Los Alamos NATIONAL LABORATORY EST.1943

Conduct of Engineering
Request for Variance or Alternate Method

To display the *VAR Request Metadata* pane for this document, click **File > Info > Properties > Show Document Panel.**

1.0 General

1.1 Document Number: VAR-10478	1.2 Revision: 0
1.3 Brief Descriptive Title: Mitsubishi City Multi VRF PURY-P TLMU-A and YLMU-A R410A Pressure Testing	
1.4 Affected Program: Engineering Standards	1.5 Request Type: Alternate Method
1.6a Affected Tech Area 99	1.6b Affected Buildings Sitewide
1.7 Requestor: Smith, Charles H Organization: ES-STO	
1.8 Revision History Revision Number Changes and Comments 0 Initial issue.	

2.0 Affected Conduct of Engineering Program/Documents

2.1 Affected "P" Document: P342 Engineering Standards If against the P document itself, revision (or ***N/A***): N/A	2.2 Subordinate or related document(s) [AP, master spec, LANL ESM chapter & section; or code, Order, standard, etc.]: Document Title/No.: ASME B31.5, Revision 2018 Document Title/No.: Enter text.. Revision Enter text.. Document Title/No.: Enter text.. Revision Enter text.. Document Title/No.: Enter text.. Revision Enter text..
2.3 Section/Paragraph: 538.4.2 Pressure Test	

2.4 Specific Requirement(s) as Written in the Document(s):

538.4.2 Pressure Test

(a) Piping shall be examined before pressure is applied to ensure that it is tightly connected. All items not subject to the pressure test shall be disconnected or isolated by valves, blanks, plugs, or other suitable means.

(b) A preliminary test at a gage pressure of up to 25 psig(170 kPa) may be applied, prior to other testing, as a means of locating major leaks.

(c) The temperature of the piping system during testing shall be above the ductile–brittle transition temperature.

CAUTION: Take measures to protect personnel from the potential of rupture of piping components during pneumatic testing of systems.

(d) The means used to furnish the test pressure shall have either a pressure limiting device or a pressure reducing device and a pressure relief device and gage on the outlet side. The pressure relief device shall be set above the test pressure, but low enough to prevent permanent deformation of any of the system components.

(e) The pneumatic test pressure used shall be at least 110% of the design pressure. The test pressure shall not exceed 130% of the design pressure of any component in the system.
(f) For large systems that are not completely visible to the testing operator, the pressure in the system shall be gradually increased to one-half of the test pressure, after which the pressure shall be increased in steps of approximately one-tenth of the test pressure until the required test pressure has been reached. The test pressure shall be continuously maintained for at least 10 min. It may then be reduced to the leak test pressure per para. 538.4.3(c).
(g) Mechanical joints at which blanks or plugs are inserted to blank off or facilitate removal of equipment during the pressure test need not be pressure tested after removal of the blank or plug provided the joint passes a subsequent leak test.

2.5 Contractual, preference, or other basis for requirement in 2.4:

All requirements derive from 10 CFR 851 Worker Safety and Health Program and SD100 Integrated Safety Management System Description Document. These requirements documents invoke ASME B31 series and lead to ESM Chapter 17.

2.6 Type of VAR from ESM Chap 1, Z10 [*Applies only to standards variances*)	2.7 Discipline
Type 2	Pressure Safety

3.0 Request Information & Comments

3.1 NCR required (work has occurred)? No
If Yes, NCR Number: Enter text.

3.2 System/Component Affected	3.3 Highest ML Level
OpSystem Acronym & Name VNT - Ventilation System Number or Name HVAC	ML-4

3.4 Proposal with Justification/Compensatory Measures:

ASME B31.5, 538.4.2, e. requirement for a pneumatic pressure test is for a minimum of 110% of design pressure. The manufacturer and manufacturer's representative have not provided a definitive design pressure and so this Alternate Method is being used to document that the code is in fact being adequately met.

Mitsubishi has provided the following information: The equipment (Mitsubishi head units and controllers) have all been factory tested to 800 psig for quality assurance; further testing at this pressure (800 psig) will invalidate the system warranty per Dale Candelaria (Mitsubishi VRF Sales Specialist, e-mail 6/24/21, see attachment). The system operating pressure is 400 psig. The system test pressure specified by Mitsubishi is 550 psig as provided in the DCF Sketch SK-M-0001 Note 4, and via e-mail from Candelaria (7/1/21), this test pressure is required by the factory to determine the presence of micro-leaks in the system prior to a vacuum test.

The refrigeration system is provided with internal safeties located in the condensing unit which are set to release at 450 psig. Ref. e-mail from Candelaria (7/13/21 IO&M PURY-P-TLMU-YLMU_Install_WT07598X02_10-15, Page E-39).
https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwijwO3m3IbyAhUUgp4KHduwDEQQFjAAegQIChAD&url=https%3A%2F%2Fwww.mitsubishitechinfo.ca%2Fsites%2Fdefault%2Ffiles%2FIM_PURY-P-%2528T%2529%2528Y%2529LMU-A%2528-BS%2529_WT07598X02.pdf&usg=AOvVaw2O2u3s3jGzIii4K4kVx6IU
The condensing unit will not be tested.

This Variance requests permission to perform a leak test of the refrigerant system at 550 psig plus 10% in accordance with ASME B31.5 code (see above). Thus the actual test pressure will be 605 psig as approved by Dale and Mitsubishi (e-mail 7/28/21).

This approach will be used first at TA3-39 and also be used of all similar VRF systems from Mitsubishi that are installed at LANL in the future.

3.5 Attachments

Document Title or Description Various e-mail correspondence

Document Title or Description Enter text...

3.6a Project ID	3.6b: Project Name	3.6c: Code of Record Date
DCF-18-03-0039-2574	03-0039 Administrative HVAC Project	2018

3.7 Duration:	3.8a If Finite Period, Start Date:	3.8b End Date:
Lifetime	Click to enter a date.	Click to enter a date

3.8c Provide the PFITS number for tracking removal/correction: N/A

3.9 USQD/USID required (Nuclear, High/Mod Hazard)? No

If Yes, USQD/USID Number Click here to enter text.

3.10 QA Review for process change matters potentially affecting LANL's NQA-1 implementation

Is a QPA Determination required?: No If ***Yes***, then: Choose an item.

QPA Comments: Enter text..

3.11 POC Determination: Accept

POC Comments: Enter text..

3.12 Management Program Owner's (SMPO) Approval for P341 and APs; P342, ESM, ML-1 and -2, and Contract Matters; and P343

SMPO Determination: Accept

Comments: Enter text..

4.0 Participant Signatures

NOTE*: DO NOT ADD NAMES FROM WITHIN WORD! Save and close the form first, then do 1-4 below:*

1. *From the SharePoint library, select the document, then click the **ellipsis (…)** in the second column; a small dialog appears*
2. *In the small dialog click the **ellipsis** again*
3. *Click **Edit Properties** and check out the document if prompted toEnter names using the controls provided, then **Save***

4.1 POC (Management Program Owner's Representative):	Organization	Signature
Swartz, Ari Ben	ES-EPD	ARI SWARTZ (Affiliate) Digitally signed by ARI SWARTZ (Affiliate) Date: 2021.08.03 08:35:38 -06'00'

4.2 Facility Design Authority Representative [FDARName] FDAR signature not required ☒	Organization Enter text..	Signature
4.3 LANL Owning Manager (FOD or R&D/Program) [FODorPrgmMgrName] FOD or Program Manager signature not required ☒	Organization Enter text..	Signature
4.4 Quality Reviewer's Name: [QPAName] QPA review/signature not required ☒	Organization Enter text.	Signature
4.5 Safety or Security Management Program Owner's Approval for P341 and APs; P342, ESM and Contract Matters; and P343 Apperson, Jason Wesley SMPO signature not required (Type 1 variance) ☐	Organization ES-DO	Signature JASON APPERSON (Affiliate) Digitally signed by JASON APPERSON (Affiliate) Date: 2021.08.03 11:57:56 -06'00'
4.6 Additional Signer 1 [AdditionalSigner1] Role: Enter text.	Organization Enter text.	Signature
4.7 Additional Signer 2 [AdditionalSigner2] Role: Enter text.	Organization Enter text.	Signature

4.8 CoE Administrator Signature Salazar-Barnes, Christina L NOTE: The CoE Admin is always the last signature placed on this document. The date of that signing is the date of this document.	Signature Tobin Oruch Digitally signed by Tobin Oruch Date: 2021.08.03 12:21:40 -06'00'