

**DRAFT****VVSG Performance and Workmanship Requirements****Alan Goldfine****March 17, 2006**

This document is a draft of a subset of VVSG 2007, corresponding to the draft outline found at <http://vote.nist.gov/TGDC/Outline-jpw-9-31-051.doc>.

The current wording of a given requirement may have been modified, perhaps significantly, beyond the wording used in the source given in the Origin of Requirement.

**Requirements are written in blue.**

*Notes and open questions are written in green italics.*

**2 Product Standard****2.3 General Requirements****2.3.3 Hardware and Software Performance Requirements**

This section contains requirements for hardware and software performance, and some other general requirements:

- a. Response Time (Normative).
- b. Printer and Other Miscellaneous Hardware Performance (Normative).
- c. Reliability and Availability (Normative).
- d. Accuracy/Error Rates (Normative).
- e. Electrical/RF (Normative).

**2.3.3.1 Response Time**

*Note: Response time requirements will be developed by the HFP subgroup.*

### 2.3.3.2 Printer and Other Miscellaneous Hardware

Note: VVSG 2005 I.4.1.7.2 moved to DWF 4.4.9 – Reporting.

### 2.3.3.3 Reliability

*Note: The Availability requirements in the 2002 VSS (I.3.4.5) have been deleted.*

#### 2.3.3.3.1 Voting systems shall be designed and constructed so that the frequency of equipment malfunctions is reduced to the lowest level consistent with cost constraint.

Origin of Requirement: 2002 VSS Volume I, 3.4.1.a, and VVSG 2005 Volume 1, 4.3.1.a.

Test Reference:

Scope: Voting systems

Discussion:

Impact:

#### 2.3.3.3.1.1 The MTBF of voting systems shall be at least 163 hours in duration

Origin of Requirement: 2002 VSS Volume I, 3.4.3, VVSG 2005 Volume I, 4.3.3.

Test Reference:

Scope: Voting System.

Discussion: The reliability of voting system devices shall be measured as Mean Time Between Failure (MTBF) for the system submitted for testing. MTBF is defined as the value of the ratio of operating time to the number of failures that have occurred in the specified time interval. A typical system operations scenario consist of approximately 45 hours of equipment operation, consisting of 30 hours of equipment set-up and readiness testing and 15 hours of elections operations. For the purpose of demonstrating compliance with this requirement, a failure is defined as any event that results in either:

- a) the loss of one or more functions

- b) the degradation of performance such that the device is unable to perform its intended function for longer than 10 seconds

Impact:

*Note: This 163 hour value of the MTBF was a live issue within the IEEE committee. Proposals were made to increase it to 1500 hours. However, the 163-hour figure is still in the latest P1583 draft standard.*

*Note: Are there any other Reliability requirements?*

#### 2.3.3.4 Accuracy/Error Rates

*Note: VVSG 2005 I.2.1.2a and b moved to DWF 4.4.1 - Election Programming.*

*Note: VVSG 2005 I.2.1.2c (first half) moved to DWF 4.4.6 - Casting.*

*Note: VVSG 2005 I.2.1.2.c (second half) modified by IEEE P1583 5.2.1.1 and moved DWF 4.4.9 - Counting and Reporting. Need input from HFP.*

*Note: VVSG 2005 I.2.1.2d modified by IEEE P1583 5.2.1.1 and moved to DWF 4.4.3 – General Design Requirements.*

*Note: VVSG 2005 I.2.1.2e moved to DWF 4.4.3 – General Design Requirements.*

##### **2.3.3.4.1 Voting systems shall achieve an error rate of no more than one in 10,000,000 ballot positions.**

*Note: Is it correct/desirable to have a sub-requirement for DREs specifying a 0% error rate?*

*Note: Is the specified error rate in this requirement still appropriate?  
Default Action: Stay with the specified error rate.*

Origin of Requirement: 2002 VSS Volume I, 3.2.1, VVSG 2005 Volume I, 4.1.1.

Test Reference:

Scope: Voting system.

Discussion: Required accuracy is defined in terms of an error rate that for testing purposes represents the maximum number of errors allowed while processing a specified volume of data. This rate is set at a sufficiently stringent level such that the likelihood of voting system errors affecting the outcome of an election is exceptionally remote even in the closest of elections.

For testing purposes, the acceptable error rate is defined using two parameters: the desired error rate to be achieved, and the maximum error rate that should be accepted by the test process.

Impact:

*Note: Are there any other Accuracy/Error Rates requirements?*

### 2.3.3.5 Electrical/RF

*Note: The requirements in this section are being rewritten. Some of the existing requirements are flawed in that they seem to be written directly as tests, rather than as pure requirements that have tests associated with them in the testing standard. This will be fixed in the rewrite.*

*Also, the rewritten requirements will rely as much as possible on referencing applicable external standards, rather than repeating or excerpting text from those standards. Some of the external standards being evaluated in this context are:*

- *National Fire Protection Association (NFPA) 70, “National Electrical Code” (2002) Edition*
- *ANSI C84.1-1995 (R2005), “Electrical Power Systems and Equipment Voltage Rating (60 Hertz)”*
- *NIST Special Publication 811, “Guide for the Use of the International Systems of Units (SI)”.*

In the following requirements, "loss of data" refers to votes that have been completed and confirmed by the voter. "Without disruption of normal operation" allows for voting equipment to reset or have momentary interruption so long as normal operation is resumed without human intervention, other than the possible input of passwords or other security activity.

#### 2.3.3.5.1 Electrical Supply

*Note: These requirements have been rewritten.*

##### 2.3.3.5.1.1 Electronic devices shall operate on standard alternating current (AC) circuits according to NFPA 70, “National Electrical Code”.

Origin of Requirement: Test Reference:

Scope: Electronic devices

Discussion:

Impact:

**2.3.3.5.1.2 Electronic devices shall be capable of operating for a period of at least 2 hours on backup power, without disruption of normal operation or loss of data.**

Origin of Requirement: 2002 VSS Volume I, 3.2.2.4 c

Test Reference:

Scope: Electronic devices

Discussion:

Impact:

**2.3.3.5.1.3 When an electronic device has been operating on backup power, and the backup power is exhausted, the system shall retain intact the contents of all memories that store accumulated vote totals, audit data, or Cast Vote Records.**

Origin of Requirement: 2002 VSS Volume I, 3.2.2.4 c, modified by IEEE P1583 5.4.4 b.

Test Reference:

Scope: Electronic devices

Discussion:

Impact:

**2.3.3.5.2 Electrical Power Disturbance**

*Note: These requirements have not yet been rewritten.*

**2.3.3.5.2.1 Electronic devices shall be able to withstand, without disruption of normal operation or loss of data, electrical power disturbances.**

**2.3.3.5.2.1.1 Electronic devices shall be able to withstand voltage dips of 30% of nominal at 10 ms.**

Origin of Requirement: VVSG 2005.

Test Reference:

Scope: Electronic devices

Discussion:

Impact:

**2.3.3.5.2.1.2 Electronic devices shall be able to withstand voltage dips of 60% of nominal at 100 ms & 1 s.**

Origin of Requirement: 2002 VSS Volume I, 3.2.2.5.

Test Reference:

Scope: Electronic devices

Discussion:

Impact:

**2.3.3.5.2.1.3 Electronic devices shall be able to withstand voltage dips of >95% interrupt at 5 s.**

Origin of Requirement: VVSG 2005.

Test Reference:

Scope: Electronic devices

Discussion:

Impact:

**2.3.3.5.2.1.4 Electronic devices shall be able to withstand surges of +-15% line variations of nominal line voltage.**

Origin of Requirement: VVSG 2005.

Test Reference:

Scope: Electronic devices

Discussion:

Impact:

**2.3.3.5.2.1.5 Electronic devices shall be able to withstand Electrical power increases of 7.5% and reductions of 12.5% of nominal specified power supply for a period of up to four (4) hours at each power level.**

Origin of Requirement: VVSG 2005.

Test Reference:

Scope: Electronic devices

Discussion:

Impact:

**2.3.3.5.3 Electrical Fast Transient**

*Note: These requirements have not yet been rewritten.*

**2.3.3.5.3.1 Electronic devices shall be able to withstand, without disruption of normal operation or loss of data, electrical fast transients.**

**2.3.3.5.3.1.1 Electronic devices shall be able to withstand electrical fast transients of + 2 kV and - 2 kV on External Power lines (AC).**

Origin of Requirement: VVSG 2005.

Test Reference:

Scope: Electronic devices

Discussion:

Impact:

**2.3.3.5.3.1.2 Electronic devices shall be able to withstand electrical fast transients of  $\pm 1$  kV all external wires > 3m no control.**

Origin of Requirement: 2002 VSS Volume I, 3.2.2.6, modified by IEEE P1583 5.5.2.

Test Reference:

Scope: Electronic devices

Discussion:

Impact:

**2.3.3.5.3.1.3 Electronic devices shall be able to withstand electrical fast transients of + 1 kV and - 1 kV on Input/Output lines (signal, data, and control lines) longer than 3 meters.**

Origin of Requirement: VVSG 2005.

Test Reference:

Scope: Electronic devices

Discussion:

Impact:

**2.3.3.5.4 Lightning Surge**

*Note: These requirements have not yet been rewritten.*

**2.3.3.5.4.1 Electronic devices shall be able to withstand, without disruption of normal operation or loss of data, lightning surges.**

**2.3.3.5.4.1.1 Electronic devices shall be able to withstand lightning surges of  $\pm 2$  kV AC line to line.**

Origin of Requirement: VVSG 2005.

Test Reference:



Scope: Electronic devices

Discussion:

Impact:

**2.3.3.5.4.1.2 Electronic devices shall be able to withstand lightning surges of  $\pm 2$  kV AC line to earth.**

Origin of Requirement: VVSG 2005.

Test Reference:

Scope: Electronic devices

Discussion:

Impact:

**2.3.3.5.4.1.3 Electronic devices shall be able to withstand lightning surges of  $\pm 1$  kV I/O signal/control at distances  $>30$ m from the voting system.**

Origin of Requirement: VVSG 2005.

Test Reference:

Scope: Electronic devices

Discussion:

Impact:

**2.3.3.5.5 Electrostatic Disruption**

*Note: These requirements have not yet been rewritten.*

**2.3.3.5.5.1 Electronic devices shall be able to withstand, without disruption of normal operation or loss of data, electrostatic disruption.**

**2.3.3.5.5.1.1 Electronic devices shall be able to withstand  $\pm 15$  kV air discharge and  $\pm 8$  kV contact discharge without disruption of normal operation or loss of data.**

Origin of Requirement: VVSG 2005.

Test Reference:

Scope: Electronic devices

Discussion:

Impact:

**2.3.3.5.5.1.2 Memory devices shall be tested both while installed in and separately from their host equipment.**

Origin of Requirement: IEEE P1583 5.5.4.

Test Reference:

Scope: Memory devices

Discussion:

Impact:

**2.3.3.5.6 Electromagnetic Radiation**

*Note: These requirements have not yet been rewritten.*

**2.3.3.5.6.1 Electronic devices shall not produce excessive radiated and conducted electromagnetic emissions.**

**2.3.3.5.6.1.1 Electronic devices shall comply with the Rules and Regulations of the Federal Communications Commission, Part 15, Subpart B requirements for both radiated and conducted emissions.**

Origin of Requirement: VVSG 2005

Test Reference:

Scope: Electronic devices

Discussion:

Impact:

**2.3.3.5.7 Electromagnetic Susceptibility**

*Note: These requirements have not yet been rewritten.*

**2.3.3.5.7.1 Electronic devices shall be able to withstand, without disruption of normal operation or loss of data, electromagnetic radiation.**

**2.3.3.5.7.1.1 Electronic devices shall be able to withstand an electromagnetic field of 10 V/m modulated by a 1 kHz 80% AM modulation (AM) over the frequency range of 80 MHz to 2.5 GHz.**

Origin of Requirement: 2002 VSS Volume I, 3.2.2.10, modified by IEEE P1583 5.5.6.

Test Reference:

Scope: Electronic devices

Discussion:

Impact:

*Note: VVSG 2005 retains 2002 VSS range of 80 MHz to 1000 MHz.*

**2.3.3.5.8 Conducted RF Immunity**

*Note: These requirements have not yet been rewritten.*

**2.3.3.5.8.1 Electronic devices shall be able to withstand, without disruption of normal operation or loss of data, conducted RF energy over the frequency range 150 kHz to 80 MHz.**

**2.3.3.5.8.1.1 Electronic devices shall be able to withstand conducted RF energy of 10 V root mean square (rms) over the frequency range 150 kHz to 80 MHz with an 80% amplitude modulation with a 1 kHz sine wave AC & DC power.**

Origin of Requirement: VVSG 2005.

Test Reference:

Scope: Electronic devices

Discussion:

Impact:

**2.3.3.5.8.1.2 Electronic devices shall be able to withstand conducted RF energy of 10 V sig/control >3 m over the frequency range 150 kHz to 80 MHz with an 80% amplitude modulation with a 1 kHz sine wave.**

Origin of Requirement: VVSG 2005.

Test Reference:

Scope: Electronic devices

Discussion:

Impact:

**2.3.3.5.9 Magnetic Fields Immunity**

*Note: These requirements have not yet been rewritten.*

**2.3.3.5.9.1 Electronic devices shall be able to withstand, without disruption of normal operation or loss of data, magnetic fields.**

**2.3.3.5.9.1.1 Electronic devices shall be able to withstand AC magnetic fields of 30 A/m at 60 Hz.**

Origin of Requirement: VVSG 2005.

Test Reference:

Scope: Electronic devices

Discussion:

Impact:

**2.3.4 Workmanship**

This section contains requirements for voting system materials, and for good design and construction workmanship for software and hardware:

- a. Engineering practices, including coding, quality assurance and configuration management (Normative)

- b. General Build Quality (Normative)
- c. Durability (Normative)
- d. Safety (Normative)
- e. Security and Audit Architectural Requirements (Normative)
- f. Maintainability (Normative)
- g. Size, Space and Weight Issues (Normative)
- h. Temperature, Humidity and other Robustness (Normative)
- i. Equipment Transportation and Storage (Normative).

#### **2.3.4.1 Engineering Practices**

##### **2.3.4.1.1 Coding (DWF)**

##### **2.3.4.1.2 Quality Assurance**

*Note: This entire section is a placeholder, consisting of text from the 2002VSS/VVSG 2005. It may be rewritten from scratch.*

Quality Assurance provides continuous confirmation that a voting system conforms with the VVSG and to the requirements of state and local jurisdictions. Quality Assurance is a vendor function with associated practices that are initiated prior to system development and continue throughout the maintenance life cycle of the voting system. Quality Assurance focuses on building quality into a system and reducing dependence on system tests at the end of the life cycle to detect deficiencies, thus helping ensure that the system:

- meets stated requirements and objectives
- adheres to established standards and conventions
- functions consistent with related components and meets dependencies for use within the jurisdiction
- reflects all changes approved during its initial development, internal testing, laboratory testing and, if applicable, additional certification processes.

##### **2.3.4.1.2.1 Vendors shall design and implement a quality assurance program.**

**2.3.4.1.2.1.1 The vendor quality assurance program shall include procedures for specifying, procuring, inspecting, accepting, and controlling parts and raw materials of the requisite quality.**

**2.3.4.1.2.1.1.1 Vendors shall select parts and materials to be used in voting systems and components according to their suitability for the intended application.**

Origin of Requirement: 2002 VSS Volume I, 7.5, 7.3.

Test Reference:

Scope: Voting systems

Discussion: Suitability may be determined by similarity of this application to existing standard practice, or by means of special tests.

Impact:

**2.3.4.1.2.1.1.2 Vendors shall design special tests, if needed, to evaluate the part or material under conditions accurately simulating the actual operating environment.**

Origin of Requirement: 2002 VSS Volume I, 7.5, 7.3.

Test Reference:

Scope: Voting systems

Discussion:

Impact:

**2.3.4.1.2.1.1.3 Vendors shall maintain the test data resulting from their evaluations as part of the quality assurance program documentation.**

Origin of Requirement: 2002 VSS Volume I, 7.5, 7.3.

Test Reference:

Scope: Voting systems

Discussion:

Impact:

**2.3.4.1.2.1.1.4 Vendors shall be responsible for verifying that the suppliers of any components of its system follow documented quality assurance procedures that are at least as stringent as those used internally by the voting system vendor.**

Origin of Requirement: 2002 VSS Volume I, 7.5, 7.3.

Test Reference:

Scope: Voting systems

Discussion:

Impact:

**2.3.4.1.2.1.2 Vendors shall identify and enforce all requirements for in-process inspection and testing that the vendor deems necessary to ensure proper fabrication and assembly of hardware.**

Origin of Requirement: 2002 VSS Volume I, 7.2 c.

Test Reference:

Scope: Voting systems

Discussion:

Impact:

**2.3.4.1.2.1.3 Vendors shall identify and enforce all requirements for the installation and operation of software (including firmware).**

Origin of Requirement: 2002 VSS Volume I, 7.2 c.

Test Reference:

Scope: Voting systems

Discussion:

Impact:

**2.3.4.1.2.1.4 Voting system vendors shall inspect and test each voting system or component to verify that it meets all inspection and test requirements for the system.**

Origin of Requirement: 2002 VSS Volume I, 7.6 a.

Test Reference:

Scope: Voting systems

Discussion:

Impact:

**2.3.4.1.2.1.5 Voting system vendors shall provide their internal test reports to testing laboratories for review, and to purchasers upon request.**

Origin of Requirement: 2002 VSS Volume I, 7.4 c.

Test Reference:

Scope: Voting systems

Discussion:

Impact:

*Note: Documentation/TDP requirements for Quality Assurance will be covered in Standards on Data to be Provided.*

*Note: To what extent, if any, should the above be replaced by explicit reference to ISO 9000, etc? If ISO 9000 is invoked, should the requirement be that the vendor is certified (by an independent, accredited registrar), or compliant (self-certified)?*

### **2.3.4.1.3 Configuration Management**

*Note: This entire section is a placeholder. It may be rewritten from scratch.*



Configuration management addresses a broad set of record keeping, audit, and reporting activities that contribute to full knowledge and control of a system and its components. These activities include:

- identifying discrete system components
- creating records of a formal baseline and later versions of components
- controlling changes made to the system and its components
- releasing new versions of the system to ITAs
- releasing new versions of the system to customers
- auditing the system, including its documentation, against configuration management records
- controlling interfaces to other systems
- identifying tools used to build and maintain the system.

Requirements for configuration management apply regardless of the specific technologies employed to all voting systems subject to the Standards. These system components include:

- software components
- hardware components
- communications components
- documentation
- identification and naming and conventions (including changes to these conventions) for software programs and data files
- development and testing artifacts such as test data and scripts
- file archiving and data repositories.

*Note: Documentation/TDP requirements for Configuration Management will be covered in Standards on Data to be Provided. All VSS 2002 requirements are in this category.*

#### **2.3.4.2 General Build Quality**

*Note: The requirements in this section will be covered in the new Quality Assurance section.*

##### **2.3.4.2.1 All vendors of voting systems shall practice proper workmanship.**

**2.3.4.2.1.1 All vendors shall adopt and adhere to practices and procedures to ensure that their products are free from damage or defect that could make them unsatisfactory for their intended purpose.**

**2.3.4.2.1.2 All vendors shall ensure that components provided by external suppliers are free from damage or defect that could make them unsatisfactory or hazardous when used for their intended purpose.**

### **2.3.4.3 Durability**

**2.3.4.3.1 Voting systems shall be designed to withstand normal use without deterioration and without excessive maintenance cost for a period of ten years.**

*Note: Is the ten-year period in this requirement still appropriate? Is it testable?*

*Default Action: Stay with ten years.*

*Note: Need a testable sub-requirement for this, specifying an appropriate definition of "excessive."*

Origin of Requirement: 2002 VSS Volume I, 3.4.2, VVSG 2005 Volume I, 4.3.2.

Test Reference:

Scope: Voting systems

Discussion:

Impact:

*Note: Are there any other Durability requirements?*

### **2.3.4.4 Safety**

*Note: Need input from HFP.*

**2.3.4.4.1 Voting systems shall be safe to operate.**

**2.3.4.4.1.1 Systems and their components shall be designed so as to eliminate hazards to personnel, or to the equipment itself.**

Origin of Requirement: 2002 VSS Volume I, 3.4.8 a, VVSG 2005 Volume I, 4.3.8.a.

Test Reference:

Scope: Voting systems

Discussion:

Impact:

*Note: Need a testable sub-requirement for this.*

*Note: Default Action: Delete the requirement.*

**2.3.4.4.1.2 Vendors shall detect and correct all defects in design and construction that can result in personal injury or equipment damage**

Origin of Requirement: 2002 VSS Volume I, 3.4.8 b, VVSG 2005 Volume I, 4.3.8.b.

Test Reference:

Scope: Voting systems

Discussion:

Impact:

*Note: Need a testable sub-requirement for this.*

*Note: Default Action: Delete the requirement.*

**2.3.4.4.1.3 The design and construction of voting systems shall be equal to or better than the appropriate requirements of the Occupational Safety and Health Act (OSHA), as identified in Title 29, part 1910, of the Code of Federal Regulations.**

*Note: Is the OSHA requirement automatically binding on voting equipment? If so, do we need to retain this explicit requirement?*

*Default Action: Retain the requirement.*

Origin of Requirement: 2002 VSS Volume I, 3.4.8 c, VVSG 2005 Volume I, 4.3.8.c.

Test Reference:

Scope: Voting systems.

Discussion:

Impact:

*Note: IEEE P1583 replaces the requirements in 4.1 above with a single requirement that voting systems meet the requirements of IEC 60950-1.*

*Note: Are there any other Safety requirements?*

#### **2.3.4.5 Security and Audit Architectural Requirements (JW)**

#### **2.3.4.6 Maintainability**

Maintainability represents the ease with which maintenance actions can be performed based on the design characteristics of equipment and software and the processes the vendor and election officials have in place for preventing failures and for reacting to failures. Maintainability includes the ability of equipment and software to self-diagnose problems and to make non-technical election workers aware of a problem.

Maintainability addresses all scheduled and unscheduled events, which are performed to:

- determine the operational status of the system or a component
- determine if there is a problem with the equipment and be able to take it off-line (out of service) while retaining all cast ballot data
- adjust, align, tune, or service components
- repair or replace a component having a specified operating life or replacement interval
- repair or replace a component that exhibits an undesirable predetermined physical condition or performance degradation
- repair or replace a component that has failed
- ensure that, by following vendor protocols provided in the TDP, all repairs or replacements of devices or components during election use preserve all stored ballot data and/or election results, as appropriate
- verify the restoration of a component, or the system, to operational status.

Maintainability is determined based on the presence of specific physical attributes that aid system maintenance activities, and the ease with which the testing laboratory can perform system maintenance tasks. Although a more quantitative basis for assessing maintainability, such as the mean time to repair the system is desirable, laboratory testing of a system is conducted before it is approved for sale and thus before a broader base of maintenance experience can be obtained.

**2.3.4.6.1 Voting systems shall be designed and constructed so that the frequency of maintenance procedures is reduced to the lowest level consistent with cost constraint.**

*Note: Need a quantifiable, testable sub-requirement here, if the above is to have any utility.*

*Default Action: Delete the requirement.*

Origin of Requirement: 2002 VSS Volume I, 3.4.1 a, VVSG 2005 Volume I, 4.3.1.a.

Test Reference:

Scope: Voting systems

Discussion:

Impact:

**2.3.4.6.2 Electronic devices shall contain the following physical attributes:**

**a) presence of labels and the identification of test points**

**b) provision of built-in test and diagnostic circuitry or physical indicators of condition**

**c) presence of labels and alarms related to failures**

**d) presence of features that allow non-technicians to perform routine maintenance tasks (such as update of the system database).**

Origin of Requirement: 2002 VSS Volume I, 3.4.4.1, VVSG 2005 Volume I, 4.3.4.1.

Test Reference:

Scope: Electronic device

Discussion:

Impact:

**2.3.4.6.3 Voting systems shall allow for:**

- a) a non-technician to easily detect that the equipment has failed;
- b) a trained technician to easily diagnose problems;
- c) a non-technician to easily perform database updates;
- d) easy access to components for replacement;
- e) easy adjustment, alignment, and tuning of components;
- f) low false alarm rates (i.e., indications of problems that do not exist).

*Note: Need performance measures and appropriate usability tests to assess "easy" and "easily."*

*Note: Need input from HFP.*

*Note: Need a quantification of "low" in f).*

Origin of Requirement: 2002 VSS Volume I, 3.4.4.2, VVSG 2005 Volume I, 4.3.4.3.

Test Reference:

Scope: Voting systems

Discussion:

Impact:

**2.3.4.6.4 Voting systems shall contain permanently affixed data plates or labels that display critical information.**

**2.3.4.6.4.1 Voting systems shall identify the name of its manufacturer or vendor, its device name, its part or model number, its revision letter, its serial number, and if applicable, its power requirements.**

Origin of Requirement: 2002 VSS Volume I, 3.4.6, VVSG 2005 Volume I, 4.3.6.a.

Test Reference:

Scope: Voting systems

Discussion:

Impact:

**2.3.4.6.4.2 Voting systems shall display a schedule for and list of operations required to service or to perform preventive maintenance.**

Origin of Requirement: 2002 VSS Volume I, 3.4.6.b, VVSG 2005 Volume I, 4.3.6.b.

Test Reference:

Scope: Voting systems

Discussion:

Impact:

**2.3.4.6.4.3 Voting systems shall display clear advisory caution and warning instructions to ensure safe operation of the equipment and to avoid exposure to hazardous electrical voltages and moving parts at all locations where operation or exposure may occur.**

Origin of Requirement: 2002 VSS Volume I, 3.4.6, VVSG 2005 Volume I, 4.3.6.c.

Test Reference:

Scope: Voting systems

Discussion:

Impact:

*Note: Are there any other Maintainability requirements?*

**2.3.4.7 Size, Space and Weight Issues**

*Note: 2002 VSS Volume I requirements in this area (3.2.2.2, 3.3.1, and 3.3.2) were deleted for irrelevance and testability reasons. Are there in fact any legitimate requirements here?*

**2.3.4.8 Temperature, Humidity and other Robustness.**

**2.3.4.8.1 Voting systems shall be capable of operation in temperatures ranging from +5°C to +40°C degrees (44° to 104° Fahrenheit) and relative humidity from 5% to 85%, non-condensing.**

Origin of Requirement: IEEE P1583 5.4.5

Test Reference:

Scope: Voting systems

Discussion:

Impact:

**2.3.4.8.2 Voting systems shall be designed to withstand the environmental conditions contained in the appropriate test procedures of the Standards.**

*Note: If this requirement is to have any utility, the forward reference to the test procedures need to be replaced with quantifiable, self contained, testable requirements. Default Action: Delete the requirement.*

Origin of Requirement: 2002 VSS Volume I, 3.2.2, VVSG 2005 Volume I, 4.1.2.

Test Reference:

Scope: Voting systems

Discussion:

Impact:

*Note: Are there any other Temperature, Humidity and other Robustness requirements?*

**2.3.4.9 Equipment Transportation and Storage**

**2.3.4.9.1 Voting systems designated for storage between elections shall meet all performance standards (section 2.3.3) after transit to and from the place of use.**

Origin of Requirement: 2002 VSS Volume I, 2.6.a, VVSG 2005 Volume I, 2.5.a.



Test Reference:

Scope: Voting system

Discussion:

Impact:

**2.3.4.9.2 Voting systems designated for storage between elections shall meet all performance standards (section 2.3.3) after storage between elections.**

Origin of Requirement: 2002 VSS Volume I, 2.6.b, VVSG 2005 Volume I, 2.5.b.

Test Reference:

Scope: Voting system

Discussion:

Impact:

**2.3.4.9.3 Precinct count systems shall be designed for storage and operation in any enclosed facility ordinarily used as a warehouse or polling place, with prominent instructions as to any special storage requirements.**

Origin of Requirement: 2002 VSS Volume II, 4.6.1, VVSG 2005 Volume I, 4.1.2.1.

Test Reference:

Scope: Voting system

Discussion:

Impact:

*Note: Should this requirement be broadened to apply to all voting equipment?*

*Note: Should this be an informative, "good practices" requirement?*

*Note: If this requirement is kept, it needs to be broken into a storage requirement (here), and operational requirements (to be included in preparing, casting, counting, etc., sections).*

**2.3.4.9.4 Voting systems shall meet specific minimum performance requirements during storage.**

Origin of Requirement: 2002 VSS Volume I, 3.2.2.14, modified by IEEE P1583 5.4.6.

Test Reference:

Scope: Voting systems

Discussion: The requirements simulate exposure to physical shock and vibration associated with handling and transportation by surface and air common carriers, and to temperature conditions associated with delivery and storage in an uncontrolled warehouse environment

Impact:

**2.3.4.9.4.1 Voting systems shall withstand high and low storage temperatures ranging from  $-20^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$  to  $+140^{\circ}\text{F}$ ), equivalent to MIL-STD-810D, Methods 501.2 and 502.2, Procedure I-Storage.**

Origin of Requirement: 2002 VSS Volume I, 3.2.2.14, modified by IEEE P1583 5.4.6.

Test Reference:

Scope: Voting systems

Discussion:

Impact:

*Note: Is there an appropriate replacement for the MIL-STD?*

*Default Action: Keep the requirement as-is.*

**2.3.4.9.4.2 Voting systems shall withstand bench handling equivalent to the procedure of MIL-STD-810D, Method 516.3, Procedure VI.**

Origin of Requirement: 2002 VSS Volume I, 3.2.2.14, modified by IEEE P1583 5.4.6.

Test Reference:

Scope: Voting systems

Discussion:

Impact:

*Note: Is there an appropriate replacement for the MIL-STD?*

*Default Action: Keep the requirement as-is.*

**2.3.4.9.4.3 Voting systems shall withstand vibration equivalent to the procedure of MIL-STD-810D, Method 514.3, Category 1- Basic Transportation, Common Carrier.**

Origin of Requirement: 2002 VSS Volume I, 3.2.2.14, modified by IEEE P1583 5.4.6.

Test Reference:

Scope: Voting systems

Discussion:

Impact:

*Note: Is there an appropriate replacement for the MIL-STD?*

*Default Action: Keep the requirement as-is.*

**2.3.4.9.4.4 Voting systems shall withstand uncontrolled humidity equivalent to the procedure of MIL-STD-810D, Method 507.2, Procedure I-Natural Hot-Humid.**

Origin of Requirement: 2002 VSS Volume I, 3.2.2.14, modified by IEEE P1583 5.4.6.

Test Reference:

Scope: Voting systems

Discussion:

Impact:

*Note: Is there an appropriate replacement for the MIL-STD?*

*Default Action: Keep the requirement as-is.*

**2.3.4.9.5 Precinct systems shall:**

- a) Provide a means to safely and easily handle, transport, and install polling place equipment, such as wheels or a handle or handles**

*Note: What criteria should be specified to enable a pass/fail determination?*

- b) Be capable of using, or be provided with, a protective enclosure rendering the equipment capable of withstanding:**

**1. Impact, shock and vibration loads accompanying surface and air transportation**

**2. Stacking loads accompanying storage.**

*Note: Do we need to quantify "capable of withstanding"?*

*Note: Probably belongs in Preparing for Election and Voting.*

Origin of Requirement: 2002 VSS Volume I, 3.3.3, VVSG 2005 Volume I, 4.2.3.

Test Reference

Scope: Precinct systems

Discussion:

Impact:

*Note: Are there any other Equipment Transportation and Storage requirements?*