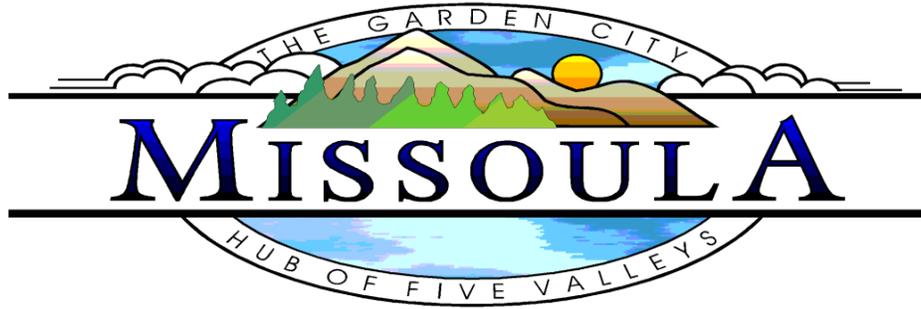




**CITY OF MISSOULA
MONTANA**

**STANDARD INSTALLATION MANUAL
FOR
RESIDENTIAL ON-SITE STEP SYSTEM
SANITARY SEWER CONNECTION**

SPECIFICATIONS AND DRAWINGS



Part I

INTRODUCTION

This manual has been created for the installation of common residential on-site installations of STEP (Septic Tank Effluent Pump) sanitary sewer only. Other applications will require an Engineers design and City of Missoula approval. This manual is designed for individual residential or duplex structures, installed by private contractors.



Table of Contents

FOR CITY OF MISSOULA RESIDENTIAL STEP STANDARDS

I. INTRODUCTION

Table of Contents

II. TECHNICAL SPECIFICATIONS

Section 10: Sewer Service Connections

Section 20: Valves, Saddles, and Miscellaneous Materials

Section 30: Pump Assemblies

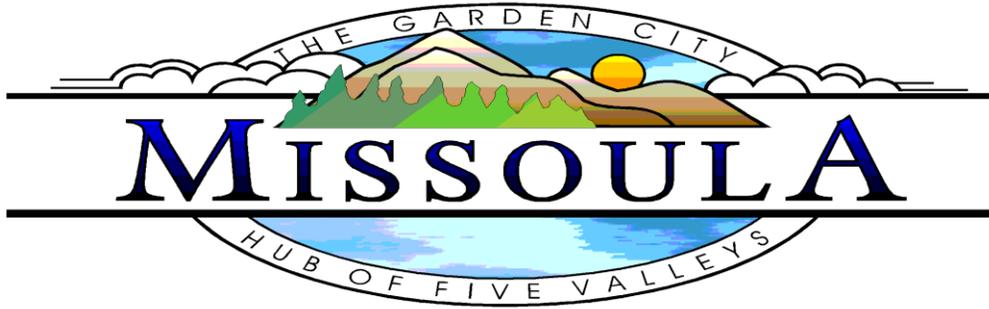
Section 40: STEP Tanks

Section 50: Insulation

Section 60: Electrical

III. DRAWINGS

IV. PHOTOGRAPHS



Part II

TECHNICAL SPECIFICATION

TECHNICAL SPECIFICATIONS

Section 10: Sewer Service Connections

10.0 General:

This section shall include the furnishing, installing, and other appurtenant work necessary to complete installation of the sanitary sewer pressure service and sanitary sewer gravity service lines, fittings; and connections to the force main line.

10.1 Materials Service Pipe and Connections:

All pipe shall be clearly marked on the outside showing manufacturer's name, pipe size, ASTM standard, strength class or thickness, and type.

A. Sewer Pressure Service:

The contractor shall use **polyethylene pipe** (PE). The sewer pressure service line shall be 1" AWWA C901 Iron Pipe Size, Type III, Grade P34, Class C, Code PE 3408, 200 PSI polyethylene pipe.

P.E. Pipe Fittings:

Materials in contact with sewage effluent shall be made from copper alloy Number C83600 in accordance with the chemical and mechanical requirements of ASTM B62 or ASTM B584. This alloy contains nominally 85% copper and 5% each tin, lead and zinc.

The fittings shall be "Insta-Tite" H 15426 by Mueller or approved equal. The fittings shall be installed per manufacturer's recommendations.

Sewer service saddles shall be as specified in Technical Specifications **Section 20**, Valves, Saddles, and Miscellaneous Materials.

Ball valves and check valves shall be as specified in Technical Specifications **Section 20**, Valves, Saddles, and Miscellaneous Materials.

B. Sewer Gravity Service: Connecting the new ~~septic~~ STEP tank to the existing building sewer pipe or to primary tanks shall be installed in accordance with City of Missoula Municipal Code Title 13.

Gravity service sewer pipe for connecting the new ~~septic~~ STEP tank to the existing building sewer pipe or to primary tanks, shall be **Schedule 40** polyvinyl chloride pipe

(PVC), drain waste and vent, ASTM D1785 with solvent weld joints. Fittings shall be solvent weld socket type, long sweep, drain waste and vent ASTM D2665, D3311. PVC material shall be ASTM D1784. Solvent cement and primer shall be ASTM D2564 and be as recommended by the pipe and fittings manufacturers.

C. Couplings:

All PVC couplers shall be rigid in nature. A bell and spigot type joint shall be acceptable. A rigid wall pipe slip coupling shall also be acceptable.

D. Pipe Bedding Material:

Pipe bedding from four inches below pipe to six inches above pipe shall be clean, natural, unwashed gravel, sand or crushed stone, and shall be free from rocks or stones over one inch in diameter. See Standard Drawing 309. Maximum plasticity shall be six (6) as determined by AASHTO Methods T89 and T90.

<u>Sieve Size</u>	<u>Gravel</u>	<u>Percent Passing</u>
¾"		100
#4		40-70
#200		Less than 10

10.2 Sewer Service Construction:

All sewer service trenches and work shall conform to City of Missoula standards and practices.

A. Sewer Pressure Service

Depth of pressure sewer service shall be a minimum of five feet or more without insulation. Sewer service lines, valves, connections and appurtenant work shall be as specified and detailed on City of Missoula Standard Drawing No. 316. Two or more pressure service lines may be installed in a common trench. The Inspector will review the placement of the sewer service saddles or tees, and the alignment of the sewer pressure service line.

Insulation requirements: all sewer service pressure pipe shall be covered with a layer of insulation as shown on drawing and as described in the Insulation: Section 50 of this manual.

The sewer pressure service lines from the curb box to the new ~~septic~~ STEP tank may be installed with a minimum depth of cover over the top of the pipe of 60 inches (except that 72 inches is required under driveways, parking areas, and sidewalks.) Insulation for the pressure service line in this area is not required when the depth of cover is 60 inches or greater (or 72 inches under driveways, parking areas, and sidewalks.) ~~The sewer pressure service line from curb box to septic tank shall be either entirely insulated, or entirely non-insulated except for locations at the curb box and near the tank riser.~~ Locations near the tank riser shall be insulated as detailed on the drawings. The sewer service pressure line for the force main to the curb box shall have 50 inches cover, and be insulated in all locations, or have 72 inches of cover without insulation.

Locating tracer wire: 14 gauge insulated solid copper toning wire with THHN-THWN insulation shall be placed directly over sewer service pressure lines. The Contractor shall bring the toning wire to the surface at valve/curb boxes and other locations as shown on the drawings for purposes of attaching a utility detection device. All connections of the toning wire for service connections shall be stripped of insulation and attached to the copper portion of the main line toning wire. The connection shall be made with a western union tap splice consisting of a minimum of five wraps covered with a double wrap of electrical tape or a split bolt connector and splicing pad. The bolted connector shall be High Strength Split Bolt Connector No. 9H as manufactured by American Electric Blackburn Products or approved equal. The splicing pad shall be Vinyl Mastic Pad No. 2200 as manufactured by 3M Electrical Products Division or approved equal.

Marking Tape requirements: A continuous ribbon of marking tape shall be placed in the trench 12" (plus or minus 3") below the surface. The marking tape shall be placed in all trenches. Marking tape shall be marked "Caution Buried Sewer Line Below" and shall be 3" wide, Allen Systems, Markline marking tape or approved equal. Only one marking tape is required where sewer service pressure lines are located in a common trench.

B. Sewer Gravity Service:

Connect the new ~~septic~~ STEP tank to the existing building sewer pipe. ~~or to primary tanks.~~ Connections to the existing building sewer service line(s) shall be made in accordance with current City of Missoula standards and practices.

Gravity Sewer Cleanouts: Gravity cleanouts shall be installed in new gravity service lines in accordance with current City of Missoula, and Uniform Plumbing Code standards see City of Missoula Standard [Drawing No. 303](#).

10.3 Alternative Installation of Service Line by Boring:

This installation must be approved by the City of Missoula Engineer or his/her designated agent. The routing of the service line shall be reviewed prior to approval. Minimum depth of bore shall be (5') five feet from surface at all points. The pipe material can be either SCH 40 PVC or HDPE class 200 and must have tracer wire.

10.4 Testing of Sewer Pressure Service Lines:

A. Sewer Pressure Service:

All sewer pressure service lines shall be subjected to a hydrostatic or air pressure test. The hydrostatic or air test pressure shall be 100 psi. There shall be no allowable loss for leakage from 1-inch pipe. There shall be no pressure loss over a fifteen minute test period.

B. Sewer pressure service line shall be tested in sections as follows:

From force main to curb stop. This section shall be tested if it is a new installation that has not been previously tested.

From the curb stop to STEP tank. This section shall be tested by closing the curb stop and pressurizing the sewer pressure service pipe to the test pressure.

Whenever it is necessary to replace defective material or correct the workmanship, the hydrostatic or air test shall be reconducted until a satisfactory test is obtained.

TECHNICAL SPECIFICATIONS

Section 20: Valves, Saddles, and Miscellaneous Materials

20.1 General.

This section covers the furnishing and installation of valves, saddles, and miscellaneous materials.

20.2 Corporation Valves: Corporation valves shall be installed on sewer pressure service lines.

Corporation valves shall be Mueller B29996 or Ford FB400 or approved equal and shall be installed in accord with Missoula Standard Drawing 316.

20.3 Ball Valves:

Ball valves shall be installed on sewer pressure service lines and at other locations shown on the drawings or specified.

1" ball valves shall be PVC ball valves with pre-loaded EPDM stem seals, ABS impact resistant handle, precision molded micro-finished PVC ball, self-adjusting polyethylene ball seat seals to compensate for wear, and shall comply with ASTM D2846. It shall be designed for use with corrosive fluids, for low torque manual operation, and for a working pressure of 150 psi. The PVC material shall be Type 1 (NSF). The valve shall be Model No. LT-1000-S or as manufactured by King Bros. Industries (KBI), or approved equal.

Ball Valve risers shall have a 6" PVC extension piece with a 6" PVC cap.

20.4 Check Valves:

Check valves shall be installed on sewer pressure service lines and at other locations shown on drawings.

Check valves shall be brass, bronze, or PVC swing check valves designed for use with corrosive fluids and shall have a Buna-N Seal on a swing gate, which lifts to allow for full-unobstructed flow. The PVC material shall be Type 1 (NSF). It shall have a working pressure of 150 psi and shall require only ½ psi backpressure for complete closure. It shall be as manufactured by KBI, or approved equal.

20.5 Curb Stops.

Curb stops for buried curb valves shall be Mueller H10287 or Ford B11-444-M or approved equal.

Curb stop risers shall be Minneapolis pattern Mueller H10302-05.066 or equivalent and shall say "Sewer" as shown on City of Missoula Standard Drawing No. 316.
Toning/tracer wire shall be taped with electrical tape onto the curb box.

20.6 Saddles.

Saddles shall be installed for sewer service connections to force mains.

Standard saddles shall be band-type saddles designed for use on PVC pipe. The material shall be UNS S 30400 stainless steel for the shell, bolts, washers, nuts, and tapped outlet. Gaskets shall be NBR compounded rubber complying with ASTM D 2000-343K515-E34. Saddles shall be Style 304 on 2" – 8" mains, manufactured by Romac Industries, Inc., or approved equal.

~~The City of Missoula shall make all pressure Sewer taps.~~

~~4.0 Traffic Bearing Lid. Traffic bearing lids shall be installed in locations designated by the Inspector. Material and installation shall be as shown on the typical drawings.~~

~~All Traffic Bearing Lids and rings shall be I.F.C.O. 770 or equal for 24-inch risers, and I.F.C.O. 235 for the 6-inch riser.~~

TECHNICAL SPECIFICATIONS

Section 30: Pump Assemblies

30.1 General.

This section covers the furnishing and installation of the effluent pump assemblies, including pumps, motors, pump vaults, risers, and appurtenant work. Orenco Systems, Inc. of Sutherlin, Oregon (541) 459-4449 shall manufacture all pump assemblies.

30.2 Warranty on Effluent Pumps and Motors.

All effluent pumps and motors shall have a five (5) year manufacturer's warranty. Defects discovered during the first year of the manufacturer's warranty will be corrected by the Contractor. Defects discovered during the final four years of the manufacturer's warranty will be administered by the City of Missoula. Pump warranty shall begin on date of acceptance by the Inspector. ~~Proof of warranty will be given to the Inspector and a copy of the warranty will be left in the STEP system's control panel.~~

30.3 Materials.

Materials shall be per current City of Missoula Standards and all applicable sections of the specifications, and as specified herein or shown on the drawings.

A. Simplex pumps for typical 1000 and 1500 gallon STEP tanks:

The effluent pumps shall be Orenco Systems, Inc., Effluent Pump submersible turbine type capable of delivering 10 gpm against total discharge head (TDH) of 165 feet or equivalent. Pumps will be provided with an orifice installed in the discharge piping to restrict flow to a maximum of 9 gpm over any head condition. Pumps shall be furnished with a brass check valve in the discharge head.

Pumps shall be stainless steel. All wetted fasteners shall be 300-series stainless steel. Pumps shall be listed by an approved testing laboratory such as UL or CSA for use as effluent pump.

Motors shall be two wire, single phase, submersible motors. Motors shall be ½ HP, 115 volt, 60 HZ. Motor shall be thermally protected with an automatic-reset feature. Motors shall be equipped with built in lightning arrestors.

All pump motors shall be supplied with cables 20 feet in length and no splices. The cables shall be heavy duty, extra hard usage, rubber insulated, oil-resistant neoprene, and water resistant jackets. The cables shall not be shortened during installation. Power cable motor- end termination shall be epoxy-sealed to prevent oil-wicking, or liquid intrusion from the outside, in case of damage to the jacketing and insulation. Cable shall be rated for NEC Severe Service "S". Cable sealing/strain relief shall consist of a corrosion-resistant gland nut, washer, and Buna-N packing.

- B. Pump Vault: Pump vaults shall be internal type as shown on the City of Missoula drawings, and shall be removable for access into the ~~septic~~ STEP tank for septage pumping. All tanks shall have a 3/8" polyurethane rope attached to the vault around lifting handles. The rope shall be long enough so that the loop reaches the top of the riser when extended upwards. The pump vault shall be of sufficient size and structural integrity to house and support the pumping equipment necessary for transportation of effluent. The pump vault shall conform to current City of Missoula standards and practices. The pump vault and appurtenances shall be protected from solids larger than 1/8".
- C. Risers: See City of Missoula Standard Drawing No. 322. Risers shall be required for access to internal vaults, required equipment and access into the ~~septic~~ STEP tanks for septage pumping. All risers shall be constructed of ribbed PVC, fiberglass, and shall be water and gas tight constructed. Risers shall be the diameter as shown on the drawings, and shall be of uniform diameter to allow removal of internal vaults without removing splice boxes, etc. All risers shall be a minimum length of 30" and shall vary depending on the depth of bury on the various tanks. The risers shall be attached to the tanks such that a watertight seal is provided. Epoxy required to adhere the PVC risers to concrete or fiberglass tanks shall be a two-part epoxy as supplied by the manufacturer or equivalent manufacturer approved epoxy. Risers may have one spliced joint. The spliced joint shall not be located in the top 30" of the riser. Use of Orenco Systems, Inc. PVC grade rings supplied by the manufacturer shall make the splice. The insert ring shall be joined to both sections of riser with a two-part epoxy supplied by the manufacturer or manufacturer approved equivalent epoxy for the riser. The joints shall be made per the manufacturer's recommendations, and shall be watertight.

Risers shall be insulated with insulation plugs, Orenco Systems Inc. model INS 246 or approved equal, and shall adhere to City of Missoula standards and practices.

Neoprene grommets shall be installed for discharge piping and the electrical conduit to assure a watertight seal.

Orenco Systems, Inc or equivalent shall provide the risers.

The lid shall be a flat fiberglass, green in color, with a non-skid aggregate finish. The lid shall be the diameter required to fit the required riser and shall be supplied with a minimum of two stainless steel bolts and shall conform to current City of Missoula standards and practices. All STEP tank risers will be required to have an insulation plug.

Traffic bearing lids shall be installed in locations designated by the Inspector, and shall be a cast iron frame and cover which will fit over the fiberglass lid. Refer to City of Missoula **Standard Drawing No. 810.**

- D. Discharge Piping. Discharge piping will consist of a current City of Missoula Package Orenco Systems, Inc. hose and valve assembly. The 1" discharge piping shall include a ball valve, check valve, Spears SCH 80 quick disconnect union, anti siphon valve (where required by the Inspector), flow control disk 1/4", high pressure (250 psi) PVC hose, internal flexible hose, two ninety (90) degree bronze swing joints and bronze or stainless steel nipple. **Refer to City of Missoula Standard Drawing No. 322.**

30.4 Installation.

All items shall be installed per City of Missoula standard drawings and specifications. Electrical work and controls shall conform to the National Electrical Code (NEC) and be inspected by the City of Missoula Electrical Inspector.

- ~~A.~~ The slope of finish grade away from the top of ~~septic~~ tank risers located in unpaved areas shall be 1" in four feet. The top of the riser lid shall be set at 3 inches above existing ground elevation within a tolerance of +/- 1". ~~Where the riser is installed in sloping ground, the slope of the finish grade in the direction of the existing slope, shall be at approximately the same slope as the existing ground.~~

30.5 Final Acceptance Test.

The Contractor shall ~~start and~~ test each pump assembly. All pumps, switches, alarms, controls and appurtenant work shall be checked for proper operation. This test shall be done in the presence of the Inspector. The Contractor shall test the operation of the STEP tank and assembly by starting the pump and pumping the tank water down to the off switch. They shall then override the off switch and pump down to the redundant off switch. The tank shall then be refilled with water to the level of the on switch and pumped down to the off switch.

- A. The start and test shall be done prior to taking the existing sewer system out of service. All deficiencies shall be corrected.

Upon completion of installation and approved electrical inspection, Contractor shall request final acceptance test from City of Missoula Utility Inspector (Inspector). Inspector will coordinate with WWTF staff, and installation contractor to meet on-site to ensure proper operation for all pumps, switches, alarms, controls and appurtenant work. 1 year Contractor warranty period shall commence on the date of final acceptance of STEP system

TECHNICAL SPECIFICATIONS

Section 40: STEP Tanks

40.0 General:

This section covers the furnishing and installation of the septic tanks for the Septic Tank Effluent Pumping (STEP) System.

40.1 Materials:

Septic Tanks shall conform in all respects to City of Missoula standards for STEP system septic tanks. ~~Septic~~ STEP tanks may be either shall be precast concrete, or specially approved fiberglass. Manufacturers currently producing STEP system septic tanks conforming to City of Missoula standards are:

Hunton Pre-Cast Concrete, Inc.
Missoula, Montana

Tanks shall be ~~Class A for 2 ½' – 5' of cover, or Class B for 5' – 10' of cover. Class B tanks may be substituted for Class A tanks.~~ All installation in vehicle traffic areas, such as driveways and parking lots, where depth of cover is less than 6' require a cast-in-place distribution slab. Refer to Standard Drawing 810.

Tanks for single-family residences shall be 1000-gallon size. Tanks for duplexes shall be 1500-gallon size. See Administrative Rule 644.

	Engineering/Utility Section Administrative Rule No. 644
	Shared STEP Tanks

Adopted: March 13, 1996

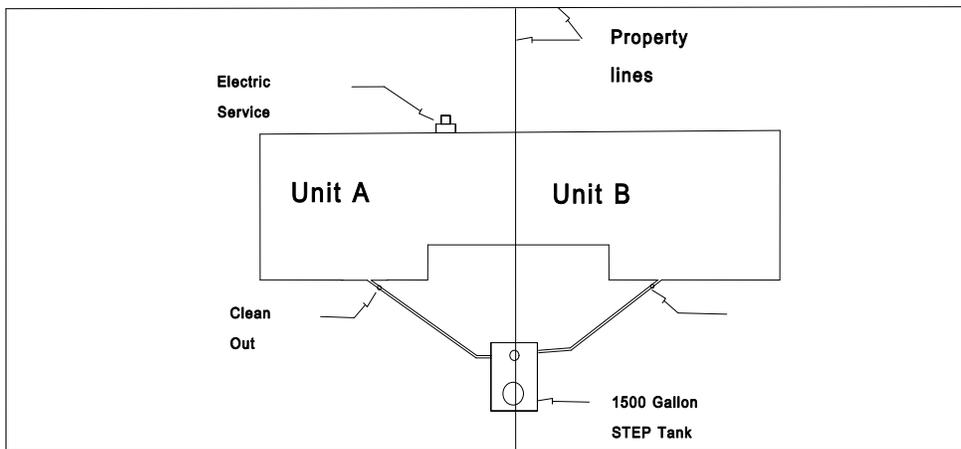
Revised: December 21, 2006

PURPOSE: Define a policy that allows a duplex or two adjacent townhouses to share one 1500 gallon residential Septic Tank Effluent Pumping (STEP) system tank.

POLICY:

1. Only two (2) residential units are permitted to share one (1) 1500 gallon residential STEP tank.

2. The electrical power must have a placard at the meter base stating, "Power cannot be terminated due to STEP sewer system."
3. Where the residential units have differing sewer elevations of one half (1/2) foot or greater, the lower unit shall have a backflow prevention device installed in its gravity sewer service line inside the building.
4. Each residential unit shall have a separate cleanout for the purpose of cleaning each unit's service line (see drawing).
5. Each residential unit shall have its own separate gravity service line from the building to the STEP tank.
6. Construction and installation of the sewer shall conform to latest City of Missoula STEP sewer standards.



Tanks for larger units or commercial units shall be designed by an engineer on an individual basis and approved by the City.

Acceptable tanks as listed above are designed to accept the pump assemblies, including the screened vaults., ~~as specified under Section 41, Pump Assemblies.~~

All ~~septic~~ **STEP** tanks shall be structurally sound and water tight, have tank manufacturer identification and shall have a six (6) year manufacturer's warranty certificate furnished to the Inspector at the time of installation. Tank warranty shall not limit liability to replacement cost of the tanks. The Contractor shall be responsible to correct any defects discovered during the first year of the manufacturer's warranty. Defects discovered during the final five years of the manufacturer's warranty will be administered by the City of Missoula. Tank warranty shall begin on date of acceptance by the Inspector.

All tanks shall have a serial number, and shall be clearly marked to show size, class, date of manufacture, and the words, "City of Missoula STEP Tank".

40.2 Installation:

All items shall be installed per City of Missoula drawings and standards.

Excavation, backfill, pipe embedment, surface replacement, and appurtenant work shall be in accordance with applicable City of Missoula standards, and with other pertinent sections of this manual.

Cast-in-place distribution slabs shall be installed when required over tanks in traffic bearing conditions in the locations as shown on City of Missoula Standard Drawing No. 810.

The Inspector will approve the tank location and alignment prior to any excavation. The tank shall be located a minimum of 10 feet from any building foundation or permanent structure. The Contractor shall be responsible for setting tank grade as determined by specification and requirements for depth of tank cover and minimum gravity pipe slope.

All OSHA regulations regarding proper excavation procedures shall be followed.

All tank installations, which involve interruption of sewer service, shall be installed as follows:

- A. The tank will be installed and tested for exfiltration.
- B. Once the electrical portion of the project has been approved, connected and the pump assembly is in operation, the existing sewer may be connected to the STEP tank.
 - a. **Precast Concrete Tanks:** Precast concrete tanks shall be installed as shown on the drawings and specified herein. Precast concrete tanks shall be installed on a level base of bedding material at thickness specified by tank manufacturer. The bedding material base shall be installed on undisturbed original subsoil. All unauthorized excavation below the bedding material shall be replaced with 2.5" minus drain rock. Tank bedding material shall be as specified for pipe embedment and shall be compacted to 95% of theoretical maximum proctor density as determined by AASHTO T-99, except when greater density is recommended by the tank manufacturer. Backfill for Precast concrete tanks shall be according to the City of Missoula standards.
 - b. ~~Fiberglass Tanks — City Engineer Approved Only:~~ Fiberglass tanks shall be installed in accordance with the manufactures specifications as shown on the Drawings and specified herein, and as recommended by the manufacturer. The handling of all fiberglass septic tanks shall utilize lifting slings or cables fastened to lifting eyes for that purpose. Forklifts shall not lift tanks or other machinery without palletization of the tanks or equivalent protection to prevent direct bearing of the lifting arms on the tank other than the skids provided for that purpose.

~~Excavation for fiberglass septic tanks shall be carefully prepared to the dimensions shown on drawings and specified. Care shall be exercised to prevent either over excavation or under excavation. The depth of the excavation shall be at least six (6) inches below tank bottom and no greater than 12 inches in order to provide for the leveling course of bedding material. Excavation width shall provide for not less than 12 inches clearance on each side of the tank and shall not exceed 18 inches each side. Additional excavated clearance on the ends may be provided if working space is required. Minimum excavation limits shall provide for at least 6 inches of bedding material.~~

~~All unauthorized excavation below the bedding material shall be replaced with 2 1/2" minus drain rock.~~

~~A minimum of 6 inch depth of bedding under the tank bottom shall be provided as a leveling course and working platform. The remainder of bedding material to 12" above the top of the tank shall be placed after the tank is placed on the leveling course of bedding. All bedding material shall meet the following:~~

~~PEA GRAVEL
BEDDING MATERIAL~~

<u>SIEVE SIZE</u>	<u>PERCENT PASSING</u>
3/4"	100%
5/8"	100% 78%
1/2"	100% 52%
3/8"	80% 26%
#4	30% 0%
#6	7% 0%
#200	3% 0%

~~At least 25 percent by weight of the aggregate retained on the No. 4 sieve shall have no mechanically fractured faces. Sand is not an acceptable alternative to pea gravel.~~

~~The tank manufacturer's requirement for bedding gradation and placement may be more stringent. If so, those requirements shall be applied.~~

~~Placement of bedding material shall be done after the tank is filled with water, the water acting to stabilize the tank during initial bedding and backfill to prevent lifting. Bedding shall be pushed under the haunches of the tank and distributed to provide uniform support without voids. Initial bedding lifts shall be placed equally on both sides of the tank to equalize pressure on each side.~~

~~Pea gravel as specified in this article may be used also as backfill above the tank to within 18 inches of the top of the excavation. The last 18 inches of backfill shall be native material. Each layer of pea gravel shall be compacted to a density of at least 95 percent of the maximum dry density, as determined by AASHTO T-19-88, Section 10. The density of each layer will be determined in accordance with AASHTO & 238-86, Method A.~~

40.3 Leakage Tests:

All tanks shall be subjected to field leakage tests as specified herein. The Inspector shall be provided 24 hours notice of field leakage test times. The Inspector shall witness all field leakage tests. The Inspector may reject any tank that fails the leakage test. When leakage occurs, the Inspector will re-inspect and test the tank after the approved repair method has been done. Clean water for testing shall be furnished by the Contractor.

A. Precast concrete tanks:

Field leakage test: After the tank has been set, water filling may commence. The tank shall be filled to the bottom of the lid of tank with water for 24 hours prior to the test. Before conducting the water test the Contractor must fill the riser six inches over top of tank. The Contractor shall allow adequate time for tank walls to absorb water. The tank shall then be tested for exfiltration over a two (2) hour period. The test will be conclusive and failure will necessitate a re-inspection. The test will be conducted using clean domestic water only. No domestic sewage effluent shall be allowed in the tank until after the final acceptance of the system has been performed and approved in the presence of the Inspector.

~~B. Fiberglass tanks—City Engineer Approved Only:~~

~~Field leakage test: After the tank has been set, the tank shall be backfilled to six inches above the top of the tank with $\frac{3}{4}$ " crushed, washed rock. Then water filling with clean domestic water may commence. The tanks shall be filled to within six inches of top of tank. The Contractor shall allow adequate time for tank walls to absorb water. The tank shall then be tested for exfiltration over a two (2) hour period. The test will be conclusive and failure will necessitate a re-inspection. No domestic sewage effluent shall be allowed in the tank until after the final acceptance of the system has been performed and approved in the presence of the Inspector.~~

40.4 Removal of Seepage Pits or Cesspools.

	Engineering/Utility Section Administrative Rule No. 615
	SEPTIC TANK ABANDONMENT

Adopted: February 5, 1988

Revised: February 23, 2010

Revised: November 18, 2010

PURPOSE. The following is an authorized deviation from Chapter 7, Section 722.2 of the Uniform Plumbing Code 2009 Edition pertaining to Abandoned Sewers and Sewage Disposal Facilities:

Section 722.2. "Every cesspool, septic tank and seepage pit which has been abandoned or has been discontinued otherwise from further use or to which no waste or soil pipe from a plumbing fixture is connected, shall have the sewage removed therefrom and be completely filled with earth, sand, gravel, concrete or other approved material."

EXCEPTION: *Reinforced concrete septic tanks and reinforced concrete seepage pits shall not be required to be pumped or filled, if it can be verified that it is a reinforced concrete tank or pit.*

This exception is only valid when the contractor cannot easily locate the tank or pit in the field and conducts a records search at the City-County Health Department to determine if the physical location of the tank or pit can be ascertained.

If the reinforced tank or pit can be field located or records research determines the location, then said tank or pit shall be pumped and completely filled per 722.2 above.

AUTHORITY. Uniform Plumbing Code 2009 Edition, Chapter 3, Section 301.1.4:

Section 301.1.4. "In existing buildings or premises in which plumbing installations are to be altered, repaired or renovated, the Authority Having Jurisdiction has discretionary powers to permit deviation from the provisions of this code, provided that such a proposal to deviate is first submitted for proper determination in order that health and safety requirements, as they pertain to plumbing, shall be observed."

~~Concrete seepage pits and concrete cesspools, which do not conflict with new construction, do not require pumping or filling, as is stated in Sewer Construction Policy No. 5.~~

Seepage pits and cesspools when encountered during on-site excavation for new septic **STEP** tanks or sewer lines may be pumped and be completely filled with earth, sand,

gravel, concrete or other approved material, ~~as is stated in Sewer Construction Policy No. 5-~~ Seepage pits and cesspools encountered during on-site excavation for new septic tanks or sewer line may also be pumped and removed from the site and disposed of by the Contractor. Excavation for removal of existing seepage pits or cesspools which results in excavation below the foundation of new septic tanks or new pipe shall be replaced to the level of the tank or pipe bedding material with 2 ½" minus drain rock.

Seepage pits and cesspools that are required to be removed shall be exposed and pumped, and then all saturated soil, concrete rings, and other associated materials removed to an elevation approximately two feet below the elevation and compacted to a 95 percent soil Proctor to the bottom of the new septic tank or pipe to be installed.

In locations where removal of the seepage pit or cesspool causes an interruption of sewage flow from a property, the Contractor shall provide temporary sewer service by pumping or bypassing the existing flow. The temporary system shall remain in service until the new STEP system for the property is in service.

40.5 Removal of Existing Septic Tanks:

Existing concrete septic tanks, which do not conflict with new construction, do not require removal. See Administrative Rule 615 (Exception). When directed by the Inspector, existing septic tanks that are in conflict with new construction shall be removed and disposed of by the Contractor.

Where existing septic tanks are to be removed, the Contractor shall pump the tank empty, excavate, remove and dispose of the tank. Excavation for removal of existing septic tanks which results in excavation below the foundation of new septic tanks shall be replaced to the level of the tank bedding material with 2 ½" minus drain rock.

In locations where removal of the existing septic tank causes and interruption of sewage flow from a property, the Contractor shall provide temporary sewer service by pumping or bypassing the existing flow. The temporary system shall remain in service until the new STEP system for the property is in service.

TECHNICAL SPECIFICATIONS

Section 50: Insulation

50.0 General:

This section covers the furnishing and installation of insulation as shown on the drawings and specified in City of Missoula Standard Drawing No. 309.

50.1 Materials:

Material shall be specified herein.

Insulation material shall be extruded polystyrene insulation board, in conformance with AASHTO Designation M230-70. Insulation material shall be designed specifically for in-ground installation.

Insulation material shall be square edge and shall have the following properties:

- A. Compressive Strength: 35psi minimum at 5% deformation or yield, as determined by ASTM D1621.
- B. Water Absorption (Percent by Volume): 0.25% maximum as determined by ASTM C 272.
- C. Thermal Resistance (R) Value: 5.0 ft² hr. F/BTU at 75° F, mean temperature in a 1” thickness as determined by ASTM C 518.

50.2 Installation:

Thickness and overall dimensions of insulation material shall be as shown on the drawings. Minimum length of insulation material boards shall be 8 feet. Insulation material shall be installed in the locations shown on the drawings.

Each thickness shall be obtained by the use of at least two layers of insulation material boards with staggered joints to prevent loss of heat. All joints shall be tightly butted.

Insulation shall be covered with 6” minimum of pipe bedding material prior to backfilling, except in locations of shallow bury (8” or less) where the insulation is backfilled with topsoil.

All field cutting of insulation material board shall be done with a straight edge to a neat line.

TECHNICAL SPECIFICATIONS

Section 60: Electrical

60.0 General:

This section covers Basic Electrical requirements including electrical demolition, metal conduit, nonmetal conduit, fittings and conduit bodies, building wire, control cable, wiring connectors and connections, pull and junction boxes, equipment grounding conductors, bonding, electrical connections to pump equipment and controls, conduit and equipment supports, non-fused knife switch disconnects, anchors and fasteners, nameplates and labels, level control and alarm floats and pump control, alarm panels, and seal offs. All items shall be installed in accordance with the National Electrical Code and state and municipal codes. All items shall be inspected and approved by the Building Division Electrical Inspector for the City of Missoula. All products shall be installed in accordance with manufacturer's instructions and Underwriters Laboratories listed requirements.

60.1 Materials:

Materials shall be per applicable sections of the specifications, and as specified herein or shown on the drawings. All materials shall conform to the City of Missoula current standard and shall be listed and classified by Underwriters Laboratories, Inc.

- A. Metal Conduit. Rigid steel conduit: ANSI C80.1 Fittings and Conduit Bodies: ANSI/NEMA FB 1; all steel fittings. With seal offs.
- B. Electrical Metallic Tubing. (EMT) ANSI C80.3; galvanized tubing. Fittings and Conduit Bodies: ANSI/NEMA FB1; steel, compression type.
- C. Nonmetallic Conduit. NEMA TC 2; Schedule 40 PVC. Fittings and Conduit Bodies: NEMA TC 3. With seal offs, type EY for vertical applications, with EYC sealing compound or Chico compound.
- D. Building Wire. Single conductor insulated wire, copper, rated 600 volts. Insulation, ANSI/NFPA 70, Type THHN/THWN.
- E. Multiconductor Cable: Seven conductor, 600V power and control cable rated for direct burial, copper. Insulation, conductors: THHN/THWN. Cable: PVC jacket. The following wire color coding shall be used to wire the Orenco control panel: Black, Orange, Red, Blue, Yellow, Brown, Red w/ Black Dash. Neutral and ground conductors shall be identified in field with color tape at all terminations and splices.
- F. Miscellaneous Junction Boxes: Sheet metal boxes, NEMA Type 3R.

- (1) Disconnect: Non-fused knife disconnect – lockable.
- G. Wiring Connectors, Grounding Lugs and Tap/Splice Fittings: UL approved for wire size and purpose intended. Butt connectors shall be Partsmaster 20366650 step down crimp and shrink, and 16-20 to 12-14 AWG and 29366655 step down crimp and shrink 14-16 to 10-12 or approved equivalent.
- H. Meter Main: 125A or 200A continuous duty. Combination meter and main circuit breaker for 120/240V, single phase, three-wire service. Overhead or underground feed as required. Meet Northwestern Energy current specifications. Size to match existing service. Breakers shall be identified as ‘Sewer’ and shall have matching locks, installed by electrician, on STEP sewer breakers.
- I. Miscellaneous Supporting Devices: Provide materials, sizes and type of anchors, fasteners and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products.
- J. Self Adhesive Label: shall be provided by the City of Missoula, upon final approval of the STEP system.
- K. Underground Warning Tape: 3” wide, black letters with red background. “Caution Buried Electrical Line Below”. Installed 6” to 8” below finished grade.
- L. Level Control & Alarm Floats: Float assembly shall meet current City of Missoula approved Orenco float assembly with City of Missoula approved Orenco splice box. Float assembly shall be complete with high water alarm float, on/off float, redundant off and low level float, all cord assemblies and wire markers. Splice box shall be complete with four cord grips (for 3 floats and a pump cord). All connections in tank junction boxes shall be stranded wire only, and connected with Partsmaster step down crimp and shrink preinsulated heat shrinkable butt connectors or approved equivalent.

All pump vaults shall have a single PVC float assembly, with floats positioned to provide space for the floats to operate without interference between floats. All floats shall be rated 120V, 13 amps maximum pump running current, 85 amps locked rotor, ½ h.p. They shall meet current City of Missoula specifications. All floats shall be classified for Class I Division II locations. All floats shall be supplied with 17’ long cords with no splices. The cords shall not be shortened during installation. 20’ pump cords shall not be spliced nor shortened during installation.

M. Pump Control and Alarm Panels:

For 1,000 gallon and 1,500 gallon STEP tanks (residential): use the current City of Missoula standard Orenco Simplex Pump control panel. The alarm activates the high liquid level alarm light and buzzer. The buzzer may be silenced by pressing the illuminated “Push To Silence” button on the front of the control panel. The alarm light will remain on until the high level condition is corrected.

On/Off float: energizes the motor contactor, which switches on the power to the pump. The float is in the up position when this occurs. De-energizes the motor contactor, which switches off the power to the pump. The float is in the down position when this occurs.

Redundant Off and Low Level Alarm: Switches off the power to the pump. This also activates the alarm light and buzzer. The float is in the down position when this occurs.

The control panels shall have a provision for a field installed elapsed time meter and event counter kit, stainless steel latch, internal 120 volt circuit breaker sized and rated for pump served, and control circuit fuse and disconnect sized per manufacturer requirements. Both the pump circuit breaker and control circuit fuse shall be rated for 10,000 AMP interrupt current. Elapsed time meter and even counter kits must be obtained separately for individual control panel.

Type EY seal offs shall be installed vertically on conduit runs only, below the control box and 18" above finished grade.

A non-fused knife switch disconnect that can be locked into energized and non-energized position shall be installed between the main meter box and the control box. Disconnect shall be within 6' of control panel, and visible from control panel. The lock shall be provided by the City of Missoula and shall be the property of the City of Missoula.

The control panels shall be supplied with a padlock and key set, keyed alike with a common key, provided by the City of Missoula, and shall be the property of the City of Missoula.

60.2 Installation:

All items shall be installed in accordance with the National Electrical Code and state and municipal codes. All items shall be inspected and approved by the Building Division Electrical Inspector for the City of Missoula. All products shall be installed in accordance with manufacturer's instructions and Underwriters Laboratories listing requirements.

Use stranded conductors or multiconductor cable. Use conductors not smaller than 10 AWG for power circuit with 30 AMP circuit breaker and 12 AWG for control circuits. Pull all conductors into raceway at the same time. Use suitable wire pulling lubricant for cable assemblies. Protect exposed cable from damage. Use suitable cable fittings and connectors. Clean conductor surfaces before installing lugs and connectors. Make splices, taps and terminations to carry full ampacity of conductors with not perceptible temperature rise. Tape uninsulated conductors and connector with electrical tape to 150% of insulation rating of conductor. Inspect wire and cable for physical damage and proper connection. Verify continuity of each circuit conductor.

Install electrical boxes as shown in City of Missoula Residential STEP Manual.

Provide bonding to meet Regulatory Requirements. Equipment grounding conductor: provide separate, insulated conductor within each circuit. Terminate each end on suitable lug, bus, or bushing. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

Make electrical connections in accordance with equipment manufacturer's instructions. Provide suitable strain-relief clamps and fittings for cord connections at splice box in tank riser. Use correct crimping tool.

Splice boxes shall be installed in the STEP tank riser in accordance with the instruction from the supplier or manufacturer. The control panel shall be installed on the permanent structure. The fastening device shall be of sufficient size and length to securely fasten the panel.

STEP CHECKLIST
(Electrical)

Use conductors not smaller than **10AWG** for power circuit with **single pole 30 AMP** circuit breaker and **12 AWG** for control circuits. Use stranded conductors or multiconductor cable. 30 AMP breaker shall be identified as **Sewer** and shall have matching **lock**, installed by electrician, on STEP sewer breaker. Proper **grounding**.

Non-fused Knife Switch Disconnect that can be locked into non-energized or energized position, installed between the main meter box and the control panel. Disconnect shall be within 6' of control panel, and visible from control panel. Placement of disconnect and control panel—Are there **obstructions** that prevent the boxes from being opened easily?

Proper fittings used to connect Control Panel and Disconnect to conduit. **Neutral shall not be broken in disconnect.**

In control panel look for **wiring diagram, wire size and placement** (see diagram), only **1 wire per lug** on bar.

Type EY seal offs, with EYC sealing compound or Chico compound, installed **vertically on conduit runs only**.

Conduit or cable at correct **trench depth**. Conduit 90 degree downsweep directly out of j-box to meet 18" code. **24" trench depth** for sewer cable. **Red Identifying/Warning tape**.

Sewer cable application to have approved **compression sealed fitting** (such as Huston Wire & Cable BICC 424-UNO2 Cable Seal) to prevent vapors, gases, or liquids.

Inside riser look at **j-box placement**, correctly crimped and heated **step-down butt connectors**, no **water** in j-box, no **extra** wires or **wirenuts**, cord grips secured, No **splices** in pump or float cords, j-box lid screws.

DIRECT BURY (Sewer Cable)
12 AWG Conductor Cable Color Coding and Labeling

<u>Wire Color</u>	<u>Terminal Connection in Orenco Panel</u>
Black	1
-----	2
Orange	3
Red	4
Blue	5
Yellow	6
Brown	7 ¹
Red w/Black Dash	Ground Lug ²

NOTES

¹Apply white tape at all terminations.

²Apply green tape at all terminations.

CONDUIT
12 AWG Conductor Cable Color Coding and Labeling

<u>Wire Color</u>	<u>Terminal Connection in Orenco Panel</u>
Black	1
-----	2
Orange	3
Red	4
Blue	5
Yellow	6
Brown	7 ¹
Green	Ground Lug ²

NOTES

¹Apply white tape at all terminations.

²Apply green tape at all terminations.

*****Make sure to secure riser lid*****

Residential

S.T.E.P. System Checklist

- ____: **Riser Lid Slightly Above Grade, External J-Box 2" Below Grade**
- ____: **Rebar at 6" tank cleanout, cleanout buried 4" below grade**
- ____: **Frost plug**
- ____: **J-Box Connections**
- ____: **Flow Restrictor**
- ____: **30 Amp Breaker w/Breaker Lock, Labeled "Sewer" at house service panel**
- ____: **Check Wire Connections in Control Panel, Wiring Diagram**
- ____: **Correct Disconnect, Hole Drilled for On Position**
- ____: **# 10 Wire from House to Disconnect**
- ____: **Anti-Siphon (when necessary)**
- ____: **Tank Warranty - Give to Inspector**
- ____: **Valve Box Operates, Stamped "Sewer", In Asphalt/Concrete Requires Cast Iron Lid Labeled "Sewer"**
- ____: **Tracer Wire on Valve & Inside Riser**
- ____: **Check for Leaks**
- ____: **All Floats & Tethers Adjusted and Working Properly**
- ____: **Cords Tied Up**
- ____: **Check Valves Installed - Brass at Pump, Plastic across from Union/Ball Valve, In-Line Checkvalves if Shared Valve**
- ____: **Lid Bolted Down w/Stainless Sc**

Sample of STEP Easement

RESIDENTIAL ON-SITE MUNICIPAL SANITARY SEWER SYSTEM EASEMENT

THIS CONVEYANCE, Made this *DATE* day of *MONTH, YEAR*, by and between *PROPERTY OWNERS' NAME(S)*, referred to as the "Owner", and the City of Missoula, a municipal corporation in the County of Missoula, State of Montana, Grantee.

WITNESSETH:

"Owner", does hereby grant, convey and warrant to the City of Missoula, its successors and assigns, a permanent easement and right-of-way over, under and across the following described real property:

Legal Description: *SUBDIVISION NAME, BLOCK NUMBER, LOT NUMBER, GEOCODE*

Street Address: *PROPERTY ADDRESS*

"Owner" grants to the City of Missoula, its successors and assigns an easement over, under, and across the above described property for the purpose of constructing, operating, maintaining, repairing, altering or reconstructing a STEP (septic tank effluent pump) sanitary sewer collection system. Each pumping unit shall consist of septic tank, pumping system, electrical conduit, and cable to the building, control panel, force main, service box, and related appurtenances. The City of Missoula will be responsible to pump the septic tank when required. "Owner" shall replace the existing sewer service from the tank to the limits of vertical plumbing within the building if found defective. The building gravity service line from the building to the tank is not a part of the STEP system.

This easement is for the benefit of all properties now or hereafter served by the sanitary sewer system of the City. The Grantor acknowledges that they are the lawful owner(s) and seized of the real property over which and upon the easement described herein are granted, and that they have good and lawful right and authority to grant said easement.

The Owner will cause an on-site STEP sanitary sewer system to be installed by a licensed and bonded contractor on the above described property. The system is to be installed in conformance with all current City requirements for designs, materials, specifications, inspections, warranties, licenses, lien releases and permits. The system approved is to provide service for *PROPERTY ADDRESS* defined as the approved use. Upon acceptance and approval by the City, the "Owner" herein transfers and assigns rights in title and interest to these STEP sanitary sewer facilities to the City of Missoula and warrants them to be free of all liens, claims or encumbrances.

The City of Missoula and "Owner" concur and agree that constructing, repairing, altering or reconstructing of said sewer improvements by the City of Missoula shall be accomplished in such a manner that the private improvements existing on this described parcel of real property shall be disturbed to the least extent possible.

The City of Missoula and "Owner" agree that "Owner" shall undertake no alteration of the installed sewer system(s), including covering access to pump basin cleanouts, and the lockout

switch, without the prior written approval of the City of Missoula. Any damage by "Owner" or their agents shall be repaired by the City of Missoula at "Owner's" expense.

"Owner" and City agree that "Owner" has incurred no displacement costs or relocation costs by virtue of the Agreement. The City agrees to furnish, install, operate and maintain the pump system in a reasonable condition and to do the work in a workmanlike manner, promptly, neatly, and with as little interference to the real property and improvements thereon of Owner as reasonably practicable. Ownership of the STEP system on the described parcel of real property shall remain with the City of Missoula.

It is understood that the agreement by the City to operate and maintain the STEP system applies to domestic sewage only. The following STEP systems, related units, and wastes are specifically excluded from City operation and/or maintenance.

- a) Oil and sand interceptors and related pumps and vaults.
- b) Grease and/or garbage interceptors and related pumps and vaults.
- c) Industrial pretreatment systems.
- d) Any commercial or industrial waste other than domestic sewage.

"Owner" and City agree that the on-site STEP sanitary sewer system is designed and approved only for the above sited approved use. "Owner" may not alter or change the approved use without written approval by the City Engineer of the City of Missoula. Any alterations or changes in the approved use will require "Owner" to bring the entire system into conformance with all Federal, State and/or City of Missoula's current standards, regulations, codes, and/or requirements for sanitary sewer systems applicable for the change in use and sewer system. The cost related thereto shall be the sole responsibility of "Owner."

Binding Effect. This grant of Easement, which shall be recorded at the Missoula County Clerk and Recorder's Office, is binding upon the heirs, executors, personal representatives, assigns and successors of the parties hereto and shall run with the land.

OWNER(S)

OWNER'S NAME

OWNER'S NAME

STATE OF MONTANA)

) ss.

County of Missoula)

On this *DATE* day of *MONTH, YEAR*, before me, the undersigned, a Notary Public for the State of Montana, personally appeared *PROPERTY OWNERS' NAME(S)*, known to me to be the

person/s whose name/s is/are subscribed to the within instrument and acknowledged to me that he/she executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my Official Seal on the day and year in this certificate first above written.

(SEAL)

Printed Notary Name: _____

Notary Public for the State of Montana,

Residing at _____ Montana.

My Commission Expires: _____

MM/DD/YYYY

CITY OF MISSOULA ACCEPTANCE

ATTEST:

BY:

Martha L. Rehbein, CMC

City Clerk

John Engen

Mayor

(SEAL)

Sample of Tank Manufacture Warranty

TANK MANUFACTURER'S CERTIFICATION,
WARRANTY AND GUARANTEE
CITY OF MISSOULA FOR
SANITARY SEWER S.T.E.P. SYSTEMS

PROPERTY LEGAL DESCRIPTION: _____

PROPERTY ADDRESS: _____

Hunton Precast Concrete, Inc. (Manufacturer) certifies, warranties and guarantees to the City of Missoula, _____ (Property Owner), _____ (Contractor) and _____ (Engineer) that this S.T.E.P tank has been manufactured in accordance with City of Missoula standard specifications and approved submittals related thereto and is structurally sound and 100% watertight in normal use for a period of six years from the issue date of the system start-up and substantial completion by the City of Missoula.

If this S.T.E.P. tank develops structural deficiencies or leaks due to non-compliance with project documents or a defect in materials or workmanship during the life of the warranty, Hunton Precast Concrete, Inc. will repair or replace the tank.

Hunton Precast Concrete, Inc. will bear the re-installation costs of the tank in question in conformance with City standards and specifications and site restoration.

A representative of Hunton Precast Concrete, Inc. shall have the opportunity to be onsite to witness excavation and removal of the tank for the purpose of determining the cause of failure.

Hunton Precast Concrete, Inc. shall have a representative available for warranty excavation witness within forty-eight (48) hours of receipt of notice from _____ (Contractor) or The City of Missoula, or _____ (contractor) or the City may proceed with excavation, removal and/or repairs under warranty.

This warranty shall be null and void if the tank is improperly installed or misused. No other warranties, either expressed or implied, are hereby made for failure due to circumstances beyond Hunton Precast Concrete, Inc.'s control.

Tank Size: _____ Class: _____ Weight: _____ Serial #: _____

Date Manufactured: _____

Date of passing factory leak test: _____

Signature: _____
(Manufacturer's Authorized Corporation Official)

Date: _____

NOTE: All products supplied with and used in the fabrication of this tank are American made.