

Existing (including Legacy) System Documentation Requirements

Existing (including Legacy) System Documentation Requirements<sup>1</sup>

RECORD OF REVISIONS

| Rev | Date      | Description   | POC                              | RM                          |
|-----|-----------|---|----------------------------------|-----------------------------|
| 0   | 9/17/2014 | Initial issue. Modification of Table 16.1 of Chapter 17, Section I, rev. 3. | Ari Ben Swartz,<br><i>ES-EPD</i> | Larry Goen,<br><i>ES-DO</i> |

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

|            |   |
|------------|---|
| Chapter 17 | <a href="#">Pressure Safety POC and Committee</a> |
|------------|---|

This document is online at <http://engstandards.lanl.gov>

Table ADMIN-1-3-1

Documentation Requirements for Existing (including Legacy) Systems

| Documentation Package Item  | Required When | Owner Verification | PSO Verification |
|---|---------------|--------------------|------------------|
| 1. Form 1, LANL Pressure System Certification Status Form                                     | Every Package |                    |                  |
| 2. Form 3, Code Non-Compliance Log (Form can be printed from Pressure Safety Database by PSO) | If Applicable |                    |                  |

<sup>1</sup> The requirements for existing systems reflect the graded approach described in other sections of this Chapter, and take credit for successful operating history.

Existing (including Legacy) System Documentation Requirements

| Documentation Package Item  | Required When   | Owner Verification | PSO Verification |
|---|---|--------------------|------------------|
| 3. Form 4, Minor Non-Compliance Log (Form can be printed from Pressure Safety Database by PSO)  | If Applicable   |                    |                  |
| 4. System schematics (If the owner does not have a system schematic, utilize the sketch prepared by the walkdown team until such time as system schematic is prepared) <sup>2</sup> | Every Package   |                    |                  |
| 5. Alternate Method/Variance or clarification/interpretation (if applicable).   | If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document  |                    |                  |
| 6. Code Stamped Vessel Fabrication Documentation  | If the code data report is not available, a manufacturer's construction drawing may be used to verify the item has not been modified.<br><br>If the manufacturer's construction drawing is not available, personal knowledge may be used to establish the code stamped item has not been modified. This requires a person or persons with intimate and long term personal knowledge since original receipt and installation of the item to create a statement of compliance. This statement of compliance will be used to document the history of the item and be used as evidence the code stamped item has not been modified. This statement of compliance will be signed by the persons of record. |                    |                  |
| 7. Non-ASME code Fabricated Vessel Information (code-equivalent Documentation)  | The pressure system contains Non-ASME-code stamped boilers and pressure vessels (which includes boilers, pressure vessels, heat exchangers, and accumulators)   |                    |                  |

<sup>2</sup> Information required on system schematics may be documented in alternative documents or captured in controlled databases, such as the Master Equipment List (MEL) or Computerized Maintenance Management System (CMMS), but must be referenced and readily available for review. The evaluation shall be considered a record and must be managed per LANL P1020, P1020-1, and P1020-2

Existing (including Legacy) System Documentation Requirements

| Documentation Package Item  | Required When  | Owner Verification | PSO Verification |
|---|--|--------------------|------------------|
| a. ASME code equivalent documentation for systems with pressure vessels which includes but is not limited to minimum wall thickness determination, corrosion allowance, weld efficiency rating, support structure loading, nozzle calculations. Calculations will use the material values specified in the ASME code. | A non-code boiler, pressure vessel, heat exchanger or accumulator is in the pressure system package  |                    |                  |
| b. Pressure Qualification Test Procedures and data OR in-service leak test for FS2 and FS3 as allowed in ESM Chapter 17.  | Non-code boiler, pressure vessel, heat exchanger or accumulator is in the pressure system package  |                    |                  |
| c. Modification procedures/instructions   | Modifications were made to non-code boilers, pressure vessels, heat exchangers or accumulators is in the pressure system package             |                    |                  |
| d. Non-Destructive Evaluation (NDE) data reports  | NDE was done to non-code boilers, pressure vessels, heat exchangers or accumulators is in the pressure system package                        |                    |                  |
| e. Weld examination forms as described in ESM Chapter 13.   | Welding was done to non-code boilers, pressure vessels, heat exchangers or accumulators is in the pressure system package                    |                    |                  |
| f. Special Calculations such as welding   | Special calculations are performed for non-code boilers, pressure vessels, heat exchangers or accumulators is in the pressure system package |                    |                  |
| g. Vendor Drawings  | Piece parts are used to fabricate non-code boilers, pressure vessels, heat exchangers or accumulators is in the pressure system package      |                    |                  |
| h. Vessel modification reports  | Vessel is modified from the as purchased condition.  |                    |                  |
| 8. Pressure Safety Devices  | The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs)                 |                    |                  |

Existing (including Legacy) System Documentation Requirements

| Documentation Package Item  | Required When   | Owner Verification | PSO Verification |
|---|---|--------------------|------------------|
| a. Flow Test documentation as described in this Chapter, if required  | Whenever a relief valve has been modified, or when calculations cannot be generated.                      |                    |                  |
| b. Safety Relief Calculations for relief valves and/or rupture discs, in accordance with ASME requirements  | Every Package, unless calculations cannot be generated, a flow test is required in place of calculations. |                    |                  |
| c. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements  | Rupture Disks are in the pressure system  |                    |                  |
| d. Certified Test Data of relief valves, e.g. steam Pressure safety valves are certified by NBIC coded shop   | A PRD is modified or tested by an outside facility  |                    |                  |
| e. Documentation of relief valve modification, (for example valve repair, orifice replacement, gasket replacement,  | If a relief valve has been modified   |                    |                  |
| f. Identification as a liquid lock PRD on PRV Recall Summary Sheet and pressure system Component List spread sheet; in accordance with ASME B&PV Code     | PRDs are used as protection against liquid lock overpressure. See ASME B&PVC UG-128.                      |                    |                  |
| 9. Piping System Documentation:   |   |                    |                  |
| a. Provide documentation required under Section 10.0 requirements for "Pressure System Deficiency Disposition Requirements for Existing Pressure Systems" | The system contains pipe, tube, or other components not classed as boilers or vessels.                    |                    |                  |

Existing (including Legacy) System Documentation Requirements

| Documentation Package Item   | Required When   | Owner Verification | PSO Verification |
|--|---|--------------------|------------------|
| b. Code required calculations e.g. flexibility analysis, pipe supports, wind loading, and seismic loading. See specific code for additional detail. (e.g. B31.3 paragraph 319 and 321) | A pressure system package contains piping system components |                    |                  |
| 10. Flexible pressure element external visual inspection records (Form 5)  | The system contains flexible hoses                          |                    |                  |
| 11. Pump or compressor discharge pressure curves, calculation, or table (if available)   | The pressure system contains pumps or compressors           |                    |                  |
| 12. Oxygen System Hazard Analysis (if applicable)  | Pressure system is an oxygen system                         |                    |                  |

**REDUCED REQUIREMENTS (LOW RISK)**

System documentation requirements of Table ADMIN-1-3-1 may be reduced for legacy systems meeting the following criteria:

1. The pressure system is not subject to low-cycle fatigue (where significant plastic straining occurs).
2. High-cycle fatigue (where stresses and strains are largely confined to the elastic region) is controlled to less than 100,000 cycles for the life of the pressure system.
3. Corrosion is not a significant factor.
4. There are no stress intensification factors for examples cracks or acute angles of pressure boundaries.
5. The system components have exhibited extensive, successful service experience under comparable conditions with similarly proportioned components of the same or like materials.
6. The pressure system is not high pressure as defined by ASME B31.3 2010 Chapter IX.
7. The pressure system is fluid is not Category M fluid as defined by ASME B31.3 2010.
8. The pressure system fluid is not steam.
9. The pressure system does not operate in the creep range.
10. The pressure system is not an ASME Section I, IV, VIII, or XII stamped item or an unstamped item performing the same task (e.g. a code equivalent vessel).
11. ASME B31.9, B31.5, or B31.3 Fluid Category Normal or D.

Existing (including Legacy) System Documentation Requirements

When the above criteria are met, the system must pass an initial service leak test at the normal system operational pressures. Then, Table ADMIN-1-3-1 items 7.b-f, 9.a-b, and 10 are not required and Table ADMIN-1-3-1 becomes Table ADMIN-1-3-1ALT as follows:

Table ADMIN-1-3-1ALT

Alternative Documentation Requirements for Existing (including Legacy) Systems<sup>3</sup>

| Documentation Package Item   | Required When | Owner Verification | PSO Verification |
|--|---------------|--------------------|------------------|
| 1. Form 1, LANL Pressure System Certification Status Form  | Every Package |                    |                  |
| 2. Form 3, Code Non-Compliance Log (Form can be printed from Pressure Safety Database by PSO), or reference on Form 1 to closed PFITS issue numbers. | If Applicable |                    |                  |
| 3. Form 4, Minor Non-Compliance Log (Form can be printed from Pressure Safety Database by PSO), or reference on Form 1 to closed PFITS issue numbers | If applicable |                    |                  |

|    |  |          |    |   |     |     |     |    |    |     |    |
|----|--|----------|----|---|-----|-----|-----|----|----|-----|----|
| 11 | Compressed Air with Receiver           | FS2, FS3 | 11 | M | YES | YES | YES | No | No | YES | No |
| 12 | Compressed Inert Gases – DOT Cylinders | FS2, FS3 | 14 | N | YES | YES | YES | No | No | No  | No |
| 13 | Compressed Air Without Receiver        | FS2, FS3 | 12 | P | YES | YES | No  | No | No | No  | No |

Deleted: <#>.....Page Break.....  
 <#>System schematics (If the owner does not have a system schematic, utilize the sketch prepared by the walkdown team until such time as system schematic is prepared)<sup>4</sup>

Deleted: YES

Deleted: YES

<sup>3</sup> The requirements for existing systems reflect the graded approach described in other sections of this Chapter, and take credit for successful operating history.

Existing (including Legacy) System Documentation Requirements

|    |   |          |    |   |     |     |     |    |    |    |    |              |
|----|---|----------|----|---|-----|-----|-----|----|----|----|----|--------------|
| 14 | Compressed Inert Gases – Building Systems | FS3      | 13 | R | YES | YES | YES | No | No | No | No | Deleted: YES |
| 15 | High Pressure –Low Liquid Volume          | FS1      | 15 | S | YES | YES | No  | No | No | No | No | Deleted: YES |
| 16 | Hydronic piping                           | FS2, FS3 | 16 | T | YES | YES | No  | No | No | No | No | Deleted: YES |
| 17 | Water Systems                             | FS2, FS3 | 17 | U | YES | YES | No  | No | No | No | No | Deleted: YES |

<sup>1</sup> **Corrosive Service** – A fluid service in which the internal fluid, or external environment, is expected to produce a progressive deterioration in the pressure boundary material.

<sup>2</sup> Evaluate oxygen systems as required in ASTM G128 and other referenced ASTM standards to determine the likelihood of fire.

(\*Note: New Table Numbers “ADMIN-1-3-I”, “ADMIN-1-3-L”, “ADMIN-1-3-O”, and “ADMIN-1-3-Q” were not used to eliminate confusion)

Existing (including Legacy) System Documentation Requirements

**Deleted: General Legacy Pressure System Description for High Pressure – Inert Pneumatic**  
Evaluation Category 1

**Assumptions:**

**Fluid Service**

The system fluid service is a FS1 as defined by ESM Chapter 17  
The pressure system fluid service is high pressure as define by ASME B31.3 2010 Chapter IX.

Corrosion is not a significant factor.

Materials of construction are compatible with the system fluid service.

**System Operation**

The pressure system is not subject to low-cycle fatigue (where significant plastic straining occurs).

High-cycle fatigue (where stresses and strains are largely confined to the elastic region) is controlled to less than 100,000 cycles for the life of the pressure system.

The pressure system does not operate in the creep range.

There are no stress intensification factors for example cracks or acute angles of pressure boundaries.

**System Hardware**

The system components have exhibited extensive, successful service experience under comparable conditions with similarly proportioned components of the same or like material.

The system is equipped with a properly sized, set, and functional pressure relief device(s), if needed, to protect against single point failures. Relief device exhaust locations are properly sized and located to protect personnel.

There are no locations in the system that requires relief protection that may be isolated from relief protection.

Flexible hoses over 12 inches in length and in service pressure greater than 150 psig are restrained in accordance with ESM Chapter 17.

In response to the PISA on LANL Welding Program (circa 2004) representative accessible welds were visually inspected and are free from indications. Solder or braze joints are not allowed.

External appearance is free from corrosion or indication of leakage.

**Failure Mode**

A ductile failure mode is assumed (not brittle fracture).

**Consequence of Failure**

The result of the failure will not result in serious personnel injury.

**Safety Class**

Applicable to ML4 only.

**Documentation Requirements**





Existing (including Legacy) System Documentation Requirements

General Legacy Pressure System Description for Compressed Inert Gases – DOT Cylinders

Evaluation Category 12

Assumptions:

Fluid Service

- 1. The system fluid service is FS2 or FS3 as defined by ESM Chapter 17
  - 1.1. The pressure system fluid service is Category D as define by ASME B31.3 2016.
  - 1.2. The pressure system fluid service is Category Normal as define by ASME B31.3 2016.
  - 1.3. The pressure systems are within the scope of ASME B31.9-2017.
  - 1.4. The pressure systems are within the scope of ASME B31.5-2016
- 2. Materials of construction are compatible with the system fluid service.

Deleted: 0

Deleted: 0

Deleted: 1

System Operation

- 1. There are no stress intensification factors for example cracks or acute angles of pressure boundaries.

System Hardware

- 1. The system components have exhibited extensive, good operating history under comparable conditions with similarly proportioned components of the same or like material.
- 2. The system is equipped with a properly sized, set, and functional pressure relief device(s), if needed, to protect against single point failures. Relief device exhaust locations are properly sized and located to protect personnel.
- 3. There are no locations in the system that requires relief protection that may be isolated from relief protection.
- 4. Flexible hoses over 12 inches in length and in service pressure greater than 150 psig are restrained in accordance with ESM Chapter 17.
- 5. System is constructed of metallic components.
- 6. External appearance is free from corrosion or indication of leakage.

Deleted: successful service experience

Deleted: <#>In response to the PISA on LANL Welding Program (circa 2004) representative accessible welds were visually inspected and are free from indications. Solder or braze joints are not allowed.

Failure Mode

- 1. A ductile failure mode is assumed (leak before burst).

Consequence of Failure

- 1. The result of the failure will not result in serious personnel injury. Safe-guarding will be applied if necessary.

Safety Class

- 1. Applicable to ML1 through

Deleted: 4

Deleted: only.

Documentation Requirements

- 1. These Compressed Inert Gases – DOT Cylinders pressure systems shall be exempt from the requirements of having code leak test documentation.

**Existing (including Legacy) System Documentation Requirements**

2. These Compressed Inert Gases – DOT Cylinders pressure systems may continue to use unlisted components provided they are used within the temperature and pressure ratings of the manufacturer’s.
3. This equipment will be considered grandfathered and will not be replaced with like items. System shall be upgraded to ASME compliance as items age out of service by attrition.
4. LANL ESM Chapter 17 documentation as required by Table ADMIN-1-3-N include: certification status form (FM01) and relief device (FM02).
5. Existing Compressed Inert Gases – DOT Cylinders pressure systems may continue to use non-ASME stamped vessels provided calculations are performed to verify code-equivalent ratings.
6. When vessels are included as part of the Compressed Inert Gases – DOT Cylinders pressure system they must be evaluated for current MAWP based on the most applicable code or standard.

**Deleted:** ,  
**Deleted:** , component list (FM07), and sketch (FM10).

**Qualitative Risk Assessment**

Probability: Remote

Consequence: Significant

QR Factor: 5

Table 3 Qualitative Risk (QR) Determination

| C<br>o<br>n<br>s<br>e<br>q<br>u<br>e<br>n<br>c<br>e |               |   | Probability |          |            |        |            |
|---|---------------|---|-------------|----------|------------|--------|------------|
|   |               |   | A           | B        | C          | D      | E          |
|   |               |   | Frequent    | Probable | Occasional | Remote | Improbable |
| I   | Major         | 1 | 1           | 1        | 2          | 3      |            |
| II  | Serious       | 1 | 1           | 2        | 3          | 4      |            |
| III   | Significant   | 1 | 2           | 3        | 4          | 5      |            |
| IV  | Minor         | 2 | 3           | 4        | 5          | 6      |            |
| V   | Insignificant | 3 | 4           | 5        | 6          | 7      |            |

Existing (including Legacy) System Documentation Requirements

| Table ADMIN-1-3-N   |   |                    |                  |
|---|---|--------------------|------------------|
| General Legacy Pressure System Documentation for Compressed Inert Gases – DOT Cylinders   |   |                    |                  |
| Documentation Package Item  | Required When   | Owner Verification | PSO Verification |
| 1. Form 1, LANL Pressure System Certification Status Form   | Every Package   |                    |                  |
| 2. <del>Form 10, System Schematic</del>   | <del>Every Package</del>  |                    |                  |
| 3. Alternate Method/Variance or clarification/interpretation (if applicable).   | If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document  |                    |                  |
| 4. Code Stamped Vessel Fabrication Documentation  | If the code data report is not available, a manufacturer’s construction drawing may be used to verify the item has not been modified.<br>If the manufacturer’s construction drawing is not available, personal knowledge may be used to establish the code stamped item has not been modified. This requires a person or persons with intimate and long term personal knowledge since original receipt and installation of the item to create a statement of compliance. This statement of compliance will be used to document the history of the item and be used as evidence the code stamped item has not been modified. This statement of compliance will be signed by the persons of record. |                    |                  |
| a. Vessel thickness and remaining life estimate   | Every Package   |                    |                  |
| 5. Non-ASME code Fabricated Vessel Information (code-equivalent Documentation)  | The pressure system contains Non-ASME-code stamped boilers and pressure vessels (which includes boilers, pressure vessels, heat exchangers, and accumulators)   |                    |                  |
| a. ASME code equivalent documentation for systems with pressure vessels which includes but is not limited to minimum wall thickness determination, corrosion allowance, weld efficiency rating, support structure loading, nozzle calculations. Calculations will use the material values specified in the ASME code. | A non-code boiler, pressure vessel, heat exchanger or accumulator is in the pressure system package   |                    |                  |

**Deleted:** ~~Form 10, System Schematic~~ ~~Page Break~~  
 Form 10, System schematics (If the owner does not have a system schematic, utilize the sketch prepared by the walkdown team until such time as system schematic is prepared)<sup>16</sup>  
**Deleted:** Every Package

Existing (including Legacy) System Documentation Requirements

| Table ADMIN-1-3-N   |  |                    |                  |
|---|--|--------------------|------------------|
| General Legacy Pressure System Documentation for Compressed Inert Gases – DOT Cylinders                     |  |                    |                  |
| Documentation Package Item  | Required When  | Owner Verification | PSO Verification |
| b. Vessel thickness and remaining life estimate   | Every Package  |                    |                  |
| 6. Pressure Safety Devices  | The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs) |                    |                  |
| a. Safety Relief Calculations for relief valves, in accordance with ASME requirements                       | Every Package, unless calculations cannot be generated, a flow test is required in place of calculations.                    |                    |                  |
| b. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements                      | Rupture Disks are in the pressure system   |                    |                  |
| c. Certified Test Data of relief valves, e.g. steam Pressure safety valves are certified by NBIC coded shop | A PRD is modified or tested by an outside facility   |                    |                  |
| 7. ▼  |  |                    |                  |
| a. ▼  | ▼  |                    |                  |
| 8. Pump or compressor discharge pressure curves, calculation, or table (If available)                       | The pressure system contains pumps or compressors  |                    |                  |

**Deleted:** Piping System Documentation:

**Deleted:** FM07; for available components

**Deleted:** Every Package

**Existing (including Legacy) System Documentation Requirements**

**General Legacy Pressure System Description for Compressed Air without Receiver**

**Evaluation Category 13**

**Assumptions:**

Fluid Service

1. The system fluid service is FS2 or FS3 as defined by ESM Chapter 17
  - 1.1. The pressure system fluid service is Category D as define by ASME B31.3 2016.
  - 1.2. The pressure system fluid service is Category Normal as define by ASME B31.3 2016.
  - 1.3. The pressure systems are within the scope of ASME B31.9-2017.
2. Materials of construction are compatible with the system fluid service.

Deleted: 0

Deleted: 0

Deleted: 1

System Operation

1. There are no stress intensification factors for example cracks or acute angles of pressure boundaries.

System Hardware

1. The system components have exhibited extensive, good operating history under comparable conditions with similarly proportioned components of the same or like material.
2. The system is equipped with a properly sized, set, and functional pressure relief device(s), if needed, to protect against single point failures. Relief device exhaust locations are properly sized and located to protect personnel.
3. There are no locations in the system that requires relief protection that may be isolated from relief protection.
4. Flexible hoses over 12 inches in length and in service pressure greater than 150 psig are restrained in accordance with ESM Chapter 17.
5. System is constructed of metallic components.
6. External appearance is free from corrosion or indication of leakage.

Deleted: successful service experience

Deleted: <#>In response to the PISA on LANL Welding Program (circa 2004) representative accessible welds were visually inspected and are free from indications. Solder or braze joints are not allowed.¶

Failure Mode

1. A ductile failure mode is assumed (leak before burst).

Consequence of Failure

1. The result of the failure will not result in serious personnel injury. Safe-guarding will be applied if necessary.

Safety Class

1. Applicable to ML1 thorough only.

Deleted: 4

**Documentation Requirements**

1. These compressed air pressure systems shall be exempt from the requirements of having code leak test documentation.
2. These compressed air pressure systems may continue to use unlisted components provided they are used within the temperature and pressure ratings of the manufacturer's.

**LANL Engineering Standards Manual STD-342-100 Chapter 17, Pressure Safety**

**Attachment ADMIN-1-3**

Rev. 0, 9/17/2014

**Existing (including Legacy) System Documentation Requirements**

3. This equipment will be considered grandfathered and will not be replaced with like items. System shall be upgraded to ASME compliance as items age out of service by attrition.
4. LANL ESM Chapter 17 documentation as required by Table ADMIN-1-3-P include: certification status form (FM01), and relief device (FM02).

**Deleted:** , component list (FM07), and sketch (FM10).

**Qualitative Risk Assessment**

Probability: Remote

Consequence: Minor

QR Factor: 4

Table 3 Qualitative Risk (QR) Determination

|   |     | Probability   |          |            |        |            |   |
|---|-----|---------------|----------|------------|--------|------------|---|
|   |     | A             | B        | C          | D      | E          |   |
|   |     | Frequent      | Probable | Occasional | Remote | Improbable |   |
| C<br>o<br>n<br>s<br>e<br>q<br>u<br>e<br>n<br>c<br>e | I   | Major         | 1        | 1          | 1      | 2          | 3 |
|   | II  | Serious       | 1        | 1          | 2      | 3          | 4 |
|   | III | Significant   | 1        | 2          | 3      | 4          | 5 |
|   | IV  | Minor         | 2        | 3          | 4      | 5          | 6 |
|   | V   | Insignificant | 3        | 4          | 5      | 6          | 7 |

Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-P

General Legacy Pressure System Description for Compressed Air without Receiver

| Documentation Package Item  | Required When  | Owner Verification | PSO Verification |
|---|--|--------------------|------------------|
| 1. Form 1, LANL Pressure System Certification Status Form   | Every Package  |                    |                  |
| 2. <del>_____</del>   | <del>_____</del>   |                    |                  |
| 3. Alternate Method/Variance or clarification/interpretation (if applicable).                               | If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document |                    |                  |
| 4. Pressure Safety Devices  | The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs)                             |                    |                  |
| a. Safety Relief Calculations for relief valves, in accordance with ASME requirements                       | Every Package, unless calculations cannot be generated, a flow test is required in place of calculations.  |                    |                  |
| b. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements                      | Rupture Disks are in the pressure system   |                    |                  |
| c. Certified Test Data of relief valves, e.g. steam Pressure safety valves are certified by NBIC coded shop | A PRD is modified or tested by an outside facility   |                    |                  |
| 5. <del>_____</del>   | <del>_____</del>   |                    |                  |
| a. <del>_____</del>   | <del>_____</del>   |                    |                  |
| 6. Pump or compressor discharge pressure curves, calculation, or table (If available)                       | The pressure system contains pumps or compressors  |                    |                  |

**Deleted:** \_\_\_\_\_Page Break\_\_\_\_\_ Form 10, System schematics (If the owner does not have a system schematic, utilize the sketch prepared by the walkdown team until such time as system schematic is prepared)<sup>89</sup>

**Deleted:** Every Package

**Deleted:** Piping System Documentation:

**Deleted:** FM07; for available components

**Deleted:** Every Package

Existing (including Legacy) System Documentation Requirements

General Legacy Pressure System Description for Compressed Inert Gases – Building Systems

Evaluation Category 14

Assumptions:

Fluid Service

- 1. The system fluid service is a FS3 as defined by ESM Chapter 17
  - 1.1. The pressure system fluid service is Category D as define by ASME B31.3 2016.
  - 1.2. The pressure system fluid service is Category Normal as define by ASME B31.3 2016. (liquids)
  - 1.3. The pressure systems are within the scope of ASME B31.9-2017.
  - 1.4. The pressure systems are within the scope of ASME B31.5-2016.
- 2. Materials of construction are compatible with the system fluid service.

Deleted: 0

Deleted: 0

Deleted: 1

Formatted: Font: 10 pt

System Operation

- 1. There are no stress intensification factors for example cracks or acute angles of pressure boundaries.

System Hardware

- 1. The system components have exhibited extensive, good operating history under comparable conditions with similarly proportioned components of the same or like material.
- 2. The system is equipped with a properly sized, set, and functional pressure relief device(s), if needed, to protect against single point failures. Relief device exhaust locations are properly sized and located to protect personnel.
- 3. There are no locations in the system that requires relief protection that may be isolated from relief protection.
- 4. System is constructed of metallic components.
- 5. External appearance is free from corrosion or indication of leakage.

Deleted: successful service experience

Deleted: <#>In response to the PISA on LANL Welding Program (circa 2004) representative accessible welds were visually inspected and are free from indications. Solder or braze joints are not allowed.

Failure Mode

- 1. A ductile failure mode is assumed (leak before burst).

Consequence of Failure

- 1. The result of the failure will not result in serious personnel injury. Safe-guarding will be applied if necessary.

Safety Class

- 1. Applicable to ML1 through 4.

Deleted: only

Documentation Requirements

- 1. These Compressed Inert Gases – Building pressure systems shall be exempt from the requirements of having code leak test documentation.
- 2. These Compressed Inert Gases – Building pressure systems may continue to use unlisted components provided they are used within the temperature and pressure ratings of the manufacturer’s.



**Existing (including Legacy) System Documentation Requirements**

3. This equipment will be considered grandfathered and will not be replaced with like items. System shall be upgraded to ASME compliance as items age out of service by attrition.
4. LANL ESM Chapter 17 documentation as required by Table ADMIN-1-3-R include: certification status form (FM01) and relief device (FM02).
5. Existing Compressed Inert Gases – Building pressure systems may continue to use non-ASME stamped vessels provided calculations are performed to verify code-equivalent ratings.
6. When vessels are included as part of the Compressed Inert Gases – Building pressure system they must be evaluated for current MAWP based on the most applicable code or standard.

Deleted: .  
Deleted: , component list (FM07), and sketch (FM10).

**Qualitative Risk Assessment**

Probability: Remote

Consequence: Minor

QR Factor: 5

Table 3 Qualitative Risk (QR) Determination

|   |     | Probability   |          |            |        |            |   |
|---|-----|---------------|----------|------------|--------|------------|---|
|   |     | A             | B        | C          | D      | E          |   |
|   |     | Frequent      | Probable | Occasional | Remote | Improbable |   |
| C<br>o<br>n<br>s<br>e<br>q<br>u<br>e<br>n<br>c<br>e | I   | Major         | 1        | 1          | 1      | 2          | 3 |
|   | II  | Serious       | 1        | 1          | 2      | 3          | 4 |
|   | III | Significant   | 1        | 2          | 3      | 4          | 5 |
|   | IV  | Minor         | 2        | 3          | 4      | 5          | 6 |
|   | V   | Insignificant | 3        | 4          | 5      | 6          | 7 |

Existing (including Legacy) System Documentation Requirements

| Table ADMIN-1-3-R   |  |                    |                  |
|---|--|--------------------|------------------|
| General Legacy Pressure System Documentation for Compressed Inert Gases - Buildings |  |                    |                  |
| Documentation Package Item  | Required When  | Owner Verification | PSO Verification |
| 1. Form 1, LANL Pressure System Certification Status Form                           | Every Package  |                    |                  |
| 2. <del>_____</del>   | <del>_____</del>   |                    |                  |
| 3. Alternate Method/Variance or clarification/interpretation (if applicable).       | If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document   |                    |                  |
| 4. Code Stamped Vessel Fabrication Documentation                                    | <p>If the code data report is not available, a manufacturer’s construction drawing may be used to verify the item has not been modified.</p> <p>If the manufacturer’s construction drawing is not available, personal knowledge may be used to establish the code stamped item has not been modified. This requires a person or persons with intimate and long term personal knowledge since original receipt and installation of the item to create a statement of compliance. This statement of compliance will be used to document the history of the item and be used as evidence the code stamped item has not been modified. This statement of compliance will be signed by the persons of record.</p> |                    |                  |
| a. Vessel thickness and remaining life estimate                                     | Every Package  |                    |                  |
| 5. Non-ASME code Fabricated Vessel Information (code-equivalent Documentation)      | The pressure system contains Non-ASME-code stamped boilers and pressure vessels (which includes boilers, pressure vessels, heat exchangers, and accumulators)  |                    |                  |

**Deleted:** \_\_\_\_\_Page Break\_\_\_\_\_ Form 10, System schematics (If the owner does not have a system schematic, utilize the sketch prepared by the walkdown team until such time as system schematic is prepared)<sup>18</sup>

**Deleted:** Every Package

Existing (including Legacy) System Documentation Requirements

| Table ADMIN-1-3-R   |  |                    |                  |
|---|--|--------------------|------------------|
| General Legacy Pressure System Documentation for Compressed Inert Gases - Buildings   |  |                    |                  |
| Documentation Package Item  | Required When  | Owner Verification | PSO Verification |
| a. ASME code equivalent documentation for systems with pressure vessels which includes but is not limited to minimum wall thickness determination, corrosion allowance, weld efficiency rating, support structure loading, nozzle calculations. Calculations will use the material values specified in the ASME code. | A non-code boiler, pressure vessel, heat exchanger or accumulator is in the pressure system package                          |                    |                  |
| b. Vessel thickness and remaining life estimate   | Every Package  |                    |                  |
| 6. Pressure Safety Devices  | The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs) |                    |                  |
| a. Safety Relief Calculations for relief valves, in accordance with ASME requirements   | Every Package, unless calculations cannot be generated, a flow test is required in place of calculations.                    |                    |                  |
| b. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements  | Rupture Disks are in the pressure system   |                    |                  |
| c. Certified Test Data of relief valves, e.g. steam Pressure safety valves are certified by NBIC coded shop   | A PRD is modified or tested by an outside facility   |                    |                  |
| 7. <del>_____</del>   |  |                    |                  |
| a. <del>_____</del>   | <del>_____</del>   |                    |                  |
| 8. Pump or compressor discharge pressure curves, calculation, or table (If available)   | The pressure system contains pumps or compressors  |                    |                  |

**Deleted:** Piping System Documentation:

**Deleted:** FM07; for available components

**Deleted:** Every Package

**Existing (including Legacy) System Documentation Requirements**

**General Legacy Pressure System Description for High Pressure – Low Liquid Volume**

**Evaluation Category 15**

**Assumptions:**

Fluid Service

1. The system fluid service is a FS1 liquid with a low flow liquid rate such that whipping of flex lines is not an issue.
  - 1.1. The pressure system fluid service is High Pressure as define by ASME B31.3 2016.
  - 1.2. The fluid used is not toxic, corrosive, or immediately dangerous to humans.
2. Materials of construction are compatible with the system fluid service.

Deleted: 0

System Operation

1. There are no stress intensification factors for example cracks or acute angles of pressure boundaries.

System Hardware

1. The system components have exhibited extensive, *good operating history* under comparable conditions with similarly proportioned components of the same or like material.
2. The system is equipped with a properly sized, set, and functional pressure relief device(s), if needed, to protect against single point failures. Relief device exhaust locations are properly sized and located to protect personnel.
3. There are no locations in the system that requires relief protection that may be isolated from relief protection.
4. Flexible hoses over 12 inches in length and in service pressure greater than 150 psig are restrained in accordance with ESM Chapter 17 only in locations where adequate volume is present to present a whipping problem.
5. Pumping rates are low enough to preclude hose whipping and fluid jetting from leaks.
6. System is constructed of metallic components.
7. External appearance is free from corrosion or indication of leakage.

Deleted: successful service experience

Deleted: <#>In response to the PISA on LANL Welding Program (circa 2004) representative accessible welds were visually inspected and are free from indications. Solder or braze joints are not allowed.

Failure Mode

1. A ductile failure mode is assumed (leak before burst).

Consequence of Failure

1. The result of the failure will not result in serious personnel injury. Safe-guarding will be applied if necessary.

Safety Class

1. Applicable to *ML1 through 4*.

Deleted: ML4

Deleted: only

**Documentation Requirements**

**Existing (including Legacy) System Documentation Requirements**

1. These High Pressure – Low Liquid Volume pressure systems shall be exempt from the requirements of having code leak test documentation.
2. These High Pressure – Low Liquid Volume pressure systems may continue to use unlisted components provided they are used within the temperature and pressure ratings of the manufacturer’s.
3. This equipment will be considered grandfathered and will not be replaced with like items. System shall be upgraded to ASME compliance as items age out of service by attrition.
4. LANL ESM Chapter 17 documentation as required by Table ADMIN-1-3-S include: certification status form (FM01), relief device (FM02),

**Deleted:** , component list (FM07), and sketch (FM10  
**Deleted:** ).

**Qualitative Risk Assessment**

Probability: Remote

Consequence: Significant

QR Factor: Insignificant

Table 3 Qualitative Risk (QR) Determination

|   |     | Probability   |          |            |        |            |   |
|---|-----|---------------|----------|------------|--------|------------|---|
|   |     | A             | B        | C          | D      | E          |   |
|   |     | Frequent      | Probable | Occasional | Remote | Improbable |   |
| C<br>o<br>n<br>s<br>e<br>q<br>u<br>e<br>n<br>c<br>e | I   | Major         | 1        | 1          | 1      | 2          | 3 |
|   | II  | Serious       | 1        | 1          | 2      | 3          | 4 |
|   | III | Significant   | 1        | 2          | 3      | 4          | 5 |
|   | IV  | Minor         | 2        | 3          | 4      | 5          | 6 |
|   | V   | Insignificant | 3        | 4          | 5      | 6          | 7 |

Existing (including Legacy) System Documentation Requirements

| Table ADMIN-1-3-S   |  |                    |                  |
|---|--|--------------------|------------------|
| General Legacy Pressure System Documentation for High Pressure – Low Liquid Volume                          |  |                    |                  |
| Documentation Package Item  | Required When  | Owner Verification | PSO Verification |
| 1. Form 1, LANL Pressure System Certification Status Form   | Every Package  |                    |                  |
| 2. <del>_____</del>   | <del>_____</del>   |                    |                  |
| 3. Alternate Method/Variance or clarification/interpretation (if applicable).                               | If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document |                    |                  |
| 4. Pressure Safety Devices  | The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs)                             |                    |                  |
| a. Safety Relief Calculations for relief valves, in accordance with ASME requirements                       | Every Package, unless calculations cannot be generated, a flow test is required in place of calculations.  |                    |                  |
| b. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements                      | Rupture Disks are in the pressure system   |                    |                  |
| c. Certified Test Data of relief valves, e.g. steam Pressure safety valves are certified by NBIC coded shop | A PRD is modified or tested by an outside facility   |                    |                  |
| 5. <del>_____</del>   | <del>_____</del>   |                    |                  |
| a. <del>_____</del>   | <del>_____</del>   |                    |                  |
| 6. Pump or compressor discharge pressure curves, calculation, or table (If available)                       | The pressure system contains pumps or compressors  |                    |                  |

**Deleted:** \_\_\_\_\_Page Break\_\_\_\_\_ Form 10, System schematics (If the owner does not have a system schematic, utilize the sketch prepared by the walk down team until such time as system schematic is prepared)<sup>19</sup>

**Deleted:** Every Package

**Deleted:** Piping System Documentation:

**Deleted:** FM07; for available components

**Deleted:** Every Package

Existing (including Legacy) System Documentation Requirements

General Legacy Pressure System Description for Hydronic Piping

Evaluation Category 16

Assumptions:

Fluid Service

- 1. The system fluid service is FS3 as defined by ESM Chapter 17
  - 1.1. The pressure system fluid service is Category D or Normal as defined by ASME B31.3 2016
  - 1.2. The pressure systems are within the scope of ASME B31.9-2017

Deleted: 0

Deleted: 1

System Operation

- 1. There are no stress intensification factors for example cracks or acute angles of pressure boundaries.

System Hardware

- 1. The system components have exhibited extensive, good operating history under comparable conditions with similarly proportioned components of the same or like material.
- 2. The system is equipped with a properly sized, set, and functional pressure relief device(s), if needed, to protect against single point failures. Relief device exhaust locations are properly sized and located to protect personnel.
- 3. There are no locations in the system that requires relief protection that may be isolated from relief protection.
- 4. System is constructed of metallic components.
- 5. External appearance is free from corrosion or indication of leakage.

Deleted: successful service experience

Deleted: <#>In response to the PISA on LANL Welding Program (circa 2004) representative accessible welds were visually inspected and are free from indications. Solder or braze joints are not allowed.

Failure Mode

- 1. A ductile failure mode is assumed (leak before burst).

Consequence of Failure

- 1. The result of the failure will not result in serious personnel injury. Safe-guarding will be applied if necessary.

Safety Class

- 1. Applicable to ML1 through 4

Deleted: 4 only

Documentation Requirements

- 1. These hydronic pressure systems shall be exempt from the requirements of having code leak test documentation.
- 2. These hydronic pressure systems may continue to use unlisted components provided they are used within the temperature and pressure ratings of the manufacturer's.
- 3. This equipment will be considered grandfathered and will not be replaced with like items. System shall be upgraded to ASME compliance as items age out of service by attrition.
- 4. LANL ESM Chapter 17 documentation as required by Table ADMIN-1-3-T include: certification status form (FM01), and relief device (FM02)

Deleted: , component list (FM07), and sketch (FM10).

Existing (including Legacy) System Documentation Requirements

Qualitative Risk Assessment

Probability: Remote

Consequence: Minor

QR Factor: 5

Table 3 Qualitative Risk (QR) Determination

|   |     | Probability   |          |            |        |            |   |
|---|-----|---------------|----------|------------|--------|------------|---|
|   |     | A             | B        | C          | D      | E          |   |
|   |     | Frequent      | Probable | Occasional | Remote | Improbable |   |
| C<br>o<br>n<br>s<br>e<br>q<br>u<br>e<br>n<br>c<br>e | I   | Major         | 1        | 1          | 1      | 2          | 3 |
|   | II  | Serious       | 1        | 1          | 2      | 3          | 4 |
|   | III | Significant   | 1        | 2          | 3      | 4          | 5 |
|   | IV  | Minor         | 2        | 3          | 4      | 5          | 6 |
|   | V   | Insignificant | 3        | 4          | 5      | 6          | 7 |



Existing (including Legacy) System Documentation Requirements

Table ADMIN-1-3-T

General Legacy Pressure System Documentation for Hydronic Piping

| Documentation Package Item  | Required When  | Owner Verification | PSO Verification |
|---|--|--------------------|------------------|
| 1. Form 1, LANL Pressure System Certification Status Form   | Every Package  |                    |                  |
| 2. <del>_____</del>   | <del>_____</del>   |                    |                  |
| 3. Alternate Method/Variance or clarification/interpretation (if applicable).                               | If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document |                    |                  |
| 4. Pressure Safety Devices  | The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs)                             |                    |                  |
| a. Safety Relief Calculations for relief valves, in accordance with ASME requirements                       | Every Package, unless calculations cannot be generated, a flow test is required in place of calculations.  |                    |                  |
| b. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements                      | Rupture Disks are in the pressure system   |                    |                  |
| c. Certified Test Data of relief valves, e.g. steam Pressure safety valves are certified by NBIC coded shop | A PRD is modified or tested by an outside facility   |                    |                  |
| 5. <del>_____</del>   | <del>_____</del>   |                    |                  |
| a. <del>_____</del>   | <del>_____</del>   |                    |                  |
| 6. Pump or compressor discharge pressure curves, calculation, or table (If available)                       | The pressure system contains pumps or compressors  |                    |                  |

**Deleted:** ~~\_\_\_\_\_~~ Page Break  
 Form 10, System schematics (If the owner does not have a system schematic, utilize the sketch prepared by the walkdown team until such time as system schematic is prepared)<sup>20</sup>

**Deleted:** Every Package

**Deleted:** Piping System Documentation:

**Deleted:** FM07; for available components

**Deleted:** Every Package

Existing (including Legacy) System Documentation Requirements

General Legacy Pressure System Description for Water Systems

Evaluation Category 17

Assumptions:

Fluid Service

- 1. The system fluid service is FS3 as defined by ESM Chapter 17
  - 1.1. The pressure system fluid service is Category D or Normal as define by ASME B31.3 2016.
  - 1.2. The pressure systems are within the scope of ASME B31.9-2017.

Deleted: 0

Deleted: 1

System Operation

- 1. There are no stress intensification factors for example cracks or acute angles of pressure boundaries.

System Hardware

- 1. The system components have exhibited extensive, good operating history under comparable conditions with similarly proportioned components of the same or like material.
- 2. The system is equipped with a properly sized, set, and functional pressure relief device(s), if needed, to protect against single point failures. Relief device exhaust locations are properly sized and located to protect personnel.
- 3. There are no locations in the system that requires relief protection that may be isolated from relief protection.
- 4. System is constructed of metallic components.
- 5. External appearance is free from corrosion or indication of leakage.
- 6. External appearance is free from corrosion or indication of leakage.

Deleted: successful service experience

Deleted: <#>In response to the PISA on LANL Welding Program (circa 2004) representative accessible welds were visually inspected and are free from indications. Solder or braze joints are not allowed.

Failure Mode

- 1. A ductile failure mode is assumed (leak before burst).

Consequence of Failure

- 1. The result of the failure will not result in serious personnel injury. Safe-guarding will be applied if necessary.

Safety Class

- 1. Applicable to 1 through ML4.

Deleted: 4 only

Documentation Requirements

- 1. These water pressure systems shall be exempt from the requirements of having code leak test documentation.
- 2. These water pressure systems may continue to use unlisted components provided they are used within the temperature and pressure ratings of the manufacturer's.
- 3. This equipment will be considered grandfathered and will not be replaced with like items. System shall be upgraded to ASME compliance as items age out of service by attrition.

**LANL Engineering Standards Manual STD-342-100 Chapter 17, Pressure Safety**

**Attachment ADMIN-1-3**

Rev. 0, 9/17/2014

**Existing (including Legacy) System Documentation Requirements**

- 4. LANL ESM Chapter 17 documentation as required by Table ADMIN-1-3-U include: certification status form (FM01), and relief device (FM02).

**Deleted:** , component list (FM07), and sketch (FM10).

**Qualitative Risk Assessment**

Probability: Remote









Consequence: Insignificant

QR Factor: 6

Table 3 Qualitative Risk (QR) Determination

|   |     | Probability   |          |            |        |            |   |
|---|-----|---------------|----------|------------|--------|------------|---|
|   |     | A             | B        | C          | D      | E          |   |
|   |     | Frequent      | Probable | Occasional | Remote | Improbable |   |
| C<br>o<br>n<br>s<br>e<br>q<br>u<br>e<br>n<br>c<br>e | I   | Major         | 1        | 1          | 1      | 2          | 3 |
|   | II  | Serious       | 1        | 1          | 2      | 3          | 4 |
|   | III | Significant   | 1        | 2          | 3      | 4          | 5 |
|   | IV  | Minor         | 2        | 3          | 4      | 5          | 6 |
|   | V   | Insignificant | 3        | 4          | 5      | 6          | 7 |

Existing (including Legacy) System Documentation Requirements

| Table ADMIN-1-3-U   |  |                    |                  |
|---|--|--------------------|------------------|
| General Legacy Pressure System Documentation for Water Systems  |  |                    |                  |
| Documentation Package Item  | Comment  | Owner Verification | PSO Verification |
| 1. Form 1, LANL Pressure System Certification Status Form   | Every Package  |                    |                  |
| 2.                         |    |                    |                  |
| 3.                         |    |                    |                  |
| 4. Alternate Method/Variance or clarification/interpretation (if applicable).                               | If the system or any item of the system has an applicable alternate method/variance or clarification/interpretation to the requirements of this document |                    |                  |
| 5. Pressure Safety Devices  | The pressure system contains a pressure safety device (which includes but is not limited to relief valves and rupture discs)                             |                    |                  |
| a. Safety Relief Calculations for relief valves, in accordance with ASME requirements                       | Every Package, unless calculations cannot be generated, a flow test is required in place of calculations.  |                    |                  |
| b. Pressure Relief Calculations for Rupture Disks in accordance with ASME requirements                      | Rupture Disks are in the pressure system   |                    |                  |
| c. Certified Test Data of relief valves, e.g. steam Pressure safety valves are certified by NBIC coded shop | A PRD is modified or tested by an outside facility   |                    |                  |
| 6.                       |    |                    |                  |
| a.                       |    |                    |                  |
| 7. Pump or compressor discharge pressure curves, calculation, or table (If available)                       | The pressure system contains pumps or compressors  |                    |                  |

**Deleted:** Every Package

**Deleted:** Form 7, Component List

**Deleted:** .....Page Break.....  
Form 10, System schematics (if the owner does not have a system schematic, utilize the sketch prepared by the walkdown team until such time as system schematic is prepared)<sup>21</sup>

**Deleted:** Every Package

**Deleted:** Piping System Documentation:

**Deleted:** FM07; for available components