IEEE Standards Interpretation for IEEE Std 485™-1997 IEEE Recommended Practice for Sizing Lead-Acid Batteries for Stationary Applications

December 2008

Interpretation Request #1
Relevant Clauses: 4.1 and 4.2.3
This is a request for interpretation of IEEE 485-1997 centering on the section on Momentary Loads (Section 4.2.3) which basically states, "the voltage drop after several seconds often determines the battery's 1 min rating." The previous statement is related to an additional statement in the same section that reads, "Sizing for a load lasting only a fraction of a second, based on the battery's 1 min performance rating, results in a conservatively sized battery."

This has caused some of our engineers to use the peak draw of the DC motor current, i.e. 81 amps, instead of the steady state current of 30 amps, to recommend a battery that is much much larger than anything we have previously used on our system. The 81 amps only lasts for about .06 seconds. The 81 amps is the lab tested draw of the DC motor and it would be expected that this value to be less under field conditions where long leads to the motor consist of lead resistance not used to compute the 81 amps in the lab. Since it is the 1 minute rating which is needed to size the battery and after several seconds, the 1 minute rating is determined, would you agree to take the average current over the first 2 or 3 seconds to determine the 1 min rating?

If you feel that possibly 2 or 3 seconds is excessive, then perhaps the average current over 1 second to show a more conservative approach? It is also my understanding that these large voltage draws from the battery may initiate the coup de fuote of the battery and perhaps this is why there is such a conservative recommendation in IEEE Std 485-1997 for the 'fraction of a second' reference as noted in the second paragraph above. Our batteries feed substation relays and are not used for any generator type control systems where sensitive battery voltage drops will adversely effect the function of the

protective relays.

Any information you can provide would be helpful.

Interpretation Response
Your question relates to the use of inrush / peak currents (especially those that only last for less than 1 second). You asked if "Since it is the 1 minute rating which is needed to size the battery and after several seconds the 1 minute rating is determined, would you agree to take the average current over the first 2 or 3 seconds to determine the 1 min rating?" and "If you feel that possibly 2 or 3 seconds is excessive, then perhaps the average current over 1 second to show a more conservative approach?"

Subclause 4.2.3 of IEEE Std 485-1997 states that "Although momentary loads may exist for only a fraction of a second, it is common practice to consider each load will last for a full minute because the battery voltage drop after several seconds often determines the battery's 1 min rating." In 4.1, it also states "The most severe of these conditions, in terms of battery load and duration, should be used to determine the battery size for the installation." The document does not support averaging of loads over any time period, but as noted within 4.2.3 you may consult the battery manufacturer for ratings of discharge durations less than 1 minute.

You also note in your request that the current values measured in the laboratory may be higher than those found in the field due to, as a minimum, the resistance in the cable to the loads. The standard does not specify in what manner load currents be determined, but it is acceptable to utilize current values that reflect actual conditions in the field, as long as the considerations of 4.1, discussed above, are considered.