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**RECORD OF REVISIONS**

Rev.	Date	Description	POC	RM
0	9/22/2023	Initial issue as section PS-GENERAL, essentially replacing previous Section GEN R0.1 and with similar attachments.	Ari Ben Swartz, <i>ES-FE</i>	Dan Tepley, <i>ES-DO</i>

**Contact the Standards point of contact (POC) for upkeep, interpretation, and variance issues.**

<b>Chapter 17</b>	<a href="#"><u>Pressure Safety POC</u></a>
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This document is online at <https://engstandards.lanl.gov>

<p><b>ESM Usage</b></p> <p><u>(Requirement 17-0XYZ)</u>: Where this phrase appears it is a LANL-internal reference in a basis file that captures and categorizes ESM drivers—and is not relevant to most users.</p> <p>Italics use: Where appropriate throughout the ESM, guidance is provided to aid in the implementation of requirements. Guidance will be <i>italicized</i> text and/or otherwise clearly indicated (e.g., by headings). Document titles in italics is normally simply a formatting style. Likewise, words and short phrases in italics and/or capitalized indicates them as a defined term (defined either in this document, the CoE Glossary (future), or the ESM chapter in which it appears).</p>
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**1.0 INTRODUCTION AND APPLICABILITY**

- A. The primary goal of the LANL Pressure Safety Program is to protect worker safety and health while working on or around pressure systems. Engineering Standards Manual (ESM) Chapter 17, *Pressure Safety*, establishes the design, fabrication, assembly, testing, inspection, and examination requirements of new pressure systems and modification of existing pressure systems for use by Los Alamos National Laboratory (LANL) personnel at any location.
- B. ESM Chapter 17 is governed by P101-34, *Pressure Safety*, which establishes LANL’s overall pressure safety program requirements. ESM Ch. 17 establishes requirements to ensure that new or modified pressure systems are designed, fabricated, tested, examined, and inspected by trained and qualified personnel in accordance with applicable and sound engineering principles as required by 10 CFR 851.23, *Safety and Health Standards*, and 10 CFR 851 Appendix A, Part 4, *Pressure Safety*. 10 CFR 851 is contractually required by the U.S. Department of Energy (DOE) and is implemented at LANL in PD100 - *DOE/NNSA Approved Los Alamos National Laboratory 10 CFR 851 Worker Safety and Health Program Description*.
- C. Definitions and acronyms used throughout the chapter are defined in Attachment GEN-1, *Definitions and Acronyms*.
- D. Per P101-34, *Pressure Safety*, all new or modified pressure and vacuum systems are subject to the requirements of this chapter (except for those excluded from the Lab’s P101-34 pressure safety program). The following is from Section 1.2 of P101-34:

*“Pressure systems means all pressure vessels, and pressure sources including cryogenics, pneumatic, hydraulic, and vacuum. Vacuum systems should be considered pressure systems due to their potential for catastrophic failure due to backfill pressurization. Associated hardware (e.g., gauges and regulators), fittings, piping, pumps, and pressure relief devices are also integral parts of the pressure system.”*

- E. ESM Chapter 17 is divided into three sections:

PS-GENERAL	General Information (this document)
PS-REQUIREMENTS	Pressure Safety Requirements for New and Modified System Design
PS-GUIDE	Pressure System Design Guidance

**2.0 NATIONAL BOARD INSPECTION CODE (NBIC)**

*(Requirement 17-0100)*

- A. National Board Inspection Code (NBIC) NB-23 Parts 1 through 4 are required for boilers and pressure vessels. Attachment GEN-2 provides a summary of the scopes of each part and discussion on how the mandates are applied at LANL.
  - 1. Part 1, Installation
  - 2. Part 2, Inspection
  - 3. Part 3, Repairs and Alterations

## 4. Part 4, Pressure Relief Devices

*Guidance: Reference the [LANL Pressure Safety Program Quality Control Systems Manual \(QCSM\) website](#) for information on LANL's R Stamp and Federal Inspection Agency Programs:*

5. PS-GEN-NBIC-RSP – *Quality Control Systems Manual (R Stamp Program)*6. PS-GEN-NBIC-FIA – *Quality Control Systems Manual (Federal Inspection Agency)***3.0 ALTERNATE METHOD/VARIANCE OR CLARIFICATION/INTERPRETATION**

- A. All variance and alternate method requests must be submitted to ESM Chapter 17 POC for processing. Approval is requested per LANL ESM, Chapter 1, Section Z10 using LANL Form 2137, *Conduct of Engineering Request for Variance or Alternate Method*. If approved by the Chapter 17 POC, [the chief pressure safety officer (CPSO) or deputy chief pressure safety officer (DCPSO) if the CPSO is unavailable] will sign or return with explanation. Conflicts that arise between the Chapter 17 POC and a variance/alternate method requestor will be resolved by the Pressure Safety Committee (PSC).
- B. An official clarification or interpretation approval is requested per the LANL ESM, Chapter 1, Section Z10 using LANL Form 2176, *Conduct of Engineering Formal Clarification or Interpretation Request*. A clarification or interpretation only requires the approval of the Chapter 17 POC.
- C. An informal clarification or interpretation may be processed by the ESM Chapter 17 POC for ESM Chapter 17 as allowed by ESM, Chapter 1, Section Z10.
- D. Approval of a variance or alternate method can occur under the following circumstances:
1. To permit continued operation prior to correction of deficiencies, or
  2. To permit a long-term operation with a condition that deviates from this ESM chapter.
- E. Variances that violate code are not allowed for new American Society of Mechanical Engineers (ASME) code (B31 or Boiler and Pressure Vessel Code) Design Basis pressure systems.
- F. Approval of an alternate method must be based on establishing a level of worker safety consistent with the requirements of 10 CFR 851.
- G. Variance and alternate method approvals must be documented and maintained with the pressure system documentation package.
- H. The CPSO and the site chief engineer must approve the alternate method (with duration, if applicable) before proceeding.
- I. Other concurrence reviews may be required, e.g., policies outside of engineering, project manager, facility operations director (FOD), or associate lab director (ALD).
- J. The master list of approved variances and alternate methods is maintained on the Conduct of Engineering website. Additionally, an unofficial list of approved ESM Ch 17 variances, alternate methods, clarifications, and interpretations is normally maintained on the Pressure Safety Program website.
- K. Variances and alternate methods cannot conflict with Safety Basis requirements. Those that affect Vital Safety Systems must meet the requirements of ESM Chapter 1 Z10, or successor document.

- L. Extensions of existing alternate methods/variances shall be processed as a revision to the original request and must include proper justification, compensatory methods, and a new end date.
- M. NNSA Field Office will be copied on all LANL approved variances and alternate methods associated with FS1, safety class, or safety significant pressure systems.

#### 4.0 TRAINING AND QUALIFICATIONS; ROLES AND RESPONSIBILITIES

- A. Introduction
  - 1. The following training and qualifications/roles and responsibilities are solely within the scope of ESM Chapter 17. Some shown below may have additional roles in other LANL documents e.g., P101-34, *Pressure Safety*.
- B. ASME Owner
  - 1. The ASME Owner is the DOE Los Alamos Site Office.
  - 2. The responsibilities of the ASME Owner have been delegated by DOE to LANL. Ref. ESM Chapter 1, Section Z10.
  - 3. The LANL Owner has further delegated the role of day-to-day operations to the chief pressure safety officer, which includes approval of ASME unlisted components.
  - 4. The LANL Owner shall designate the Owner's Inspector. Click for the LANL [Owner's Inspector database](#).
- C. ASME Pressure System Designer (aka Designer, sometimes called the Engineer in the ASME Code) (*Requirement 17-0101*):
  - 1. Shall be qualified in accordance with the ASME code of record (COR).
  - 2. Shall be familiar with the ASME COR.
  - 3. Is responsible for the design of pressure systems for the applicable ASME COR.
  - 4. Is responsible for generating system calculations, sketches, drawings, piping and instrumentation diagrams, specifications, and/or isometrics to meet the Design Criteria. Examples include, but are not limited to, overpressure protection calculations (e.g., relief device sizing), flexibility analysis, wall thickness, static loads, dynamic loads, piping supports, and anchors.

*NOTE: Additional calculations may be required to ensure the design meets all applicable design requirements, including those outside the scope of ESM Ch. 17. Examples include, but are not limited to sizing, flow, pressure drop calculations of a process flow or a building compressed air system, a refrigeration system heat load design, a hydronic thermal calculation, or specialized evaluations for instrumentation, experimental systems, or R&D systems.*
  - 5. Is responsible for defining any additional Design Criteria if necessary to ensure a safe pressure system for the proposed installation in addition to the Design Basis. Examples include, but are not limited to, specification of additional nondestructive examination (NDE) and pass/fail criteria, evaluating and specifying materials of construction to ensure system integrity, and specifying necessary construction techniques for radioactive material handling service. Designs or practices known to be unsafe are prohibited.

- D. ASME Examiners (*Requirement 17-0102*)
1. Shall be qualified for NDE as required by the ASME COR.
  2. Shall perform examinations of pressure system construction as defined by the ASME COR and as defined by the Engineering design.
  3. Will provide records of examinations and tests to the Owner's Inspector or Owner's Inspector delegate.
  4. Will work with the Owner's Inspector or the Owner's Inspector delegate to have access to and observe any examinations and testing being performed on pressure systems.
- E. ASME Owner's Inspector (*Requirement 17-0103*)
1. Owner's Inspector shall be qualified per the ASME COR.
  2. The Owner's Inspector shall designate the Owner's Inspector delegate.
  3. Owner's Inspector or delegate shall have access to any and all design, fabrication, manufacture, fabrication, heat treatment, assembly, erection, examination, testing, records, documentation or other project information or activities to verify that all required examinations and testing have been completed and to inspect the piping to the extent necessary to be satisfied that it conforms to all applicable examination requirements of the ASME Code and of the engineering design and to perform the role defined in the COR.
  4. Owner's Inspector is the final authority on acceptance of the project examination or test.
  5. Owner's Inspector is responsible for determining that a person to whom an inspection function is delegated is qualified to perform that function.
- F. ASME Owner's Inspector Delegate (*Requirement 17-0104*)
1. Perform Owner's Inspector delegate duties as assigned by the LANL Owner's Inspector.
  2. The Owner's Inspector delegate shall be trained and qualified as required by the Owner's Inspector.
- G. Pressure Safety Officer (*Requirement 17-0105*)
1. The pressure safety officer (PSO) may be responsible for review of system designs for compliance to the applicable design basis.
- NOTE: The use of PSO here includes all PSO Duty Areas, DCPSOs, and the CPSO.*
2. The PSO may act as a subject matter expert (SME) within their qualification limit.
  3. PSOs shall be qualified per ESD-QS-001, [Qualification Standard for Pressure Safety Personnel](#), or successor document.
  4. Aids pressure system representative (PSR) in compliance with the ESM, Chapter 17, *Pressure Safety*, and the use of the ASME Codes.
  5. May serve as a SME for review of integrated work documents (IWDs)/work control documents (WCDs) involving pressure systems within their qualification.

6. May serve as an SME for hazards analysis of work per P300, *Integrated Work Management*, and P300-1, *Integrated Work Management for R&D*, (and SD601, *Conduct of Research and Development*).
  7. Reviews pressure or leak test plan as part of system design review.
  8. Reviews pressure safety calculations as part of design review.
- H. Peer Reviewer (*Requirement 17-0106*)
1. A trained peer reviewer may be responsible for Design Review of FS-3 and FS3-ULH programmatic (non-Safety Basis) system designs for compliance to the applicable Design Basis.
  2. Peer reviewers shall be trained per Pressure Safety Peer Review Curricula 13046.
- I. Pressure System Designer (aka Designer) (*Requirement 17-0107*)
1. Shall be qualified in accordance with the Design Basis, as applicable.
  2. Shall be familiar with the Design Basis.
  3. Is responsible for the design of pressure systems to meet the applicable Design Basis.
  4. Is responsible for generating system calculations, sketches, drawings, piping and instrumentation diagrams, specifications, and/or isometrics to meet the Design Criteria. Examples include, but are not limited to, overpressure protection calculations (e.g., relief device sizing), flexibility analysis, wall thickness, static loads, dynamic loads, piping supports, and anchors.

*NOTE: Additional calculations may be required to ensure the design meets all applicable design requirements, including those outside the scope of ESM Ch. 17. Examples include, but are not limited to sizing, flow, pressure drop calculations of a process flow or a building compressed air system, a refrigeration system heat load design, a hydronic thermal calculation, or specialized evaluations for instrumentation, experimental systems, or R&D systems.*

## 5.0 ATTACHMENTS

GEN-1 – *Definitions and Acronyms*

GEN-2 – *National Board Inspection Code NB-23 Application*