SECTION 22 1500

COMPRESSED-AIR SYSTEMS

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LANL MASTER SPECIFICATION

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

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| Rev. 5 Summary of changesInserted test pressures and duration for piping pressure tests. Updated Code references. Clarified use of unlisted components from the LANL Reputable Manufacturers List. |

The designer is encouraged to review the DOE Handbook 1132, Design Considerations and ESM Chapters 6, 13, and 17.

This template was primarily written for piping inside a building. Large, outside systems should normally be covered in the site utilities series (Div 33). The utility sections may reference this section.

This template was developed to meet the requirements of ASME B31.9-2020. Use with a different edition will require a detailed review of the code and ESM Chapter 17. **NOTE for systems with pressures greater than 150 psig**: These must be constructed to ASME B31.3, *Process Piping* and this Section edited to reflect the requirements of ASME B31.3 by Design Agency, including verifying that all material specified meets the design pressure/temperature requirements. This pressure also means that system is almost certainly categorized FS2 per ESM Ch. 17 GEN and must meet requirements for same.

For compressed air component details, refer to LANL Standard Drawing ST-D2090-1.

Seismic: To properly edit this section for Project-specific seismic requirements, refer to author notes that say/begin with “Seismic” and the “*Seismic Specification Editing Guide Mechanical Components*” and flowchart posted with the templates for guidance.

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.  This 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.

Please contact Mechanical Standards [POC](http://engstandards.lanl.gov/POCs.shtml#mech) with suggestions for improvements.
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
	1. Section Includes
		1. General requirements for tube, pipe, piping components, materials, fittings, valves, flanges, and installation of process piping systems applicable to ASME B31.9, *Building Services Piping,* [2020].
	2. SUMMARY
		1. Section Includes
			1. Pipe fittings, valves, and accessories
			2. Filters
			3. Automatic drain valves
			4. Oil/Water separators
			5. Air dryers
			6. Pressure regulating valves
			7. Air receivers
			8. Safety valves
			9. Air compressors
	3. RELATED SECTIONS
		1. Section 01 2500, *Substitution Procedures*
		2. Section 01 3300, *Submittal Procedures*
		3. Section 01 4000, *Quality Requirements*
		4. Section 01 4115, *Pressure Safety Submittals*
		5. Section 01 4200, *References*
		6. Section 01 4444, *Offsite Welding and Joining Requirements*
		7. Section 01 4455, *Onsite Welding and Joining Requirements*
		8. Section 01 4631, *Welding of ASME B31 Piping*
		9. Section 01 4731, *Flange Assembly for ASME B31 Systems*

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Seismic: Edit “J” per Guide

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* + 1. [Section 01 8734, *Seismic Qualification of Nonstructural Components (IBC)*, for requirements pertaining to [manufacturer’s certification] [and] [special certification].]
		2. Section 22 0529, *Hangers and Supports for Plumbing Piping and Equipment*

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Seismic: Edit “L” per Guide

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* + 1. [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.]
		2. Section 22 0554, *Identification for Plumbing, HVAC, and Fire Protection and Equipment*
		3. Section 22 0713, *Plumbing and HVAC Insulation*
		4. Section 22 0813, *Testing Piping Systems.*
	1. References
		1. ASME B31.9-[2020]

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In the listing below, designer shall eliminate standards that are not applicable to the project and add other standards that are. Then, designer must either (1) specify each B31.9-listed materials’ national standard edition for each remaining standard listed or (2) determine latest is equivalent. Then modify 1.4 to either (1) choose the first option—and also list the edition year after each standard number (e.g., ASTM F493-04) or (2) choose the second option (and remove the years listed for ASTMs, etc.).

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[[All national standards invoked herein shall be taken to be the edition in effect for the code of record listed above in 1.4.A and shown below, unless noted otherwise] [All national standards invoked below and herein shall be taken to be the latest edition].

astm International

* + 1. ASTM A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
		2. ASTM A197, Standard Specification for Cupola Malleable Iron
		3. ASTM A234, Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service
		4. ASTM B32, Standard Specification for Solder Metal
		5. ASTM B68, Standard Specification for Seamless Copper Tube, Bright Annealed
		6. ASTM B75, Standard Specification for Seamless Copper Tube
		7. ASTM B88, Standard Specification for Seamless Copper Water Tube
		8. ASTM B280, Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service

ASME (American Society of Mechanical Engineers)

* + 1. ASME PCC-1, Guidelines for Pressure Boundary Bolted Flange Joint Assembly
		2. B40.100, Pressure Gauges and Gauge Attachments

ASME B1 Series

* + 1. ASME B1.20.1, Pipe Threads, General Purpose (Inch)

ASME B16 Series

* + 1. ASME B16.3, Malleable Iron Threaded Fittings Classes 150 and 300
		2. ASME B16.9, Factory Made Wrought Steel Buttwelding Fittings
		3. ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings
		4. ASME B16.22, Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings
		5. ASME B16.39, Malleable Iron Threaded Pipe Unions Classes 150, 250, and 300

ASME Boiler and Pressure Vessel Code

* + 1. ASME BPVC Section VIII, Division 1, Rules for Construction of Pressure Vessels
		2. ASME BPVC Section IX, Welding, Brazing, and Fusing Qualifications

American Welding Society (AWS)

* + 1. AWS A 5.8, Specification for Filler Metals for Brazing and Braze Welding
		2. AWS D 2.4, Standard Symbols for Welding, Brazing, and Nondestructive Examination

Manufacturers Standardization Society of the Valve and Fittings Industry (MSS)

* + 1. MSS SP-25, Standard Marking System for Valves, Fittings, Flanges, and Unions
		2. MSS SP-70, Gray Iron Gate Valves, Flanged and Threaded Ends
		3. MSS SP-72, Ball Valves with Flanged or Butt-Welding Ends for General Service
		4. MSS SP-80, Bronze Gate, Globe, Angle, and Check Valves
		5. MSS SP-85, Gray Iron Globe & Angle Valves, Flanged and Threaded Ends
		6. MSS SP-110, Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends
		7. MSS SP-125, Gray Iron and Ductile Iron In-Line, Spring-Loaded, Center-Guided Check Valves

UL (Underwriters Laboratory)

* + 1. UL 207, Standard for Safety Refrigerant-Containing Components and Accessories, Nonelectrical
		2. UL 404, Gauges, Indicating Pressure, for Compressed Gas Service
	1. ACTION SUBMITTALS
		1. Submit the following per submittal procedures:
			1. Product data: 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. Include air compressor performance data for LANL elevation (7,500ft).
			2. Spare Parts and Maintenance Materials list
			3. Installation, Operation, & Maintenance Manual
			4. Warranties
			5. Per the requirements of 01 4444, *Offsite Welding and Joining Requirements* and/or 01 4455, *Onsite Welding and Joining Requirements*, and 01 4631 Welding of ASME B31 Piping, submit:

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When Offsite only, delete submittals below regarding Onsite welding. For high-risk applications such as FS1 or FS 2 or 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. 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]
				3. Inspector qualification records
				4. Inspection procedures
				5. Weld inspection report(s) and weld map(s)
			1. Manufacturer’s data report form for ASME pressure vessels
			2. Follow Section 01 4115 *Pressure Safety Submittals* regarding required documentation and submit under this Section 22 1500. In addition, provide the installation examination evidence documentation required by Article 3.1 of this Section.
			3. Follow Section 01 4731 *Flange Assembly for ASME B31 Systems* and submit under this Section 22 1500.
			4. Before fabrication, submit NDE (non-destructive examination) procedures that will be used for fabrication and examination of the piping, test and inspection plan, and cleaning procedures.
			5. [Prior to receiving materials, submit the Material Control Procedure.]
	1. closeout submittals
		1. Maintenance Material Submittals
			1. Air compressor inlet air filters, two for each compressor
			2. Belts: [One] [Two] for each belt-driven compressor
		2. Submit under this Section the system and component documentation per Section 01 4115, Pressure Safety Submittals.
	2. QUALITY ASSURANCE
		1. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum 5 years’ experience.
		2. Material and Installation: Conform to ASME B31.9-[2020], Building Services Piping for systems operating at pressure of 150 psig or less and at temperature of 200°F or less. When beyond above pressure and temperature limitations, conform to ASME B31.3-[2018].
		3. Performance of rotary air compressor shall be tested and rated per CAGI (Compressed Air and Gas Institute) rotary compressor performance verification program (ISO 1217: [2009] *Displacement Compressors-Acceptance Tests*).
		4. Air quality classification shall be Class [0], [1],[2],[3],[4] according to ISO 8573-1: [2010] *Compressed air -- Part 1: Contaminants and purity classes*.
		5. Welders Certification and Qualified Procedure Standards shall be per Section IX of ASME Boiler and Pressure Vessel Code. Welding per Sections [01 4444, *Offsite Welding and Joining Requirements* and/or 01 4455, *Onsite Welding and Joining Requirements*].
		6. Valve Identification: Each valve shall bear markings per 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.
		7. Component identification shall follow ESM Chapter 1, Section 200, *Equipment and Numbering & Labeling*. At existing facilities, component labeling conventions are to be continued to be used to avoid confusion.
		8. Design pressure of compressed air system is [125] [ ]psig. Design temperature is [150] [ ]°F.
	3. WARRANTIES
		1. Provide a minimum of 1-year manufacturer’s warranty, parts and labor, for air compressor system.
1. PRODUCTS
	1. PRODUCT OPTIONS AND SUBSTITUTION
		1. Alternate products may be accepted; follow Section 01 2500, *Substitution Procedures.*
		2. Proposal of unlisted components is strongly discouraged and will be evaluated per 01 2500. 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 unlisted components shall be the responsibility of the Subcontractor.

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On Brazing: When specifying brazed joints, consider that brazing reduces the tube rating to the fully annealed condition. Brazing shall meet Section 01 4631, *Welding of B31 Piping*

On welding: Welding design shall meet Section 01 4631, *Welding of B31 Piping*.

On flanges: Flange joint design must comply with ASME PCC-1. Use 01 4731 *Flange Assembly for B31 Systems*.

Copper tubing thickness callouts throughout are below based on LANL Alternate Method VAR‑2015-011

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* 1. COPPER TUBING AND FITTINGS (up to 2 inches)
		1. Copper tubing alloy 12220 per ASME B31.9 Table I-1. ASTM B88, B75, or B68; temper shall be soft annealed O60 or drawn general purpose H58. Copper thickness shall meet the alternative method LANL VAR- 2015-011 for the design pressure.
			1. Braze Joints
				1. Fittings: ASME B16.22, wrought copper and copper alloy, solder-joint pressure fittings [and/or] ASME B16.18 cast-copper-alloy solder-joint pressure-fittings
				2. Unions: Copper Tube and Pipe: ASME B16.22, Class 150, bronze unions with soldered joints.
				3. AWS A5.8 TB-BCuP-5 silver braze.
				4. Comply with Section [01 4444, *Offsite Welding and Joining Requirements*, 01 4455, *Onsite Welding and Joining Requirements*, 01 4631, *Welding of B31 Piping*].
			2. Solder joint
				1. Application is restricted to tubing less than 4.125 inch OD.
				2. Fittings: ASME B16.22, wrought copper and copper alloy, solder-joint pressure fittings [and/or] ASME B16.18 cast-copper-alloy solder-joint pressure-fittings.
				3. Solder per ASTM B32, Alloy Grade [Sb5, Sn50, other] or UNS [L13950, L55031, other].
				4. Flux [manufacturer, material]
	2. STEEL PIPE AND FITTINGS UP TO 2 INCHES

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Carbon steel piping is not recommended for compressed air quality Class 1 or Class 2

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* + 1. Pipe: black steel ASTM A53, Type [E, F, S] grade [A or B], wall thickness [standard wall]. Threaded joints per ASME B1.20.1 for pipe sizes 2 inches and under.
		2. Threaded Joints:
			1. Fittings: Black steel, ASTM A197, ASME B16.3 malleable threaded type ASME B1.20.1. [Class 150] [Class 300]
			2. Unions: Ferrous Pipe: ASME B16.39, Class 150, malleable iron, threaded unions.
	1. STEEL PIPE AND FITTINGS 2 inches, up to 4 inches
		1. Pipe: Black steel, ASTM A53, Type [E, F, S], Schedule 40 grade [A or B], standard wall.
		2. Fittings: Steel, ASTM A234, Grade WPB, Schedule 40, butt-welding type, ASME B16.9.
		3. Flanges: Forged carbon steel, ASTM A105, Class 150
	2. VALVES
		1. Ball Valves up to 2 inches.
			1. Manufacturer: Nibco, Series 585-70.
			2. MSS SP 110, 600 psi non-shock cold working pressure (CWP) pressure rating.
			3. Bronze, two-piece body, chrome-plated brass ball, full port, Teflon seats and stuffing box ring, blowout proof stem, lever handle, [solder][threaded] ends.
		2. Ball Valves over 2 inches.
			1. Manufacturer: Nibco, Series F-510-CS-R-66-FS.
			2. MSS SP-72, one piece carbon steel body, full port ball, ASME B16.5 class 150 flange, 285 psig non-shock cold working pressure (CWP) pressure rating.
		3. Swing Check Valves up to 2 inches.
			1. Manufacturer: Nibco 413 Series.
			2. MSS SP-80, Type [1, 2] bronze, horizontal swing, Y-pattern, renewable seat and disc, 200 psig non-shock cold working pressure (CWP) pressure rating. Solder or threaded ends.
			3. Not for use with reciprocating air compressor service.
		4. Spring Check Valves over 2 inches.
			1. Manufacturer: Nibco F-910-B.
			2. MSS-SP-125, Class 125, cast iron body, fluid to 200 degrees F, renewable seats and disc, spring actuated, flanged.
	3. STRAINER
		1. Wye-type strainer, [½ inch NPT], [threaded type ASME B1.20.1][solder type], 20-mesh stainless steel wire screen, 200 psig non-shock cold working pressure (CWP) pressure rating.
			1. Manufacturer: Nibco
			2. Model number: [T-221][S-221]
	4. FLEXIBLE CONNECTOR
		1. Manufacturer: Anaconda Universal Metal Hose
		2. Model: [model number]
		3. Industrial Metal Hose, Refrigeration Products, Armored and Specialty Flexible Hose Components Anaconda Vibration Eliminators, Bronze or Stainless Steel Vibration Eliminators, copper conforms to UL SA 2528, ends per ASME B16.18 and B16.22;
		4. Diameter [ ] inch
		5. Length [ ] inch

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If individual components listed below are furnished by the compressor manufacturer as part of a packaged system, those components should be listed as compressor accessories under compressor in this Section. The manufacturer (not the vendor) is to provide any line sets required to link the compressor system items.

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* 1. PREFILTER, HIGH-EFFICIENCY COALESCING

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When selecting filter and housing, assume maximum flow conditions at the minimum operating pressure. Match inlet and outlet connections to system pipe size. Filter housing will need to be approved as an unlisted component via code unlisted component evaluation or request for addition to ESM Ch. 17 NASME reputable manufacturer’s listing (or previously approved at LANL)

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* + 1. Manufacturers:
			1. [Van Air, Housing Series F200, Filter Grade C]
			2. [Pneumatics Products, Housing Series P2001, Filter Grade SU]
		2. High-efficiency coalescing filter efficiency 99.99 percent at 0.6 microns, maximum oil carryover 0.008 ppm by weight, maximum inlet temperature 125 degrees F, maximum clean dry pressure drop 1.50 psid. Housing maximum working pressure 250 psig at 225 degrees F, furnish with optional two-sided color-coded pressure differential indicator, and without internal float drain.
			1. In/Out Connection: [ ] inches [NPT]
			2. Flow Capacity: [ ] scfm at [ ] psig
	1. AFTERFILTER, HIGH-EFFICIENCY PARTICULATE

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When selecting filter, assume maximum flow conditions at the minimum operating pressure. Match inlet and outlet connections to system pipe size.

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* + 1. Manufacturers:
			1. [Van Air, Housing Series F200, Filter Grade RC]
			2. [Pneumatics Products, Housing Series P2001, Filter Grade AF]
		2. High-efficiency particulate filter efficiency 99.99 percent at 0.9 microns, maximum inlet temperature 150 degrees F, maximum clean dry pressure drop 1.50 psid. Housing maximum working pressure 250 psig at 225 degrees F, furnish with optional two-sided color-coded pressure differential indicator, and without internal float drain.
			1. In/Out Connection: [ ] inches [NPT]
			2. Flow Capacity: [ ] scfm at [ ] psig
	1. Automatic drain valve (zero air loss)
		1. Manufacturer: Zeks, Model [NCC2701-D] [NCC2702-D].
		2. Zero air loss drain valve, 1/2 inch NPT connections, pressure range 0-230 psi, temperature range 36 - 120 degree F, electrical connection [115] [230] VAC, NEMA 4 enclosure, and Y-strainer. Operation, 50 volume checks/second.
	2. OIL/WATER SEPARATOR

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Consult with manufacturers’ representative for application and sizing information. Edit Standard Detail ST-D2090-1 accordingly.

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* + 1. Provide a commercial oil/water separator that will treat condensate waste to discharge no more than 10 ppm of residual oil.
		2. Manufacturers:
			1. Atlas Copco, Model OSC
			2. Sullair, SP Series.
	1. REGENERATIVE AIR DRYER
		1. Manufacturers:
			1. Van Air, [Model HLS-], [HL-].
		2. Pneumatic Products, DHA/CDA Series, Model [ ]. Heatless, regenerative dryer, minus 40 degrees F pressure dew point, solid state controller, twin towers, with adsorbent desiccant, purge exhaust valve and muffler, drain connection and cycle saver control option that adjusts dryer purge to actual moisture load condition and includes failure to switch (FTS) alarm. ASME Section VIII, Division 1 Pressure Vessel Code, “U” stamped. NBIC numbered and registered.
			1. Capacity: [ ] scfm at [ ]psig
			2. Power Voltage: [ ] V, [ ] phase, 60 Hz.
	2. REFRIGERATED AIR DRYER (Air-Cooled)

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* + 1. Manufacturers:
			1. Van Air, [Model RD ].
			2. Hankison, [Model HPR ].
		2. Refrigerated air dryer, air cooled condenser, 35‑38 degrees F pressure dew point, indoor installation (ambient temperature 40‑100 degrees F), automatic drain valve, and charged with R134a.
			1. Capacity: [ ] scfm at [ ] degrees F inlet temperature and [ ] psig inlet pressure.
			2. Power Voltage: [ ] V, [ ] phase, 60 Hz.
	1. PRESSURE GAUGE

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Refer to manufacturer’s recommendations for pressure ranges. Generally, a range of twice the expected normal pressure is recommended, with a maximum working pressure not exceeding 75 percent of the range.

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* + 1. Manufacturer: Ashcroft, Type 1009.
		2. ASME B40.100, Grade 1A, minimum 2 1/2 inch dial, 1/4 inch NPT brass bottom connection, maximum plus or minus 1 percent full scale accuracy, stainless steel case, phosphor bronze bourdon tube, and isolation valve.
			1. Range: [ psi] [per Drawings].
			2. Cock Valve: 1/4 inch brass plug, 250 psi working pressure valve.
			Manufacturer: Anderson Metals, PAC-56NB, Part No. 138-00110.
		3. 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) per 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.
		4. Pressure gauges that serve primarily a pressure indication for over pressure 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.
	1. PRESSURE REGULATors
		1. Manufacturer: Norgren Model: [11-002 series]
		2. Manufacturer/Model: Swagelok K Series, Part Number: [KPR‑AGJA415C2000]
			1. Design Description: Maximum [500] psig inlet, 0- maximum [45] psig outlet
			2. Fluid Service: [ASME B31.9]
			3. System Application(s): Compressed Air
			4. Inlet Size: [¼ in]
			5. Outlet Size: [¼ in]
			6. Cv: [0.20]
			7. Maximum Inlet Pressure: [500 psig]
			8. Outlet Control Range: [0 to 250] psig
			9. Location: Above grade
			10. Assembly Methods: ASME B1.20.1 NPT threads
			11. Failure flow in application: [61.61] SCFM as air with [500] psig maximum inlet pressure
	2. DEW POINT TEST FITTING
		1. Manufacturer: Swagelok.
		2. Model: QC Series, rated 250 PSIG uncoupled.
		3. Size: Brass quick-disconnect fitting, 1/4 inch FPT x QD with protector.
		4. Part number: B-QC4-BP-4PF
	3. MOISTURE INDICATOR

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Provide visible moisture indicator when not provided with regenerative dryer. Do not install on system with refrigerated dryer.

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* + 1. Manufacturers:
			1. Puregas Model [51364 1/8” NPT] [51356, 1/4” NPT]
			2. Van Air, No. 46-2300.
			3. Pneumatic Products, Aquadex.
		2. Visible moisture indicator assembly, with indicating silica gel that changes from blue to pink at dew point of 0 - 10 degrees F, and back to blue when dew point is lower than minus 10 degree F.

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Designer note: the relief valve is required to have a calculation meeting the rigor of AP-341-605 to show that it can accommodate the fail-open regulator fault condition and meet the design parameters of ASME B31.9 paragraphs 901.2.3, and 922.1.Pressure Reducing Systems. The regulator and relief device shown below are examples only and the section must be tailored to the design requirements. The designer is cautioned that the design must accommodate flow demand requirements of the system as well as relief valve sizing. For a compressed air system whose primary pressure source is the compressor, this generally means the relief device needs to exceed the SCFM equivalent capacity of the compressor.

The safety relief device(s) on the compressed air receiver shall be meet the requirements of ASME Boiler and Pressure Vessel Section VIII Division 1, UG-125 through UG-138. Per the ASME B&PVC Section VIII Division 1, UG-125 (a) (3) the designer shall act as the owner’s agent to ensure the required overpressure protection is properly sized for and selected. There shall be at least one reclosing relief device for normal operation not to exceed 110% of MAWP. There shall also be relief device(s) to ensure the vessel does not exceed 121% of MAWP during a fire.

Note that if the compressed air receiver is included as part of an off-the-shelf compressed air package, there will be a manufacturer-specified and installed relief device and the piping system designer is not responsible for the sizing of this valve. However, the designer is responsible for ensuring this relief valve (1) would limit system pressure with ASME COR limits (150 psig for B31.9) and (2) would sufficiently protect any downstream piping components from exceeding their pressure rating.

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* + 1. COMPRESSED AIR RELIEF VALVES
			1. Manufacturer/Model: [Kingston Valves, M/N 118, Part Number: 118CSS‑2-045]
			2. Description: [stainless steel[ ASME Section VIII, Div. 1 “UV” stamped relief device, set pressure [45 psig]
			3. Fluid Service: [ASME B31.9]
			4. System Application(s): Compressed Air
			5. Inlet Size: ¼ inch
			6. Set Pressure: [45 psig]
			7. Location: Above grade. Installation location shall be indicated on design drawings.
			8. Assembly Methods: [ASME B1.20.1 NPT threads]
			9. Manufacturers rating: [69] SCFM air
	1. AIR RECEIVER
		1. Manufacturer: [Hanson Tank] [Compressor Manufacturer]
		2. Carbon steel tank built and tested to ASME Section VIII, Division 1 Pressure Vessel Code, “U” stamped. NBIC numbered and registered.
			1. Configuration: [Vertical] [Horizontal] tank with ring base and standard, screw or flange inlet and outlet connections with factory exterior prime coat.
			2. Size: [ ] gallons, rated at [ ] psi, [ ] diameter x [ ] long.
			3. Seismic Design Category [D]
	2. AIR COMPRESSOR or PACKaged system (1/4 through 30 HP)

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Consult with manufacturer’s representative, commercial guide specs, and the LANL Engineering Manual Mechanical chapter when editing this Article. Verify compressor capacity (discharge pressure and flow rate) can meet the pressure and flow demands at LANL elevation. Furnish compressors with an after cooler, mechanical separator and an intake air filter silencer. If sound control is a factor, an intake filter silencer, muffler or sound enclosure may be required. Furnish duplex compressors with hour meters. For air compressors of greater than 30HP, a separate Section for air compressors may be used.
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* + 1. Manufacturer:
			1. Atlas Copco
			2. Sullair
			3. Ingersoll Rand
			4. Quincy
			5. [other]
		2. Compressor: Discharge pressure and air flow must be rated for LANL elevation (7,500 ft).
			1. Types:

[Reciprocating single or two stage], [rocking piston type], [diaphragm type], [lubricated, non-lubricated or oil less].

[Rotary vane type- oil lubricated],[rotary screw type- oil lubricated or oil less],[rotary scroll type-oil lubricated or oil less].

* + - 1. Controls: [Constant speed- start stop controls], [variable speed controls].

Drives: [Electric motor-V belt drive or gear drive or direct drive], [diesel engine- V belt drive or direct drive] or [ ]

* + - 1. Mounting: [Base mounted],[tank mounted],[portable].
			2. HP: [ ] HP, [ V/phase].
			3. Discharge pressure: [ ] psig rated for 7,500 ft elevation.
			4. Delivery capacity: [ ] scfm (14.5 psia, 68F and 0% relative humidity).
		1. Others: [Diagnostic control devices-high air temperature shutdown, low oil level shutdown], [belt guard], [intake filter], [after cooler], [motor starter].
		2. Compressor accessories (components furnished by the compressor manufacturer):
			1. [ Refrigerated air dryer ]
			2. [Filters]
			3. [other]
1. EXECUTION
	1. INSTALLATION
		1. Follow the manufacturer’s installation requirements.
		2. Install compressor unit on concrete housekeeping pad. Provide thermometer and pressure gage on discharge piping from each air compressor and on each receiver tank.
		3. Install compressor unit on vibration isolators. Level and bolt in place. See [Section 05 0520, *Post-Installed Concrete and Grouted-Masonry Anchors - Normal Confidence*] [drawings] for anchors.
		4. Install air piping with a slope of at least 1 inch per 100ft or less downward in direction of flow.
		5. Install branch take-offs to outlets from top of main, with shutoff valve after take-off. Slope take-off piping to outlets.
		6. Provide drip legs and drain traps at end of each main and branch and at low points of piping system.
		7. Install piping hangers and supports per Section 22 0529, *Hangers and Supports for Plumbing Piping and Equipment.*
		8. Cap or seal ends of piping when not connected to mechanical equipment to ensure contamination by foreign material does not occur.
		9. Route condensate drains to nearest floor drain.
		10. Install compressed air couplings, female quick connectors, and pressure gages [where branch outlets are indicated] [as indicated on Drawings].
		11. Label piping system per Section 22 0554, *Identification for Plumbing, HVAC and Fire Piping and Equipment*.
		12. Pressure test piping system per Section 22 0813, *Testing Piping Systems,* at the pressures and durations listed below.
			1. Compressed Air (Less than 150 psig design pressure)
				1. Test with air at [ ] psig per ASME B31.9, paragraph 937.4 for at least 10 minutes.
			2. Instrument Air (Less than 150 psig design pressure)
				1. [Test with air at [ ] psig per ASME B31.9, paragraph 937.4.for at least 10 minutes.]

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Test compressed or instrument air at a pressure between design pressure and 1.25 times design pressure, not to exceed 150 psig. ASME B31.9 does not specify a minimum test pressure, but LANL requires that the test pressure be, at minimum, the design pressure for the system. See ASME B31.9 937.4. (Note: ASME B31.9 paragraph 937.4.5 only requires the test pressure to be maintained at a minimum of 10 minutes).

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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 22 1500 Rev. 5, dated May 20, 2022.