



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-10200		1.2 Revision: 0	
1.3 Brief Descriptive Title: Voltage drop requirements in ESM			
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: Stromberg, Eric R Organization: ES-EPD			
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.: Engineering Standards Manual, STD-342-100, Chapter 7 Electrical, Section D5010 Revision 4 (Nov 2011) Document Title/No.: Enter text.. Revision Enter text.. Document Title/No.: Enter text.. Revision Enter text..
2.3 Section/Paragraph: 2.10.2 Building Wire and Cable; Paragraph H	
2.4 Specific Requirement(s) as Written in the Document(s): H. For new construction work size service and feeder conductors to limit the total voltage drop from the service point to the most remote outlet to 5%. 1. Use voltage drop calculation methods outlined in Chapter 3 of IEEE Std 141™. 2. Design branch circuit conductors for a maximum voltage drop of 3% at full design load. 3. Design feeder conductors for a maximum voltage drop of 2% at full design load. ¹⁵⁶ 4. Include voltage drop in service conductors in the 5% total voltage drop.	
2.5 Contractual, preference, or other basis for requirement in 2.4: LANL preference, mandating (and extrapolating beyond) a National Electric Code (NEC) recommendation.	

2.6 Type of VAR from ESM Chap 1, Z10 [<i>Applies only to standards variances</i>) Type 2	2.7 Discipline Electrical
---	----------------------------------

3.0 Request Information & Comments

3.1 NCR required (work has occurred)? No If Yes, NCR Number: <i>Enter text.</i>	
3.2 System/Component Affected OpSystem Acronym & Name ED_Electrical Distribution System Number or Name ED_Electrical Distribution	3.3 Highest ML Level ML-1
3.4 Proposal with Justification/Compensatory Measures: Delete subparagraphs 2 and 3 as shown below: H. For new construction work size service and feeder conductors to limit the total voltage drop from the service point to the most remote outlet to 5%. 1. Use voltage drop calculation methods outlined in Chapter 3 of IEEE Std 141™. 2. Design branch circuit conductors for a maximum voltage drop of 3% at full design load. 3. Design feeder conductors for a maximum voltage drop of 2% at full design load.156 4. Include voltage drop in service conductors in the 5% total voltage drop. Justification: When these requirements were written, the NEC had an <u>overall</u> voltage drop recommendation (not requirement) that the total should be 5% or less. It further stated that the <u>branch circuit</u> voltage drop should be limited to 3%. When this recommendation was first written in the NEC, it was silent on recommendations for voltage drop on the feeder. Those who interpreted the Code assumed that the <u>feeder</u> should be limited to 2%, but this was never written in the Code. The next revision of the NEC recommended that both the feeder and the branch circuit should be limited to 3%, but that the total should be 5% or less. It is important to note that the only voltage drop <u>requirements</u> in the NEC are for fire pumps. General feeders and branch circuits have no voltage drop requirements, only recommendations. The ESM, in the footnote for the voltage drop requirements, references ASHRAE 90.1. ASHRAE 90.1 has been adopted by Los Alamos National Laboratory and <u>does have requirements</u> for total voltage drop, as follows in 8 Power/8.4 Mandatory Provisions: "8.4.1 Voltage Drop – The feeder conductors and branch circuits combined shall be sized for a maximum of 5% voltage drop total." The key is the 5% total requirement. Thus, the expectation is that, upon incorporation of this variance (e.g., in the next revision of the ESM), these individual requirements will be removed and the 5% total will remain.	

3.5 Attachments Document Title or Description Enter text...		
3.6a Project ID N/A	3.6b: Project Name N/A	3.6c: Code of Record Date N/A
3.7 Duration: lifetime Click to choose..	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): Stromberg, Eric R	Organization ES-EPD	Signature
4.2 Facility Design Authority Representative [FDARName] FDAR signature not required <input checked="" type="checkbox"/>	Organization Enter text..	Signature

<p>4.3 LANL Owing Manager (FOD or R&D/Program)</p> <p>[FODorPrgmMgrName]</p> <p>FOD or Program Manager signature not required <input checked="" type="checkbox"/></p>	<p>Organization</p> <p>Enter text..</p>	<p>Signature</p>
<p>4.4 Quality Reviewer's Name:</p> <p>[QPAName]</p> <p>QPA review/signature not required <input checked="" type="checkbox"/></p>	<p>Organization</p> <p>Enter text.</p>	<p>Signature</p>
<p>4.5 Safety or Security Management Program Owner's Approval for P341 and APs; P342, ESM and Contract Matters; and P343</p> <p>Goen, Lawrence Kenneth</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>	