

Assmann

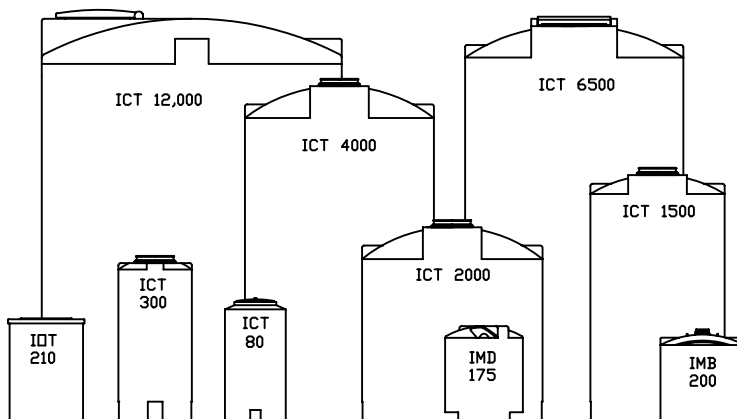
CORPORATION OF AMERICA



300 N. Taylor Rd. * Garrett, Indiana 46738 * (260) 357-3181 Fax: (260) 357-3738

A Proud Producer of Industrial Chemical Storage Tanks

Assmann Specification For Polyethylene Upright Storage Tanks



Manufacturing Specification for Vertical Storage Tanks

1. Scope

- 1.1 This specification covers polyethylene tanks manufactured in one-piece construction by rotational molding at our facility in Garrett, IN. The tanks are molded from FDA conforming linear polyethylene or cross-linked polyethylene for above ground installation and are capable of containing contents at atmospheric pressure. This specification covers flat bottom, closed top tanks 65-gallons to 12,000-gallons.
- 1.2 This specification does not cover the design of vessels intended for applications involving pressure above atmospheric, vacuum, burial, or temperatures above the maximum limit of the tank.
- 1.3 Assmann polyethylene tanks are designed and molded with a **uniform wall thickness** equal to or greater than the minimum thickness requirement per the Barlow Formula shown in this specification. This standard procedure in the Assmann manufacturing process allows the part to cure evenly throughout the entire surface area, thus allowing a more controlled and higher cross-linking percentage with less stress on the part when reaching the cooling process. The end result will give each unit greater structural integrity and a longer life span.
- 1.4 Assmann polyethylene tanks are **air cooled** in chambers with high velocity fans giving a controlled temperature drop, insuring a more uniform resin cure, less stress on the part, improved shrinkage parameter and a more consistent product.
- 1.5 ASTM D-1998-96 documentation is available at your request for additional charge.

2. Applicable Documents

2.1	ASTM Standards
D648	Heat distortion temperature
D638	Tensile properties
D790	Flexural properties of plastic
D883	Definitions of terms relating to plastics
D1505	Density by density gradient technique
D1693	Environmental stress crack resistance
D1921	Particle size (sieve analysis) of plastic
D2765	Degree of cross-linking ethylene plastics as determined by solvent extraction
D2837	Standard method for obtaining hydrostatic design basis for thermoplastic pipe materials
D3892	Practice for packaging/packing of plastics
F412	Definitions of terms relating to plastic piping
ARM Std.	Low temperature impact resistance (Falling dart test)

3. Terminology

- 3.1 General – definitions are in accordance with ASTM D883 and F412, unless otherwise specified.
- 3.2 Rotational molding – a four stage process consisting of loading resin in the mold; heating/fusion of the material while biaxially rotating; air-cooling, and removal.

4. Materials

- 4.1 The resin used shall be virgin FDA conforming polyethylene or cross-linked polyethylene.
- 4.2 All tanks used for outdoor installation shall contain a suitable ultraviolet stabilizer, minimum 0.3% 2-hydroxy-4-n-Octoxy-benzophenone or equivalent. The stabilizer shall be compounded into the polyethylene.
- 4.3 Cross-linked and LMDPE materials can be pigmented (black, blue, green, yellow, gray). Standard loading is limited to 0.02% to avoid degradation of material.
- 4.4 Tanks molded in cross-linked polyethylene shall be Marlex resins supplied by Phillips 66 (CL-200) or equivalent.
- 4.5 Tanks molded in LMDPE polyethylene shall be Exxon Escorene 8461 resins by Exxon or equivalent.
- 4.6 No fillers shall be added to either resin.
- 4.7 The resin suppliers' recommended maximum material use temperature for crosslinked resin is 150 degrees F, and for LMDPE resins is 120 degrees F. Generally, the less exposure to elevated temperatures, the greater the tank life.
- 4.8 Published chemical resistance charts are a general guide to chemical compatibility as regards to polyethylene resins.
- 4.9 Laboratory (ideal) material properties are set forth in **Materials Properties Table** (below) as stated by the resin suppliers.

This chart lists nominal properties as supplied by the resin suppliers

Material Properties

	<u>LMDPE</u>	<u>XLPE CL-200</u>
Density (g/cc)	.939	.937- .940
ASTM D1505		
ESCR (hrs) 100% solution	>1,000	>1,000
15% solution	40	>1,000
ASTM 1693		
Flexural modulus (psi)	96,500	100,000
ASTM D790		
Tensile strength (psi)	3,900	2,600
ASTM D638		
Heat distortion temp. (°C)		
ASTM D648		
@ 66 psi	-----	66
@ 264 psi	-----	48
Impact (ft.-lbs.)	110	450
ARM ¼ -in. thickness		
UV-stabilized	Yes	Yes
FDA-grade resin	Yes	No

5. Design requirements

- 5.1 The minimum required wall thickness of the cylindrical straight shell at any fluid level shall be determined by the following equation, but shall not be less than 3/16-in. thick. The tolerance indicated in section 7.3 applies to these dimensions.

$$T = \frac{P \times O.D.}{2 SD} = .433 \times S.G. \times H \times \frac{O.D.}{2.SD}$$

T = Wall thickness, inches

SD = Hydrostatic design stress, psi

P = Pressure (.433 x S.G. x H), psi

S.G. = Specific gravity of fluid

O.D. = Outside diameter, inches

H = Height, feet

Standard product line includes tanks designed for use with materials having a specific gravity of 1.5 or 1.9

- 5.2 The hydrostatic design shall be determined by multiplying the hydrostatic design basis (determined by ASTM D2837 using rotationally molded samples) by a service (design) factor selected for the application. The standard product line of tanks is engineered using a maximum hydrostatic design stress, 600-psi and 550 psi for XLPE and LMDPE, respectively.

Note: The hydrostatic design basis for various polyethylenes are typically supplied by the resin manufacturer.

- 5.3 Top head shall be integrally molded (one piece) with the cylinder shell. The minimum thickness of the top head shall be 3/16-in. The tolerance indicated in section 7.3 applies to this dimension.
- 5.4 Tanks are designed with mounting flats to enhance fixture assemblies.
- 5.5 The bottom head of a tank shall be integrally molded (one piece) with the cylinder shell. The minimum thickness for a fully supported flat bottom head shall be 3/16-in.

6 Fittings

- 6.1 Fabricated nozzles, gaskets and other fitting accessories must be chemically compatible with the intended contents of the tank.
- 6.2 Fitting material types available are PVC, CPVC, PVDF, virgin polypropylene, black polypropylene, and stainless steel. Bolt material types are stainless steel, hastelloy, and titanium.
- 6.3 Gasket materials types are EPDM, viton, XLPE, white viton, hypolon, buna and silicone. Other gaskets are available upon request.
- 6.4 Vents will be provided as agreed, to prevent pressure or vacuum from damaging the tank when filling or draining. Vents shall be at least equal to or 1 ½ times the largest fill or drain fittings. Some applications may require larger vents.
- 6.5 All piping shall be supported independently of the tank. **Flexible expansion joints are required to allow the tank to expand and contract when filling and draining.**
- 6.6 All flange and flange adapters shall be 150 lb. ANSI- drilled bolt patterns.

7 Dimensions and Tolerances

- 7.1 General - dimensions shall be taken with tank empty.
- 7.2 Thickness – The tolerance for thickness is specified in section 5 shall be +/- 3%
- 7.3 Fitting placement – The tolerances for fitting placement shall be +/- 3% in elevation and degree.

8 Workmanship

- 8.1 The finished tank wall, so far as is commercially practical, shall be free of visual defects such as foreign inclusions, air-bubbles, and pinholes that may impair the serviceability of the vessel.
- 8.2 The inner surface shall be smooth and free of cracks, crazing or pits. Waviness is a characteristic of the molding process for large tanks and is acceptable, provided the surface is smooth and free of cracks.

9 Quality Assurance

- 9.1 Materials (Resins)
- Manufacturer will verify receipt of a supplier certification that each lot of resin conforms to supplier's specification.
 - Manufacturer will verify that each lot of resin complies with its purchase order.
 - Manufacturer will visually examine each lot of resin for contamination, color, texture, etc.
- 9.2 Tanks
- In house quality control has the ability to run a battery of tests, some at additional charge to the customer. Testing available; impact, gel test, hydrostatic test, ultra sonic thickness test, and HIC specialty procedures.

10 Marking

- 10.1 Each tank is marked with a quality and routing control number.
- 10.2 Product identification label with installation and use instructions will be applied to each tank.

11 Shipping

- 11.1 When the tank arrives at the destination, the purchaser shall be responsible for inspecting the tank. If damaged, notify Assmann Corporation of America at (219) 357-3181.

12 Product Handling

- 12.1 The purchaser shall follow recommendations as shown in the installation and use instructions. The purchaser is responsible to insure that all products shipped will be stored, handled and installed in such a manner as not to degrade quality, serviceability or appearance. Vertical tanks should be stored in an upright position on a clean surface with no sharp objects under the tank.

13 Installation

- 13.1 Tanks and accessories shall be installed and handled according to the manufacturer's recommendations as shown in the installation and use instructions as supplied with the tank. Failure to follow these recommendations will void the warranty. This includes support of all pipes leading to and from the tank and a method to control expansion and vibration of the piping.
- 13.2 Purchaser should position the tank before assembling to peripheral equipment to ensure proper clearances.

14 Submittals

- 14.1 Approved Drawings
ASTM D-1998-96
Certification of testing requested by customer

15 Warranty

- 15.1 Assmann Corporation of America warrants that all tanks manufactured and sold shall be free of defects in material and workmanship for a period of five (5) years limited. All tanks carry a two (2) year full warranty with the remainder prorated from the date of shipment, with the following exceptions.
1. Stress cracking agents, high caustics, i.e. sulfuric acid, sodium hydroxide etc., one (1) year.
 2. All tanks must be used in accordance with Assmann Corporation chemical resistance charts.
 3. All tanks must be supported or mounted in a manner approved by Assmann Corporation and in accordance with approved installation and use instructions.
 4. Transport and storage tanks must be used in accordance with temperature limitations of polyethylene.
 - HDLPE, linear = 120 degrees F.
 - XLPE, cross-linked = 150 degrees F.
 5. Warranty does not cover misuse, fire, accident, negligence or tanks that have been altered after said date of shipment, except alterations or repairs made only by Assmann Corporation.
 6. Liability of the manufacturer under this warranty is limited to the repair and/or replacement of the tank only, (at the manufacturer's option) which has been proven to have been defective at date of shipment. Assmann Corporation will bear no liability for consequential or incidental damages, loses or expenses of any kind relative to tank failure.
 7. Should purchaser or user not pay for any tank in full when as due, Assmann's warranty shall be deemed suspended until such time as Assmann receives payment in full. The suspended period will not be added on to the warranty period applicable to said order.
 8. Intermediates Bulk Containers (IBC) manufactured by Assmann Corporation are so warranted for one (1) year from date of shipment.
 9. Hardware and accessories are warranted for one (1) year from date of shipment.