SECTION 23 2215

STEAM AND CONDENSATE HEATING PIPING and Specialties

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LANL MASTER SPECIFICATION SECTION

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| Rev. 4 Summary of Changes  Updated Articles *Related Sections* and *References*. Revamped article *Submittals* to standardize across piping specifications. Clarified when unlisted component evaluations are required in submittal space. Revised piping, fittings, and components throughout Part 2 to ensure template is ASME B31.9-compliant. Updated article on *Seismic Performance Requirements*. Clarified some items in Article *Installation*. Miscellaneous updates throughout to better align with ESM Ch. 6 and Ch. 17 requirements. Updated Part 3 to standardize across other piping sections and other minor editorial changes. |

Word file at <https://engstandards.lanl.gov>

This template was developed to meet the requirements of ASME B31.9-2020, which is valid for steam/condensate up to 125 psig pressure and 0-353 degrees F temperature range.

For steam above these limits or centrally generated steam, comply with ASME B31.1, and use Section 33 6300 *Steam Energy Distribution*. For steam used in a process, follow ASME B31.3 Process Piping; specifier could modify Section 40 0504 *Process Piping* for such use or use this section as a starting point for a new section for process steam with necessary changes.

This section does not address buried piping. It is the responsibility of the Designer to include provisions for corrosion control of buried piping, if necessary. Consult other Sections such as 23 2113 *Hydronic Piping* for template information on buried piping.

**This specification section does not meet the requirements for ASME B31.9 and ASME BPVC Section IV for boiler external piping. Changes to allowed materials is required when specifying boiler external piping. See ASME B31.9-2020 Figure 900.1.2 Code Jurisdictional Limits for Piping — Drum-Type Boilers, for locations to apply boiler external piping. Boiler External piping requires the use of ASME BPVC Section II, *Materials*.**

This template must be edited for each project.  In doing so, specifier must add job-specific requirements.  Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.  Once the choice is made or text supplied, remove the brackets.  The section must also be edited to delete requirements for processes, items, or designs that are not included in the project -- and specifier’s notes such as these.  This template is written to meet requirements contained in the LANL Engineering Standards Manual (ESM).

To seek a variance from or alternate method to requirements in this section that are applicable, contact the ESM Pressure Safety [POC](https://engstandards.lanl.gov/POCs.shtml#pressure) and/or Mechanical [POC](https://engstandards.lanl.gov/POCs.shtml#mech). Please contact POCs with suggestions for improvement as well.

When assembling a specification package, include applicable Sections from all Divisions, especially Division 1, General Requirements.

This template was developed for ML-4 projects.  For ML-1, 2, and 3 applications, additional requirements and independent reviews should be added if increased confidence in procurement or execution is desired; see ESM Chapter 1 Section Z10 Specifications and Quality sections.

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1. GENERAL

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NOTE on LANL Ownership: Utilities normally owns steam piping up to and including the first shutoff valve inside the building (ESM Ch. 1 Section 200 designates this Opsystem USD- Utilities Steam Distribution, System STM – Steam). The building’s steam system (Opsys SD - Steam Distribution and Sys STM-Steam) is downstream of that valve. Thus, installation of these systems follows Sections 33 3600 and 23 2215 (and thus B31.1 and B31.9) but the long-term ownership breakpoint is different than the code/specification breakpoint.

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* 1. SECTION INCLUDES
     1. Building steam and condensate service piping and components within the 0‑125 psig pressure and 0-353 degrees F temperature range. (Follow 33 6300 *Steam Energy Distribution* when above these limits).
     2. When using central plant steam, components downstream of the regulator in the steam pit just outside the building in TA3, TA9, and TA16.
     3. Piping specialties downstream of the regulator noted above:
        1. Valves
        2. Strainers
        3. Steam traps
        4. Thermostatic air vents
        5. Vacuum breakers
        6. Pressure gauges
        7. Pressure reducing valves
        8. Safety relief valves
        9. Pump-Traps (steam-powered condensate pump)
        10. Steam heat exchangers
  2. RELATED SECTIONS
     1. Section 01 2500, *Substitution Procedures*
     2. Section 01 3300, *Submittal Procedures*
     3. Section 01 4000, *Quality Requirements – Non-nuclear*
     4. Section 01 4115, *Pressure Safety Submittals*
     5. Section 01 4216, *Definitions*
     6. Section 01 4444, *Offsite Welding, Brazing & Joining Requirements*
     7. Section 01 4455, *Onsite Welding, Brazing & Joining Requirements*
     8. Section 01 4525, *Nondestructive Examination (NDE) Requirements*
     9. Section 01 4631, *Welding, Brazing, and Soldering of ASME B31 Piping*
     10. Section 01 4731, *Flange Assembly for ASME B31 Systems*
     11. [Section 01 8113.13 Sustainable Design [LEED v4 and]Guiding Principles 2020: *Requirements for water efficiency, energy efficiency, material composition, and indoor air quality requirements]*
     12. [Section 01 8734, *Seismic Qualification of Nonstructural Components (IBC)*, for requirements pertaining to [manufacturer’s certification][and][special certification].]
     13. Section 07 8400, *Firestopping*
     14. Section 22 0529, *Hangers and Supports for Plumbing Piping and Equipment*
     15. [Section 22 0548.23, *Vibration and Seismic Controls for Mechanical Systems* for [seismic-design criteria,] submittal requirements, devices for seismic restraint, and installation requirements for these devices.]
     16. Section 22 0554, *Identification for Plumbing, HVAC, and Fire Piping and Equipment*
     17. Section 22 0713, *Plumbing and HVAC Insulation*
     18. Section 22 0813, *Testing Piping Systems*
     19. Section 23 2500, *HVAC Water Treatment*

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In the listing below, designer shall eliminate code and standards that are not applicable to the project and add other code and standards that are. The referenced standards editions are based on the code of record ASME B31.9-2020 and ASME BPVC-2023. If the Code of Record for the project refers to a different version of ASME B31.9 & ASME BPVC, the designer is responsible to update the years/editions for the invoked standards. If the invoked standards editions do not comply with those referenced by the Code of Record, EOR needs to evaluate and verify those for equal or better. For the standards without an edition/year, the latest edition is to be used. In addition, the designer must ensure the code and standards editions align between sections in the project specification package and the project design drawings.

Note: ASCE 7 edition is based on Code of Record IBC 2021.

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* 1. REFERENCES
     1. ASCE 7-[16], Minimum Design Loads and Associated Criteria for Buildings and Other Structures
     2. ASME B1.20.1-[2013(R2018)], Pipe Threads, General Purpose (Inch)
     3. ASME B16.3-[2021], Malleable Iron Threaded Fittings Classes 150 and 300
     4. ASME B16.5-[2020], Pipe Flanges and Flanged Fittings NPS ½ Through NPS 24 Metric/Inch Standard
     5. ASME B16.9-[2018], Factory-Made Wrought Buttwelding Fittings
     6. ASME B16.25-[2022], Buttwelding Ends
     7. ASME B16.34-[2020], Valves – Flanged, Threaded, and Welding End
     8. ASME B16.39-[2020], Malleable Iron Threaded Pipe Unions Classes 150, 250, and 300
     9. [ASME B31.3-[2022], Process Piping]
     10. ASME B31.9-[2020], Building Services Piping
     11. ASME B40.100, Pressure Gauges and Gauge Attachments
     12. ASME BPVC Section II-[2023], Materials
     13. ASME BPVC Section IV – [2023], Rules for Construction of Heating Boilers
     14. ASME BPVC Section VIII, Division 1-[2023], Rules for Construction of Pressure Vessels
     15. ASME BPVC Section IX-[2023], Qualification Standard for Welding, Brazing and Fusing Procedures; Welders; Brazers; and Welding, Brazing and Fusting Operators
     16. ASME BPVC Section XIII-[2023], Rules for Overpressure Protection
     17. ASTM A53/A53M-[2012], Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
     18. ASTM A105/A105M-[2014], Standard Specification for Carbon Steel Forgings for Piping Applications
     19. ASTM A126-[2004(R2014)], Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
     20. ASTM A197/A197M-[2000(R2015)], Standard Specification for Cupola Malleable Iron
     21. ASTM A216/A216M-[2018], Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service
     22. ASTM A234/A234M-[2015], Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service
     23. ASTM A351/A351M-[2018], Standard Specification for Castings, Austenitic, for Pressure-Containing Parts
     24. ASTM B62-[2015], Standard Specification for Composition Bronze or Ounce Metal Castings
     25. ASTM B584-[2014], Standard Specification for Copper Alloy Sand Castings for General Applications
     26. MSS SP-25-[2013], Standard Marking System for Valves, Fittings, Flanges, and Unions
     27. MSS SP-80-[2013], Bronze Gate, Globe, Angle, and Check Valves
     28. MSS SP-110-[2010], Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends
     29. NMAC, New Mexico Administrative Code
  2. SUBMITTALS
     1. Submit the following in accordance with Section 01 3300, *Submittal Procedures.*
     2. Action Submittals:
        1. Catalog data on pipe materials, fittings, valves, and accessories. Include the manufacturer’s name, model number, parts list, and brief description of equipment and its basic operational features, i.e., data sheet, spec sheet, etc.

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When offsite only, delete submittals below regarding onsite welding. When onsite only, delete submittals below for offsite welding. For high-risk applications such as ML-1 or ML-2, add submittals for “Weld Filler Material Control Procedures” and “Filler Material Certified Material Test Reports CMTRs” when required. Add “Post-Weld Heat Treatment Procedures” when required.

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* + - 1. Per the requirements of Section 01 4444, *Offsite Welding, Brazing and Joining Requirements* and/or Section 01 4455, *Onsite Welding, Brazing and Joining Requirements*, submit:
         1. Welding Procedure Specification (WPS) and supporting Procedure Qualification Record (PQR). [Note: For onsite welding use of LANL WPS/PQR is the default; coordinate usage with the LANL CWI; no submittal required]
         2. Welder Performance Qualification Records (WPQR) including continuity [Note: For Onsite, welders are tested by LANL who will produce WPQR and track continuity; this includes brazing, bonding, and fusing; no submittal required]
      2. [Per the requirements of Section 01 4525, *Nondestructive Examination* (*NDE) Requirements*, submit:
         1. Written Practice or Procedure for Qualification and Certification of NDE Personnel
         2. NDE Personnel Qualification Records
         3. NDE Procedures
         4. [NDE Procedure Qualification Records (Note: this is not required per ASME B31.9 unless requested by EOR)]
         5. NDE Report(s)
         6. NTIP submitted under Section 01 4525.]
      3. Before fabrication, submit:
         1. Proof of journeyman certificate of competence in accordance with NMAC 14.6.6.11
         2. Leak Test plan submitted under Section 22 0813
         3. Cleaning procedures for joint assembly preparation
      4. After fabrication, submit examination records per ASME B31.9 para. 936.3.
    1. Informational Submittals:
       1. Spare Parts and Maintenance Materials list
       2. Installation, Operation, and Maintenance Manual
       3. Warranties
       4. Manufacturer’s data report form for ASME boilers and/or pressure vessels (e.g., ASME Form H-3 and U-1) showing National Board registration
  1. QUALITY ASSURANCE
     1. Material and Installation: Conform to ASME B31.9 for systems operating at pressure of 125 psig or less and at temperature of 250 degrees F or less.
     2. Welders Certification and Qualified Procedure Standards shall be in accordance with Section IX of ASME Boiler and Pressure Vessel Code. Welding per Sections [01 4444, *Offsite Welding, Brazing and Joining Requirements,* and/or 01 4455, *Onsite Welding, Brazing and Joining Requirements*].
     3. [NDE Personnel Certification and NDE Procedures shall be per Section 01 4525, *Nondestructive Examination (NDE) Requirements*.]
     4. Valve Identification: Each valve shall bear markings in accordance with MSS SP-25, including manufacturer’s name or trademark, the material of construction, and symbols to indicate the service conditions for which the manufacturer rates the valve.
     5. Component identification shall follow [ESM Chapter 1, Section 200, Item Numbering and Labelling](https://engstandards.lanl.gov/ESM_Chapters.shtml#esm1). At existing facilities, component labeling conventions are to be continued to be used to avoid confusion.
     6. Design pressure and temperature of piping systems within this Section is provided in the Pressure Safety Implementation Plan, contained in [drawing or document number].

1. PRODUCTS
2. PRODUCT OPTIONS AND SUBSTITUTIONS
   * 1. Alternate products may be accepted; follow Section 01 2500, *Substitution Procedures* and 01 4115, *Pressure Safety Submittals.*
     2. Proposal of unlisted components as substituted components is strongly discouraged and shall be evaluated per Section 01 2500, *Substitution Procedures*. Substitutions will be allowed only if the Subcontractor can demonstrate that the product can meet the same code requirements of the item specified in the design. Costs associated with evaluation of substituted unlisted components shall be the responsibility of the Subcontractor.
3. SEISMIC PERFORMANCE REQUIREMENTS

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The seismic exemptions noted below are based on ASCE 7-16. If the Code of Record for the project refers to a different version of ASCE 7, the Designer is responsible to check the seismic design requirements per that applicable edition.

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* 1. Piping systems with trapeze assemblies/rod hangers that meet the requirements per ASCE 7, Section 13.6.7.3 are seismically exempt.
  2. For piping systems not meeting the above exemptions, Structural EOR shall design seismic supports per [ESM Chapter 5, Structural, Section II](https://engstandards.lanl.gov/ESM_Chapters.shtml#esm5); ASCE 7, Chapter 13; and ASME B31.9.

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On Welding: Welding shall meet Section 01 4631, *Welding, Brazing, and Soldering of ASME B31 Piping.*

On flanges: Use Section 01 4731, *Flange Assembly* *for ASME B31 Systems.* Use ASME PCC-1, *Pressure Boundary Bolted Flange Joint Assembly*, for ASME B16.5 flanges.

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1. STEAM AND CONDENSATE PIPING, ABOVE GRADE
   * 1. Steel Pipe and Fittings up to 2 Inches:
        1. Pipe: Black Steel, ASTM A53, Type [E, F, S], Grade [A or B], Schedule 40.
        2. Threaded joints: ASTM A197 malleable iron, ASME B16.3 threaded type ASME B1.20.1, Class [150] [300]
        3. Unions: ASME B16.39 malleable iron, threaded type ASME B1.20.1, Class [150] [200] [300]
     2. Steel Pipe and Fittings greater than 2 Inches:
        1. Pipe: Black Steel, ASTM A53, Type [E, F, S], Grade [A or B], Schedule [40] [80].
        2. [Bolted Joints: ASME B16.5 forged carbon steel, ASTM A105, Class 150.] [Flange hardware per Section 01 4731*, Flange Assembly for ASME B31 Systems*.]
        3. [Welded Joints: Carbon steel, ASTM A234 Grade WPB, butt welding type per ASME B16.9. Wall thickness to match pipe schedule.]

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All the following components (disregarding ASME BPVC items) are either standard piping components (listed items) per ASME B31.9 para. 926 or have previously LANL approved unlisted component evaluations in accordance with ASME B31.9 para. 904.7.

The types of components shown may be a non-exhaustive list. Any substitutions or additions shall be ASME B31.9 compliant. All previously LANL approved B31.9 components are available in the [LANL ESM Ch. 17](https://engstandards.lanl.gov/ESM_Chapters.shtml#esm17) Approved ASME Unlisted Material/Component List and Approval Process.

Provide globe valves for throttling, bypass, or manual flow control services. Any valves used for pressure reducing valve bypass shall have a flow capacity (Cv) no greater than that of the reducing valve per ASME B31.9 para. 922.1.3. Bypass valves shall be capable of administrative control.

Provide gate valves inside building to isolate equipment or part of piping system.

Provide safe access or remote operators where valves and fittings are not exposed or installed over 7 feet in height above finished floor.

Provide ball valves on strainer drain ports.

Provide drip legs and drain traps at end of each main and branch and at low points of piping system.

Most components listed are not rated for superheated steam. When using superheated steam, the Designer shall ensure all components are rated for that service.

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1. STEEL GATE VALVES (UP TO 2 INCHES)
   * 1. Manufacturer: [Vogt, Series 12111] [Powell Figure GA08] [Velan 2054B-02Y Series]
     2. Forged steel, ASTM A105, Class 800, steam service, 500 degrees F at 1,610 psig, rising stem, threaded ends (ASME B1.20.11), bolted bonnet, ASME B16.34.
2. STEEL GATE VALVES (ABOVE 2 INCHES)
   * 1. Manufacturer: [Powell, Figure 1503N] [Velan 0064C-02TY Series].
     2. Cast carbon steel, ASTM A216, Grade WCB, Class 150, steam service, 500 degrees F at 170 psig, rising stem, flanged (ASME B16.5) or welded (ASME B16.25) ends to suit piping, bolted bonnet, ASME B16.34. Furnish chain-wheel operators for valves 6 inches and larger mounted over 7 feet above the floor.
   1. BALL VALVES (UP TO 2 INCHES)
      1. Manufacturer: Nibco, Series 585-70.
      2. MSS SP-110, 150 psi pressure rating up to saturated steam.
   2. STEEL GLOBE VALVES (UP TO 2 INCHES)
      1. Manufacturer: [Vogt, Series 12141] [Powell, Figure GL08] [Velan 2014B-02TY Series].
      2. Forged steel, ASTM A105, Class 800, steam service, 500 degrees F at 1,610 psig, rising stem, threaded (ASME B1.20.11) ends, bolted bonnet, ASME B16.34.
   3. STEEL GLOBE VALVES (ABOVE 2 INCHES)
      1. Manufacturer: [Powell, Figure 1531] [Velan 0014B-02TY Series].
      2. Cast carbon steel, ASTM A216, Grade WCB, Class 150, steam service, 500 degrees F at 170 psig, rising stem, flanged (ASME B16.5) or welded (ASME B16.25) ends, bolted bonnet, ASME B16.34. Furnish chain-wheel operators for valves 6 inches and larger mounted over 7 feet above the floor.
   4. BRONZE GATE VALVES (UP TO 2 INCHES)
      1. Manufacturer: [Powell, Figure 500] [Nibco, T-111].
      2. Bronze, ASTM B62, Class 125, steam service, 353 degrees F at 125 psig, threaded bonnet, rising stem, solid wedge, threaded (ASME B1.20.1) ends, MSS SP-80.
   5. BRONZE GLOBE VALVES (UP TO 2 INCHES)
      1. Manufacturer: [Powell, Figure 650] [Nibco, T211].
      2. Bronze, ASTM B62, Class 125, steam service, 353 degrees F at 125 psig, threaded bonnet, integral seat, threaded (ASME B1.20.1) ends, MSS SP-80.
   6. BRONZE CHECK VALVES (UP TO 2 INCHES)
      1. Manufacturer: [Powell, Figure 578] [Nibco, T413].
      2. Bronze, ASTM B62, Class 125, steam service, 353 degrees F at 125 psig, horizontal swing, integral seat, renewable discs, threaded (ASME B1.20.1) ends, MSS SP-80.
   7. STEEL CHECK VALVES (UP TO 2 INCHES)
      1. Manufacturer: [Powell Figure SW08] [Vogt Series S701].
      2. Forged steel, ASTM A105, steam service, Class 800, 1,610 psig at 500 degrees F, bolted bonnet, horizontal swing, threaded (ASME B1.20.1) connections, ASME B16.34.
   8. STRAINERS
      1. Pressures 15 psig or less (up to 2 inches):
3. Manufacturer: Nibco
4. Model number: T-221-A
5. Size: Size: [1/4][\_\_\_\_\_] inch
6. Body: [Bronze ASTM B584 Alloy C84400 (Solder)] [Bronze ASTM B62 Alloy C83600 (Threaded)]
7. End connections: [threaded] [solder]
8. Screen: [20 mesh] [1/32” perforations]
9. Pressure rating: minimum 125 psig saturated steam to 353 degrees F
   * 1. Pressures above 15 psig:
        1. Specification: ASME B16.34
        2. Manufacturer: [Spirax Sarco]
        3. Model Number: [Fig 34HP]
        4. Size: [1/2][8][ ] inch
        5. Body: ASTM A216 Gr. WCB cast carbon steel
        6. End connections: [butt weld] [ASME B16.5 Class 600 flange]
        7. Mesh/Perforations: [ ]
        8. Pressure rating: ASME B16.34 Class [150][300][600]
        9. Temperature range: 353 degrees F minimum.

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Watson McDaniel FT series may be specified for design pressures up to 75 psig.

FLOAT AND THERMOSTATIC TRAP (UP TO 75 PSIG)

* + 1. Manufacturer: Watson McDaniel FT series
    2. Trap: Cast iron (ASTM A126) body, stainless steel float and valve, minimum 75 psig @ 450 degrees F, threaded (ASME B1.20.1) connections.
       1. Capacity: [ ] lbs/hr condensate at [ ] inlet pressure.
       2. Size: [ ] inches.

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* 1. FLOAT AND THERMOSTATIC TRAP
     1. Manufacturer: Watson McDaniel, FT600.
     2. Trap: Cast Steel body (ASTM A216), with stainless steel interior parts, stainless steel thermostatic air vent, horizontal installation.
        1. Capacity: [ ] lbs/hr condensate at [ ] psig inlet pressure.
        2. Size: [ ] inch.
        3. End connections: [ASME B1.20.1 threaded] [ASME B16.5 Class [150] [300] flange]
        4. Pressure and temperature rating: [670 psig @ 750 degrees F] [505 psig @ 750 degrees F] [150 psig @ 567 degrees F]
  2. THERMOSTATIC TRAP
     1. Manufacturer: Yarway [751] [761]

B. Trap: Stainless steel construction (ASME BPVC Section II SA182 Gr. F11) maximum operating pressure 300 psig at 750 degrees F. [Includes integral Y-strainer and blowdown valve.]

* + - 1. Capacity: [ ] lbs/hr condensate at [ ] psig inlet pressure.
      2. Size: [ ] inch.
  1. THERMOSTATIC AIR VENTS
     1. Manufacturer: Watson McDaniel
     2. Model: [AV2001-[12][13]-N] [AV2003-[12][13]-N]
     3. Air Vent: Stainless steel body [ASTM A351 CF3] with stainless steel interior parts, stainless steel strainer screen, maximum pressure of 650 psig @ 750 degrees F, threaded (ASME B1.20.1) connections.
        1. Capacity: [ ] SCFM at [ ] inlet pressure psig.
        2. Size: [1/2] [3/4] inches.
        3. Orifice Size: [3/16] [5/16] inches.
  2. VACUUM BREAKER
     1. Manufacturer: Hoffman Specialty (Bell and Gossett).
     2. Model: Model 62
     3. Material: [brass][steel]
     4. Vacuum Breaker: Brass body, maximum pressure of 150 psig @ 366 degrees F, threaded (ASME B1.20.1) connection.
        1. Factory set: 2” Hg vacuum.
        2. Size: 3/4” inch.
  3. PRESSURE GAUGE

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Pressure and Vacuum Gauges: Overpressure relief protection must be provided on Bourdon-tube, dial-indicating pressure gauges that operate at pressures greater than 15 psig by one of the following means:

1. Pressure gauges approved by Underwriters Laboratories (UL) in accordance with UL-404, “Standard for Gauges, Indicating Pressure, for Compressed Gas Service” Standard for Safety.
2. Tempered safety glass or plastic face or shield and a blowout back or plug for pressure relief.

Pressure gauges that serve primarily a pressure indication for overpressure protection (i.e., not used for process data collection) must have a range of at least 1.25 times, but no more than twice the set pressure of the relief device as recommended in ASME Section VIII, Div. 1, Appendix M, Para. M-14.

Refer to manufacturer’s recommendation for gauge pressure range. Generally, a pressure range of twice the expected normal pressure is recommended with maximum working pressure not exceeding 75 percent of the range. If pulsation occurs, working pressure should not exceed 65 percent of the pressure range. Pressure gauges in the suction side of the pump will be vacuum pressure gauges.

See website <https://blog.ashcroft.com/protecting-pressure-gauges-with-steam-siphons> and callout the pigtail siphon with the gauge. Pigtail siphon is essential to limit the temperature to which the gauge is exposed.

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* + 1. Manufacturer: Ashcroft, Type 1009
       1. Gauge: ASME B40.100, Accuracy Grade 1A, minimum 2-1/2 inch dial, 1/4 inch NPT brass bottom connection, phosphor bronze bourdon tube, maximum plus or minus 1 percent accuracy full scale, stainless steel case, process temperature limit of -40 degrees F to 250 degrees F, and with stainless steel tube.
          1. Range: [ psi] [per drawings].
          2. Required options: Dry gauge, pressure relief blowout plug, acrylic or shatter-proof glass
          3. [Isolation Valve: ¼ inch brass plug, minimum 250 psi working pressure valve. Manufacturer: \_\_\_\_\_\_\_Part No.\_\_\_\_\_\_\_\_]
    2. Pigtail Siphon: Ashcroft model [1100][1098] [black steel] [brass] [stainless steel], 1/4 inch NPT connections.
  1. MOISTURE SEPARATOR (UP TO 4 INCH SIZE)
     1. Manufacturer: Watson McDaniel
     2. Model: WDS Series
     3. Material: [Ductile Iron] [Carbon Steel]
     4. Moisture Separator: Centrifugal type, maximum pressure [ ] psig @ [ ] degrees F, horizontal installation.
     5. Capacity: [ ] labs saturated steam at [ ] inlet pressure.
     6. Size: [ ] inch
     7. End Connections: [NPT] [ASME B16.5 Class 150 flange], with [ ] inch NPT drain.

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Specify NPT for up to 2 inches; Flanged over 2 inches.

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* 1. PRESSURE REDUCING VALVE
     1. Manufacturer: [Watson McDaniel [HD with PP pilot] [HSP]]
     2. Body: [Ductile Iron (HD w/PP)] [Cast Steel (HSP)]
     3. End connections: [NPT threaded (HD w/PP)] [Class 150 flange (HD w/PP)] [Class 300 flange (HSP)]
     4. Pressure and temperature rating: minimum [450 psig @ 650 degrees F (HD w/PP)] [550 psig @ 650 degrees F (HSP)]
        1. Capacity: [ ] lbs/hr at [ ] psig inlet and [ ] psig outlet pressures.
        2. Size: [ ] inch
        3. Cv: [ ].

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Generally, relief valve end connections should be threaded up 2 inches pipe size and flanged if above 2 inches.

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* 1. SAFETY RELIEF VALVES
     1. Manufacturer: Kunkle, [6010 (threaded ends, bronze body)] [6252 (flanged ends, cast iron body)].
     2. Valve: ASME BPVC Section XIII stamped for steam service, N.B. certified, lever handle, factory tested and adjusted, maximum pressure 250 psig @ 406 degrees F.
        1. Capacity and set pressure: [ ] lbs/hr at [ ] psig.
        2. Inlet Size: [ ] inch
        3. Outlet Size: [ ] inch
        4. End Connections: [NPT threaded] [Class [150] [300] flange]
        5. Accessories: Drip pan elbow shipped loose, same size as relief valve outlet.
  2. PUMP-TRAP (STEAM POWERED CONDENSATE PUMP) \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Complete skid-mounted unit, including receiver tanks, pump(s), check valves, etc., all fully piped are available. It is recommended that a receiver tank be specified when above ground steam/condensate distribution lines feed the building. Consult with the motive pump distributor for selection guidance. Specify ASME BPVC Section VIII Division 1 coded receiver tanks.

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* + 1. Manufacturer: Watson McDaniel, Series PMPT (Ductile Iron Body).
    2. Pump-Trap: Internal float trap powered by steam, ductile iron (ASME BPVC Section II SA-395) body, stainless steel cover, stainless steel check valves (inlet and outlet), maximum operating pressure of 125 psig @ 366 degrees F, [1 inch] or [1-1/2 inch] threaded (ASME B1.20.1) connections, and ASME Code Stamp.
  1. STEAM HEAT EXCHANGERS

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When heat exchangers are supplied as part of a pre-assembled package or skid, more information needs to be provided than what is shown below. See P101-34 definition for Commercially-Available, Off-the-Shelf (COTS)

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* + 1. Manufacturer: [ ]
    2. Material: [ ]
    3. Specification: ASME Section VIII, Division 1 Pressure Vessel Code, “U” stamped. NBIC numbered and registered.
    4. Heat Transfer Capacity: [ ]
    5. End Connection Size: [ ]
    6. End Connection Type: [ ]

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Maximum Allowable Working Pressure (MAWP) shall be 125 psig minimum; Maximum Allowable Working Temperature (MAWT) shall be 353 degrees F minimum.

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* + 1. Maximum Allowable Working Pressure: [125 psig]
    2. Maximum Allowable Working Temperature: [353 degrees F]
    3. [Seismic Design Category: [D]]
    4. Configuration: [ ]
    5. [Other Options or Requirements]

1. EXECUTION
   1. PREPARATION
      1. Square, ream pipe and tube ends. Remove burrs.

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Consult manufacturer’s recommendation for the use of acids and cleaning agents to prevent damage.

Ensure safeguards are taken to protect personnel from hazards of cleaning, which may include but not be limited to flying particulates, corrosive chemicals, and harmful vapors.

A suitable chemical and/or mechanical cleaning method shall be used, if necessary, to clean all surfaces to be fabricated.

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* + 1. Cleaning:
       1. Remove scale and dirt on inside and outside before assembly.
       2. Cleaning will consist of removing all non-adhering material such as loose scale, sand, weld spatter particles, rust, cutting chips, grinding residue, etc. from the inside of the piping assembly by suitable means. This level of cleaning will allow the presence of mill scale and surface rust.
       3. [specify any special cleaning requirement].
    2. Prepare piping connections to equipment with flanges or unions.
    3. Fastener materials shall be free of nicks, burrs, chips, dirt, and damage (inspect threads, shank, and nuts). All damaged fasteners must be replaced.
  1. INSTALLATION
     1. General:
        1. Install piping in conformance with ASME B31.9.
        2. Welding, brazing, or soldering shall be in accordance with Section 01 4631, *Welding, Brazing and Soldering of ASME B31 Piping*.
        3. Assemble flange joints per Section 01 4731, *Flange Assembly for ASME B31 Piping*.
        4. [Prior to operation: fill, clean, and chemically treat piping system. Refer to Section 23 2500, *HVAC Water Treatment*.]
        5. Label piping system per Section 22 0554, *Identification for Plumbing, HVAC, and Fire Piping and Equipment.*
        6. Insulate piping system per Section 22 0713, *Plumbing and HVAC Insulation.* Provide clearance for installation of insulation and access to valves and fittings.
        7. Support piping system in accordance with Section 22 0529, *Hangers and Supports for Plumbing Piping and Equipment*. Do not anchor the pipe. Allow piping to slide and expand or contract with temperature.
        8. [Sleeve and caulk pipes penetrating exterior walls or interior bearing walls. Provide waterproof installation for exterior walls. Provide UL/FM approved through-penetration firestop system when penetrating fire rated barriers (e.g., walls, floors, etc.). See Section 07 8400, *Firestopping*.]
        9. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
        10. For multiple openings in piping mains, the distance between their centers shall be at least the sum of their inside diameters.
        11. Branch connections shall utilize fittings (tee, lateral, or cross) in accordance with listed codes.
        12. Install piping to maintain headroom and neither interfere with use of space nor take more space than necessary.
        13. Group piping whenever practical at common elevations.
        14. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
        15. All valves shall be installed in accordance with the manufacturer's installation instructions and with sufficient clearance and access for ease of operation and maintenance. Install valves with stems upright or horizontal, not inverted.
        16. Slope steam and condensate piping at least 1 inch in 40 feet (0.25 percent) in direction of flow.
        17. Provide pigtail siphon connection for all pressure gauges.
        18. Install pressure gauges vertically.
        19. Keep open ends of pipe free from scale and dirt. Whenever work is suspended during construction, protect open ends with temporary plugs, caps, or residue-free tape.
        20. Install eccentric reducers flat on bottom, in horizontal runs of steam and condensate piping.
            1. Connect steam and condensate branch lines into top of main or at a 45-degree angle from top of main
     2. Welding, brazed, or soldered joints:
        1. Welded, brazed, or soldered joining of piping/tubing and components shall be per Section 01 4631, *Welding, Brazing and Soldering of ASME B31 Piping*.
        2. When brazing/welding or soldering piping/tubing to a valve, follow manufacturer’s instructions to prevent heat damage to valve internals.
     3. Threaded joints:
        1. Assemble ASME B1.20.1 threaded pipe joints as follows:
           1. No more than six and no less than two threads visible after makeup of the joint.
           2. No severe chipping or tearing of visible threads.
     4. Bolted joints:
        1. Assemble flanges per Section 01 4731, *Flange Assembly for ASME B31 Systems.*
  2. EXAMINATION, INSPECTION, AND TESTING
     1. All welding, brazing and soldering: Inspected, examined, and tested in accordance with Section 01 4631 *Welding, Brazing, and Soldering of ASME B31 Piping* [and Section 01 4525 *Nondestructive Examination (NDE) Requirements*].
     2. Externally the pressure system will be free of weld slag, flux, and weld spatter.
     3. Contact LANL Owner’s Inspector to determine the initial inspection points (minimum hold points).
     4. LANL Owner’s Inspector shall have access to any and all design, fabrication, manufacture, heat treatment, assembly, erection, examination, testing, records, documentation and 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 Code and of the engineering design and to perform the role defined in ASME B31.3.
     5. LANL Owner’s Inspector is the final authority on acceptance of the project examination or test.
     6. Examination activities to verify the quality of the work must be performed by personnel other than those who performed the activity being examined. Such persons must not report directly to the immediate supervisors responsible for work being examined.
     7. The fabrication documentation must have evidence of the examination, the evidence must be maintained in the pressure system documentation package submitted to the pressure safety officer.

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Test steam and condensate piping hydrostatically per ASME B31.9 para. 937.3 at a minimum of 1.5 times design pressure.

Leak testing of the connections between existing piping and new piping defined below are based in [ESM Ch. 17](https://engstandards.lanl.gov/ESM_Chapters.shtml#esm17) Section PS-REQUIREMENTS 10.3, Pressure and Leak Testing.

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* + 1. Pressure test piping system per Section 22 0813, *Testing Piping Systems*, at the test pressures and durations indicated.
       1. Test with water per ASME B31.9 paragraph 937.3 at [ ] psig, holding test pressure for at least [10] minutes. After [10] minutes, reduce to design pressure before checking for leaks.
       2. For modifications to existing piping test the connection between new and existing at normal operating pressure. Bring system up to operating pressure gradually. Visually examine the piping for leaks at one-half the system operating pressure. Perform a final examination at the system operating pressure. No leaking from the piping indicates that the system meets the requirement of the project.

END OF SECTION

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Do not delete the following reference information:

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THE FOLLOWING STATEMENT IS FOR LANL USE ONLY

This project specification section is based on LANL Master Specification Section 23 2215 Rev. 4, dated January 8, 2025.