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RECORD OF REVISIONS (GEN)

Rev	Date	Description	POC	RM
0	9/17/14	Initial issue. Section I rev. 3 separated into alpha-named sections. Incorporation of lessons learned, variances, and clarifications in material remaining in GEN. NA-LA concurred with chapter/changes (EMRef-69)	Ari Ben Swartz, *ES-EPD*	Larry Goen, *ES-DO*
0.1	12/16/21	Updated document title for qual standard and hyperlink. Also updated other hyperlinks.	Ari Ben Swart, *ES-EPD*	Jason Apperson, *ES-DO*

HISTORY OF CHAPTER (Chapter 17 Section I)

0	3-10-09	Initial issue.	Charles DuPre, *ES-DE*	Kirk Christensen, *CENG-OFF*
1	7-29-09	Revised 1.0.E scope; 5.0 FS categories; 7.0(A) excluded systems; 8.0(B) requirements for relocated or removed systems; 9.I discrepancy actions; 10.T.16 fire sizing; 10.T.18, boiler requirements (from D30HVAC); 11.B future pre-testing of	Charles DuPre, *ES-DE*	Gary Read, *CENG-OFF*

		certain PRVs; 12.C required PMTs and PMs; 13.0.B.3 cylinder retest (corrected); FM01 and 06.		
2	8-2-09	Clarified 9.0.B, C, and G and 9.0.I regarding handling of deficiencies.	Charles DuPre, ES-DE	Gary Read, CENG-OFF
3	5-11-10	General revision to incorporate approved clarifications, alternate methods, and lessons learned. LASO concurred with changes (Vozella email EMRef-62).	Charles DuPre, ES-DE	Larry Goen, CENG-OFF

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

Chapter 17	**Pressure Safety POC and Committee**

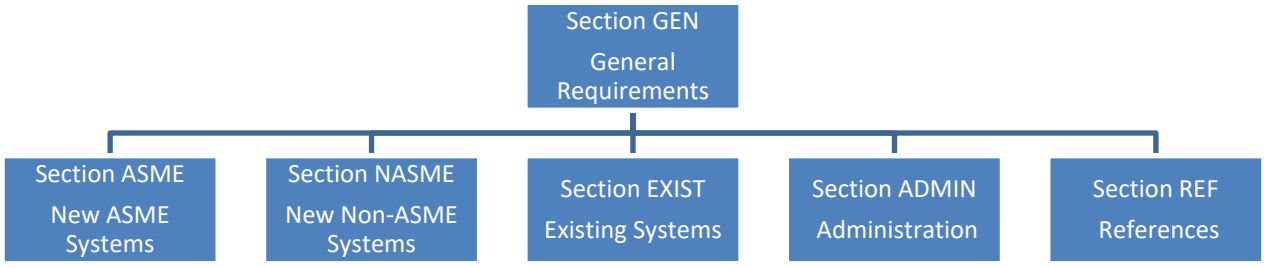
This document is online at http://engstandards.lanl.gov

1.0 GENERAL

A. Introduction and Applicability

1. Engineering Standards Manual Chapter 17 *Pressure Safety* contains the requirements for management of pressure systems to ensure that both new and existing systems are compliant with applicable 10CFR851 Appendix A, Part 4 requirements (*reproduced as REF-1 of this chapter*).[1]

2. The structure of this chapter was changed in 2014 to clearly group requirements for new ASME construction, new non-ASME construction, existing systems, and the program's administrative requirements (including maintenance). References are also included:



[1] At time of writing, the Engineering Services Division Leader is the safety management program owner for pressure safety

Note: In the event of a conflict between this Chapter and guidance or referenced documentation, this document shall take precedence.

3. This Section also has attachments that apply to all sections of the pressure safety program that include the following:

   - Definitions and Acronyms
   - Exclusions from the Program
   - OSHA Requirements for all Pressure Systems

4. This chapter establishes the design, review, inspection, fabrication, testing, and pressure program management requirements for pressure systems in use at LANL. Operational safety requirements can be found in LANL Procedure P101-34, *Pressure Safety*; however, such safety requirements must be taken into account when designing and working with pressure systems.

   a. Examples of such safety requirements not covered by this chapter are: personal protective equipment, skin injection, moving of gas cylinders, securing of gas cylinders, cryogen burns, chemical hazards, oxygen deficiency, operation and maintenance training requirements, etc.

5. Throughout this document there are references to specific ASME code paragraphs or sections. For most cases across the Laboratory, the appropriate codes are B31.3[2] and Section VIII of the Boiler and Pressure Vessel Code. However, the most applicable code must be used for design, fabrication, inspection, and testing; take requirements in this document referring to or taken from B31.3 to mean the corresponding provisions in the applicable B31 code.

   a. For example, use B31.1 for site steam distribution, B31.5 for refrigeration piping, and B31.9 for building services where the LANL-adopted plumbing code[3] does not apply.

   b. The UPC stops applying when chemicals are added to the water (e.g. boiler treatment) or after the water is run through a process (e.g., DI water).

   c. A summary listing of the applicable ASME B31 and DOT codes is presented in Chapter 17 document ASME-1, *Code and Regulation Application (Scope Summaries)*.

   d. Attachments to NASME titled Equivalency Evaluations for New Non-ASME Pressure systems (1-a, 1-b, etc.) contain engineering equivalencies for piping not associated with pressure vessels, boilers, air receivers, or supporting piping systems (see GEN-1 definition of supporting piping systems).

6. Pressure and vacuum systems (including but not limited to facility, utility, environmental, R&D, and programmatic) are subject to the requirements of this program except as noted below:

[2] For the applicability of ASME B31.3 see B31.3 Para 300.1.1 regarding the content and coverage.
[3] Plumbing code adopted by ESM Chapter 16, IBC-GEN Att A. (*e.g., IAPMO UPC)*

a. Vacuum systems that do not have the potential for catastrophic failure due to backfill pressurization or internal pressure generation.
b. Others as noted under Exempt below.

7. New pressure systems in preliminary design as of March 10, 2009 (original issuance of this Chapter) must be certified according to this Chapter prior to use.

8. Projects Underway: Projects in design or fabrication stages must also follow this chapter and must be in full compliance prior to fluid introduction including system pressure testing (not component or pipe section testing).[4]

   a. In addition, existing systems are subject to the certification and preventive maintenance requirements herein, as well as being expected to maintain (but generally not recreate) required documentation.[5]

9. Documentation, including forms, generated by this program must be considered records, and must be managed per LANL P1020, P1020-1, and P1020-2 located here.

10. ASME Boiler and Pressure Vessel Codes and the B31 series of piping codes are designed to be so that when applied personnel close proximity to the finished pressure system are exposed to a low risk level.

11. Mobile and portable pressure systems are also included in this program. These can include tube trailers, vehicle-mounted vessels, and skid-mounted vessels.

12. Pressure systems must have documentation proving compliance with the ASME code, or indicating excluded status, where the definition of excluded is defined in this document.

B. Exempt

1. Pressure systems with a design pressure [or existing system with MAWP below 15 psig provided the fluid handled is nonflammable, nontoxic, and not damaging to human tissues as defined in 300.2, and its design temperature is from −29°C (−20°F) through 186°C (366°F)] are exempt from the majority of requirements of this chapter provided there is documented adequate relief protection.

2. The first relief device of an exempt system is NOT exempt and must be entered into CMMS or other approved data repository for tracking.

3. Applicable requirements are inventory and System Identification Tag with “Exempt” printed in the sticker area; Pressure System Certification Status Form (*Section ADMIN-1-1 Form 1*), an evaluation showing the system cannot be pressurized to greater than 15 psig (without relief device activation), and inclusion of the relief device into the maintenance tracking system. The regulator and the relief device must be close-coupled with no intervening stop valves. A copy of a simplified system sketch

[4] ESM Ch 1 Section Z10 normally grandfathers projects underway for new requirements; however, the need to comply with 10 CFR 851 as implemented by this chapter supersedes that allowance; furthermore, compliance prior to startup ensures safety and is more cost-effective than program backfit after fluid introduction.
[5] Unlike many ESM chapters, this is a complete program and not only for new installations.

and the documentation showing the system is adequately protected against overpressure shall be maintained as records.

C. Excluded

1. Excluded systems are those pressure system categories that were not inventoried during the pressure safety project. See Attachment GEN-2

D. Chapter Overview

1. This Chapter addresses the process by which new pressure systems are made or existing systems are modified and both are certified for use. The key areas of this document are: ASME code requirements, configuration control, inspection and testing, design oversight, documentation requirements, and pressure systems accountability and traceability.[6]

2. Contact the Chief Pressure Safety Officer (CPSO) for questions regarding the subject matter of this document, applicability, or interpretations. When greater levels of assistance are required, an Engineering Services Request must be submitted.

3. The CPSO may perform or participate in an annual assessment to evaluate institutional compliance with requirements of the Pressure Safety Program as defined in this chapter.

E. Alternate Method/Variance

1. Request for variance from compliance with this chapter, or alternate methods and clarifications, must be submitted to the CPSO, for review and approval processing.

2. Approval of an alternate method or variance can occur under the following circumstances:

   a. To permit continued operation prior to correction of deficiencies

   b. To permit a long-term operation with a condition that deviates from this document.

   c. Systems where installation of pressure relief devices is impossible or unnecessary (such variances must be reviewed for applicability against ASME Code Case 2211 and ASME Section VIII, Division 1, Part UG-140).

3. Approval is requested per ESM Chapter 1 Section Z10. (*Owner submits a Conduct of Engineering Request for Variance or Alternate Method, LANL Form 2137)*

4. The alternate method or variance (with duration, if applicable) must be approved by the CPSO and the Site Chief Engineer.

[6] Programs in similar industries and national standards were used in the generation of this program. Industries include White Sands Test Facility (NASA) and Savannah River Site (DOE). Primary national standards and guidelines used: NBIC, Code of Federal Regulations, API, and the ASME Boiler and Pressure Vessel and B31 series codes.

5. Approval of an alternate method must be based on establishing a level of worker safety consistent with the requirements of 10 CFR 851.

6. Variance approvals must be documented and maintained with the pressure system documentation package

   a. The master list of approved variances, alternate methods and clarifications is maintained on the Engineering websites.

   b. Variances cannot conflict with a Safety Basis.

7. Extension of variances will not be granted without justification by the Requestor, the Design Authority Representative (if assigned), and the LANL Owning Manager (FOD or RAD); see ESM Chapter 1 Section Z10 and Form 2137. Extensions will be processed as a revision to the original request. Documentation provided with the extension request will be current and support the justification request.

8. Variances to code are not allowed for new ASME code-compliant pressure construction.

9. Alternative Methods are used to document alternatives allowed by code.

2.0 QUALIFICATION REQUIREMENTS

A. Pressure Safety Officers (PSO)

LANL Pressure Safety Officers (PSOs) shall be trained and qualified in accordance with requirements stipulated in Qualification Standard ESD-QS-001 or its successor.

NOTE: The PSOs qualification standard has different duty areas of responsibilities and the PSO may or may not be qualified depending on the type of work being performed. The current official qualifications are maintained in UTrain, but quick reference is located on the Pressure Protection Program page with the title "Pressure Safety: Officer Qualification Status."

PSO Duty Area	ASME B31 Code	Training Plan (TP)
A	None	11957
B	B31.3	11958
C	B31.9	11959
D	B31.1	11960
E	B31.8	11961

B. Pressure System Designers[7]

1. The Designer is the person in charge of the engineering design of a piping system and shall be experienced in the use of the applicable ASME Code. The qualifications and experience required of the Designer will depend on the complexity and criticality of the system and the nature of the individual's experience. The Designer shall meet at least one of the following criteria:

    a. Completion of an Accreditation Board for Engineering and Technology (ABET) accredited or equivalent engineering degree, requiring the equivalent of at least 4 years of study, plus a minimum of 5 years of experience in the design of related pressure piping.

    b. Professional Engineering registration, recognized by the local jurisdiction, and experience in the design of related pressure piping.

    c. Completion of an accredited engineering technician or associates degree, requiring the equivalent of at least 2 years of study, plus a minimum of 10 years of experience in the design of related pressure piping.

    d. Fifteen (15) years of experience in the design of related pressure piping.

    e. Experience in the design of related pressure piping is satisfied by piping design experience that includes design calculations for pressure, sustained and occasional loads, and piping flexibility.

C. Owner's Inspectors[8]

1. The owner's Inspector shall have not less than 10 years of experience in the design, fabrication, or inspection of industrial pressure piping each 20% of satisfactorily completed work toward an engineering degree recognized by the Accreditation Board for Engineering and Technology (Three Park Avenue, New York, NY) shall be considered equivalent to 1 year of experience, up to 5 years total. (B31.3 340.21-340.4)

2. It is the owner's responsibility, exercised through the owner's Inspector, 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 code and of the engineering design. (B31.3 340.2)

3. The owner's Inspector and the Inspector's delegates shall have access to any place where work concerned with the piping installation is being performed. This includes manufacture, fabrication, heat treatment, assembly, erection, examination, and testing of the piping. They shall have the right to audit any examination, to inspect the piping using any examination method specified by the engineering design, and to review all certifications and records necessary to satisfy the owner's responsibility; to verify that all required examinations and testing have been completed and to inspect the piping to

[7] ASME B31.3 Article 301.1 Qualifications of the Designer
[8] ASME B31.3 Article 340.4 Qualifications of the Owner's Inspector

the extent necessary to be satisfied that it conforms to all applicable examination requirements of the code and of the engineering design. (B31.3 340.2 and 340.3)

4. The Owner's Inspection program is implemented by CM-CE (Project Field Engineering).

5. If personnel qualified as Pressure Safety Officers have the code-required experience, they may be granted the authority of the Owner's Inspector or the Owner's Inspector Designee by Construction Management per the duty areas shown above under PSO qualification.

   a. PSOs acting for the Owner's Inspector must follow the requirements of the Owner's Inspector program including utilization of the appropriate check lists and the designated mandatory inspection points.

NOTE: The Owner Inspector qualification standard has different duty areas of responsibilities and the PSO may or may not be qualified depending on the type of work being performed. The current official qualifications are maintained in UTrain, but quick reference is located on the Construction Management site with the title "LANL Owner's Inspectors."

D. Examiners

1. Examiners shall have training and experience commensurate with the needs of the specified examinations. (B31.3 342.1)

2. The employer shall certify records of the examiners employed, showing dates and results of personnel qualifications, and shall maintain them and make them available to the Inspector. (B31.3 342.1)

3. Examiners are assigned by the Responsible Line Manager (RLM) in accordance with LANL Policy P330-8, paragraph 3.6. This procedure applies LANL wide, and the document is for Inspection and Tests required for acceptance.

4. An example of required code Examination is for pneumatically tested, pressure systems an assembly tubing components for a piping systems meeting the scope of B31.3 would need examination in accordance with B31.3 341.4.1(a)(4) "When pneumatic testing is to be performed, all threaded, bolted, and other mechanical joints shall be examined".

5. The examiner shall provide the Inspector with a certification that all the quality control requirements of the code and of the engineering design have been carried out. (Normal fluid 341.4.1(c)).

6. ESM Chapter 13 Volume 6, *Welding Inspection and General NDE,* contains LANL NDE qualifications.

E. Pressure Safety Committee

1. The Pressure Safety Committee (also known as Chapter 17 Technical Committee) is chaired by the CPSO (POC of ESM Chapter 17). Members are appointed by the CPSO and typically include the PSOs and others from around the laboratory whom the CPSO

may call upon to review and provide input as requested on variances, alternate methods, clarifications, and interpretations with respect to Chapter 17.

2. SMEs are not permanent members of the pressure safety committee but have experience in areas relevant to the topic of discussion. For example, a welding SME may be engaged on welding or brazing questions but their involvement is not required when evaluating a pressure system that will be assembled with compression fittings.

3.0 ATTACHMENTS

Attachment GEN-1 Definitions and Acronyms

Attachment GEN-2 Exclusions from Program

Attachment GEN-3 OSHA Requirements for Pressure Systems