

TEST RECORD NO. 1

SAMPLES:

The manufacturer submitted the TC1, TC2 and TC4 tanks covered in this Report for evaluation in accordance with UL 142, Steel Aboveground Tanks for Flammable and Combustible Liquids.

GENERAL:

The Model TC1 was determined to be representative of the Models TC2 (same as TC1 except half the width) and TC4 (same as TC1 except half the width and half the length).

The test results reported relate only to the items tested.

The following tests were conducted in accordance with UL142, Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids, Ninth Edition dated December 28, 2006 with revisions through and including December 15, 2007.

| <u>Test</u>               | <u>UL 142<br/>Section</u> |
|---------------------------|---------------------------|
| Leakage Test              | 39                        |
| Hydrostatic Strength Test | 40                        |
| Static Load/Top Load Test | 41                        |
| Lift Lug Strength Test    | 44A                       |

The results of the above tests were reviewed and found to comply with the applicable requirements of UL142, Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids, Ninth Edition dated December 28, 2006 with revisions through and including December 15, 2007.



CONCLUSION

Samples of the products covered by this Report have been found to comply with the requirements covering the category and the products are judged to be eligible for Listing and Follow-Up Service. The manufacturer is authorized to use the UL Mark on such products which comply with the Follow-Up Service Procedure and any other applicable requirements of Underwriters Laboratories Inc. Only those products which properly bear the UL Mark are considered as Listed by Underwriters Laboratories Inc. Any information and documentation involving UL Mark services are provided on behalf of Underwriters Laboratories Inc. (UL) or any authorized licensee of UL.

Report by:

Reviewed by:

Wayne Doversberger  
Staff Engineer

Tim Crews  
Staff Engineer

Certificate of Compliance

|          |   |           |                |
|----------|---|-----------|----------------|
| Project: | <b>ANSI/UL142-2007 COMPLIANCE<br/>for Cube series TC1,TC2 and TC4</b> | Prepared: | Bernard Dubois |
|          |   | Date:     | 15/10/08       |
|          |   | Pages     | 2              |

Scope

**TRANSTank** submitted the new **TC1, TC2 and TC4** cubes for evaluation in accordance with **ANSI/UL 142-2007** Steel Aboveground Tanks for Flammable and Combustible Liquids.

GENERAL:

The Model TC1 was determined to be representative of the Models TC2 (same as TC1 except half the width) and TC4 (same as TC1 except half the width and half the length).

The following tests were conducted in accordance with **ANSI/UL142-2007** Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids, UL Ninth Edition dated December 28, 2006.

| <b>SECTION 39      <i>Interstitial leak test for primary and Secondary tank</i></b> |                                  |                                   |                                    |
|---|----------------------------------|-----------------------------------|------------------------------------|
| <b><i>Air Pressure</i></b>  |                                  |                                   |                                    |
| <b><i>Tank</i></b>  | <b><i>35Kpa(5psi)2 hours</i></b> | <b><i>Leaks</i></b>               |                                    |
| <b>TC1</b>  | <i>Pass</i>                      | <i>None</i>                       |                                    |
| <b>TC2</b>  | <i>Pass</i>                      | <i>None</i>                       |                                    |
| <b>TC4</b>  | <i>Pass</i>                      | <i>None</i>                       |                                    |
| <b>SECTION 40      <i>Hydrostatic Strength Test</i></b>                             |                                  |                                   |                                    |
| <b><i>Water Pressure</i></b>  |                                  |                                   |                                    |
| <b><i>Tank</i></b>  | <b><i>35Kpa(5psi) 2 min.</i></b> | <b><i>70Kpa(10psi) 2 min.</i></b> | <b><i>105Kpa(15psi) 2 min.</i></b> |
| <b>TC1</b>  | <i>Pass</i>                      | <i>Pass</i>                       | <i>Pass</i>                        |
| <b>TC2</b>  | <i>Pass</i>                      | <i>Pass</i>                       | <i>Pass</i>                        |
| <b>TC4</b>  | <i>Pass</i>                      | <i>Pass</i>                       | <i>Pass</i>                        |
| <b>SECTION 41      <i>Top Load Test</i></b>   |                                  |                                   |                                    |
| <b><i>1000lb (454kg) load applied to weakest part of roof</i></b>                   |                                  |                                   |                                    |
| <b><i>Tank</i></b>  | <b><i>5 Minutes</i></b>          | <b><i>Deformation</i></b>         | <b><i>Leakage</i></b>              |
| <b>TC1</b>  | <i>Pass</i>                      | <i>None</i>                       | <i>None</i>                        |
| <b>TC2</b>  | <i>Pass</i>                      | <i>None</i>                       | <i>None</i>                        |
| <b>TC4</b>  | <i>Pass</i>                      | <i>None</i>                       | <i>None</i>                        |

| <b>SECTION 44A</b> |                       | <b>Lift Lug Test</b>    |                    |              |
|--------------------|-----------------------|-------------------------|--------------------|--------------|
|                    |                       | <b>2 x empty weight</b> |                    |              |
| <b>Tank</b>        | <b>Lifting Points</b> | <b>Lifting capacity</b> | <b>Deformation</b> | <b>Leaks</b> |
| <b>TC1</b>         | 4                     | 1500Kg                  | None               | None         |
| <b>TC2</b>         | 4                     | 2400Kg                  | None               | None         |
| <b>TC4</b>         | 4                     | 3700Kg                  | None               | None         |

❖ The test results reported relate only to the items tested.

*Note: the above section used are extracted from the Underwriters laboratories, Standard for safety, Steel aboveground Tanks for Flammable and Combustible liquids ANSI/UL 142-2007 publication, ninth edition December 28,2006.*

Test carried out by Mr. Wayne Doversberger, **Underwriter Laboratories** Inspector, Illinois, USA

***The results of the above tests were reviewed and found to comply with the applicable requirements of ANSI/UL142-2007, Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids, Ninth Edition dated December 28, 2006.***

Verified by:

Bernard Dubois BE (Mech)  
Engineering & Product Development Manager  
**Transtank Pty Ltd**

Witness: Nicholas Groothoff Dip.Mech  
Design Draftsperson  
**Transtank Pty Ltd**

## **PERFORMANCE TEST METHODS**

### **39 Tank Leakage Test**

#### **39.1 Caution**

39.1.1 Caution – Testing with air pressure presents a risk of injury to persons and personnel should be instructed in precautions to be taken during such testing. The precautions should include the use of a pressure-relief device that will reduce the risk of the tank becoming pressurized in excess of the specified test pressure.

#### **39.2 Primary containment tanks**

39.2.1 The leakage test is to be conducted before painting the tank by a method described in items (a) – (b). There shall be no evidence of leakage or sign of permanent deformation following the leakage test. If subjected to a leakage test pressure, the tank wall, head, or roof may deflect but shall return to its original position and shape when the test pressure is released.

a) Apply internal air pressure and use soap-suds, or equivalent material for the detection of leaks. For a horizontal or rectangular tank, the test gauge pressure is to be not less than 3 psi (21 kPa) or more than 5 psi (35 kPa). For a vertical tank, the test gauge pressure is not to be less than 1-1/2 psi (10 kPa) nor more than 2-1/2 psi (17 kPa) or that gauge pressure above 1-1/2 psi which first causes visible deformation of the tank; or

b) Completely fill the tank with water, applying the pressure specified in item (a) hydrostatically, and examine the tank for leakage.

39.2.1 effective June 28, 2007

39.2.2 Each compartment of a tank having two or more compartments is to be tested separately for leakage.

#### **39.3 Secondary containment tanks**

39.3.1 After completion of the primary containment shell, the tank is to be checked for leakage using the method described in 39.2.1 and 39.2.2 for primary containment tanks.

39.3.2 Upon completion of the finished secondary containment tank, the primary tank is again to be pressurized using the method described in 39.2.1 and 39.2.2 and held for 1 hour to check for leakage. A continuous drop in pressure will be considered evidence of leakage.

39.3.3 While maintaining pressure on the primary tank, the interstitial (annular) space bounded by the primary and secondary tank is to be pressurized to the pressures indicated in 39.2.1 and checked for external leakage by applying a leak detection solution. There shall be no evidence of leakage or sign of permanent deformation following the leakage test. A tank wall, head, or roof may deflect when subjected to the leakage test pressure, but shall return to its original position and shape when the test pressure is released.

39.3.4 As an option to the leakage test described in 39.3.2 and 39.3.3, the annular space may be tested by applying a vacuum of at least 13 inches of mercury for a minimum of 12 hours. If the tank is unable to maintain the vacuum (plus or minus 2 inches of mercury) for the specified time, the tank shall be retested using the method described in 39.3.2 and 39.3.3.

## 40 Hydrostatic Strength Test

### 40.1 General

40.1.1 The hydrostatic strength test is to be conducted as described in 40.3.1 and 40.4.1 using the test apparatus described in 40.2.1. Neither the primary containment tank nor the secondary containment shell shall rupture or leak when subjected to this test.

### 40.2 Test apparatus

40.2.1 The source of water pressure is to be capable of maintaining a gauge pressure of at least 30 psi (207 kPa) for a period of not less than 2 minutes. The pressure gauges are to be calibrated and have a dial range gauge pressure of 0 – 50 or 0 – 60 psi (345 or 415 kPa), a face size of at least 3-1/2 inches (89 mm) in diameter, graduations of a gauge pressure of 1 psi or 10 kPa maximum, and an accuracy of  $\pm 1$  percent of the full scale reading. Piping and fittings as shown in Figure 40.1 are to be appropriate for the test pressure.

### 40.3 Primary containment tanks

40.3.1 The tank and connections are to be arranged as shown in Figure 40.1. All unused openings in the tank to be tested are to be plugged.

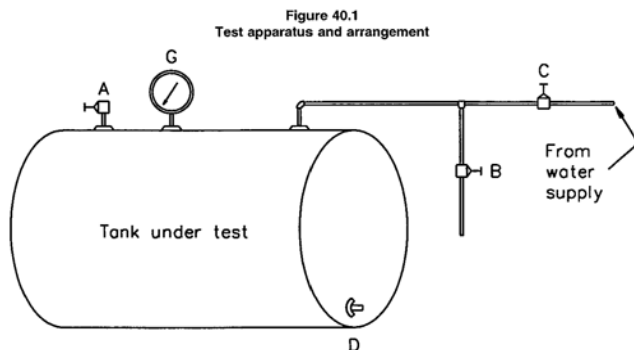
- a) The tank is to be completely filled with water, and all air expelled from the tank.
- b) Pressure is to be applied gradually to the tank in increments of a gauge pressure of 5 psi (35 kPa) at a rate not exceeding a gauge pressure of 2 psi (14 kPa) per minute. The gauge pressure is to be held for 2 minutes after each increment of a gauge pressure of 5 psi until the test gauge pressure of 25 psi (172 kPa) is attained.

*Exception: Test gauge pressure of 15 psi (103 kPa) may be used instead of 25 psi if tanks are marked as specified in 48.5.1.*

- c) Once the test pressure is attained, the tank is to be examined for visible signs of leakage or rupture.

### 40.4 Secondary containment tanks

40.4.1 Upon completion of the test on the primary containment shell as described in 40.3.1, pressure is to be reduced in the primary containment shell, the interstitial (annular) space is to be filled with water, and the test method is to be repeated to test the secondary containment shell. Pressure in the primary tank is to be maintained the same as the pressure of the annular space while testing the annular space.



## **41 Top Load Test**

41.1 The top surface of flat top tanks is to be subjected to a 1000 pound (454 kg) load, applied over a one square foot (0.09 m<sup>2</sup>) area at the weakest part of the tank top for a period of 5 minutes.

41.2 The load is then to be removed. There shall be no permanent deformation or leakage when subjecting the tank to the Tank Leakage Test, Section, 39.

## **44A Lift Lug Test**

Added 44A effective December 15, 2009

44A.1 Fittings intended to be used to lift and move a tank shall be subjected for not less than 1 minute to a load equal to twice the weight of the empty tank. Single or multiple fittings may be tested to establish a load rating for each fitting. A fitting or fittings shall be tested in a manner which simulates the worst case lifting configuration for which each fitting's load rating will be determined.

Added 44A.1 effective December 15, 2009

44A.2 Following this test, the tank shall not leak when tested per the production leakage test. The lift fittings and the tank shall not show evidence of damage, as defined by cracking or tearing of the lift fitting itself, of the tank wall itself, or of any metal weld attachment.

Added 44A.2 effective December 15, 2009

44A.3 As an alternative to testing, calculations at two times the empty tank weight may be used provided that the fitting stresses do not exceed the material's properties and that there is no permanent tank deformation in excess of 1 percent of its original dimensions.

Added 44A.3 effective December 15, 2009

## Certificate of Compliance

|          |   |           |                |
|----------|---|-----------|----------------|
| Project: | <b>CAN/ULC-S601-07 COMPLIANCE<br/>for Cube series TC1,TC2 and TC4</b> | Prepared: | Bernard Dubois |
|          |   | Date:     | 15/10/08       |
|          |   | Pages     | 2              |

### Scope

**TRANSTank** submitted the new **TC1, TC2 and TC4** cubes for evaluation in accordance with **CAN/ULC-S601-07** Steel Aboveground Tanks for Flammable and Combustible Liquids.

### GENERAL:

The Model TC1 was determined to be representative of the Models TC2 (same as TC1 except half the width) and TC4 (same as TC1 except half the width and half the length).

The following tests were conducted in accordance with CAN/ULC-S601-07 Standard for Shop Fabricated Steel Aboveground Tanks for Flammable and Combustible Liquids, ULC fourth edition dated December 2007.

| <b>SECTION 7.1</b>                               |                              |                                |                           |                     |
|--|------------------------------|--------------------------------|---------------------------|---------------------|
| <b><i>Proof of design Test</i></b>               |                              |                                |                           |                     |
| <b><i>Tank</i></b>                               | <b><i>Material</i></b>       | <b><i>Welding</i></b>          | <b><i>Design</i></b>      |                     |
| TC1  | Pass                         | Pass                           | Pass                      |                     |
| TC2  | Pass                         | Pass                           | Pass                      |                     |
| TC4  | Pass                         | Pass                           | Pass                      |                     |
| <b>SECTION 7.3</b>                               |                              |                                |                           |                     |
| <b><i>Hydrostatic Test<br/>Gravity load</i></b>  |                              |                                |                           |                     |
| <b><i>Tank</i></b>                               | <b><i>Primary-Leaks</i></b>  | <b><i>Secondary-Leaks</i></b>  |                           |                     |
| TC1  | None                         | None                           |                           |                     |
| TC2  | None                         | None                           |                           |                     |
| TC4  | None                         | None                           |                           |                     |
| <b>SECTION 7.4</b>                               |                              |                                |                           |                     |
| <b><i>Handling Test<br/>2 x empty weight</i></b> |                              |                                |                           |                     |
| <b><i>Tank</i></b>                               | <b><i>Lifting Points</i></b> | <b><i>Lifting capacity</i></b> | <b><i>Deformation</i></b> | <b><i>Leaks</i></b> |
| TC1  | 4                            | 1500Kg                         | None                      | None                |
| TC2  | 4                            | 2400Kg                         | None                      | None                |
| TC4  | 4                            | 3700Kg                         | None                      | None                |

| <b>SECTION 7.5 Interstitial leak test for primary and Secondary tank<br/>Air Pressure</b>                 |                           |                     |                                 |                                      |              |
|---|---------------------------|---------------------|---------------------------------|--------------------------------------|--------------|
| <b>Tank</b>   | <b>35Kpa(5psi)2 hours</b> | <b>Leaks</b>        |                                 |                                      |              |
| TC1   | Pass                      | None                |                                 |                                      |              |
| TC2   | Pass                      | None                |                                 |                                      |              |
| TC4   | Pass                      | None                |                                 |                                      |              |
| <b>SECTION 7.6 Drop test @ 1200MM<br/>Tank full</b>   |                           |                     |                                 |                                      |              |
| <b>Tank</b>   | <b>Capacity</b>           | <b>Total Weight</b> | <b>Deflection-<br/>1 Edge</b>   | <b>Deflection-<br/>1 Corner</b>      | <b>Leaks</b> |
| TC1   | 1000L                     | 1950Kg              | None                            | None                                 | None         |
| TC2   | 2000L                     | 3400Kg              | None                            | None                                 | None         |
| TC4   | 4000L                     | 6500Kg              | None                            | None                                 | None         |
| <b>SECTION 7.7 Rough Usage<br/>Free Fall from 30°</b>   |                           |                     |                                 |                                      |              |
| <b>Tank</b>   | <b>Capacity</b>           | <b>Total Weight</b> | <b>Deflection-<br/>30% Load</b> | <b>Deflection-<br/>100%<br/>Load</b> | <b>Leaks</b> |
| TC1   | 400L                      | 1400Kg              | None                            | None                                 | None         |
| TC2   | 700L                      | 2100Kg              | None                            | None                                 | None         |
| TC4   | 1350L                     | 3870Kg              | None                            | None                                 | None         |
| <b>SECTION 7.8 Tank Support Load Test<br/>Full plus same load applied<br/>equally across top of tanks</b> |                           |                     |                                 |                                      |              |
| <b>Tank</b>   | <b>Capacity</b>           | <b>Total Weight</b> | <b>Duration</b>                 | <b>Deformati<br/>on</b>              | <b>Leaks</b> |
| TC1   | 1000L                     | 3900Kg              | 2 Min.                          | None                                 | None         |
| TC2   | 2000L                     | 6800Kg              | 2 Min.                          | None                                 | None         |
| TC4   | 4000L                     | 13000Kg             | 2 Min.                          | None                                 | None         |
| <b>SECTION 8.1 Production Leak Test<br/>Air Pressure</b>  |                           |                     |                                 |                                      |              |
| <b>Tank</b>   | <b>20Kpa(3psi)2 hours</b> | <b>Leaks</b>        |                                 |                                      |              |
| TC1   | Pass                      | None                |                                 |                                      |              |
| TC2   | Pass                      | None                |                                 |                                      |              |
| TC4   | Pass                      | None                |                                 |                                      |              |

❖ The test results reported relate only to the items tested.

Note: the above section used are extracted from the Underwriters laboratories, Standard for safety, Steel aboveground Tanks for Flammable and Combustible liquids ANSI/UL 142-2007 publication, ninth edition December 28, 2006.

Test carried out by Mr. Wayne Doversberger, **Underwriter Laboratories** Inspector, Illinois, USA.

***The results of the above tests were reviewed and found to comply with the applicable requirements of CAN/ULC-S601-07 standard for shop fabricated steel above ground tanks for flammable and combustible liquids, with revisions through and including December 2007.***

Verified by:

Bernard Dubois BE (Mech)  
Engineering & Product Development Manager  
***Transtank Pty Ltd***

Witness: Nicholas Groothoff Dip.Mech  
Design Draftsperson  
***Transtank Pty Ltd***

## **7.1 PROOF OF DESIGN TEST**

### **7.1.1 General**

7.1.1.1 Representative samples of each tank design shall be tested to demonstrate that the strength of the assembly, head design, and the welded joints are in accordance with the requirements of Clause

7.1.1.2 Each tank design shall not rupture or leak, when subject to an internal hydrostatic pressure of 175 Kpa. This test shall be conducted using the apparatus shown in Figure 16 and the method described in Subsection 7.1.3, Method.

EXCEPTION: Test gauge pressure of 105 Kpa may be used instead of 175 kPa if tanks are marked as specified in Clause 10.2.2 or Clause 10.3.4, as applicable.

7.1.1.3 As an alternative to the requirements of Clause 7.1.1.2, tanks may be designed and certified by a professional engineer and tested in accordance with Clause 7.1.1.4.

Calculations shall allow for a design load of 70 kPa, which prevents maximum panel deflection from exceeding its longest dimension of the face divided by 100 under this load. The certified design shall be retained by the manufacturer.

7.1.1.4 A sample tank constructed in accordance with a certified design as described in Clause 7.1.1.3 shall not sustain permanent distortion when subjected to an internal pressure of 35 kPa (gauge) nor exceed the allowable design deflection when subject to an internal hydrostatic pressure of 70 kPa (gauge)

### **7.1.2 Apparatus**

7.1.2.1 Representative samples of the size and design of tank to be tested, a source of hydrostatic pressure capable of maintaining a pressure of at least 70 kPa for a period of not less than 2 min, a pressure gauge having a range of 0 to 350 kPa, piping and fittings as shown in Figure 16 shall be used.

### **7.1.3 Method**

7.1.3.1 The sample tank and connections shall be arranged as shown in Figure 16.

7.1.3.2 The tank shall be completely filled with water by filling tank through valve C while expelling all air through valve A.

7.1.3.3 Pressure shall be applied gradually to the tank in increments of 35 kPa (gauge) at a rate not exceeding a 14 kPa (gauge) per min. The pressure shall be held for 2 min after each increment of 35 kPa (gauge) until the required test pressure is reached.

## **7.3 HYDROSTATIC TEST**

7.3.1 Each tank subject to this requirement shall have first the *primary tank* and then the *secondary containment* filled with water to overflow and allowed to sit for a minimum of 2 h. The *primary tank* or *secondary containment* shall not leak or permanently distort.

## **7.4 HANDLING TEST**

7.4.1 The tank shall not exhibit any permanent deformation following the test described in Clause 7.4.2.

NOTE: Bending of the lift lug to align with the direction of the lift chain or cable shall not be considered failure of this test.

7.4.2 A tank of the maximum capacity for a given set of lift lug(s) shall have water added so that its weight equals twice the weight of the empty tank. The tank and water shall be lifted by the lift lug(s) and held for a minimum of 5 min.

## **7.5 PRESSURE LEAK TEST**

7.5.1 All fittings in the tank are to be plugged and the test described in Clause 7.5.2 shall be performed.

7.5.2 Pneumatic pressure shall be applied to the tank in accordance with Table 6. While the pressure is maintained, a liquid soap solution shall be brushed or poured over all seams, threaded connections, flanged connections, *manways*, bolts, etc. A complete inspection of the entire tank surface for flaws in the welds or parent metal shall then be made.

NOTE: The air supply for use in testing tanks must be controlled and monitored so that there exists no danger of over pressurizing.

## **7.6 DROP TEST**

7.6.1 A representative sample tank shall not rupture when dropped in accordance with Clause 7.6.2.

7.6.2 The representative sample tank shall be positioned on a platform 1.2 m above a concrete floor. It shall be loaded with water equivalent to the mass of fuel when filled to its normal capacity. The representative sample tank shall be pushed to simulate a free fall, head first, onto the concrete floor. A second impact on the other head shall be achieved with one end of the tank still resting on, and loosely secured to, the platform and the other end released and allowed to free fall onto the floor so as to impact on the tank corner. Refer to Figure 17, Drop Test Arrangement.

7.6.3 The representative sample tank shall be observed for rupture.

## **7.7 ROUGH USAGE / STABILITY TEST**

7.7.1 The representative sample tank and support structure shall not sustain any significant damage as a result of the test described in Clause 7.7.2 as evidenced by being capable of meeting the requirements of Clause 7.7.3 and Section 7.1, Proof of Design Test following this test.

7.7.2 A representative sample tank shall be placed on a level concrete surface and filled with water equivalent in mass to 30% of its rated capacity of fuel. It shall then be tipped laterally to 30° from the horizontal and allowed to free-fall back to its original position.

7.7.3 Following the test in Clause 7.7.2, the representative sample tank shall not upset and shall return to its original position when tested as described in Clause 7.7.4.

7.7.4 The representative sample tank shall be loaded with water equivalent in mass to its normal capacity of fuel and, from a horizontal level surface, tipped laterally to 30° from the horizontal in each direction. In conducting this test, means shall be taken to prevent impact on the saddles when returning to the vertical position.

## **7.8 STATIC LOAD TEST**

7.8.1 The representative sample tank and support structure shall not sustain any permanent deflection as a result of the test described in Clause 7.8.2. The required test load shall be three times the manufacturer's rated load for the tank or support structure designed to carry the load. *Workbench tanks* shall be subject to a load of 450 kg.

7.8.2 The test load shall be evenly applied to the tank top or support structure, which is designed to carry the load for a period of 5 min. For *workbench tanks*, the load shall be applied over an area of 0.1 m<sup>2</sup>, which is judged to be the weakest.

## **7.9 TANK SUPPORT LOAD TEST**

7.9.1 A tank of the maximum capacity for a given support structure shall be mounted on the support structure and completely filled with water. An evenly distributed load equal to the weight of the filled tank shall be placed across the top of the filled tank for a period of 2 min.

7.9.2 The support structure shall be examined for deformation.

# **8. PRODUCTION TESTS**

## **8.1 PRODUCTION LEAK TEST**

8.1.1 The manufacturer shall test each tank after all welding slag has been removed and all fittings and appurtenances, which are appropriate to its use, have been fitted. Each tank shall be proved leak tight at all points including welds, threaded joints, fittings and *manways* by applying pressure in accordance with Table 6. While the pressure is maintained, a liquid soap solution shall be brushed or poured over all seams, threaded connections, flanged connections, bolts, etc. A complete inspection of the entire tank surface for flaws in the welds or parent metal shall then be made.

NOTE: The air supply for use in testing tanks must be controlled and monitored so that there exists no danger of over pressurizing.

8.1.2 If leaks are noted during the test, the pressure shall be removed and the tank shall be made leak tight and then retested. Defects in welds shall be repaired by chipping or gouging the defective weld from one or both sides of the joint, as required, and re-welded.

8.1.3 After testing, the plugs in all openings above the normal liquid level in the tank shall be backed off to a hand tight position or removed and replaced with closures in accordance with Clause 3.5.8.