

**Staff Responses to Public Comments  
Draft Regulatory Guide (DG)-1269  
(Proposed Revision 3 of Regulatory Guide (RG) 1.129)**

A notice that Draft Regulatory Guide DG-1269 (Proposed Revision 3, of RG 1.163) was published for public comment appeared in the *Federal Register* on March 12, 2013 in Vol. 78, No. 48, pp. 15753-54. The public comment period ended May 13, 2013.

Comments were received from:

<p>George Morris 20 Marquette Drive Cody, Wyoming 82414 ADAMS Accession No. ML13112A004</p>	<p>Mark A. Richter Nuclear Energy Institute (NEI) 1201 F Street NW, Suite 1100 Washington, DC 20004 ADAMS Accession No. ML13135A309</p>	<p>Scott A. Bauer Star Alliance 1626 N. Litchfield Rd., Suite 230 Goodyear, Arizona 85395 ADAMS Accession No. ML13144A825</p>
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Commenter	Section of DG-1269	Specific Comment	NRC's Resolution
<p>George Morris</p>	<p>General comment: Please consider the following enhancements to DG 1269</p>	<p>1. Replace the battery "BEFORE" capacity reaches 80% not "when capacity drops below 80%."</p> <p>2. Fully charged float current range is stated as '0.5 - 2.0 Amps" However most utilities are using 2.0 A as their acceptance limit for all the installed batteries independent of size, even though the actual recorded float current in many cases is less than 50 milliamps. The universal use of a 2 Amp acceptance criteria</p>	<p>1. The NRC staff disagreed with the comment and did not adopt the suggestion. The staff consider the recommendation of Section 6.2.3 of IEEE 485-2010 to provide an adequate margin of safety. That section states (in part):  <i>"...that a battery be replaced when its actual capacity drops to 80% of its rated capacity...."</i></p> <p>2. The NRC staff disagreed with the comment and it was not adopted. The final RG references the NRC sponsored testing program as having identified 0.5-2.0 amps as an observed range of stable float current. However, it goes on to say that "The specific point at which a battery can be considered fully</p>

<p>George Morris</p>		<p>appears un-conservative. Because of this variation in actual field measurements of float current, the sizing calculation recommendations in IEEE-485 should use a Design Margin correction factor of no less than 1.05 to account for the "not fully recharged" condition.</p> <p>3. Using float current as a measure of charge should be only used for a limited time following a recharge when the electrolyte may be stratified. Float current can be affected by a number of variables besides the average condition of a string of cells, such as the actual float voltage and the inter-cell connection resistance.</p> <p>4. If float current is used to determine capacity, a calibrated shunt, as noted in the referenced NUREC/CR-7148, should be used NOT a clamp-on meter.</p>	<p>charged needs to be established by the end user on a battery-by-battery basis." The testing showed that 100% of the ampere-hours were restored to the battery by the time the float current reached a stable float current of 0.5 to 2 amps. Additional ampere-hours added to the battery beyond this point add little to battery's available capacity. Therefore, this approach is not deemed to be un-conservative.</p> <p>3. The NRC staff disagreed with the comment and it was not adopted. While it is true that the absolute value of the float current is influenced by the float voltage and the circuit resistance, the NRC confirmatory test found that regardless of these parameters, when a <u>stabilized float current</u> was reached, the battery was found to be sufficiently charged. The absolute value of the stabilized float current did not affect the measured battery capacity significantly.</p> <p>4. The NRC staff disagreed with the comment and did not adopt it because there are other instruments that can provide the level of accuracy needed to determine the battery's state-of-charge. A calibrated shunt is preferred monitoring equipment; however, a clamp-on ammeter of sufficient accuracy and range could also prove to be effective. The wording in the regulatory guide emphasizes the importance of</p>
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George Morris		<p>5 The Acceptance Criteria for the Service Test and the Modified Performance Test should have BOTH the Load Current Profile and the Required Minimum Voltage Profile for all period steps during service duty portion of both tests.</p> <p>6 The service duty portion of the modified performance test is an as-found test with no temperature compensation. Therefore, the total Amp-hours removed in the service duty portion of the modified performance test should be adjusted for initial electrolyte temperature when calculating the total amp-hours to be discharged in the performance duty section.</p>	<p>the instruments used for this measurement: “it is extremely important to use precise, calibrated instrumentation when taking float current measurements for determining a battery’s state-of-charge.”</p> <p>5 The NRC staff agreed and the RG was changed to endorse IEEE 450-2010. The standard provides guidance on the acceptance criteria for both types of test and that includes load current profile and minimum voltage profiles for all period steps.</p> <p>6 The NRC staff agreed with the comment, but the final RG remains unchanged. IEEE 450-2010 Tables 1 and 2 provide the needed temperature compensation factors to ensure that testing is performed consistently and the actual electrolyte temperature is referenced to 77°F. The revised RG endorses this part of the standard so no further change is required.</p>
NEI	B. page 4, first full sentence at top of page	<p>The first full sentence that begins with “For example, the battery replacement criteria in IEEE Std 450-2010 are based...” is incorrect. The word “replacement” only appears in IEEE 485-2010 when discussing the replacement criteria in IEEE 450 or 1188.</p> <p><b>Proposed Change:</b> Reword to say “...replacement criteria in IEEE 485-2010 are based on IEEE 450-2010 or IEEE 1185-2005...”</p>	<p>The NRC staff agreed with the comment and adopted the suggestion by rewording the affected sentences on the bottom of page 3 and top 4 to read: “...Consequently, some of the test acceptance criteria in IEEE Std 450-2010 depend on having sized the batteries in accordance with IEEE Std 485-2010 and also on properly trending of battery capacity to predict the end of life. For example, the battery replacement criteria in IEEE Std 485-2010 are based on IEEE Std 450-2010, which</p>
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			<p>recommends that the batteries be replaced when their actual performance reaches 80 percent of their rated performance. In addition, IEEE Std 485-2010 recommends that, to ensure the batteries are capable of meeting their design loads throughout their service life, the batteries' rated capacity should be at least 125% (1.25 aging factor) of the load expected at the end of its service life.”</p>
B, page 4, last sentence in paragraph at top of page	<p>The sentence that includes “...the batteries' rated capacity should use the rate-adjusted method (1.25 aging factor)...” is misquoted from 485-2010, Sec. 6.2.3. Sec. 6.2.3 does not mention the rate-adjusted method. It does discuss adding margin to be sure that a battery will be capable of meeting design load as it approaches end of life.</p> <p><b>Proposed Change:</b> Reword to say “...their service life, the batteries' rated capacity should be at least 125% (1.25 aging factor) of the load expected at the end of its service life.”</p>	<p>The NRC staff agreed with the comment and adopted it. The 1.25 sizing factor has nothing to do with the rated-adjusted method. This sentence was indeed misquoted and was rectified.</p>	
B, page 4, fourth paragraph	<p>Once current is stable, the amp meter is sufficient to declare the battery fully charged.</p> <p><b>Proposed Change:</b> Add “Once the current has stabilized, use of the amp meter for the charger should be sufficient to declare the battery fully charged.” At the end of the paragraph.</p>	<p>The NRC staff disagreed with the comment and did not adopt the suggestion. The charger's amp meter may not have sufficient sensitivity and accuracy to make the determination that the battery is fully charged. The current revised RG is more general in its use regarding its monitoring instrumentation.</p>	

NEI	C. page 6, C-2 Section 5.2	<p>Disagree with selecting the pilot cell with the lowest voltage as stated: “Where reference is made to the lowest pilot cell, the pilot cell shall be based on the lowest voltage cell in the battery.”</p> <p><b>Proposed Change:</b> Delete the sentence since pilot cell voltage varies; thus, it would be challenging to change the selection of pilot cells frequently and trending would be unavailable. Such guidance would also impact existing station procedures, work orders, and labeling in the field.</p>	<p>The NRC staff disagreed with the comment and did not adopt the suggestion. Selection of a pilot cell with the lowest voltage ensures that all the other cells are above the technical specification limits and that the battery is capable of performing its specified safety function.</p>
C. page 6	<p>Staff Regulatory Guidance under Section 5.2 on weekly measurement and recording of float current and voltage is excessive.</p> <p><b>Proposed Change:</b> Maintain test intervals as stated in IEEE 450-2010.</p>	<p>The NRC staff disagreed with the comment and did not adopt the change in the final RG. The weekly checks of voltage and float current is a reasonable level of effort to ensure the integrity of the standby status of the critical equipment and the NRC staff does not deem it to be excessive.</p>	
C. page 6, Section 5.4.1	<p>Section 5.4.1 should be supplemented to allow for consideration of vendor recommendations.</p> <p><b>Proposed Change:</b> Add: “Also, vendor recommendations may be considered for determining these parameters” at the end of the first bullet point.</p>	<p>The NRC staff agreed with the comment and the final RG incorporated the recommendation.</p>	
C. page 7, (4) Section 6.5	<p>Clarify the next-to-last sentence in the paragraph: “The modified performance test</p>	<p>The NRC staff agreed with the comment. The proposed change is consistent with IEEE 450-</p>	

		should be performed with intervals not to exceed 24 months.”	2010, section 6.5 and the revised RG is endorsing the standard.
		<p><b>Proposed Change:</b> Add the wordings noted in bold: “The modified performance test/<b>service test</b> should be performed with intervals not to exceed 24 months”</p> <p>Consistent with IEEE 450-2010 guidance, some stations may do a modified performance test in one outage and a service test in the next outage.</p> <p><b>Proposed Change:</b> In Section 6.5 the statement “However, it is preferred that the same test method be used throughout the battery life.” should be deleted.</p>	<p>The NRC staff agreed with the comment and adopted the proposed change to Section 6.5. The text in the draft guide where the suggestion was made that the same type of battery test be used throughout the life of the battery was misleading. IEEE Std 450-2010, Annex I, which the RG endorses, recommends the use of the same test method or program solely for Type 1, Type 2 or Type 3 modified performance tests throughout the battery life, not for the three types of tests specified for batteries such as 1) service discharge test, 2) performance discharge test, and 3) modified performance test.</p>
Star Alliance	Discussion Section B, page 5, third paragraph, last sentence, and Staff Regulatory Guidance, Section C, page 7, third paragraph, second sentence	<p>“ ... while discussing the various types of battery testing, suggest that the same type of battery test be used throughout the life of the battery for best trending results.</p> <p><i>“For best trending results, the same test method or program should be used throughout the life of the battery”.</i></p> <p><i>“However, it is preferred that the same test method be used throughout the battery life.”</i></p>	<p>The NRC staff agreed with the comment. The text in the draft guide where the suggestion was made that the same type of battery test be used throughout the life of the battery was misleading. IEEE Std 450-2010, Annex I, which the RG endorses, recommends the use of the same test method or program solely for Type 1, Type 2 or Type 3 modified performance tests throughout the battery life, not for the three types of tests specified for batteries such as 1) service discharge test, 2) performance discharge test, and 3) modified performance test. As explained in the</p>

<p>Discussion Section of RG 1.129 in paragraph 3 on page 5, plant specific Technical Specifications (TS) may permit the substitution of the performance and service discharge tests with the modified performance test, the NRC staff recommends the modified performance tests in lieu of the performance and service discharge tests since additional information can be gained on the capacity, health, and capability of the battery at more frequent intervals. Therefore, the NRC staff agrees with the comment and has clarified RG 1.129 to reflect the guidance found in the Standard IEEE 450-2010</p>	<p>Furthermore, the NRC staff disagrees with the comment about the modified performance test shortening the life span of batteries, the NRC sponsored battery testing conducted by Brookhaven National Laboratory (NUREG/CR-7148, ML12284A296) demonstrated that batteries can handle many deep discharges without affecting the aging of the battery. This is supported by the battery manufacturers who also suggest that the batteries are capable of 50-100 deep discharge cycles.</p>
<p>There are three types of tests specified for batteries: 1) service test, 2) performance test, and 3) modified performance test. A modified performance test may substitute for either of the other two. IEEE-450 and Plant Technical Specifications specify service tests, typically at 18 month intervals and a performance test typically at 60 month intervals. If a modified performance test were substituted for either test, then in order to meet the suggestion in the draft guide, a station would have to always do the modified performance test.</p>	<p>The modified performance test is a more rigorous test than the service test, discharging the battery further and thus putting more cycles on the battery. There are a finite number of discharge cycles for each battery; therefore, always performing the modified performance test would age the battery more rapidly. The deeper discharge is also undesirable from an outage perspective as it takes longer to discharge and subsequently recharge the battery and restore Operability. This may limit other outage activities or raise the risk profile while the battery is inoperable.”</p> <p><b>Proposed Change:</b> “It is recommended that DG-1269 recognize this trade-off rather than focus primarily on the trending consideration. Further, <i>it is</i> suggested that the optimum test regime should be to always perform a service test except when the more rigorous test is required (typically 5 years), then, perform a</p>

		modified performance test. This sequence should be followed for the life of the battery, as practical.”	
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