SECTION 221223.11 - FACILITY INDOOR POTABLE-WATER STORAGE TANKS

Revise this Section by deleting and inserting text to meet Project-specific requirements.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

1. GENERAL
	* + 1. RELATED DOCUMENTS

Retain or delete this article in all Sections of Project Manual.

* + - * 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
			1. SUMMARY
				1. Section Includes:

Steel, pressure, potable-water storage tanks.

Steel, nonpressure, potable-water storage tanks.

Steel, floating-wafer, potable-water storage tanks.

Steel, precharged, potable-water storage tanks.

Insulated, steel, potable-water storage tanks.

Plastic, pressure, potable-water storage tanks.

Plastic, nonpressure, potable-water storage tanks.

* + - 1. DEFINITIONS

Retain definition(s) remaining after this Section has been edited.

* + - * 1. HDPE: High-density polyethylene plastic.
				2. LDPE: Low-density polyethylene plastic.
			1. PERFORMANCE REQUIREMENTS

Retain paragraph below with "Seismic Qualification Certificates" paragraph in "Informational Submittals" Article for projects requiring seismic design. Model building codes and ASCE/SEI 7 establish criteria for buildings subject to earthquake motions. Verify requirements of authorities having jurisdiction.

* + - * 1. Seismic Performance: Steel water tanks shall withstand the effects of earthquake motions determined according to [**ASCE/SEI 7**] <**Insert requirement**>.

Retain subparagraph below to define the term "withstand" as it applies to this Project. Definition varies with type of building and occupancy and is critical to valid certification. Option is used for essential facilities where equipment must operate immediately after an earthquake.

The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified[**and the unit will be fully operational after the seismic event**]."

* + - 1. SUBMITTALS
				1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Manufacturer's installation instructions shall be provided along with product data.
				3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
				4. Product Data: For each type of product indicated.

Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for water storage tanks.

Include rated capacities, operating characteristics, and furnished specialties and accessories.

Retain first paragraph below if required by seismic criteria applicable to Project. Coordinate with Sections specifying mechanical vibration, supports, and seismic controls. See ASCE/SEI 7 for certification requirements for equipment and components. Coordinate with steel, potable-water storage tank articles for seismic requirements.

* + - * 1. Seismic Qualification Certificates: For steel water storage tanks, accessories, and components, from manufacturer.

Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

Retain first paragraph below for product certificates from manufacturers.

* + - * 1. Product Certificates: For each type of potable-water storage tank, from manufacturer.
				2. Source quality-control reports.
				3. Purging and disinfecting reports.
			1. QUALITY ASSURANCE

Retain one or both of first two paragraphs below only if specifying ASME-code tanks.

* + - * 1. ASME Compliance for Steel Tanks: Fabricate and label steel, ASME-code, potable-water storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," Division 1.
				2. ASME Compliance for FRP Tanks: Fabricate and label FRP, ASME-code, potable-water storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section X, "Fiber-Reinforced Plastic Pressure Vessels."

Retain first paragraph below if specifying any plastic tanks.

* + - * 1. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic potable-water storage tanks and components. Include appropriate NSF marking.
				2. Comply with NSF 61 Annex G, "Drinking Water System Components - Health Effects," for potable-water storage tanks. Include appropriate NSF marking.
			1. COORDINATION
				1. Coordinate sizes and locations of concrete bases with actual equipment provided.
1. PRODUCTS

Show locations, types, pressure ratings, capacities, and physical sizes of potable-water storage tanks on Drawings. Indicate air-precharge pressure required for steel, precharged, potable-water storage tanks.

* + - 1. STEEL, PRESSURE, POTABLE-WATER STORAGE TANKS
				1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=2097) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[A. O. Smith Corporation](http://www.specagent.com/Lookup?uid=123457131310).

[Bradford White Corporation](http://www.specagent.com/Lookup?uid=123457131312).

[Lochinvar, LLC](http://www.specagent.com/Lookup?uid=123457131298).

[Wessels Company](http://www.specagent.com/Lookup?uid=123457131307).

Approved equivalent.

* + - * 1. Description: Steel, [**horizontal**] [**vertical**], pressure-rated tank with cylindrical sidewalls.

Retain first paragraph below for projects in seismic areas.

* + - * 1. Fabricate supports and attachments to tank with reinforcement strong enough to resist tank movement during seismic event when tank supports are anchored to building structure.
				2. Construction: [**ASME code, steel**] [**Steel**], constructed with nontoxic welded joints, for [**125-psig**] [**150-psig**] <**Insert value**> working pressure.

Indicate manhole location on Drawings.

* + - * 1. Manhole: Watertight, for tank more than [**36 inches**] <**Insert dimension**> in diameter; same pressure rating as tank.

Retain second option in first paragraph below if ASME label is required.

* + - * 1. Tappings: Factory-fabricated[**stainless**] steel, welded to tank[**before testing and labeling**].

NPS 2 and Smaller: ASME B1.20.1, with female thread.

NPS 2-1/2 and Larger: ASME B16.5 “Pipe Flanges & Flanged Fittings”, flanged.

* + - * 1. Specialties and Accessories: Include tappings in tank and the following:

Retain specialties in subparagraphs below to suit Project.

Pressure relief valve.

Pressure gage.

Thermometer.

Air-charging connection.

Gage glass, brass fittings, compression stops, and gage-glass guard.

Retain first paragraph below or specify cast-in-place concrete saddles and detail on Drawings. Retain option if ASME label is required.

* + - * 1. Horizontal Tank Supports: Factory-fabricated steel saddles, welded to tank[**before testing and labeling**].

Retain option in first paragraph below if ASME label is required.

* + - * 1. Vertical Tank Supports: Factory-fabricated steel legs or steel skirt, welded to tank[**before testing and labeling**].
				2. Tank Interior Finish: Materials and thicknesses complying with NSF 61 Annex G “Drinking Water Systems Components - Health Effects” barrier materials for potable-water tank linings. Extend finish into and through tank fittings and outlets.

Retain one of two subparagraphs below.

Lining Material: [Cement] [Copper] <Insert material>.

Coating: [Epoxy resin] [Galvanized] [Glass] [Nickel] <Insert coating>.

Retain paragraph below to require tanks to have exterior coating.

* + - * 1. Exterior Coating: [Galvanized] [Manufacturer's standard enamel paint] [Primer paint] <Insert coating>.
			1. STEEL, NONPRESSURE, POTABLE-WATER STORAGE TANKS

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=2099) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Adamson Global Technology](http://www.specagent.com/Lookup?uid=123457131313).

[Highland Tank & Manufacturing Company, Inc](http://www.specagent.com/Lookup?uid=123457131314).

[Steel Tank and Fabricating Corporation (STAFCO)](http://www.specagent.com/Lookup?uid=123457131317).

Approved equivalent.

* + - * 1. Description: Steel, [**horizontal**] [**vertical**], nonpressure-rated tank with cylindrical sidewalls.

Retain first paragraph below for projects in seismic areas.

* + - * 1. Fabricate supports and attachments to tank with reinforcement strong enough to resist tank movement during seismic event when tank supports are anchored to building structure.
				2. Construction: Steel, constructed with nontoxic welded joints.

Indicate manhole location on Drawings.

* + - * 1. Manhole: Watertight, for tank more than [**36 inches**] <**Insert dimension**> in diameter.
				2. Cover for Open Tank: [**Plastic**] [**Steel, with lining same as or similar to tank lining and**] with shape that encloses top of tank.
				3. Tappings: Factory-fabricated[**stainless**] steel, welded to tank.

NPS 2 and Smaller: ASME B1.20.1, with female thread.

NPS 2-1/2 and Larger: ASME B16.5 “Pipe Flanges & Flanged Fittings”, flanged.

* + - * 1. Specialties and Accessories: Include tappings in the tank and the following:

Retain specialties in subparagraphs below to suit Project.

Vacuum relief valve.

Free air vent with insect screen.

Thermometer.

Gage glass, brass fittings, compression stops, and gage-glass guard.

Retain first paragraph below or specify cast-in-place concrete saddles and detail on Drawings. Retain option if ASME label is required.

* + - * 1. Horizontal Tank Supports: Factory-fabricated steel saddles, welded to tank[**before testing and labeling**].

Retain option in first paragraph below if ASME label is required.

* + - * 1. Vertical Tank Supports: Factory-fabricated steel legs or steel skirt, welded to tank[**before testing and labeling**].
				2. Tank Interior Finish: Materials and thicknesses complying with NSF 61 Annex G “Drinking Water Systems Components - Health Effects” barrier materials for potable-water tank linings. Extend finish into and through tank fittings and outlets.

Retain one of two subparagraphs below.

Lining Material: [Cement] [Copper] <Insert material>.

Coating: [Epoxy resin] [Galvanized] [Glass] [Nickel] <Insert coating>.

Retain paragraph below to require tanks to have exterior coating.

* + - * 1. Exterior Coating: [Galvanized] [Manufacturer's standard enamel paint] [Primer paint] <Insert coating>.
			1. STEEL, FLOATING-WAFER, POTABLE-WATER STORAGE TANKS

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=2101) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Cemline Corporation](http://www.specagent.com/Lookup?uid=123457131344).

[State Industries](http://www.specagent.com/Lookup?uid=123457131345).

[Wood, John Co](http://www.specagent.com/Lookup?uid=123457131343).

Approved equivalent.

* + - * 1. Description: Steel, vertical, pressure-rated tank with cylindrical sidewalls and with floating-wafer separator.

Retain first paragraph below for projects in seismic areas.

* + - * 1. Fabricate supports and attachments to tank with reinforcement strong enough to resist tank movement during seismic event when tank supports are anchored to building structure.
				2. Construction: [**ASME code, steel**] [**Steel**], constructed with nontoxic welded joints, for [**125-psig**] [**150-psig**] <**Insert value**> working pressure.

Indicate manhole location on Drawings.

* + - * 1. Manhole: Watertight, for tank more than [**36 inches**] <**Insert dimension**> in diameter; same pressure rating as tank.
				2. Floating Wafer: Nontoxic plastic, of diameter to match tank.

Retain second option in first paragraph below if ASME label is required.

* + - * 1. Tappings: Factory-fabricated[**stainless**] steel, welded to tank[**before testing and labeling**].

NPS 2 and Smaller: ASME B1.20.1 “Pipe Threads, General Purpose, Inch”, with female thread.

NPS 2-1/2 and Larger: ASME B16.5 “Pipe Flanges & Flanged Fittings”, flanged.

* + - * 1. Specialties and Accessories: Include tappings in tank and the following:

Retain specialties in subparagraphs below to suit Project.

Pressure relief valve.

Pressure gage.

Thermometer.

Air-charging connection.

Gage glass, brass fittings, compression stops, and gage-glass guard.

Retain option in first paragraph below if ASME label is required.

* + - * 1. Vertical Tank Supports: Factory-fabricated steel legs or steel skirt, welded to tank[**before testing and labeling**].
				2. Tank Interior Finish: Materials and thicknesses complying with NSF 61 Annex G “Drinking Water Systems Components - Health Effects” barrier materials for potable-water tank linings. Extend finish into and through tank fittings and outlets.

Retain one of two subparagraphs below.

Lining Material: [**Copper**] <**Insert material**>.

Coating: [Epoxy resin] [Galvanized] [Glass] [Nickel] <Insert coating>.

Retain paragraph below to require tanks to have exterior coating.

* + - * 1. Exterior Coating: [Galvanized] [Manufacturer's standard enamel paint] [Primer paint] <Insert coating>.
			1. STEEL, PRECHARGED, POTABLE-WATER STORAGE TANKS

Retain one of first two paragraphs below. Retain first paragraph for diaphragm tanks or second paragraph for bladder tanks.

* + - * 1. Steel, Precharged, Diaphragm, Water Storage Tanks:

[Manufacturers:](http://www.specagent.com/Lookup?ulid=2102) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[AMTROL, Inc](http://www.specagent.com/Lookup?uid=123457131319).

[Flo Fab Inc](http://www.specagent.com/Lookup?uid=123457131321).

[Taco Comfort Solutions](http://www.specagent.com/Lookup?uid=123457131323).

[Wessels Company](http://www.specagent.com/Lookup?uid=123457131324).

Approved equivalent.

Description: Steel, vertical, pressured-rated tank with cylindrical sidewalls and with air-charging valve and air precharge.

Retain first subparagraph below for projects in seismic areas.

Fabricate supports and attachments to tank with reinforcement strong enough to resist tank movement during seismic event when tank supports are anchored to building structure.

Operation: Factory-installed, butyl-rubber diaphragm.

* + - * 1. Steel, Precharged, Bladder, Water Storage Tanks:

[Manufacturers:](http://www.specagent.com/Lookup?ulid=2103) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Armstrong Fluid Technology](http://www.specagent.com/Lookup?uid=123457131347).

[Flo Fab Inc](http://www.specagent.com/Lookup?uid=123457131348).

[Taco Comfort Solutions](http://www.specagent.com/Lookup?uid=123457131349).

[Wessels Company](http://www.specagent.com/Lookup?uid=123457131350).

Approved equivalent.

Description: Steel, vertical, pressured-rated tank with cylindrical sidewalls and with air-charging valve and air precharge.

Retain first subparagraph below for projects in seismic areas.

Fabricate supports and attachments to tank with reinforcement strong enough to resist tank movement during seismic event when tank supports are anchored to building structure.

Operation: Factory-installed, butyl-rubber bladder.

Retain remaining paragraphs with either tank type retained above.

* + - * 1. Construction: [**ASME code, steel**] [**Steel**], constructed with nontoxic welded joints, for [**125-psig**] [**150-psig**] <**Insert value**> working pressure.

Retain second option in first paragraph below if ASME label is required.

* + - * 1. Tappings: Factory-fabricated[**stainless**] steel, welded to tank[**before testing and labeling**].

NPS 2 and Smaller: ASME B1.20.1, with female thread.

NPS 2-1/2 and Larger: ASME B16.5 “Pipe Flanges & Flanged Fittings”, flanged.

* + - * 1. Specialties and Accessories: Include tappings in tank and the following:

Verify availability of required specialties.

Pressure gage.

<Insert required specialties>.

Retain option in first paragraph below if ASME label is required.

* + - * 1. Vertical Tank Supports: Factory-fabricated steel legs or steel skirt, welded to tank[**before testing and labeling**].
				2. Tank Interior Finish: Materials and thicknesses complying with NSF 61 Annex G “Drinking Water Systems Components - Health Effects” barrier materials for potable-water tank linings. Extend finish into and through tank fittings and outlets.

Retain one of two subparagraphs below.

Lining Material: [Cement] [Copper] <Insert material>.

Coating: [Epoxy resin] [Galvanized] [Glass] [Nickel] <Insert coating>.

Retain paragraph below to require tanks to have exterior coating.

* + - * 1. Exterior Coating: [Galvanized] [Manufacturer's standard enamel paint] [Primer paint] <Insert coating>.
			1. INSULATED, STEEL, POTABLE-WATER STORAGE TANKS

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=2104) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[A. O. Smith Corporation](http://www.specagent.com/Lookup?uid=123457131338).

[Bradford White Corporation](http://www.specagent.com/Lookup?uid=123457131341).

[Lochinvar, LLC](http://www.specagent.com/Lookup?uid=123457131331).

[PVI; A WATTS Brand](http://www.specagent.com/Lookup?uid=123457131333).

Approved equivalent.

* + - * 1. Description: Steel, vertical, pressure-rated tank with cylindrical sidewalls.

Retain first paragraph below for projects in seismic areas.

* + - * 1. Fabricate supports and attachments to tank with reinforcement strong enough to resist tank movement during seismic event when tank supports are anchored to building structure.
				2. Construction: [**ASME code, steel**] [**Steel**], constructed with nontoxic welded joints, for [**125-psig**] [**150-psig**] <**Insert value**> working pressure.

Indicate manhole location on Drawings.

* + - * 1. Manhole: Watertight, for tank more than [**36 inches**] <**Insert dimension**> in diameter; same pressure rating as tank.

Retain second option in first paragraph below if ASME label is required.

* + - * 1. Tappings: Factory-fabricated[**stainless**] steel, welded to tank[**before testing and labeling**].

NPS 2 and Smaller: ASME B1.20.1, with female thread.

NPS 2-1/2 and Larger: ASME B16.5 “Pipe Flanges & Flanged Fittings”, flanged.

* + - * 1. Specialties and Accessories: Include tappings in tank and the following:

Retain specialties in subparagraphs below to suit Project.

Pressure relief valve.

Pressure gage.

Thermometer.

Air-charging connection.

Gage glass, brass fittings, compression stops, and gage-glass guard.

Retain option in first paragraph below if ASME label is required.

* + - * 1. Vertical Tank Supports: Factory-fabricated steel legs or steel skirt, welded to tank[**before testing and labeling**].
				2. Tank Interior Finish: Materials and thicknesses complying with NSF 61 Annex G “Drinking Water Systems Components - Health Effects” barrier materials for potable-water tank linings. Extend finish into and through tank fittings and outlets.

Retain one of two subparagraphs below.

Lining Material: [Cement] [Copper] <Insert material>.

Coating: [Epoxy resin] [Galvanized] [Glass] [Nickel] <Insert coating>.

* + - * 1. Insulation: Factory-installed fiberglass or polyurethane foam; surrounding entire tank except connections and other openings; suitable for tank operating temperature; and complying with ASHRAE/IESNA 90.1 “Energy Standard for Buildings Except Low-Rise Residential Buildings”.
				2. Jacket: Steel, with manufacturer's standard finish unless otherwise indicated.
			1. PLASTIC, PRESSURE, POTABLE-WATER STORAGE TANKS

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=2105) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Pentair, Inc](http://www.specagent.com/Lookup?uid=123457131352).

[Tankinetics, Inc](http://www.specagent.com/Lookup?uid=123457131351).

Approved equivalent.

* + - * 1. Description: FRP, vertical, pressure-rated tank with cylindrical sidewalls.
				2. Construction: [ASME code, composite FRP] [Composite FRP], [contact-molded] [or] [filament-wound], thermosetting-resin tank for [**100-psig**] [**125-psig**] [**150-psig**] <Insert value> working pressure.

Tank Lining Material: Nontoxic [**HDPE**] [**LDPE**] <**Insert material**> complying with NSF 61 Annex G barrier materials for potable-water tanks.

Indicate manhole location on Drawings.

* + - * 1. Manhole: Watertight, for tank more than [**36 inches**] <**Insert dimension**> in diameter; same pressure rating as tank.
				2. Tappings: Factory-fabricated, FRP flanged-end nozzle.

NPS 2 and Smaller: Include plastic-to-steel transition fitting from tank nozzle flange to ASME B1.20.1, female thread.

NPS 2-1/2 and Larger: ASME B16.5 “Pipe Flanges & Flanged Fittings”, flanged.

* + - * 1. Specialties and Accessories: Include tappings in tank and the following:

Retain specialties in subparagraphs below to suit Project.

Pressure relief valve.

Pressure gage.

Thermometer.

* + - * 1. Vertical Tank Supports: Factory-fabricated steel legs or FRP skirt attached by FRP brackets to tank sidewall.
				2. Tank Interior Finish: Materials and thicknesses complying with NSF 61 Annex G “Drinking Water Systems Components - Health Effects” barrier materials for potable-water tank linings. Extend finish into and through tank fittings and outlets.
			1. PLASTIC, NONPRESSURE, POTABLE-WATER STORAGE TANKS

Retain one of first two paragraphs below. Retain first paragraph for tanks fabricated of FRP and second paragraph for tanks fabricated of PE.

* + - * 1. FRP Potable-Water Storage Tanks:

[Manufacturers:](http://www.specagent.com/Lookup?ulid=2107) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[AMTROL, Inc](http://www.specagent.com/Lookup?uid=123457131356).

[Belding Tank Technologies, Inc](http://www.specagent.com/Lookup?uid=123457131354).

[L. F. Manufacturing, Inc](http://www.specagent.com/Lookup?uid=123457131355).

[Palmer Manufacturing and Tank Company](http://www.specagent.com/Lookup?uid=123457131353).

Approved equivalent.

Description: FRP, vertical, nonpressure-rated water tank; complying with NSF 61 Annex G “Drinking Water Systems Components - Health Effects” barrier materials for potable-water tanks.

Construction: [ASTM D3299, filament-wound] [or] [ASTM D4097, contact-molded] FRP.

Tappings: Factory-fabricated, FRP flanged-end nozzle.

NPS 2 and Smaller: Include plastic-to-steel transition fitting from tank nozzle flange to ASME B1.20.1 “Pipe Threads, General Purpose, Inch”, female thread.

[Exception: Tappings may be threaded FRP coupling integral with nozzle for connections for plastic piping.]

NPS 2-1/2 and Larger: Flanged.

Retain subparagraph below only if a stand is required.

Vertical Tank Support: Separate factory-fabricated steel stand capable of supporting tank.

* + - * 1. PE Potable-Water Storage Tanks:

[Manufacturers:](http://www.specagent.com/Lookup?ulid=2108) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Amprotec, Inc](http://www.specagent.com/Lookup?uid=123457131364).

[Premier Plastics Inc](http://www.specagent.com/Lookup?uid=123457131360).

[Steel Tank and Fabricating Corporation (STAFCO)](http://www.specagent.com/Lookup?uid=123457131362).

Approved equivalent.

Description: PE, vertical, flat-bottom, nonpressure-rated water tank; complying with NSF 61 Annex G “Drinking Water Systems Components - Health Effects” barrier materials for potable-water tanks.

Construction: ASTM D1998 “Standard Specification for Polyethylene Upright Storage Tanks”, molded PE.

Tappings: Factory-fabricated bulkhead fittings attached to tank.

NPS 2 and Smaller: With female thread.

NPS 2-1/2 and Larger: Flanged.

Retain subparagraph below only if a stand is required. Tanks are specified as flat-bottom shape and may be installed directly on a base.

Vertical Tank Support: Separate factory-fabricated steel stand capable of supporting entire bottom of tank.

Retain remaining paragraphs with either tank material retained above.

Indicate manhole location on Drawings.

* + - * 1. Manhole: Watertight, for tank more than [**36 inches**] <**Insert dimension**> in diameter.
				2. Cover for Open Tank: Plastic, same as or similar to tank material and with shape that encloses top of tank.
				3. Specialties and Accessories: Include tappings in the tank and the following:

Retain specialties in subparagraphs below to suit Project.

Vacuum relief valve.

Free air vent with insect screen.

Thermometer.

Gage glass, brass fittings, compression stops, and gage-glass guard.

* + - 1. SOURCE QUALITY CONTROL
				1. Test and inspect potable-water storage tanks according to the following tests and inspections and prepare test reports:

Pressure Testing for ASME-Code, Potable-Water Storage Tanks: Hydrostatically test to ensure structural integrity and freedom from leaks. Fill tanks with water, vent air, pressurize to 1-1/2 times tank pressure rating, disconnect test equipment, hold pressure for 30 minutes with no drop in pressure, and check for leaks.

Pressure Testing for Non-ASME-Code, Pressure, Potable-Water Storage Tanks: Hydrostatically test to ensure structural integrity and freedom from leaks at pressure of [**50 psig**] <**Insert value**> above system operating pressure, but not less than [**150 psig**] <**Insert value**>. Fill tanks with water, vent air, pressurize tanks, disconnect test equipment, hold pressure for two hours with no drop in pressure, and check for leaks.

Testing for Nonpressure, Potable-Water Storage Tanks: Fill tanks to water operating level to ensure structural integrity and freedom from leaks. Hold water level for two hours with no drop in water level.

* + - * 1. Repair or replace tanks that fail test with new tanks, and repeat until test is satisfactory.
1. EXECUTION
	* + 1. INSTALLATION
				1. Install water storage tanks on concrete bases, level and plumb, firmly anchored. Arrange so devices needing servicing are accessible.

Install horizontal tanks on [concrete piers and factory-fabricated] [fabricated steel supports and] saddles.

* + - * 1. Anchor tank supports and tanks to substrate.

Use steel or FRP straps over or around plastic tanks.

Retain first paragraph below if required. Insert special requirements or detail on Drawings.

* + - * 1. Install tank seismic restraints.
				2. Install thermometers and pressure gages on water storage tanks and piping if indicated. Thermometers and pressure gages are specified in Section 220519 "Meters and Gages for Plumbing Piping."

Revise first paragraph below to suit Project; coordinate with Drawings.

* + - * 1. Install the following devices on tanks where indicated:

Pressure relief valves.

Temperature and pressure relief valves.

Vacuum relief valves.

Tank vents on nonpressure tanks.

Connections to accessories.

* + - * 1. After installing tanks with factory finish, inspect finishes and repair damages to finishes.
			1. CONNECTIONS

Coordinate piping installations and specialty arrangements with schematics on Drawings and with requirements specified in piping systems. If Drawings are explicit enough, these requirements may be reduced or omitted.

* + - * 1. Piping installation requirements are specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.
				2. Install piping adjacent to potable-water storage tanks to allow service and maintenance.
				3. Connect water piping to water storage tanks with unions or flanges and with shutoff valves. Connect tank drains with shutoff valves and discharge over closest floor drains.

General-duty valves are specified in Section 220523.12 "Ball Valves for Plumbing Piping," Section 220523.13 "Butterfly Valves for Plumbing Piping," and Section 220523.15 "Gate Valves for Plumbing Piping."

Valves NPS 2 and Smaller: Gate or ball.

Valves NPS 2-1/2 and Larger: Gate or butterfly.

Drain Valves: NPS 3/4 gate or ball valve. Include outlet with, or nipple in outlet with, ASME B1.20.7, 3/4-11.5NH “Hose Coupling Screw Threads” thread for garden-hose service, threaded cap, and chain.

Water Piping Connections: Make connections to dissimilar metals with dielectric fittings. Dielectric fittings are specified in Section 221116 "Domestic Water Piping."

Retain subparagraph below for hydropneumatic booster systems with air supply.

Connect air piping to hydropneumatic tanks with unions or flanges and gate or ball valves. Make connections to dissimilar metals with dielectric fittings, which are specified in Section 221513 "General-Service Compressed-Air Piping."

* + - 1. IDENTIFICATION
				1. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."
			2. FIELD QUALITY CONTROL
				1. Perform the following final checks before filling:

Verify that air precharge in precharged tanks is correct.

Test operation of tank accessories and devices.

Verify that pressure relief valves have correct setting.

Manually operate pressure relief valves.

Adjust pressure settings.

Verify that vacuum relief valves are correct size.

Manually operate vacuum relief valves.

Adjust vacuum settings.

* + - * 1. Filling Procedures: Follow manufacturer's written procedures. Fill tanks with water to operating level.
			1. CLEANING

Retain this article if disinfecting of tanks is required. Requirements below were taken from plumbing codes. Revise to suit Project.

* + - * 1. Clean and disinfect potable-water storage tanks.
				2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed, use procedure described in AWWA C652 “Standard for Disinfection of Water Storage Facilities” or as described below:

Purge water storage tanks with potable water.

Disinfect tanks by one of the following methods:

Fill tanks with water-chlorine solution containing at least 50 ppm of chlorine. Isolate tanks and allow to stand for 24 hours.

Fill tanks with water-chlorine solution containing at least 200 ppm of chlorine. Isolate tanks and allow to stand for three hours.

Flush tanks, after required standing time, with clean, potable water until chlorine is not present in water coming from tank.

Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination made by authorities having jurisdiction shows evidence of contamination.

* + - * 1. Prepare written reports for purging and disinfecting activities.

END OF SECTION 22133.11