Revision to the 2005 VVSG

Conformance Tests for Operating Temperature and Humidity

March 10, 2009

Version 1.1

The following Operating Temperature and Humidity test scenario corresponds to the Operating Temperature and Humidity requirements in the revised VVSG 2005, as specified in **Revision to the 2005 VVSG, Operating Temperature and Humidity**.

Operating Temperature and Humidity
Test Scenario

References to the Revised 2005 VVSG:

Volume I, section 4.1.2.13 Environmental Control - Operating Environment:

- 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.

Volume II, section 4.7.1 Operating Temperature and Humidity Tests

- **4.7.1 Operating Temperature and Humidity Tests**

  All voting systems shall be tested in accordance with the appropriate procedures of MIL-STD-810D, "Environmental Test Methods and Engineering Guidelines".

- **4.7.1.1 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.

- **4.7.1.2 Operating Humidity**

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

Procedure:

Prior to test: Make sure the voting equipment has been maintained at ambient conditions of temperature and humidity for at least 24 hours prior to the test.

Step 1: Perform a pre-test operational status check as in Volume II, Section 4.6.1.5. If the equipment shows evidence of damage, or any examined function or feature is not working correctly, then the equipment under test is defective and testing shall be suspended until the defect is eliminated. In accordance with Volume II, 1.8.2.6-c Certification Test Practices, if corrective action is taken to restore the equipment to a fully operational condition within eight hours, then the testing may be resumed with a re-run of Step 1.

Step 2: Arrange the equipment in the test chamber. Connect as required and provide for power, control, and data service through the enclosure wall. Configure the equipment for operating temperature-humidity test (ports open/closed, etc.) as specified by the manufacturer.

Step 3: Power the equipment; allow it to reach operating temperature.

Step 4: Set the chamber to 41 degrees Fahrenheit and 5% relative humidity (see Comment 1), observing precautions against thermal shock and condensation (see Comment 2). Allow relative humidity and equipment temperature to stabilize. All paper, including ballots, used by the system must be stabilized at the specified testing temperature and humidity levels prior to testing (see Comment 4).

Step 5: Perform an operational status check. If the equipment shows evidence of damage, or any examined function or feature is not working correctly, then the equipment under test fails the test scenario.

Step 6: Set the chamber to 41 degrees Fahrenheit and 85% relative humidity (see Comment 1), observing precautions against thermal shock and condensation (see Comment 2). Allow relative humidity and equipment temperature to stabilize. All paper, including ballots, used by the system must be stabilized at the specified testing temperature and humidity levels prior to testing (see Comment 4).

Step 7: Perform an operational status check. If the equipment shows evidence of damage, or any examined function or feature is not working correctly, then the equipment under test fails the test scenario.

Step 8: Set the chamber to 104 degrees Fahrenheit and 85% relative humidity (see Comment 1), observing precautions against thermal shock and condensation

(see Comment 2). Allow relative humidity and equipment temperature to stabilize. All paper, including ballots, used by the system must be stabilized at the specified testing temperature and humidity levels prior to testing (see Comment 4).

Step 9: Perform an operational status check. If the equipment shows evidence of damage, or any examined function or feature is not working correctly, then the equipment under test fails the test scenario.

Step 10: Set the chamber to 104 degrees Fahrenheit and 5% relative humidity (see Comment 1), observing precautions against thermal shock and condensation (see Comment 2). Allow relative humidity and equipment temperature to stabilize. All paper, including ballots, used by the system must be stabilized at the specified testing temperature and humidity levels prior to testing (see Comment 4).

Step 11: Perform an operational status check. If the equipment shows evidence of damage, or any examined function or feature is not working correctly, then the equipment under test fails the test scenario.

Step 12: Repeat steps 4-11 two more times, so that the equipment completes three temperature-humidity test cycles (see Comment 3).

Step 13: Return the chamber to ambient laboratory conditions, observing precautions against thermal shock and condensation (see Comment 2). Allow relative humidity and equipment temperature to stabilize. All paper, including ballots, used by the system must be stabilized at the ambient laboratory conditions (see Comment 4).

Step 14: Remove the equipment from the chamber.

Step 15: Perform a post-test operational status check. If the equipment shows evidence of damage, or any examined function or feature is not working correctly, then the equipment under test fails the test scenario.

Comments:

1. This test scenario checks for correct operation at four points: (1) 41 degrees Fahrenheit and 5% RH, (2) 41 degrees Fahrenheit and 85% RH, (3) 104 degrees Fahrenheit and 85%, and (4) 104 degrees Fahrenheit and 5%. The transitions between these test points are chosen to facilitate testing and to minimize stress to the equipment being tested, within the scope of the conformance requirements.
2. To prevent thermal shock, MIL-STD-810D recommends a rate of temperature change no greater than 18 degrees Fahrenheit per minute. The more recent standard MIL-STD-810F recommends a rate of temperature change no greater than 6 degrees Fahrenheit per minute.
3. For the operational high temperature test, MIL-STD-810D (and MIL-STD-810F) recommends a minimum of three temperature cycles. This test scenario includes three temperature-humidity cycles to comply with this recommendation. For the humidity test, MIL-STD-810D (and MIL-STD-810F) recommends a minimum of 10 temperature-humidity cycles with an operational check at least every 5 cycles, but has no distinct “operating humidity” test

procedure. Since voting devices are already subjected to 10 temperature-humidity cycles as part of the storage humidity test, this test scenario specifies that the operating temperature-humidity test use three temperature-humidity cycles.

4. Physical changes in paper during changes in temperature and humidity, such as expansion and warping, are significantly affected by the rate of change and by handling procedures such as stacking. When stabilizing paper to the required conditions for operating tests, it is important to follow system and paper manufacturer handling instructions, wherever these instructions are consistent with VVSG testing requirements.