IEEE Standards Interpretation for IEEE Std 1290™-1996 IEEE Guide for Motor Operated Valve (MOV) Motor Application, Protection, Control, and Testing in Nuclear Power Generating Stations

This is an interpretation of IEEE Std 1290-1996.

26 November 2001

Interpretation Request #1
Topic: (Users' Feedback) Misinterpretation of the term Cable Temperature. **Relevant Clause:** Annex A, Pages 40, 43, and 48 - Formula for **Cable Resistance Corrected**.

In Annex A, page 40, the formula for **cable resistance corrected** includes the term cable temperature. The correct terminology that should be used is conductor temperature, since there are differences between the two entities.

In situations where the cable is unloaded, and temperature equilibrium exists between cable and conductor, the ambient cable- and conductor temperature will be one and the same, so there is no real concern. However, if the cable is, or has been, carrying current, the conductor temperature will be higher than the cable ambient temperature; and using cable ambient temperature in this formula instead of conductor temperature, would result in an incorrect cable resistance values.

This distinction should also be clarified in the example calculations shown on page 43 and page 48. Identifying and listing both cable ambient temperature and conductor temperature would help users realize that the formula calls for the conductor temperature even though many situations show these values identical.

Interpretation Request #2
Topic: (Users' Feedback) Motor Operated Value (MOV) Calculations. Relevant Clause: Annex A, Clause A.2, Value Actuator Motors (VAM) - **Calculation Method, Page 40.**

Motor Operated Value (MOV) calculations utilize the resistance values of cable, motor, and thermal overload heaters to determine the terminal voltage at the MOV. By using the formula in Annex A, Clause A.2, on page 40, these resistance values are corrected for temperature differences between the reference resistance value and the temperature that the device is exposed.

Since MOV's are intermittent devices operating on demand, the MOV and its appurtenances, including the conductor and thermal overload heater, will usually be at the same temperature as the ambient temperature.

If there is a change in ambient temperature, the MOV and its appurtenances, will over time, reach equilibrium with this new ambient temperature. However; if the MOV is required to operate immediately following the change in temperature, its windings and cables will still be at the earlier temperature. Given this background, MOVs that are required to operate within the first few minutes of an accident can safely be assumed to still be at the pre-accident ambient temperature, and therefore, should not have their motor and conductor resistance values converted to the accident temperature as suggested by the examples provided; instead, the pre-accident temperature will determine the resistance values. The Standard should recognize this category of MOV, and provide necessary guidance.

It is recommended that the working group consider these enhancements (Interpretation Request #1 and Interpretation Request #2) to the Standard, which will help reduce misunderstandings, and improve the calculational methodology.

Interpretation Response #1
(The Chair and Working Group for IEEE Std 1290 have reviewed the above comments and interpretation requests. These comments will be implemented in the next revision.)

The interpretation request comments that the Value Actuator Motor (VAM) conductor temperature may be different from the ambient cable temperature specified in the formula if it has been carrying current.

The IEEE 1290 committee concurs that the term conductor temperature is more descriptive than cable temperature, and it is consistent with the referenced correction factor used for copper conductors. The word conductor will replace the word cable in the body of the text on page 40, Annex A, and the examples on page 43 and page 48.

Interpretation Response #2
In the "High temperature ambient" (example 1 for ac motor torque calculations), the interpretation request comments that the temperature assumed is indicative of accident temperatures, which may not be appropriate for MOVs that are only required to operate at the initiation of a design basis accident.

The several examples given for solving motor torque, assumed different ambient temperatures for the Motor Control Center (MCC) as compared to the motor location in demonstrating the effects of temperature extremes, such as an MCC in a mild environment and an MOV in the environment of a Drywell in a Boiling Water Reactor (BWR). The committee concurs that in the examples it is assumed that 102 degrees C is more in-line with accident temperatures, even though they are not thus identified. In the next revision, the committee will revi ew the temperatures for normal operating conditions in these examples to ensure that the user is not misled into using values that would not be appropriate for their application.