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## **Engineering Note**

**Date: 1/25/01**

**Project: 3M Type 90411 Pleated-Foil Cable**

**Doc. No: U010125A**

**Subject: Temperature Rise Measurements**

### **Introduction**

Tests were performed on the temperature rise of the cable assembly by subjecting one internal conductor (30AWG) to a current of five amperes for a duration of 75 minutes.

This was to represent an extreme fault condition whereby:

- 1) All but one of the four or six conductors carrying AVDD, AVDD2, or DVDD remain to carry all the current going to an HDI, *and*
- 2) The remaining conductor is shorted to ground, *and*
- 3) The current sensing/interrupting circuitry has failed on the Interface board.

Bundle test This test was carried out with the cable carrying about 5 amps and measurements were taken at ten-minute intervals with the cable coiled up tightly upon itself, in the attempt to represent an extreme case. Measurements were taken of the surface of the cable in the bundled portion of the coil.

Free Air test This test was carried out with the cable carrying about 5 amps and measurements were taken at ten-minute intervals with the cable uncoiled so as to be cooled by ambient air. Measurements were taken of the surface of the cable near the center of its length.

The temperature of the single 30 AWG wire is conducted through the dielectric, to the pleated-foil shield, and then through the plastic jacket to the surface.

## Results

<u>Time</u>	<u>I(amps)</u>	<u>Bundle Temp (F)</u>	<u>Free Air temp (F)</u>
0	5.04	72	72
5	5.02	125	86
15	5.0	153	95
25	4.9	182	98
35	4.81	194	99
45	4.70	203	99
55	4.64	213	99
65	4.6	223	99
75	4.58	233	99

## Conclusion

The bundle test showed temperature measured continued rising during the measurement period. This temperature was measured at the sandwiched-surface of the cable where air flow was very restricted and adjacent layers of the cable also had the same current applied.

The free-air test showed that the temperature stabilized quickly at 99 degrees F.

Failure of neither the conductor nor the jacket was observed.

Fusing current if 30AWG wire is 10.2 amperes.<sup>1</sup>

Fusing at the power supply for these circuits will be 5A.

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<sup>1</sup> Edward C. Jordan, Reference Data for Engineers, Seventh Edition, Howard Sams & Co., 1989, p 4-41.