

ADMIN-4-1 Pressure Vessel Inspection and Test Procedure

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ADMIN-4-1 Pressure Vessel Inspection and Test Procedure

TABLE OF CONTENTS

1.0 PURPOSE.....3

2.0 AUTHORITY AND APPLICABILITY4

 2.1 Authority **Error! Bookmark not defined.**

 2.2 Applicability4

3.0 PRECAUTIONS AND LIMITATIONS4

4.0 PREREQUISITE ACTIONS5

 4.1 Planning and Coordination 5

 4.2 Performance Documents..... 5

 4.3 Special Tools, Test Equipment, Parts and Supplies..... 5

 4.4 Approvals and Notifications 6

5.0 PERFORMANCE ACTIVITIES6

 5.1 Vessel Inspection Prior to Service 7

 5.2 Site-Fabricated Vessel Inspection Prior to Service..... 7

 5.3 External Inspection 7

 5.4 Thickness Measurement..... 9

 5.5 Internal Inspections, Preparing for..... 10

 5.6 Internal Surface Inspection 10

 5.7 Repairs and/or Alteration Inspection 12

 5.8 Hydrostatic Testing..... 12

 5.9 Pneumatic Testing..... 13

6.0 POST-PERFORMANCE ACTIVITIES14

 6.1 Results..... 14

7.0 RESPONSIBILITIES15

8.0 IMPLEMENTATION.....15

9.0 TRAINING15

10.0 EXCEPTION OR VARIANCE15

11.0 DOCUMENTS AND RECORDS.....15

12.0 DEFINITIONS AND ACRONYMS.....16

 12.1 Definitions..... 16

 12.2 Acronyms..... **Error! Bookmark not defined.**

13.0 HISTORY16

14.0 REFERENCES16

15.0 FORMS.....16

16.0 CONTACT.....16

RECORD OF REVISIONS

Rev	Date	Description	POC	RM
0	9/17/2014	Initial issue as ADMIN-4-1. Previously in Chapter 17 as ITM-342-1701 r0, 8/3/2009. Minor admin updates.	Ari Ben Swartz, <i>ES-EPD</i>	Larry Goen, <i>ES-DO</i>

Contact the Standards POC for upkeep, interpretation, and variance issues.

Chapter 17	<u>Pressure Safety POC and Committee</u>
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This document is online at <http://engstandards.lanl.gov>

1.0 PURPOSE

This procedure provides instructions to establish a method for inspection and testing of pressure vessels in accordance with applicable drawings, specifications, codes, standards, and policies that fall within the scope of ESM Chapter 17 Pressure Safety, Section ADMIN-4, which sets maximum inspection intervals and defines excluded vessels. These inspection intervals may be adjusted downward by the fitness for service evaluation for any specific vessel based on the findings of the inspection.

Section I frequency requirements at time of writing:

Inspection Frequencies for Non-Exempt Pressure Vessels

<i>Service</i>	<i>External + wall thickness (e.g, ultrasonic)</i>	<i>Internal</i>
<i>Corrosive</i>	3	3
<i>Non-corrosive</i>	5	10

This procedure may be used for vessels and tanks rated below Chapter 17 pressure, size, and service limits.

Sections **5.1** through **5.9** of this procedure may be performed independently or omitted, as necessary.

ADMIN-4-1 Pressure Vessel Inspection and Test Procedure

2.0 APPLICABILITY

2.2 *Applicability*

This document applies to qualified pressure vessel inspection personnel performing inspections and tests at LANL.

3.0 PRECAUTIONS AND LIMITATIONS

- A. Ground fault circuit interrupters (GFCIs) shall be used on all electrically-driven equipment (110 VAC only).
- B. Barricades and/or flagging, if used, shall be installed in accordance with LANL policy.
- C. Low-voltage safety lights and air-driven tools shall be used inside the vessel as required by the Job Hazard Analysis (JHA) or safety work permit.
- D. Inspection and testing of pressure vessels shall be conducted by code-qualified inspectors (i.e., those who have passed the API or National Board of Boiler and Pressure Vessel Inspectors examination).
- E. Discovery of a non-code stamped pressure vessel with request for continued use shall be reviewed/approved as safe for continued operation by the Chief Pressure Safety Officer (CPSO).
- F. Pneumatic testing shall be limited to pressure vessels where testing with a liquid is impractical or when the equipment cannot be exposed to liquids and shall be approved by the CPSO.
- G. Hydrostatic testing shall be performed when inspection discloses unusual, hard to evaluate forms of deterioration that may affect the safety of the vessel. Hydro testing also shall be performed as requested by Operations or Engineering or by the Inspector to confirm suspected leaks and following repairs or alterations.
- I. Pressure vessel(s) shall be evaluated for any condition that may affect the remaining life of the vessel. The remaining life may be adjusted based on conditions such as corrosion, erosion in local areas, fatigue, creep, operating and ambient temperatures, effects of hydrogen attack and embrittlement, and stress-corrosion cracking.
- J. The maximum period between internal inspections or a complete in-service evaluation of pressure-retaining items shall not exceed the inspection frequency per ESM Chapter 17 Section ADMIN-4.
- K. Pressure vessels that have been out of service for one year or more and are past due on an inspection shall be inspected prior to being placed into service.
- L. External ultrasonic thickness measurement may be performed in lieu of internal inspections if the internal inspection is impractical or presents excessive hazards to the Inspector. In such cases, the next ultrasonic measurement interval shall be determined the same as for the internal inspection interval described in Item 3.J, above.
- M. Each new, structurally repaired, or altered pressure vessel shall be inspected and tested before use.
- N. Pressure vessels within the scope of the ASME Code shall be code stamped in accordance with the applicable section of the ASME code, unless a Code Equivalency determination is made in accordance with ESM Chapter 17 Section GEN.
- O. Pressure vessels shall **NOT** have any leakage. Any evidence of leakage shall be thoroughly investigated prior to acceptance of the vessel.

ADMIN-4-1 Pressure Vessel Inspection and Test Procedure

- P. Pressure vessels, appurtenances, associated piping and connections shall be rejected for abrasion, dents, distortion, cuts, gouges, or other significant defects that may affect the vessel integrity.
- Q. Measurements of pressure vessel wall thickness shall **NOT** be less than the minimum allowable thickness identified by Engineering.
- R. Where this procedure conflicts with LANL-adopted national code requirements, those codes shall take precedence.
- S. Performance steps in Section 5, *Performance Activities*, do **NOT** have to be performed in a step-by-step manner; however, all applicable steps within a topic shall be performed unless otherwise documented on the applicable DMAPS inspection report.

4.0 PREREQUISITE ACTIONS

4.1 Planning and Coordination

NDE Supervisor/Designee

- [1] Obtain work authorization from the owner/user or operating organization. Inspections within nuclear facilities shall be scheduled on the Plan-of-the-Day.
- [2] Conduct pre-job briefing(s) prior to pressure vessel inspection and testing that includes a pre-inspection review of applicable safety and operations documents, including the most current Job Hazard Analysis (JHA) and associated permits (including confined space entry permits for internal inspections), tagouts, special hazard controls or barriers, etc.

Inspector

- [3] Obtain and review the inspection folder for the vessel to be inspected (*should be in the EDMS*). This should contain the U-1 or U-1A data sheet from the manufacturer or NBIC. If not, coordinate with owner to purchase from NBIC.¹
- [4] Obtain current copies of the documents identified in Section 4.2, *Performance Documents*, as necessary.

4.2 Performance Documents

- DMAPS pressure vessel inspection checklist and record of wall thickness measurements
- Section VIII, Div. 1, *ASME Boiler and Pressure Vessel Code*, latest edition
- NBIC ANSI/NB-23, *National Boiler Inspection Code*, latest edition.
- U1 or U1A report of vessel to be inspected (5.1).
- Service history and cycle history of vessel to be inspected. (5.1 [5])

4.3 Special Tools, Test Equipment, Parts and Supplies

- air-driven tools
- barricades and/or warning devices, as needed
- borescope

¹ Approx \$20/per. Without data sheet, assumptions would need to be made that could require rerating of the vessel

ADMIN-4-1 Pressure Vessel Inspection and Test Procedure

- inspection mirrors
- calibrated pressure gauge
- calibrated thermometer (for hydrostatic and pneumatic testing)
- GFCIs (for electrical equipment)
- hydro test equipment
- low voltage safety lights
- non-sparking hammer
- ultrasonic thickness gauge
- wire brush
- oxygen meter (if required for vessel entry)

4.4 Approvals and Notifications

NDE Supervisor/Designee

- [1] Obtain permission from the equipment owner, Building Manager/Shift Manager or designee to begin inspection, as appropriate.
- [2] Obtain approval for discharging fluid from systems hydrostatically tested, as necessary. See also LANL Master Spec [01 3545](#), Water Discharge Requirements

NOTE *Where beryllium or radiological hazards may exist, the FOD IH Office or RADCON Office, respectively, will evaluate the hazard conditions(existing and anticipated) and specific work activities to make a BWP or RWP determination (none required, use existing, generate new).*

- [3] **IF** any of the following beryllium conditions exist:
 - Performing work in beryllium areas
 - Moving equipment that may expose previously inaccessible surfaces that may be contaminated with beryllium,

THEN contact with the FOD IH Office.
- [4] **IF** any of the following radiological conditions exist:
 - Performing work in radiological areas, Radiological Buffer Areas, and areas posted to contact RADCON prior to working above 8 feet
 - Moving equipment that may expose previously inaccessible surfaces that may be contaminated with radiological material
 - Disturbing surfaces in/identified as Fixed Contamination Areas
 - Disturbing surfaces of yellow-tagged material and suspect older items,

THEN contact the FOD RADCON Office for an RWP.
- [5] Obtain appropriate review of the JHA and BWP(s) or RWP(s) to ensure there are no conflicts or new hazards introduced by the BWP or RWP PPE requirements and controls.
- [6] Document the BWP or RWP number(s) and the SME review.

5.0 PERFORMANCE ACTIVITIES

NOTE 1 *Performance activity sub-sections may be performed independently or omitted, as required.*
NOTE 2 *All non-conformances are to be documented by a Nonconformance Report (NCR) or by affixing reject tags.*

ADMIN-4-1 Pressure Vessel Inspection and Test Procedure

5.1 Vessel Inspection Prior to Service

Inspector (alternatively, may be performed by CPSO or delegate)

- [1] Check for the presence of nameplate and other manufacturer's markings/stamps.
- [2] Inspect (visually) vessel, connecting piping, and structural supports for damage and obvious defects such as dents, bulges, etc.
- [3] Verify that any modifications (welded brackets, etc.) were performed under appropriate qualification stamp (this requires the original manufacture document U1 or U1A forms as a baseline).

NOTE *Pressure relief device shall be set **NO** higher than the Maximum Allowable Working Pressure (MAWP) of the pressure vessel.*

- [4] Ensure required pressure relief device(s) are inspected in accordance with PMI below.
 - [a] **IF** testing is required, **THEN** ensure pressure relief device is removed and tested in accordance with PMI below.
 - [b] Ensure reinstallation of pressure relief device, as necessary.
- [5] **If not already completed**, establish an inspection folder in EDMS or DMAPS for each to include manufacturer's data report, inspection reports, and other pertinent information (e.g., service media history and pressure and temperature cycle history; this may dictate specific examination requirements for example hydrogen embrittlement)
- [6] Obtain and affix proper equipment identification tag to vessel and pressure relief device.

The MSS Document "Inspections and Testing of Pressure Vessels and Pressure Relief Valves" is [O&M Criterion 419](#) (internal only).

Work instructions [40-25-040](#) "Pressurized Tank Relief Valve Testing", [40-25-041](#) Pressure Vessel Relief Valve Testing

5.2 Site-Fabricated Vessel Inspection Prior to Service

NOTE: *Such vessels are generally not allowed at LANL; contact CPSO before undertaking.*

Inspector

- [1] Ensure the required nondestructive testing is performed by qualified personnel and recorded as required.
- [2] Inspect vessel after installation or prior to service in accordance with Section 5.1, *Vessel Inspection Prior to Service*.
- [3] Perform the hydrostatic (Section 5.8) or pneumatic (Section 5.9) pressure test, as required.

5.3 External Inspection

Inspector

- [1] Initiate DMAPS Checklist by recording all available requested information.

ADMIN-4-1 Pressure Vessel Inspection and Test Procedure

- [2] Review any previous vessel inspection reports to identify areas of concern and to determine if previously identified deficiencies have been corrected.
- [3] Contact the vessel owner/user, as necessary, to determine and consider the service history of the vessel and other vessels in the same service since the last inspection.
- [4] Check for the presence of nameplate and other manufacturer's markings/stamps.
- [5] Check insulation coverings, supports, or settings for evidence of leakage.
 - [a] *If external coverings such as insulation or corrosion-resistant coatings are in good condition and no reason exists to suspect any unsafe condition underneath the coverings, removal is not necessary for inspection. However, it is advisable to remove small portions of the coverings (e.g., UT ports) in order to investigate the condition of the coverings and vessel surface.*

NOTE Due to significant time requirements, Step 5.3[6] may be performed concurrently with the remainder of this section.

- [6] **IF** evidence of leakage (including in the past) is found, **THEN** perform the following in any order.
 - Reject vessel pending further inspection
 - Inform vessel owner of observation(s)
 - Investigate leakage source completely until the source is established/known.
- [7] Check structural attachments and supports (e.g., legs, saddles, skirts, hangers) for the following:
 - Freedom for expansion and contraction, as applicable
 - Anchor bolts and nuts for corrosion or defects
 - Distortion
 - Protective coating for evidence of blisters, peeling, or corrosion
 - Excessive cracks or settlement on concrete pads, piers, or saddles
 - Rot deterioration of wood support structures
 - Cracks or other defects in weld areas
 - Electrical grounding, for corrosion and other defects.
- [8] Inspect vessel connections as follows:
 - [a] Examine manholes, reinforcing plates, nozzles, or other connections for cracks, deformation, or other defects.
 - [b] Inspect bolts and nuts for corrosion and other defects.
 - [c] Examine accessible flange faces for distortion and evidence of leakage.
- [9] Check the surface of the vessel (shell, heads) for the following conditions:
 - External corrosion²
 - Dents
 - Distortion³
 - Erosion
 - Cuts or gouges⁴

² Cosmetic (non-failing) anomalies:

- Surface corrosion where no pitting corrosion or significant loss of vessel wall material is observed
- Protective coatings that are scratched or peeled

Significant anomalies that to be reported (may require corrective action):

- Protective coatings bubbled or blistered
- Protective coatings that have disbonded and exhibit corrosion beneath
- Surface areas in which a representative sample area (approx 1 sq ft) exhibits ~1/6 or greater of the area rusted

³ Evaluate to API 579

ADMIN-4-1 Pressure Vessel Inspection and Test Procedure

- Cracks, blisters, or bulges, on shell and head surfaces
- Weld areas for cracks and other defects.⁵

[10] Examine inlet and outlet piping and fittings for the following:

- Provisions for expansion
- Provisions for adequate support
- Evidence of leakage
- Proper alignment of connections
- Evidence of corrosion, erosion, cracking or other detrimental conditions.

[11] Verify proper operation and condition of vessel instrumentation, pressure gauges, controls, sight glasses, and blow-down drains.

[12] Inspect stop valve stems, hand wheels, and extension rods for excessive wear and damage.

NOTE *All pressure vessels are required to have a means of overpressure protection⁶*

[13] Check overpressure protection devices for the following:

- Proper type
- Proper size
- Leaks, corrosion, or damage
- Connecting bolts intact
- Deposits or material buildup
- Overdue test (PRVs) or expiration of service life (burst discs)
- Vent and/or drain lines are clear of obstructions and discharge to a safe location (when practical)
- Relief valves are directed or shielded so personnel in normal working areas will not be impinged by discharge
- Seals for adjustments are intact and show no evidence of tampering
- Set pressure is no higher than MAWP of pressure vessel, EXCEPT for rupture disks rated at temperatures above 100°F.

[14] Verify installed pressure relieving device(s) are within required inspection/testing/calibration frequency.

[15] Perform UT thickness testing of components per Section 5.4 and complete corrosion rate and DMAPS remaining life calculation form.⁷

5.4 Thickness Measurement

Inspector

[1] When thickness measurement is required or **IF** it is determined that an internal inspection is impractical, cannot be performed, or would present excessive hazards to the Inspector⁸, **THEN** perform external thickness measurements as follows:

⁴ Ibid.

⁵ Magnetic particle and liquid penetrant may be used to supplement visual inspection by an ASNT-qualified individual

⁶ Excepting Code Case 2211 and UG-140

⁷ Required to determine next inspection interval; not less than ½ of the remaining life of the vessel

⁸ This is where ESM Chapter 17 Section I allows given when API 510 or NBIC allows on-stream [external and wall thickness] in lieu of internal.

ADMIN-4-1 Pressure Vessel Inspection and Test Procedure

- [a] Perform external thickness measurements to include those areas where pitting and corrosion are evident or expected, **AND** document in DMAPS

Note: External thickness measurement is not valid for laminated vessels.

NOTE An NCR shall be prepared if minimum allowable thickness data cannot be determined from manufacturer's data or documentation by Engineering.

- [2] **IF** thickness measurements are performed, **THEN** compare the measurements obtained to the minimum allowable wall thickness as identified in the manufacturer's data report or as determined by Engineering.

5.5 Internal Inspections, Preparing for

Inspector

- [1] Obtain authorization **AND** coordinate scheduling of pressure vessel inspections and associated outages with the appropriate equipment owner(s).
- [2] Ensure external inspection has been performed in accordance with Section 4.3, *Vessel External Surface Inspection*.
- [3] Ensure the required lockout/tagout permits are in effect; the vessel has been adequately shut down; and is isolated by closed, tagged, and locked stop valves, or by blanked off pipelines prior to entry.
- [4] Ensure the removal of fuses, locking of controls, and blocking of movable parts on rotating type vessels or vessels with movable internal parts.
 - [a] Ensure such controls and movable parts are included in any lockout/tagout permits.

WARNING

Failure to purge vessel or adequately remove surface residue can cause death or serious injury due to asphyxiation or inhalation of toxic gases or vapors.

- [5] Ensure the vessel has been drained, ventilated, and cleaned prior to internal inspection.
- [6] Ensure applicable confined space entry permits are in place in accordance with confined space entry program.
- [7] Ensure the internal atmosphere (oxygen content, etc.) has been analyzed by Industrial Hygiene and that IH has deemed the vessel safe for entry.
- [8] Remove the inspection plugs and covers, as necessary, to allow a thorough examination of internal surfaces.
- [9] Use adequate lighting to ensure visibility.
- [10] Ensure adequate surface preparation so residue will not interfere with determining the true condition of the base metal.

5.6 Internal Surface Inspection

Inspector

- [1] Examine internal surface conditions that could adversely affect the safety and dependability of the vessel, such as:
 - Pitting
 - Distortion
 - Corrosion

ADMIN-4-1 Pressure Vessel Inspection and Test Procedure

- Grooving
- Erosion
- Dents
- Cuts or gouges
- Blistering
- Cracking
- Flaking
- Heat affects

NOTE Where there is evidence of leakage or defects/deterioration are suspected, insulation or lining may require removal to the extent necessary to make a complete investigation.

- [2] Examine appurtenances, such as baffles, screens, and hangers for loose parts, loose or broken bolts, and excessive corrosion.
- [3] Examine rotating equipment such as agitators or pump impellers for:
 - Evidence of abrasion
 - Scoring
 - Misalignment
 - Cracked mountings.
- [4] Check any stays and braces for:
 - Looseness
 - Corrosion
 - Cracks
 - Breakage
 - Bowing
 - Leakage at upset and fastened ends.
- [5] Examine manholes and other openings that are flanged or screwed into the vessel for cracks, corrosion, deformation, or evidence of leakage and check bolts and nuts for corrosion or defects. **IF** the pressure vessel is equipped with quick-actuating closures, **THEN** inspect for excessive wear/distortion **AND** ensure the proper function of the holding and locking elements.
- [6] Examine all openings to external attachments such as gauge glasses, safety valves, and pressure or temperature controls to assure freedom from obstructions.
- [7] Examine coils, tubes, and tube sheets for corrosion, erosion, scale, and other deposits.
- [8] Examine rolled, flared, beaded, or sealed tube ends.
- [9] Inspect the tube sheet for cracks in the ligaments between tube holes.
- [10] Inspect visibly accessible gasket seating surfaces for cleanliness, leakage, and surface defects such as pitting or grooving.
- [11] Check protective linings for cracks, tears, and other signs of deterioration. Vessels with special lining will require the use of special instruments to evaluate the lining. For example, glass-lined vessels will require high potential voltage equipment.
- [12] Inspect external heating or cooling jackets and coils for defects and/or distortion resulting from over pressurization.
- [13] Inspect cathodic protection (anode and cathode, if present) for evidence of excessive deterioration.
- [14] Check gaskets and sealing surfaces for evidence of leakage and continued serviceability.
- [15] Ensure adequate preparation of the surface and perform thickness measurements (or other non-destructive evaluations) to include those areas where pitting and corrosion are expected or evident, **AND** document measurements in DMAPS.

ADMIN-4-1 Pressure Vessel Inspection and Test Procedure

NOTE An NCR shall be prepared if minimum allowable thickness data cannot be determined from manufacturer's data or documentation by Engineering.

- [16] **IF** thickness measurements are performed, **THEN** compare the measurements obtained to the minimum allowable wall thickness as identified in the manufacturer's data report or as determined by Engineering.

5.7 Repairs and/or Alteration Inspection

NOTE Repair of vessels is generally not allowed at LANL; contact CPSO before undertaking.

Inspector

NOTE 1 *The following steps may be performed in any order.*

- [1] Ensure all applicable (completed) repair forms (R-1, R-2, R-3, etc.) and other pertinent information is present in equipment file(s).
- [2] Inspect vessel after installation or prior to service in accordance with Section 5.1, *Vessel Inspection Prior to Service*.
- [3] Perform or witness the hydrostatic (Section 5.8) or pneumatic (Section 5.9) pressure test, as required.

5.8 Hydrostatic Testing

NOTE 1 *Hydrostatic testing is usually required for post-fabrication, alteration, and repairs prior to the "R" or "U" stamp being applied. Hydrostatic testing is NOT normally required for in-service inspections. When hydrostatic testing is performed during in-service inspections, the original test pressure shall NOT be exceeded.*

NOTE 2 *Use Appendix A, Pressure Test Record, or equivalent.*

Inspector

- [1] Ensure the pressure gauges used by the Inspector have current calibration stickers.
 - [2] Remove all persons not directly involved from the immediate test area.
- NOTE** *The designated test pressure for new construction, repair, and alterations is specified in the design documents. For in-service inspections, it is a pressure designated by the Inspector which does not exceed the MAWP stamped on the vessel. (NBIC NB-23 Vol 3, 4.4.1 allows 150% of MAWP)*
- [3] Determine (establish) test pressure.
 - [4] Remove pressure relief valves or non-reclosing relief device from the vessel or test boundary where the test pressure will exceed the set pressure of the valve, **OR** hold down each valve disk by means of an appropriate test clamp and pressurize both sides of non-reclosing relief devices. Install temporary, higher-rated devices where practical.
 - [5] Install the calibrated test gauge so it is visible to the Inspector at all times.
 - [6] Ensure the skillet blanks or test plugs or clamps are appropriate for use and are free of obvious defects.

ADMIN-4-1 Pressure Vessel Inspection and Test Procedure

- [7] Ensure the metal temperature for the hydrostatic test is between 60°F and 120°F inclusive or other temperature range as specified by Engineering.
- [8] Fill and vent system as necessary to remove as much air from the vessel as practical.
- [9] Pressurize the vessel, raising the pressure in the vessel gradually until the designated test pressure is achieved.
- [10] Maintain this test pressure for ten minutes prior to inspection (NBIC NB-23 Vol 3, 4.4.1) then, if testing above MAWP, reduce to MAWP while making a full and thorough inspection for leaks.

NOTE Engineering is to be contacted when structural distortion of the vessels is observed.

- [11] **IF** there is evidence of structural distortion, **THEN** reject the vessel.
- [12] **IF** there is leakage in the vessel, **THEN** perform the following as appropriate:
 - Ensure minor repair is performed **AND RETURN TO** Step 5.8[1]
 - Contact Engineering for evaluation
 - Reject the vessel.
- [13] **WHEN** the test is completed, **THEN** vent the test pressure to atmosphere. Return relief devices to normal configuration.

5.9 Pneumatic Testing

WARNING

Stringent control of test pressure is required when using air or gas as a test medium to prevent over pressurization and potential injury/death.

NOTE 1 Justification for using pneumatic testing instead of hydrostatic testing SHALL be reviewed and approved by the CPSO.

NOTE 2 Use Appendix A, Pressure Test Record

Inspector

- [1] Determine (establish) the test pressure.
- [2] Ensure the pneumatic test pressure does **NOT** exceed the established test pressure of the vessel, unless otherwise specified in the Engineering design documents.⁹
- [3] Remove from the immediate area all persons **NOT** directly involved in the test.
- [4] Ensure the test area is properly flagged, barricaded, or otherwise controlled in accordance with LANL procedures to prevent unauthorized personnel entry.
- [5] Install the calibrated test gauge so it is visible to the Inspector at all times.
- [6] Ensure that the test gauge has a current calibration sticker.

NOTE A pressure relief valve or non-reclosing relief device may be installed in the test medium supply line to ensure that this limit is not exceeded.

- [7] Verify that the pressure is continually monitored to ensure that pressure never exceeds the designated test pressure of the vessel.

⁹ NBIC NB-23 Vol 3 4.4.1 “The test pressure shall be the minimum required to verify leak tightness integrity for the repair, but shall not exceed the maximum pneumatic test pressure of the original code of construction.”

ADMIN-4-1 Pressure Vessel Inspection and Test Procedure

- [8] Remove relief devices from the vessel to be tested, where the test pressure will exceed the set pressure of the device, **OR** hold down each valve disk by an appropriate test clamp and equalize pressure on non-reclosing relief devices.
- [9] Pressurize the vessel, raising the pressure in the vessel gradually until not more than ½ of the test pressure is achieved.
- [10] Increase the test pressure **SLOWLY** in steps of approximately 1/10 of the test pressure until the required test pressure has been reached.
- [11] Reduce the pressure to the maximum operating pressure before proceeding with the inspection (see ASME Section VIII Div 1 UG-100). Hold the pressure for a sufficient period of time to permit inspection of the vessel.
- [12] Check the pressure gauge periodically for indications of leakage.
- [13] Apply a soap solution to accessible welds, screwed pipe joints, flanges, etc., where leakage is suspected.

NOTE Engineering is to be contacted when structural distortion of the vessels is observed.

- [14] **IF** there is evidence of structural distortion, **THEN** reject the vessel.
- [15] **IF** there is leakage vessel, **THEN** perform the following, as appropriate:
 - Ensure minor repair is performed **AND RETURN TO** Step 5.9[1]
 - Contact Engineering for evaluation
 - Reject the vessel.
- [16] Ensure personnel are clear **AND** vent the test medium to approved discharge vicinity/atmosphere.

6.0 POST-PERFORMANCE ACTIVITIES

6.1 Results

Inspector

- [1] Complete DMAPS entry.
- [2] Complete and forward Work Order and inspection checklist to the reports and data specialist.
- [3] Include sketches or photographs with the inspection reports when necessary to depict more complex defects.
- [4] Transmit a copy of the inspection report for accepted vessel to the owner and FOD PSO.
Define the when the next inspection is required based on the fitness for service evaluation. (see NBIC NB-23 5.3.7.1 10. & 19)
- [5] Attach appropriate status tag to the equipment and contact equipment owner/user, as applicable.
- [6] Generate non-conformance report, as necessary, for rejected vessels.
- [7] Forward inspection documentation for rejected vessels to NDE team supervision for review/approval.
- [8] Provide the owner/user with the completed inspection report and/or reject report, as necessary, **AND** file a copy of each in the work package. *Should also send a copy to the FOD PSO for the equipment files.*
Folder shall be kept in EDMS or PSCS as a Maintenance History Report with an appropriate numbering system (e.g. ,MHR-TABLDG-XXXX) and revised whenever inspection, test, or maintenance is accomplished

ADMIN-4-1 Pressure Vessel Inspection and Test Procedure

Supervisor/Designee

[9] Complete shop floor paperwork using biennial inspection frequency as a “default” frequency for accepted vessels, until the actual frequency determination is determined by DMAPS fitness for service feature or engineering.

NOTE The following step may be performed at any time and independent of this procedure.

[10] Perform the following actions upon receipt of the DMAPS determination of next inspection due date:

- [a] Ensure that CMMS is updated to reflect the next inspection due date.
- [b] Ensure the Inspector updates the equipment status tag in the field to reflect the next inspection due date, if applicable.
- [c] Place documentation of the determination in any central equipment file.

7.0 RESPONSIBILITIES

AET-6 or successor is performing organization; should responsible organizations change, applies to successor organizations. Performance may be subcontracted by AET-6, or by owners with AET-6 permission. Use by other LANL groups is allowed with permission of CPSO.

Other organization responsibilities as noted throughout.

8.0 IMPLEMENTATION

As noted throughout.

9.0 TRAINING

Lead inspectors shall be NBIC or API vessel inspection certified. NDE personnel working under their supervision shall be certified under ASNT SNT-TC-1A.

10.0 EXCEPTION OR VARIANCE

To obtain an exception or variance to this document, follow ESM Chapter 1 Section Z10 variance and exception process for procedures (e.g., CPSO may grant via email).

The requesting organization must maintain the official copy of record of the approved correspondence granting the exception or variance.

11.0 DOCUMENTS AND RECORDS

Records generated as a result of this procedure shall be maintained in accordance with LANL records policies.

AET-6 NDE Team

- DMAPS checklists and data

ADMIN-4-1 Pressure Vessel Inspection and Test Procedure

- Manufacturer's Data Report for Pressure Vessels if available, or engineering evaluation of minimum required wall thicknesses
- Non-conformance Reports (NCR)

12.0 DEFINITIONS AND ACRONYMS

12.1 Definitions and Acronyms

API	American Petroleum Institute
CMMS	Computerized Maintenance Management System (e.g., PassPort or Asset Suite)
CPSO	Chief Pressure Safety Officer
PSO	Pressure Safety Officer

For others see Chapter 17 (*Section GEN-1 Definitions*) and/or LANL [Definition of Terms](#) and [Acronyms and Names](#).

13.0 HISTORY

This document supersedes any conflicting requirements in O&M Criterion 419 but the Criterion will remain in force and effect for each nuclear and high-hazard facility until that facility completes the Unreviewed Safety Question (USQ) or Unreviewed Safety Issue (USI) review determinations.

14.0 REFERENCES

- ANSI/NB-23, *National Board Inspection Code*
- American Society of Mechanical Engineers (ASME) Boiler & Pressure Vessel Code, Section VIII, Division 1
- API 510, *Pressure Vessel Inspection Code: Maintenance Inspection, Rating, Repair, and Alteration*
- API 579, *Fitness for Service*

15.0 FORMS

- A. Pressure Test Record (Sample)

16.0 CONTACT

Chief Pressure Safety Officer (*in ES-EPD*)
Telephone: (505) 606-2279 or 667-4657
Fax: (505) 606-0581
Location: TA-00, Building 0726, Room 200
E-mail: TBD
Website: [Pressure Protection Program](#)

ADMIN-4-1 Pressure Vessel Inspection and Test Procedure

FORM ADMIN-4-1-FM01

Pressure Test Record

SAMPLE from Chapter 17 Section REF-3 B31.3 Guide. Edit Word file with that Guide to suit but capture all data required for ASME Section VIII compliance.

TEST NUMBER:	PROJECT NO.:	PAGE 1 OF
PROJECT NAME:		
<i>TEST INFORMATION</i>		
SYSTEM DESCRIPTION:		
DESCRIPTION OF TEST BOUNDARIES: (Attach Sketch Showing Boundaries as Required. P&ID Recommended)		
DESIGN TEMPERATURE:	DESIGN PRESSURE:	
TEST METHOD: <input type="checkbox"/> HYDROSTATIC <input type="checkbox"/> PNEUMATIC:		
TEST FLUID:	APPLICABLE CODE:	
<i>TEST REQUIREMENTS</i>		
REQUIRED TEST PRESSURE:	TEST FLUID TEMPERATURE:	
REQUIRED TEST DURATION:	AMBIENT TEMPERATURE:	
<i>GAUGE PRESSURE CALCULATION (See Section 4.2.4)</i>		
ELEVATION DIFFERENCE BETWEEN GAUGE AND HIGH POINT:		
X CONVERSION FACTOR:		
PLUS REQUIRED TEST PRESSURE:		
EQUALS REQUIRED GAUGE PRESSURE:		
<i>TEST RESULTS</i>		

Section ADMIN-4 - Inspection and Testing

Rev. 0, 9/17/2014

ADMIN-4-1 Pressure Vessel Inspection and Test Procedure

TEST DATE:	START TIME:	<input type="checkbox"/> AM <input type="checkbox"/> PM	
	FINISH TIME:	<input type="checkbox"/> AM <input type="checkbox"/> PM	
ACTUAL GAUGE PRESSURE:			
<i>TEST EQUIPMENT</i>			
TYPE:	RANGE:	CAL. DATE:	CAL. DUE:
REMARKS:			
<i>TEST ACCEPTANCE</i>			
CODE EXAMINER:		DATE:	
CODE INSPECTOR:		DATE:	