWF. This requires about 4yd^3 (3m^3) of concrete.*

Step 8. Connect 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 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 4in (100mm) 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.

Key Point — 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 1.25in (32mm) Sch. 80 PVC.

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

Key Point — Do not use primer on ABS parts.

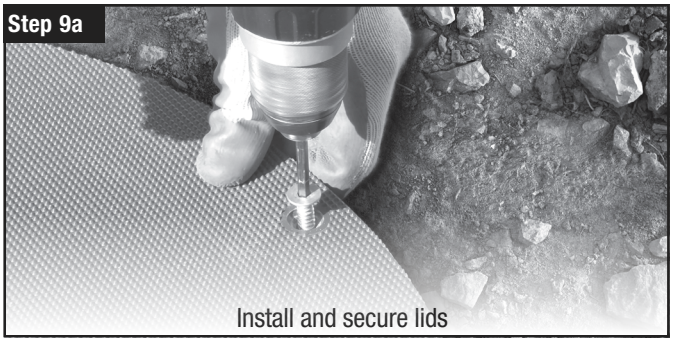
Step 9. Perform Final Backfill and Cleanup

Key Point — 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.

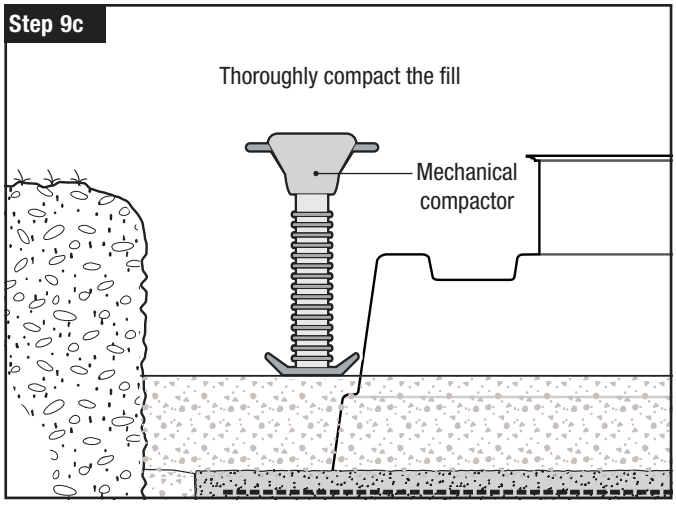
Step 9b. Backfill a 24in (610mm) layer of fill material around the tank.

- 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 (> 3/4in or 19mm), sharp rocks, peat, or muck.
- If native fill isn't usable, use 3/4in (19mm) minus rounded gravel, crushed stone, or pea gravel as fill. 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.

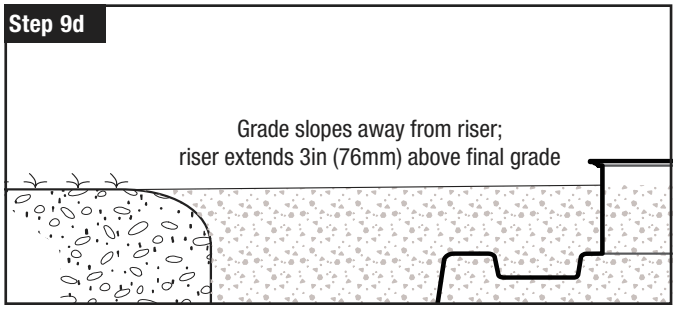


Install and secure lids

Step 9c



Step 9d



Step 9. Perform Final Backfill and Cleanup, cont.

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

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

- Make sure the final grade slopes away from riser.
- Make sure the tank's access riser extends 3in (76mm) 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.