Ameritube LLC 1000 N. Hwy 77, Hillsboro TX 76645	Revision Level: C	Procedure No. SOP 900
	Revision Date: 09/27/13	Page No. 1 of 4
Hydrostatic Testing	This Document expires one day after printing Last Printed: July 25, 2014	

Date	*Description Of Change*	*Signature*	*Rev. Level*
09/27/2013	*Initial Release*	*Shawn Franks*	*A*
05/21/2014	*ASTM E1003 Addition Para 2*	*Shawn Franks*	*B*
5/23/2014	*Addition of Safety Procedures*	*Shawn Franks*	*C*

Procedure Approval:	**Company Title:**	**Date:**
	Quality Manager	9/27/2013

1. Scope

The scope of this procedure is to provide for a system and instructions, and to assign responsibilities for initiating, requesting, implementing, and checking the effectiveness of hydrostatic testing. This procedure applies to the testing of materials for conformance to ASTM standards.

1.1 These test methods cover the hydrostatic testing of metallic materials in any form at room temperature, specifically, the methods of determination of tube integrity, non visible holes or cracks, and a secondary test method in qualifying tube based from non conformance of eddy current.

1.2 Quality Assurance is responsible for collecting the tubing to be tested, compiling and reviewing the pertinent information. At a minimum, Quality Assurance reviews:

1.2.1 The cause of failure based from eddy current results;

1.2.2 Contractual obligation to preform test;

1.2.3 Provide Material Test Reports (MTR) to customers; and

1.2.4 Customer specification on tests; and

1.3 Hydrostatic Testing is conducted when the material is finished with the final anneal, straightening and eddy current results unless otherwise specified by customer purchase order.

2. General Procedures as

2.1 *Openings:*

2.1.1 Seal all openings using plugs or covers that can withstand the test pressure and can be completely removed after the test

2.1.2 The test fluid inlet should be located on the bottom of the test object with the trapped air vent at the highest point.

2.1.3 Components rated at pressures below the test pressure must be isolated.

2.2 *Gauges*—One or more test gauges must be connected to the system. If more than one gauge is used, one may be a recording gauge. At least one gauge which is used for acceptance of the test shall be calibrated within 30 days prior to use. One indicating gauge must be easily visible to the operator controlling the pressure throughout the pressurizing and testing cycle.

2.3 *Pre-Test Inspection:*

2.3.1 Before pressurizing is begun, inspect the outside of the test object to verify that it is dry and all welds and connectors are exposed if a visual inspection is to be conducted.

2.3.2 Securely brace critical areas that may not be able to withstand the weight.

2.4 *Pressurizing*—Gradually increase the pressure in the system to 50 % of test pressure and make an initial check for leakage. Thereafter slowly increase the pressure to the final test pressure. The test pressure usually is between 75 % and 150% of the operating design pressure.

2.5 *Leak Test:*

2.5.1 At the completion of test pressure holding time, examine the system for leakage. Examination for leakage shall be made of all accessible joints and connections, attachment welds where practical, and weep holes for paddings and attachments. Also inspect the area around inaccessible leakage sites.

2.5.2 The inspector shall circle all accessible leaks found on the equipment using a nondeleterious marker. The

magnitude of leak shall be described in terms of: damp or moist area, drops per minute or steady stream.

2.6 *Depressurizing*—After inspection release the pressure slowly. The air vents need to be opened during draining to admit air and prevent collapsing of the test system.

3. Operation of Hydrostatic Tester

3.1 Prepare the test area to ensure all safety precautions are established.

3.2 Select the appropriate test plugs for the tube diameter.

3.3 Ensure that the water reservoir is full and pressure pump is operating within the manufacturer's guidelines.

3.4 Obtaining appropriate testing work order and ensure that the correct pressure amount for the tubing is in accordance with ASTM standard and customer requirements.

3.5 Adjust the control regulator, with the system on, so that pressures do not exceed the maximum PSI, causing an unstable work environment and causing tube rupture or deformation.

3.6 With the shut off valve engaged, affix the test couplings to both ends of the tube, double checking that the plugs are firmly attached.

3.7 Engage the shut off valve to fill the tube with water while expelling any air in the tube with the automatic air release valve.

3.8 Allow the tube to pressurize to the specified amount and disengage the shut off valve.

3.9 Let sample hold at desired PSI and note any fluctuation in the pressure gage reading or leak on tube. Any rapid drop in the tube's pressure is considered a non compliant tube. Note any water leaking from the tube and any deformations that might occur.

3.10 Release the pressure from the release valve and allow tube to empty of water, blowing air into the end of the tube to clean out any excess water. If material has a drop in reading, retest the tube with items 3.7-3.10.

3.11 If material fails, segregate the tubing from the compliant bundle and write up a Non Conforming Mater Report (NCMR). If the tubing passes, return tube to the current area of production that is required.

3.12 Record all compliant and non compliant information to the work order provided. Return tube to original bundle and continue the Finishing precess.

4. Safety Procedures for Hydrostatic Testing (From: *The Petro Street, Engineering Professional HSE Board*)

Hydrostatic test preparation:

4.1. Specification sheet of the equipments and or pipe line, which mentions pressure and temperature designs are available and complete.

4.2. Hydrostatic test pressure and temperature standard are already clearly defined in the related document.

4.3. Supported documents supplied for testing.

4.4. Pressure test planning has to be distributed to all relevant sections in the plant site at least two days before the execution date.

4.5. Make good coordination among related sections that involve in the test.

4.6. All test equipments and tools shall be inspected for wear and damage.

4.7. Pressure measurement tools are calibrated and their statuses of calibration are still valid.

4.8. Pressure gauges used in the test have enough capacity. The gauges are recommended to have 150% of the maximum allowable working pressure.

4.9. The pressure gauge is safety type, with blowout back.

4.10. Pressure gauges must be installed at a proper location so that it can be easily read and do not create additional hazards to the hydrostatic test or expose personnel to the vessel being tested.

4.11. All the temporary tools (such as valve, fitting, hoses, flanges, blind plate, etc) have to be rated more than the maximum hydrostatic pressure.

4.12. Isolate other equipments and pipe lines that do not include in the hydrostatic test.

4.13. Vents are available and installed the high points to vent air. Check the vent line before testing and make sure it is not blocked.

4.14. Choose drain valve at the lowest point in order to completely empty the vessel and pipe.

4.15. Safety relief valve is already installed. Safety relief valve setting is 1.5 times maximum allowable working pressure.

4.16. Safety relief valve is calibrated.

4.17. Isolate the test area and surround it with safety line. Put appropriate safety sign at that area.

4.18. Do not allow person who does not have any relation with the hydrostatic test, to enter the test area.

4.19. Always perform the test from a remote area in high pressure situations.

4.20. Make sure that all pipe and vessel supports are in good condition and have been inspected.

4.21. All hoses must be tied down.

4.22. Water temperature must be more than 16oC (60 F).

4.23. The hydrostatic-pressurizing pump is completed with safety relief valve.

4.24. Wear proper personal protective equipments.

4.25. Do not start the test if a problem is identified.

4.26. Issue a work order by authorized personnel.

Pressurization process:

a. Remove all air from the vessel and pipe line by water through vent line.

b. Pressurization is conducted gradually/slowly.

c. Mark all leak points before preceding to the next test item.

d. Do not monitor during pressurization step directly from the front of sight glass or in the pressurized safety zone.

e. Observe tested item from a distance or use a separate looking device i.e. bore scope.

De-pressurization process:

i. Start de-pressurization by opening gradually the vent valve. Do it slowly.

ii. Do not open the drain valve if the vent valve if still closed. This is to avoid vacuum condition inside the vessel.

iii. Open the lowest drain point to completely remove water from the vessel and pipeline.

iv. Ensure that no remaining pressure trapped inside the pipe line or vessel.

v. The above hydrostatic pressure test safety checklist will ensure worker’s safety and the facility of the plant. Thus, do not try to ignore them.