

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-10538	1.2 Revision: 0				
1.3 Brief Descriptive Title: Utility Metering Requirements (Building-level)					
1.4 Affected Program: Engineering Standards	1.5 Request Type: Variance				
1.6a Affected Tech Area 99	1.6b Affected Buildings Sitewide				
1.7 Requestor: Oruch, Tobin H Organization: ES-FE					
1.8 Revision History <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; border-bottom: 1px solid black;">Revision Number</th> <th style="text-align: left; border-bottom: 1px solid black;">Changes and Comments</th> </tr> </thead> <tbody> <tr> <td style="border-bottom: 1px solid black;">0</td> <td style="border-bottom: 1px solid black;">Initial issue.</td> </tr> </tbody> </table>		Revision Number	Changes and Comments	0	Initial issue.
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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): <p style="text-align: center;">N/A</p>	2.2 Subordinate or related document(s) [AP, master spec, LANL ESM chapter & section; or code, Order, standard, etc.]: Document Title/No.: ESM Chapter 3 Civil, Section G30 Revision 3 Document Title/No.: ESM Chapter 5 Mechanical, Section D10-30GEN, General Mechanical Requirements Revision 5 Document Title/No.: ESM Chapter 7 Electrical, Section D5010 Electrical Service & Distribution (also Revision 5 Document Title/No.: Tailored Standards Manual, STD-342-600 Revision 0 Document Title/No.: ESM Chapter 14, Sustainable Design Revision 10 Document Title/No.: LANL Master Specification Section 26 2713, Electricity Metering Revision 5
2.3 Section/Paragraph: See 2.4 below	

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

G30:

Subsection G3010 Potable/Fire Protection Water, 1.0 General, F. Water Meters: For all facilities greater than 10,000 sf floor area with restrooms, provide water meters. Meters shall be electronic and connected to the building automation system for monitoring.

Subsection G3060 Natural Gas, 1.0 Design, C. Meters: Provide a gas meter for any building with a heating unit with an input btu requirement of 5,000,000 btu/hr or greater.

D10-30GEN, 11.0 Meters:

- A. Building Supply: **Potable water, steam, and gas** meters are required for new buildings greater than 4000 ft² and, for renovations, if more than 50% of the particular mechanical system is upgraded.
- B. Specify meters with a digital remote readout and a 4-20 mA signal. Tie meters into the Supervisory Control and Data Acquisition (SCADA) network, the Equipment Surveillance System (ESS), and/or the Building Automation System (BAS; preferred location), if present. ...
- D. HVAC Systems: Provide totalizing water meters in the make-up and blowdown lines of all cooling towers and air washers 25,000 cfm and larger.

D5010, 2.0 Low-Voltage Service & Distribution Systems, 2.4 Metering, 2.4.2 Meters

A. For electrical systems that require a meter, provide an addressable multi-function, microprocessor-based, digital electrical meter.

1. Meter type shall be determined by LANL Utilities and Infrastructure. Send email to umetering@lanl.gov to request direction which may differ from LANL Master Specifications Section 26 2713, *Electricity Metering*.

2. Buildings or structures requiring metering:

- a. Buildings over 5000 square feet.
- b. Buildings 5000 square feet or less with substantial loads.

Exception to 2: Where the cost of the metering exceeds the benefit of the metering and POC and UI approval is obtained, metering is not required.

Tailored Standards Manual

Various locations including:

Chapter 3 Civil 1.0 DOE Order-Based Metering Requirements

- A. Provide water meters for all facilities greater than 10,000 sf floor area with restrooms.
- B. Provide a gas meter for any building with a heating unit with an input Btu requirement of 5,000,000 Btu/hr or greater.

Chapter 7 Electrical, 4.0 Sustainability

- A. Provide remotely-monitored (e.g., SCADA, EES, or BAS) metering for electrical service when structure > 5,000 ft².

ESM Ch. 14, Sustainable Design for Facilities is currently silent on meters (a new Attachment 2 is the target destination for this VAR's material).

LANL Master Specification Section 26 2713, Electricity Metering, various paragraphs including but not limited to:

2.2.C. Manufacturer: Square D. Contact LANL UI Metering at umetering@lanl.gov for current meter selection/standard. No substitution.

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

Contractual requirements and LANL preferences for meeting same cost-effectively. As examples, Ch 6 footnote reads, in part: Based on DOE O 430.2B CRD 6.D "To the maximum extent practicable, the contractor must install metering for devices that measure consumption of potable water, electricity, steam, and natural gas in each building and other facilities and grounds." Ch 7 footnote reads, in part: Refer to DOE O 436.1 Departmental Sustainability, DOE/EE-0312 Guidance for Electric Metering in Federal Buildings, and EPA 2005. EPA 2005 directs that all Federal buildings be metered "...for the purposes of efficient energy use and reduction in the cost of electricity used in such buildings..." by October 1, 2012.

2.6 Type of VAR from ESM Chap 1, Z10 [Applies only to standards variances)

Type 2

2.7 Discipline

Instrumentation & Controls

3.0 Request Information & Comments

3.1 NCR required (work has occurred)? No

If Yes, NCR Number: Enter text.

3.2 System/Component Affected

OpSystem Acronym & Name [Select OpSysAcronymAndName]

System Number or Name [Select SystemNumberOrName]

3.3 Highest ML Level

ML-4

3.4 Proposal with Justification/Compensatory Measures:

Background

Expectations for metering are evolving rapidly and have changed since some affected LANL Standards documents were written. Consolidation of updated requirements into this single document should improve understanding, compliance, and timely requirements maintenance by the Standards Program. Standardized meters are important to ensure automated data availability and compatibility with LANL's existing metering infrastructure and information technology.

Proposal/Requirements

Administrative Direction on this VAR

1. This VAR consolidates and modifies existing direction and positions it as an addendum (e.g., new Attachment 2) to ESM Ch. 14, Sustainable Design for Facilities, which is currently silent on meters.
2. VAR Postings: So long as affected LANL Standards documents (e.g., ESM, TSM, Master Spec Sections) do not align with this VAR — e.g., do not yet refer to Ch. 14 direction (or, in the case of spec sections, incorporate relevant details) — this VAR will remain posted against them.
3. Metering Ultimate Destination: If/when future revisions of ESM Ch. 14 Sustainable Design incorporate (and possibly alter) this VAR's technical material, it will supersede the technical material and so state.
4. VAR Retirement: When all LANL Standards align in a cohesive manner relative to metering, this VAR should be statused "Sitewide Incorporated."

Technical Direction

In multiple LANL Standards locations, modify current metering requirements and guidance as necessary to comply with the following:

1. New Facility or Structure Construction (Applicability)

- A. Building-level utility meters shall be installed for electric, potable water, steam, and natural gas services in new facilities or structures where the total square footage is 5,000 or more.
 - a. Where less than 5,000 square feet, utility meters are recommended but not required unless the planned facility or structure is designed with a substantial demand load increase on any one of the utilities, in which case utility meters are then required. Email umetering@lanl.gov for review of applicability of metering for each system.

2. Existing Facilities (Applicability)

- A. Building-level utility meters shall be installed for electric, potable water, steam, and natural gas services when an existing facility greater than or equal to 5,000 square feet undergoes a modernization, renovation, equipment replacement, and/or upgrade efforts.
 - a. Modernization: See Ch 14 Definitions: *Currently: The comprehensive replacement or restoration of virtually all major systems (such as plumbing, mechanical, electrical), interior finishes (such as ceilings, partitions, doors, and floor finishes), and building features (such as exterior wall and roof).*

3. Communication Requirements

- A. Building-level utility meters shall be connected to the LANL UI owned and managed Metering Program Power Monitoring Expert (PME) system via an active yellow network connection.
 - a. Electric meters may be connected directly.
 - b. Water, gas, and steam meters require a gateway device for cyber security and device firmware management purposes; email umetering@lanl.gov to request current approved model selection, required communication gateway device information, and additional direction. Provide a separate enclosure with a DIN rail to house these components and run both a yellow-net connection and 120-volt individual branch circuit to the enclosure. The power supply, isolation device, and a terminal block are on the DIN rail. Design documents shall reflect these requirements.
- B. Where other non-utility level meters, facility level meters, or sub-meters are installed or used, they shall be connected to one or more of the below Utilities and Infrastructure (UI)-owned monitoring systems, where available:
 - PME System
 - Supervisory Control and Data Acquisition (SCADA) System
 - Equipment Surveillance Systems (ESS)
 - Building Automation Systems (BAS)

4. Exclusions

- A. Where an existing building is metered with shared infrastructure, i.e., two or more buildings with one meter, a separate or sub-meter may not be required depending on the size, function, and complexity of the building(s). The Variance or Alternative Method, Form 2137 process shall be followed to determine the requirements.
- B. For any other special use facilities where the situation does not fit into any of the above, such as for photovoltaic systems, contact umetering@lanl.gov for direction.

5. Building-Level Meter Specifics by Service

Due to rapid changes in manufacturer's available products, make and model changes periodically. Checking with umetering@lanl.gov is imperative to specifying the correct models and connections.

- A. Electricity
 - a. Meter make/model shall be determined by LANL UI. Email umetering@lanl.gov to request required make/model; this may differ from LANL ESM Chapter 7, D5010 2.4.2 and LANL Master Specification Section 26 2713, *Electricity Metering*.
 - b. Refer to Specification Section 26 2713 for additional material installation details and yellow network connection requirements.
 - c. Refer to LANL Standard Drawings ST-D5010-3, -4, and -5 for meter installation details and connection requirements.

- d. For electrical systems connected to the LANL distribution system but considered non-LANL loads (such as Bandelier National Monument), contact umetering@lanl.gov for further direction.
 - e. Prior to acceptance, UI must review and commission the meter installation.
- B. Natural Gas
- a. Meter make/model shall be determined by LANL UI. Email umetering@lanl.gov to request direction; this may differ from LANL ESM Chapter 6, D10-30GEN for building-level natural gas metering.
 - b. Network: See Communications heading above.
 - c. The meter shall incorporate pressure and temperature compensation.
 - d. The meter may be installed upstream or downstream of the regulator station. Location approval required by umetering@lanl.gov.
 - e. Prior to acceptance, UI must review and commission the meter installation.
- C. Water
- a. Meter make/ model shall be determined by LANL UI. Email umetering@lanl.gov to request direction; this may differ from LANL ESM Chapter 6 D10-30GEN and LANL Master Specifications (various locations) for building-level metering.
 - b. Refer to Mechanical Drawing(s) ST-D2020-1 for building water meter location.
 - c. Network: See Communications heading above.
 - d. Cooling towers and other equipment with high water usage shall be separately metered in addition to the facility supported (see ESM Chapter 6 D10-30GEN, *r5 Section 11*), and these additional meters shall follow the above requirements for water meters and be connected to the UI monitoring systems. Requirement may be waived with Mechanical and Civil POC concurrence.
 - e. Prior to acceptance, UI must review and commission the meter installation.
- D. Steam
- a. Make/model shall be determined by LANL Utilities and Infrastructure. Send email to umetering@lanl.gov to request current approved meter selection and additional direction which may differ from LANL Master Specification (if any) for building level steam metering.
 - b. Network: See Communications heading above.
 - c. Prior to acceptance, UI must review and commission the meter installation.

Justification

As noted under Background, expectations for metering are evolving rapidly and have changed since some affected LANL Standards documents were written. Consolidation of updated requirements into this single document should improve understanding, compliance, and timely requirements maintenance by the Standards Program.

At LANL, building-level utility meter location, design specifications, installation, and commissioning requirements are determined by UI-DO and -ES based on the latest Federal requirements: EAct 2005 § 103 (42 U.S.C § 8253(e), EISA 2007 § 434 (42 U.S.C. § 8253(e)(1)), and [Federal Building Metering Guidance](#). Utility meters are owned, maintained, and monitored by UI-DO (FOD-8) who is responsible for reporting site-wide and facility specific energy consumption data on an annual basis to the DOE.

3.5 Attachments

Document Title or Description N/A

3.6a Project ID N/A	3.6b: Project Name N/A	3.6c: Code of Record Date N/A
3.7 Duration: Lifetime	3.8a If Finite Period, Start Date: Click to enter a date.	3.8b End Date: Click to enter a date
3.8c Provide the PFITS number for tracking removal/correction: [PFITSNum]		
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 to Enter names using the controls provided, then **Save**

4.1 POC (Management Program Owner's Representative): Oruch, Tobin H	Organization ES-FE	Signature
4.2 Facility Design Authority Representative [FDARName] FDAR signature not required <input checked="" type="checkbox"/>	Organization Enter text..	Signature
4.3 LANL Owning Manager (FOD or R&D/Program) Erickson, Andrew W FOD or Program Manager signature not required <input type="checkbox"/>	Organization UI-DO	Signature
4.4 Quality Reviewer's Name: [QPAName] QPA review/signature not required <input checked="" type="checkbox"/>	Organization Enter text.	Signature

<p>4.5 Safety or Security Management Program Owner's Approval for P341 and APs; P342, ESM and Contract Matters; and P343</p> <p>Apperson, Jason Wesley</p> <p>SMPO signature not required (Type 1 variance) <input type="checkbox"/></p>	<p>Organization</p> <p>ES-DO</p>	<p>Signature</p>
<p>4.6 Additional Signer 1</p> <p>[AdditionalSigner1]</p> <p>Role: Enter text.</p>	<p>Organization</p> <p>Enter text.</p>	<p>Signature</p>
<p>4.7 Additional Signer 2</p> <p>[AdditionalSigner2]</p> <p>Role: Enter text.</p>	<p>Organization</p> <p>Enter text.</p>	<p>Signature</p>
<p>4.8 CoE Administrator Signature</p> <p>Salazar-Barnes, Christina L</p> <p>NOTE: The CoE Admin is always the last signature placed on this document. The date of that signing is the date of this document.</p>	<p>Signature</p>	