

Ad Hoc on Air Temperatures surrounding cables

The ad hoc group met Tuesday morning, with 18 persons in attendance.

We discussed clauses in C37.20.1 and C37.20.2 that require measuring the air temperature surrounding cables in a compartment, which imply it shall not exceed 65° C.



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The clauses in question do not indicate exactly where this temperature is to be measured.

Questions have also been raised regarding the origin of the 65°C requirement.

Previously, the ad hoc polled manufacturers to determine how this requirement has been applied.



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Input from manufacturers about test methods:

- 1) Most indicated they use a single thermocouple mounted to a metal plate somewhere in the cable compartment
- 2) One stated they use 3 thermocouples, mounted on copper plates hung in the cable compartment (top, middle and upper areas) with no specific distance specified.
- 3) Others said they simply monitor terminal temperatures.



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Manufacturers also indicated that their test methods have evolved over time, and that in some cases, testing is only conducted with bus connections, not cables.

Input from the manufacturers that responded, as well as input from third party certification personnel, indicates that the requirements are not being applied consistently.



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After further discussion, the Ad Hoc agreed that the cable compartment air is very unlikely to exceed 65 C if all the other temperature limits in the switchgear do not exceed their respective maximum temperature rises, and properly sized cables or bus are connected to the load terminals.



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This is based on the following limitations:

- Cable termination points – 45 C maximum rise
- Accessible outer surface of enclosure – 70 C max



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Additionally, when installed in accordance with the NEC, the cables connected to the switchgear will be sized using ampacities based on the NEC, and de-rated based on ambient temperatures.

This normally will result in larger cross sectional area than in the actual test, which will result in less heating inside the switchgear compartment.



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It is the recommendation of the Ad Hoc that references to the air surrounding cables in a compartment be removed from the following standards:

- **C37.20.1**
- **C37.20.2**
- **C37.20.9**
- **C37.20.3 (not currently in the published version, but in the proposed draft)**



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Also note that the NEC allows short portions of a cable run to be located in areas with higher ambients, as long as the “short portion” does not exceed 10% of the total cable run. This allowance essentially eliminates the need for the cable installer to know the internal ambient of the cable compartment.



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This recommendation does NOT include any changes to:

- **temperature limits on cable termination points**
- **temperature limits for accessible services**
- **Any other temperature limits currently in the any of the standards**

