

## LCV Specification

### 1.0 Delivery, Handling and Installation

- 1.1 Furnish **UL 2245 LCV<sup>TM</sup>** precast concrete below grade fuel storage vault, or approved equal, as shown on drawings.
- 1.2 Handle and transport precast concrete fuel storage vault components with suitable equipment that will not damage or subject the product to excessive stresses.
- 1.3 Additional reinforcing, inserts, strong backs or other items shall be provided at time of installation per precast manufacturer recommendations for erection and handling stresses.
- 1.4 Install **LCV<sup>TM</sup>** precast concrete below grade fuel storage vault, or approved equal, as shown on drawings and according to precast manufacturer recommendations.
- 1.5 Field cutting shall not be allowed, except as indicated on the drawings, without prior approval of the Engineer/Architect and precast manufacturer.

### 2.0 Calculations and Drawings

- 2.1 Calculations for loading conditions shall be submitted as shown on shop drawings.
- 2.2 Shop drawings shall be stamped by a state registered professional engineer.

### 3.0 Quality Control Submittals

- 3.1 Information shall be submitted showing the precast concrete vault manufacturer has a minimum of five (5) years experience producing vaults or similar products.
- 3.2 Certificates of compliance shall be submitted including mill certificates for cement, aggregates, reinforcing steel, admixtures, gaskets and embedded items.
- 3.3 Manufacturer's concrete comprehensive strength cylinder test reports, ASTM C 31, shall be submitted.
- 3.4 Quality control personnel shall be certified to ACI concrete field testing technician, Grade 1.
- 3.5 Precast manufacturer shall prepare a minimum of three (3) standard concrete test cylinders for each casting per ASTM C 31.
- 3.6 Vault concrete test cylinder information shall be submitted by the precast manufacturer to the Engineer/Architect for review.

### 4.0 Vault Design

- 4.1 Vault shall be factory poured, reinforced, precast concrete.
- 4.2 Vault shall consist of two-piece construction (top and base).
- 4.3 Vault walls shall consist of a minimum of 6" precast, reinforced concrete.
- 4.4 The minimum volume of the bottom shall be  $\geq$  100% of the volume of the steel fuel storage tank.
- 4.5 The precast bottom section slab and walls shall be a monolithic casting.
- 4.6 No seams or joints shall be used below the 100% liquid containment level.
- 4.7 Vault shall include all hole penetrations for piping as shown on drawings.
- 4.8 Vault shall be designed in accordance with the American Concrete Institute Building Code Requirements for Reinforced Concrete (ACI 318 Latest Edition).
- 4.9 Loading shall be per ASTM C 857 "minimum structural design loading for underground precast concrete utility structures."
- 4.10 Vault shall be designed against flotation.

### 5.0 Tank Design

## **Product Specification**

- 5.1 Tank shall be an aboveground grade steel tank manufactured according to UL 142 specifications.
- 5.2 Tank shall be of the size and dimensions as shown on drawings.
- 5.3 Tank shall have continuous welds on inside and outside according to American Welding Society Standards.
- 5.4 Tank shall be pressure tested at 5 psi for 24 hours.
- 5.5 Tank shall have emergency vent as required by NFPA 30.
- 5.6 Tank openings shall be threaded.
- 5.7 Tank exterior shall be finished with a rust preventative primer.

### **6.0 Concrete and Raw Materials**

- 6.1 ASTM C 150 Portland Cement Type I, II or III shall be used.
- 6.2 Design strength shall be 5,000 psi minimum at 28 days.
- 6.3 Concrete aggregates shall meet ASTM C 33.
- 6.4 Maximum size of concrete aggregates shall be 3/4 inch.
- 6.5 Maximum water to cement ratio of .40 shall be permitted.
- 6.6 Silica fume additive and synthetic fiber secondary reinforcement may be used in the concrete mix.
- 6.7 Calcium Chloride shall not be used in the concrete mix.
- 6.8 Minimum quantities per cubic yard of concrete shall be the following: cement content = 705 lbs.; silica fume = 40 lbs.; high range water reducer = 25 oz./cwt cement; synthetic fibers = 1.5 lbs.
- 6.9 W.R. Grace WRDA-19, or approved equal meeting ASTM C 494, Type F shall be used { Air Content 5% (+/-) 1% }.
- 6.10 W.R. Grace Force 10,000 or approved equal, microsilica fume mineral admixture may be used.
- 6.11 W.R. Grace Fibers, or approved equal, polypropylene fibers may be used.
- 6.12 Precast manufacturer shall place, consolidate, finish and cure concrete in accordance with recommended practices of the American Concrete Institute.
- 6.13 Steam curing is permitted.
- 6.14 Casting forms shall be constructed of steel sufficient to maintain dimensional tolerances of the product.
- 6.15 Casting form surfaces shall be in "undamaged" condition to form an acceptable finish.
- 6.16 Slump to be 6" (+/-) 1.5"

### **7.0 Reinforcing Steel**

- 7.1 Deformed bars shall conform to ASTM A 615 GRADE 60.
- 7.2 Reinforcing bars to be welded shall conform to ASTM A 706 weldable Grade 60 or Grade 60 bars to be preheated as per ANSI/AWS D1.1-92 Structural Welding Code.
- 7.3 Welding of reinforcing steel shall conform to American Welding Society's ANSI/AWS D1.1-92 Structural Welding Code-Reinforcing Steel.
- 7.4 Welded wire fabric shall conform to ASTM 185 or 497 (Minimum Yield 66,000 psi)

### **8.0 Gaskets**

- 8.1 Premolded joint filler shall be Concrete Sealant CS-440, or approved equal.
- 8.2 Premolded joint filler shall be fuel and oil resistant.
- 8.3 External joint sealer shall be Concrete Sealant CS-212 Conwrap Barrier, or approved equal, conforming to ASTM C 877.

### **9.0 Access Covers**

- 9.1 Access covers shall be designed for AASHTO HS-20 wheel loading.
- 9.2 Access covers shall be water and air tight.
- 9.3 Access covers shall conform to the dimensions shown on the drawings and pertinent OSHA requirements.

**10.0 Loads**

- 10.1 Unit weight of soil = 120 psf.
- 10.2 Maximum soil cover = 2'-0"; minimum soil cover = 0'-0".
- 10.3 AASHTO HS-20-44 truck loading with impact.
- 10.4 2'-0" live load surcharge.
- 10.5 39.6 psf equivalent fluid pressure-lateral soil pressure above the water table.
- 10.6 81.4 psf equivalent fluid pressure-lateral soil pressure below the water table.
- 10.7 Water table at elevation of exterior roof slab of vault.

**11.0 Coatings**

- 11.1 Internal coating on bottom section shall be Sherwin Williams Shelcoate II meeting EPA requirements for secondary containment.
- 11.2 Interior coating on top section shall be Sherwin Williams Based Catalyzed Epoxy.