

# DER-16 / Five-Year Inspection of Plastic Tanks

New York State Department of Environmental Conservation

## DEC Program Policy

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<b>Date Issued:</b> September 11, 2007	<b>Latest Date Revised:</b> February 13, 2020

### I. Summary

This program policy provides guidance on the five-year inspection of homogenous plastic tank systems used as aboveground storage tanks in the Chemical Bulk Storage (CBS) program.

### II. Policy

This program policy provides guidance on the evaluation of homogeneous plastic tank systems. Homogeneous plastic tanks are tanks that are molded in one-piece seamless construction using a single plastic material. This excludes tanks constructed of fiberglass. 6 NYCRR subdivision 598.7(c) of the CBS regulation requires (amongst other things) that all aboveground tanks be inspected in accordance with a consensus code or practice. This guidance is intended to assist operators in complying with the requirements of 6 NYCRR subdivision 598.7(c). In addition, this guidance will ensure that compliance reviews of five-year inspections by Regional CBS inspectors are conducted uniformly in each of the New York State Department of Environmental Conservation's (DEC's) nine regions.

### III. Purpose and Background

#### A. Purpose

The primary purpose of this document is to provide guidance on how to conduct the five-year inspection of plastic tanks and associated piping systems. Such an inspection must consist of a comprehensive evaluation of system tightness, structural soundness, evidence of wear, foundation integrity, operability, and controls. This document also provides information on available nondestructive test (NDT) methods applicable to plastic tanks, tank useful life evaluations, and proper record keeping to satisfy the requirements of 6 NYCRR subdivision 598.7(c). This guidance will serve as an acceptable inspection method until a consensus code or practice that meets the requirement of 6 NYCRR subdivision 598.7(c) is developed. As used in this document, "plastic tank" shall mean a "homogenous plastic tank."

## **B. Background**

6 NYCRR subdivision 598.7(c) of the CBS regulations requires a five-year inspection of all aboveground storage tanks (ASTs) and piping. Owners/operators are required to inspect ASTs and piping systems on a five-year cycle beginning in 1999 or upon installation. A shorter cycle is required when a tank or pipe is thinning at a rate of one millimeter per year or greater or when the expected remaining useful life (as determined by inspection) is less than ten years. In either scenario, the inspection shall be performed at half the remaining useful life of the tank or pipe, but not to exceed a five-year period. The regulation requires that the inspection be consistent with a consensus code, standard or practice that is developed by a nationally recognized association or independent testing laboratory and meet the specifications of 6 NYCRR subdivision 598.7(c).

Currently there is no inspection consensus code, standard or practice that has been developed by a nationally recognized association or independent testing laboratory for plastic tanks. In recognition of this, the Department provides the following guidance on the inspection of plastic tanks.

## **IV. Responsibility**

The New York State Department of Environmental Conservation (DEC) Regional CBS staff are responsible for implementing this policy in consultation with Central Office technical and legal staff. The Bureau of Technical Support in DEC's Division of Environmental Remediation (DER) is responsible for maintaining this program policy.

## **V. Procedure**

### **A. Evaluation/Assessment of Tank Systems**

The evaluation of tank systems shall include external inspection, internal inspection (when applicable), and an evaluation of the expected useful life of the tank as specified in section V.F below, "Failure Indicators", and Table 1 (see section V.C, below). Where available, manufacturer guidance and specifications shall be used as a primary guide for the evaluation of the tank system.

The structural integrity of a plastic tank may be adversely affected by the method/form of haulage, storage, and/or installation of the tank. As such, to maintain the as-manufactured structural integrity, proper installation procedures must be followed. See Appendix A for details.

### **B. Identification Procedure and Failure Mechanism**

Most plastic tanks fail by cracking. This can either be due to the improper installation of the tank and/or tank anchors, exposure to environmental elements, an uneven foundation, and/or accidents. Plastic tanks have also been known to fail by chemical degradation. This often happens when tank materials are incompatible with the stored chemical or where conditions in

the tank encourage the presence of degradation-inducing microbes. Tank degradation may result in the thinning of tank walls. Conversely, tank degradation may also be seen by an increase in wall thickness. An increase in tank shell thickness generally indicates tank incompatibility with stored chemical, where the tank absorbs the stored chemical. In addition, tank degradation may result in tank walls becoming brittle or soft. Such degradation affects the structural integrity of the tank.

Although plastic pipes are exposed to the same degradation mechanism as the tank, unlike the tanks, most piping systems fail at joint connections and fittings or when exposed to excessive vibration.

Exposed pipes may also fail as a result of vehicular accident or from inadequate support.

### C. Comprehensive Inspection

Table 1 (below) describes the categories/types of inspections based on the size of the tanks (in gallons) and minimum regulatory requirements.

<b>Table 1 Inspection Classification</b>		
<b>Tank Sizes (gallons)</b>	<b>Minimum Required Test <u>if</u> tank meets 6 NYCRR subdivisions 599.8(g)<sup>1</sup> and 599.9(c)<sup>2</sup></b>	<b>Minimum Required Test <u>if</u> tank was installed before 1996 <u>and</u> <u>does not</u> meet 6 NYCRR subdivisions 599.8(g) and 599.9(c)</b>
Less than 5,000	Comprehensive external inspection (see section V.D.1, below).	Comprehensive external inspection; <b><u>and either:</u></b>  (1) A liquid penetrant <sup>3</sup> test (dye) (see section V.E.2, below); <b><u>or</u></b>  (2) an “Informal Stress Cracking Test” (see section V.E.2.a, below); <b><u>or</u></b>  (3) A circumferential measurement test (see section V.E.3, below).
5,000 but less than 10,000	(1) Comprehensive external inspection (see section V.D.1, below); <b><u>and</u></b>  (2) A liquid penetrant <sup>3</sup> test (dye) <b><u>or</u></b> an “Informal Stress Cracking Test” (see section V.E.2.a, below).	(1) Comprehensive external inspection; <b><u>and</u></b>  (2) A liquid penetrant <sup>3</sup> test (dye) or an “Informal Stress Cracking Test” (see section V.E.2 and V.E.2.a, below); <b><u>and</u></b>  (3) A circumferential measurement test (see section V.E.3, below).
10,000 or more	Comprehensive external and internal inspections, representative thickness readings, and perform at least two of the listed NDTs (see section V.E, below). All inspections and tests must be conducted under the direction of a qualified engineer (New York State licensed and registered Professional Engineer).	

<sup>1</sup> Requirements for impermeable barriers under tank bottoms.

<sup>2</sup> Requirements for remote impounding.

<sup>3</sup> **Caution:** Cleaner dye penetrant and developer (dye penetrant system) must be compatible with the tank material. Incompatible dye penetrant systems may have an adverse effect on the tank.

## **1. Inspection Preparation**

The tank and equipment surfaces must be cleaned as necessary to complete the visual and physical inspections. The inspector must be familiar with the inspection methods, testing equipment, required personal protection equipment, and other health precautions prior to inspection. In addition, the inspector shall be knowledgeable in the inspection of plastic tanks.

DEC recommends that, at a minimum, the lead inspector on site should have five years of experience in the inspection of plastic tanks, including two years in a leadership role.

All inspections must meet the minimum criteria in Table 1, above. All temporarily out-of-service tanks are subject to the same inspection standards as in-service tanks. CBS tanks that were installed after 1996 are required to meet 6 NYCRR subdivisions 599.8(g) and 599.9(c).

The inspection should start with a review of the following:

- tank/vessel drawings;
- service history and maintenance records;
- previous inspection records;
- safety procedures; and
- process conditions.

## **2. Tanks with a Capacity of less than 5,000 Gallons**

For tanks with a capacity of less than 5,000 gallons, if the tank meets 6 NYCRR subdivisions 599.8(g) and 599.9(c), the five-year inspections will only include a comprehensive external inspection. If the tank does not meet 6 NYCRR subdivisions 599.8(g) and 599.9(c), the five-year inspection shall include a comprehensive external inspection (section V.D.1) and either a liquid penetrant test (dye) (section V.E.2), informal stress cracking test (section V.E.2.a), or a circumferential measurement test (section V.E.3).

## **3. Tanks with a Capacity of 5,000 or more but less than 10,000 Gallons**

For tanks with a capacity of 5,000 or more but less than 10,000 gallons, if the tank meets 6 NYCRR subdivisions 599.8(g) and 599.9(c), the five-year inspections shall include a comprehensive external inspection, as described in section V.D.1, below, and a liquid penetrant test or informal stress cracking test (see section V.E.2, below). If the tank does not meet 6 NYCRR subdivisions 599.8(g) and 599.9(c), then the five-year inspections will include a comprehensive external inspection, a liquid penetrant test or informal stress cracking test, and a circumferential test (see section V.E.3, below).

## **4. Tanks with a Capacity of 10,000 Gallons or more**

For tanks with a capacity of 10,000 gallons or more, the five-year inspections will include an external inspection (as described below in section V.D.1), an internal inspection (section V.D.2), representative thickness measurements (section V.D.3), and at least two NDTs as described in

section V.E below. The inspection must be conducted under the direction of a qualified engineer (New York State licensed and registered Professional Engineer).

External and internal inspections should be conducted as specified in sections V.D.1 and V.D.2, respectively. Several NDT methods are used in the evaluation of plastic tank systems. These methods are described in section V.E of this document. The NDTs should be used to examine the structural integrity of the tank shell and determine the tank shell thickness.

## **5. Pipe and equipment inspection**

Exposed piping, joints, welds and connections must be examined for degradation, misalignment, and tightness. The following steps should be taken, as appropriate.

- Insulation material shall be removed in representative sections (at least 30% of the pipe, equally distributed) of the pipe and the underlying pipe examined for evidence of weepage, drips, and/or unusual moisture.
- Pipe joints and connections (e.g., flanges and flange gaskets) shall be examined for misalignment, tightness, and deterioration.
- The piping system shall be examined for deficiencies resulting from exposure to environmental elements including vibration, expansion, contraction, settlement, shock, etc.
- Ancillary equipment, such as pumps and leak detectors, shall be inspected for adequacy, operability, leakage, fouling, corrosion, wear, etc.

## **6. Inspection of double wall tank**

All double wall tanks shall be inspected in accordance with Table 1 above. The interstitial space between the primary and secondary tank must be inspected for evidence of releases.

# **D. Inspections and Measurements**

## **1. External Inspections**

External inspections shall include a visual and physical inspection of the tank system. In addition, it shall include the inspection of the tank secondary containment area. The secondary containment shall be capable of containing 110% of the volume of the largest tank or interconnected tanks.

Inspection of the secondary containment area shall include a review of the chemical compatibility along with visual and physical inspections for:

- cracks, and discoloration;
- degradation of corners, sides, and floor; and
- general integrity of the drain area and drain valve.

### **a. Visual Inspections**

The inspector shall walk around the tank at a distance (about four feet from the tank) and visually inspect the tank system in detail. The inspector should evaluate the condition of the tank system's individual components. This should focus on the following, as applicable.

- Evidence of chemical degradation
- Damage from animals or vegetation
- Cracks of any kind, degradation, erosion
- Separation or breaks of structural components
- Evidence of releases or wetness, especially at nozzles
- Discolored spots or areas
- Physical damage such as impacts, gouges, bulges, dents, out-of-roundness, etc.
- Signs of deterioration, or shape changes to the system
- Vibrating or flexing portions of tank or piping
- Condition of insulation
- Foundation and supports
- Nozzle and tank device separation

The primary objective of the visual inspection is to look for indications of deterioration and degradation on the tank shell or the supporting structure. The significance of these indicators of degradation depends upon the extent to which they have or will allow the contained chemical liquid to breach the tank. The evidence of degradation of the shell wall is to be characterized by size, extent, depth, and location.

For a sample of a detailed visual inspection check list, see Appendix B.

### **b. Physical Inspections**

It is important to physically inspect the tank for the depth of cuts, cracks, permeation, and extensive brittleness, swelling, or softening of the tank that could lead or contribute to tank failure. These conditions can be physically identified, as follows.

- Extensive brittleness is usually characterized by a web of cracks or missing a portion of the molded tank.
- Swelling can be observed when a tank deforms in a mode not consistent with the accepted or normal deflections seen when the tank is filled.
- Softening of the tank walls is caused by degradation of the tank shell. For example, this can be detected by pressing on the surface of the tank around the area of suspected degradation. A spongy feel of the shell indicates that the shell is being degraded or permeated by its contents, although the absence of a spongy feel does not eliminate the presence of degradation.

- Permeation of the tank wall by a chemical can sometimes be observed as a discoloration of the tank wall. Permeation can cause the complete breakdown of the physical properties of the tank walls.

The presence of any of these conditions indicates a compromise in the structural integrity of the tank shell, and proper precautions, including repair or removal of the tank from service must be taken.

## **2. Internal Inspections**

All tanks with a capacity of 10,000 gallons or more must have an internal inspection. Tank entry shall be performed in accordance with confined space entry requirements of 29 CFR 1910.146. In some cases, inspections may be carried out with appropriate video camera and recording equipment. Such inspections must follow a nationally acceptable and recognized video inspection standard. The inspection of tanks with a capacity of 10,000 gallons or more must be under the direction of a New York State licensed and registered Professional Engineer. The inspector should perform the following steps.

- Ensure the tank is empty, the interior is clean, and the atmosphere is safe.
- Ensure all required lock/out and tag/out procedures are observed prior to internal inspections.
- Follow appropriate tank entry procedures and cautions.
- Check equipment to be used for access to tank openings.
- Note and pay adequate attention to areas of concern from external inspections.
- Ensure proper and sufficient lighting is available.
- If a video system is to be used, ensure familiarity with the equipment and the necessary inspection standard.
- Look for changes to the wall surface including: color differences and streaks, opacity differences, and stains.
- Check for signs of degradation and wear.

All abnormalities shall be characterized and reported. Such reports must include location and distribution, nature, size, and depth of the abnormality.

*Note: Photo documentation of these areas of concern is highly recommended.*

## **3. Thickness Measurements**

Tank shell thickness measurements can be performed using an ultrasonic test method. Other NDT methods may also be used subject to the Department's approval. The inspector should be familiar with the device/equipment employed for this test. The inspector should:

- clean the tank shell test area, ensure that the surface is free of loose scale, failing paint or dirt;



- calibrate the test equipment to the specific plastic material (material of construction being tested) as per the instrument instructions; and
- readings must start as low on the shell wall as possible, and be concentrated on the lower 25%, by height, of the tank. Additional measurements should be made where there is evidence of discoloration, or degradation is suspected.

*Note: Tank thickness calculations may vary depending on the quality and calibration of the test equipment and the level of experience of the inspector conducting the test.*

Shell thickness readings should be taken in representative areas of the whole tank, but concentrated in the area of the lower 25%, by height, of the tank. The Department recommends the use of a continuous scanner to measure the thickness of the tank shell, a minimum of one reading point per square foot should be taken at the lower 25% of the tank.

## **E. Non-destructive Test Methods**

Several non-destructive test methods are used in the evaluation of plastic tank systems, including (other nationally accepted tests may be used subject to DEC approval):

- Acoustic Emission Test
- Liquid Penetrant Testing (dye)
- Circumferential Measurement Test
- Ultrasonic Testing

### **1. Acoustic Emission Test**

Acoustic emission (AE) inspection techniques detect elastic waves generated within a test specimen by such mechanisms as plastic deformation, fatigue, and fracture. It differs from ultrasonic inspection, which actively probes the structure. AE listens for emissions from active defects and is very sensitive to defect activity when a structure is loaded beyond its service load in a proof test. AE tests are widely used as an advanced, cost-effective, and sensitive technique for detecting and locating potential problem areas. This process must be followed by either an ultrasonic test or a liquid penetrant test to quantify problems in the areas identified by AE testing.

AE testing should be able to tell if there are problems and give the general location of the problem. However, this is not always possible. The size of a tank, its configuration, the number and locations of transducers used, and the level of experience of the person analyzing the data can all affect this capability.

The disadvantage of AE is that commercial AE systems can only estimate qualitatively how much damage is in the material and approximately how long the components will last. So, other NDT methods are still needed to do more comprehensive examinations and provide quantitative results. Moreover, service environments are generally very noisy, and the AE signals are usually very weak. Thus, signal discrimination and noise reduction are very difficult, yet extremely important for successful AE applications.

## **2. Liquid Penetrant Testing (Dye)**

The first step in liquid penetrant testing is to properly clean the surface to be tested. After cleaning, the penetrant is applied by spray or immersion. The penetrant is pulled into the surface flaws by capillary action. A cleaner is again applied to remove the residual penetrant from the surface of the tank so the liquid penetrant alone is left behind in the surface flaws or cracks that are present.

Different liquid penetrant systems can be selected depending on the sensitivity required and the type of flaw being inspected. There are two common types of penetrants: fluorescent or visible. Visible penetrants produce a colored (e.g., red) indication that is easily visible in bright light. The major disadvantage of using visible penetrants is that they can only be used for one level of sensitivity which limits their use to less critical applications. Their most important advantage is their ease of use. They do not require special black lights (as are required by fluorescent penetrants). Red dye penetrants are visible under normal light.

Ultraviolet or black-light illumination is required for fluorescent penetrant systems. Visibility may be further enhanced by using developers or fluorescent powders. The ease of use of the fluorescent penetrants is much more restricted. Both dye penetrant techniques have been used to identify cracks in plastic tanks.

There is a possibility that the constituents of the dye penetrant system could affect the stored material or the tank wall. Thus, it is important to ensure that the chemical constituents are compatible with both the tank and the stored material.

### **a. Informal Stress Cracking Test**

Select an area towards the bottom of the tank or with suspected cracks. Fill in the area with a black, water-soluble magic marker or shoe polish, and immediately rub off excess ink. Do not let ink dry. Look for signs of stress cracks (web of fine lines).

## **3. Circumferential Measurement Test**

The circumference of the tank is measured at a fixed line (e.g., two feet from the bottom on a vertical tank, or two feet from the north end on a horizontal tank) the first time the tank is filled to capacity after installation (this is the baseline measurement), and it is measured again during the five-year inspection of the tank. It is anticipated that degradation and/or overheating could cause the material to lose its strength and expand or contract. If the five-year inspection measurement differs from the baseline measurement by 2% or more, the tank should be removed from service, except in cases when the inspector can provide DEC with evidence of adequate structural integrity of the tank.

#### **4. Ultrasonic Testing**

Ultrasonic testing (UT) uses high frequency sound energy to conduct examinations and make measurements. Ultrasonic inspections can be used for flaw detection/evaluation, dimensional measurements, material characterization, and more.

A typical UT inspection system consists of several functional units, such as the pulser/receiver, transducer, and display devices. Ultrasonic inspection is a very useful and versatile NDT method. Some of the advantages of ultrasonic inspection that are often cited are included below.

- It is sensitive to both surface and subsurface discontinuities.
- The depth of penetration for flaw detection or measurement is superior to other NDT methods.
- Only single-sided access is needed when the pulse-echo technique is used.
- It is highly accurate in determining reflector position and estimating size and shape.
- Minimal part preparation is required.
- Electronic equipment provides instantaneous results.
- Detailed images can be produced with automated systems.
- It has other uses, such as thickness measurement, in addition to flaw detection.

As with all NDT methods, ultrasonic inspection also has its limitations, which are listed below.

- Surface must be accessible to transmit ultrasound.
- Skill and training are more extensive than with some other methods.
- It normally requires a coupling medium to promote the transfer of sound energy into the test specimen (couplants are generally water based and non-reactive, but compatibility between the tank material and couplant should be ensured before use).
- Materials that are rough, irregular in shape, very small, exceptionally thin or not homogeneous are difficult to inspect.
- Linear defects oriented parallel to the sound beam may go undetected.
- Reference standards are required for both equipment calibration and the characterization of flaws.

#### **F. Failure Indicators**

Unlike steel tanks, plastic tanks have several failure mechanisms and determining the useful life of these tanks is very challenging.

If a tank's five-year inspection is conducted as specified in the Procedure section of this document (above) and it is determined to meet all the standards set forth in this guidance, the tank will be presumed to be suitable for service and the next inspection will be conducted in five years. However, the useful life of the tank will be dependent on its operation, the product stored, and exposure to environmental elements. If, in the professional judgement of the tank inspector, the tank is in a condition that suggests a shorter useful life or the operating conditions are such that the expected remaining useful life as determined by the inspection is less than 10 years, then reinspection must be performed on the tank or pipe at one-half of the remaining useful life.

The following failure mechanism must be taken into consideration when estimating the useful life of a plastic tank.

Cracks: Any cracks less than one-third the depth of the shell must be monitored and reexamined in two years. The tank must be removed from service if, at the two-year reexamination, there are indications that the cracks have continued to expand. Larger cracks may indicate the need to take the tank out-of-service (see section V.G, below).

An increase or decrease in the tank shell thickness (method 1): Any gain or loss in tank thickness that is up to 30% of the original shell thickness must be monitored and reexamined in two years. The tank must be removed from service if, at the two-year reexamination, there are indications that the tank shell continues to deteriorate (gain or loss of thickness).

An increase or decrease in the tank shell thickness (method 2): If the original tank shell thickness is not known, the tank must be removed from service if the difference between the bottom and the topmost measurement is 30% or more. Where there is a difference of between 10% to 29%, the tank must be monitored and re-examined in two years.

Discoloration of the tank: Any localized discoloration is a call for concern and must be investigated and/or re-evaluated as soon as possible.

Bulges: These are indications of a structural defect. The extent of this defect and its effect on the continued use of the tank must be investigated and/or re-evaluated as soon as possible.

Circumferential measurement: If the circumferential measurement of the five-year tank inspection differs from the baseline measurement by more than 2%, the tank should be removed from service.

## **G. Acceptance Criteria**

Tank inspectors must be knowledgeable in plastic tank failure mechanisms and must use this knowledge and professional judgment in determining the suitability of the plastic tank for continued service. Tanks must be removed from service where any of the following elements are noticed:

- during the five-year tank inspection, the circumferential measurements differs from the baseline measurement by more than 2%;
- there is a two inch or more crack with a depth of more than 1/3 of the thickness of the tank shell in the area of the bottom 25% of the height of the tank;
- there is a four inch or more crack with a depth of more than 1/3 of the thickness of the tank shell in the area of the top 75% of the height of the tank;
- any significant brittleness or softness is noticed in the area of the bottom 25% of the height of the tank;

- the tank shell has lost or gained more than 30% of its original thickness; **or**
- the difference between the bottom and the topmost measurements of the tank shell is 30% or more.

The absence of any of the above-mentioned elements may not be a guarantee of the structural integrity of the tank. Tank inspectors must use their professional judgment in determining the suitability of a tank when returning it to service.

## **H. Record Requirements**

The following records must be kept at the facility for a minimum of ten years from the date of inspection.

- Visual inspection records/report
- NDT report
- Qualifications of the NDT inspector
- Recommendations and corrective actions taken
- For tanks that are larger than 10,000 gallons, a Professional Engineer, who is licensed and registered in New York State by the New York State Education Department, must verify and certify that:
  1. the tank system has been evaluated in accordance with this guidance;
  2. the system meets or exceeds applicable requirements;
  3. all engineering evaluations and repairs were done under his/her supervision; and
  4. the system is suitable for continued use.

## **VI. Related References**

- 6 NYCRR Parts 596-599, Chemical Bulk Storage Regulation (provisions for the storage of hazardous substances), New York State Department of Environmental Conservation, October 11, 2015.
- American Petroleum Institute (API) 653 Section 6 (information on the inspection of metal tanks), December 2001.
- “Tank and Vessel Inspection Guideline,” Photocircuits Corporation, August 5, 2005.
- 29 CFR 1910.146, “Permit-required confined spaces” (Federal Regulation - Occupational Safety and Health Administration (OSHA))

### **Attachments:**

- Appendix A – Installation of Plastic Tanks**
- Appendix B – Visual Inspection Checklist**

## Appendix A

### INSTALLATION OF PLASTIC TANKS

#### 1. General Information

The useful life of a plastic tank is greatly dependent on the quality of tank installation. The Department requires the inspection of plastic tanks and their respective foundations and supports before and after installation (6 NYCRR section 599.11). This inspection should include the following, as applicable.

##### a. Staging

Prior to installation, tanks should only be stored in a prepared, secured location outside of trafficked areas. Tanks should be restrained to prevent toppling and/or impact damage (i.e., from wind and wind-driven debris). Restraint can be provided by putting a small volume of water in the tank; however, it is essential that the tank is drained before it is moved and installed.

##### b. Foundations & Supports

Only properly graded and leveled surfaces having adequate physical characteristics shall be used for foundations. Tank anchors should be installed to allow for the tank expansion/flexure; improperly installed anchors may initiate cracks in the tank. Flat bottomed tanks should only be installed on a smooth, flat base. Manufacturers typically specify a deviation from nominal level depending on the tank size. Care must be taken to ensure that the base is free of debris. All installations shall follow manufacturer's specifications where available. Where wind-loading calculations require the use of tie-down bolts, these must be correctly installed using the brackets or steel girdle attached to the tank. All of the requirements of 6 NYCRR section 598.3 must be followed when tanks are installed within a flood plain.

##### c. Primary Tank

Tanks must be inspected for evidence of improper shipping or handling as well as evidence that the tanks may have been lifted by nozzle connections.

##### d. Secondary Containment

Most fabricators now offer integral secondary containment systems with their tanks and, even where a tank is installed in a pre-existing secondary containment, it is essential that procedures are in place to ensure that the storm water is promptly removed from the secondary containment system. This must be a manual process to prevent the release of any spilled product. Gravity drains should be avoided because of the potential for drains to be left open after storm water has been removed thereby defeating the system.

## **2. Post Installation**

### **a. The Installed Tank**

Tank shall be properly supported by a proper foundation or, as applicable, its tie bolts, foundation anchors, or other supporting structure(s).

If the tank is located in a secondary containment, there shall be a system to promptly detect liquid in the secondary containment. At a minimum this system must be able to detect liquids on a daily basis. There shall also be a ready means to evacuate the containment of both entrained precipitation as well as the contained product. NOTE: A SPDES permit may be required to discharge stormwater to the waters of the State.

### **b. Tank Supports**

Tank anchors should be installed to allow for the tank expansion/flexure; improperly installed anchors may initiate cracks in the tank.

Tank anchor tie down points should be designed such that they will provide restraint but provide enough flexibility to not damage the tank when exposed to excessive winds and storm events.

### **c. Tank Piping**

Piping and connections (including valves, couplings, unions, gaskets, welds, etc.) must be chemically compatible with the stored substance.

Piping shall be properly supported and accessible for inspection.

Metallic and non-metallic on-ground and underground piping shall have a leak monitoring system and metallic piping shall have a cathodic protection system available for inspection and testing.

### **d. Operation**

Tank must not be reassigned to a new duty without independent assessment.

Thermoplastic tank should not be allowed to operate beyond its design life.

Fire protection must be considered for all tanks.

Secondary containment systems must be checked regularly for product leakage.

Except where the tank stores a water reactive chemical, water deluge systems shall be considered for tanks which could be exposed to exothermic reactions by decomposition or dilution of their contents.

## Appendix B

### VISUAL INSPECTION CHECKLIST

Visual Inspection Checklist			
	Yes	No	N/A
<b>Tank Shell</b>			
Are there any cracks?			
Note the location and size of cracks (comments)			
Are there any worn areas? (comments)			
Is there any damage or defects?			
Are the connections tight and aligned?			
Is the coating in good condition?			
Is there any delamination?			
Note location of delamination (comments)			
Are there any stains or releases?			
Is there any discoloration?			
Is there any chemical degradation?			
<b>Containment Walls and Floor</b>			
Are there any releases?			
Is the secondary containment volume adequate?			



<b>Vents</b>				
	Are there any releases?			
	Is there any evidence of scaling or fouling?			
	Are the vents operating correctly?			
<b>Piping</b>				
	Are there any releases?			
	Are the pipes in good working condition?			
	Are the gaskets in good working condition?			
<b>Supports and Access</b>				
	Is the foundation/base in poor condition?			
	Do the platform, steps, rail have problems?			
	Are the legs or saddles in poor condition?			
	Are the supports inadequate?			

**Comments**