

SECTION 13206 - PRESSURIZED STEEL TANKS

City of San Diego, CWP Guidelines

PART 1 - GENERAL

1.1 WORK OF THIS SECTION

- A. The WORK of this Section includes providing fabricated welded steel pressurized tanks for unfired use, and associated fittings, supports, protective coatings, and appurtenances.

1.1 RELATED SECTIONS

- A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 09800 Protective Coating
2. Section 11000 Equipment General Provisions
- [3. Section 11373 Compressors, Base-Mounted]
4. Section 13300 Instrumentation and Control
5. Section 15034 Gauges
6. Section 15250 Pipe and Equipment Insulation

1.3 CODES

- A. The WORK of this Section shall comply with the current editions of the following codes as adopted by the City of San Diego Municipal Code:

1. Uniform Building Code

1.4 SPECIFICATIONS AND STANDARDS

- A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section:

1. ASME Code Boiler and Pressure Vessel Code, Section VIII, Rules for Construction of Pressure Vessels, Division 1
2. ASTM A 36 Specification for Structural Steel
3. 49 CFR 172.101 Code of Federal Regulations, Part 172, Section 101 - Hazardous Materials Table
4. 49 CFR 173.315 Code of Federal Regulations, Part 173, Section 315 - Compressed Gases in Cargo Tanks and Portable Tanks
5. 49 CFR 178 Code of Federal Regulations, Part 178, Subpart J - Specifications for Containers for Motor Vehicle Transportation
6. Chlorine Institute Non-Refrigerated Liquid Chlorine Storage

Pamphlet 5

7. Chlorine Institute Pamphlet 66 Chlorine Tank Car Loading, Unloading, Air Padding, and Hydrostatic Testing

1.5 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300:

1. List of materials and coatings used.
2. Detail drawings or manufacturer's literature to indicate compliance with the indicated requirements.
3. Dimensional drawings indicating mounting and anchorage requirements.

1.6 OWNER'S MANUAL

A. The following shall be included in the OWNER'S MANUAL in compliance with Section 01300:

1. Certification and ASME data reports in accordance with 49 CFR 178.337 (or other similar Section for the tank specifications used). The certification shall include certification of post weld heat treatment, joint radiography and hydrostatic testing.
2. Fabrication drawings.
3. Chlorine Institute drawings for appurtenances provided.
4. Copy of structural calculations for the support system signed by a Registered Structural Engineer registered in California.

1.7 FACTORY TESTING

- A. After fabrication but prior to application of linings each tank shall be tested in accordance with the ASME code.

PART 2 - PRODUCTS

2.1 GENERAL

- A. **Materials:** Tanks shall be constructed of ASTM A 36 steel unless otherwise indicated.
- B. **Nameplates and Code Stamps:** Tanks shall be designed, fabricated and tested in accordance with the ASME code. Each tank shall bear a stainless steel ASME nameplate. Each nameplate shall bear the applicable code symbol. Manufacturer shall be authorized to apply the applicable code symbols.
- C. **Pressure Rating:** Unless otherwise indicated, all unfired pressure tanks shall be fabricated in accordance with the ASME code for unfired pressure vessels, for a pressure rating of at least 50 percent above the maximum operating pressure.

- D. **Welding:** Weld reinforcement shall be as specified by ASME code and excessive reinforcement shall be ground down to within the requirements, and as required to install the lining systems. All internal corners and edges shall be ground to a 1/8-inch radius, or a greater radius if required by the lining system.
- E. **Fittings and Attachments:** Fittings shall be in accordance with Section 11000. Fittings larger than 1 inch shall be flanged. Fittings 1-inch and smaller shall be NPT threaded. Openings shall be reinforced in accordance with the ASME Code. Access openings shall be flanged, and, unless otherwise indicated, have a nominal diameter of at least 24 inches. The cover plate and flange of access openings shall each have a net thickness, after machining, of at least 1/2-inch.
- F. All shell attachments for pipe supports, tank gages, instruments and other items shall be welded to the tank shell before application of the tank lining.
- G. **Restraint System:** The tank restraint system shall be designed for Seismic Zone [III] [IV]. Horizontal force for design shall be equal to at least [50] percent of the total weight of the tank plus contents or per UBC, whichever is greater. Vertical force for design shall be equal to at least [25] percent of the total weight of tank plus contents or UBC, whichever is greater. The restraint system shall be capable of withstanding the vertical and horizontal forces acting simultaneously. The restraint system shall also be capable of withstanding the weight of the vessel full of water during hydrostatic testing.

Anchor bolts shall have a nominal diameter of at least 3/4-inch, unless otherwise indicated, and shall be anchored into concrete foundations using methods designed to transfer the full ultimate strength of the anchor bolt to the concrete foundation. Anchor bolts shall be attached to the tank by use of anchor bolt chairs or rings, as required, and such chairs or rings shall be designed to transfer the full ultimate strength of the bolt, or [150] percent of the calculated load, whichever is less, to the tank shell.

- H. **Tank Schedule:** The items specified under this Section shall be furnished by manufacturers having experience in the manufacture of similar products and having a record of successful installations. The following welded steel tanks are included in this Section:

<u>I.D. No.</u>	<u>Service</u>	<u>Diameter (in.)</u>	<u>Capacity (gallons)</u>	<u>Max. Operating Pressure (psig)</u>
[]	[]	[]	[]	[]
[]	[]	[]	[]	[]
[]	[]	[]	[]	[]
[]	[]	[]	[]	[]

2.2 SURGE TANKS

- A. **Design:** Surge tanks shall be of the size indicated and shall be designed with a 1/16-inch corrosion allowance.
- B. **Appurtenances:** Appurtenances shall include mounting flanges, drain valves, lifting lugs, and 3 brass try valves to determine water level. The pneumatic fill valves shall be of Type 316 stainless steel.

- C. **Protective Coating:** Interior surfaces of the tank shall be factory-coated with System [100] per Section 09800 at a minimum dry film thickness of [10] mils. A layer of liquid silicon shall be provided to reduce air absorption.
- D. **Air Charging:** The surge tank shall be fully charged with air in accordance with the manufacturer's instructions prior to field testing the system. Final adjustments in pressure shall be made after installation.

2.3 EXPANSION TANKS

- A. **General:** Expansion tanks shall be [horizontal] tanks, designed for the maximum operating temperature indicated. Tanks shall be provided with sealed-in bladder or diaphragm to physically separate the liquid from the air cushion. The bladder or diaphragm shall be [butyl rubber] suitable for use with [240] degree F water. Tanks shall be provided with lifting lugs.
- B. **Appurtenances:** Each tank shall be provided with the following accessories:
 - 1. Air Charging Valve: Valve shall be standard tire valve type.
 - 2. Drain Connection: Drain connection shall be the manufacturer's standard size for the tank size.
 - 3. Manual Air Vent Valve: The valve shall be a screw driver operated, low projection type vent for shallow height clearance installation. The valve shall be designed for the tank pressure rating with a minimum operating pressure of 125 psig and for a maximum operating temperature of [240] degrees F. The connection shall be a 1/8-inch male pipe thread.
 - 4. Pressure Gauge: Pressure gauges shall be in accordance with Section 15034, with a 0-[] psi dial range. Pressure gauge shall be separated from the tank by ball valves and insulating bushings.
- C. **Protective Coating:** Interior surfaces of the tanks shall be factory coated with system [100] per Section 09800.
- D. **Insulation:** After installation, tanks for heated systems shall be insulated in accordance with Section 15250.
- [E. **Controls:** Control system shall be provided per Section 13300.]

2.4 CHLORINE STORAGE TANK

- A. **General:** Unless otherwise indicated, chlorine storage tanks and appurtenances shall be horizontal tanks designed in accordance with 49 CFR 172.101, 49 CFR 173.315, and 49 CFR 178.320; items not covered by these federal regulations shall be designed in accordance with the Chlorine Institute Pamphlet 5. Tanks shall be designed for liquid storage with operating temperatures no lower than minus 40 degrees F. Butt-welded joints shall be fully radiographed and the tank shall be post weld heat treated. Tank wall thickness shall include a minimum corrosion allowance of 1/8-inch.
- B. **Structural Design:** Tanks, saddles, supports, and anchorage shall be designed for Seismic Zone IV. Calculations shall be performed by a Registered Structural Engineer registered in the State of California.

- C. **Tank Openings:** The manway shall be designed in accordance with paragraph 4.3 "Manway Arrangement for Single Unit Tank Cars," Chlorine Institute Pamphlet 66, including safety relief valve, angle valves, and excess flow valves.
- D. **Factory Testing:** Tanks shall be hydrostatically tested to a minimum of 150 percent of the maximum operating pressure.

2.5 MANUFACTURERS

- A. Products of the type indicated shall be provided by the following manufacturers (or equal):
 - 1. Surge tanks:
 - Greer Hydraulics
 - Fluid Kinetics
 - 2. Expansion tanks:
 - Amtrol
 - Amstrong
 - Bell and Gossett
 - 3. Manual air vent:
 - Amstrong 505A
 - Bell and Gossett 4V

PART 3 -- EXECUTION

3.1 GENERAL

- A. **Installation:** Installation in accordance with the recommendations of the manufacturer.
- B. **Chlorine Storage Tank:** Tanks shall be cleaned and dried in the field prior to placing in service in accordance with Chlorine Institute Pamphlet 5. The tank will be considered dry when air within the tank has a dewpoint of minus 40 degrees F or less. Chlorine gas shall then be introduced to the tank to a pressure of 100 psig and leak tested in accordance with Chlorine Institute Pamphlet 5.

** END OF SECTION **