Points to Ponder on

Re: "Excerpts from Revised Final Report
Seasonal LED String Testing
Project 14738-23-00", Powertech

1. Limited numbers of samples were used in this test:
   14 samples of LED string with plug-in lampholder
   3 samples of LED string in solid molded lampholder
   2 samples of typical incandescent string (lampholder is not described).

   Our concern:
   If 14 samples will facilitate relatively accurate estimation of the real performance of test subjects, good statistical conclusions probably will not be drawn from 3 or 2 samples.
   Another concern is that not every possible weak point of the products will be exposed, it is thus hard to evaluate these weak points in the deterioration process of the subjects.

2. The parallel title of IEC 1109 standard is "Composite insulators for a. c. overhead lines with a nominal voltage greater than 1000 V: definitions, test methods and acceptance criteria".

   Our concern:
   We don't have the full copy of IEC 1109 Annex C which was used as the standard to conduct this test, but we noticed from the title of the documentation that this standard is for insulators with a nominal voltage greater than 1000 V. As the nominal voltage is a. c. 120V for all the test samples, is it appropriate that a standard for high nominal voltage components is used for low nominal voltage components?

3. "The LED string samples were powered through the test, but whether they are powered or not should not make a large difference." excerpted from the report.
   Our concern:
   Does the IEC 1109 Annex C stipulate that the samples should be powered through the test? Were the test steps stipulated in IEC 1109 followed rigorously? How is the last statement justified? Base on results of the test conducted in our factory, there are big differences between power-on LED strings and power-off strings.

4. "There is no experience on which to base predictions of actual life, but we can reasonably assert that the equivalent aging time in outdoor service would be somewhere between 2000 and 20,000 hours exposure."
   Our concern:

How will the above assertion be justified, especially when considering the standard is written for components with nominal voltage AC 1000v instead of AC 120v?

5. "Most of the failures could be attributed to connector corrosion, although many individual diodes also failed either short circuit or open circuit." excerpted from the report.
   Our concern:
   When there are both connector corrosion and failed LED bulbs with open circuit on the LED strings, what technical means or measurements were used to finally conclude that the string failures are due to connector corrosion other than open circuit LED or other possible factors such as loose parts, etc.?

6. "Of the three molded strings without plug connectors, one was working, one dead, and one partially working (one of two parallel groups failed). The three failed groups each had several open circuit diodes in it, but the failures were in the diodes, not the connections." excerpted from the report.
   Our concern:
   The failure rate for molded LED string without plug connectors is still very high – 50% from the 3 tested samples? What are the real statistical results if much more molded strings were tested?

7. "These test results suggest that there may still be a lifetime problem, but show that sealed strings are much superior to plug-in strings." (Line 1 – 2, page 6 of 11)
   Our concern:
   In what respects are sealed strings much superior to plug-in strings? From this report, the only conclusion we can make based on the test results is that plug-in LED strings suffer the problem of connector corrosion but molded strings don't. But we don't know how much the connector corrosion problem affects the life time of plug-in strings. We may think that we should consider the fact that those samples used in this test are neither CSA nor UL approved when evaluating the test results.

8. Regarding the test of incandescent string:
   Our concern is the limited number of samples used and the lack of a detailed description of the lampholder and test results.

Finally, as LED strings and possibly LED lights of other types have obvious merits over incandescent lights, such as much lower power consumption, much longer rated lifetime (need to decide how much longer), improved safety due to low temperature, etc. customers of utility companies should be encouraged to use much more of them. The manufacturers of LED lights, however, have been facing not only manufacturing but also marketing challenges as these are pretty new lighting products and the whole LED

lighting industry is not mature, the manufacturing cost and thus the retail price are still very high, and the rated long lifetime of LED is not guaranteed for some uncertain reasons. While the considerably high price for LED strings has deterred many potential customers away, the LED bulb replaceability and low replacement cost the plug-in lampholders provide are definitely appealing for the customers. Even though the molded seal method prevents connector corrosion inside the lampholders, it still can not prevent the failure of LED strings as the test results showed, and since the replacement cost for molded string are much higher than the plug-in strings, and when considering all aspects and trade offs in terms of the lampholder type, the plug-in LED strings are more affordable and acceptable, and thus superior to the molded LED strings for most of the average customers.