



## EAC Decision on Request for Interpretation 2016-02 (Environmental Control Testing: Operating)

VVSG 1.1 Volume I, Section 4.1.2.13

VVSG 1.1 Volume II, Sections 5.7.1.1 and 5.7.1.2

### *Date:*

October 18, 2016

### *Questions:*

1. Does the temperature ranges outlined in 4.1.2.13 a. unreasonably eliminate COTS products (such as tablets and laptops) from being more widely incorporated into voting systems?
2. Is it required that the relative humidity range of 5% - 85% described in VVSG Volume I Section 4.1.2.13 be completed entirely in the Operating Humidity test described in VVSG Volume II Section 5.7.1.2 or can the requirement be fulfilled by testing the range through the combination of tests described in VVSG Volume II Section 5.7.1 – Operating Temperature and Humidity Tests?
3. How many cycles are required for the Operating Humidity?

### *Section(s) of Guidelines:*

#### **4.1.2.13 Environmental Control - Operating Environment**

- a. Voting systems shall be capable of operation in temperatures ranging from 41 °F to 104 °F (5 °C to 40 °C) and relative humidity from 5% to 85%, non-condensing.
- b. If the system documentation states that the system can operate in humidity higher or lower than the required range, the system shall be tested to the level of humidity asserted in the documentation.

For testing information, see Volume II, section 5.7.1.

#### **5.7.1.1 Operating Temperature**

All voting systems **shall** be tested according to the low temperature and high temperature testing specified by MIL-STD-810-D: Method 502.2, Procedure II – Operation and Method 501.2, Procedure II – Operation, with test conditions that simulate system operation.

#### **5.7.1.2 Operating Humidity**

All voting systems **shall** be tested according to the humidity testing specified by MIL-STD-810-D: Method 507.2, Procedure I – Natural (Hot-Humid), with test conditions that simulate system operation.

## ***Discussion:***

For the past several years, EAC has received input from entities and individuals suggesting that the operational environment temperatures required by VVSG Section 4.1.2.13 are unreasonable for COTS devices. Since more and more COTS devices are being incorporated into voting systems, the EAC felt the need to further review this section to see if, in fact, the requirements are unreasonably limiting COTS products from inclusion into systems seeking EAC certification.

After significant research into this matter, the EAC concludes that while some COTS tablets, laptops and printers are not designed to meet the requirements of Section 4.1.2.13, a large variety of products in the COTS market place are available and have operating environment specifications equal to or exceeding those required by the VVSG. Because there are products readily available that meet these requirements, the EAC finds little merit to the argument that the operating environment requirements are either excessive or limiting to voting system manufacturers.

The EAC has also conducted extensive research into the MIL-STD-810 and determined that there is a disparity between the temperature and humidity ranges in VVSG 1.1 Volume I Section 4.1.2.13 and MIL-STD-810D, against which the standards shall be tested, pursuant to VVSG 1.1 Volume II Section 5.7.1. For the Operating Temperature (high) and the Operating Humidity test, the variation is very minimal, whereas in the Operating Temperature (low) test the variation in temperature is fairly significant.

The temperature range described in MIL-STD-810D Table 501.2-II, set forth in VVSG 1.1 Volume II Section 5.7.1.1, for the high-temperature test under basic hot conditions fulfills the high-temperature (104 °F) and low-humidity (RH 5%) levels described in the VVSG 1.1 Volume I Section 4.1.2.13. Further, the humidity range in MIL-STD-810D Table 507.2-I for Natural, Hot-Humid Conditions (Cycle 1), set forth in VVSG 1.1 Volume II Section 5.7.1.2 fulfills the high- humidity levels (85%) described in the VVSG 1.1 Volume I Section 4.1.2.13. However, as previously stated, the ranges vary slightly between the VVSG 1.1 Volume I Section 4.1.2.13 a. and its respective MIL-STD-810D test procedure. Therefore, the EAC finds that the test labs should adjust the ranges listed in MIL-STD-810D for the Operating Temperature (high) and the Operating Humidity tests proportionately to fulfill the requirements prescribed by VVSG 1.1 Volume I Section 4.1.2.13.

Although the range for Operating Temperature (low) varies significantly from the suggested ranges provided for in MIL-STD-810D Method 502.2, the procedures described in MIL-STD-810-D: Method 502.2, Procedure II – Operation, as required by VVSG 1.1 Volume II Section 5.7.1.1, do not prescribe a specific range; rather the procedures states “With the test item in the test chamber, adjust the chamber air temperature to the low operating temperature of the test item as specified in the test plan.” Since the chamber is to be set to the low operating temperature as specified in the test plan, the test plan shall be 41 °F, pursuant to VVSG 1.1 Volume I Section 4.1.2.13 a.

The MIL-STD-810-D: Method 507.2, Procedure I – Natural (Hot–Humid), Step 4 states “Repeat steps 2 and 3 for the number of cycles indicated in table 507.2-II...” Table 507.2-II states that duration for non-hazardous items under natural conditions (Cycle 1) is 10 cycles.

## ***Conclusion:***

The EAC does not believe that an interpretation or adaptation appears necessary to allow the industry to reasonably meet the temperature requirements of VVSG 1.1 Volume I Section 4.1.2.13.

The EAC concludes that the range of relative humidity does not need to be fulfilled in the single Operating Humidity test as prescribed by VVSG 1.1 Volume II Section 5.7.1.2; rather the range will be met when conducting the three tests defined within the MIL-STD-810D – Operating Temperature (high), Operating Temperature (low), and Operating Humidity. However, in order to align the test procedures for those tests, the EAC has interpreted VVSG Volume II Section 5.7.1 to read as “All voting systems **shall** be tested *similar to...*” the respective tests specified in MIL-STD-810D. To further clarify the term “similar to”, it is the EAC’s intent that the test labs will proportionately adjust the tables contained within the MIL-STD-810D for the Operating Temperature (high) and the Operating Humidity tests, MIL-STD-810D Table 501.2-II and MIL-STD-810D Table 507.2-I for Natural, Hot-Humid Conditions (Cycle 1), respectively, so that they align with the requirements of VVSG 1.1 Volume I Section 4.1.2.13. The proportional methodology is not applicable to the Operating Temperature (low) test in that the procedure for it does not provide a range, yet states “...adjust the chamber air temperature to the low operating temperature of the test item as specified in the test plan.” The test plan shall specify the low operating temperature of 41 °F, pursuant to VVSG 1.1 Volume I Section 4.1.2.13.

The EAC does not believe that an interpretation appears necessary for the number of cycles necessary for the Operating Humidity test. However, Step 3 states that an operational checkout should be performed at any convenient time which test conditions are constant and at a maximum temperature and RH levels. As to not have ambiguity in testing the EAC has interpreted that as during the interval between time = 71 hours and time = 77 hours (maximum RH) and between time = 181 hours and time = 185 hours (maximum temperature).

***Effective Date:***

Effective immediately for all new test campaigns.