IEEE Standards Interpretations for IEEE Std 1210™-2004 IEEE Standard Tests for Determining Compatibility of Cable-Pulling Lubricants With Wire and Cable

This is an interpretation of IEEE Std 1210-2004.

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Interpretation Request #1
Topic: Heated Immersion of the specimens... **Clause:** 5.4
Clause 5.4 requires the "immersed test specimens, will be heated for the specified time and temperature (refer to Table 1)."

For Type 2, Semiconducting materials, Table 1 calls for immersion at 121 degrees Celsius for 168 hours.

A water-based lubricant such as mine will vaporize and dissipate in that time period, therefore the test specimen cannot remain "immersed."

Is the intention to immerse the specimen, expose it to lubricant until such time as the liquid evaporates, then continue exposing it to the remaining residue for the remaining time period?

Interpretation Response #1
Table 1 contains a number of aging temperatures at or above the boiling point of water. These are the "typical" short-term accelerated aging temperatures for these jackets as found in multiple specifications. Since most pulling lubricants are water-based, some dissipation of the water is anticipated. How much depends on the time and temperature. However, a quantity of 350 ml and a low volume vapor escape situation (5 mm hole in rubber stopper) is specified in the test. A reflux environment is established at all temperatures and often there is still water present at the end of the aging. Note the same issue when a "water" control is used for cable jackets approved for a wet environment.

Regardless, set up the test as specified (specified temperature, specified lubricant quantity, and specified vapor escape (to avoid a pressurized environment). Run the aging for the full specified time length regardless of concentration changes of non-volatiles to volatiles in the reagent. Any residues left should be washed off before physical properties are measured. In Clause 4.3, "the semiconducting material shall show stability if it meets Equation (1)." However, this equation provides no equivalence or limit. To confirm stability, what value must Equation (1) equal or be less than?

Interpretation Request #2
Topic: Incomplete Equation **Clause:** 4.3

In Clause 4.3, "the semiconducting material shall show stability if it meets Equation (1)." However, this equation provides no equivalence or limit. To confirm stability, what value must Equation (1) equal or be less than?

Interpretation Response #2
Yes, there is a typo in equation 1. Looking at the original Word doc, it appears the "less than" symbol did not convert. At any rate, the equation should read.

$$3 \log_{10} r_n < \log_{10} r_{(n-14)} + \log_{10} r_{(n-28)} + \log10\, r_{(n-42)} + 0.3$$

This looks OK on my Word, but alternatively in English:

$3 \log_{10} r_n$ is less than $\log_{10} r_{(n-14)} + \log10\, r_{(n-28})$ + $\log_{10} r_{(n-42)} + 0.3$

This equation has been around forever, and basically requires an increase of less than 1% per day to establish stability. Quick calculations show more like 0.8% per day at a steady increase rate, so the equation seems to serve its function.