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**HighDRO® Aboveground Vertical Cylindrical Single-wall Steel**

**Fire Protection Water Storage Tank with Bottom Drain Pipe and Anti-Vortex Plate**

**Product Guide Specification**

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| Specifier Notes: This product guide specification is written according to the Construction Specifications Institute (CSI) 3-Part Format, including *MasterFormat, SectionFormat,* and *PageFormat,* as described in *The Project Resource Manual - CSI Manual of Practice, Fifth Edition.*This section must be carefully reviewed and edited by the Architect or Engineer to meet the requirements of the project and applicable codes and regulations. Coordinate this section with other specification sections and the Drawings. **Delete all “Specifier Notes” after editing this section.**Section numbers are from *MasterFormat 2014 Edition*. |

**SECTION 21 41 00**

HIGHDRO® STORAGE TANK(S) FOR FIRE-SUPPRESSION WATER

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| Specifier Notes: This section covers Highland Tank & Mfg. Co., Inc., HighDRO® Aboveground Vertical Cylindrical, Single-wall Steel Water Storage Tankfor Fire Suppression with Bottom Drain Pipe and Anti-Vortex Plate Model20000AVSWHDFPTBDCSI126**.** Consult Highland Tank for assistance in editing this section for the specific application. |

PART 1 GENERAL

1.1 SECTION INCLUDES

A. HighDRO® Aboveground Vertical Cylindrical, Single-wall Steel Fire Protection Water Storage Tank(s) for Fire Suppression.

1.2 RELATED REQUIREMENTS

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| Specifier Notes: Edit the following list of related sections as required. Delete related sections not required. List other sections with work directly related to this section. |

A. Section 03 15 19 - Cast-In Concrete Anchors (Anchor Bolts for Anchor Chairs)

B. Section 03 30 00 - Cast-in-Place Concrete (Concrete for Anchor Pad)

C. Section 05 05 19 - Post-Installed Concrete Anchors

D. Section 09 96 00 - High-Performance Coatings

E. Section 21 10 00 - Water-Based Fire-Suppression Systems

F. Section 21 41 16 - Elevated Storage Tanks for Fire-Suppression Water

F. Section 31 00 00 - Earthwork

1.3 REFERENCE STANDARDS

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| Specifier Notes: List reference standards mentioned in this section, complete with designations and titles. Delete reference standards not included in this edited section. This provision does not require compliance with reference standards, but is merely a listing of those used. |

1. AISC - American Institute of Steel Construction: Manual of Steel Construction
2. ANSI - American National Standards Institute
3. ASME - American Society of Mechanical Engineers
* Pipe Flanges and Flanged Fittings
* Forged Fittings, Socket-Welding and Threaded
1. ASTM - American Society for Testing and Materials
* ASTM Standard Specification for Carbon Structural Steel - ASTM International
1. AWS - American Welding Society
* Structural Welding Code - Steel
1. AWWA - American Water Works Association
* AWWA D100 - Welded Carbon Steel Tanks for Water Storage
* AWWA D102 - Standard for Coating Steel Water Storage Tanks
1. IBC - International Building Code - International Code Council, Inc.
2. NEC - National Electric Code

1. NEMA - National Electric Manufacturers Association
2. NFPA – National Fire Protection Association
* NFPA 22 - Water Storage Tanks for Fire Protection Systems
* NFPA 1142 - Water Supplies for Suburban and Rural Fire Fighting
1. NSF - National Sanitation Foundation International
* NSF/ANSI Standard 61: Drinking Water System Components - Health Effects
1. OSHA - U. S. Department of Labor, Occupational Safety and Health Administration
* OSHA 29 CFR 1910, Occupational Safety and Health Standards
1. PEI - Petroleum Equipment Institute
* RP200, Recommended Practices for Installation of Aboveground Liquid Storage Systems
1. SSPC - Steel Structures Painting Council/NACE - National Association of Corrosion Engineers
* SSPC-SP 6/NACE No. 3, Commercial Blast Cleaning
* SSPC-SP 10/NACE No. 2, Near-White Blast Cleaning
1. STI - Steel Tank Institute
2. UL - Underwriters Laboratories, Inc.
* UL 142 - Steel Aboveground Tanks

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| Specifier Notes: The codes and standards listed are as of the date of this Specification. Codes and standards are continuously updated. The Contractor/Specifier shall confirm the construction standard edition enforced by the authority having jurisdiction. |

1.4 SUBMITTALS

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| Specifier Notes: Edit submittal requirements as required. Delete submittals not required. |

1. Comply with Section 01 33 00 – Submittal Procedures.
2. Shop Drawings: Submit shop drawings of the aboveground fire protection water storage tank(s) by the manufacturer showing principal dimensions and location of all fittings in accordance with AWWA D100.
3. Product Data: Submit manufacturer’s product data, including:
	1. Brochures/Catalogs specifically describing aboveground vertical single-wall steel water storage tank(s) for fire suppression.
	2. Technical Data Sheets on NSF/ANSI Standard 61 compliant internal protective lining.
	3. Design Force Calculations for seismic shall be in accordance with AWWA D100, Section 13, IBC or as adopted by the local jurisdiction.
	4. Design Force Calculations for dead, roof and wind loads shall be calculated in accordance with AWWA D100, Section 3, IBC or as adopted by the local jurisdiction.
	5. Installation, operation and maintenance instructions.
4. Quality Control: Quality control, inspection procedures, and reports shall be considered part of the submittal package.
5. Manufacturer’s Certification:
6. Submit manufacturer’s certification that the aboveground vertical single-wall steel water storage tank(s) for fire suppression comply with specified requirements and are suitable for the intended application. Storage tank(s) intended solely for fuel storage shall not be permitted.
7. Signed Certified Manufacturing Statement: A clear statement that:
	1. All structural and pipe welds as specified herein shall be performed by certified welders.
	2. The aboveground vertical single-wall steel water storage tank(s) for fire suppression is fabricated in the United States of America. (*See* Appendix A).
8. Warranty Documentation: Submit manufacturer’s standard warranty.

Specifier Notes: There shall be a limit to the number of submittals for the specified aboveground fire protection water storage tank. If the fire protection water storage tank is not “Approved” or “Approved as Noted” on the second submittal for approval, the engineer reserves the right to refuse further submittals from the same manufacturer and may require the contractor to submit for approval a different manufacturer’s product. [MAKE BOX YELLOW]

1.5 QUALITY ASSURANCE

1. Manufacturer’s Qualifications:
	1. Manufacturer regularly engaged, for past 10 years, in manufacture of aboveground vertical single-wall steel water storage tank(s) for fire suppression of similar type to that specified.
	2. Manufacturer shall provide written documentation that the aboveground steel fire protection water storage tank was “Made in USA.” The product must be "all or virtually all" fabricated in the United States, including the 50 states, the District of Columbia, and U.S. territories and possessions.

B. Installer's Qualifications:

1. Installer regularly engaged, for past 5 years, in installation of aboveground vertical single-wall steel water storage tank(s) for fire suppression of similar type to that specified.
2. Employ persons trained for installation of aboveground vertical single-wall steel water storage tank(s) for fire suppression.

1.6 DELIVERY, STORAGE, AND HANDLING

1. Deliver, store, and handle aboveground vertical single-wall steel water storage tank(s) for fire suppression in accordance with manufacturer’s instructions.
2. Protect aboveground vertical single-wall steel water storage tank(s) for fire suppression during delivery, storage, handling and installation to prevent damage.

1.7 WARRANTY

1. Warranty Period:

1. The manufacturer shall:

a. Warrant its products to be free from defects in material and workmanship for a period of one (1) year from the date of shipment. The warranty shall be limited to repair or replacement of the defective part(s).

b. Warrant aboveground vertical single-wall steel water storage tank(s) for fire suppression against structural failure due to defective materials or poor workmanship for a period of one (1) year.

c. Warrant interior and exterior coatings of aboveground vertical single-wall steel water storage tank(s) for fire suppression against defects under normal usage conditions for a period of one (1) year on terms provided by manufacturer.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Highland Tank & Mfg. Co., Inc.

 One Highland Road

 Stoystown, PA 15563

 Phone: 814-893-5701

 Fax: 814-893-6126

 E-mail: info@highlandtank.com

 Website: [www.highlandtank.com](http://www.highlandtank.com)

2.2 HIGHDRO® ABOVEGROUND VERTICAL CYLINDRICAL SINGLE-WALL STEEL WATER

 STORAGE TANK(S) FOR FIRE-SUPPRESSION

1. HighDRO® aboveground vertical cylindrical single-wall steel water storage tank(s) for fire-suppression water near atmospheric pressure. The water storage tank:

1. Must be fabricated with a liner certified to NSF/ANSI Standard 61: Drinking Water System Components - Health Effects.

2. Must be installed aboveground, at or near grade level.

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| Specifier Notes: Specify quantity. |

1. Quantity: \_\_\_\_\_\_\_\_
2. Nominal water storage tank capacity: 20,000-gallons., as indicated on the drawings.
3. Nominal water storage tank dimensions:
4. Nominal diameter: 10-feet, 6-inches, as indicated on the drawings.
5. Nominal height: 31-feet, 0-inches, as indicated on the drawings.
6. Conformance:
7. The fire protection water storage tank shall be designed and fabricated in accordance with UL-142 Standard for Steel Aboveground Tanks, Single-Walled construction and AWWA D100 Welded Carbon Steel Tanks for Water Storage.
8. Pressure testing of new tank. The fire protection water tank’s, welds, seams and connecting fittings must be factory-tested for tightness using standard engineering practices. Tank must be guaranteed by the manufacturer to be tight.
9. Storage tank shall be coated for potable water service in accordance with AWWA D102.
10. Storage tank liner shall be certified to NSF/ANSI Standard 61: Drinking Water System Components - Health Effects.
11. The fire protection water storage tank shall have the structural strength to withstand static and dynamic hydraulic loading while empty and during operating conditions.

F. Construction:

1. The fire protection water storage tank shall be cylindrical, vertical, atmospheric-type steel tank intended for storage of fire-suppression water.
	1. Water storage tank shall be of single-walled construction.
	2. Water storage tank shall be fabricated of \_\_\_\_\_\_ mild carbon steel with shell seams of continuous lap weld construction.
	3. The water storage tank shall be fabricated, inspected and pressure tested for leakage before shipment from the factory by manufacturer as a completely assembled, single vessel ready for installation. The water storage tank shall be a pre-packaged, pre-engineered, ready to install unit. Sectionalized, bolted steel storage tanks are not permissible.
	4. A means of grounding the tank shall be provided.
2. Loading Conditions - Water storage tank shall meet the following design criteria:
	1. Internal Load – Water storage tank shall withstand a 5-psig air test (3-psig for >12’) with a 5:1 safety factor.
	2. Vacuum Test - To verify structural integrity, water storage tank shall be designed to withstand a vacuum test to 11.5” of mercury.
	3. Ancillary Equipment – Water storage tank shall be capable of supporting internal equipment platforms, drop/fill/suction tubes, and ladders when installed according to storage tank manufacturer’s current installation instructions.
3. Product Storage:
	1. Storage tank shall be capable of storing water products with a specific gravity up to 1.1

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| Specifier Notes: Typical Fire Protection Water Storage Tank Fittings include: Supply (Suction Outlet with Vortex Breaker), Vent, Overflow, Fill (Inlet), Gauge and Sensor. Please review your project to determine the appropriate size and quantity of the tank fittings. Flanged Fittings are preferred except for small (less than 2”) opening, where stainless steel threaded fittings are preferred. |

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| Specifier Notes: Specify quantity of threaded NPT fittings (add entries as required). |

1. Threaded NPT Fittings: Stainless Steel (to prevent corrosion in threaded area).
2. Threaded fittings with thread protectors shall be supplied as follows:
	1. \_\_\_ Inch diameter, intended for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ usage, located as indicated on the drawings
	2. \_\_\_ Inch diameter, intended for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ usage, located as indicated on the drawings
	3. \_\_\_ Inch diameter, intended for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ usage, located as indicated on the drawings
	4. \_\_\_ Inch diameter, intended for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ usage, located as indicated on the drawings
	5. \_\_\_ Inch diameter, intended for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ usage, located as indicated on the drawings
	6. \_\_\_ Inch diameter, intended for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ usage, located as indicated on the drawings

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| Specifier Notes: Specify quantity of flanged fittings (add entries as required). Specify size, class, facing and type of flanges (add entries as required). |

1. Flanged Fittings: Flanged fittings with flange protectors shall be supplied as follows:
2. \_\_\_ Inch diameter, Class: \_\_\_\_#, Type: \_\_\_\_\_ (RF – Raised Face, FF – Flat Face / SO – Slip On, WN –Weld Neck) Flange intended for \_\_\_\_\_\_\_\_\_\_ usage, located as indicated on the drawings
3. \_\_\_ Inch diameter, Class: \_\_\_\_#, Type: \_\_\_\_\_ (RF – Raised Face, FF – Flat Face / SO – Slip On, WN –Weld Neck) Flange intended for \_\_\_\_\_\_\_\_\_\_ usage, located as indicated on the drawings
4. \_\_\_ Inch diameter, Class: \_\_\_\_#, Type: \_\_\_\_\_ (RF – Raised Face, FF – Flat Face / SO – Slip On, WN –Weld Neck) Flange intended for \_\_\_\_\_\_\_\_\_\_ usage, located as indicated on the drawings
5. \_\_\_ Inch diameter, Class: \_\_\_\_#, Type: \_\_\_\_\_ (RF – Raised Face, FF – Flat Face / SO – Slip On, WN –Weld Neck) Flange intended for \_\_\_\_\_\_\_\_\_\_ usage, located as indicated on the drawings
6. \_\_\_ Inch diameter, Class: \_\_\_\_#, Type: \_\_\_\_\_ (RF – Raised Face, FF – Flat Face / SO – Slip On, WN –Weld Neck) Flange intended for \_\_\_\_\_\_\_\_\_\_ usage, located as indicated on the drawings
7. \_\_\_ Inch diameter, Class: \_\_\_\_#, Type: \_\_\_\_\_ (RF – Raised Face, FF – Flat Face / SO – Slip On, WN –Weld Neck) Flange intended for \_\_\_\_\_\_\_\_\_\_ usage, located as indicated on the drawings

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| Specifier Notes: Manholes shall be provided in the locations specified. At least one manhole shall be circular with a minimum diameter of 24”, however larger diameter manholes are available. Typical diameters are 24”, 30”, and 36”. Water storage tanks larger than eight foot diameter or 5,000 gallons require a minimum of one additional manhole. Rectangular manways with pneumatic assist covers are available upon request. |

1. Manholes:

	* 1. Manhole 1, conforming to AWWA D100, circular, minimum 30-inches in diameter. Manhole to be located as indicated on the Drawings
		2. Manhole 2 conforming to AWWA D100, [circular, minimum 24-inches in diameter]. Manhole to be located as indicated on the Drawings.

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| Specifier Notes: Manhole covers are heavy and potential for injury exists in handling them. A means of supporting them during installation or removal is recommended. |

c. Manhole covers shall have [lifting eye] [surface handles] [hinge or davit].

1. Roof access hatch conforming to AWWA D100 shall be located near roof ladder and shall be provided with hinged cover and locking hasp.
2. Overflow:
3. A \_\_\_\_\_\_\_ inch diameter overflow to ground in accordance with AWWA D100 shall be provided. The overflow shall terminate near grade and be directed away from the foundation for discharge to a drainage inlet structure.
4. Vent:
5. A vent assembly of \_\_\_\_\_\_\_\_\_ square inches open area in accordance with AWWA D100 shall be furnished and installed above the maximum water level of sufficient capacity so that as maximum design rate of water fill or withdrawal, the resulting interior design pressure / vacuum will not exceed = 2.0 / -0.5 ounces per square inch.
6. The overflow pipe shall not be considered to be a tank vent.
7. The vent shall be so designed in construction as to prevent the entrance of birds and/or animals by including a 4 mesh (1/4” opening size) galvanized screen. If required by the contract drawings, a 16 mesh (1/16” opening size) galvanized screen will be installed to prevent the entrance of insects. However, if the tank is located in an area where heavy frost is common during the winter months an additional pressure / vacuum relief must also be provided.
8. Bottom Supply (Drain) Pipe equipped with Vortex Breaker:
	1. Bottom Supply (Drain) Pipe allows for connection to a vertical pump vault in order to remove water from the tank at the specified rate of flow (fire flow).
	2. The Bottom Supply (Drain) Pipe shall be equipped with a vortex breaker installed inside the tank according to NFPA-22. The vortex breaker shall be designed to eliminate air entrainment that is potentially damaging to the vertical pump.
9. Corrosion Protection System:
	1. Exterior Protective Coating:
		1. Surface Preparation: Steel Grit blast - SSPC-SP 6/NACE No.3 Commercial Blast Cleaning.
		2. Finish: AWWA D102 OCS #4 Acrylic polyurethane high performance finish paint system, 5-7 mils DFT, applied on the shell and heads. Color to be Reflective White with Gloss Finish.
	2. Interior Protective Coating:
		1. Surface Preparation: Steel Grit blast - SSPC-SP 10/NACE No. 2, Near-White Blast Cleaning.
		2. Finish: Internal surfaces coated with 15 mils DFT HighDRO®-Liner Plus Polyurethane Lining
			1. The lining must comply with NSF/ANSI 61 - Approved for potable water.
			2. The liner shall be applied on all internal surfaces in accordance with AWWA D102, ICS #4.
10. Lifting lugs: Lifting lugs shall be provided at balancing points to facilitate handling and installation.
11. Anchoring: Anchor Chairs shall be provided in accordance with requirements of calculations for seismic and wind loads determined in accordance with the IBC.
12. Identification plates: Plates to be affixed in prominent location and be durable and legible throughout equipment life.

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| Specifier Notes: Specify Optional Equipment |

1. HighDRO® Aboveground Fire Protection Water Storage Tank(s) Options/Accessories:
	1. UL listed Liquid Level Sensors and Controls:
	2. Water storage tank(s) shall be supplied with an audible and visual alarm system that indicates high level in the tank.
	3. Level sensor to be intrinsically-safe, tank-mounted magnetic float probes.
	4. Level sensor floats to be made of stainless steel.
	5. The control panel shall be NEMA 4X (FRP).
	6. A silence control shall be provided for the audible alarms.
	7. Power to the control panel is to be [ \_\_\_\_\_ ] volt, [\_\_\_\_\_ ] phase.
	8. Fill Tube:
	9. Provide Drop/Fill tube per drawings.
	10. Pipe shall be [stainless steel, carbon steel coated, PVC] and terminate per engineer’s drawing.
	11. Exterior Ladders:
		1. Ladders shall be of steel construction and designed in accordance with OSHA standards and acceptable engineering practices, located as indicated on the Drawings.
		2. Safety Cage and/or intermediate step off platform for ladder shall be provided should height of ladder dictate the requirement of these items.
	12. Stairway: Provide an external stairway to allow access to top of tank for filling and/or maintenance that complies with applicable OSHA standards (treads, risers, handrails, etc.) and building codes.
	13. Platforms and Walkways: Platforms and Walkways shall be of steel construction with fiberglass decking and designed in accordance with OSHA standards and acceptable engineering practices. Platform/walkway shall be located offset from tank center-line to provide access to tank fittings, as indicated on the drawings. Platform/walkway shall include post and chain access to tank on one side, and solid railing on the opposite side
	14. Roof Perimeter Guardrails: Two partial perimeter guardrails and toe board around the perimeter of the deck shall be provided and installed in accordance with NFPA-22.

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| Specifier Notes: AWWA D100 does not recommend internal ladders where ice may form. Specifier delete either carbon steel or aluminum construction material. |

* 1. Internal Ladder:
		1. Ladder shall be manufactured and installed in accordance with OSHA 1910.27 of [aluminum] [carbon steel, coated per AWWA D102 ICS #4] utilizing HighDRO®-Liner Plus Polyurethane lining, NSF/ANSI 61 Approved for potable water, minimum 15 mils DFT.].

PART 3 EXECUTION

3.1 GENERAL

1. Installation and testing shall be in strict accordance with the Highland Tank’s HighDRO® Fire Protection Water Storage Tank’s Installation Instructions available at [www.highlandtank.com](http://www.highlandtank.com).
2. No modifications shall be made to the water storage tank(s) without the prior written approval of the manufacturer and the Engineer. This includes any welding on tank shell, adding penetrations, modifying the tank structure, or repairing damage that might affect the integrity of the water storage tank(s). Unauthorized modifications will void warranty.
3. Contractor shall install water storage tank(s), piping, and equipment (valves, sensors, pumps, vents, gauges) in accordance with the manufacturers' installation instructions, industry standard recommended practices, and federal, state and local regulations.
4. Water storage tank(s) shall be handled, lifted, stored, and secured in accordance with the manufacturer's instructions.
5. Securely store the tank at the job site. The location should be selected to minimize tank relocations as work progresses.
6. Always store tanks in a secure area on level ground. Tanks may be stored outside. If necessary, tie down tanks with hold-down lugs to prevent movement due to wind.
7. Before any amount of liquid is stored in a tank, even on a temporary basis, the tank must be installed according to manufacturer’s installation instructions.
8. The hazards associated with the cleaning, entry, inspection, testing, maintenance or other aspects of storage tank(s) are significant. Safety considerations and controls should be established prior to undertaking physical activities associated with storage tank(s).
9. Never enter a storage tank or enclosed space, under any condition, without proper training and OSHA approved equipment. (Consult OSHA regulation 29 CFR §1910.146 “Permit Required Confined Spaces.”)
10. Entry and cleaning of water storage tank(s) must be per federal (OSHA), state, and local regulations as well as company requirements.
11. Familiarity with the Site.
	1. The Contractor shall familiarize itself with the location of all public utility facilities and structures that may be found in the vicinity of the construction.
	2. The Contractor shall conduct his operation to avoid damage to the utilities or structures.
	3. The Contractor is responsible for meeting all the requirements established by all governing agencies for utility work, as well as work affecting utilities and other government agencies.
	4. Regional and local building codes authorities shall be consulted for local requirements.
	5. Notify the Engineer of any local requirements not incorporated in the system as designed.
12. Foundation for tank shall be in accordance with AWWA D100 Section 12 or in accordance with the design of the Engineer of Record. Consult with a geotechnical engineer if the in situ soil is extremely soft or inherently unstable.

3.2 EXAMINATION

1. Examine area to receive aboveground fire protection water storage tank(s).
2. Notify site supervisor or engineer of conditions that would adversely affect installation.
3. Do not begin installation until unacceptable conditions are corrected.

3.3 PREPARATION

Specifier Notes: Include the following paragraph when specifying single-walled HighDRO® Fire Protection Water Storage Tank. [MAKE BOX YELLOW]

1. The site shall be prepared to ensure adequate support for the water storage tank and drainage of surface water.
	1. The foundation and tank supports shall be capable of supporting the weight of the tank and associated equipment when full.
	2. The foundation shall be comprised of reinforced concrete or other stable material designed to prevent tank movement, and must be rated for the specific wind loads and seismic zone for each tank location.
2. Water storage tanks located in areas subject to flooding must be protected against flotation.
3. Maintain legal separation distances from property lines, buildings, public ways, and other storage tanks. Caution: Distance requirements vary significantly between jurisdictions.
4. Air Test (if required):
	1. Perform air test of water storage tank(s) above ground before installation in accordance with manufacturer’s instructions in Highland Tank Installation Instructions or with PEI/RP200.
	2. Test Pressure: 5 psi maximum.
	3. Bubble solution applied to welded seams.
5. Before Placing Water Storage Tank(s) on reinforced concrete pad:
	1. Remove dirt clods and similar foreign matter from storage tank(s).
	2. Visually inspect storage tank(s) for damage.
	3. Notify site supervisor of damage to storage tank(s).
	4. Repair damaged areas of storage tank coating in accordance with Highland Tank Installation Instructions.

3.4 INSTALLATION

A. Install aboveground HighDRO® Fire Protection Water Storage Tank(s) in accordance with Highland Tank Installation Instructions and PEI/RP200.

B. Install water storage tank(s) at locations and to elevations indicated on the Drawings.

C. HighDRO® Fire Protection Water Storage Tank(s) Placed on Concrete Pad.

Specifier Notes: Specify the section number for cast-in-place concrete. [MAKE BOX YELLOW]

1. Concrete for pad: Specified in Section 03 30 00.

D. HighDRO® Fire Protection Water Storage Tank(s) handling:

1. Ensure equipment to handle water storage tank(s) is of adequate size to lift and lower storage tank(s) without dragging, dropping, or damaging storage tank or tank’s coating.

2. Carefully lift and lower water storage tank(s) with cables or chains of adequate length attached to lifting lugs provided.

3. Use spreader bar where necessary.

4. Do not use chains or slings around water storage tank’s shell.

5. Maneuver storage tanks with guidelines attached to each end of the tank.

E. Factory supplied saddles for field erection.

 1. Carefully position and lower the storage tank until properly set in a vertical position.

 2. Confirm that the tank base rests uniformly on the concrete pad.

 3. Ensure that anchor chairs and hold-down anchor bolts align.

 4. Securely fasten the anchor chairs to the anchor bolts.

 5. The storage tank shall be installed in an upright level position.

G. Plugs:

1. Remove plugs at unused water storage tank(s) openings, add pipe compound, and reinstall plugs in unused openings.

2. Do not cross-thread or damage storage tank(s) fittings when replacing plugs or installing tank’s piping.

H. Piping:

1. Piping shall be installed in accordance with Section 40 23 23 - Fire Protection Water Process Piping.

2. All piping shall be externally supported so that the weight of the piping is not transferred to the tank or connection.

I. Before Placing Water in Fire Protection Water Storage Tank(s):

1. Final Inspection: Visually inspect water storage tank(s), tank coating, and pipe connections.

**3.5 ELECTRICAL**

A. Installation of all electrical components including (electric level sensors, alarm/control panels, electronic valves, pumps):

1. Installation shall be in accordance with manufacturers' installation instructions and shall conform to state and local electrical codes with special attention to compliance with requirements for work in classified areas.

2. Provide proper electrical junction boxes, conduit and seal offs as specified in Article 500 514 of the National Electrical Code.

3. Contractor shall provide wiring and seal-offs for all conduits.

3.6 PROTECTION

A. Protect installed aboveground steel fire protection water storage tank(s) from damage during construction.

**3.7 START-UP, OPERATION AND MAINTENANCE**

A. HighDRO® Fire Protection Water Storage Tank(s) shall be started, operated and maintained according to the Highland Tank Installation Instructions in effect at time of installation.

B. Calibration and start-up of ancillary equipment shall be performed by factory-trained and qualified personnel.

**3.8 INSPECTION**

1. The tank operator should perform periodic walk-around inspections to identify and repair areas of damage to the tank or the coating and check for proper drainage around the tank area.

1. Should ground conditions change or settlement occur, take the appropriate steps to maintain proper drainage and prevent standing water near or under the tank area.

1. It is imperative that the tank exterior be inspected periodically to ensure that the integrity of the coating is maintained.

1. The frequency of periodic repainting will be based upon environmental factors in the geographic area where the tank is located.

2. Special consideration should be given to the selection of the paint, surface preparation and coating application.

3. The coating selected should be supplied by the manufacturer and deemed suitable for use with the current coating.

END OF SECTION

Appendix A

**CERTIFIED MANUFACTURING STATEMENT**

All Facility Aboveground Water Storage Tank(s), skid, structural, transmission piping, pipe and equipment supports/restraints welding shall be performed by individuals certified the American Welding Society (AWS) Structural Welding Code, Section 9.10.

The Facility Aboveground Water Storage Tank(s) shall be “Made in USA.” The product must be fabricated in the United States (includes the 50 states, the District of Columbia, and the U.S. territories and possessions).

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Company Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Title: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_