



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: Enter text.	
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
<p>3.4 Proposal with Justification/Compensatory Measures:</p> <p>Delete subparagraphs 2 and 3 as shown below:</p> <p>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%.</p> <ol style="list-style-type: none"> 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. <p>Justification:</p> <p>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.</p> <p>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:</p> <p>"8.4.1 Voltage Drop – The feeder conductors and branch circuits combined shall be sized for a maximum of 5% voltage drop total."</p> <p>The key is the 5% total requirement.</p> <p>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.</p>	

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:*

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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>[FODorPrgrMgrName]</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>	