EVS 5.0.0.0 Requirements Matrix Cross Reference

Volume I	**Voting System Performance Guidelines**				
Section 2	**Functional Requirements**				
2.1	**Overall System Capabilities**			**WoP 3, WoP 26, WoP 30**	
2.1.1	**Security**				
a.	Security access controls are provided that limit or detect access to critical system components to guard against loss of system integrity, availability, confidentiality, and Accountability.	**TDP**	AM_PRE_TC00526_Maintenance login, DS200_PRE_TC00514_Hardware Diagnostics DS850_ES&S_VOTE_TC00581_VVSG_Requirements ERM_POST_TC00669_Validate Media	**WoP 6**	**X**
b.	The provided system functions are executable only in the intended manner and order, and only under the intended conditions.	**FCA**		**WoP 6**	**X**
c.	The system's control logic prevents a system function from executing, if any preconditions to the function have not been met.	**FCA**		**WoP 6**	**X**
d.	Provides safeguards that protect against tampering during system repair or interventions in system operations.	**Security Test**		**WoP 6**	**X**
e.	The security provisions are compatible with the procedures and administrative tasks involved in equipment preparation, testing, and operation.	**FCA**	ERM_POST_TC00669_Validate Media	**WoP 6**	**X**
f.	Incorporates a means of implementing a capability if access to a system function is to be restricted or controlled.	**FCA**	AM_PRE_TC00526_Maintenance login, DS200_PRE_TC00514_Hardware Diagnostics DS850_ES&S_VOTE_TC00581_VVSG_Requirements ERM_POST_TC00669_Validate Media	**WoP 6**	**X**
g.	Provides documentation of mandatory administrative procedures for effective system security.	**Security Test**		**WoP 6**	**X**
2.1.2	**Accuracy**				
a.	Recording the election contests, candidates, and issues exactly as defined by election officials.	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, Pre_TC-22, Pre_TC-23, Pre_TC-27, Pre_TC-31, Pre_TC-32, Pre_TC-33, Pre_TC-73, Pre_TC-74, Pre_TC-106, Pre_TC-107, Pre_TC-52, AM_VOTE_TC00548_Straight Party, DS200_VOTE_TC00611_Ballot Casting	**WHVS07.9, WoP 21**	**X**
b.	Recording the appropriate options for casting and recording votes.	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, VOTE_TC-39, VOTE_TC-40, VOTE_TC-41, VOTE_TC-49, VOTE_TC-50, VOTE_TC-51, VOTE_TC-57, VOTE_TC-58, AM_VOTE_TC00548_Straight Party, DS200_VOTE_TC00611_Ballot Casting	**WHVS07.9, WoP 21**	**X**
c.	Recording of each vote precisely as indicated by the voter and have the ability to produce an accurate report of all votes cast.	**Accuracy Test**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, VOTE_TC-39, VOTE_TC-40, VOTE_TC-41, VOTE_TC-49, VOTE_TC-50, VOTE_TC-51, VOTE_TC-57, VOTE_TC-58, AM_ TC00584-EVS5000-Accuracy-14in-Even, VOTE_TC-EVS5000-DS200 Accuracy, VOTE_TC-EVS5000-DS850 Accuracy DS850_ES&S_VOTE_TC00577_Reports	**WHVS07.9, WoP 21**	**X**

d.	Includes control logic and data processing methods incorporating parity and check sums (or equivalent error detection and correction methods) to demonstrate the system has been designed for accuracy.	**Accuracy Test**	AM_ TC00584-EVS5000-Accuracy-14in-Even, VOTE_TC-EVS5000-DS200 Accuracy, VOTE_TC-EVS5000-DS850 Accuracy	**WHVS07.9, WoP 21**	**X**
e.	Provides software that monitors the overall quality of data read-write and transfer quality status, checking the number and types of errors that occur in any of the relevant operations on data and how they were corrected	**Accuracy Test**	AM_ TC00586-EVS5000-Accuracy-17in-Even, VOTE_TC-EVS5000-DS200 Accuracy, VOTE_TC-EVS5000-DS850 Accuracy	**WHVS07.9, WoP 21**	**X**
f.	As an additional means of ensuring accuracy in DRE systems, voting devices shall record and retain redundant copies of the original ballot image. *A ballot image is an electronic record of all votes cast by the voter, including undervotes.*	**N/A**		**WHVS07.9, WoP 21**	
2.1.3	**Error Recovery**				
a.	Restoration of the device to the operating condition existing immediately prior to an error or failure, without loss or corruption of voting data previously stored in the device.	**System Integration Test**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
b.	Resumption of normal operation following the correction of a failure in a memory component, or in a data processing component, including the central processing unit.	**System Integration Test**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
c.	Recovery from any other external condition that causes equipment to become inoperable, provided that catastrophic electrical or mechanical damage due to external phenomena has not occurred.	**System Integration Test**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
2.1.4	**Integrity**				
a.	Protection against a single point of failure that would prevent further voting at the polling place.	**FCA and TDP**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
b.	Protection against the interruption of electronic power.	**FCA**	VOTE_TC-59	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
c.	Protection against generated or induced electromagnetic radiation.	**Electromagnetic Radiation Test**		**WoP 8 thru 15, WoP 26**	**X**
d.	Protection against ambient temperature and humidity fluctuations.	**Temperature and Power Test**	VOTE_TC-ESS-EVS5000-WoP21-TempPower	**WoP 18, WoP 19, WoP 21, WoP 26**	**X**
e.	Protection against failure of any data input or storage device.	**Electrical Supply Test**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
f.	Protection against any attempt at improper data entry or retrieval.	**Security Test**	DS850_ES&S_VOTE_TC00574_Startup, ERM_POST_TC00634_Activate Tabulators	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**

g.	Records and reports the date and time of any normal or abnormal events.	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, Pre_TC-49, VOTE-TC-18, POST_TC-03, POST_TC-23, AM_VOTE_TC00550_System Audit Functions, DS200_PRE_TC00594_Test Ballots Event Log Summary Report, ERM_POST_TC00667_System Log Report, DS850_ES&S_VOTE_TC00577_Reports	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
h.	Maintenance of a permanent record of original audit data that cannot be modified or overridden but may be augmented by designated authorized officials in order to adjust for errors or omissions (e.g., during the canvassing process).	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, Pre_TC-49, VOTE-TC-18, POST_TC-03, POST_TC-23, AM_VOTE_TC00550_System Audit Functions, DS200_PRE_TC00594_Test Ballots Event Log Summary Report, ERM_POST_TC00667_System Log Report, DS850_ES&S_VOTE_TC00577_Reports	**WHVS07.1, WHVS07.5, WoP 3, WoP 26, WoP 6**	**X**
i.	Detect and record every event, including the occurrence of an error condition that the system cannot overcome, and time-dependent or programmed events that occur without the intervention of the voter or a polling place operator.	**FCA**	Pre_TC-49, VOTE-TC-18, POST_TC-03, POST_TC-23, AM_VOTE_TC00550_System Audit Functions, DS200_PRE_TC00594_Test Ballots Event Log Summary Report, ERM_POST_TC00667_System Log Report, DS850_ES&S_VOTE_TC00577_Reports	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
j.	Detecting and reporting of system status and degree of operability by built-in measurement, self-test, and diagnostic software and hardware.	**FCA**	VOTE_TC-01, VOTE_TC-02, VOTE_TC-03, VOTE_TC-04, VOTE_TC-05, VOTE_TC-06, VOTE_TC-07, VOTE_TC-08, VOTE_TC-09, VOTE_TC-10, VOTE_TC-11, VOTE_TC-12, VOTE_TC-13, VOTE_TC-14, VOTE_TC-15, VOTE_TC-74, VOTE_TC-81, VOTE_TC-82, VOTE_TC-83, VOTE_TC-19, DS850_ES&S_VOTE_TC00574_Startup	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
k.	For DRE systems: Maintenance of a record of each ballot cast using a process and storage location that differs from the main vote detection, interpretation, processing, and reporting path.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
l.	For DRE systems: Provision of a capability to retrieve ballot images in a form readable by humans.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
2.1.5	**System Audit**				
	System's characteristics documented in sufficient detail for accredited test labs and system users to evaluate the adequacy of the system's audit trail.	**TDP and FCA**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
2.1.5.1	**Operational Requirements**				
	Audit records are prepared for all phases of election operations performed using devices controlled by the jurisdiction or its contractors. (Includes ballot preparation, election definition, system readiness tests, voting, and ballot-counting operations).				
2.1.5.1a.	**Time, Sequence, and Preservation of Audit Records**				
i.	Create and maintain a real-time audit record.	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, Pre_TC-49, VOTE-TC-18, POST_TC-03, POST_TC-23, AM_VOTE_TC00550_System Audit Functions, DS200_PRE_TC00594_Test Ballots Event Log Summary Report, ERM_POST_TC00667_System Log Report, DS850_ES&S_VOTE_TC00577_Reports	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**

ii.	System has a real-time clock, and maintains an absolute record of time and date, or record relative to some event whose time and data are known and recorded.	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, Pre_TC-49, VOTE-TC-18, POST_TC-03, POST_TC-23, AM_VOTE_TC00550_System Audit Functions, DS200_PRE_TC00594_Test Ballots Event Log Summary Report, ERM_POST_TC00667_System Log Report, DS850_ES&S_VOTE_TC00577_Reports	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
iii.	All audit record entries include the time-and-date stamp.	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, Pre_TC-49, VOTE-TC-18, POST_TC-03, POST_TC-23, AM_VOTE_TC00550_System Audit Functions, DS200_PRE_TC00594_Test Ballots Event Log Summary Report, ERM_POST_TC00667_System Log Report, DS850_ES&S_VOTE_TC00577_Reports	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
iv.	The audit record shall be active whenever the system is in an operating mode. Record shall be available at all times, though it need not be continually visible.	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, Pre_TC-49, VOTE-TC-18, POST_TC-03, POST_TC-23, AM_VOTE_TC00550_System Audit Functions, DS200_PRE_TC00594_Test Ballots Event Log Summary Report, ERM_POST_TC00667_System Log Report, DS850_ES&S_VOTE_TC00577_Reports	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
v.	The generation of audit record entries shall not be terminated or altered by program control, or by the intervention of any person.	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, Pre_TC-49, VOTE-TC-18, POST_TC-03, POST_TC-23, AM_VOTE_TC00550_System Audit Functions, DS200_PRE_TC00594_Test Ballots Event Log Summary Report, ERM_POST_TC00667_System Log Report, DS850_ES&S_VOTE_TC00577_Reports	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
vi.	System not affected by interruption of power.	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, Pre_TC-49, VOTE-TC-18, POST_TC-03, POST_TC-23, AM_VOTE_TC00550_System Audit Functions, DS200_PRE_TC00594_Test Ballots Event Log Summary Report, ERM_POST_TC00667_System Log Report, DS850_ES&S_VOTE_TC00577_Reports	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
vii.	Printable copy of the audit record. Separate printer is not required, and the record may be produced on the standard system printer if all the following conditions are met:	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, Pre_TC-49, VOTE-TC-18, POST_TC-03, POST_TC-23, AM_VOTE_TC00550_System Audit Functions, DS200_PRE_TC00594_Test Ballots Event Log Summary Report, ERM_POST_TC00667_System Log Report, DS850_ES&S_VOTE_TC00577_Reports	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
	Generation of audit trail records does not interfere with production of output reports	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, Pre_TC-49, VOTE-TC-18, POST_TC-03, POST_TC-23, AM_VOTE_TC00550_System Audit Functions, DS200_PRE_TC00594_Test Ballots Event Log Summary Report, ERM_POST_TC00667_System Log Report, DS850_ES&S_VOTE_TC00577_Reports	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
	Entries can be identified so as to facilitate their recognition, segregation, and retention	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, Pre_TC-49, VOTE-TC-18, POST_TC-03, POST_TC-23, AM_VOTE_TC00550_System Audit Functions, DS200_PRE_TC00594_Test Ballots Event Log Summary Report, ERM_POST_TC00667_System Log Report, DS850_ES&S_VOTE_TC00577_Reports	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**

	Audit record entries are kept physically secure	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, Pre_TC-49, VOTE-TC-18, POST_TC-03, POST_TC-23, AM_VOTE_TC00550_System Audit Functions, DS200_PRE_TC00594_Test Ballots Event Log Summary Report, ERM_POST_TC00667_System Log Report, DS850_ES&S_VOTE_TC00577_Reports	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
2.1.5.1b.	**Error messages**				
i.	Generation, storage and reporting of all error messages as they occur to the user.	**FCA**	AM_VOTE_TC00550_System Audit Functions, DS200_PRE_TC00594_Test Ballots Event Log Summary Report, ERM_POST_TC00667_System Log Report, DS850_ES&S_VOTE_TC00577_Reports	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
ii.	All error messages requiring intervention by an operator or precinct official are displayed or printed unambiguously in easily understood language text, or by means of other suitable visual indicators.	**FCA**	DS850_ES&S_VOTE_TC00581_VVSG_Requirements	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
iii.	System use of numerical error codes for trained technician maintenance or repair containing the text corresponding to the code is self-contained, or affixed inside the unit device.	**FCA**	DS850_ES&S_VOTE_TC00581_VVSG_Requirements	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
iv.	All error messages written clearly.	**FCA**	DS850_ES&S_VOTE_TC00581_VVSG_Requirements	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
v.	The message cue for all systems shall clearly state the action to be performed in the event that voter or operator response is required.	**FCA**	DS850_ES&S_VOTE_TC00581_VVSG_Requirements	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
vi.	That an erroneous response would not lead to irreversible error.	**FCA**	DS850_ES&S_VOTE_TC00581_VVSG_Requirements	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
vii.	Nested error conditions are corrected in a controlled sequence such that system status shall be restored to the initial state existing before the first error occurred.	**FCA**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
2.1.5.1c.	**Status Messages**				
	The display and report of critical status messages use unambiguous indicators or English language.	**FCA**	Pre_TC-12, Pre_TC-49, VOTE-TC-18, POST_TC-03, POST_TC-21, POST_TC-23	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
	For the capability of status messages as part of the real-time audit record.	**FCA**	Pre_TC-12, Pre_TC-49, VOTE-TC-18, POST_TC-03, POST_TC-21, POST_TC-23	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
	For the capability for a jurisdiction to designate critical status messages.	**FCA**	Pre_TC-12, Pre_TC-49, VOTE-TC-18, POST_TC-03, POST_TC-21, POST_TC-23	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
2.1.5.2	**Use of Shared Computing Platforms**				

	COTS operating systems hosting election software: The local terminal (display screen and keyboard) and external connection devices (network cards and ports) configuration only for authorized, identified users.	**FCA**	Pre_TC-78, Pre_TC-01, Pre_TC-103	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
	COTS operating systems hosting election software: The operating system audit is enabled for all session openings and closings, for all process executions and terminations, and for the alteration or deletion of any memory or file object.	**FCA**	Pre_TC-78, Pre_TC-01, Pre_TC-103	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
	COTS operating systems hosting election software: The system is configured to execute only intended and necessary processes during the execution of election software.	**FCA**	Pre_TC-78, Pre_TC-01, Pre_TC-103	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
	COTS operating systems hosting election software: The system has been configured to halt election software processes upon the termination of any critical system process (such as system audit) during the execution of election software.	**FCA**	Pre_TC-78, Pre_TC-01, Pre_TC-103	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
2.1.6	**Election Management System**				
	An EMS shall generate and maintain a database, or one or more interactive databases, that enables election officials or their designees to perform the following functions:				
a.	Definition of the political subdivision boundaries and multiple election districts, as indicated in the system documentation.	**FCA**	Pre_TC-13, Pre_TC-14, Pre_TC-15, Pre_TC-16, Pre_TC-17, Pre_TC-19, Pre_TC-20, Pre_TC-21, Pre_TC-43, Pre_TC-44, Pre-TC-45, Pre_TC-46, Pre_TC-47, Pre_TC-48, Pre_TC-55, Pre_TC-91, Pre_TC-128, Pre_TC-129, Pre_TC-57, Pre_TC-58, Pre_TC-59, Pre_TC-60, Pre_TC-61, Pre_TC-62, Pre_TC-63, Pre_TC-64, Pre_TC-65, Pre_TC-66, Pre_TC-67, Pre_TC-68, Pre_TC-69, Pre_TC-70, Pre_TC-94, Pre_TC-95, Pre_TC-96, Pre_TC-97, Pre_TC-98,	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
b.	Identification of contests, candidates, and issues.	**FCA**	Pre_TC-150, Pre_TC-151, Pre_TC-122, Pre_TC-123, Pre_TC-124, Pre_TC-13, Pre_TC-20, Pre_TC-21, Pre_TC-43, Pre_TC-44, Pre-TC-45, Pre_TC-46, Pre_TC-47, Pre_TC-48, Pre_TC-75, Pre_TC-57, Pre_TC-58, Pre_TC-59, Pre_TC-60, Pre_TC-61, Pre_TC-62, Pre_TC-63, Pre_TC-64, Pre_TC-65, Pre_TC-66, Pre_TC-67, Pre_TC-68, Pre_TC-69, Pre_TC-70, Pre_TC-94, Pre_TC-95, Pre_TC-96, Pre_TC-97, Pre_TC-98, Pre_TC-100, Pre_TC-106, Pre_TC-107, Pre_TC-122	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
c.	Definition of ballot formats and appropriate voting options.	**FCA**	Pre_TC-134, Pre_TC-91, Pre_TC-40, Pre_TC-94, Pre_TC-98, Pre_TC-43, Pre_TC-44, Pre-TC-45, Pre_TC-46, Pre_TC-47, Pre_TC-48, Pre_TC-90	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
d.	Generation of ballots and election-specific programs for vote recording and vote counting equipment.	**FCA**	Pre_TC-43, Pre_TC-44, Pre-TC-45, Pre_TC-46, Pre_TC-47, Pre_TC-48, Pre_TC-52, Pre_TC-53	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**

e.	Installation of ballots and election-specific programs.	**FCA**	Pre_TC-43, Pre_TC-44, Pre-TC-45, Pre_TC-46, Pre_TC-47, Pre_TC-48, Pre_TC-53	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
f.	Validation that ballots and programs have been properly prepared and installed.	**FCA**	Pre_TC-43, Pre_TC-44, Pre-TC-45, Pre_TC-46, Pre_TC-47, Pre_TC-48, VOTE_TC-16	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
g.	Accumulated vote totals at multiple reporting levels as indicated in the system documentation.	**FCA**	Pre_TC-43, Pre_TC-44, Pre-TC-45, Pre_TC-46, Pre_TC-47, Pre_TC-48, POST_TC-08	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
h.	Generation of post-voting reports per Section 2.4 [Post-voting Capabilities].	**FCA**	Pre_TC-43, Pre_TC-44, Pre-TC-45, Pre_TC-46, Pre_TC-47, Pre_TC-48, POST_TC-16, POST_TC-17	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
i.	Process and produce audit reports of the data indicated in Section 5.5 [sic] [5.4 Audit Record Data]	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, Pre_TC-43, Pre_TC-44, Pre-TC-45, Pre_TC-46, Pre_TC-47, Pre_TC-48, Pre_TC-49, Pre_TC-50, VOTE_TC-19, POST_TC-21, POST_TC-23	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
2.1.7	**Vote Tabulating Program** Each voting system shall have a vote tabulation program that will meet specific functional requirements.			**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
2.1.7.1	**Functions**				
	The vote tabulating program software resident in each voting machine, vote count server, or other devices shall include all software modules required to:				
a.	Monitor system status and generate machine-level audit reports.	**FCA**	POST_TC-03, DS200_PRE_TC00593_Test Ballots Event Log Report, DS200_PRE_TC00594_Test Ballots Event Log Summary Report, DS850_ES&S_VOTE_TC00576_Election, ERM_POST_TC00667_System Log Report	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
b.	Accommodate device control functions performed by polling place officials and maintenance personnel.	**FCA**	POST_TC-24, POST_TC-25, DS200_PRE_TC00514_Hardware Diagnostics, DS850_ES&S_VOTE_TC00575_Scanning, ERM_POST_TC00630_ErmShortcut	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
c.	Register and accumulate votes.		DS200_PRE_TC00513_Test Ballots, DS850_ES&S_VOTE_TC00577_Reports, ERM_POST_TC00635_ Update Results Manually	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
d.	Accommodate variations in ballot counting logic.	**FCA**	DS200_VOTE_TC00611_Ballot Casting, DS850_ES&S_VOTE_TC00575_Scanning,	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
2.1.7.2	**Voting Variation**				
	The Technical Data Package accompanying the system shall specifically identify which of the following items *can* and *cannot* be supported by the voting system, as well as *how* the voting system can implement the items supported:				
	Support of closed primaries.	**FCA**	Pre_TC-13, Pre_TC-63, Pre_TC-64, Pre_TC-87, Pre_TC-88, Pre_TC-89, Pre_TC-106, Pre_TC-107	**WoP 3, WoP 26**	**X**

	Support of open primaries.	**FCA**	Pre_TC-14, Pre_TC-65, Pre_TC-66, Pre_TC-87, Pre_TC-88, Pre_TC-89, Pre_TC-106, Pre_TC-107	**WoP 3, WoP 26**	**X**
	Support of partisan offices.	**FCA**	Pre_TC-22, Pre_TC-87, Pre_TC-88, Pre_TC-89, Pre_TC-106, Pre_TC-107	**WoP 3, WoP 26**	**X**
	Support of non-partisan offices.	**FCA**	Pre_TC-23, Pre_TC-87, Pre_TC-88, Pre_TC-89, Pre_TC-106, Pre_TC-107	**WoP 3, WoP 26**	**X**
	Support of write-in voting.	**FCA**	Pre_TC-32, Pre_TC-35, Pre_TC-38	**WoP 3, WoP 26**	**X**
	Support of primary presidential delegation nominations.	**FCA**	Pre_TC-24, Pre_TC-71, Pre_TC-72, Pre_TC-87, Pre_TC-88, Pre_TC-89, Pre_TC-106, Pre_TC-107	**WoP 3, WoP 26**	**X**
	Support of ballot rotation.	**FCA**	N/A	**WoP 3, WoP 27**	**X**
	Support of straight party voting.	**FCA**	Pre_TC-15, Pre_TC-67, Pre_TC-68, Pre_TC-87, Pre_TC-88, Pre_TC-89, Pre_TC-106, Pre_TC-107	**WoP 3, WoP 26**	**X**
	Support of cross-party endorsement	**FCA**	Pre_TC-26, Pre_TC-87, Pre_TC-88, Pre_TC-89, Pre_TC-106, Pre_TC-107	**WoP 3, WoP 26**	**X**
	Support of split precincts.	**FCA**	Pre_TC-16	**WoP 3, WoP 26**	**X**
	Support of vote for N of M.	**FCA**	Pre_TC-27, Pre_TC-73, Pre_TC-74, Pre_TC-106, Pre_TC-107	**WoP 3, WoP 26**	**X**
	Support of recall issues with options.	**FCA**	Pre_TC-28	**WoP 3, WoP 26**	**X**
	Support of cumulative voting.	**FCA**	Pre_TC-29, Pre_TC-87, Pre_TC-88, Pre_TC-89, Pre_TC-106, Pre_TC-107	**WoP 3, WoP 26**	**X**
	Support of ranked order voting.	**FCA**	Pre_TC-30, Pre_TC-87, Pre_TC-88, Pre_TC-89, Pre_TC-106, Pre_TC-107	**WoP 3, WoP 26**	**X**
	Support of provisional or challenged ballots.	**FCA**	Pre_TC-17, Pre_TC-69, Pre_TC-70, Pre_TC-87, Pre_TC-88, Pre_TC-89, Pre_TC-106, Pre_TC-107	**WoP 3, WoP 26**	**X**
2.1.8	**Ballot Counter**				
a.	The counter is able to be set to zero before any ballots are submitted for tally.	**FCA**	VOTE_TC-25, DS200_VOTE_TC00611_Ballot Casting, DS850_ES&S_VOTE_TC00576_Election, ERM_POST_TC00635_Update Results Manually	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
b.	The counter records the number of ballots cast during a particular test cycle or election.	**FCA**	VOTE_TC-25, DS200_VOTE_TC00611_Ballot Casting, DS850_ES&S_VOTE_TC00576_Election, ERM_POST_TC00635_Update Results Manually	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
c.	The counter increases the count only by the input of a ballot.	**FCA**	VOTE_TC-25, DS200_VOTE_TC00611_Ballot Casting, DS850_ES&S_VOTE_TC00576_Election, ERM_POST_TC00635_Update Results Manually	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
d.	Prevention or disabling the resetting of the counter by any person other than authorized persons at authorized points.	**FCA**	VOTE_TC-25, DS200_VOTE_TC00611_Ballot Casting, DS850_ES&S_VOTE_TC00576_Election, ERM_POST_TC00635_Update Results Manually	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
e.	The counter is visible to designated election officials.	**FCA**	VOTE_TC-25, DS200_VOTE_TC00611_Ballot Casting, DS850_ES&S_VOTE_TC00576_Election, ERM_POST_TC00635_Update Results Manually	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
2.1.9	**Telecommunications**				
	Transmission of data during pre-voting, voting or post-voting activities includes capabilities to ensure data are transmitted with no alternation or unauthorized disclosure during transmission for:				
	· Voter Authentication	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26, WoP 31**	

	· Ballot Definition	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26, WoP 31**	
	· Vote Transmission to Central Site	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26, WoP 31**	
	· Vote Count	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26, WoP 31**	
	· List of Voters	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26, WoP 31**	
2.1.10	**Data Retention**				
	All systems shall maintain integrity of voting and audit data during an election and for at least 22 months thereafter.	**FCA**	POST_TC-01, POST_TC-02	**WHVS07.1, WHVS07.5, WoP 3, WoP 26, WoP 30**	**X**
2.2	**Pre-voting Capabilities**				
	All voting systems shall provide capabilities to support:				
	• Ballot preparation	**FCA**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
	• Election programming	**FCA**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
	• Ballot and program installation and control	**FCA**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
	• Readiness testing	**FCA**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
	• Verification at the polling place	**FCA**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
	• Verification at the central counting place	**FCA**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
2.2.1	**Ballot Preparation**				
2.2.1.1	**General Capabilities**				

	Systems provide the general capability for ballot preparation, ballot formatting and ballot production.				
a.	Automatic formatting of ballots in accordance with the requirements for offices, candidates, and measures qualified to be placed on the ballot for each political subdivision and election district.	**FCA**	Pre_TC-138, Pre_TC-139, Pre_TC-22, Pre_TC-23, Pre_TC-24, Pre_TC-26, Pre_TC-27, Pre_TC-28, Pre_TC-29, Pre_TC-30, Pre_TC-31, Pre_TC-32, Pre_TC-33, Pre_TC-34, Pre_TC-35, Pre_TC-36, Pre_TC-37, Pre_TC-38, Pre_TC-39, Pre_TC-71, Pre_TC-72, Pre_TC-73, Pre_TC-74, Pre_TC-98, Pre_TC-106, Pre_TC-107, PRE_TC-ESS-EVS5000-016 Add State, PRE_TC-ESS-EVS5000-019 Add County	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
b.	**Collecting and maintaining the following data:**				
	i. Offices and their associated labels and instructions	**FCA**	Pre_TC-150, Pre_TC-151, Pre_TC-122, Pre_TC-123, Pre_TC-124, Pre_TC-138, Pre_TC-139, Pre_TC-22, Pre_TC-23, Pre_TC-24, Pre_TC-26, Pre_TC-27, Pre_TC-28, Pre_TC-29, Pre_TC-30, Pre_TC-71, Pre_TC-72, Pre_TC-73, Pre_TC-74, Pre_TC-95, Pre_TC-96, Pre_TC-97, Pre_TC-99, Pre_TC-100, Pre_TC-106, Pre_TC-107	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
	ii. Candidate names and their associated labels	**FCA**	Pre_TC-150, Pre_TC-151, Pre_TC-122, Pre_TC-123, Pre_TC-124, Pre_TC-31, Pre_TC-32, Pre_TC-34, Pre_TC-35, Pre_TC-37, Pre_TC-38, Pre_TC-95, Pre_TC-96, Pre_TC-97, Pre_TC-99, Pre_TC-100, PRE_TC-ESS-EVS5000-045 Edit Candidate Level Text	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
	iii. Issues or measures and their associated text	**FCA**	Pre_TC-150, Pre_TC-151, Pre_TC-122, Pre_TC-123, Pre_TC-124, Pre_TC-33, Pre_TC-36, Pre_TC-39, Pre_TC-95, Pre_TC-96, Pre_TC-97, Pre_TC-99, Pre_TC-100, PRE_TC-ESS-EVS5000-102 Edit Question Style Sheet	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
c.	Support of the maximum number of potentially active voting positions as indicated in the system documentation.	**Volume and Stress Test**	AutoMark_V&S_TC00617_Election_A,AutoMark_V&S_TC00618_Election_BAutoMark_V&S_TC00619_Election_C,AutoMark_V&S_TC00620_Election_DAutoMark_V&S_TC00621_Election_E,AutoMark_V&S_TC00622_Election_F DS200_V&S_TC00561_Election_A, DS200_V&S_TC00562_Election_B DS200_V&S_TC00563_Election_C, DS200_V&S_TC00564_Election_D DS200_V&S_TC00565_Election_E, DS200_V&S_TC00566_Election_F DS850_V&S_TC00567_Election_A, DS850_V&S_TC00568_Election_B DS850_V&S_TC00569_Election_C, DS850_V&S_TC00614_Election_D DS850_V&S_TC00615_Election_E, DS850_V&S_TC00616_Election_F	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
d.	Generating ballots that segregate the choices in partisan races by party affiliation for primary election.	**FCA**	Pre_TC-13, Pre_TC-22, Pre_TC-63, Pre_TC-64, Pre_TC-67, Pre_TC-68, Pre_TC-69, Pre_TC-70, Pre_TC-99, PRE_TC-ESS-EVS5000-028 Edit Political Subdivision	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
e.	Generation of ballots containing identifying codes or marks uniquely associated with each format.	**FCA**	Pre_TC-40, Pre_TC-99, PRE_TC-ESS-EVS5000-207 Edit Ballot Sheet	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
f.	Vote response fields, selection buttons, or switches properly align with the specific candidate names and/or issues printed on the ballot display, ballot card or sheet, or separate ballot pages.	**FCA**	Pre_TC-40	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
g.	For paper-based systems, voters are able to make selections by making a mark in areas designated for this purpose upon each ballot card or sheet.	**FCA**	Pre_TC-40	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**

h.	For paper-based systems, marksense systems ensure that the timing marks align properly with the vote response fields.	**FCA**	Pre_TC-53	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
2.2.1.2	**Ballot Formatting**				
	All voting systems shall provide a capability for:				
a.	Creation of newly defined elections.	**FCA**	Pre_TC-134, Pre_TC-120, Pre_TC-122, Pre_TC-123, Pre_TC-124, Pre_TC-138, Pre_TC-139, Pre_TC-13, Pre_TC-14, Pre_TC-15, Pre_TC-16, Pre_TC-17, Pre_TC-19, Pre_TC-20, Pre_TC-21, Pre_TC-55, Pre_TC-75, Pre_TC-91, Pre_TC-57, Pre_TC-58, Pre_TC-59, Pre_TC-60, Pre_TC-61, Pre_TC-62, Pre_TC-63, Pre_TC-64, Pre_TC-65, Pre_TC-66, Pre_TC-67, Pre_TC-68, Pre_TC-69, Pre_TC-70, Pre_TC-87, Pre_TC-88, Pre_TC-89, Pre_TC-90, Pre_TC-94, Pre_TC-95, Pre_TC-96, Pre_TC-97, Pre_TC-101, Pre_TC-105, Pre_TC-118, Pre_TC-119, Pre_TC-135, Pre_TC-136, PRE_TC-ESS-EVS5000-019 Add County	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
b.	Rapid and error-free definition of elections and their associated ballot layouts.	**FCA**	Pre_TC-134, Pre_TC-120, Pre_TC-122, Pre_TC-123, Pre_TC-124, Pre_TC-138, Pre_TC-139, Pre_TC-13, Pre_TC-14, Pre_TC-15, Pre_TC-16, Pre_TC-17, Pre_TC-19, Pre_TC-20, Pre_TC-21, Pre_TC-55, Pre_TC-75, Pre_TC-91, Pre_TC-128, Pre_TC-129, Pre_TC-57, Pre_TC-58, Pre_TC-59, Pre_TC-60, Pre_TC-61, Pre_TC-62, Pre_TC-63, Pre_TC-64, Pre_TC-65, Pre_TC-66, Pre_TC-67, Pre_TC-68, Pre_TC-69, Pre_TC-70, Pre_TC-87, Pre_TC-88, Pre_TC-89, Pre_TC-90, Pre_TC-94, Pre_TC-95, Pre_TC-96, Pre_TC-97, Pre_TC-98, Pre_TC-99, Pre_TC-101, Pre_TC-105, Pre_TC-106, Pre_TC-107, Pre_TC-118, Pre_TC-119, Pre_TC-135, Pre_TC-136, Pre_TC-132, PRE_TC-ESS-EVS5000-068 Print Ballots to PDF	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
c.	Uniform allocation of space and fonts used for each office, candidate, and contest such that the voter perceives no active voting position to be preferred to any other.	**FCA**	Pre_TC-150, Pre_TC-151, Pre_TC-138, Pre_TC-139, Pre_TC-40, Pre_TC-98, Pre_TC-99, Pre_TC-100, VOTE_TC-75	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
d.	Simultaneous display of the maximum number of choices for a single contest as indicated by the vendor in the system documentation.	**FCA**	Pre_TC-19, Pre_TC-20, VOTE_TC-75	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
e.	Retention of previously defined formats for an election.	**FCA**	Pre_TC-90, Pre_TC-52	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
f.	Prevention of unauthorized modification of any ballot formats.	**FCA**	Pre_TC-52	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
g.	Modification by authorized persons of a previously defined ballot format for use in a subsequent election.	**FCA**	PRE_TC-44, PRE_TC-46, Pre_TC-48	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
2.2.1.3	**Ballot Production**				
	The voting system shall provide a means of printing or otherwise generating a ballot display that can be installed in all voting equipment for which it is intended.				

	All voting systems shall provide the following capabilities:				
a.	The electronic display or printed document on which the user views the ballot is capable of rendering an image of the ballot in any of the languages required by The Voting Rights Act of 1965, as amended	**FCA**	Pre_TC-134, Pre_TC-122, Pre_TC-123, Pre_TC-124, Pre_TC-18, Pre_TC-75, Pre_TC-40, Pre_TC-99, AM_VOTE_TC00535_Alternate Language, DS200_VOTE_TC00644_Closed Primary Ballot Casting	**WoP 3, WoP 26**	**X**
	The following Languages were displayed during test:				
b.	The electronic display or printed document on which the user views the ballot does not show any advertising or commercial logos of any kind, whether public service, commercial, or political, unless specifically provided for in State law. Electronic displays shall not provide connection to such material through hyperlink.	**FCA**	Pre_TC-40, Pre_TC-99, DS200_VOTE_TC00611_Ballot Casting	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
c.	The ballot conforms to vendor specifications for type of paper stock, weight, size, shape, size and location of punch or mark field used to record votes, folding, bleed through, and ink for printing if paper ballot documents or paper displays are part of the system.	**FCA**	Pre_TC-53	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
	Vendor documentation for marksense systems shall include specifications for ballot materials to ensure that vote selections are read from only a single ballot at a time, without detection of marks from multiple ballots concurrently (e.g., reading of bleed-through from other ballots).	**FCA**	VOTE_TC-68	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
2.2.2	**Election Programming** *Process by which election officials or their designees use election databases and vendor system software to logically define the voter choices associated with the contents of the ballots*				
a.	Logical definition of the ballot, including the definition of the number of allowable choices for each office and contest.	**FCA**	Pre_TC-138, Pre_TC-139, Pre_TC-31, Pre_TC-32, Pre_TC-33, Pre_TC-34, Pre_TC-35, Pre_TC-36, Pre_TC-37, Pre_TC-38, Pre_TC-39, Pre_TC-57, Pre_TC-87, Pre_TC-88, Pre_TC-89, Pre_TC-106, Pre_TC-107	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
b.	Logical definition of political and administrative subdivisions, where the list of candidates or contests varies between polling places.	**FCA**	Pre_TC-14, Pre_TC-15, Pre_TC-16, Pre_TC-17, Pre_TC-19, Pre_TC-20, Pre_TC-21, Pre_TC-55, Pre_TC-91, Pre_TC-128, Pre_TC-129, Pre_TC-58, Pre_TC-59, Pre_TC-60, Pre_TC-61, Pre_TC-62, Pre_TC-63, Pre_TC-64, Pre_TC-65, Pre_TC-66, Pre_TC-67, Pre_TC-68, Pre_TC-69, Pre_TC-70, Pre_TC-94	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
c.	Exclusion of any contest on the ballot in which the voter is prohibited from casting a ballot because of place of residence, or other such administrative or geographical criteria.	**FCA**	Pre_TC-16, Pre_TC-17, Pre_TC-69, Pre_TC-70	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**

d.	Ability to select from a range of voting options to conform to the laws of the jurisdiction in which the system will be used.	**FCA**	Pre_TC-138, Pre_TC-139, Pre_TC-13, Pre_TC-14, Pre_TC-15, Pre_TC-16, Pre_TC-17, Pre_TC-19, Pre_TC-20, Pre_TC-18, Pre_TC-75, Pre_TC-91, Pre_TC-22, Pre_TC-23, Pre_TC-24, Pre_TC-26, Pre_TC-27, Pre_TC-28, Pre_TC-29, Pre_TC-30, Pre_TC-63, Pre_TC-64, Pre_TC-65, Pre_TC-66, Pre_TC-67, Pre_TC-68, Pre_TC-69, Pre_TC-70, Pre_TC-71, Pre_TC-72, Pre_TC-73, Pre_TC-74, Pre_TC-94, Pre_TC-101, Pre_TC-135, Pre_TC-136	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
e.	Generation of all required master and distributed copies of the voting program, in conformance with the definition of the ballots for each voting device and polling place, and for each tabulating device.	**FCA**	Pre_TC-13, Pre_TC-14, Pre_TC-15, Pre_TC-16, Pre_TC-17, Pre_TC-19, Pre_TC-20, Pre_TC-63, Pre_TC-64, Pre_TC-65, Pre_TC-66, Pre_TC-67, Pre_TC-68, Pre_TC-69, Pre_TC-70, Pre_TC-53	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
2.2.3	**Ballot and Program Installation and Control**				
	All systems provide a means of installing ballots and programs on each piece of polling place or central count equipment according to the ballot requirements of the election and the jurisdiction.				
a.	Documented a detailed work plan providing a schedule and steps for the software and ballot installation, including a table outlining the key dates, events and deliverables.	**FCA**	PRE_TC-54, VOTE_TC-16	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
b.	Capability for automatically verifying that the software has been properly selected and installed in the equipment or in programmable memory devices and for indicating errors.	**FCA**	Pre_TC-53, VOTE_TC-16, DS200_PRE_TC00519_Load Election, DS850_ES&S_VOTE_TC00574_Startup	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
c.	The capability for automatically validating that software correctly matches the ballot formats that it is intended to process, for detecting errors, and for immediately notifying an election official of detected errors.	**FCA**	DS200_PRE_TC00519_Load Election, DS850_ES&S_VOTE_TC00574_Startup	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
2.2.4	**Readiness Testing**				
a.	Provide the capabilities to verify that voting equipment and precinct count equipment is properly prepared for an election, and collect data that verifies equipment readiness.	**FCA**	VOTE_TC-01, VOTE_TC-02, VOTE_TC-03, VOTE_TC-04, VOTE_TC-05, VOTE_TC-06, VOTE_TC-07, VOTE_TC-08, VOTE_TC-09, VOTE_TC-10, VOTE_TC-11, VOTE_TC-12, VOTE_TC-13, VOTE_TC-81, VOTE_TC-82, VOTE_TC-83, VOTE_TC-16, VOTE_TC-19, DS200_PRE_TC00502_Readiness Testing and Poling Place Verification, DS850_ES&S_VOTE_TC00576_Election, ERM_VOTE_TC00631_Create ERM from XML	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
b.	Provide capabilities for obtaining status and data reports from each set of equipment.	**FCA**	VOTE_TC-01, VOTE_TC-13, VOTE_TC-16, VOTE_TC-19, DS200_PRE_TC00502_Readiness Testing and Poling Place Verification, DS850_ES&S_VOTE_TC00574_Startup, ERM_POST_TC00663_Reprint DS200 Reports	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**

c.	Verify the correct installation and interface of all voting equipment.	**FCA**	VOTE_TC-01, VOTE_TC-02, VOTE_TC-03, VOTE_TC-04, VOTE_TC-05, VOTE_TC-06, VOTE_TC-07, VOTE_TC-08, VOTE_TC-09, VOTE_TC-10, VOTE_TC-11, VOTE_TC-12, VOTE_TC-13, VOTE_TC-81, VOTE_TC-82, VOTE_TC-83, VOTE_TC-16, VOTE_TC-19, AM_PRE_TC00527_Polling Place Verification, DS200_PRE_TC00502_Readiness Testing and Poling Place Verification, DS850_ES&S_VOTE_TC00574_Startup, ERM_POST_TC00660_Help Menu	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
d.	Verify that hardware and software function correctly.	**FCA**	VOTE_TC-01, VOTE_TC-02, VOTE_TC-03, VOTE_TC-04, VOTE_TC-05, VOTE_TC-06, VOTE_TC-07, VOTE_TC-08, VOTE_TC-09, VOTE_TC-10, VOTE_TC-11, VOTE_TC-12, VOTE_TC-13, VOTE_TC-81, VOTE_TC-82, VOTE_TC-83, VOTE_TC-16, VOTE_TC-19, DS200_PRE_TC00514_Hardware Diagnostics, DS850_ES&S_VOTE_TC00574_Startup	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
e.	Provide capabilities for generating consolidated data reports at the polling place and higher jurisdictional levels.	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, POST_TC-12, DS850_ES&S_VOTE_TC00577_Reports, ERM_POST_TC00677_Election Summary Report	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
f.	Provide capabilities for segregating test data from actual voting data, either procedurally or by hardware/software features.	**FCA**	POST_TC-05, POST_TC-06, POST_TC-07, DS200_PRE_TC00502_Readiness Testing and Poling Place Verification	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
g.	Resident test software, external devices, and special purpose test software connected to or installed in voting devices to simulate operator and voter functions used for these tests shall be capable of being tested separately, and shall be proven to be reliable verification tools prior to their use.	**FCA**	VOTE_TC-12	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
h.	Resident test software, external devices, and special purpose test software connected to or installed in voting devices to simulate operator and voter functions used for these tests shall be incapable of altering or introducing any residual effect on the intended operation of the voting device during any succeeding test and operational phase.	**FCA**	VOTE_TC-12	**WoP 3, WoP 26, WoP 21**	**X**
i.	Paper-based systems shall support of conversion testing that uses all potential ballot positions as active positions.	**FCA**	VOTE_TC-15, VOTE_TC-74, AM_PRE_TC00533_Test ballot feature, DS200_PRE_TC00629_Test Ballots All Fill	**WoP 3, WoP 26, WoP 21**	**X**
j.	Paper-based systems shall support of conversion testing of ballots with active position density for systems without pre-designated ballot positions.	**FCA**	VOTE_TC-15, VOTE_TC-74	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
2.2.5	**Verification at Polling Place**				
	All systems provide a formal record of the following, in any media, upon verification of the authenticity of the command source:				
a.	The election's identification data.	**FCA**	VOTE_TC-17, VOTE_TC-23, VOTE_TC-24, POST_TC-05, POST_TC-06, DS200_PRE_TC00502_Readiness Testing and Poling Place Verification	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**

b.	The identification of all equipment units.	**FCA**	VOTE_TC-17, VOTE_TC-23, VOTE_TC-24, POST_TC-05, POST_TC-06, AM_PRE_TC-Polling Place Verification, DS200_PRE_TC00502_Readiness Testing and Poling Place Verification	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
c.	The identification of the polling place.	**FCA**	VOTE_TC-17, VOTE_TC-23, VOTE_TC-24, POST_TC-05, POST_TC-06, AM_PRE_TC-Polling Place Verification, DS200_PRE_TC00502_Readiness Testing and Poling Place Verification	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
d.	The identification of all ballot formats.	**FCA**	VOTE_TC-23, POST_TC-05, POST_TC-06, DS200_PRE_TC00521_Test Ballots Ballot Status Accunting Report	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
e.	The contents of each active candidate register by office and of each active measure register at all storage locations (showing that they contain only zeros).	**FCA**	VOTE_TC-24, POST_TC-05, POST_TC-06, DS200_PRE_TC00597_Zero Totals Ballot Status Accunting Report	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
f.	A list of all ballot fields that can be used to invoke special voting options.	**FCA**	VOTE_TC-23, VOTE_TC-24, POST_TC-05, POST_TC-06	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
g.	Other information needed to confirm the readiness of the equipment, and to accommodate administrative reporting requirements.	**FCA**	VOTE_TC-17, POST_TC-05, POST_TC-06, AM_PRE_TC-Polling Place Verification DS200_PRE_TC00502_Readiness Testing and Poling Place Verification	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
h.	Capability to test all voting devices prior to opening to confirm no hardware or software failures.	**FCA**	VOTE_TC-01, VOTE_TC-02, VOTE_TC-03, VOTE_TC-04, VOTE_TC-05, VOTE_TC-06, VOTE_TC-07, VOTE_TC-08, VOTE_TC-09, VOTE_TC-10, VOTE_TC-11, VOTE_TC-12, VOTE_TC-13, VOTE_TC-81, VOTE_TC-82, VOTE_TC-83, VOTE_TC-16, POST_TC-05, POST_TC-06	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
i.	Capability to test all voting devices prior to opening to confirm that the device is ready to be activated for accepting votes.	**FCA**	VOTE_TC-01, VOTE_TC-02, VOTE_TC-03, VOTE_TC-04, VOTE_TC-05, VOTE_TC-06, VOTE_TC-07, VOTE_TC-08, VOTE_TC-09, VOTE_TC-10, VOTE_TC-11, VOTE_TC-12, VOTE_TC-13, VOTE_TC-81, VOTE_TC-82, VOTE_TC-83, VOTE_TC-16, POST_TC-05, POST_TC-06, DS200_PRE_TC00502_Readiness Testing and Poling Place Verification	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
	For equipment that consolidates polling place data at one or more central counting places, there is verification for the correct extraction of voting data from transportable memory devices or transmission of secure data over secure communication links.	**FCA**	POST_TC-05, POST_TC-06	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
2.2.6	**Verification at the Central Location**				
	Upon verification of the authenticity of the command source, any equipment used in a central count environment provides a printed record of:				
a.	The election's identification data	**FCA**	VOTE_TC-17, VOTE_TC-23, VOTE_TC-24, DS850_ES&S_VOTE_TC00574_Startup, ERM_POST_TC00634_Activate Tabulators	**WoP 3, WoP 26**	

b.	The contents of each active candidate register by office and of each active measure register at all storage locations (showing that they contain only zeros)	**FCA**	VOTE_TC-17, VOTE_TC-24, DS850_ES&S_VOTE_TC00577_Reports, ERM_POST_TC00677_Election Summary Report	**WoP 3, WoP 26**	
c.	Other information needed to confirm the readiness of the equipment, and to accommodate administrative reporting requirements	**FCA**	VOTE_TC-17, VOTE_TC-23, VOTE_TC-24, DS850_ES&S_VOTE_TC00574_Startup, ERM_POST_TC00677_Election Summary Report	**WoP 3, WoP 26**	
2.3	**Voting Capabilities**				
	All voting systems shall support:				
	• Opening the polls	**FCA**	VOTE_TC-22, VOTE_TC-25, VOTE_TC-26, VOTE_TC-27, VOTE_TC-28, VOTE_TC-29, VOTE_TC-30, VOTE_TC-31, VOTE_TC-39, VOTE_TC-55, VOTE_TC-59, VOTE_TC-60	**WHVS07.1, WHVS07.5, WoP 26**	**X**
	• Casting a ballot	**FCA**	VOTE_TC-22, VOTE_TC-25, VOTE_TC-26, VOTE_TC-27, VOTE_TC-28, VOTE_TC-29, VOTE_TC-30, VOTE_TC-31, VOTE_TC-39, VOTE_TC-55, VOTE_TC-59, VOTE_TC-60	**WHVS07.1, WHVS07.5, WoP 26**	**X**
	Additionally, all DRE systems shall support:				
	• Activating the ballot	**N/A**		**WHVS07.1, WHVS07.5, WoP 26**	
	• Augmenting the election counter	**N/A**		**WHVS07.1, WHVS07.5, WoP 26**	
	• Augmenting the life-cycle counter	**N/A**		**WHVS07.1, WHVS07.5, WoP 26**	
2.3.1	**Opening the Polls**				
2.3.1.1	**Precinct Count Systems**				
a.	All precinct count systems shall provide an internal test or diagnostic capability to verify that all of the polling place tests specified in 2.2.5 [Verification at the Polling Place] have been successfully completed.	**FCA**	Pre_TC-40, VOTE_TC-01	**WHVS07.1, WHVS07.5, WoP 26**	**X**
b.	All precinct count systems shall provide automatic disabling any device that has not been tested until it has been tested.	**FCA**	VOTE_TC-01	**WHVS07.1, WHVS07.5, WoP 26**	**X**
2.3.1.2	**Paper-Based System Requirements**				
a.	All paper-based systems shall include a means of verifying that ballot marking devices are properly prepared and ready to use.	**FCA**	VOTE_TC-01, VOTE_TC-03, VOTE_TC-06, VOTE_TC-07, VOTE_TC-10, VOTE_TC-11, VOTE_TC-12, VOTE_TC-13	**WoP 3, WoP 26**	**X**
b.	All paper-based systems shall include a voting booth or similar facility, in which the voter may mark the ballot in privacy.	**FCA**	VOTE_TC-01, VOTE_TC-03, VOTE_TC-06, VOTE_TC-07, VOTE_TC-10, VOTE_TC-11, VOTE_TC-12, VOTE_TC-13	**WoP 3, WoP 26**	**X**
c.	All paper-based systems shall include secure receptacles for holding voted ballots.	**FCA**	VOTE_TC-01, VOTE_TC-03, VOTE_TC-06, VOTE_TC-07, VOTE_TC-10, VOTE_TC-11, VOTE_TC-12, VOTE_TC-13	**WoP 3, WoP 26**	**X**
d.	All paper-based precinct count equipment shall include a means of activating the ballot counting device.	**FCA**	VOTE_TC-01, VOTE_TC-03, VOTE_TC-06, VOTE_TC-07, VOTE_TC-10, VOTE_TC-11, VOTE_TC-12, VOTE_TC-13,VOTE_TC-22, DS200_VOTE_TC00611_Ballot Casting	**WoP 3, WoP 26**	**X**

e.	All paper-based precinct count equipment shall include a means of verifying that the device has been correctly activated and is functioning properly.	**FCA**	VOTE_TC-01, VOTE_TC-03, VOTE_TC-06, VOTE_TC-07, VOTE_TC-10, VOTE_TC-11, VOTE_TC-12, VOTE_TC-13	**WoP 3, WoP 26**	**X**
f.	All paper-based precinct count equipment shall include a means of identifying device failure and corrective action needed.	**FCA**		**WoP 3, WoP 26**	**X**
2.3.1.3	**DRE System Requirements**				
a.	All DRE Systems shall include a security seal, password, or data code to verify that they prevent the inadvertent or unauthorized actuation of poll-opening functions.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
b.	All DRE Systems shall include a means of enforcing the execution of steps in the proper sequence.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
c.	All DRE Systems shall include a means of verifying the system has been activated correctly.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
d.	All DRE Systems shall include a means of identifying system failure and any corrective action needed.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
2.3.2	**Activating the Ballot (DRE Systems)**				
a.	To activate the ballot, all DRE Systems shall enable election officials to control the content of the ballot presented to the voter, either printed form or electronic display, such that each voter is permitted to record votes only in contests in which that voter is authorized to vote.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
b.	All DRE Systems shall allow each eligible voter to cast a ballot.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
c.	All DRE Systems shall prevent a voter from voting on a ballot to which s/he is not entitled.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
d.	All DRE Systems shall prevent a voter from casting more than one ballot in the same election.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
e.	All DRE Systems shall activate the casting of a ballot in a general election.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
f.	All DRE Systems shall enable the selection of the ballot that is appropriate to the party affiliation declared by the voter in a primary election.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
g.	All DRE Systems shall activate all portions of the ballot upon which the voter is entitled to vote.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	

h.	All DRE Systems shall disable all portions of the ballot upon which the voter is not entitled to vote.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
2.3.3	**Casting a Ballot**				
	Systems must provide additional functional capabilities that enable accessibility to disabled voters as defined in Subsection 3.2 [Accessibility Requirements].	**Usability Test**	VOTE_TC-54, VOTE_TC-56	**WoP 3, WoP 26, WoP 30**	**X**
2.3.3.1	**Common Requirements**				
a.	All systems shall provide text that is at least 3 millimeters high and provide the capability to adjust or magnify the text to an apparent size of 6.3 millimeters.	**Usability Test and FCA**	VOTE_TC-54	**WoP 3, WoP 26**	**X**
b.	All systems shall protect the secrecy of the vote such that the system cannot reveal any information about how a particular voter voted, except as otherwise required by individual State law.	**Usability Test**	DS850_ES&S_VOTE_TC00575_Scanning	**WoP 3, WoP 26**	**X**
c.	All systems shall record the selection and non-selection of individual vote choices for each contest and ballot measure.	**Usability Test and FCA**	VOTE_TC-32, VOTE_TC-33, VOTE_TC-36, VOTE_TC-43, VOTE_TC-44, VOTE_TC-47, VOTE_TC-61, VOTE_TC-62, VOTE_TC-79, VOTE_TC-80, AM_VOTE_TC00548_Straight Party, DS200_VOTE_TC00643_Early Voting Ballot Casting, DS850_ES&S_VOTE_TC00576_Election	**WoP 3, WoP 26**	**X**
d.	All systems shall record the voter's selection of candidates whose names do not appear on the ballot, if permitted under State law, and record as many write-in votes as the number of candidates the voter is allowed to select.	**FCA**	VOTE_TC-33, VOTE_TC-61, VOTE_TC-62, VOTE_TC-79, AM_VOTE_TC00558_Write in	**WoP 3, WoP 26**	**X**
e.	In the event of a failure of the main power supply external to the voting system, all systems shall provide the capability for any voter who is voting at the time to complete casting a ballot, allow for the successful shutdown of the voting system without loss or degradation of the voting and audit data, and allow voters to resume voting once the voting system has reverted to back-up power.	**FCA and Electrical Supply**	VOTE_TC-59	**WoP 3, WoP 26**	**X**
f.	All systems shall provide the capability for voters to continue cast ballots in the event of a failure of a telecommunications connection within the polling place or between the polling place and any other location.	**N/A**		**WoP 3, WoP 26, WoP 31**	
2.3.3.2	**Paper-Based System Requirements**				
a.	All paper-based systems shall allow the voter to easily identify the voting field that is associated with each candidate or ballot measure response.	**FCA**	VOTE_TC-32, VOTE_TC-33, VOTE_TC-61, VOTE_TC-79, AM_VOTE_TC00548_Straight Party, DS200_VOTE_TC00611_Ballot Casting	**WoP 3, WoP 26**	**X**

b.	All paper-based systems shall allow the voter to mark the ballot to register a vote.	**Usability Test and FCA**	VOTE_TC-32, VOTE_TC-33, VOTE_TC-61, VOTE_TC-79, AM_VOTE_TC00548_Straight Party, DS200_VOTE_TC00611_Ballot Casting	**WoP 3, WoP 26**	**X**
c.	All paper-based systems shall allow either the voter or the appropriate election official to place the voted ballot into the ballot counting device (precinct count systems) or a secure receptacle (central count systems).	**FCA**	VOTE_TC-39, VOTE_TC-40, VOTE_TC-41, VOTE_TC-57, DS200_VOTE_TC00611_Ballot Casting	**WoP 3, WoP 26**	**X**
d.	All paper-based systems shall protect the secrecy of the vote throughout the process.	**Usability Test and FCA**		**WoP 3, WoP 26**	**X**
e.	All paper-based precinct count systems shall provide feedback to the voter that identifies specific contests for which s/he has made no selection or fewer than the allowable number of selection (e.g., undervotes).	**Usability Test and FCA**	VOTE_TC-41, VOTE_TC-57, DS200_VOTE_TC00611_Ballot Casting, AM_VOTE_TC00552_Undervote	**WoP 3, WoP 26**	**X**
f.	All paper-based precinct count systems shall notify the voter if he or she has made more than the allowable number of selections for any contest (e.g., overvotes)	**Usability Test and FCA**	VOTE_TC-40, AM_VOTE_TC00546_Overvote, DS200_VOTE_TC00611_Ballot Casting	**WoP 3, WoP 26**	**X**
g.	All paper-based precinct count systems shall notify the voter before the ballot is cast and counted of the effect of making more than the allowable number of selections for a contest.	**Usability Test and FCA**	VOTE_TC-40, AM_VOTE_TC00546_Overvote, DS200_VOTE_TC00611_Ballot Casting	**WoP 3, WoP 26**	**X**
h.	All paper-based precinct count systems shall provide the voter opportunity to correct the ballot for either an undervote or overvote before the ballot is cast and counted.	**Usability Test and FCA**	VOTE_TC-40, VOTE_TC-41, VOTE_TC-57, AM_VOTE_TC00552_Undervote, AM_VOTE_TC00546_Overvote, DS200_VOTE_TC00611_Ballot Casting	**WoP 3, WoP 26**	**X**
2.3.3.3	**DRE Systems Requirements**				
a.	DRE Systems shall prohibit the voter from accessing or viewing any information on the display screen that has not been authorized by election officials and preprogrammed into the voting system (i.e., no potential for display of external information or linking to other information sources).	**Usability Test and FCA**	AM_VOTE_TC00548_Straight Party,	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
b.	DRE Systems shall enable the voter to easily identify the selection button or switch, or the active area of the ballot display, that is associated with each candidate or ballot measure response.	**Usability Test and FCA**	AM_VOTE_TC00548_Straight Party,	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
c.	DRE Systems shall allow the voter to select his or her preferences on the ballot in any legal number and combination.	**Usability Test and FCA**	AM_VOTE_TC00548_Straight Party,	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
d.	DRE Systems shall indicate that a selection has been made or canceled.	**Usability Test and FCA**	AM_VOTE_TC00548_Straight Party,	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	

e.	DRE Systems shall indicate to the voter when no selection, or an insufficient number of selections, has been made for a contest (e.g., undervotes).	**Usability Test and FCA**	AM_VOTE_TC00552_Undervote,	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
f.	DRE Systems shall notify the voter if he or she has made more than the allowable number of selections for any contest (e.g., overvotes).	**Usability Test and FCA**	AM_VOTE_TC00546_Overvote,	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
g.	DRE Systems shall notify the voter before the ballot is cast and counted of the effect of making more than the allowable number of selections for a contest.	**Usability Test and FCA**	AM_VOTE_TC00546_Overvote,	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
h.	DRE Systems shall provide the voter opportunity to correct the ballot for either an undervote or overvote before the ballot is cast and counted.	**Usability Test and FCA**	AM_VOTE_TC00549_Summary Selections Menu	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
i.	DRE Systems shall notify the voter when the selection of candidates and measures is completed.	**Usability Test and FCA**	AM_VOTE_TC00549_Summary Selections Menu	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
j.	DRE Systems shall allow the voter, before the ballot is cast, to review his or her choices and, if the voter desires, to delete or change his or her choices before the ballot is cast.	**Usability Test and FCA**	AM_VOTE_TC00549_Summary Selections Menu	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
k.	For electronic image displays, DRE Systems shall prompt the voter to confirm the voter's choices before casting his or her ballot, signifying to the voter that casting the ballot is irrevocable and directing the voter to confirm the voter's intention to cast the ballot.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
l.	DRE Systems shall notify the voter after the vote has been stored successfully that the ballot has been cast.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
m.	DRE Systems shall notify the voter that the ballot has not been cast successfully if it is not stored successfully, including storage of the ballot image, and provide clear instruction as to the steps the voter should take to cast his or her ballot should this event occur.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
n.	DRE Systems shall provide sufficient computational performance to provide responses back to each voter entry in no more than three seconds.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
o.	DRE Systems shall ensure that the votes stored accurately represent the actual votes cast.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26, WoP 21**	
p.	DRE Systems shall prevent modification of the voter's vote after the ballot is cast.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	

q.	DRE Systems shall provide a capability to retrieve ballot images in a form readable by humans [in accordance with the requirements of Subsections 2.1.2 (f) [Accuracy] and 2.1.4 (k) and (l)] [Integrity].	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
r.	DRE Systems shall increment the proper ballot position registers or counters.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
s.	DRE Systems shall protect the secrecy of the vote throughout the voting process.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
t.	DRE Systems shall prohibit access to voted ballots until after the close of polls.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
u.	DRE Systems shall provide the ability for election officials to submit test ballots for use in verifying the end-to-end integrity of the voting system.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
v.	DRE Systems shall isolate test ballots such that they are accounted for accurately in vote counts and are not reflected in official vote counts for specific candidates or measures.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
2.4	**Post-Voting Capabilities**				
	All voting systems shall provide capabilities to accumulate and report results for the jurisdiction and to generate audit trails.	**FCA**	POST_TC-02	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
	Precinct count voting systems must provide a means to close the polls including generating appropriate reports.	**FCA**	POST_TC-02	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
2.4.1	**Closing the Polls**				
a.	For precinct count systems: Preventing the further casting of ballots once the polls have closed.	**FCA**	VOTE_TC-71, VOTE_TC-72, DS200_VOTE_TC00611_Ballot Casting	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
b.	For precinct count systems: Providing an internal test that verifies that the prescribed closing procedure has been followed, and that the device status is normal.	**FCA**	VOTE_TC-70	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
c.	For precinct count systems: Incorporating a visible indication of system status.	**FCA**	VOTE_TC-70, DS200_VOTE_TC00611_Ballot Casting	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
d.	For precinct count systems: Producing a diagnostic test record that verifies the sequence of events, and indicates that the extraction of voting data has been activated.	**FCA**	VOTE_TC-70, POST_TC-02	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
e.	For precinct count systems: Precluding the unauthorized reopening of the polls once the poll closing has been completed for that election.	**FCA**	VOTE_TC-71, DS200_POST_TC00612_Polls Re-open and Vote clearing	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
2.4.2	**Consolidating Vote Data**				

	All systems provide a means to consolidate vote data from all polling places, and optionally from other sources such as absentee ballots, provisional ballots, and voted ballots requiring human review (e.g., write-in votes).	**FCA**	Pre_TC-91, POST_TC-05, POST_TC-06, POST_TC-07, POST_TC-09, POST_TC-10, POST_TC-11, ERM_POST_TC00661_Merge Results	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
2.4.3	**Producing Reports**				
	All systems shall be able to create reports summarizing the vote data on multiple levels.				
a.	All systems shall provide capabilities to support geographic reporting, which requires the reporting of all results for each contest at the precinct level and additional jurisdictional levels.	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, POST_TC-16, POST_TC-17, DS850_ES&S_VOTE_TC00577_Reports, ERM_POST_TC00642_Display Precinct Results	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
b.	All systems shall provide capabilities to produce a printed report of the number of ballots counted by each tabulator.	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, POST_TC-17, ERM_POST_TC00677_Election Summary Report	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
c.	All systems shall provide capabilities to produce a printed report for each tabulator of the results of each contest that includes the votes cast for each selection, the count of undervotes, and the count of overvotes.	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, POST_TC-17, DS200_VOTE_TC00611_Ballot Casting, DS850_ES&S_VOTE_TC00577_Reports, ERM_POST_TC00677_Election Summary Report	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
d.	All systems shall provide capabilities to produce a consolidated printed report of the results for each contest of all votes cast (including the count of ballots from other sources supported by the system as specified by the vendor) that includes the votes cast for each selection, the count of undervotes, and the count of overvotes.	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, POST_TC-16, ERM_POST_TC00677_Election Summary Report	**WoP 3, WoP 26**	**X**
e.	All systems shall be capable of producing a consolidated printed report of the combination of overvotes for any contest that is selected by an authorized official (e.g.; the number of overvotes in a given contest combining candidate A and candidate B, combining candidate A and candidate C, etc.).	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, POST_TC-16	**WoP 3, WoP 26**	**X**
f.	All systems shall provide capabilities to produce all system audit information required in Subsection 5.4 [Audit Record Data] in the form of printed reports, or in electronic memory for printing centrally.	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, Pre_TC-49, Pre_TC-50, VOTE-TC-18, VOTE_TC-19, POST_TC-03, POST_TC-21, POST_TC-23, DS850_ES&S_VOTE_TC00577_Reports	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
g.	All systems shall provide capabilities to prevent data from being altered or destroyed by report generation, or by the transmission of results over telecommunications lines.	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, POST_TC-01, POST_TC-06, DS200_POST_TC00626_Polls Closed Event Log Report, DS850_ES&S_VOTE_TC00577_Reports, ERM_POST_TC00665_Precinct Summary Report	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**

h.	All precinct count voting systems shall prevent the printing of reports and the unauthorized extraction of data prior to the official close of the polls.	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, VOTE_TC-73	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
i.	All precinct count voting systems shall provide a means to extract information from a transportable programmable memory device or data storage medium for vote consolidation.	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, POST_TC-01, POST_TC-05, POST_TC-06, POST_TC-07	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
j.	All precinct count systems shall consolidate the data contained in each unit into a single report for the polling place when more than one voting machine or precinct tabulator is used.	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, POST_TC-12	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
k.	All precinct count systems shall prevent data in transportable memory from being altered or destroyed by report generation, or by the transmission of results over telecommunications lines.	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, POST_TC-01, POST_TC-05, DS200_VOTE_TC00611_Ballot Casting	**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
2.4.4	**Broadcasting Results**				
a.	Systems that make unofficial results available shall provide only aggregated results, and not data from individual ballots.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
b.	Systems that make unofficial results available shall provide no access path from unofficial electronic reports or files to the storage devices for official data.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
c.	Systems that make unofficial results available shall clearly indicate on each report or file that the results it contains are unofficial.	**N/A**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	
2.5	**Maintenance, Transportation and Storage**				
	All systems shall be designed and manufactured to facilitate preventive and corrective maintenance, conforming to the hardware standards described in Subsection 4.1. [Performance Requirements]	**Bench Handling Test, Vibration Test**		**WHVS07.1, WHVS07.5, WoP 3, WoP 26**	**X**
a.	All vote casting and tally equipment designated for storage between elections shall function without degradation in capabilities after transit to and from the place of use, as demonstrated by meeting the performance standards described in Subsection 4.1.	**Bench Handling Test, Vibration Test**		**WHVS07.1, WHVS07.5, WoP 3, WoP 16, WoP 17**	**X**
b.	All vote casting and tally equipment designated for storage between elections shall function without degradation in capabilities after storage between elections, as demonstrated by meeting the performance standards described in Subsection 4.1.	**Bench Handling Test, Vibration Test**		**WHVS07.1, WHVS07.5, WoP 3,**	**X**

3	**Usability and Accessibility Requirements**				
1.	The voting process shall be accessible to individuals with disabilities. The voting process includes access to the polling place, instructions on how to vote, initiating the voting session, making ballot selections, review of the ballot, final submission of the ballot, and getting help when needed.	**Usability Test**		**WoP 3, WoP 26, WoP 24-1, WoP 24-1a thru - 1g, WoP 24-2, WoP 24-2a thru 24-2h**	**X**
2.	The ballot shall be presented to the voter in a manner that is clear and usable. Voters should encounter no difficulty or confusion regarding the process for recording their selections.	**Usability Test**		**WoP 3, WoP 26, WoP 24-1, WoP 24-1a thru - 1g, WoP 24-2, WoP 24-2a thru 24-2h**	**X**
3.	The voting process shall preclude anyone else from determining the content of a voter's ballot, without the voter's cooperation. If such a determination is made against the wishes of the voter, then his or her privacy has been violated.	**Usability Test**		**WoP 3, WoP 26, WoP 24-1, WoP 24-1a thru - 1g, WoP 24-2, WoP 24-2a thru 24-2h**	**X**
3.1	**Usability Requirements**				
a. 1. A. i.	The voting system (including any lever voting system, optical scanning voting system, or direct recording electronic system) shall permit the voter to verify (in a private and independent manner) the votes selected by the voter on the ballot before the ballot is cast and counted.	**Usability Test**	VOTE_TC-37, VOTE_TC-48	**WoP 24-1b**	**X**
a. 1. A. ii.	The voting system (including any lever voting system, optical scanning voting system, or direct recording electronic system) shall provide the voter with the opportunity (in a private and independent manner) to change the ballot or correct any error before the ballot is cast and counted (including the opportunity to correct the error through the issuance of a replacement ballot if the voter was otherwise unable to change the ballot or correct any error).	**Usability Test**	VOTE_TC-37, VOTE_TC-48	**WoP 24-1b**	**X**
a. 1. A. iii.	If the voter selects votes for more than one candidate for a single office:	**Usability Test**		**WoP 24-1b**	**X**
	I. Notify the voter that the voter has selected more than one candidate for a single office on the ballot;	**Usability Test**		**WoP 24-1b**	**X**
	II. Notify the voter before the ballot is cast and counted of the effect of casting multiple votes for the office; and	**Usability Test**		**WoP 24-1b**	**X**
	III. Provide the voter with the opportunity to correct the ballot before the ballot is cast and counted.	**Usability Test**		**WoP 24-1b**	**X**

a. 1. B.	A state or jurisdiction that uses a paper ballot voting system, a punch card voting system, or a central count voting system (including mail-in absentee ballots and mail-in ballots), may meet the requirements of subparagraph (A)(iii) by:	**Usability Test**		**WoP 24-1**	**X**
	i. Establishing a voter education program specific to that voting system that notifies each voter of the effect of casting multiple votes for an office; and	**Usability Test**		**WoP 24-1**	**X**
	ii. Providing the voter with instructions on how to correct the ballot before it is cast and counted (including instructions on how to correct the error through the issuance of a replacement ballot if the voter was otherwise unable to change the ballot or correct any error).	**Usability Test**		**WoP 24-1**	**X**
a. 1. C.	The voting system shall ensure that any notification required under this paragraph preserves the privacy of the voter and the confidentiality of the ballot.	**Usability Test**		**WoP 24-1b**	**X**
3.1.1	**Usability Testing**				
	The vendor shall conduct summative usability tests on the voting system using individuals representative of the general population. The vendor shall document the testing performed and report the test results using the Common Industry Format. This documentation shall be included in the Technical Data Package submitted to the EAC for national certification.	**TDP**			**X**
	For the present, vendors can define their own testing protocols.	**TDP**			**X**
3.1.2	**Functional Capabilities**				
a.	The voting system shall provide feedback to the voter that identifies specific contests or ballot issues for which he or she has made no selection or fewer than the allowable number of selections (e.g., undervotes).	**FCA and Usability Test**	AM_VOTE_TC00552_Undervote,	**WoP 24-1b**	**X**
b.	The voting system shall notify the voter if he or she has made more than the allowable number of selections for any contest (e.g., overvotes).	**FCA and Usability Test**	AM_VOTE_TC00546_Overvote	**WoP 24-1b**	**X**
c.	The voting system shall notify the voter before the ballot is cast and counted of the effect of making more than the allowable number of selections for a contest.	**FCA and Usability Test**	AM_VOTE_TC00546_Overvote	**WoP 24-1b**	**X**

d.	The voting system shall provide the voter the opportunity to correct the ballot for either an undervote or overvote before the ballot is cast and counted.	**FCA and Usability Test**	VOTE_TC-37, VOTE_TC-38, VOTE_TC-48, AM_VOTE_TC00549_Summary Selections Menu	**WoP 24-1b**	**X**
e.	The voting system shall allow the voter, at his or her choice, to submit an undervoted ballot without correction.	**FCA and Usability Test**	AM_VOTE_TC00552_Undervote,	**WoP 24-1b**	**X**
f.	DRE voting machines shall allow the voter to change a vote within a contest before advancing to the next contest.	**N/A**		**WoP 24-1b**	
g.	DRE voting machines should provide navigation controls that allow the voter to advance to the next contest or go back to the previous contest before completing a vote on the contest currently being presented (whether visually or aurally).	**N/A**		**WoP 24-1b**	
3.1.3	**Alternative Languages**				
	The voting equipment shall be capable of presenting the ballot, ballot selections, review screens and instructions in any language required by state or federal law.	**FCA and Usability Test**	Pre_TC-134, Pre_TC-122, Pre_TC-123, Pre_TC-124, Pre_TC-75, Pre_TC-109, Pre_TC-110, Pre_TC-111, VOTE_TC-53, AM_VOTE_TC00535_Alternate Language	**WoP 24-1c**	**X**
	HAVA Section 301 (a) (4) states that the voting system shall provide alternative language accessibility pursuant to the requirements of Section 203 of the Voting Rights Act f 1965 (42 U.S.C. 1973aa-1a)….As a practical matter, alternative language access is mandated under the Voting Rights Act of 1975, subject to certain thresholds, e.g. if the language group exceeds 5% of the voting age population. The audio interface provided for blind voters may also assist voters who speak English, but are unable to read it (See Subsection 3.2.2.2) [Blindness].	**FCA and Usability Test**	Pre_TC-134, Pre_TC-122, Pre_TC-123, Pre_TC-124, Pre_TC-75, Pre_TC-109, Pre_TC-110, Pre_TC-111, VOTE_TC-53	**WoP 24-1c**	**X**
3.1.4	**Cognitive Issues**				
a.	Consistent with election law, the voting system should support a process that does not introduce any bias for or against any of the selections to be made by the voter. In both visual and aural formats, contest choices shall be presented in an equivalent manner.	**FCA and Usability Test**	VOTE_TC-75, VOTE_TC-76	**WoP 24-1d**	**X**
	Comparable characteristics such as font size or voice volume and speed must be the same for all choices.	**FCA and Usability Test**	VOTE_TC-75, VOTE_TC-76	**WoP 24-1d**	**X**
b.	The voting machine or related materials shall provide clear instructions and assistance to allow voters to successfully execute and cast their ballots independently.	**FCA and Usability Test**	VOTE_TC-75, VOTE_TC-76	**WoP 24-1d**	**X**

b. i.	Voting machines or related materials shall provide a means for the voter to get help at any time during the voting session.	**FCA and Usability Test**	VOTE_TC-75, VOTE_TC-76	**WoP 24-1d**	**X**
	DRE machines may provide help with a distinctive "help" button. Any type of voting equipment may provide written instructions that are separate from the ballot.	**N/A**		**WoP 24-1d**	
b. ii.	The voting machine shall provide instructions for all its valid operations.	**FCA and Usability Test**	VOTE_TC-75, VOTE_TC-76, AM_VOTE_TC00545_Operating Instructions Validation	**WoP 24-1d, WoP 3**	**X**
	If an operation is available to the voter, it must be documented.	**FCA and Usability Test**	VOTE_TC-75, VOTE_TC-76	**WoP 24-1d, WoP 3**	**X**
c.	The voting system shall provide the capability to design a ballot for maximum clarity and comprehension.	**FCA and Usability Test**	VOTE_TC-75	**WoP 24-1d**	**X**
c. i.	The voting equipment should not visually present a single contest spread over two pages or two columns.	**FCA**	VOTE_TC-75, VOTE_TC-76, AM_VOTE_TC0559_Zoom with Large Contest	**WoP 24-1d**	**X**
	If a contest has a large number of candidates, it may be infeasible to observe this guideline.		VOTE_TC-75, VOTE_TC-76, AM_VOTE_TC0559_Zoom with Large Contest	**WoP 24-1d**	
c. ii.	The ballot shall clearly indicate the maximum number of candidates for which one can vote within a single contest.	**FCA and Usability Test**	VOTE_TC-75, VOTE_TC-76, AM_VOTE_TC00553_Vote for review	**WoP 24-1d**	**X**
c. iii.	There shall be a consistent relationship between the name of a candidate and the mechanism used to vote for that	**FCA and Usability Test**	VOTE_TC-75, AM_VOTE_TC00548_Straight Party	**WoP 24-1d** **WoP 24-1d**	 **X**
d.	Warnings and alerts issued by the voting system should clearly state the nature of the problem and the set of responses available to the voter. The warning should clearly state whether the voter has performed or attempted an invalid operation or whether the voting equipment itself has malfunctioned in some way.	**FCA and Usability Test**	VOTE_TC-75, VOTE_TC-76, AM_VOTE_TC00546_Overvote	**WoP 24-1d**	**X**
e.	The use of color by the voting system should agree with common conventions:			**WoP 24-1d**	
	(a) green, blue or white is used for general information or as a normal status indicator;	**FCA and Usability Test**	VOTE_TC-75	**WoP 24-1d**	**X**
	(b) amber or yellow is used to indicate warnings or a marginal status;	**FCA and Usability Test**	VOTE_TC-75	**WoP 24-1d**	**X**
	(c) red is used to indicate error conditions or a problem requiring immediate attention.	**FCA and Usability Test**	VOTE_TC-75	**WoP 24-1d**	**X**
3.1.5	**Perceptual Issues**				
a.	No voting machine display screen shall flicker with a frequency between 2 Hz and 55 Hz.	**Usability Test**	VOTE_TC-108-US	**WoP 24-1e**	**X**

b.	Any aspect of the voting machine that is adjustable by the voter or poll worker, including font size, color, contrast, and audio volume, shall automatically reset to a standard default value upon completion of that voter's session.	**Usability Test**	VOTE_TC-103-US, AM_VOTE_TC00541_Display adjustments reset	**WoP 24-1e**	**X**
	The voting machine must present the same initial appearance to every voter.	**Usability Test**	VOTE_TC-103-US, AM_VOTE_TC00541_Display adjustments reset		
c.	If any aspect of a voting machine is adjustable by the voter or poll worker, there shall be a mechanism to reset all such aspects to their default values.	**Usability Test**	VOTE_TC-103-US, AM_VOTE_TC00541_Display adjustments reset	**WoP 24-1e**	**X**
d.	All electronic voting machines shall provide a minimum font size of 3.0 mm (measured as the height of a capital letter) for all text.	**FCA and Usability Test**	VOTE_TC-110-US	**WoP 24-1e**	**X**
e.	All voting machines using paper ballots should make provisions for voters with poor reading vision.	**Usability Test**	VOTE_TC-54-US	**WoP 24-1e**	**X**
f.	The default color coding shall maximize correct perception by voters with color blindness.	**Usability Test**	PRE_TC-40-US, VOTE_TC-109-US	**WoP 24-1e**	**X**
g.	Color coding shall not be used as the sole means of conveying information, indicating an action, prompting a response, or distinguishing a visual element.	**Usability Test**	PRE_TC-40-US, VOTE_TC-98-US	**WoP 24-1e**	**X**
	While color can be used for emphasis, some other non-color must also be used to convey the information, such as shape or text style (e.g., red can be enclosed in an octagon shape).	**Usability Test**	PRE_TC-40-US, VOTE_TC-98-US		
h.	All text intended for the voter should be presented in a sans serif font.	**FCA and Usability Test**	PRE_TC-40-US	**WoP 24-1e**	**X**
i.	The minimum figure-to-ground ambient contrast ratio for all text and informational graphics (including icons) intended for the voter shall be 3:1.	**Usability Test**	VOTE_TC-110-US, VOTE_TC-99-US	**WoP 24-1e**	**X**
3.1.6	**Interaction Issues**				
a.	Voting machines with electronic image displays shall not require page scrolling by the voter.	**Usability Test**	VOTE_TC-105-US, AM_VOTE_TC00548_Straight Party	**WoP 24-1f**	**X**
	This is not an intuitive operation for those unfamiliar with the use of computers. Even those experienced with computers often do not notice a scroll bar and miss information at the bottom of the "page." Voting systems may require voters to move to the next or previous "page."	**Usability Test**	VOTE_TC-105-US, AM_VOTE_TC00548_Straight Party	**WoP 24-1f**	**X**
b.	The voting machine shall provide unambiguous feedback regarding the voter's selection, such as displaying a checkmark beside the selected option or conspicuously changing its appearance.	**Usability Test**	VOTE_TC-44-US , VOTE_TC-33-US, AM_VOTE_TC00548_Straight Party	**WoP 24-1f**	**X**

c.	If the voting machine requires a response by a voter within a specific period of time, it shall issue an alert at least 20 seconds before this time period has expired and provide a means by which the voter may receive additional time.	**Usability Test**	VOTE_TC-92-US, AM_VOTE_TC00551_Timeout Feature	**WoP 24-1f**	
d. i.	Input mechanisms shall be designed to minimize accidental activation.	**Usability Test**	VOTE_TC-100-US	**WoP 24-1f**	**X**
	On touch screens, the sensitive touch areas shall have a minimum height of 0.5 inches and minimum width of 0.7 inches. The vertical distance between the centers of adjacent areas shall be at least 0.6 inches, and the horizontal distance at least 0.8 inches.	**Usability Test**	VOTE_TC-100-US		
d. ii.	Input mechanisms shall be designed to minimize accidental activation.	**Usability Test**	VOTE_TC-93-US, AM_VOTE_TC00536_ATI feature	**WoP 24-1f**	**X**
	No key or control on a voting machine shall have a repetitive effect as a result of being held in its active position.				
3.1.7	**Privacy**				
	The voting process shall preclude anyone else from determining the content of a voter's ballot, without the voter's cooperation.	**Usability Test**	VOTE_TC-111-US Privacy Inspection, AM_VOTE_TC00536_ATI feature	**WoP 24-1g**	**X**
	…Among other practices, this forbids the issuance of a receipt to the voter that would provide proof of how he or she voted.				
3.1.7.1	**Privacy at the Polls**				
	When deployed according to the installation instructions provided by the vendor, the voting station shall prevent others from observing the contents of a voter's ballot.			**WoP 24-1g**	
a.	The ballot and any input controls shall be visible only to the voter during the voting session and ballot submission.	**Usability Test**	VOTE_TC-111-US, AM_VOTE_TC00536_ATI feature	**WoP 24-1g**	**X**
b.	The audio interface shall be audible only to the voter.	**Usability Test**	VOTE_TC-106-US	**WoP 24-1g**	**X**
	Voters who are hard of hearing but need to use an audio interface may also need to increase the volume of the audio. Such situations require headphones with low sound leakage.	**Usability Test**	VOTE_TC-106-US	**WoP 24-1g**	**X**
c.	As mandated by HAVA 301 (a)(1)(C), the voting system shall notify the voter of an attempted overvote in a way that preserves the privacy of the voter and the confidentiality of the ballot.	**Usability Test**	VOTE_TC-61-US, VOTE_TC-62-US	**WoP 24-1g**	**X**
3.1.7.2	**No Recording of Alternate Format Usage**				
	Voter anonymity shall be maintained for alternative format ballot presentation.				

a.	No information shall be kept within an electronic cast vote record that identifies any alternative language feature(s) used by a voter.	**Usability Test**	POST_TC-04-US	**WoP 24-1g**	**X**
b.	No information shall be kept within an electronic cast vote record that identifies any accessibility feature(s) used by a voter.	**Usability Test**	POST_TC-04-US	**WoP 24-1g**	**X**
3.2	**Accessibility Requirements**				
	As a minimum, every polling place shall have at least one voting station equipped for individuals with disabilities, as provided for in HAVA 301 (a) (3) (B).				
(A)	The voting system shall be accessible for individuals with disabilities, including nonvisual accessibility for the blind and visually impaired, in a manner that provides the same opportunity for access and participation (including privacy and independence) as for other voters;	**Usability Test**		**WoP 24-2, WoP 3**	**X**
(B)	The voting system shall satisfy the requirement of subparagraph (A) through the use of at least one direct recording electronic voting system or other voting system equipped for individuals with disabilities at each polling place	**Usability Test**		**WoP 24-2, WoP 3**	**X**
3.2.1	**General**				
a.	When the provision of accessibility involves an alternative format for ballot presentation, then all information presented to voters including instructions, warnings, error and other messages, and ballot choices shall be presented in that alternative format.	**Usability Test**	VOTE_TC-113-US	**WoP 24-2a**	**X**
b.	The support provided to voters with disabilities shall be intrinsic to the accessible voting station. It shall not be necessary for the accessible voting station to be connected to any personal assistive device of the voter in order for the voter to operate it correctly.	**Usability Test**	VOTE_TC-113-US	**WoP 24-2a**	**X**
c.	When the primary means of voter identification or authentication uses biometric measures that require a voter to possess particular biological characteristics, the voting process shall provide a secondary means that does not depend on those characteristics.	**Usability Test**	VOTE_TC-113-US	**WoP 24-2a**	**X**
	For example, if fingerprints are used for voter identification, another mechanism shall be provided for voters without usable fingerprints.			**WoP 24-2a**	
3.2.2	**Vision**				

	The voting process shall be accessible to voters with visual disabilities.	**Usability Test**	VOTE_TC-45, VOTE_TC-46, VOTE_TC-53	**WoP 24-2b**	**X**
	Note that all aspects of the voting process are to be accessible, not just the voting machine.				
3.2.2.1	**Partial Vision**				
	The accessible voting station shall be accessible to voters with partial vision.			**WoP 24-2b**	
a.	The vendor shall conduct summative usability tests on the voting system using partially sighted individuals. The vendor shall document the testing performed and report the test results using the Common Industry Format. This documentation shall be included in the Technical Data Package submitted to the EAC for national certification.	**Usability Test performed by ES&S**			**X**
	For the present, vendors can define their own testing protocols.				
b.	The accessible voting station with an electronic image display shall be capable of showing all information in at least two font sizes, (a) 3.0-4.0 mm and (b) 6.3-9.0 mm, under control of the voter.	**Usability Test**	VOTE_TC-54-US	**WoP 24-2b**	
	All millimeters will be calculated using Hard Metric Conversion.			**WoP 24-2b**	
c.	An accessible voting station with a monochrome-only electronic image display shall be capable of showing all information in high contrast either by default or under the control of the voter or poll worker. High contrast is a figure-to-ground ambient contrast ratio for text and informational graphics of at least 6:1.	**Usability Test**	VOTE_TC-110-US	**WoP 24-2b**	
d.	An accessible voting station with a color electronic image display shall allow the voter to adjust the color or the figure-to-ground ambient contrast ratio.	**Usability Test**	VOTE_TC-110-US	**WoP 24-2b**	
	See Technical Guide for Color, Contrast and Text Size in Appendix D for examples of how a voting station may meet this requirement by offering a limited number of discreet choices…				
e.	Buttons and controls on accessible voting stations shall be distinguishable by both shape and color.	**Usability Test**	VOTE_TC-107-US	**WoP 24-2b**	**X**
f.	An accessible voting station using an electronic image display shall provide synchronized audio output to convey the same information as that which is displayed on the screen.	**Usability Test**	Pre_TC-109, Pre_TC-110, Pre_TC-111, AM_VOTE_TC00548_Straight Party	**WoP 24-2b**	**X**
3.2.2.2	**Blindness**				

	The accessible voting station shall be accessible to voters who are blind.				
a.	The vendor shall conduct summative usability tests on the voting system using individuals who are blind. The vendor shall document the testing performed and report the test results using the Common Industry Format. This documentation shall be included in the Technical Data Package submitted to the EAC for national certification.	**Usability Test performed by ES&S**		**WoP 3**	**X**
	For the present, vendors can define their own testing protocols.				
b.	The accessible voting station shall provide an audio-tactile interface (ATI) that supports the full functionality of the visual ballot interface, as specified in Subsection 2.3.3. [Casting a Ballot]	**Usability Test**	VOTE_TC-107-US	**WoP 24-2b**	**X**
	Full functionality includes at least:			**WoP 24-2b**	
	Instructions and feedback on initial activation of the ballot (such as insertion of a smart card), if this is normally performed by the voter on comparable voting stations	**Usability Test**		**WoP 24-2b**	**X**
	Instructions and feedback to the voter on how to operate the accessible voting station, including settings and options (e.g., volume control, repetition)	**Usability Test**		**WoP 24-2b**	**X**
	Instructions and feedback for navigation of the ballot	**Usability Test**		**WoP 24-2b**	**X**
	Instructions and feedback for contest choices, including write-in candidates	**Usability Test**		**WoP 24-2b**	**X**
	Instructions and feedback on confirming and changing selections	**Usability Test**		**WoP 24-2b**	**X**
	Instructions and feedback on final submission of ballot	**Usability Test**		**WoP 24-2b**	**X**
b. i.	The ATI of the accessible voting station shall provide the same capabilities to vote and cast a ballot as are provided by other voting machines or by the visual interface of the standard voting machine.	**Usability Test**	VOTE_TC-53	**WoP 24-2b**	**X**
b. ii.	The ATI shall allow the voter to have any information provided by the voting system repeated.	**Usability Test**		**WoP 24-2b**	**X**
b. iii.	The ATI shall allow the voter to pause and resume the audio presentation.	**Usability Test**		**WoP 24-2b**	**X**
b. iv.	The ATI shall allow the voter to skip to the next contest or return to previous contests.	**Usability Test**	VOTE_TC-45, VOTE_TC-46	**WoP 24-2b**	**X**

b. v.	The ATI shall allow the voter to skip over the reading of a referendum so as to be able to vote on it immediately.	**Usability Test**		**WoP 24-2b**	**X**
c.	All voting stations that provide audio presentation of the ballot shall conform to the following requirements:				
	These requirements apply to all voting machine audio output, not just to the ATI of an accessible voting station.				
c. i.	The ATI shall provide its audio signal through an industry standard connector for private listening using a 3.5mm stereo headphone jack to allow voters to use their own audio assistive devices.	**Usability Test**		**WoP 24-2b**	**X**
c. ii.	When a voting machine utilizes a telephone style handset or headphone to provide audio information, it shall provide a wireless T-Coil coupling for assistive hearing devices so as to provide access to that information for voters with partial hearing. That coupling shall achieve at least a category T4 rating as defined by American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids, ANSI C63.19.	**Usability Test**		**WoP 24-2b**	**X**
c. iii.	No voting equipment shall cause electromagnetic interference with assistive hearing devices that would substantially degrade the performance of those devices. The voting equipment, considered as a wireless device, shall achieve at least a category T4 rating as defined by American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids, ANSI C63.19.	**Electromagnetic Radiation Test**		**WoP 24-2b**	**X**
c. iv.	A sanitized headphone or handset shall be made available to each voter.	**Usability Test**		**WoP 3**	**X**
c. v.	The voting machine shall set the initial volume for each voter between 40 and 50 dB SPL.	**Usability Test**		**WoP 24-2b**	**X**
c. vi.	The voting machine shall provide a volume control with an adjustable volume from a minimum of 20dB SPL up to a maximum of 100 dB SPL, in increments no greater than 10 dB.	**Usability Test**		**WoP 24-2b**	**X**
c. vii.	The audio system shall be able to reproduce frequencies over the audible speech range of 315 Hz to 10 KHz.	**Usability Test**		**WoP 24-2b**	**X**

c. viii.	The audio presentation of verbal information should be readily comprehensible by voters who have normal hearing and are proficient in the language. This includes such characteristics as proper enunciation, normal intonation, appropriate rate of speech, and low background noise. Candidate names should be pronounced as the candidate intends.	**Usability Test**	Pre_TC-109, Pre_TC-110, Pre_TC-111	**WoP 24-2b**	**X**
c. ix.	The audio system shall allow voters to control the rate of speech. The range of speeds supported should be at least 75% to 200% of the nominal rate.	**Usability Test**		**WoP 24-2b**	**X**
d.	If the normal procedure is to have voters initialize the activation of the ballot, the accessible voting station shall provide features that enable voters who are blind to perform this activation.	**Usability Test**	VOTE_TC-30	**WoP 24-2b**	**X**
e.	If the normal procedure is for voters to submit their own ballots, then the accessible voting station shall provide features that enable voters who are blind to perform this submission.	**Usability Test**		**WoP 24-2b**	**X**
f.	All mechanically operated controls or keys on an accessible voting station shall be tactilely discernible without activating those controls or keys.	**Usability Test**		**WoP 24-2b**	**X**
g.	On an accessible voting station, the status of all locking or toggle controls or keys (such as the "shift" key) shall be visually discernible, and discernible either through touch or sound.	**Usability Test**		**WoP 24-2b**	**X**
3.2.3	**Dexterity**				
	The voting process shall be accessible to voters who lack fine motor control or use of their hands.			**WoP 24-2c**	
a.	The vendor shall conduct summative usability tests on the voting system using individuals lacking fine motor control. The vendor shall document the testing performed and report the test results using the Common Industry Format. This documentation shall be included in the Technical Data Package submitted to the EAC for national certification.	**Usability Test**		**WoP 3**	**X**
	For the present, vendors can define their own testing protocols.			**WoP 3**	
b.	All keys and controls on the accessible voting station shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate controls and keys shall be no greater 5 lbs. (22.2 N).	**Usability Test**		**WoP 24-2c**	**X**

c.	The accessible voting station controls shall not require direct bodily contact or for the body to be part of any electrical circuit.	**Usability Test**		**WoP 24-2c**	**X**
d.	The accessible voting station shall provide a mechanism to enable non-manual input that is functionally equivalent to tactile input.	**Usability Test**	VOTE_TC-56	**WoP 24-2c**	**X**
	This requirement ensures that the accessible voting station is operable by individuals who do not have the use of their hands. All the functionality of the accessible voting station (e.g. straight party voting, write-in candidates) that is available through the other forms of input, such as tactile, must also be available through a non-manual input mechanism if it is provided by the accessible voting station.		VOTE_TC-56	**WoP 24-2c**	
e.	If the normal procedure is for voters to submit their own ballots, then the accessible voting station shall provide features that enable voters who lack fine motor control or the use of their hands to perform this submission.	**Usability Test**		**WoP 24-2c**	**X**
3.2.4	**Mobility**				
	The voting process shall be accessible to voters who use mobility aids, including wheelchairs.			**WoP 24-2d**	
a.	The accessible voting station shall provide a clear floor space of 30 inches (760 mm) minimum by 48 inches (1220 mm) minimum for a stationary mobility aid. The clear floor space shall be level with no slope exceeding 1:48 and positioned for a forward approach or a parallel approach.	**Usability Test**	VOTE_TC-102-US	**WoP 24-2d, WoP 3**	**X**
b.	All controls, keys, audio jacks and any other part of the accessible voting station necessary for the voter to operate the voting machine shall be within reach as specified under the following sub-requirements:	**Usability Test**	VOTE_TC-102-US	**WoP 24-2d**	**X**
	Note that these requirements have meaningful application mainly to controls in a fixed location. A hand-held tethered control panel is another acceptable way of providing reachable controls.			**WoP 24-2d**	
b. i.	If the accessible voting station has a forward approach with no forward reach obstruction then the high reach shall be 48 inches maximum and the low reach shall be 15 inches minimum.	**Usability Test**	VOTE_TC-102-US	**WoP 24-2d**	**X**
b. ii.	If the accessible voting station has a forward approach with a forward reach obstruction, the following requirements apply:	**Usability Test**		**WoP 24-2d**	**X**

	The forward obstruction shall be no greater than 25 inches in depth, its top no higher than 34 inches and its bottom surface no lower than 27 inches.	**Usability Test**	VOTE_TC-102-US	**WoP 24-2d**	**X**
	If the obstruction is no more than 20 inches in depth, then the maximum high reach shall be 48 inches, otherwise it shall be 44 inches.	**Usability Test**	VOTE_TC-102-US	**WoP 24-2d**	**X**
b. iii.	Space under the obstruction between the finish floor or ground and 9 inches (230 mm) above the finish floor or ground shall be considered toe clearance and shall comply with the following provisions:	**Usability Test**	VOTE_TC-102-US	**WoP 24-2d**	**X**
	Toe clearance shall extend 25 inches (635 mm) maximum under the obstruction	**Usability Test**	VOTE_TC-102-US	**WoP 24-2d**	**X**
	The minimum toe clearance under the obstruction shall be either 17 inches (430 mm) or the depth required to reach over the obstruction to operate the accessible voting station, whichever is greater	**Usability Test**	VOTE_TC-102-US	**WoP 24-2d**	**X**
	Toe clearance shall be 30 inches (760 mm) wide minimum	**Usability Test**	VOTE_TC-102-US	**WoP 24-2d**	**X**
b. iv.	Space under the obstruction between 9 inches (230 mm) and 27 inches (685 mm) above the finish floor or ground shall be considered knee clearance and shall comply with the following provisions:	**Usability Test**	VOTE_TC-102-US	**WoP 24-2d**	**X**
	Knee clearance shall extend 25 inches (635 mm) maximum under the obstruction at 9 inches (230 mm) above the finish floor or ground.	**Usability Test**	VOTE_TC-102-US	**WoP 24-2d**	**X**
	The minimum knee clearance at 9 inches (230 mm) above the finish floor or ground shall be either 11 inches (280 mm) or 6 inches less than the toe clearance, whichever is greater.	**Usability Test**	VOTE_TC-102-US	**WoP 24-2d**	**X**
	Between 9 inches (230 mm) and 27 inches (685 mm) above the finish floor or ground, the knee clearance shall be permitted to reduce at a rate of 1 inch (25 mm) in depth for each 6 inches (150 mm) in height.	**Usability Test**	VOTE_TC-102-US	**WoP 24-2d**	**X**
	Knee clearance shall be 30 inches (760 mm) wide minimum.	**Usability Test**	VOTE_TC-102-US	**WoP 24-2d**	**X**
b. v.	If the accessible voting station has a parallel approach with no side reach obstruction then the maximum high reach shall be 48 inches and the minimum low reach shall be 15 inches.	**Usability Test**	VOTE_TC-102-US	**WoP 24-2d**	**X**
b. vi.	If the accessible voting station has a parallel approach with a side reach obstruction, the following sub-requirements apply:	**Usability Test**	VOTE_TC-102-US	**WoP 24-2d**	**X**

	The side obstruction shall be no greater than 24 inches in depth and its top no higher than 34 inches.	**Usability Test**	VOTE_TC-102-US	**WoP 24-2d**	**X**
	If the obstruction is no more than 10 inches in depth, then the maximum high reach shall be 48 inches, otherwise it shall be 46 inches.	**Usability Test**	VOTE_TC-102-US	**WoP 24-2d**	**X**
	Since this is a parallel approach, no clearance under the obstruction is required.		VOTE_TC-102-US	**WoP 24-2d**	
c.	All labels, displays, controls, keys, audio jacks, and any other part of the accessible voting station necessary for the voter to operate the voting machine shall be easily legible and visible to a voter in a wheelchair with normal eyesight (no worse than 20/40, corrected) who is in an appropriate position and orientation with respect to the accessible voting station	**Usability Test**	VOTE_TC-102-US	**WoP 24-2d**	**X**
3.2.5	**Hearing**				
	The voting process shall be accessible to voters with hearing disabilities.				
a.	The accessible voting station shall incorporate the features listed under requirement 3.2.2.2 (c) [Blindness] for voting equipment that provides audio presentation of the ballot to provide accessibility to voters with hearing disabilities.	**Usability Test**	Pre_TC-109, Pre_TC-110, Pre_TC-111	**WoP 24-2e**	**X**
	Note especially the requirements for volume initialization and control.				
b.	If voting equipment provides sound cues as a method to alert the voter, the tone shall be accompanied by a visual cue, unless the station is in audio-only mode.	**Usability Test**	VOTE_TC-62-US	**WoP 24-2e**	**X**
	For instance, the voting equipment might beep if the voter attempts to overvote. If so, there would have to be an equivalent visual clue, such as the appearance of an icon, or a blinking element. Some voting equipment may have an audio-only mode, in which case, there would be no visual cue.				
3.2.6	**Speech**				
	The voting process shall be accessible to voters with speech disabilities.				
a.	No voting equipment shall require voter speech for its operation.	**Usability Test**	VOTE_TC-39-US	**WoP 24-2f**	**X**
3.2.7	**English Proficiency**				

	For voters who lack proficiency in reading English, or whose primary language is unwritten, the voting equipment shall provide spoken instructions and ballots in the preferred language of the voter, consistent with state and federal law. The requirements of 3.2.2.2 (c) [Blindness] shall apply to this mode of interaction.	**Usability Test**	VOTE_TC-112-US	**WoP 24-2g**	**X**
3.2.8	**Cognition**				
	The voting process should be accessible to voters with cognitive disabilities.				
	At present there are no design features specifically aimed at helping those with cognitive disabilities. Requirements 3.2.2.1 (f) [Partial Vision], the synchronization of audio with the screen in a DRE, is helpful for some cognitive disabilities such as dyslexia. Requirements in Subsection 3.1.4 also address cognitive issues relative to voting system usability.	**Usability Test**	VOTE_TC-75, VOTE_TC-76	**WoP 24-2h**	**X**
4	**Hardware Requirements**				
4.1	**Performance Requirements**				
4.1.1	**Accuracy Requirements**				
a.	The system can capture, record, store, consolidate and report the specific selections and absence of selections, made by the voter for each ballot position without error. The voting system shall achieve a target error rate of no more than one in 10,000,000 ballot positions, with a maximum acceptable error rate in the test process of one in 500,000 ballot positions. For all paper-based systems:				
	i. Scanning ballot positions on paper ballots to detect selections for individual candidates and contests;	**Accuracy Test**	AM_ TC00585-EVS5000-Accuracy-14in-Odd, VOTE_TC-EVS5000-AM19 Accuracy, VOTE_TC-EVS5000-DS200 Accuracy, VOTE_TC-EVS5000-DS850 Accuracy	**WHVS07.9, WoP 21**	**X**
	ii. Conversion of selections detected on paper ballots into digital data.	**Accuracy Test**	AM_ TC00585-EVS5000-Accuracy-14in-Odd, VOTE_TC-EVS5000-AM19 Accuracy, VOTE_TC-EVS5000-DS200 Accuracy, VOTE_TC-EVS5000-DS850 Accuracy	**WHVS07.9, WoP 21**	**X**

b.	The system can capture, record, store, consolidate and report the specific selections and absence of selections, made by the voter for each ballot position without error. The voting system shall achieve a target error rate of no more than one in 10,000,000 ballot positions, with a maximum acceptable error rate in the test process of one in 500,000 ballot positions. For all DRE systems:				
	i. Recording the voter selections of candidates and contests into voting data storage; and	**N/A**		**WHVS07.9, WoP 21**	
	ii. Independently from voting data storage, recording voter selections of candidates and contests into ballot image storage.	**N/A**		**WHVS07.9, WoP 21**	
c.	The system can capture, record, store, consolidate and report the specific selections and absence of selections, made by the voter for each ballot position without error. The voting system shall achieve a target error rate of no more than one in 10,000,000 ballot positions, with a maximum acceptable error rate in the test process of one in 500,000 ballot positions. For precinct-count systems (paper-based and DRE):				
	i. Consolidation of vote selection data from multiple precinct-based systems to generate jurisdiction-wide vote counts, including storage and reporting of the consolidated vote data.	**Accuracy Test**	AM_ TC00585-EVS5000-Accuracy-14in-Odd, VOTE_TC-EVS5000-AM19 Accuracy, VOTE_TC-EVS5000-DS200 Accuracy, VOTE_TC-EVS5000-DS850 Accuracy	**WHVS07.9, WoP 21**	**X**
d.	The system can capture, record, store, consolidate and report the specific selections and absence of selections, made by the voter for each ballot position without error. The voting system shall achieve a target error rate of no more than one in 10,000,000 ballot positions, with a maximum acceptable error rate in the test process of one in 500,000 ballot positions. For central-count systems (paper-based and DRE):	**N/A**		**WHVS07.9, WoP 21**	
	i. Consolidation of vote selection data from multiple counting devices to generate jurisdiction-wide vote counts, including storage and reporting of the consolidated vote data.	**N/A**		**WHVS07.9, WoP 21**	
4.1.2	**Environmental Requirements**				

	The Technical Data Package supplied by the vendor shall include a statement of all requirements and restrictions regarding environmental protection, electrical service, recommended auxiliary power, telecommunications service, and any other facility or resource required for the proper installation and operation of the system.	**TDP**		**WHVS07.1 WoP 3**	**X**
4.1.2.1	**Shelter Requirements**				
	All 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.	**TDP**		**WHVS07.1**	**X**
4.1.2.2	**Space Requirements**				
	There is no restriction on space allowed for the installation of voting systems, except that the arrangement of these systems shall not impede performance of their duties by polling place officials, the orderly flow of voters through the polling place or the ability for the voter to vote in private.	**TDP**		**WHVS07.1**	**X**
4.1.2.3	**Furnishings and Fixtures** Any furnishings or fixtures provided as a part of the voting systems, and any components provided by the vendor that are not a part of the voting system but that are used to support its storage, transportation or operation, shall comply with the safety design of Subsection 4.3.8 [Safety].				
	Any furnishings or fixtures provided as a part of voting systems, and any components provided by the vendor that are not a part of the voting system but that are used to support its storage, transportation or operation, shall comply with the safety design of Subsection 4.3.8.	**TDP**		**WHVS07.1 WoP 23**	**X**
4.1.2.4	**Electrical Supply**				
	Components of voting systems that require an electrical supply shall meet the following standards:				
a.	Precinct count voting systems shall operate with the electrical supply ordinarily found in polling places (Nominal 120 Vac/60Hz/1 phase).	**Electrical Supply Test**		**WHVS07.1, WoP 29**	**X**

b.	Central count voting systems shall operate with the electrical supply ordinarily found in central tabulation facilities or computer room facilities (Nominal 120 Vac/60Hz/1, nominal 208 Vac/60Hz/3 or nominal 240 Vac/60Hz/2).	**N/A**		**WHVS07.1, WoP 29**	
c.	All voting machines shall also be capable of operating for a period of at least 2 hours on backup power, such that no voting data is lost or corrupted nor normal operations interrupted. When backup power is exhausted the voting machine shall retain the contents of all memories intact.	**Electrical Supply Test**		**WoP 29**	**X**
4.1.2.5	**Electrical Power Disturbance**				
	Vote scanning and counting equipment for paper-based voting systems, and all DRE voting equipment, shall be able to withstand, without disruption of normal operation or loss of data:			**WoP 8**	
	a. Voltage dip of 30% of nominal @10 ms;	**Prior testing accepted by Wyle (Electrical Power Disturbance Test)**		**WoP 8**	**X**
	b. Voltage dip of 60% of nominal @100 ms & 1 sec	**Prior testing accepted by Wyle (Electrical Power Disturbance Test)**		**WoP 8**	**X**
	c. Voltage dip of >95% interrupt @5 sec	**Prior testing accepted by Wyle (Electrical Power Disturbance Test)**		**WoP 8**	**X**
	d. Surges of +15% line variations of nominal line voltage	**Prior testing accepted by Wyle (Electrical Power Disturbance Test)**		**WoP 8**	**X**
	e. Electric power increases of 7.5% and reductions of 12.5% of nominal specified power supply for a period of up to four hours at each power level	**Prior testing accepted by Wyle (Electrical Power Disturbance Test)**		**WoP 8**	**X**
4.1.2.6	**Electrical Fast Transient**				

	Vote scanning and counting equipment for paper-based systems, and all DRE equipment, shall be able to withstand, without disruption of normal operation or loss of data, electrical fast transients of:			**WoP 12**	
	a. + 2 kV and - 2 kV on External Power lines (both AC and DC)	**Prior testing accepted by Wyle (Electrical Fast Transient Test)**		**WoP 12**	**X**
	b. + 1 kV and - 1 kV on Input/Output lines (signal, data, and control lines) longer than 3 meters	**Prior testing accepted by Wyle (Electrical Fast Transient Test)**		**WoP 12**	**X**
	c. Repetition Rate for all transient pulses will be 100 kHz	**Prior testing accepted by Wyle (Electrical Fast Transient Test)**		**WoP 12**	**X**
4.1.2.7	**Lighting Surge**				
	Vote scanning and counting equipment for paper-based systems, and all DRE equipment, shall be able to withstand, without disruption of normal operation or loss of data, surges of:			**WoP 13**	
	a. +2 kV AC line to line	**Prior testing accepted by Wyle (Lightning Surge Test)**		**WoP 13**	**X**
	b. +2 kV AC line to earth	**Prior testing accepted by Wyle (Lightning Surge Test)**		**WoP 13**	**X**
	c. + or – 0.5 kV DC line to line >10m	**Prior testing accepted by Wyle (Lightning Surge Test)**		**WoP 13**	**X**
	d. + or – 0.5 kV DC line to earth >10m	**Prior testing accepted by Wyle (Lightning Surge Test)**		**WoP 13**	**X**
	e. +1 kV I/O sig/control >30m	**Prior testing accepted by Wyle (Lightning Surge Test)**		**WoP 13**	**X**
4.1.2.8	**Electrostatic Disruption**				

	Vote scanning and counting equipment for paper-based systems, and all DRE equipment, shall be able to withstand ±15 kV air discharge and ±8 kV contact discharge without damage or loss of data. The equipment may reset or have momentary interruption so long as normal operation is resumed without human intervention or loss of data. Loss of data means votes that have been completed and confirmed to the voter.	**Prior testing accepted by Wyle (Electrostatic Disruption Test)**		**WoP 10**	**X**
4.1.2.9	**Electromagnetic Emissions**				
	Vote scanning and counting equipment for paper-based systems, and all DRE equipment, complies with the Rules and Regulations of the Federal Communications Commission, Part 15, Class B requirements for both radiated and conducted emissions.	**Prior testing accepted by Wyle (Electromagnetic Emissions Test)**		**WoP 9**	**X**
4.1.2.10	**Electromagnetic Susceptibility**				
	Vote scanning and counting equipment for paper-based systems, and all DRE equipment, is able to withstand an electromagnetic field of 10 V/m modulated by a 1 kHz 80% AM modulation over the frequency range of 80 MHz to 1000 MHz, without disruption of normal operation or loss of data.	**Prior testing accepted by Wyle (Electromagnetic Susceptibility Test)**		**WoP 11**	**X**
4.1.2.11	**Conducted RF Immunity**				
	Vote scanning and counting equipment for paper-based systems, and all DRE equipment, shall withstand, without disruption of normal operation or loss of data, conducted RF energy of:			**WoP 14**	
	a. 10V rms over the frequency range 150 KHz to 80 MHz with an 80% amplitude modulation with a 1 KHz sine wave AC & DC power	**Prior testing accepted by Wyle (Conducted RF Immunity Test)**		**WoP 14**	**X**
	b. 10V sig/control >3 m over the frequency range 150 KHz to 80 MHz with an 80% amplitude modulation with a 1 KHz sine wave	**Prior testing accepted by Wyle (Conducted RF Immunity Test)**		**WoP 14**	**X**
4.1.2.12	**Magnetic Fields Immunity**				
	Vote scanning and counting equipment for paper-based systems, and all DRE equipment, shall be able to withstand, without disruption of normal operation or loss of data, AC magnetic fields of 30 A/m at 60 Hz.	**Prior testing accepted by Wyle (Magnetic Fields Immunity Test)**		**WoP 15**	**X**
4.1.2.13	**Environmental Control – Operating Environment**				

	Equipment used for election management activities or vote counting (including both precinct and central count systems) shall be capable of operation in temperatures ranging from 50 to 95 degrees Fahrenheit.	**Operating (Temperature & Power Variation, Reliability, Data Accuracy) Test**		**WoP 21**	**X**
4.1.2.14	**Environmental Control – Transit and Storage**				
	Vote casting or vote counting equipment in a precinct count system, meets specific minimum performance standards that 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:			**WoP 16, WoP 17, WoP 18, WoP 19, WoP 20**	
	a. High and low storage temperatures ranging from -4 to +140 degrees Fahrenheit, equivalent to MIL-STD-810D, Methods 501.2 and 502.2, Procedure I-Storage	**Low Temperature Test, High Temperature Test**		**WoP 18, WoP 19**	**X**
	b. Bench handling equivalent to the procedure of MIL-STD-810D, Method 516.3, Procedure VI	**Bench Handling Test**		**WoP 16**	**X**
	c. Vibration equivalent to the procedure of MIL-STD-810D, Method 514.3, Category 1- Basic Transportation, Common Carrier	**Vibration Test**		**WoP 17**	**X**
	d. Uncontrolled humidity equivalent to the procedure of MIL-STD-810D, Method 507.2, Procedure I-Natural Hot-Humid	**Humidity Test**		**WoP 20**	**X**
4.1.2.15	**Data Network Requirements**				
	When a voting system uses a local or remote data network all components of the network comply with the telecommunications requirements described in Section 6 and the Security requirements described in Section 7.	**N/A**		**WHVS07.7, WoP 31**	
4.1.3	**Election Management System (EMS) Requirements**				
4.1.3.1	**Recording Requirements**				
	Voting systems shall accurately record all election management data entered by the user, including election officials or their designees.				
	For recording accuracy, all systems shall:				
	a. Record every entry made by the user	**FCA**	ERM_POST_TC00667_System Log Report	**WoP 36**	**X**
	b. Add permissible voter selections correctly to the memory components of the device	**FCA**	ERM_POST_TC00639_Process DS200 Memory Card	**WoP 36**	**X**
	c. Verify the correctness of detection of the user selections and the addition of the selections correctly to memory	**FCA**	ERM_POST_TC00635_ Update Results Manually	**WoP 36**	**X**

	d. Add various forms of data entered directly by the election official or designee, such as text, line art, logos, and images	**FCA**	Pre_TC-148, Pre_TC-150, Pre_TC-151, Pre_TC-122, Pre_TC-123, Pre_TC-124, Pre_TC-149, Pre_TC-22, Pre_TC-23, Pre_TC-24, Pre_TC-26, Pre_TC-27, Pre_TC-28, Pre_TC-29, Pre_TC-30, Pre_TC-31, Pre_TC-32, Pre_TC-33, Pre_TC-34, Pre_TC-35, Pre_TC-36, Pre_TC-37, Pre_TC-38, Pre_TC-39, Pre_TC-71, Pre_TC-72, Pre_TC-73, Pre_TC-74, Pre_TC-95, Pre_TC-96, Pre_TC-98, Pre_TC-100, Pre_TC-106, Pre_TC-107, Pre_TC-109, Pre_TC-110, Pre_TC-40	**WoP 36**	**X**
	e. Verify the correctness of detection of data entered directly by the user and the addition of the selections correctly to memory	**FCA**	ERM_POST_TC00635_ Update Results Manually	**WoP 36**	**X**
	f. Preserve the integrity of election management data stored in memory against corruption by stray electromagnetic emissions, and internally generated spurious electrical signals	**Prior testing accepted by Wyle (Electromagnetic Susceptibility Test)**		**WoP 36**	**X**
	g. Log corrected data errors by the voting system	**FCA**	POST_TC-03, POST_TC-21, ERM_POST_TC00667_System Log Report	**WoP 36**	**X**
4.1.3.2	**Memory Stability**				
	Memory devices used to retain election management data shall have demonstrated error-free data retention for a period of 22 months.	**Warranty Statement**		**WoP 3**	**X**
4.1.4	**Vote Recording Requirements**				
4.1.4.1	**Common Requirements**				
	All voting systems shall provide voting booths or enclosures for poll site use. Such booths or enclosures may be integral to the voting system or supplied as components of the voting system, and shall:			**WoP24-2, WoP 36**	
	a. Be integral to, or make provision for, the installation of the voting machine	**Accessibility Test**		**WoP24-2, WoP 36**	**X**
	b. Ensure by its structure stability against movement or overturning during entry, occupancy, and exit by the voter	**Accessibility Test**		**WoP24-2, WoP 36**	**X**
	c. Provide privacy for the voter, and be designed in such a way as to prevent observation of the ballot by any person other than the voter	**Accessibility Test**		**WoP24-2, WoP 36**	**X**
	d. Be capable of meeting the accessibility requirements of Subsection 3.2. [Accessibility Requirements]	**Accessibility Test**		**WHVS07.1, WHVS07.5, WoP 24, WoP 36**	**X**
4.1.4.2	**Paper Based Recording Requirements**				
a.	Paper ballots used by paper-based voting systems shall meet the following standards:			**WHVS07.1, WHVS07.5, WoP 36**	

a. i.	Marks that identify the unique ballot format shall be outside the area in which votes are recorded, so as to minimize the likelihood that these marks will be mistaken for vote responses and the likelihood that recorded votes will obliterate these marks.	**FCA**	PRE_TC-40, PRE_TC-41, PRE_TC-42	**WHVS07.1, WHVS07.5, WoP 36**	**X**
a. ii.	If printed alignment marks are used to locate the vote response fields on the ballot, these marks shall be outside the area in which votes are recorded, so as to minimize the likelihood that these marks will be mistaken for vote responses and the likelihood that recorded votes will obliterate these marks.	**FCA**	PRE_TC-40, PRE_TC-41, PRE_TC-42	**WHVS07.1, WHVS07.5, WoP 36**	**X**
a. iii.	The Technical Data Package shall specify the required paper stock, size, shape, opacity, color, watermarks, field layout, orientation, size and style of printing, size and location of mark fields used for vote response fields and to identify unique ballot formats, placement of alignment marks, ink for printing, and folding and bleed-through limitations for preparation of ballots that are compatible with the system.	**TDP**		**WHVS07.1, WHVS07.5, WoP 36, WoP 3**	**X**
b.	The Technical Data Package shall specify marking devices, which, if used to make the prescribed form of mark, produce readable marked ballots such that the system meets the performance requirements for accuracy in Subsection 4.1.1. Marking devices can be either manual (such as pens or pencils) or electronic. These specifications shall identify:	**TDP**		**WHVS07.1, WHVS07.5, WoP 36, WoP 3**	**X**
b. i.	Specific characteristics of marking devices that affect readability of marked ballots.	**FCA**		**WHVS07.1, WHVS07.5, WoP 36, WoP 3**	**X**
b. ii.	Performance capabilities with regard to each characteristic.	**FCA**		**WHVS07.1, WHVS07.5, WoP 36, WoP 3**	**X**
b. iii.	For marking devices manufactured by multiple external sources, a listing of sources and model numbers that are compatible with the system.	**FCA**		**WHVS07.1, WHVS07.5, WoP 36, WoP 3**	**X**
c.	A frame or fixture for printed ballot cards is optional. However, if such a device is provided, it shall:	**N/A**		**WHVS07.1, WHVS07.5, WoP 36**	
c. i.	Be of any size and shape consistent with its intended use.	**N/A**		**WHVS07.1, WHVS07.5, WoP 36**	
c. ii.	Position the card properly.	**N/A**		**WHVS07.1, WHVS07.5, WoP 36**	

c. iii.	Hold the ballot card securely in its proper location and orientation for voting.	**N/A**		**WHVS07.1, WHVS07.5, WoP 36**	
c. iv.	Comply with the requirements for design and construction contained in Subsection 4.3.	**N/A**		**WHVS07.1, WHVS07.5, WoP 36**	
d.	Ballot boxes and ballot transfer boxes, which serve as secure containers for the storage and transportation of voted ballots, shall:			**WoP 36, WoP 3**	
d. i.	Be of any size, shape, and weight commensurate with their intended use.	**PCA**		**WoP 36**	**X**
d. ii.	Incorporate locks or seals, the specifications of which are described in the system documentation.	**PCA and Security Test**		**WoP 36, WoP 3**	**X**
d. iii.	Provide specific points where ballots are inserted, with all other points on the box constructed in a manner that prevents ballot insertion.	**PCA and Security Test**		**WoP 36**	**X**
d. iv.	For precinct count systems, contain separate compartments for the segregation of unread ballots, ballots containing write-in votes or any irregularities that may require special handling or processing. In lieu of compartments, the conversion processing may mark such ballots with an identifying spot or stripe to facilitate manual segregation.	**FCA**		**WoP 36**	**X**
4.1.4.3	**DRE Systems Recording Requirements**				
a.	DRE systems shall include an audible or visible activity indicator providing the status of each voting device. This indicator shall:	**N/A**		**WHVS07.1, WHVS07.5, WoP 36**	
a. i.	Indicate whether the device has been activated for voting.	**N/A**		**WHVS07.1, WHVS07.5, WoP 36**	
a. ii.	Indicate whether the device is in use.	**N/A**		**WHVS07.1, WHVS07.5, WoP 36**	
b.	To ensure vote recording accuracy and integrity while protecting the anonymity of the voter, all DRE systems shall:	**N/A**		**WHVS07.1, WHVS07.5, WoP 36**	
b. i.	Contain all mechanical, electromechanical, and electronic components; software; and controls required to detect and record the activation of selections made by the voter in the process of voting and casting a ballot.	**N/A**		**WHVS07.1, WHVS07.5, WoP 36**	
b. ii.	Incorporate redundant memories to detect and allow correction of errors caused by the failure of any of the individual memories.	**N/A**		**WHVS07.1, WHVS07.5, WoP 36**	
b. iii.	Provide at least two processes that record the voter's selections that:	**N/A**		**WHVS07.1, WHVS07.5, WoP 36**	
	To the extent possible, are isolated from each other	**N/A**		**WHVS07.1, WHVS07.5, WoP 36**	

	Designate one process and associated storage location as the main vote detection, interpretation, processing and reporting path	**N/A**		**WHVS07.1, WHVS07.5, WoP 36**	
b. iv.	Use a different process to store ballot images, for which the method of recording may include any appropriate encoding or data compression procedure consistent with the regeneration of an unequivocal record of the ballot as cast by the voter.	**N/A**		**WHVS07.1, WHVS07.5, WoP 36**	
b. v.	Provide a capability to retrieve ballot images in a form readable by humans.	**N/A**		**WHVS07.1, WHVS07.5, WoP 36**	
b. vi.	Ensure that all processing and storage protects the anonymity of the voter.	**N/A**		**WHVS07.1, WHVS07.5, WoP 36**	
c.	DRE systems shall meet the following requirements for recording accurately each vote and ballot cast:	**N/A**		**WHVS07.1, WHVS07.5, WoP 36**	
c. i.	Detect every selection made by the voter.	**N/A**		**WHVS07.1, WHVS07.5, WoP 36**	
c. ii.	Correctly add permissible selections to the memory components of the device.	**N/A**		**WHVS07.1, WHVS07.5, WoP 36**	
c. iii.	Verify the correctness of the detection of the voter selections and the addition of the selections to memory.	**N/A**		**WHVS07.1, WHVS07.5, WoP 36**	
c. iv.	Achieve an error rate not to exceed the requirement indicated in Subsection 4.1.1.	**N/A**		**WHVS07.1, WHVS07.5, WoP 36**	
c. v.	Preserve the integrity of voting data and ballot images (for DRE machines) stored in memory for the official vote count and audit trail purposes against corruption by stray electromagnetic emissions, and internally generated spurious electrical signals.	**N/A**		**WHVS07.1, WHVS07.5, WoP 36**	
c. vi.	Maintain a log of corrected data.	**N/A**		**WHVS07.1, WHVS07.5, WoP 36**	
	The DRE system shall record votes reliably in accordance with the requirements of Subsection 4.3.3.	**N/A**		**WHVS07.1, WHVS07.5, WoP 36**	
4.1.5	**Paper based Conversion Requirements**				
4.1.5.1	**Ballot Handling**				
a.	The capacity to convert the marks on individual ballots into signals is uniquely important to central count systems. The capacity for a central count system shall be documented by the vendor. This documentation shall include the capacity for individual components that impact the overall capacity.	**N/A**		**WHVS07.1, WHVS07.5 WoP 37, WoP 3**	

b.	When ballots are unreadable or some condition is detected requiring that the cards be segregated from normally processed ballots for human review (e.g. write-ins), all central count paper-based systems shall do one of the following:				
	ii. Outstack the ballot	**FCA**	VOTE_TC-64, VOTE_TC-65, VOTE_TC-66, VOTE_TC-67, VOTE_TC-69, DS850_ES&S_VOTE_TC00575_Scanning	**WHVS07.1, WHVS07.5, WoP 37**	**X**
	iii. Stop the ballot reader and display a message prompting the election official or designee to remove the ballot	**FCA**	VOTE_TC-64, VOTE_TC-65, VOTE_TC-66, VOTE_TC-67, VOTE_TC-69,	**WHVS07.1, WHVS07.5, WoP 37**	**X**
	iv. Mark the ballot with an identifying mark to facilitate its later identification	**FCA**	VOTE_TC-64, VOTE_TC-65, VOTE_TC-66, VOTE_TC-67, VOTE_TC-69	**WHVS07.1, WHVS07.5, WoP 37**	**X**
c.	The voting systems provides a capability that can be activated by an authorized election official to identify ballots containing overvotes, blank ballots, and ballots containing undervotes in a designated contest. If enabled, these capabilities shall perform one of the above actions in response to the indicated condition.	**FCA**	VOTE_TC-64, VOTE_TC-65, VOTE_TC-67, DS850_ES&S_VOTE_TC00575_Scanning	**WHVS07.1, WHVS07.5, WoP 37**	**X**
d.	When ballots are unreadable or when some condition is detected requiring that the cards be segregated from normally processed ballots for human review (e.g. write-in votes) all precinct count systems shall:	**FCA**	DS200_VOTE_TC00611_Ballot Casting	**WHVS07.1, WHVS07.5 WoP 37**	**X**
d. i.	In response to an unreadable or blank ballot, return the ballot and provide a message prompting the voter to examine the ballot.	**FCA**	VOTE_TC-67, VOTE_TC-69	**WHVS07.1, WHVS07.5 WoP 37**	**X**
d. ii.	In response to a ballot with a write-in vote, segregate the ballot or mark the ballot with an identifying mark to facilitate its later identification.	**FCA**	VOTE_TC-66, DS200_VOTE_TC00644_Closed Primary Ballot Casting	**WHVS07.1, WHVS07.5 WoP 37**	**X**
d. iii.	In response to a ballot with an overvote the system shall:				
	Provide a capability to identify an overvoted ballot	**FCA**	VOTE_TC-64, DS200_VOTE_TC00611_Ballot Casting	**WHVS07.1, WHVS07.5, WoP 37**	**X**
	Return the ballot	**FCA**	VOTE_TC-64, DS200_VOTE_TC00611_Ballot Casting	**WHVS07.1, WHVS07.5, WoP 37**	**X**
	Provide an indication prompting the voter to examine the ballot	**FCA**	VOTE_TC-64, DS200_VOTE_TC00611_Ballot Casting	**WHVS07.1, WHVS07.5, WoP 37**	**X**
	Allow the voter to correct the ballot	**FCA**	VOTE_TC-64, DS200_VOTE_TC00611_Ballot Casting	**WHVS07.1, WHVS07.5, WoP 37**	**X**
	Provide a means for an authorized election official to deactivate this capability entirely and by contest	**FCA**	VOTE_TC-64, DS200_VOTE_TC00611_Ballot Casting	**WHVS07.1, WHVS07.5, WoP 37**	**X**
d. iv.	In response to a ballot with an undervote, the system shall:				

	Provide a capability to identify an undervoted ballot	**FCA**	VOTE_TC-65, DS200_VOTE_TC00611_Ballot Casting	**WHVS07.1, WHVS07.5, WoP 37**	**X**
	Return the ballot	**FCA**	VOTE_TC-65, DS200_VOTE_TC00611_Ballot Casting	**WHVS07.1, WHVS07.5, WoP 37**	**X**
	Provide an indication prompting the voter to examine the ballot	**FCA**	VOTE_TC-65, DS200_VOTE_TC00611_Ballot Casting	**WHVS07.1, WHVS07.5, WoP 37**	**X**
	Allow the voter to correct the ballot	**FCA**	VOTE_TC-65, DS200_VOTE_TC00611_Ballot Casting	**WHVS07.1, WHVS07.5, WoP 37**	**X**
	Allow the voter to submit the ballot with the undervote	**FCA**	VOTE_TC-65, DS200_VOTE_TC00611_Ballot Casting	**WHVS07.1, WHVS07.5, WoP 37**	**X**
	Provide a means for an authorized election official to deactivate this capability	**FCA**	VOTE_TC-65, DS200_VOTE_TC00611_Ballot Casting	**WHVS07.1, WHVS07.5, WoP 37**	**X**
e.	Ballot readers shall prevent multiple feed or detect and provide an alarm indicating multiple feed.	**FCA**	VOTE_TC-68, DS200_VOTE_TC00611_Ballot Casting, DS850_ES&S_VOTE_TC00581_VVSG_Requirements	**WHVS07.1, WHVS07.5, WoP 37**	**X**
e. i.	If multiple feed is detected, the card reader shall halt in a manner that permits the operator to remove the unread cards causing the error, and reinsert them in the card input hopper.	**FCA**	VOTE_TC-68, DS200_VOTE_TC00611_Ballot Casting, DS850_ES&S_VOTE_TC00581_VVSG_Requirements	**WHVS07.1, WHVS07.5 WoP 37**	**X**
e. ii.	The frequency of multiple feeds with ballots intended for use with the system shall not exceed l in 10,000.	**FCA**	DS200_VOTE_TC00611_Ballot Casting, DS850_ES&S_VOTE_TC00581_VVSG_Requirements	**WHVS07.1, WHVS07.5 WoP 37**	**X**
4.1.5.2	**Ballot Reading Accuracy**				
d.	Paper-based systems detect marks that conform to vendor specifications with an error rate not exceeding the requirement indicated in Section 4.1.1.	**Accuracy Test and FCA**	AM_ TC00585-EVS5000-Accuracy-14in-Odd, VOTE_TC-EVS5000-AM19 Accuracy, VOTE_TC-EVS5000-DS200 Accuracy, VOTE_TC-EVS5000-DS850 Accuracy	**WoP 21**	**X**
e.	Paper-based systems ignore, and not record, extraneous perforations, smudges, and folds.	**Accuracy Test and FCA**	AM_ TC00585-EVS5000-Accuracy-14in-Odd, VOTE_TC-EVS5000-AM19 Accuracy, VOTE_TC-EVS5000-DS200 Accuracy, VOTE_TC-EVS5000-DS850 Accuracy	**WoP 21**	**X**
f.	Paper-based systems reject ballots that meet all vendor specifications at a rate not to exceed 2 percent.	**Accuracy Test and FCA**	AM_ TC00585-EVS5000-Accuracy-14in-Odd, VOTE_TC-EVS5000-AM19 Accuracy, VOTE_TC-EVS5000-DS200 Accuracy, VOTE_TC-EVS5000-DS850 Accuracy	**WoP 21**	**X**
4.1.6	**Tabulation Processing Requirements**				
4.1.6.1	**Paper-based System Processing Requirements**				
a. i.	Processing accuracy shall be measured by vote selection error rate, the ratio of uncorrected vote selection errors to the total number of ballot positions that could be recorded across all ballots when the system is operated at its nominal or design rate of processing.	**Accuracy Test**	AM_ TC00585-EVS5000-Accuracy-14in-Odd, VOTE_TC-EVS5000-AM19 Accuracy, VOTE_TC-EVS5000-DS200 Accuracy, VOTE_TC-EVS5000-DS850 Accuracy	**WoP 21**	**X**

a. ii.	The vote selection error rate shall include data that denotes ballot style or precinct as well as data denoting a vote in a specific contest or ballot proposition.	**Accuracy Test**	AM_ TC00585-EVS5000-Accuracy-14in-Odd, VOTE_TC-EVS5000-AM19 Accuracy, VOTE_TC-EVS5000-DS200 Accuracy, VOTE_TC-EVS5000-DS850 Accuracy	**WoP 21**	**X**
a. iii.	The vote selection error rate shall include all errors from any source.	**Accuracy Test**	AM_ TC00585-EVS5000-Accuracy-14in-Odd, VOTE_TC-EVS5000-AM19 Accuracy, VOTE_TC-EVS5000-DS200 Accuracy, VOTE_TC-EVS5000-DS850 Accuracy	**WoP 21**	**X**
a. iv.	The vote selection error rate shall not exceed the requirement indicated in Subsection 4.1.1.	**Accuracy Test**	AM_ TC00585-EVS5000-Accuracy-14in-Odd, VOTE_TC-EVS5000-AM19 Accuracy, VOTE_TC-EVS5000-DS200 Accuracy, VOTE_TC-EVS5000-DS850 Accuracy	**WoP 21**	**X**
b.	Paper-based system memory devices, used to retain control programs and data, shall have demonstrated error-free data retention for a period of 22 months, under the environmental conditions for operation and non-operation (i.e., storage).	**Warranty Statement**		**WoP 3**	**X**
4.1.6.2	**DRE System Processing Requirements**				
	Processing includes all operations to consolidate voting data after the polls have been closed. DRE voting systems shall				
a. i.	DRE voting systems shall operate at a speed sufficient to respond to any operator and voter input without perceptible delay (no more than three seconds).	**N/A**		**WHVS07.5, WoP 21**	
a. ii.	Local consolidation of polling place data does not exceed five minutes for each device in the polling place.	**N/A**		**WHVS07.5, WoP 21**	
b. i.	Processing includes all operations to consolidate voting data after the polls have been closed. DRE voting systems shall produce reports that are completely consistent, with no discrepancy among reports of voting device data produced at any level.	**N/A**		**WHVS07.5, WoP 21**	
b. ii.	Processing includes all operations to consolidate voting data after the polls have been closed. DRE voting systems shall produce consolidated reports containing absentee, provisional or other voting data that are similarly error-free. Any discrepancy, regardless of source, is resolvable to a procedural error, to the failure of a non-memory device or to an external cause.	**N/A**		**WHVS07.5, WoP 21**	

c.	DRE system memory devices used to retain control programs and data shall have demonstrated error-free data retention for a period of 22 months. Error-free retention may be achieved by the use of redundant memory elements, provided that the capability for conflict resolution or correction among elements is included.	**N/A**		**WHVS07.5, WoP 21, WoP 3**	
4.1.7	**Reporting Requirements**				
4.1.7.1	**Removable Storage Media**				
	Storage media that can be removed from the voting system and transported to another location for readout and report generation demonstrate error-free retention for a period of 22 months under the environmental conditions for operation and non-operation contained in Subsection 4.1.2. Examples of removable storage media include: programmable read-only memory (PROM), random access memory (RAM) with battery backup, magnetic media, or optical media.	**Warranty Statement**		**WHVS07.5, WoP 3**	**X**
4.1.7.2	**Printers**				
	Printers used to produce reports of the vote count shall be capable of producing:				
	a. Alphanumeric headers;	**FCA**	VOTE_TC-23, VOTE_TC-24, POST_TC-01, DS200_PRE_TC00593_Test Ballots Event Log Report, DS850_ES&S_VOTE_TC00577_Reports, ERM_POST_TC00663_Reprint DS200 Reports	**WoP 3**	**X**
	b. Election, office and issue labels; and	**FCA**	VOTE_TC-23, VOTE_TC-24, POST_TC-01, DS200_PRE_TC00593_Test Ballots Event Log Report, DS850_ES&S_VOTE_TC00577_Reports, ERM_POST_TC00663_Reprint DS200 Reports	**WoP 3**	**X**
	c. Alphanumeric entries generated as part of the audit record.	**FCA**	VOTE_TC-23, VOTE_TC-24, POST_TC-01, DS200_PRE_TC00593_Test Ballots Event Log Report, DS850_ES&S_VOTE_TC00577_Reports, ERM_POST_TC00663_Reprint DS200 Reports	**WoP 3**	**X**
4.1.8.1	**Vote Data Management Requirements**				
a.	All voting systems provide the capability to integrate voting data files with ballot definition files.	**FCA**	VOTE_TC-16, ERM_POST_TC00639_Process DS200 Memory Card	**WoP 3**	**X**
b.	All voting systems provide the capability to verify file compatibility.	**FCA**	VOTE_TC-16, ERM_POST_TC00639_Process DS200 Memory Card	**WoP 3**	**X**
c.	All voting systems provide the capability to edit and update files as required.	**FCA**	VOTE_TC-16, ERM_POST_TC00661_Merge Results	**WoP 3**	**X**
4.1.8.2	**Data Report Generation**				

	All voting systems shall include report generators for producing output reports at the device, polling place, and summary level, with provisions for administrative and judicial subdivisions as required by the using jurisdiction.	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, Pre_TC-49, Pre_TC-50, Pre_TC-51, VOTE_TC-13, VOTE-TC-18, VOTE_TC-19, POST_TC-03, POST_TC-16, POST_TC-17, POST_TC-23, ERM_POST_TC00665_Precinct Summary Report	**WoP 3**	**X**
4.2	**Physical Characteristics**				
4.2.1	**Size**				
	The size of each voting machine should be compatible with its intended use and the location at which the equipment is to be used.	**FCA**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
4.2.2	**Weight**				
	The weight of each voting machine should be compatible with its intended use and the location at which the equipment is to be used.	**FCA**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
4.2.3	**Transport and Storage of Precinct Systems**				
a.	The precinct voting system provides a means to safely and easily handle, transport, and install voting equipment (example: wheels or handles).	**Vibration Test**		**WHVS07.1, WHVS07.3**	**X**
b.	The precinct voting system includes/uses a protective enclosure capable of withstanding:	**Vibration Test**		**WHVS07.1, WHVS07.3**	**X**
	i. Impact, shock and vibration loads associated with surface and air transportation; and	**Vibration Test**		**WHVS07.1, WHVS07.3**	**X**
	ii. Stacking loads associated with storage.	**Vibration Test**		**WoP 3**	**X**
4.3	**Design, Construction, and Maintenance Characteristics**				
4.3.1	**Materials, Processes, and Parts**				
a.	All voting systems are designed and constructed so that the frequency of equipment malfunctions and maintenance requirements are reduced to the lowest level consistent with cost constraints.	**Reliability Test**		**WHVS07.1, WHVS07.3**	**X**
b.	All voting systems include, as part of the accompanying TDP, and approved parts list.	**TDP**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
c.	All voting systems include, as part of the accompanying TDP, exclude parts or components not included in the approved parts list.	**TDP**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
4.3.2	**Durability**				
	System is designed to withstand normal use without deterioration and without excessive maintenance cost for a period of ten years.	**Warranty Statement**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
4.3.3	**Reliability**				

	While demonstrating the reliability of the voting system device measured as a Mean Time Between Failure of 163 hours of equipment operation. A typical system operations scenario consists of approximately 45 hours of equipment operation, consisting of 30 hours of equipment set-up and readiness testing and 15 hours of elections operations.	**Reliability Test**		**WoP 21**	**X**
	a. The voting system did not lose one or more functions;	**Reliability Test**		**WoP 21**	**X**
	b. There was no degradation of performance such that the device was unable to perform its intended function for longer than 10 seconds.	**Reliability Test**		**WoP 21**	**X**
	The MTBF demonstrated during certification testing shall be at least 163 hours.	**Reliability Test**		**WoP 21**	**X**
4.3.4	**Maintainability**				
4.3.4.1	**Physical Attributes**				
a.	Labels and the identification of test points are present.	**Maintainability Test**		**WoP 27**	**X**
b.	Built-in test and diagnostic circuitry or physical indicators of condition are provided.	**Maintainability Test**		**WoP 27**	**X**
c.	Labels and alarms related to failures are present.	**Maintainability Test**		**WoP 27**	**X**
d.	Features that allow non-technicians to perform routine maintenance tasks (such as update of the system database) are present.	**Maintainability Test**		**WoP 27**	**X**
4.3.4.2	**Additional Attributes**				
a.	Non-technicians can detect equipment failures without difficulty.	**Maintainability Test**		**WoP 27**	**X**
b.	Trained technician can diagnose problems without difficulty.	**Maintainability Test**		**WoP 27**	**X**
c.	The voting system exhibits a low false alarm rate (indication of non-existent problems).	**Maintainability Test**		**WoP 27**	**X**
d.	Components can be accessed for replacement, without difficulty.	**Maintainability Test**		**WoP 27**	**X**
e.	Adjustments and alignments can be performed without difficulty.	**Maintainability Test**		**WoP 27**	**X**
f.	Non-technicians can perform database updates without difficulty.	**Maintainability Test**		**WoP 27**	**X**
g.	Service components can be adjusted, aligned, or tuned without difficulty.	**Maintainability Test**		**WoP 27**	**X**
4.3.5	**Availability**				
a.	Paper based voting systems and supporting software respond to operational commands and accomplish the functions of:				

	a. Recording voter selections (such as by ballot marking); and	**Availability Test**	VOTE_TC-39	**WoP 28**	**X**
	i. Scanning the marks on paper ballots and converting them into digital data.	**Availability Test**	VOTE_TC-39	**WoP 28**	**X**
b.	DRE voting systems and supporting software respond to operational commands and accomplish the functions of recording and storing the voter's ballot selections.	**N/A**		**WoP 28**	
c.	DRE and paper-based precinct count systems and supporting software respond to operational commands and accomplish the functions of consolidation of vote selection data from multiple precinct-based systems, generate jurisdiction-wide vote counts, store and report the consolidated vote data.	**N/A**		**WoP 28**	
d.	DRE and paper-based central count systems and supporting software respond to operational commands and accomplish the functions of consolidation of vote selection data from multiple counting devices generate jurisdiction-wide vote counts, store and report the consolidated vote data.	**N/A**		**WoP 28**	
	The voting system achieved at least a 99% inherent availability (Ai) during normal operation for the functions indicated above, i.e., Ai = (MTBF)/(MTBF + MTTR),	**Reliability Test**		**WoP 28**	**X**
	i.e., Mean Time Between Failure (MTBF), Mean Time to Repair (MTTR).				
	Vendor specified the typical system configuration used to assess availability and any assumptions made with regard to any parameters that impact MTTR. At a minimum, these factors shall include e., f., & g., below.	**Reliability Test**		**WoP 28, 3**	**X**
e.	Vendor recommended number and locations of spare devices or components to be kept on hand for repair purposes during periods of system operation.	**Availability Test**		**WoP 3**	**X**
f.	Vendor recommended number and locations of qualified maintenance personnel who need to be available to support repair calls during system operation.	**Availability Test**		**WoP 3**	**X**
g.	Organizational affiliation (i.e., jurisdiction, vendor) of qualified maintenance personnel.	**Availability Test**		**WoP 3**	**X**
4.3.6	**Product Marking**				

a.	All voting systems shall identify all devices by means of a permanently affixed nameplate or label containing the name of the manufacturer or vendor, the name of the device, its part or model number, its revision letter, its serial number, and if applicable, its power requirements.	**Product Safety COC & Prior testing accepted by Wyle (Product Safety Test)**		**WHVS07.3 WoP 23**	**X**
b.	All voting systems shall display on each device a separate data plate containing a schedule for and list of operations required to service or to perform preventive maintenance.	**Product Safety COC & Prior testing accepted by Wyle (Product Safety Test)**		**WHVS07.3 WoP 23**	**X**
c.	All voting systems shall display 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.	**Product Safety COC & Prior testing accepted by Wyle (Product Safety Test)**		**WHVS07.3 WoP 23**	**X**
4.3.7	**Workmanship**				
	Practices and procedures used to ensure:			**WHVS07.3**	
	a. Products are free from damage or defect making them unsatisfactory for their intended purpose; and	**TDP**		**WHVS07.3, WoP 3**	**X**
	b. Components from external suppliers are free from damage or defect making them unsatisfactory for their intended purpose.	**TDP**		**WHVS07.3, WoP 3**	**X**
4.3.8	**Safety**				
a.	All voting systems and their components shall be designed to eliminate hazards to personnel or to the equipment itself.	**Product Safety COC & Prior testing accepted by Wyle (Product Safety Test)**		**WoP 23**	**X**
b.	Defects in design and construction that can result in personal injury or equipment damage must be detected and corrected before voting systems and components are placed into service.	**Product Safety COC & Prior testing accepted by Wyle (Product Safety Test)**		**WoP 23**	**X**
c.	Equipment design for personnel safety shall be equal to or better than the appropriate requirements of the Occupational Safety and Health Act, Code of Federal Regulations, Title 29, Part 1910.	**Product Safety COC & Prior testing accepted by Wyle (Product Safety Test)**		**WoP 23**	**X**
5	**Software Standards**				
5.1.1	**Software Sources**				

	The vendors shall submit a record of all user selections made during software installation as part of the Technical Data Package. The vendor shall also submit a record of all configuration changes made to the software following its installation. The accredited test lab shall confirm the propriety and correctness of these user selections and configuration changes.	**Source Code Review**		**WHVS07.1, WoP 3**	**X**
5.1.2	**Management of Software and Hardware**				
	In addition to the requirements of this section, all software used in any manner to support any voting-related activities shall meet the requirements for security described in Section 7. [Security Requirements]	**Source Code Review**		**WHVS07.1**	**X**
5.1.3	**Exclusions**				
	Some voting systems use computers that also may be used for other purposes. General purpose software such as operating systems, programming language compilers, database management systems, and Web browsers may be installed on these computers. Such software is governed by the *Guidelines* unless:			**WHVS07.1**	
	a. The software provides no support of voting system capabilities	**Source Code Review**		**WHVS07.1**	**X**
	b. The software is removable, disconnectable or switchable such that it cannot function while voting system functions are enabled	**Source Code Review**		**WHVS07.1**	**X**
	c. Procedures are provided that confirm that the software has been removed, disconnected or switched	**Source Code Review**		**WHVS07.1**	**X**
5.2	**Software Design and Coding Standards**				
5.2.1	**Selection of Programming Languages**				
	Software associated with the logical and numerical operations of vote data shall use a high level programming language, such as: Pascal, Visual Basic, Java, C and C++. The requirement for the use of high-level language for logical operations does not preclude the use of assembly language for hardware-related segments, such as device controllers and handler programs. Also, operating system software may be designed in assembly language.	**Source Code Review**		**WHVS07.1, WoP 5a**	**X**
5.2.2	**Software Integrity**				
	Self-modifying, dynamically loaded or interpreted code is prohibited, except under the provisions outlined in Subsection 7.4. [Software Security]	**Source Code Review**			

	External modification of code during execution shall be prohibited.				
	Where the development environment (programming language and development tools) includes the following features, the software shall provide controls to prevent accidental or deliberate attempts to replace executable code:				
	a. Unbounded arrays or strings (including buffers used to move data);	**Source Code Review**		**WoP 5a, WoP 5c**	**X**
	b. Pointer variables; and	**Source Code Review**		**WoP 5a, WoP 5c**	**X**
	c. Dynamic memory allocation and management.	**Source Code Review**		**WoP 5a, WoP 5c**	**X**
5.2.3	**Software Modularity and Programming**				
	Voting system application software, including commercial off-the-shelf (COTS) software, shall be designed in a modular fashion.	**Source Code Review**		**WoP 5a**	**X**
a.	Each module shall have a specific function that can be tested and verified independently of the remainder of the code. In practice, some additional modules (such as library modules) may be needed to compile the module under test, but the modular construction allows the supporting modules to be replaced by special test versions that support test objectives.	**Source Code Review**		**WoP 5a**	**X**
b.	Each module shall be uniquely and mnemonically named, using names that differ by more than a single character. In addition to the unique name, the modules shall include a set of header comments identifying the module's purpose, design, conditions, and version history, followed by the operational code. Headers are optional for modules of fewer than ten executable lines where the subject module is embedded in a larger module that has a header containing the header information. Library modules shall also have a header comment describing the purpose of the library and version information.	**Source Code Review**		**WoP 5a**	**X**

c.	All required resources, such as data accessed by the module, should either be contained within the module or explicitly identified as input or output to the module. Within the constraints of the programming language, such resources shall be placed at the lowest level where shared access is needed. If that shared access level is across multiple modules, the definitions should be defined in a single file (called header files in some languages, such as C) where any changes can be applied once and the change automatically applies to all modules upon compilation or activation.	**Source Code Review**		**WoP 5a**	**X**
d.	A module is small enough to be easy to follow and understand. Program logic visible on a single page is easy to follow and correct. Volume II, Section 5 [Software Testing] provides testing guidelines for the accredited test lab to identify large modules subject to review under this requirement.	**Source Code Review**		**WoP 5a**	**X**
e.	Each module shall have a single entry point, and a single exit point, for normal process flow. For library modules or languages such as the object-oriented languages, the entry point is to the individual contained module or method invoked. The single exit point is the point where control is returned. At that point, the data that is expected as output must be appropriately set. The exception for the exit point is where a problem is so severe that execution cannot be resumed. In this case, the design must explicitly protect all recorded votes and audit log information and must implement formal exception handlers provided by the language.	**Source Code Review**		**WoP 5a**	**X**
f.	Process flow within the modules shall be restricted to combinations of the control structures defined in Volume II, Section 5. These structures support the modular concept, especially the single entry and exit rule above. They apply to any language feature where program control passes from one activity to the next, such as control scripts, object methods or sets of executable statements, even though the language itself is not procedural.	**Source Code Review**		**WoP 5a**	**X**
5.2.4	**Control Constructs**				

a.	Acceptable constructs are Sequence, If-Then-Else, Do-While, Do-Until, Case, and the General Loop (including the special case for loop).	**Source Code Review**		**WoP 5a**	**X**
a. i.	If the programming language used does not provide these control constructs, the vendor shall provide comparable control structure logic. The constructs shall be used consistently throughout the code. No other constructs shall be used to control program logic and execution.	**Source Code Review**		**WoP 5a**	**X**
a. ii.	While some programming languages do not create programs as linear processes, stepping from an initial condition through changes to a conclusion, the program components nonetheless contain procedures (such as "methods" in object-oriented languages). Even in these programming languages, the procedures must execute through these control constructs or their equivalents, as defined and provided by the vendor.	**Source Code Review**		**WoP 5a**	**X**
a. iii.	Operator intervention or logic that evaluates received or stored data shall not redirect program control within a program routine. Program control may be redirected within a routine by calling subroutines, procedures, and functions, and by interrupt service routines and exception handlers (due to abnormal error conditions). Do-While (False) constructs and intentional exceptions (used as GoTos) are prohibited.	**Source Code Review**		**WoP 5a**	**X**
5.2.5	**Naming Conventions**				
	Internal coding standards for naming conventions, including:			**WHVS07.2, WoP 5a**	
	a. Object, function, procedure, and variable names, chosen to enhance readability and intelligibility.	**Source Code Review**		**WHVS07.2, WoP 5a**	**X**
	b. Consistent used of names in code and documentation.	**Source Code Review**		**WHVS07.2, WoP 5a**	**X**
	c. Unique names within an application, differing by more than 1 character with single character names forbidden except those for variables used as loop indexes. Duplicate name may be used where scope of name is unique with the application. Names in shared modules are unique.	**Source Code Review**		**WHVS07.2, WoP 5a**	**X**
	d. Language keywords are not used in any manner inconsistent with the design of the language.	**Source Code Review**		**WHVS07.2, WoP 5a**	**X**
5.2.6	**Coding Conventions**				
	Coding conventions used are either:			**WHVS07.2, WoP 5a**	

	a. Published, reviewed and industry-accepted coding conventions (provide a copy to the accredited test lab); or	**Source Code Review**		**WHVS07.2, WoP 5a, WoP 3**	**X**
	b. The accredited test lab shall evaluate the code using the coding convention requirements specified in Volume II, Section 5.	**Source Code Review**		**WHVS07.2, WoP 5a**	**X**
5.2.7	**Comment Conventions**				
	Internal coding standards for comment conventions, including:			**WHVS07.2, WoP 5a**	
	a. All modules contain headers indicating identification of unit and revision information. Modules with more than 10 lines of code shall also include:	**Source Code Review**		**WHVS07.2, WoP 5a**	**X**
	i. Purpose of the unit and how it works;	**Source Code Review**		**WHVS07.2, WoP 5a**	**X**
	ii. Other units called and the calling sequence;	**Source Code Review**		**WHVS07.2, WoP 5a**	**X**
	iii. A description of input parameters and outputs;	**Source Code Review**		**WHVS07.2, WoP 5a**	**X**
	iv. File references by name and method of access;	**Source Code Review**		**WHVS07.2, WoP 5a**	**X**
	v. Global variables used; and	**Source Code Review**		**WHVS07.2, WoP 5a**	**X**
	vi. Date of creation and a revision record.	**Source Code Review**		**WHVS07.2, WoP 5a**	**X**
	b. Descriptive comments identify objects and data types. At the point of declaration, variables have comments explaining their use;	**Source Code Review**		**WHVS07.2, WoP 5a**	**X**
	c. In-line comments facilitate interpretation of functional operations, tests and branching;	**Source Code Review**		**WHVS07.2, WoP 5a**	**X**
	d. Assembly code comments clearly describe the executable lines; and	**Source Code Review**		**WHVS07.2, WoP 5a**	**X**
	e. Uniform format of comments, distinguishable from executable code.	**Source Code Review**		**WHVS07.2, WoP 5a**	**X**
5.3	**Data and Document Retention**				
a.	All systems shall maintain the integrity of voting and audit data during an election, and for at least 22 months thereafter, a time sufficient to resolve most contested elections and support other activities related to the reconstruction and investigation of a contested election.	**Warranty Statement**		**WHVS07.2, WoP 3**	**X**
b.	Protect against the failure of any data input or storage device at a location controlled by the jurisdiction or its contractors, and against any attempt at improper data entry or retrieval.	**Warranty Statement**		**WHVS07.2, WoP 3**	**X**
5.4	**Audit Record Data**				

5.4.1	**Pre-election Audit Records**				
	During election definition and ballot preparation, the system shall audit the preparation of the baseline ballot formats and modifications to them, a description of these modifications, and corresponding dates. The log shall include:				
a.	The log shall include the allowable number of selections for an office or issue;	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, Pre_TC-50	**WoP 3, WoP 26**	**X**
b.	The log shall include the combinations of voting patterns permitted or required by the jurisdiction;	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, Pre_TC-50	**WoP 3, WoP 26**	**X**
c.	The log shall include the inclusion or exclusion of offices or issues as the result of multiple districting within the polling place;	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, Pre_TC-50	**WoP 3, WoP 26**	**X**
d.	The log include any other characteristics that may be peculiar to the jurisdiction, the election, or the polling place's location;	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, Pre_TC-50	**WoP 3, WoP 26**	**X**
e.	The log shall include manual data maintained by election personnel;	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, Pre_TC-50	**WoP 3, WoP 26**	**X**
f.	The log shall include samples of all final ballot formats; and	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, Pre_TC-99, Pre_TC-50	**WoP 3, WoP 26**	**X**
g.	The log shall include ballot preparation edit listings.	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, Pre_TC-50	**WoP 3, WoP 26**	**X**
5.4.2	**System Readiness Audit Records**				
a.	Prior to the start of ballot counting, a system process shall verify hardware and software status and generate a readiness audit record, including the identification of the software release, the identification of the election to be processed, and the results of software and hardware diagnostic tests;	**FCA**	VOTE_TC-19, DS850_ES&S_VOTE_TC00574_Startup	**WoP 3, WoP 26**	**X**
b.	In the case of systems used at the polling place, the record shall include the polling place's identification;	**FCA**	VOTE_TC-19, DS850_ES&S_VOTE_TC00574_Startup	**WoP 3, WoP 26**	**X**
c.	Ballot interpretation logic tests and records the correction installation of ballot formats on voting devices;	**FCA**	VOTE_TC-10, VOTE_TC-19, DS850_ES&S_VOTE_TC00574_Startup	**WoP 3, WoP 26, WoP 30**	**X**
d.	The software shall check and record the status of all data paths and memory locations to be used in vote recording to protect against contamination of voting data;	**FCA**	VOTE_TC-19, DS850_ES&S_VOTE_TC00574_Startup	**WoP 3, WoP 26**	**X**
e.	Upon the conclusion of the tests, the software shall provide evidence in the audit record that the test data have been expunged;	**FCA**	VOTE_TC-19, DS850_ES&S_VOTE_TC00574_Startup	**WoP 3, WoP 26**	**X**

f.	If required and provided, the ballot reader and arithmetic-logic unit shall be evaluated for accuracy, and the system shall record the results, allowing the processing, or simulated processing, of sufficient test ballots to provide a statistical estimate of processing accuracy; and	**FCA**	VOTE_TC-10, VOTE_TC-19, DS850_ES&S_VOTE_TC00574_Startup	**WoP 3, WoP 26**	**X**
g.	For systems that use a public network, provide a report of test ballots that includes:				
	i. Number of ballots sent;	**N/A**		**WoP 3**	
	ii. When each ballot was sent;	**N/A**		**WoP 3**	
	iii. Machine from which each ballot was sent; and	**N/A**		**WoP 3**	
	iv. Specific votes or selections contained in the ballot.	**N/A**		**WoP 3**	
5.4.3	**In-Process Audit Records**				
a.	At a minimum, the in-process audit records shall contain:				
	Machine generated error and exception messages demonstrate successful recovery, including, but are not necessarily limited to:	**FCA**		**WoP 3**	**X**
	i. The source and disposition of system interrupts resulting in entry into exception handling routines;	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, VOTE-TC-18, DS850_ES&S_VOTE_TC00577_Reports	**WoP 3**	**X**
	ii. All messages generated by exception handlers;	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, VOTE-TC-18, DS850_ES&S_VOTE_TC00577_Reports	**WoP 3**	**X**
	iii. The identification code and number of occurrences for each hardware and software error or failure;	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, VOTE-TC-18, DS850_ES&S_VOTE_TC00581_VVSG_Requirements	**WoP 3**	**X**
	iv. Notification of system login or access errors, file access errors, and physical violations of security as they occur, and a summary record of these events after processing; and	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, VOTE-TC-18, DS850_ES&S_VOTE_TC00581_VVSG_Requirements	**WoP 3**	**X**
	v. Other exception events such as power failures, failure of critical hardware components, data transmission errors, or other type of operating anomaly.	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, VOTE-TC-18, DS850_ES&S_VOTE_TC00581_VVSG_Requirements	**WoP 3**	**X**
b.	Critical system status messages other than informational messages displayed by the system during the course of normal operations, including, but are not limited to:				
	i. Diagnostic and status messages upon startup;	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, VOTE-TC-18, DS850_ES&S_VOTE_TC00581_VVSG_Requirements	**WoP 3**	**X**
	ii. The “zero totals” check conducted before opening the polling place or counting a precinct centrally;	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, VOTE-TC-18, DS850_ES&S_VOTE_TC00577_Reports	**WoP 3**	**X**

	iii. For paper-based systems, the initiation or termination of card reader and communications equipment operation; and	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, VOTE-TC-18, DS850_ES&S_VOTE_TC00577_Reports	**WoP 3**	**X**
	iv. For DRE machines at controlled voting locations, the event (and time, if available) of activating and casting each ballot (i.e., each voter's transaction as an event). This data can be compared with the public counter for reconciliation purposes.	**N/A**		**WoP 3**	
c.	Non-critical status messages that are generated by the machine's data quality monitor or by software and hardware condition monitors.	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, VOTE-TC-18, DS850_ES&S_VOTE_TC00576_Election	**WoP 3**	**X**
d.	System generated log of all normal process activity and system events that require operator intervention, so that each operator access can be monitored and access sequence can be constructed.	**FCA**	Pre_TC-144, Pre_TC-146, Pre_TC-143, Pre_TC-145, Pre_TC-147, VOTE-TC-18, DS850_ES&S_VOTE_TC00576_Election	**WoP 3**	**X**
5.4.4	**Vote Tally Data**				
	Voting systems shall meet reporting requirements by providing software capable of obtaining data concerning various aspects of vote counting and producing reports of them on a printer. At a minimum:				
a.	Vote tally data shall include number of ballots cast, using each ballot configuration, by tabulator, by precinct, and by political subdivision;	**Accuracy Test and FCA**	AM_ TC00585-EVS5000-Accuracy-14in-Odd, VOTE_TC-EVS5000-AM19 Accuracy, VOTE_TC-EVS5000-DS200 Accuracy, VOTE_TC-EVS5000-DS850 Accuracy, DS850_ES&S_VOTE_TC00577_Reports, ERM_POST_TC00663_Reprint DS200 Reports	**WoP 3**	**X**
b.	Vote tally data shall include candidate and measure vote totals for each contest, by tabulator;	**Accuracy Test and FCA**	AM_ TC00585-EVS5000-Accuracy-14in-Odd, VOTE_TC-EVS5000-AM19 Accuracy, VOTE_TC-EVS5000-DS200 Accuracy, VOTE_TC-EVS5000-DS850 Accuracy, DS850_ES&S_VOTE_TC00577_Reports, ERM_POST_TC00663_Reprint DS200 Reports	**WoP 3**	**X**
c.	Vote tally data shall include the number of ballots read within each precinct and for additional jurisdictional levels, by configuration, including separate totals for each party in primary elections;	**Accuracy Test and FCA**	AM_ TC00585-EVS5000-Accuracy-14in-Odd, VOTE_TC-EVS5000-AM19 Accuracy, VOTE_TC-EVS5000-DS200 Accuracy, VOTE_TC-EVS5000-DS850 Accuracy, DS850_ES&S_VOTE_TC00577_Reports	**WoP 3**	**X**
d.	Vote tally data shall include separate accumulation of overvotes and undervotes for each contest, by tabulator, precinct and for additional jurisdictional levels (no overvotes would be indicated for DRE voting devices); and	**Accuracy Test and FCA**	AM_ TC00585-EVS5000-Accuracy-14in-Odd, VOTE_TC-EVS5000-AM19 Accuracy, VOTE_TC-EVS5000-DS200 Accuracy, VOTE_TC-EVS5000-DS850 Accuracy, DS850_ES&S_VOTE_TC00575_Scanning,	**WoP 3**	**X**

e.	Vote tally data shall include for paper-based systems only, the total number of ballots both processed and unprocessable; and if there are multiple card ballots, the total number of cards read.	**Accuracy Test and FCA**	AM_ TC00585-EVS5000-Accuracy-14in-Odd, VOTE_TC-EVS5000-AM19 Accuracy, VOTE_TC-EVS5000-DS200 Accuracy, VOTE_TC-EVS5000-DS850 Accuracy, DS200_VOTE_TC00645_Multipage Ballot Casting	**WoP 3**	**X**
	For systems that produce an electronic file containing vote tally data, the contents of the file shall include the same minimum data cited in a-e for printed vote tally reports.	**Accuracy Test and FCA**	AM_ TC00585-EVS5000-Accuracy-14in-Odd, VOTE_TC-EVS5000-AM19 Accuracy, VOTE_TC-EVS5000-DS200 Accuracy, VOTE_TC-EVS5000-DS850 Accuracy DS850_ES&S_VOTE_TC00577_Reports	**WoP 3**	**X**
5.5	**Voter Secrecy on DRE Systems**				
a.	Immediately after the voter casts a ballot, the voter's selections are recorded in memory to be used for vote counting and audit data, including ballot images, and the selections are erased from the display, memory and all other storage, including all forms of temporary storage; and	**N/A**		**WoP 3, WoP 30**	
b.	Immediately after the voter cancels a ballot, selections are erased from the display and all other storage, including buffers and other temporary storage.	**N/A**		**WoP 3, WoP 30**	
6	**Telecommunications**				
6.2	**Design, Construction, and Maintenance Requirements**				
6.2.1	**Accuracy**				
	Telecommunications components meet the accuracy requirements of Subsection 4.1.1.	**N/A**		**WHVS07.7, WoP 31**	
6.2.2	**Durability**				
	Telecommunications components meet the durability requirements of Subsection 4.3.2.	**N/A**		**WHVS07.7, WoP 31**	
6.2.3	**Reliability**				
	Telecommunications components meet the reliability requirements of section 4.3.3.	**N/A**		**WHVS07.7, WoP 31**	
6.2.4	**Maintainability**				
	Telecommunications components meet the maintainability requirements of section 4.3.4.	**N/A**		**WHVS07.7, WoP 31**	
6.2.5	**Availability**				
	Telecommunications components meet the availability requirements of section 4.3.5.	**N/A**		**WHVS07.7, WoP 31**	
6.2.6	**Integrity**				
a.	WANs using public telecommunications, boundary definition and implementation shall not give direct access or control of inside the boundary resources to any outside entity.	**N/A**		**WHVS07.7, WoP 31**	

b.	Voting system administrators shall not require any control of resources outside the boundary….Regardless of the technology used, the boundary point must ensure that everything on the voting system side is locally configured and controlled by the election jurisdiction while everything on the public network side is controlled by an outside service provider.	**N/A**		**WHVS07.7, WoP 31**	
c.	The system design and configuration is not vulnerable to a single point of failure in the connection to the public network causing loss of voting capabilities at any polling place.	**N/A**		**WHVS07.7, WoP 31**	
6.2.7	**Confirmation**				
	The telecommunications components of a voting system shall notify the user of the successful or unsuccessful completion of the data transmission.	**N/A**		**WHVS07.7, WoP 31**	
	In the event of unsuccessful transmission the user shall be notified of the action to be taken.	**N/A**		**WHVS07.7, WoP 31**	
7	**Security Requirements**				
7.2	**Access Controls**				
7.2.1	**General Access Control Policy**				
	The vendor shall specify the general features and capabilities of the access control policy recommended to provide effective voting system security.			**WoP 3, WoP 6**	
	The vendor shall provide a description of recommended policies for:				
	a. Software access controls;	**Security Test**	Pre_TC-78, Pre_TC-79, Pre_TC-104, Pre_TC-133, Pre_TC-116, Pre_TC-82, Pre_TC-83, Pre_TC-84, Pre_TC-08, Pre_TC-117, Pre_TC-80, Pre_TC-81, Pre_TC-06, Pre_TC-07, Pre_TC-09, Pre_TC-10, Pre_TC-11	**WoP 3, WoP 6**	**X**
	b. Hardware access controls;	**Security Test**	Pre_TC-78, Pre_TC-79, Pre_TC-104, Pre_TC-133, Pre_TC-116, Pre_TC-82, Pre_TC-83, Pre_TC-84, Pre_TC-08, Pre_TC-117, Pre_TC-80, Pre_TC-81, Pre_TC-06, Pre_TC-07, Pre_TC-09, Pre_TC-10, Pre_TC-11	**WoP 3, WoP 6**	**X**
	c. Communications;	**Security Test**	Pre_TC-78, Pre_TC-79, Pre_TC-104, Pre_TC-133, Pre_TC-116, Pre_TC-82, Pre_TC-83, Pre_TC-84, Pre_TC-08, Pre_TC-117, Pre_TC-80, Pre_TC-81, Pre_TC-06, Pre_TC-07, Pre_TC-09, Pre_TC-10, Pre_TC-11	**WoP 3, WoP 6**	**X**
	d. Effective password management;	**Security Test**	Pre_TC-78, Pre_TC-79, Pre_TC-104, Pre_TC-133, Pre_TC-116, Pre_TC-82, Pre_TC-83, Pre_TC-84, Pre_TC-08, Pre_TC-117, Pre_TC-80, Pre_TC-81, Pre_TC-06, Pre_TC-07, Pre_TC-09, Pre_TC-10, Pre_TC-11	**WoP 3, WoP 6**	**X**
	e. Protection abilities of a particular operating system;	**Security Test**	Pre_TC-78, Pre_TC-116, Pre_TC-85, Pre_TC-01, Pre_TC-103	**WoP 3, WoP 6**	**X**
	f. General characteristics of supervisory access privileges;	**Security Test**	Pre_TC-78, Pre_TC-79, Pre_TC-114, Pre_TC-82, Pre_TC-83, Pre_TC-84, Pre_TC-08, Pre_TC-85, Pre_TC-86, Pre_TC-01, Pre_TC-80, Pre_TC-81, Pre_TC-103, Pre_TC-06, Pre_TC-07, Pre_TC-09, Pre_TC-10, Pre_TC-11		

	g. Segregation of duties; and	**Security Test**	Pre_TC-79, Pre_TC-82, Pre_TC-83, Pre_TC-84, Pre_TC-08, Pre_TC-85, Pre_TC-86, Pre_TC-01, Pre_TC-80, Pre_TC-81, Pre_TC-103, Pre_TC-06, Pre_TC-07, Pre_TC-09, Pre_TC-10, Pre_TC-11	**WoP 3, WoP 6**	**X**
	h. Any additional relevant characteristics.	**Security Test**	Pre_TC-79, Pre_TC-82, Pre_TC-83, Pre_TC-84, Pre_TC-08, Pre_TC-85, Pre_TC-86, Pre_TC-80, Pre_TC-81, Pre_TC-06, Pre_TC-07, Pre_TC-09, Pre_TC-10, Pre_TC-11	**WoP 3, WoP 6**	**X**
7.2.1.1	**Individual Access Privileges**				
	a. Identification of each person to whom access is granted, and the specific functions and data to which each person holds authorized access;	**Security Test**	Pre_TC-78, Pre_TC-116, Pre_TC-85, Pre_TC-86, Pre_TC-01, Pre_TC-76, Pre_TC-77, Pre_TC-103, Pre_TC-02, Pre_TC-102, VOTE_TC-39, VOTE_TC-49	**WoP 3, WoP 6**	**X**
	b. Individual authorizations limited to a specific time, time interval, or phase of the voting or counting operations; and	**Security Test**	Pre_TC-114, Pre_TC-116, Pre_TC-117, Pre_TC-01, Pre_TC-76, Pre_TC-77, Pre_TC-103, Pre_TC-02, Pre_TC-102	**WoP 3, WoP 6**	**X**
	c. Permitting the voter to cast a ballot expeditiously, but precluding voter access to all other aspects of the vote-counting processes.	**Security Test**	Pre_TC-78, Pre_TC-79, Pre_TC-104, Pre_TC-133, Pre_TC-116, Pre_TC-82, Pre_TC-83, Pre_TC-84, Pre_TC-08, Pre_TC-117, Pre_TC-80, Pre_TC-81, Pre_TC-06, Pre_TC-07, Pre_TC-09, Pre_TC-10, Pre_TC-11	**WoP 3, WoP 6**	**X**
7.2.1.2	**Access Control Measures**				
	Vendors shall provide a detailed description of all system access control measures designed to permit authorized access to the system and prevent unauthorized access.	**Security Test**	Pre_TC-78, Pre_TC-79, Pre_TC-104, Pre_TC-133, Pre_TC-116, Pre_TC-82, Pre_TC-83, Pre_TC-84, Pre_TC-08, Pre_TC-117, Pre_TC-80, Pre_TC-81, Pre_TC-06, Pre_TC-07, Pre_TC-09, Pre_TC-10, Pre_TC-11	**WoP 3, WoP 6**	**X**
	Examples of such measures include:				
	a. Use of data and user authorization	**Security Test**		**WoP 3, WoP 6**	
	b. Program unit ownership and other regional boundaries	**Security Test**		**WoP 3, WoP 6**	
	c. One-end or two-end port protection devices	**Security Test**		**WoP 3, WoP 6**	
	d. Security kernels	**Security Test**		**WoP 3, WoP 6**	
	e. Computer-generated password keys	**Security Test**		**WoP 3, WoP 6**	
	f. Special protocols	**Security Test**		**WoP 3, WoP 6**	
	g. Message encryption	**Security Test**		**WoP 3, WoP 6**	
	h. Controlled access security	**Security Test**		**WoP 3, WoP 6**	
	Vendors also shall define and provide a detailed description of the methods used to prevent unauthorized access to the access control capabilities of the system itself.	**Security Test**	Pre_TC-78, Pre_TC-79, Pre_TC-104, Pre_TC-133, Pre_TC-116, Pre_TC-82, Pre_TC-83, Pre_TC-84, Pre_TC-08, Pre_TC-117, Pre_TC-80, Pre_TC-81, Pre_TC-06, Pre_TC-07, Pre_TC-09, Pre_TC-10, Pre_TC-11	**WoP 3, WoP 6**	**X**
7.3	**Physical Security Measures**				
7.3.1	**Polling Place Security**				
	Detailed documentation of measures to anticipate and counteract vandalism, civil disobedience, and similar occurrences. The measures shall:			**WoP 3, WoP 6**	
	Allow the immediate detection of tampering with vote casting devices and precinct ballot counters; and	**Security Test**	Pre_TC-78, Pre_TC-79, Pre_TC-104, Pre_TC-133, Pre_TC-116, Pre_TC-82, Pre_TC-83, Pre_TC-84, Pre_TC-08, Pre_TC-117, Pre_TC-80, Pre_TC-81, Pre_TC-06, Pre_TC-07, Pre_TC-09, Pre_TC-10, Pre_TC-11	**WoP 3, WoP 6**	**X**

	Control physical access to a telecommunications link if such a link is used.	**Security Test**	Pre_TC-78, Pre_TC-79, Pre_TC-104, Pre_TC-133, Pre_TC-116, Pre_TC-82, Pre_TC-83, Pre_TC-84, Pre_TC-08, Pre_TC-117, Pre_TC-80, Pre_TC-81, Pre_TC-06, Pre_TC-07, Pre_TC-09, Pre_TC-10, Pre_TC-11	**WoP 3, WoP 6**	**X**
7.3.2	**Central Count Location Security**				
	Vendors shall develop and document in detail the measures to be taken in a central counting environment. These measures shall include physical and procedural controls related to the handling of ballot boxes, preparing of ballots for counting, counting operations and reporting data.	**N/A**		**WoP 3, WoP 6**	
7.4	**Software Security**				
	Voting systems shall meet specific security requirements for the installation of software and for protection against malicious software.				
7.4.1	**Software and Firmware Installation**				
a.	If software is resident in the system as firmware, the vendor shall require and state in the system documentation that every device is to be retested to validate each ROM prior to the start of elections operations.	**N/A**		**WoP 7**	
b.	No software shall be permanently installed or resident in the voting system unless the system documentation states that the jurisdiction must provide a secure physical and procedural environment for the storage, handling, preparation, and transportation of the system hardware.	**Security Test**	Pre_TC-78, Pre_TC-79, Pre_TC-104, Pre_TC-133, Pre_TC-116, Pre_TC-82, Pre_TC-83, Pre_TC-84, Pre_TC-08, Pre_TC-117, Pre_TC-80, Pre_TC-81, Pre_TC-06, Pre_TC-07, Pre_TC-09, Pre_TC-10, Pre_TC-11	**WoP 7**	**X**
c.	The system bootstrap, monitor, and device-controller software may be resident permanently as firmware, provided that this firmware has been shown to be inaccessible to activation or control by any means other than by the authorized initiation and execution of the vote-counting program, and its associated exception handlers.	**N/A**		**WoP 7**	
d.	The election-specific programming may be installed and resident as firmware, provided that such firmware is installed on a component (such as computer chip) other than the component on which the operating system resides.	**N/A**		**WoP 7**	
e.	After initiation of election day testing, no source code or compilers or assemblers shall be resident or accessible.	**Security Test**	Pre_TC-78, Pre_TC-79, Pre_TC-104, Pre_TC-133, Pre_TC-116, Pre_TC-82, Pre_TC-83, Pre_TC-84, Pre_TC-08, Pre_TC-117, Pre_TC-80, Pre_TC-81, Pre_TC-06, Pre_TC-07, Pre_TC-09, Pre_TC-10, Pre_TC-11	**WoP 7**	**X**
7.4.2	**Protection Against Malicious Software**				

	Documented procedures to follow to ensure protection against file and macro viruses, worms, Trojan horses, and logic bombs are maintained in a current status.	**Security Test**	Pre_TC-78, Pre_TC-79, Pre_TC-104, Pre_TC-133, Pre_TC-116, Pre_TC-82, Pre_TC-83, Pre_TC-84, Pre_TC-08, Pre_TC-117, Pre_TC-80, Pre_TC-81, Pre_TC-06, Pre_TC-07, Pre_TC-09, Pre_TC-10, Pre_TC-11	**WoP 6, WoP 3**	**X**
7.4.4	**Software Distribution**				
a.	The vendor shall document all software including voting system software, third party software (such as operating systems and drivers) to be installed on the certified voting system, and installation programs.	**FCA**		**WoP 3, WoP 7**	**X**
a. i.	The documentation shall have a unique identifier (such as a serial number or part number) for the following set of information: documentation, software vendor name, product name, version, the certification application number of the voting system, file names and paths or other location information (such as storage addresses) of the software.	**FCA**		**WoP 3, WoP 7**	**X**
a. ii.	The documentation shall designate all software files as static, semi-static or dynamic.	**TDP**		**WoP 3, WoP 7**	**X**
b.	The EAC accredited testing lab shall witness the final build of the executable version of the certified voting system software performed by the vendor.	**Witness Build**		**WoP 3, WoP 7**	**X**
b. i.	The testing lab shall create a complete record of the build that includes: a unique identifier (such as a serial number) for the complete record; a list of unique identifiers of unalterable storage media associated with the record; the time, date, location, names and signatures of all people present; the source code and resulting executable file names; the version of voting system software; the certification application number of the voting system; the name and versions of all (including third party) libraries; and the name, version, and configuration files of the development environment used for the build.	**Witness Build**		**WoP 3, WoP 7**	**X**
b. ii.	The record of the source code and executable files shall be made on unalterable storage media. Each piece of media shall have a unique identifier.	**Witness Build**		**WHVS07.1, WoP 7**	**X**
	Unalterable storage media includes CD-R but not CD-RW. Unique identifiers appear on indelibly printed labels and in a digitally signed file on the unalterable storage media.			**WoP 7**	
b. iii.	The testing lab shall retain this record until notified by the EAC that it can be archived.	**Witness Build**		**WHVS07.1, WoP 7**	**X**

c.	After EAC certification has been granted, the testing lab shall create a subset of the complete record of the build that includes a unique identifier (such as a serial number) of the subset, the unique identifier of the complete record, a list of unique identifiers of unalterable storage media associated with the subset, the vendor and product name, the version of voting system software, the certification number of the voting system, and all the files that resulted from the build and binary images of all installation programs.	**Witness Build**		**WoP 7**	**X**
	iii. The record of the software shall be made on unalterable storage media. Each piece of media shall have a unique identifier.	**Witness Build**		**WoP 7**	**X**
	iv. The testing lab shall retain a copy, send a copy to the vendor, and send a copy to the NIST National Software Reference Library (NSRL) and/or to any repository designated by a State.	**N/A**		**WHVS07.1, WoP 7**	
7.4.6	**Software Setup Validation**				
a.	Setup validation methods shall verify that no unauthorized software is present on the voting equipment.	**FCA**		**WoP 3, WoP 7, WoP 30**	**X**
b.	The vendor shall have a process to verify that the correct software is loaded, that there is no unauthorized software, and that voting system software on voting equipment has not been modified, using the reference information from the NSRL or from a State designated repository.	**FCA and Security Test**		**WoP 3, WoP 7, WoP 30**	
	i. The process used to verify software should be possible to perform without using software installed on the voting system.	**FCA**		**WoP 3, WoP 7, WoP 30**	**X**
	ii. The vendor shall document the process used to verify software on voting equipment.	**FCA**		**WoP 3, WoP 7, WoP 30**	**X**
	iii. The process shall not modify the voting system software on the voting system during the verification process.	**FCA**		**WoP 3, WoP 7, WoP 30**	**X**
c.	The vendor shall provide a method to comprehensively list all software files that are installed on voting systems.	**FCA**		**WoP 3, WoP 7, WoP 30**	**X**
d.	The verification process should be able to be performed using COTS software and hardware available from sources other than the voting system vendor.			**WoP 3, WoP 7, WoP 30**	

	i. If the process uses hashes or digital signatures, then the verification software shall use a FIPS 140-2 level 1 or higher validated cryptographic module.	**FCA**		**WoP 3, WoP 7, WoP 30**	**X**
	ii. The verification process shall either (a) use reference information on unalterable storage media received from the repository or (b) verify the digital signature of the reference information on any other media.	**FCA**		**WoP 3, WoP 7, WoP 30**	**X**
e.	Voting system equipment shall provide a means to ensure that the system software can be verified through a trusted external interface, such as a read-only external interface, or by other means.			**WoP 3, WoP 7, WoP 30**	
	i. The external interface shall be protected using tamper evident techniques	**FCA**		**WoP 3, WoP 7, WoP 30**	**X**
	ii. The external interface shall have a physical indicator showing when the interface is enabled and disabled	**FCA**		**WoP 3, WoP 7, WoP 30**	**X**
	iii. The external interface shall be disabled during voting	**FCA**		**WoP 3, WoP 7, WoP 30**	**X**
	iv. External interface should provide a direct read-only access to the location of the voting system software without the use of installed software.	**FCA**		**WoP 3, WoP 7, WoP 30**	**X**
f.	Setup validation methods shall verify that registers and variables of the voting system equipment contain the proper static and initial values.			**WoP 3, WoP 7, WoP 30**	
	i. The vendor should provide a method to query the voting system to determine the values of all static and dynamic registers and variables including the values that jurisdictions are required to modify to conduct a specific election.	**FCA**		**WoP 3, WoP 7, WoP 30**	**X**
	ii. The vendor shall document the values of all static registers and variables, and the initial starting values of all dynamic registers and variables listed for voting system software, except for the values set to conduct a specific election.	**FCA**		**WoP 3, WoP 7, WoP 30**	**X**
7.5	**Telecommunications and Data Transmission**				
7.5.1	**Maintaining Data Integrity**				

a.	Standard transmission error detection and correction methods such as checksums or message digest hashes. Verification of correct transmission shall occur at the voting system application level and ensure that the correct data is recorded on all relevant components consolidated within the polling place prior to the voter completing casting of his or her ballot.	**N/A**		**WHVS07.7, WoP 31**	
b.	Voting systems that use telecommunications to communicate between system components and locations before the polling place is officially closed shall:			**WHVS07.7, WoP 31**	
	i. Implement an encryption standard currently documented and validated for use by an agency of the U.S. government	**N/A**		**WHVS07.7, WoP 31**	
	ii. Provide a means to detect the presence of an intrusive process, such as an Intrusion Detection System.	**N/A**		**WHVS07.7, WoP 31**	
7.5.2	**Protection Against External Threats**				
a.	Voting systems that use public telecommunications networks shall implement protections against external threats to which commercial products used in the system may be susceptible.	**N/A**		**WHVS07.7, WoP 31**	
b.	Voting systems that use public telecommunications networks shall provide system documentation that clearly identifies all COTS hardware and software products and communications services used in the development and/or operation of the voting system, including operating systems, communications routers, modem drivers and dial-up networking software.	**N/A**		**WoP 31**	
	i. Such documentation shall identify the name, vendor, and version used for each such component.	**N/A**		**WoP 31**	
c.	Voting systems that use public telecommunications networks shall use protective software at the receiving-end of all communications paths to:			**WHVS07.7, WoP 31**	
	i. Detect the presence of a threat in a transmission	**N/A**		**WHVS07.7, WoP 31**	
	ii. Remove the threat from infected files/data	**N/A**		**WHVS07.7, WoP 31**	
	iii. Prevent against storage of the threat anywhere on the receiving device	**N/A**		**WHVS07.7, WoP 31**	

	iv. Provide the capability to confirm that no threats are stored in system memory and in connected storage media	**N/A**		**WHVS07.7, WoP 31**	
	v. Provide data to the system audit log indicating the detection of a threat and the processing performed.	**N/A**		**WHVS07.7, WoP 31**	
7.5.3	**Monitoring and Responding to External Threats**				
	Detailed description, including scheduling information, of the procedures to:			**WHVS07.7, WoP 31**	
	a. Monitor threats;	**N/A**		**WHVS07.7, WoP 3**	
	b. Evaluate threats and proposed responses;	**N/A**		**WHVS07.7, WoP 3**	
	c. Develop responsive updates to the system and/or corrective procedures;	**N/A**		**WHVS07.7, WoP 3**	
	d. Submit the proposed response to the accredited test lab and appropriate states for approval, identifying the exact changes and whether or not they are temporary or permanent;	**N/A**		**WHVS07.7, WoP 3**	
	e. After implementation of the proposed response is approved by the state, assist clients, either directly or through detailed written procedures, how to update their systems and/or to implement the corrective procedures within the timeframe established by the state; and	**N/A**		**WHVS07.7, WoP 3**	
	f. Address threats emerging too late to correct the system at least one month before the election, including:	**N/A**		**WHVS07.7, WoP 3**	
	i. Providing prompt, emergency notification to the accredited test lab and the affected states and user jurisdictions;	**N/A**		**WHVS07.7, WoP 3**	
	ii. Assisting client jurisdictions directly, or advising them through detailed written procedures, to disable the public telecommunications mode of the system; and	**N/A**		**WHVS07.7, WoP 3**	
	iii. After the election, modifying the system to address the threat; submitting the modified system to an accredited test lab and the EAC or state certification authority for approval, and assisting client jurisdictions directly, or advising them through detailed written procedures, to update their systems and/or to implement the corrective procedures after approval.	**N/A**		**WHVS07.7, WoP 3**	
7.5.4	**Shared Operating Environment**				
a.	Systems that use a shared operating environment use security procedures and logging records to control access to system functions.	**N/A**		**WHVS07.7, WoP 3**	

b.	Systems that use a shared operating environment partition or compartmentalize voting system functions from other concurrent functions at least logically, and preferably physically as well.	**N/A**		**WHVS07.7, WoP 3**	
c.	Systems that use a shared operating environment control system access by means of passwords, and restriction of account access to necessary functions only.	**N/A**		**WHVS07.7, WoP 3**	
d.	Systems that use a shared operating environment have capabilities in place to control the flow of information, precluding data leakage through shared system resources.	**N/A**		**WHVS07.7, WoP 3**	
7.5.5	**Incomplete Election Returns**				
a.	Voting systems that provide access to incomplete election returns and interactive inquiries before the completion of the official count, including equipment operating in a central counting environment or polling place equipment containing removable memory modules or that may be removed entirely to a central place for consolidation polling place returns, is designed to provide external access to incomplete election returns only if the statutes and regulations of the using agency authorize that access.	**N/A**		**WHVS07.7, WoP 3**	
b.	Voting systems that provide access to incomplete election returns and interactive inquiries before the completion of the official count, use voting system software and its security environment designed such that data accessible to interactive queries resides in an external file, or database, that is created and maintained by the elections software under the restrictions applying to any other output report, namely, that:	**N/A**		**WHVS07.7, WoP 3**	
	i. The output file or database has no provision for write-access back to the system.	**N/A**		**WHVS07.7, WoP 3**	
	ii. Persons whose only authorized access is to the file or database are denied write-access, both to the file or database, and to the system.	**N/A**		**WHVS07.7, WoP 3**	
7.6	**Use of Public Communications Networks**				
7.6.1	**Data Transmission**				
a.	Systems that transmit data over public telecommunications networks preserve the secrecy of a voter's ballot choices, and prevent anyone from violating ballot privacy.	**N/A**		**WHVS07.7, WoP 31**	

b.	Systems that transmit data over public telecommunications networks employ digital signature for all communications between the vote server and other devices that communicate with the server over the network.	**N/A**		**WHVS07.7, WoP 3, WoP 31**	
c.	Systems that transmit data over public telecommunications networks require that at least two authorized election officials activate any critical operation regarding the processing of ballots transmitted over a public communications network takes place, i.e. the passwords or cryptographic keys of at least two employees are required to perform processing of votes.	**N/A**		**WHVS07.7, WoP 3, WoP 31**	
7.6.2	**Casting Individual Ballots**				
7.6.2.1	**Documentation of Mandatory Security Activities**				
a.	Systems that transmit data over public telecommunications networks, all activities mandatory to ensuring effective system security to be performed in setting up the system for operation, including testing of security before an election.	**N/A**		**WHVS07.7, WoP 3, WoP 31**	
b.	Systems that transmit data over public telecommunications networks, all activities that should be prohibited during system setup and during the time frame for voting operations, including both the hours when polls are open and when polls are closed.	**N/A**		**WHVS07.7, WoP 3, WoP 31**	
7.6.2.2	**Ability to Operate During Interruption of Service**				
a.	Systems shall provide resistance to interruptions of telecommunications service that prevent voting devices at the poll site from communicating with external components via telecommunications, detecting the occurrence of a telecommunications interruption at the poll site and switching to an alternative mode of operation that is not dependent on the connection between poll site voting devices and external system components;	**N/A**		**WHVS07.7, WoP 31**	
b.	Systems shall provide resistance to interruptions of telecommunications service that prevent voting devices at the poll site from communicating with external components via telecommunications, provide an alternate mode of operation that includes the functionality of a conventional electronic voting system without losing any single vote;	**N/A**		**WHVS07.7, WoP 31**	

c.	Systems shall provide resistance to interruptions of telecommunications service that prevent voting devices at the poll site from communicating with external components via telecommunications, create and preserve an audit trail of every vote cast during the period of interrupted communication and system operation in conventional electronic voting system mode;	**N/A**		**WHVS07.7, WoP 31**	
d.	Systems shall provide resistance to interruptions of telecommunications service that prevent voting devices at the poll site from communicating with external components via telecommunications, upon reestablishment of communications, transmit and process votes accumulated while operating in conventional electronic voting system mode with all security safeguards in effect;	**N/A**		**WHVS07.7, WoP 31**	
e.	Systems shall provide resistance to interruptions of telecommunications service that prevent voting devices at the poll site from communicating with external components via telecommunications, ensure that all safeguards related to voter identification and authentication are not affected by the procedures employed by the system to counteract potential interruptions of telecommunications capabilities.	**N/A**		**WHVS07.7, WoP 31**	
7.7	**Wireless Communications**				
7.7.1	**Controlling Usage**				
a.	If wireless communications are used in a voting system, then the vendor shall supply documentation describing how to use all aspects of wireless communications in a secure manner. This documentation shall include:	**N/A**		**WHVS07.7, WoP 3**	
a. i.	A complete description of the uses of wireless in the voting system including descriptions of the data elements and signals that are to be carried by the wireless mechanism.	**N/A**		**WHVS07.7, WoP 3**	
a. ii.	A complete description of the vulnerabilities associated with this proposed use of wireless, including vulnerabilities deriving from the insertion, deletion, modification, capture or suppression of wireless messages.	**N/A**		**WHVS07.7, WoP 3**	

a. iii.	A complete description of the techniques used to mitigate the risks associated with the described vulnerabilities including techniques used by the vendor to ensure that wireless cannot send or receive messages other than those situations specified in the documentation. Cryptographic techniques shall be carefully and fully described, including a description of cryptographic key generation, management, use, certification, and destruction.	**N/A**		**WHVS07.7, WoP 3**	
a. iv.	A rationale for the inclusion of wireless in the proposed voting system, based on a careful and complete description of the perceived advantages and disadvantages of using wireless for the documented uses compared to using non-wireless approaches.	**N/A**		**WHVS07.7, WoP 3**	
b.	The details of all cryptographic protocols used for wireless communications, including the specific features and data, shall be documented.	**N/A**		**WHVS07.7, WoP 3**	
c.	The wireless documentation shall be closely reviewed for accuracy, completeness, and correctness.	**N/A**		**WHVS07.7, WoP 3**	
d.	There shall be no undocumented use of the wireless capability, nor any use of the wireless capability that is not entirely controlled by an election official.	**N/A**		**WHVS07.7, WoP 3**	
e.	If a voting system includes wireless capabilities, then the voting system shall be able to accomplish the same function if wireless capabilities are not available due to an error or no service.	**N/A**		**WHVS07.7, WoP 3**	
	i. The vendor shall provide documentation how to accomplish these functions when wireless is not available.	**N/A**		**WHVS07.7, WoP 3**	
f.	The system shall be designed and configured so it is not vulnerable to a single point of failure using wireless communications that causes a total loss of any voting capabilities.	**N/A**		**WoP 3**	
g.	If a voting system includes wireless capabilities, then the system shall have the ability to turn on the wireless capability when it is to be used and to turn off the wireless capability when the wireless capability is not in use.	**N/A**		**WHVS07.7, WoP 3**	

h.	If a voting system includes wireless capabilities, then the system shall not activate the wireless capabilities without confirmation from an elections official.	**N/A**		**WHVS07.7, WoP 3**	
7.7.2	**Identifying Usage**				
a.	If a voting system provides wireless communications capabilities, then there shall be a method for determining the existence of the wireless communications capabilities.	**N/A**		**WHVS07.7, WoP 3, WoP 39**	
b.	If a voting system provides wireless communications capabilities, then there shall be an indication that allows one to determine when the wireless communications (such as radio frequencies) capability is active.	**N/A**		**WHVS07.7, WoP 3, WoP 39**	
c.	The indication shall be visual.	**N/A**		**WHVS07.7, WoP 3, WoP 39**	
d.	If a voting system provides wireless communications capabilities, then the type of wireless communications used (such as radio frequencies) shall be identified either via a label or via the voting system documentation.	**N/A**		**WHVS07.7, WoP 3, WoP 39**	
7.7.3	**Protecting Transmitted Data**				
a.	All information transmitted via wireless communications shall be encrypted and authenticated--with the exception of wireless T-coil coupling--to protect against eavesdropping and data manipulation including modification, insertion, and deletion.	**N/A**		**WHVS07.7, WoP 31, WoP 39, WoP 3**	
a. i.	The encryption shall be as defined in Federal Information Processing Standards (FIPS) 197, “Advanced Encryption Standard (AES).”	**N/A**		**WHVS07.7, WoP 31, WoP 39, WoP 3**	
a. ii.	The cryptographic modules used shall comply with FIPS 140-2, Security Requirements for Cryptographic Modules.	**N/A**		**WHVS07.7, WoP 31, WoP 39, WoP 3**	
b.	The capability to transmit non-encrypted and non-authenticated information via wireless communications shall not exist.	**N/A**		**WHVS07.7, WoP 31, WoP 39, WoP 3**	
c.	If audible wireless communication is used, and the receiver of the wireless transmission is the human ear, then the information shall not be encrypted.	**N/A**		**WHVS07.7, WoP 31, WoP 39, WoP 3**	
7.7.4	**Protecting the Wireless Path**				
a.	The voting system shall be able to function properly throughout a DoS attack, since the DoS attack may continue throughout the voting period.	**N/A**		**WoP 31, WoP 39**	

b.	The voting system shall function properly as if the wireless capability were never available for use.	**N/A**		**WoP 31, WoP 39**	
c.	Alternative procedures or capabilities shall exist to accomplish the same functions that the wireless communications capability would have done.	**N/A**		**WoP 31, WoP 39**	
d.	If infrared is being used, the shielding shall be strong enough to prevent escape of the voting system signal, as well as strong enough to prevent infrared saturation jamming.	**N/A**		**WoP 31, WoP 39**	
7.7.5	**Protecting the Voting System**				
a.	The security requirements in Subsection 2.1.1 shall be applicable to systems with wireless communications.	**N/A**		**WoP 31, WoP 39**	
b.	The accuracy requirements in Subsection 2.1.2 shall be applicable to systems with wireless communications.	**N/A**		**WoP 31, WoP 39**	
c.	The use of wireless communications that may cause impact to the system accuracy through electromagnetic stresses is prohibited.	**N/A**		**WoP 31, WoP 39**	
d.	The error recovery requirements in Subsection 2.1.3 shall be applicable to systems with wireless communications.	**N/A**		**WoP 31, WoP 39**	
e.	All wireless communications actions shall be logged.	**N/A**		**WoP 3, WoP 31, WoP 39**	
	i. The log shall contain at least the following entries: times when the wireless is activated and deactivated, services accessed, identification of device to which data was transmitted to or received from, identification of authorized user, and successful and unsuccessful attempts to access wireless communications or service.	**N/A**		**WoP 3, WoP 31 WoP 39**	
f.	Device authentication shall occur before any access to, or services from, the voting system are granted through wireless communications.	**N/A**		**WoP 31, WoP 39**	
	i. User authentication shall be at least level 2 as per NIST Special Publication 800-63 Version 1.0.1, Electronic Authentication Guideline.	**N/A**		**WoP 31, WoP 39**	
7.8	**Independent Verification Systems**				
7.8.2	**Basic Characteristics of IV Systems**				
	An independent verification system produces at least two independent cast vote records of ballot selections via interactions with the voter, such that one record can be compared against the other to check their equality of content.	**N/A**		**WoP 3, WoP 30**	

	The voter verifies the content of each cast vote record and either (a) verifies at least one of the records directly or (b) verifies both records indirectly if the records are each under the control of independent processes.	**N/A**		**WoP 3, WoP 30**	
	Discussion: Direct verification: using human senses-directly reading a paper record via eyesight. Indirect verification: using an intermediary to perform the verification-e.g. verifying electronic ballot image on the voting machine.	**N/A**		**WoP 3, WoP 30**	
	The creation, storage and handling of the cast vote records are sufficiently separate that the failure or compromise of one record does not cause the failure or compromise of another.	**N/A**		**WoP 3, WoP 30**	
	Discussion: The records must be stored on different media and handled independently of each other so that no one process could compromise all records.	**N/A**		**WoP 3, WoP 30**	
	Both cast vote records are highly resistant to damage or alteration and capable of long-term storage.	**N/A**		**WoP 3, WoP 30**	
	The processes of verification for the cast vote records do not all depend on the same device, software module, or system for their integrity, and are sufficiently separate that each record provides evidence of the voter's selections independently of its corresponding record.	**N/A**		**WoP 3, WoP 30**	
	Discussion: For example, the verification of the summary screen (electronic record) of a DRE is sufficiently separate from the verification of a paper record printed by a VVPAT component or a copy of the electronic record stored on a separate system.	**N/A**		**WoP 3, WoP 30**	
	The multiple cast vote records are linked to their corresponding audit records by including a unique identifier within each record.	**N/A**		**WoP 3, WoP 30**	
	Each cast vote record includes information identifying the following:				
	An identification of the polling place and precinct	**N/A**		**WoP 3, WoP 30**	
	Whether the balloting is provisional, early, or on election day	**N/A**		**WoP 3, WoP 30**	
	Ballot style	**N/A**		**WoP 3, WoP 30**	
	A timestamp generated when the voting machine is enabled to begin a voting session that can be used to correctly group the cast vote records	**N/A**		**WoP 3, WoP 30**	

	A unique identifier associated with the voting machine	**N/A**		**WoP 3, WoP 30**	
	The cryptographic software used in IV systems is approved by the U.S. Government's Cryptographic Module Validation Program, as applicable.	**N/A**		**WoP 3, WoP 30**	
	Discussion: This software should be reviewed and approved by the Cryptographic Module Validation Program (CMVP). There may be cryptographic voting schemes where the cryptographic algorithms used are necessarily different from any algorithms that have approved CMVP implementations; thus CMVP-approved software shall be used where feasible. The CMVP website is http://csrc.nist.gov/cryptval	**N/A**		**WoP 3, WoP 30**	
7.9	**Voter Verifiable Paper Audit Trail Requirements**				
	VVPAT is not required for national certification. However, these requirements will be applied for certification testing of DRE systems that are intended for use in states that require DREs to provide this capability.			**WHSV07.1, WoP 3, WHVS07.5, WoP 30 WoP 38**	
7.9.1	**Display and Print a Paper Record**				
a.	The voting system shall print and display a paper record of the voter ballot selections prior to the voter making his or her selections final by casting the ballot.	**N/A**		**WoP 3, WoP 30, WoP 38**	
	This is the basic requirement of the VVPAT capability. It requires: paper record be treated as a distinct representation of the voter ballot selections and requires the paper record to contain the same information as the electronic record and be suitable for use in verifications of the voting machine's electronic records.	**N/A**		**WoP 3, WoP 30, WoP 38**	
b.	The paper record shall constitute a complete record of ballot selections that can be used to assess the accuracy of the voting machine's electronic record, to verify the election results, and, if required by state law, in full recounts.	**N/A**		**WoP 3, WoP 30, WoP 38**	
	Requirement is to clarify that it is possible to use the paper record for checking voter machine's accuracy, is usable for election audits, and shall also be suitable for use in full recounts.	**N/A**		**WoP 3, WoP 30, WoP 38**	
c.	The paper record shall contain all voter selection information stored in the electronic (ballot image) record.	**N/A**		**WoP 3, WoP 30, WoP 38**	

	The electronic ballot image record cannot hide any information related to ballot selections; all information relating to voter selections must be equally present in both records.	**N/A**		**WoP 3, WoP 30, WoP 38**	
7.9.2	**Approve or Void the Paper Record**				
a.	The voting equipment shall allow the voter to approve or void the paper record.	**N/A**		**WoP 3, WoP 30, WoP 38**	
	Discussion: The voter can verify that the ballot selections displayed on the DRE summary screen and those printed on the paper record are the same. If they are, and the voter is satisfied with these selections, the voter can proceed to cast his or her ballot, thereby approving the paper record.	**N/A**		**WoP 3, WoP 30, WoP 38**	
	Discussion: If the selections match, but the voter wishes to change one or more selections, the paper record must be voided so a new paper record can be created to compare to the new summary screen displayed after the voter changes his or her ballot selections.	**N/A**		**WoP 3, WoP 30, WoP 38**	
	Discussion: In the event the selections do not match between the summary screen and the paper record, the voter shall immediately request assistance from a poll worker. A non-match could indicate a potential voting machine or printer malfunction.	**N/A**		**WoP 3, WoP 30, WoP 38**	
b.	The voting equipment shall, in the presence of the voter, mark the paper record as being approved by the voter if the ballot selections are accepted; or voided or if the voter decides to change one or more selections.	**N/A**		**WoP 3, WoP 30, WoP 38**	
c.	If the records do not match, the voting equipment shall mark and preserve the paper record and shall provide a means to preserve the corresponding electronic record so the source of error or malfunction can be analyzed.	**N/A**		**WoP 3, WoP 30, WoP 38**	
	The voting machine shall be withdrawn from service immediately and its use discontinued in accordance with jurisdiction procedures.	**N/A**		**WoP 3, WoP 30, WoP 38**	
d.	The voting machine shall not record the electronic record until the paper record has been approved by the voter.	**N/A**		**WoP 3, WoP 30, WoP 38**	

e.	Vendor documentation shall include procedures to enable the election official to return a voting machine to correct operation after a voter has used it incompletely or incorrectly. **This procedure shall not cause discrepancies between the tallies of the electronic and paper records.**	**N/A**		**WoP 3, WoP 30, WoP 38**	
7.9.3	**Electronic and Paper Record Structure**				
a.	All cryptographic software in the voting system shall be approved by the U.S. Government's Cryptographic Module Validation Program, as applicable.	**N/A**		**WoP 3, WoP 30, WoP 38**	
	This software should be reviewed and approved by the Cryptographic Module Validation Program (CMVP). There may be cryptographic voting schemes where the cryptographic algorithms used are necessarily different from any algorithms that have approved CMVP implementations; thus CMVP-approved software shall be used where feasible. The CMVP website is http://csrc.nist.gov/cryptval	**N/A**		**WoP 3, WoP 30, WoP 38**	
b.	The electronic ballot image and paper records shall include information about the election.	**N/A**		**WoP 3, WoP 30, WoP 38**	
	i. The voting equipment shall be able to include an identification of the particular election, the voting site and precinct, and the voting machine.	**N/A**		**WoP 3, WoP 30, WoP 38**	
	ii. The records shall include information identifying whether the balloting is provisional, early, or on election day, and information that identifies the ballot style in use.	**N/A**		**WoP 3, WoP 30, WoP 38**	
	iii. The records shall include a voting session identifier that is generated when the voting equipment is placed in voting mode, and that can be used to identify the records as being created during that voting session.	**N/A**		**WoP 3, WoP 30, WoP 38**	
	If there are several voting sessions on the same voting machine on the same day, the voting session identifiers must be different. They should be generated from a random number generator.			**WoP 3, WoP 30, WoP 38**	
c.	The electronic ballot image and paper records shall be linked by including a unique identifier within each record that can be used to identify each record uniquely and each record's corresponding record.	**N/A**		**WoP 3, WoP 30, WoP 38**	
d.	The voting machine should generate and store a digital signature for each electronic record.	**N/A**		**WoP 3, WoP 30, WoP 38**	

e.	The electronic ballot image records shall be able to be exported for auditing or analysis on standards-based and /or COTS information technology computing platforms.	**N/A**		**WoP 3, WoP 30, WoP 38**	
	i. The exported electronic ballot image records shall be in a publicly available, non-proprietary format.	**N/A**		**WoP 3, WoP 30, WoP 38**	
	ii. The records should be exported with a digital signature, which shall be calculated on the entire set of electronic records and their associated digital signatures.	**N/A**		**WoP 3, WoP 30, WoP 38**	
	iii. The voting system vendor shall provide documentation as to the structure of the exported ballot image records and how they shall be read and processed by software.	**N/A**		**WoP 3, WoP 30, WoP 38**	
	iv. The voting system vendor shall provide a software program that will display the exported ballot image records and that may include other capabilities such as providing vote tallies and indications of undervotes.	**N/A**		**WoP 3, WoP 30**	
	v. The voting system vendor shall provide full documentation of procedures for exporting electronic ballot image records and reconciling those records with the paper audit records.	**N/A**		**WoP 3, WoP 30**	
f.	The paper record should be created in a format that may be made available across different manufacturers of electronic voting systems.	**N/A**		**WoP 3, WoP 30**	
g.	The paper record shall be created such that its contents are machine readable.	**N/A**		**WoP 3, WoP 30, WoP 38**	
	i. The paper record shall contain error correcting codes for the purpose of detecting read errors and for preventing other markings on the paper record from being misinterpreted when machine reading the paper record.	**N/A**		**WoP 3, WoP 30, WoP 38**	
	This requirement is not mandatory if a state prohibits the paper record from containing any information that cannot be read and understood by the voter. This requirement serves the purpose of detecting scanning errors and preventing stray or deliberate markings on the paper from being interpreted as valid data.			**WoP 3, WoP 30**	
h.	If barcode is used, the voting equipment shall be able to print a barcode with each paper record that contains the human-readable contents of the paper record.			**WoP 3, WoP 30, WoP 38**	

	i. The barcode shall use an industry standard format and shall be able to be read using readily available commercial technology.	**N/A**		**WoP 3, WoP 30, WoP 38**	
	ii. If the corresponding electronic record contains a digital signature, the digital signature shall be included in the barcode on the paper record.	**N/A**		**WoP 3, WoP 30, WoP 38**	
	iii. The barcode shall not contain any information other than the paper record's human-readable content, error correcting codes, and digital signature information.	**N/A**		**WoP 3, WoP 30, WoP 38**	
7.9.4	**Equipment Security and Reliability**				
a.	The voting machine shall provide a standard, publicly documented printer port (or the equivalent) using a standard communication protocol.	**N/A**		**WoP 3, WoP 30, WoP 38**	
b.	Tamper-evident seals or physical security measures shall protect the connection between the printer and the voting machine.	**N/A**		**WoP 3, WoP 30, WoP 38**	
c.	If the connection between the voting machine and the printer has been broken, the voting machine shall detect this event and record it in the DRE internal audit log.	**N/A**		**WoP 3, WoP 30, WoP 38**	
d.	The paper path between the printing, viewing and storage of the paper record shall be protected and sealed from access except by authorized election officials.	**N/A**		**WoP 3, WoP 30, WoP 38**	
e.	The printer shall not be permitted to communicate with any system or machine other than the voting machine to which it is connected.	**N/A**		**WoP 3, WoP 30, WoP 38**	
f.	The printer shall only be able to function as a printer; it shall not contain any other services (e.g., provide copier or fax functions) or network capability.	**N/A**		**WoP 3, WoP 30, WoP 38**	
g.	The voting machine shall detect errors and malfunctions such as paper jams or low supplies of consumables such as paper and ink that may prevent paper records from being correctly displayed, printed or stored.	**N/A**		**WoP 3, WoP 30, WoP 38**	
h.	If an error or malfunction occurs, the voting machine shall suspend voting operations and should present a clear indication to the voter and election officials of the malfunction.	**N/A**		**WoP 3, WoP 30, WoP 38**	
i.	The voting machine shall not record votes if an error or malfunction occurs.	**N/A**		**WoP 3, WoP 30, WoP 38**	

j.	Printing devices should contain sufficient supplies of paper and ink to avoid reloading or opening equipment covers or enclosures and thus potential circumvention of security features; or be able to reload paper and ink with minimal disruption to voting and without circumvention of security features such as seals.	**N/A**		**WoP 3, WoP 30, WoP 38**	
k.	Vendor documentation shall include procedures for investigating and resolving printer malfunctions including, but not limited to; printer operations, misreporting of votes, unreadable paper records, and power failures.	**N/A**		**WoP 3, WoP 30**	
l.	Vendor documentation shall include printer reliability specifications including Mean Time Between Failure estimates, and shall include recommendations for appropriate quantities of backup printers and supplies.	**N/A**		**WoP 3, WoP 30**	
m.	Protective coverings intended to be transparent on voting equipment shall be maintainable via a predefined cleaning process. If the coverings become damaged such that they obscure the paper record, they shall be replaceable.	**N/A**		**WoP 3, WoP 30**	
n.	The paper record shall be sturdy, clean, and of sufficient durability to be used for verifications, reconciliations, and recounts conducted manually or by automated processing.	**N/A**		**WoP 3, WoP 30, WoP 38**	
7.9.5	**Preserving Voter Privacy**				
	VVPAT records can be printed and stored by two different methods: printed and stored on a continuous spool-to-spool paper roll where the voter views the paper record in a window, or printed on separate pieces of paper, which are deposited in a secure receptacle.	**N/A**		**WoP 3, WoP 30, WoP 38**	
	If a requirement applies to only one method, that will be specified. Otherwise, the requirement applies to both.			**WoP 3, WoP 30, WoP 38**	
a.	Voter privacy shall be preserved during the process of recording, verifying and auditing his or her ballot selections.	**N/A**		**WoP 30, WoP 38**	
	The privacy requirements from Section 3 [3.1.7 Usability Requirements, Privacy] also apply to voting equipment with VVPAT.			**WoP 30, WoP 38**	
b.	When a VVPAT with a spool-to-spool continuous paper record is used, a means shall be provided to preserve the secrecy of the paper record of voter selections.	**N/A**		**WoP 3, WoP 30, WoP 38**	

c.	When a VVPAT with a spool-to-spool continuous paper record is used, no record shall be maintained of which voters used which voting machine or the order in which they voted.	**N/A**		**WoP 3, WoP 30, WoP 38**	
d.	The electronic and paper records shall be created and stored in ways that preserve the privacy of the voter.	**N/A**		**WoP 3, WoP 30, WoP 38**	
e.	The privacy of voters whose paper records contain an alternative language shall be maintained.	**N/A**		**WoP 30, WoP 38**	
f.	Unique identifiers shall not be displayed in a way that is easily memorable by the voter.	**N/A**		**WoP 30, WoP 38**	
g.	Both paper rolls and paper record secure receptacles shall be controlled, protected, and preserved with the same security as a ballot box.	**N/A**		**WoP 30, WoP 38**	
7.9.6	**VVPAT Usability**				
a.	All usability requirements from Subsection 3.1 shall apply to voting machines with VVPAT. The requirements in this section are in addition to those in Subsection 3.1.	**N/A**			
b.	The voting equipment shall be capable of showing the information on the paper in a font size of at least 3.0 mm and should be capable of showing the information in at least two font ranges; 3.0-4.0 mm, and 6.3-9.0 mm, under control of the voter or poll worker.	**N/A**			
	In keeping with the requirements in Subsection 3.1, the paper record should use the same font sizes as displayed by the voting machine, but at least be capable of 3.0 mm.				
c.	The voting equipment shall display, print and store the paper record in any of the written alternative languages chosen for the ballot.	**N/A**			
	i. To assist with manual auditing, candidate names on the paper record shall be presented in the same language as used on the DRE summary screen.	**N/A**			
	ii. Information on the paper record not needed by the voter to perform verification shall be in English.	**N/A**			
	In addition to the voter ballot selections, the marking of the paper record as accepted or void, and the indicate of the ballot page number need to be printed in the alternate language. Other information, such as precinct and election identifiers, shall be in English to facilitate use of the paper record for auditing.				

d.	The paper and electronic records shall be presented to allow the voter to read and compare the records without the voter having to shift his or her position.	**N/A**			
e.	If the paper record cannot be displayed in its entirety on a single page, a means shall be provided to allow the voter to view the entire record.	**N/A**			
	The voter should be notified if it is not possible to scroll in reverse, so they will know to complete verification in one pass.				
f.	If the paper record cannot be displayed in its entirety on a single page, each page of the record shall be numbered and shall include the total count of pages for the record.	**N/A**			
g.	The instructions for performing the verification process shall be made available to the voter in a location on the voting machine.	**N/A**			
	All instructions must meet the usability requirements contained in Subsection 3.1.				
7.9.7	**VVPAT Accessibility**				
a.	All accessibility requirements from Subsection 3.2 shall apply to voting machines with VVPAT.	**N/A**			
b.	If the normal voting procedure includes VVPAT, the accessible voting equipment should provide features that enable voters who are visually impaired and voters with an unwritten language to perform this verification. If state statute designates the paper record produced by the VVPAT to be the official ballot or the determinative record on a recount, the accessible voting equipment shall provide features that enable visually impaired voters and voters with an unwritten language to review the paper record.	**N/A**			
8	**Quality Assurance Requirements**				
8.2	**General Requirements**				
a.	Implementation of a quality assurance program, including procedures for specifying, procuring, inspecting, accepting, and controlling parts and raw materials of the requisite quality;	**CM and QA Audit, TDP**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
b.	Implementation of a quality assurance program requiring the documentation of the hardware and software development process;	**CM and QA Audit, TDP**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
c.	Implementation of a quality assurance program to identify and enforce all requirements for:			**WHVS07.1, WHVS07.3, WoP 3**	

	i. In-process inspection and testing that the manufacturer deems necessary to ensure proper fabrication and assembly of hardware, and	**CM and QA Audit, TDP**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
	ii. Installation and operation of software and firmware.	**CM and QA Audit, TDP**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
d.	Implementation of a quality assurance program including plans and procedures for post-production environmental screening and acceptance test; and	**CM and QA Audit, TDP**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
e.	Implementation of a quality assurance program including a procedure for maintaining all data and records required to document and verify the quality inspections and tests.	**CM and QA Audit, TDP**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
8.3	**Components from Third Parties**				
	A vendor who does not manufacture all the components of its voting system, but instead procures components as standard commercial items for assembly and integration into a voting system, shall verify that the supplier vendors follow documented quality assurance procedures that are at least as stringent as those used internally by the voting system vendor.	**CM and QA Audit, TDP**		**WoP 3**	**X**
8.4	**Responsibility for Tests**				
	The manufacturer or vendor shall be responsible for performing all quality assurance tests, acquiring and documenting test data, and providing test reports for examination by the test lab as part of the national certification process.	**CM and QA Audit, TDP**		**WoP 3**	**X**
8.5	**Parts and Materials Special Tests and Examinations**				
a.	Parts and materials to be used in voting systems and components have been selected according to their suitability for the intended application. Suitability may be determined by similarity of this application to existing standard practice or by means of special tests.	**CM and QA Audit, TDP**		**WoP 3**	**X**
b.	Special tests are designed, if needed, to evaluate the part or material under conditions accurately simulating the actual voting system operating environment.	**CM and QA Audit, TDP**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
c.	Resulting test data has been maintained as part of the quality assurance program documentation.	**CM and QA Audit, TDP**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
8.6	**Quality Conformance Inspections**				
a.	Each voting system or component is inspected and tested to verify that it meets all inspection and test requirements for the system.	**CM and QA Audit, TDP**		**WHVS07.1, WHVS07.3, WoP 3**	**X**

b.	A record of tests or a certificate of satisfactory completion is delivered with each system or component.	**CM and QA Audit, TDP**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
8.7	**Documentation**				
	The Technical Data Package shall include, at a minimum, the following:			**WHVS07.1, WHVS07.3, WoP 3**	
	System overview	**TDP**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
	System functionality description	**TDP**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
	System hardware specification	**TDP**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
	Software design and specifications	**TDP**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
	System security specification	**TDP**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
	System test and verification specification	**TDP**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
	System operations procedures	**TDP**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
	System maintenance procedures	**TDP**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
	Personnel deployment and training requirements	**TDP**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
	Configuration management plan	**TDP**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
	Quality assurance program	**TDP**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
	System change notes	**TDP**		**WHVS07.1, WHVS07.3, WoP 3**	**X**
9	**Configuration Management Requirements**				
9.1	**Scope**				
	Vendors are required to submit these procedures as part of the Technical Data Package for system certification.	**TDP**		**WoP 3**	**X**
9.1.1	**Configuration Management Requirements**				
	Configuration Management Practices for:			**WoP 3**	
	· Identifying discrete system components;	**TDP**		**WoP 3**	**X**
	· Creating records of a formal baseline and later versions of components;	**TDP**		**WoP 3**	**X**
	· Controlling changes made to the system and its components;	**TDP**		**WoP 3**	**X**
	· Releasing new versions of the system to accredited test labs;	**TDP**		**WoP 3**	**X**
	· Releasing new versions of the system;	**TDP**		**WoP 3**	**X**

	· Auditing the system, including its documentation, against configuration management records;	**TDP**		**WoP 3**	**X**
	· Controlling interfaces to other systems;	**TDP**		**WoP 3**	**X**
	· Identifying tools used to build and maintain the system.	**TDP**		**WoP 3**	**X**
9.1.3	**Application of Configuration Management Requirements**				
	Documented Configuration Management Practices for:				
	· Software components;	**TDP**		**WoP 3**	**X**
	· Hardware components;	**TDP**		**WoP 3**	**X**
	· Communications components;	**TDP**		**WoP 3**	**X**
	· Documentation;	**TDP**		**WoP 3**	**X**
	· Identification and naming and conventions (including changes to these conventions) for software programs and data files;	**TDP**		**WoP 3**	**X**
	· Development and testing artifacts such as test data and scripts; and	**TDP**		**WoP 3**	**X**
	· File archiving and data repositories.	**TDP**		**WoP 3**	**X**
9.2	**Configuration Management Policy**				
	The vendor shall describe its policies for configuration management in the Technical Data Package. This description shall address the following elements:	**TDP**		**WoP 3**	**X**
	Scope and nature of configuration management program activities	**TDP**		**WoP 3**	**X**
	Breadth of application of the vendor's policies and practices to the voting system, i.e., extent to which policies and practices apply to the total system, and extent to which policies and practices of suppliers apply to particular components, subsystems or other defined system elements	**TDP**		**WoP 3**	**X**
9.3	**Configuration Identification**				
9.3.1	**Classification and Naming Configuration Items**				
	Procedures and conventions used to:				
	a. Classify configuration items into categories and subcategories;	**TDP**		**WoP 3**	**X**
	· Uniquely number or otherwise identify configuration items; and	**TDP**		**WoP 3**	**X**
	· Name configuration items.	**TDP**		**WoP 3**	**X**
9.3.2	**Version Conventions**				
	Conventions used when a system component is used to identify higher-level system elements:			**WoP 3**	

	a. Identify the specific versions of individual configuration items and sets of items that are used by the vendor to identify higher level system elements such as subsystems;	**TDP**		**WoP 3**	**X**
	b. Uniquely number or otherwise identify versions; and	**TDP**		**WoP 3**	**X**
	c. Name versions.	**TDP**		**WoP 3**	**X**
9.4	**Baseline and Promotion Procedures**				
	Formal procedures and conventions for establishing and providing a complete description of the procedures and related conventions used to:				
	a. Establish a particular instance of a component as the starting baseline;	**TDP**		**WoP 3**	**X**
	b. Promote subsequent instances of a component to baseline status as development progresses through to completion of the initial completed version released to the accredited test lab for qualification testing; and	**TDP**		**WoP 3**	**X**
	c. Promote subsequent instances of a component to baseline status as the component is maintained throughout its life cycle until system retirement (i.e., the system is no longer sold or maintained by the vendor).	**TDP**		**WoP 3**	**X**
9.5	**Configuration Control Procedures**				
	Complete description of procedures and related conventions used to:				
	a. Develop and maintain internally developed items;	**TDP**		**WoP 3**	**X**
	b. Acquire and maintain third-party items;	**TDP**		**WoP 3**	**X**
	c. Resolve internally identified defects for items regardless of their origin; and	**TDP**		**WoP 3**	**X**
	d. Resolve externally identified and reported defects (i.e., by customers and accredited test labs).	**TDP**		**WoP 3**	**X**
9.6	**Release Process**				
	Complete description of procedures and related conventions used to:			**WoP 3**	
	a. Perform a first release of the system to an accredited test lab;	**TDP**		**WoP 3**	**X**
	b. Perform a subsequent maintenance or upgrade release of the system, or a particular components, to an accredited test lab;	**TDP**		**WoP 3**	**X**

	c. Perform the initial delivery and installation of the system to a customer, including confirmation, including confirmation that the installed version of the system matches exactly the qualified system version.; and	**TDP**		**WoP 3**	**X**
	d. Perform a subsequent maintenance or upgrade release of the system, or a particular component, to a customer, including confirmation that the installed version of the system matches exactly the qualified system version.	**TDP**		**WoP 3**	**X**
9.7	**Configuration Audits**				
9.7.1	**Physical Configuration Audit**				
	For the PCA, a vendor shall provide:				
	a. Identification of all items that are to be a part of the software release	**TDP**		**WoP 3, WoP 25**	**X**
	b. Specification of compiler (or choice of compilers) to be used to generate executable programs	**TDP**		**WoP 3, WoP 25**	**X**
	c. Identification of all hardware that interfaces with the software	**TDP**		**WoP 3, WoP 25**	**X**
	d. Configuration baseline data for all hardware that is unique to the system	**TDP**		**WoP 3, WoP 25**	**X**
	e. Copies of all software documentation intended for distribution to users, including program listings, specifications, operations manual, voter manual, and maintenance manual	**TDP**		**WoP 3, WoP 25**	**X**
	f. User acceptance test procedures and acceptance criteria	**TDP**		**WoP 3, WoP 25**	**X**
	g. Identification of any changes between the physical configuration of the system submitted for the PCA and that submitted for the FCA, with a certification that any differences do not degrade the functional characteristics	**TDP**		**WoP 3, WoP 25**	**X**
	h. Complete descriptions of its procedures and related conventions used to support this audit by:	**TDP**		**WoP 3, WoP 25**	**X**
	i. Establishing a configuration baseline of the software and hardware to be tested	**TDP**		**WoP 3, WoP 25**	**X**
	ii. Confirming whether the system documentation matches the corresponding system components	**TDP**		**WoP 3, WoP 25**	**X**
9.7.2	**Functional Configuration Audit**				
	The Functional Configuration Audit is conducted by the accredited test lab to verify that the system performs all the functions described in the system documentation. The vendor shall:			**WoP 3, WoP 26**	

	a. Completely describe its procedures and related conventions used to support this audit for all system components	**TDP**		**WoP 3, WoP 26**	**X**
	b. Provide the following information to support this audit:	**TDP**		**WoP 3, WoP 26**	**X**
	i. Copies of all procedures used for module or unit testing, integration testing, and system testing	**TDP**		**WoP 3, WoP 26**	**X**
	ii. Copies of all test cases generated for each module and integration test, and sample ballot formats or other test cases used for system tests	**TDP**		**WoP 3, WoP 26**	**X**
	iii. Records of all tests performed by the procedures listed above, including error corrections and retests	**TDP**		**WoP 3, WoP 26**	**X**
9.8	**Configuration Management Resources**				
	Automated tools used by vendors: Complete description of procedures and related practices to maintaining information about:				
	a. Specific tools used, current version, and operating environment;	**TDP**		**WoP 3**	**X**
	b. Physical location of the tools, including designation of computer directories and files; and	**TDP**		**WoP 3**	**X**
	c. Procedures and training materials for using the tools.	**TDP**		**WoP 3**	**X**
Vol. II	**National Certification Testing Guidelines**				
Section 2	**Description of the Technical Data Package**				
2.1	**Scope**				
	This subsection contains a description of the vendor documentation relating to the voting system that shall be submitted with the system as a precondition of qualification testing. Any information relevant to the system evaluation shall be submitted to include source code, object code, and sample report formats.	**TDP Review**			**X**
	Both formal documentation and notes of the vendor's development process shall be submitted for qualification tests. If the vendor's developmental test data are incomplete, the accredited test lab shall design and conduct the appropriate tests	**TDP Review**			**X**
2.1.1	Content and Format				
	The vendor shall provide a list of all documents submitted controlling the design, operation, and maintenance of the system. Documents shall be listed in order of precedence.	**TDP Review**		*(italics are xrefs for TDP review)*	**X**

2.1.1.1	Required Content for Initial Certification At a minimum, the TDP shall contain the following documentation:			*Vol. I, 8.7 Quality Assurance Requirements, Documentation*	
	a. System configuration overview;	**TDP Review**			**X**
	b. System functionality description;	**TDP Review**			**X**
	c. System hardware specification;	**TDP Review**			**X**
	d. Software design and specifications;	**TDP Review**			**X**
	e. System and test verification specifications;	**TDP Review**			**X**
	f. System security specifications;	**TDP Review**			**X**
	g. User/system operations procedures;	**TDP Review**			**X**
	h. System maintenance procedures;	**TDP Review**			**X**
	i. Personnel deployment and training requirements;	**TDP Review**			**X**
	j. Configuration management plan;	**TDP Review**			**X**
	k. Quality assurance program, and	**TDP Review**			**X**
	l. System change notes.	**TDP Review**			**X**
2.1.1.2	Required Content for System Changes and Re-Certification For systems seeking re-qualification, vendors shall submit System Change Notes as described in Section 2.13, as well as current revisions of all documents that have been updated to reflect system changes.	**TDP Review**			**X**
2.1.1.3	Format				
	The TDP shall include a detailed table of contents for the required documents, an abstract of each document and listing of each of the informational sections and appendices presented within each.	**TDP Review**			**X**
	A cross-index shall be provided indicating the portions of the documents that are responsive to documentation requirements for any item presented.	**TDP Review**			**X**
2.1.3	Protection of Proprietary Information				
	Protection of Proprietary Information The vendor shall identify all documents, or portions of documents, containing proprietary information not approved for public release.	**TDP Review**			**X**
2.2	System Overview				
	In the system overview, the vendor shall provide information that enables the test authority identify the functional and physical components of the system, how they are structured, and the interfaces between them.	**TDP Review**			**X**

2.2.1	System Description The system description shall include paragraphs, drawings, and diagrams that represent:				
	a. A description of the functional components (or subsystems) as defined by the vendor (e.g. environment, election management and control, vote recording, vote conversion, reporting, and their logical relationships;	**TDP Review**			**X**
	b. A description of the operational environment of the system that provides an overview of the hardware, software, and communications structure;	**TDP Review**			**X**
	c. A concept of operation that explains each system function, and how the function is achieved in the design;	**TDP Review**			**X**
	d. Descriptions of the functional and physical interfaces between subsystems and components;	**TDP Review**			**X**
	e. Identification of all COTS hardware and software products and communications services used in the development and/or operation of the voting system, identifying the name, vendor and version used for each component, including:	**TDP Review**			**X**
	(1) Operating systems;	**TDP Review**			**X**
	(2) Database software;	**TDP Review**			**X**
	(3) Communications routers;	**TDP Review**			**X**
	(4) Modem drivers; and	**N/A**			
	(5) Dial-up networking software;	**N/A**			
	f. Interfaces among internal components, and interfaces with external systems. For components that interface with other components for which multiple products may be used, the TDP shall provide an explanation of:	**TDP Review**			**X**
	(1) File specifications, data objects, or other means used for information exchange; and	**TDP Review**			**X**
	(2) The public standard used for such file specifications, data objects, or other means;	**TDP Review**			**X**
	g. Benchmark directory listings for all software (including firmware elements) and associated documentation included in the vendor's release in the order in which each piece of software would normally be installed upon setup and installation.	**TDP Review**			**X**
2.2.2	System Performance The vendor shall provide system performance information including:			*Vol. I, 2.2.1.1 Pre-Voting Capabilities, Ballot Preparation, General Capabilities*	

	a. The performance characteristics of each operating mode and function in terms of expected and maximum speed, throughput capacity, maximum Volume (maximum number of voting positions and maximum number of ballot styles represented), and processing frequency;	**TDP Review**			**X**
	b. Quality attributes such as reliability, maintainability, usability, availability, and portability;	**TDP Review**			**X**
	c. Provisions for safety, security, privacy, and continuity of operation; and	**TDP Review**			**X**
	d. Design constraints, applicable standards, and compatibility requirements.	**TDP Review**			**X**
2.3	System Functionality Description				
	The vendor shall declare the scope of the system's functional capabilities, thereby establishing the performance, design, test, manufacture, and acceptance context for the system.	**TDP Review**			**X**
	The vendor shall provide a listing of the system's functional processing capabilities, encompassing capabilities required by the Standards and any additional capabilities provided by the system.	**TDP Review**			**X**
	This listing shall provide a simple description of each capability. Detailed specifications shall be provided in other documentation required for the TDP.	**TDP Review**			**X**
	a. The vendor shall organize the presentation of required capabilities in a manner that corresponds to the structure and sequence of functional capabilities indicated in Volume I, Section 2 [Functional Capabilities]. The contents of Volume I Section 2 may be used as the basis for a checklist to indicate the specific functions provided and those not provided by the system;	**TDP Review**			**X**
	b. Additional capabilities shall be clearly indicated. They may be presented using the same structure as that used for required capabilities (i.e. overall system capabilities, pre-voting functions, voting functions, post-voting functions), or may be presented in another format of the vendor's choosing;	**TDP Review**			**X**
	c. Required capabilities that may be bypassed or deactivated during installation or operation by the user shall be clearly indicated;	**TDP Review**			**X**

	d. Additional capabilities that function only when activated during installation or operation by the user shall be clearly indicated; and	**TDP Review**			**X**
	e. Additional capabilities that normally are active but may be bypassed or deactivated during installation or operation by the user shall be clearly indicated.	**TDP Review**			**X**
2.4	System Hardware Specification				
	The vendor shall expand on the system overview by providing detailed specifications of the hardware components of the system, including specifications of hardware used to support the telecommunications capabilities of the system, if applicable.	**TDP Review**			**X**
2.4.1	System Hardware Characteristics The vendor shall provide a detailed discussion of the characteristics of the system, indicating how the hardware meets individual requirements defined in Volume I, Sections 3, 4, 5. And 6 of the Standards including:			*Vol. I, 4.1.2 Performance Requirements, Environmental Requirements*	
	a. Performance characteristics: This discussion addresses basic system performance attributes and operational scenarios that describe the manner in which system functions are invoked, describe environmental capabilities, describe life expectancy, and describe any other essential aspects of system performance;	**TDP Review**			**X**
	b. Physical characteristics: This discussion addresses suitability for intended use, requirements for transportation and storage, health and safety criteria, security criteria, and vulnerability to adverse environmental factors;	**TDP Review**			**X**
	c. Reliability: This discussion addresses system and component reliability stated in terms of the systems operating functions, and identification of items that require special handling or operation to sustain system reliability;	**TDP Review**			**X**

	d. 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 make non-technical election workers aware of a problem. Maintainability also addresses a range of scheduled and unscheduled events.	**TDP Review**			**X**
	e. Environmental conditions: This discussion addresses the ability of the system to withstand natural environments, and operational constraints in normal and test environments, including all requirements and restrictions regarding electrical service, telecommunications services, environmental protection, and any additional facilities or resources required to install and operate the system.	**TDP Review**			**X**
2.4.2	Design and Construction The vendor shall provide sufficient data, or references to data, to identify unequivocally the details of the system configuration submitted for qualification testing. The vendor shall provide a list of materials and components used in the system and a description of their assembly into major system components and the system as a whole. Paragraphs and diagrams shall be provided that describe:				
	a. Materials, processes, and parts used in the system, their assembly, and the configuration control measures to ensure compliance with the system specification;	**TDP Review**			**X**
	b. The electromagnetic environment generated by the system;	**TDP Review**			**X**
	c. Operator and voter safety considerations and any constraints on system operations or the use environment;	**TDP Review**			**X**
	d. Human engineering considerations, including provisions for access by disabled voters.	**TDP Review**			**X**
2.5	Software Design and Construction				

	The vendor shall expand on the system overview by providing detailed specifications of the software components of the system, including software used to support the telecommunications capabilities of the system, if applicable.	**TDP Review**			**X**
2.5.1	Purpose and Scope				
	The vendor shall describe the function or functions that are performed by the software programs that comprise the system, including software used to support the telecommunications capabilities of the system, if applicable.	**TDP Review**			**X**
2.5.2	Applicable Documents				
	The vendor shall list all documents controlling the development of the software and its specifications.	**TDP Review**			**X**
	Documents shall be listed in order of precedence.	**TDP Review**			**X**
2.5.3	Software Overview The vendor shall provide an overview of the software that includes the following items:				
	a. A description of the software system concept, including specific software design objectives, and the logic structure and algorithms used to accomplish these objectives;	**TDP Review**			**X**
	b. The general design, operational considerations, and constraints influencing the design of the software;	**TDP Review**			**X**
	c. Identification of all software items, indicating items that were:				
	(1) Written in-house;	**TDP Review**			**X**
	(2) Procured and not modified;	**TDP Review**			**X**
	(3) Procured and modified including descriptions of the modifications to the software and to the default configuration options;	**TDP Review**			**X**
	d. Additional information for each item that includes:				
	(1) Item identification;	**TDP Review**			**X**
	(2) General description;	**TDP Review**			**X**
	(3) Software requirements performed by the user;	**TDP Review**			**X**
	(4) Identification of interfaces with other items provide data to, or receive data from, the item; and	**TDP Review**			**X**
	(5) Concept of execution for the item.	**TDP Review**			**X**
	The vendor shall also include a certification that procured software items were obtained directly from the manufacturer, or a licensed dealer or distributor.	**TDP Review**			**X**

2.5.4	Software Standards and Conventions				
	The vendor shall provide information that can be used by an ITA or state certification board to support software analysis and test design.	**TDP Review**			**X**
	The information shall address standards and conventions developed internally by the vendor as well as published industry standards that have been applied by the vendor.	**TDP Review**			**X**
	The vendor shall provide information that addresses the following standards and conventions:				
	a. Software System development methodology;	**TDP Review**			**X**
	b. Software design standards, including internal vendor procedures;	**TDP Review**			**X**
	c. Software specification standards, including internal vendor procedures;	**TDP Review**			**X**
	d. Software coding standards, including internal vendor procedures;	**TDP Review**			**X**
	e. Testing and verification standards, including internal vendor procedures, that can assist in determining the program's correctness and ACCEPT/REJECT criteria;	**TDP Review**		*Vol. I, 5.2.6 Software Design and Coding Standards, Coding Conventions*	**X**
	f. Quality assurance standards or other documents that can be used to examine and test the software. These documents include standards for program flow and control charts, program documentation, test planning, and for test data acquisition and reporting.	**TDP Review**			**X**
2.5.5	Software Operating Environment				
	This section shall describe or make reference to all operating environment factors that influence the software design.	**TDP Review**			**X**
2.5.5.1	Hardware Environment and Constraints The vendor shall identify and describe the hardware characteristics that influence the design of the software, such as:				
	a. The logic and arithmetic capability of the processor;	**TDP Review**			**X**
	b. Memory read-write characteristics;	**TDP Review**			**X**
	c. External memory device characteristics;	**TDP Review**			**X**
	d. Peripheral device interface hardware;	**TDP Review**			**X**
	e. Data input/output device protocols; and	**TDP Review**			**X**
	f. Operator controls, indicators, and displays.	**TDP Review**			**X**
2.5.5.2	Software Environment				

	The vendor shall identify the compilers or assemblers used in the generation of executable code, and describe the operating system or system monitor.	**TDP Review**			**X**
2.5.6	Software Functional Specification				
	The vendor shall provide a description of the operating modes of the system and of software capabilities to perform specific functions.	**TDP Review**			**X**
2.5.6.1	Configurations and Operating Modes				
	The vendor shall describe all software configurations and operating modes of the system, such as ballot preparation, election programming, preparation for opening the polling place, recording votes and/or counting ballots, closing the polling place, and generating reports.	**TDP Review**			**X**
	For each software function or operating mode, the vendor shall provide:				
	a. A definition of the inputs to the function or mode (with characteristics, tolerances or acceptable ranges as applicable);	**TDP Review**			**X**
	b. An explanation of how the inputs are processed.	**TDP Review**			**X**
	c. A definition of the outputs produced, (again with characteristics, tolerances, or acceptable ranges as applicable).	**TDP Review**			**X**
2.5.6.2	Software Functions The vendor shall describe the software's capabilities or methods for detecting or handling:				
	a. Exception conditions;	**TDP Review**			**X**
	b. System failures.	**TDP Review**			**X**
	c. Data input/output errors;	**TDP Review**			**X**
	d. Error logging for audit record generation;	**TDP Review**			**X**
	e. Production of statistical ballot data;	**TDP Review**			**X**
	f. Data quality assessment; and	**TDP Review**			**X**
	g. Security monitoring and control.	**TDP Review**			**X**
2.5.7	Programming Specifications				
	The vendor shall provide in this section an overview of the software design, its structure, and implementation algorithms and detailed specifications for individual software modules.	**TDP Review**			**X**
2.5.7.1	Programming Specifications Overview				

	This overview shall include such items as flowcharts, data flow diagrams, and other graphical techniques that facilitate understanding of the programming specifications. This section shall be prepared to facilitate understanding of the internal functioning of the individual software modules. Implementation of these functions shall be described in terms of the software architecture, algorithms, and data structures.	**TDP Review**			**X**
2.5.7.2	Programming Specification Details				
	The programming specifications shall describe individual software modules and their component units, if applicable. For each module and unit, the vendor shall provide the following information:				
	a. Module and unit design decisions, if any, such as algorithms used;	**TDP Review**			**X**
	b. Any constraints, limitations, or unusual features in the design of the software module or unit;	**TDP Review**			**X**
	c. The programming language to be used and rationale for its use if other than the specified module or unit language;	**TDP Review**			**X**
	d. If the software module or unit consists of or contains procedural commands (such as menu selections in a database management system for defining forms and reports, on-line queries for database access and manipulation, input to a graphical user interface builder for automated code generation, commands to the operating system, or shell scripts), a list of the procedural commands and reference to user manuals or other documents that explain them;	**TDP Review**			**X**
	e. If the software module or unit contains, receives, or outputs data, a description of its inputs, outputs, and other data elements as applicable. (Subsection 2.5.9 describes the requirements for documenting system interfaces.) Data local to the software module or unit shall be described separately from data input to or output from the software module or unit;	**TDP Review**			**X**
	f. If the software module or unit contains logic, the logic to be used by the software unit, including, as applicable:	**TDP Review**			**X**
	1. Conditions in effect within the software module or unit when its execution is initiated;	**TDP Review**			**X**

	2. Conditions under which control is passed to other software modules or units;	**TDP Review**			**X**
		TDP Review			**X**
	4. Sequence of operations and dynamically controlled sequencing during the software module's or unit's operation, including:	**TDP Review**			**X**
	(i). The method for sequence control;	**TDP Review**			**X**
	(ii) The logic and input conditions of that method, such as timing variations, priority assignments;	**TDP Review**			**X**
	(iii) Data transfer in and out of memory; and	**TDP Review**			**X**
	(iv) The sensing of discrete input signals, and timing relationships between interrupt operations within the software module or unit; and	**TDP Review**			**X**
	5. Exception and error handling; and	**TDP Review**			**X**
	g. If the software module is a database, provide the information described in Volume II, Section 2.5.8.	**TDP Review**			**X**
2.5.8	System Database The vendor shall identify and provide a diagram and narrative description of the system's databases, and any external files used for data input or output. The information provided shall include for each data base or external file:				
	The number of levels of design and the names of those levels (such as conceptual, internal, logical, and physical):	**TDP Review**			**X**
	Design conventions and standards (which may be incorporated by references) needed to understand the design;	**TDP Review**			**X**
	Identification and description of all database entities and how they are implemented physically (e.g. tables, files, etc.);	**TDP Review**			**X**
	Entity relationship diagram and description of relationships;	**TDP Review**			**X**
	Details of table, record or file contents (as applicable) to include individual data elements and their specifications, including:	**TDP Review**			**X**
	1) Names/identifiers;	**TDP Review**			**X**
	2) Data type (alphanumeric, integer, etc.);	**TDP Review**			**X**
	3) Size and format (such as length and punctuation of a character string);	**TDP Review**			**X**
	4) Units of measurement (such as meters, dollars, nanoseconds)	**TDP Review**			**X**
	5) Range or enumeration of possible values (such as 0-99);	**TDP Review**			**X**

	6) Accuracy (how correct) and precision (number of significant digits)	**TDP Review**			**X**
	7) Priority, timing, frequency, Volume, sequencing, and other constraints, such as whether the data element may be updated and whether business rules apply;	**TDP Review**			**X**
	8) Security and privacy constraints, and;	**TDP Review**			**X**
	9) Sources (setting/sending entities) and recipients (using/receiving entities); and	**TDP Review**			**X**
	For external files, a description of the procedures for file maintenance, management of access privileges, and security.	**TDP Review**			**X**
2.5.9	Interfaces The vendor shall identify and provide a complete description of all internal and external interfaces, using a combination of text and diagrams				
	The vendor shall identify and provide a complete description of all internal and external interfaces, using a combination of text and diagrams	**TDP Review**			**X**
2.5.9.1	Interface Description For each interface identified in the system overview, the vendor shall:				
	Provide a unique identifier assigned to the interface;	**TDP Review**			**X**
	Identify the interfacing entities (systems, configuration items, users, etc.) by name, number, version, and documentation references, as applicable, and;	**TDP Review**			**X**
	Identify which entities have fixed interface characteristics (and therefore impose interface requirements on interfacing entities) and which are being developed or modified (thus having interface requirements imposed on them).	**TDP Review**			**X**
2.5.9.2	Interface Description For each interface identified in the system overview, the vendor shall provide information that describes:				
	Type of interface (such as real-time data transfer, storage-and-retrieval of data, etc.) to be implemented;	**TDP Review**			**X**
	Characteristics of individual data elements that the interfacing entity(ies) will provide, store, send, access, receive, etc. such as:	**TDP Review**			**X**
	1) Names/identifiers;	**TDP Review**			**X**
	2) Data type (alphanumeric, integer, etc.);	**TDP Review**			**X**

3) Size and format (such as length and punctuation of a character string);	**TDP Review**			**X**
4) Units of measurement (such as meters, dollars, nanoseconds);	**TDP Review**			**X**
5) Range or enumeration of possible values (such as 0-99);	**TDP Review**			**X**
6) Accuracy (how correct) and precision (number of significant digits);	**TDP Review**			**X**
7) Priority, timing, frequency, Volume, sequencing, and other constraints, such as whether the data element may be updated and whether business rules apply;	**TDP Review**			**X**
8) Security and privacy constraints; and	**TDP Review**			**X**
9) Sources (setting/sending entities) and recipients (using/receiving entities);	**TDP Review**			**X**
Characteristics of communication methods that the interfacing entity(ies) will use for the interface, such as:				
1) Communication links/bands/frequencies/media and their characteristics	**TDP Review**			**X**
2) Message formatting;	**TDP Review**			**X**
3) Flow control (such as sequence numbering and buffer allocation);	**TDP Review**			**X**
4) Data transfer rate, whether periodic/aperiodic, and interval between transfers;	**TDP Review**			**X**
5) Routing, addressing, and naming conventions;	**TDP Review**			**X**
6) Transmission services, including priority and grade; and	**TDP Review**			**X**
7) Safety/security/privacy considerations, such as encryption, user authentication, compartmentalization, and auditing;	**TDP Review**			**X**
Characteristics of protocols the interfacing entity(ies) will use for the interface, such as:				
1) Priority/layer of the protocol;	**TDP Review**			**X**
2) Packeting, including fragmentation and reassembly, routing, and addressing;	**TDP Review**			**X**
3) Legality checks, error control, and recover procedures;	**TDP Review**			**X**
4) Synchronization, including connection establishment, maintenance, termination, and	**TDP Review**			**X**
5) Status identification, and any other reporting features; and	**TDP Review**			**X**

	Other characteristics, such as physical compatibility of the interfacing entity(ies) (dimensions, tolerances, loads, Voltage, plug compatibility, etc).	**TDP Review**			**X**
2.5.10	Appendices The vendor may provide descriptive material and data supplementing the various sections of the body of the Software Specifications. The content and arrangement of appendices shall be at the discretion of the vendor. Topics recommended for amplification or treatment in appendix form include:				
	Glossary: A listing and brief definition of all software module names and variable names, with reference to their locations in the software structure. Abbreviations, acronyms, and terms should be included, if they are either uncommon in data processing and software development or are used in an unorthodox semantic	**TDP Review**			**X**
	References: A list of references to all related vendor documents, data, standards, and technical sources used in software development and testing	**TDP Review**			**X**
	Program Analysis: The results of software configuration analysis algorithm analysis and selection, timing studies, and hardware interface studies that are reflected in the final software design and coding	**TDP Review**			**X**
2.6	System Security Specification				
	System Security Specification Vendors shall submit a system security specification that addresses the security requirements of Volume I, Section 7 [Security Standards] of the Standards.	**TDP Review**		*Vol. I, 2.1.1 g. Functional Requirements, Security*	**X**

	This specification shall describe the level of security provided by the system in terms of the specific security risks addressed by the system, the means by which each risk is addressed, the process used to test and verify the effective operation of security capabilities and, for systems that use public telecommunications networks as defined in Volume I, Section 6, the means used to keep the security capabilities of the system current to respond to the evolving threats against these systems.	**TDP Review**			**X**
	Information submitted by the vendor shall be used to assist in developing and executing the system qualification test plan. The Security Specification shall contain the sections identified below.	**TDP Review**			**X**
2.6.1	Access Control Policy				
	The vendor shall specify the features and capabilities of the access control policy recommended to purchasing jurisdictions to provide effective voting system security. The access control policy shall address the general features and capabilities and individual access privileges indicated in Volume I, Subsection 7.2 [Access Control].	**TDP Review**		*Vol. I, 7.2.1a-f. Security Requirements, General Access Control Policy*	**X**
2.6.2	Access Control Measures				
	The vendor shall provide a detailed description of all system access control measures and mandatory procedures designed to permit access to system states in accordance with the access policy, and to prevent all other types of access to meet the specific requirements of Volume I, Subsection 7.2 [Access Control].	**TDP Review**		*Vol. I, 7.2.1.1 a-c. Security Requirements, Individual Access Privileges*	**X**
	The vendor shall also define and provide a detailed description of the methods used to preclude unauthorized access to the access control capabilities of the system itself.	**TDP Review**		*Vol. I, 7.2.1.1 a-c. Security Requirements, Individual Access Privileges*	**X**
2.6.3	Equipment and Data Security				

	The vendor shall provide a detailed description of system capabilities and mandatory procedures for purchasing jurisdictions to prevent disruption of the voting process and corruption of voting data to meet the specific requirements of Volume I, Subsection 7.3 [Physical Security Measures]. This information shall address measures for polling place security and central count location security.	**TDP Review**		*Vol. I, 7.3.1 Physical Security Requirements, Polling Place Security; Vol. I, 7.3.2 Physical Security Requirements, Central Count Location Security*	**X**
2.6.4	Software Installation				
	The vendor shall provide a detailed description of the system capabilities and mandatory procedures for purchasing jurisdictions to ensure secure software (including firmware) installation to meet the specific requirements of Volume I, Subsection 7.4 [Software Security]. This information shall address software installation for all system components.	**TDP Review**		*Vol. I, 7.4.1a-d Software Security, Software and Firmware Installation* *Vol. I, 7.4.2 Software Security, Protection Against Malicious Software* *VI, 7.4.4 a Software Security, Software Distribution* *VI, 7.4.6 b-c. Software Security, Setup Validation*	**X**
2.6.5	Telecommunications and Data Transmission Security				
	The vendor shall provide a detailed description of the system capabilities and mandatory procedures for purchasing jurisdictions to ensure secure data transmission to meet the specific requirements of Volume I, Subsection 7.5:	**N/A**		*Vol. I 7.5.2 b. Security Requirements, Telecommunications and Data Transmission, Protection Against External Threats*	
	a. For all systems, this information shall address access control, and prevention of data interception; and for systems that use public communications networks as defined in Volume I Section 6, this information shall also include:	**N/A**		*Vol. I 7.5.3 a-f. Security Requirements, Telecommunications and Data Transmission, Monitoring and Responding to External Threats*	

	1) Capabilities used to provide protection against threats to third party products and services;	**N/A**		*Vol. I, 7.6.2.1 a-b. Security Requirements, Use of Public Communications Networks, Documentation of Mandatory Security Activities*	
	2) Policies and processes used by the vendor to ensure that such protection is updated to remain effective over time;	**N/A**		*Vol. I, 7.7.1 a, b, c, e. Security Requirements, Wireless Communications, Controlling Usage*	
	3) Policies and procedures used by the vendor to ensure that current versions of such capabilities are distributed to user jurisdictions and are installed effectively by the jurisdiction;	**N/A**		*Vol. I, 7.7.2 a-d. Security Requirements, Wireless Communications, Identifying Usage*	
	4) A detailed description of the system capabilities and procedures to be employed by the jurisdiction to diagnose the occurrence of a denial of service attack, to use an alternate method of voting, to determine when it is appropriate to resume voting over the network, and to consolidate votes cast using the alternate method;	**N/A**		*Vol. I, 7.7.5 e. Security Requirements, Wireless Communications, Protecting the Voting System*	
	5) A detailed description of all activities to be performed in setting up the system for operation that are mandatory to ensure effective system security, including testing of security before an election; and	**N/A**			
	6) A detailed description of all activities that should be prohibited during system setup and during the timeframe for voting operations, including both the hours when polls are open and when polls are closed.	**N/A**			
2.6.6	Other Elements of an Effective Security Program The vendor shall provide a detailed description of the following additional procedures required for use by the purchasing jurisdiction:				
	Administrative and management controls for the voting system and election management, including access controls;	**TDP Review**			**X**

	Internal security procedures, including operating procedures for maintaining the security of the software for each system function and operating mode;	**TDP Review**			**X**
	Adherence to, and enforcement of, operational procedures (e.g. effective password management);	**TDP Review**			**X**
	Physical facilities and arrangements	**TDP Review**			**X**
	Organizational responsibilities and personnel screening.	**TDP Review**			**X**
	The documentation shall be prepared such that these requirements can be integrated by the jurisdiction into local administrative and operating procedures.	**TDP Review**			**X**
2.7	System Test and Verification Specification The vendor shall provide test and verification specifications for:				
	Development test specifications	**TDP Review**			**X**
	National certification test specifications.	**TDP Review**			**X**
2.7.1	Development Test Specifications The vendor shall describe the plans, procedures, and data used during the software development and system integration to verify system logic correctness, data quality, and security. This description shall include:				
	Test identification and design, including:				
	1) Test structure	**TDP Review**			**X**
	2) Test sequence or progression	**TDP Review**			**X**
	3) Test conditions	**TDP Review**			**X**
	Standard test procedures, including any assumptions or constraints	**TDP Review**			**X**
	Special purpose test procedures including any assumptions or constraints	**TDP Review**			**X**
	Test data; including the data source, whether it is real or simulated, and how test data are controlled	**TDP Review**			**X**
	Expected test results	**TDP Review**			**X**
	Criteria for evaluating test results	**TDP Review**			**X**
	Additional details for these requirements are provided by MIL-STD-498, Software Test Plan and Software Test Description. In the event that test data are not available, the accredited test lab shall design test cases and procedures equivalent to those ordinarily used during product verification.	**TDP Review**			**X**

2.7.2	National Certification Test Specifications The vendor shall provide specifications for verification and validation of overall software performance. These specifications shall cover:				
	a. Control and data input/output;	**TDP Review**			**X**
	b. Acceptance criteria;	**TDP Review**			**X**
	c. Processing accuracy;	**TDP Review**			**X**
	d. Data quality assessment and maintenance;	**TDP Review**			**X**
	e. Ballot interpretation logic;	**TDP Review**			**X**
	f. Exception handling;	**TDP Review**			**X**
	g. Security; and	**TDP Review**			**X**
	h. Production of audit trails and statistical data.	**TDP Review**			**X**
	The specifications shall identify procedures for assessing and demonstrating the suitability of the software for election use.	**TDP Review**			**X**
2.8	System Operations Procedures				
	This documentation shall provide all information necessary for system use by all personnel who support pre-election and election preparation, polling place activities and central counting activities, as applicable, with regard to all system functions and operations identified in Subsection 2.3 above. The nature of the instructions for operating personnel will depend upon the overall system design and required skill level of system operations support personnel.	**TDP Review**			**X**
	The system operations procedures shall contain all information that is required for the preparation of detailed system operating procedures, and for operator training, as described below.	**TDP Review**		*Vol. I, 4.1.5.1 a. Hardware Requirements, Performance Requirements, paper-Based Conversion Requirements, Ballot Handling*	**X**
2.8.1	Introduction				

	The vendor shall provide a summary of system operating functions and modes, in sufficient detail to permit understanding of the system's capabilities and constraints. The roles of operating personnel shall be identified and related to the operating modes of the system. Decision criteria and conditional operator functions (such as error and failure recovery actions) shall be described.	**TDP Review**			**X**
	The roles of operating personnel shall be identified and related to the operating modes of the system.	**TDP Review**			**X**
	Decision criteria and conditional operator functions (such as error and failure recovery actions) shall be described.	**TDP Review**			**X**
	The vendor shall also list all reference and supporting documents pertaining to the use of the system during elections operations.	**TDP Review**			**X**
2.8.2	Operational Environment				
	The vendor shall describe the system environment, and the interface between the user or operator and the system.	**TDP Review**			**X**
	The vendor shall identify all facilities, furnishings, fixtures, and utilities that will be required for equipment operations, including equipment that operates:	**TDP Review**			**X**
	Polling place;	**TDP Review**			**X**
	Central count facility; and	**TDP Review**			**X**
	Other locations.	**TDP Review**			**X**
2.8.3	System Installation and Test Specification The vendor shall provide specifications for validation of system installation, acceptance, and readiness. These specifications shall address all components of the system and all locations of installation (e.g. polling place central count facility) , and shall address all elements of system functionality and operations identified in Section 2.3 above, including:			*Vol I, Sec. 5.1.1 Software Requirements, Software Sources*	
	Pre-voting functions;	**TDP Review**			**X**
	Voting functions;	**TDP Review**			**X**
	Post-voting functions; and	**TDP Review**			**X**
	General capabilities.	**TDP Review**			**X**

2.8.4	Operational Features The vendor shall provide documentation of system operating features that meets the following requirements:				
	Provides a detailed description of all input, output, control, and display features accessible to the operator or voter;	**TDP Review**			**X**
	Provide examples of simulated interactions in order to facilitate understanding of the system and its capabilities;	**TDP Review**			**X**
	Provide sample data formats and output reports; and	**TDP Review**			**X**
	Illustrate and describe all status indicators and information messages.	**TDP Review**			**X**
2.8.5	Operational Features The vendor shall provide documentation of system operating features that meets the following requirements:				
	Provides a detailed description of procedures required to initiate, control, and verify proper system operation;	**TDP Review**			**X**
	Provides procedures that clearly enable the operator to assess the correct flow of system functions (as evidenced by system-generated status and information messages);	**TDP Review**			**X**
	Provides procedures that clearly enable the operator to intervene the system operations to recover from an abnormal system state;	**TDP Review**			**X**
	Defines and illustrates the procedures and system prompts for situations where operator intervention is required to load, initialize, and start the system;	**TDP Review**			**X**
	Defines and illustrate procedures to enable and control the external interface to the system operating environment if supporting hardware and software are involved. Such information shall be provided for the interaction of the system with other data processing systems or data interchange protocols.	**TDP Review**			**X**
	Provides administrative procedures and off-line operator duties (if any) if they relate to the initiation or termination of system operations, to the assessment of system status, or to the development of an audit trail;	**TDP Review**			**X**

	Supports successful ballot and program installation and control by election officials, provides a detailed work plan or other form of documentation providing a schedule and steps for the software and ballot installation, which includes a table outlining the key dates, events and deliverables; and	**TDP Review**		*Vol. I, 2.2.3 a. Pre-Voting Capabilities, Ballot and Program Installation and Control*	**X**
	Supports diagnostic testing, specifies diagnostic tests that may be employed to identify problems in the system, verifies the correction of maintenance problems, and isolates and diagnoses faults from various system states.	**TDP Review**			**X**
2.8.6	Operations Support The vendor shall provide documentation of system operating procedures that meets the following requirements:				
	Defines the procedures required to support system acquisition, installation, and readiness testing. These procedures may be provided by reference, if they are contained either in the system hardware specifications, or in other vendor documentation.	**TDP Review**			**X**
	Describes procedures for providing technical support, system maintenance and correction of defects, and for incorporating hardware upgrades and new software releases.	**TDP Review**			**X**
2.8.7	Appendices The vendor may provide descriptive material and data supplementing the various sections of the body of the System Operations Manual. The content and arrangement of appendices shall be at the discretion of the vendor. Topics recommended for discussion include:				
	Glossary: A listing and brief definition of all terms that may be unfamiliar to persons not trained in either voting systems or computer operations	**TDP Review**			**X**
	References: A list of references to all vendor documents and to other sources related to operation of the system	**TDP Review**			**X**
	Detailed Examples: Detailed scenarios that outline correct system responses to faulty operator input; Alternative procedures may be specified depending on the system state	**TDP Review**			**X**

	Manufacturer's Recommended Security Procedures: This appendix shall contain the security procedures that are to be executed by the system operator	**TDP Review**			**X**
2.9	System Maintenance Manual				
	The system maintenance procedures shall provide information in sufficient detail to support election workers, data personnel, or maintenance personnel in the adjustment or removal and replacement of components or modules in the field. Technical documentation needed solely to support the repair of defective components or modules ordinarily done by the manufacturer or software developer is not required.	**TDP Review**			**X**
	Recommended service actions to correct malfunctions or problems shall be discussed, along with personnel and expertise required to repair and maintain the system; and equipment, materials, and facilities needed for proper maintenance. This manual shall include the sections listed below.	**TDP Review**			**X**
2.9.1	Introduction The vendor shall describe the structure and function of the equipment (and related software) for election preparation, programming, vote recording, tabulation, and reporting in sufficient detail to provide an overview of the system for maintenance, and for identification of faulty hardware or software. The description shall include a theory of operation that fully describes such items as:				
	The electrical and mechanical functions of the equipment;	**TDP Review**			**X**
	How the processes of ballot handling and reading are performed (paper-based systems);	**TDP Review**			**X**
	How vote selection and casting of the ballot are performed (DRE systems);	**N/A**			
	How transmission of data over a network are performed (DRE systems, where applicable);	**N/A**			
	How data are handled in the processor and memory units;	**TDP Review**			**X**
	How data output is initiated and controlled;	**TDP Review**			**X**
	How power is converted or conditioned; and	**TDP Review**			**X**
	How test and diagnostic information is acquired and used.	**TDP Review**			**X**
2.9.2	Maintenance Procedures				

	The vendor shall describe preventive and corrective maintenance procedures for hardware and software.	**TDP Review**			**X**
2.9.2.1	Preventive Maintenance Procedures The vendor shall identify and describe:				
	All required and recommended preventive maintenance tasks, including software tasks such as software backup, database performance analysis, and database tuning;	**TDP Review**			**X**
	Number and skill levels of personnel required for each task;	**TDP Review**			**X**
	Parts, supplies, special maintenance equipment, software tools, or other resources needed for maintenance; and	**TDP Review**			**X**
	Any maintenance tasks that must be coordinated with the vendor or a third party (such as coordination that may be needed for off-the-shelf items used in the system).	**TDP Review**			**X**
2.9.2.2	Corrective Maintenance Procedures				
	The vendor shall provide fault detection, fault isolation, correction procedures, and logic diagrams for all operational abnormalities identified by design analysis and operating experience.	**TDP Review**			**X**
	The vendor shall identify specific procedures to be used in diagnosing and correcting problems in the system hardware (or user-controlled software). Descriptions shall include:	**TDP Review**			**X**
	a. Steps to replace failed or deficient equipment;	**TDP Review**			**X**
	b. Steps to correct deficiencies or faulty operations in software;	**TDP Review**			**X**
	c. Modifications that are necessary to coordinate any modified or upgraded software with other software modules;	**TDP Review**			**X**
	d. The number and skill levels of personnel needed to accomplish each procedure;	**TDP Review**			**X**
	e. Special maintenance equipment, parts, supplies, or other resources needed to accomplish each procedure; and	**TDP Review**			**X**
	f. Any coordination required with the vendor, or other party for off the shelf items.	**TDP Review**			**X**
2.9.3	Maintenance Equipment				
	The vendor shall identify and describe any special purpose tests or maintenance equipment recommended for fault isolation and diagnostic purposes.	**TDP Review**			**X**

2.9.4	Parts and Materials				
	Vendors shall provide detailed documentation of parts and materials needed to operate and maintain the system. Additional requirements apply for paper-based systems.	**TDP Review**			**X**
2.9.4.1	Common Standards The vendor shall provide a complete list of approved parts and materials needed for maintenance. This list shall contain sufficient descriptive information to identify all parts by:			*Vol. I 4.3.1 b-c. Hardware Requirements, Design, Construction, and Maintenance Characteristics, Materials, Processes, and Parts*	
	a. Type;	**TDP Review**			**X**
	b. Size;	**TDP Review**			**X**
	c. Value or range;	**TDP Review**			**X**
	d. Manufacturer's designation;	**TDP Review**			**X**
	e. Individual quantities needed; and	**TDP Review**			**X**
	f. Sources from which they may be obtained.	**TDP Review**			**X**
2.9.4.2	Paper-based Systems				
	For marking devices manufactured by multiple external sources, the vendor shall provide a listing of sources and model numbers that are compatible with the system.	**TDP Review**			**X**
	The TDP shall specify the required paper stock, size, shape, opacity, color, watermarks, field layout, orientation, size and style of printing, size and location of mark fields used for vote response fields and to identify unique ballot formats, placement of alignment marks, ink for printing, and folding and bleed through limitations for preparation of ballots that are compatible with the system	**TDP Review**		*Vol. I 2.2.1.3 c. and following paragraph Functional Requirements, Pre-voting Capabilities, Ballot Production Vol. I 4.1.4.2 a-b. Hardware Requirements, Vote Recording Require-mints, Paper Based Recording Requirements*	**X**
2.9.5	Maintenance Facilities and Support				

	The vendor shall identify all facilities, furnishings, fixtures, and utilities that will be required for equipment maintenance. In addition, vendors shall specify the assumptions made with regard to any parameters that impact the mean time to repair. These factors shall include at a minimum:	**TDP Review**		*Vol I 4.3.5 e-g. Hardware Requirements, Design, Construction, and Maintenance, Availability*	**X**
	a. Recommended number and locations of spare devices or components to be kept on hand for repair purposes during periods of system operation;	**TDP Review**			**X**
	b. Recommended number and locations of qualified maintenance personnel who need to be available to support repair calls during system operation; and	**TDP Review**			**X**
	c. Organizational affiliation (i.e., jurisdiction, vendor) of qualified maintenance personnel.	**TDP Review**			**X**
2.9.6	Appendices The vendor may provide descriptive material and data supplementing the various sections of the body of the System Maintenance Manual. The content and arrangement of appendices shall be at the discretion of the vendor. Topics recommended for amplification or treatment in appendices include:				
	Glossary: A listing and brief definition of all terms that may be unfamiliar to persons not trained in either voting systems or computer maintenance	**TDP Review**			**X**
	References: A list of references to all vendor documents and other sources related to maintenance of the system	**TDP Review**			**X**
	Detailed Examples: Detailed scenarios that outline correct system responses to every conceivable faulty operator input; alternative procedures may be specified depending on the system state	**TDP Review**			**X**
	Maintenance and Security Procedures: This appendix shall contain technical illustrations and schematic representations of electronic circuits unique to the system	**TDP Review**			**X**
2.10	Personnel Deployment and Training Requirements				
	The vendor shall describe the personnel resources and training required for a jurisdiction to operate and maintain the system.	**TDP Review**			**X**

2.10.1	Personnel The vendor shall specify the number of personnel and skill level required to perform each of the following functions:				
	Pre-Election or election preparation functions (e.g., entering an election, race and candidate information; designing a ballot; generating pre-election reports);	**TDP Review**			**X**
	System operations for voting system functions performed at the polling place;	**TDP Review**			**X**
	System operations for voting system functions performed at the central count facility;	**TDP Review**			**X**
	Preventive maintenance tasks;	**TDP Review**			**X**
	Diagnosis of faulty hardware or software;	**TDP Review**			**X**
	Corrective maintenance tasks; and	**TDP Review**			**X**
	Testing to verify the correction of problems.	**TDP Review**			**X**
	A description shall be presented of which functions may be carried out by user personnel, and those that must be performed by vendor personnel.	**TDP Review**			**X**
2.10.2	Training The vendor shall specify requirements for the orientation and training of the following personnel:				
	a. Poll workers supporting polling place operations;	**TDP Review**			**X**
	b. System support personnel involved in election programming;	**TDP Review**			**X**
	c. User system maintenance technicians;	**TDP Review**			**X**
	d. Network/system administration personnel (if a network is used);	**N/A**			
	e. Data personnel; and	**TDP Review**			**X**
	f. Vendor personnel.	**TDP Review**			**X**
2.11	Configuration Management Plan				
	Vendors shall submit a Configuration Management Plan that addresses the configuration management requirements of Volume I, Section 9. This plan shall describe all policies, processes and procedures employed by the vendor to carry out these requirements. Information submitted by the vendor shall be used by the accredited test lab to assist in developing and executing the system qualification test plan.	**TDP Review**			**X**

2.11.1	Configuration Management Policy The vendor shall provide a description of its organizational policies for configuration management, addressing the specific requirements of Volume I Subsection 9.2. These requirements pertain to:			*Vol. I 9.2 Configuration Management Policy*	
	Scope and nature of configuration management program activities; and	**TDP Review**			**X**
	Breadth of application of vendor's policy and practices to the voting system.	**TDP Review**			**X**
2.11.2	Configuration Identification The vendor shall provide a description of the procedures and naming conventions used to address the specific requirements of Volume I, Subsection 9.3. These requirements pertain to:			*Vol. I 9.3.2 a-c. Configuration Identification, Version Conventions*	
	Classifying configuration items into categories and subcategories;	**TDP Review**			**X**
	Uniquely numbering or otherwise identifying configuration items; and	**TDP Review**			**X**
	Naming configuration items.	**TDP Review**			**X**
2.11.3	Baseline and Promotion The vendor shall provide a description of the procedures and naming conventions used to address the specific requirements of Volume I, Subsection 9.4. These requirements pertain to:			*Vol. I 9.4 a-c. Baseline and Promotion Requirements, Baseline and Promotion Procedures*	
	Establishing a particular instance of a system component as the starting baseline;	**TDP Review**			**X**
	Promoting subsequent instances of a component to baseline throughout the system development process for the first complete version of the system submitted for qualification testing;	**TDP Review**			**X**
	Promoting subsequent instances of a component to baseline status as the component is maintained throughout its life cycle until system retirement (i.e., the system is no longer sold or maintained)	**TDP Review**			**X**
2.11.4	Configuration Control Procedures The vendor shall provide a description of the procedures used by the vendor to approve and implement changes to a configuration item to prevent unauthorized additions, changes, or deletions to address the specific requirements of Volume I, Subsection 9.5. These requirements pertain to:			*Vol. I 9.5 a-d. Baseline and Promotion Requirements, Baseline and Promotion Procedures*	

	Developing and maintaining internally developed items;	**TDP Review**			**X**
	Developing and maintaining third-party items;	**TDP Review**			**X**
	Resolving internally identified defects	**TDP Review**			**X**
	Resolving externally identified and reported defects	**TDP Review**			**X**
2.11.5	Release Process The vendor shall provide a description of the contents of a system release, and the procedures and related conventions by which the vendor installs, transfers, or migrates the system to accredited voting system testing laboratories and customers to address the specific requirements of Volume I, Subsection 9.6. These requirements pertain to:				
	A first release of the system to an accredited test lab	**TDP Review**			**X**
	A subsequent maintenance or upgrade release of a system, or particular components, to an accredited test lab	**TDP Review**			**X**
	The initial delivery and installation of the system to a customer	**TDP Review**			**X**
	A subsequent maintenance or upgrade release of a system, or particular components, to a customer	**TDP Review**			**X**
2.11.6	Configuration Audits The vendor shall provide a description of the procedures and related conventions for the two audits required by Volume I, Subsection 9.7. These requirements pertain to:				
	a. Physical configuration audit that verifies the voting system components submitted for certification testing to the vendor's technical documentation	**TDP Review**			**X**
	b. Functional configuration audit that verifies the system performs all the functions described in the system documentation	**TDP Review**			**X**
2.11.7	Configuration Management Resources The vendor shall provide a description of the procedures and related conventions for maintaining information about configuration management tools required by Volume I, Subsection 9.8. These requirements pertain to information regarding:			*Vol. I, 9.8 Configuration Management Resources*	
	a. Specific tools used, current version, and operating environment	**TDP Review**			**X**

	b. Physical location of the tools, including designation of computer directories and files	**TDP Review**			**X**
	c. Procedures and training materials for using the tools	**TDP Review**			**X**
2.12	Quality Assurance Program				
	Vendors shall submit a Quality Assurance Program that addresses the quality assurance requirements of Volume I, Section 8. This plan shall describe all policies, processes and procedures employed by the vendor to ensure the overall quality of the system for its initial development and release and for subsequent modifications and releases.	**TDP Review**		*Vol. I 8.2 a-e. Quality Assurance Requirements, General Requirements*	**X**
2.12.1	Quality Assurance Policy The vendor shall provide a description of its organizational policies for quality assurance, including:				
	a. Scope and nature of QA activities; and	**TDP Review**			**X**
	b. Breadth of application of vendor's policy and practices to the voting system.	**TDP Review**			**X**
2.12.2	Parts and Materials Test				
	The vendor shall provide a description of its practices for parts and materials tests and examinations that meet the requirements of Volume I, Subsection 8.5.	**TDP Review**		*Vol. I 8.5 c. Parts and Materials Special Tests and Examinations*	**X**
2.12.3	Quality Conformance Inspections				
	The vendor shall provide a description of its practices for quality conformance inspections that meet the requirements of Volume I, Subsection 8.6.	**TDP Review**			**X**
	The record of tests provided shall include for each test performed:				
	a. Test location;	**TDP Review**			**X**
	b. Test date;	**TDP Review**			**X**
	c. Individual who conducted the test; and	**TDP Review**			**X**
	d. Test outcomes.	**TDP Review**			**X**
2.12.4	Documentation				
	The vendor shall provide a description of its practices for documentation of the system and system development process that meet the requirements of Volume I, Subsection 8.7.	**TDP Review**		*Vol. I 8.7 Quality Assurance Require-mints, Documentation Vol. II, 2.1.1.1 TDP Scope, Required Content for Initial Certification*	**X**

2.13	System Change Notes Vendors submitting modifications for a system that has been tested previously and received national certification shall submit system change notes. These will be used by the accredited test lab to assist in developing and executing the test plan for the modified system. The system change notes shall include the following information:				
	The system change notes shall include the following information:				
	Summary description of the nature and scope of the changes, and reasons for each change;	**TDP Review**			**X**
	A listing of the specific changes made, citing the specific system configuration items changed and providing detailed references to the sections of the documentation changed;	**TDP Review**			**X**
	The specific sections of the documentation that are changed (or complete revised documents, if more suitable to address a large number of changes);	**TDP Review**			**X**
	Documentation of the test plan and procedures executed by the vendor for testing the individual changes and the system as a whole, and records of the test results.	**TDP Review**			**X**
Section 3	**Functionality Testing**				
3.2.1	Basic Functionality Testing Requirements The accredited test lab shall design and perform procedures to test a voting system against the functional requirements outlined in Volume I, Section 2. Test procedures shall be designed and performed that address: Overall system capabilities, Pre-voting functions, Voting functions, Post-voting functions, System maintenance, Transportation and storage.				
	The specific procedures to be used shall be identified in the National Certification Test Plan prepared by the accredited test lab. These procedures may replicate testing performed by the vendor and documented in the vendor's TDP, but shall not rely on vendor testing as a substitute for independent functionality testing.	**Test Plan and FCA**			**X**

	Recognizing variations in system design and the technologies employed by different vendors, the accredited test lab shall design test procedures that account for such variations and reflect the system-specific functional capabilities in Volume I, Section 2.	**FCA**			**X**
3.2.2	Testing to Reflect Technologies				
	The testing procedure designed and performed for a particular system shall reflect the specific technologies and design configurations used by that system.	**FCA**			**X**
3.2.3	Testing to reflect additional Capabilities:				
	Vendors may, and often do, provide additional capabilities in systems in order to respond to the requirements of individual states. These additional capabilities shall be identified by the vendor within the TDP, as described in Volume II, Section 2. Based on this information, the accredited test lab shall design and perform system functionality testing for these additional functional capabilities.	**TDP Review**			**X**
3.2.4	Testing to reflect previously tested capabilities				
	Some new systems using a combination of new subsystems or system components interfaced with the components of a previously certified system. In this situation, the vendor shall identify in the TDP the functional capabilities supported by new subsystems/components and those supported by subsystems/components taken from a previously certified system. The vendor shall indicate in its system design documentation and configuration management records the scope and nature of any modifications made to the re-used subsystems or components.	**TDP Review**			**X**
	Irrespective of previous testing performed, the scope of testing shall include certain functionality tests:				
	All functionality performed by new subsystems/modules	**FCA**			**X**
	All functionality performed by modified subsystems/modules	**FCA**			**X**
	Functionality that is accomplished using any interfaces to new modules, or that shares inputs or outputs from new modules	**FCA**			**X**
	All functionality related to vote tabulation and election results reporting	**FCA**			**X**

	All functionality related to audit trail maintenance	**FCA**			**X**
3.3	General Test Sequence				
	Regardless of the sequence of testing used, the full certification testing process shall include functionality testing for all system functions of a voting system.	**FCA, Usability and Accessibility**			**X**
3.3.1	Testing in parallel with Precinct Count Systems				
	For testing voting functions defined in Volume I, Sections 2, the following procedures shall be performed during the functionality tests of voting equipment and precinct counting equipment.				
	The procedure to prepare election programs shall:				
	Verify resident firmware, if any	**FCA**			**X**
	Prepare software (including firmware) to simulate all ballot format and logic options for which the system will be used	**FCA**			**X**
	Verify program memory device content	**FCA**			**X**
	Obtain and design test ballots with formats and voting patterns sufficient to verify performance of the test election programs.	**FCA**			**X**
	The procedures to program precinct ballot counters shall:				
	Install program and data memory devices, or verify presence if resident	**FCA**			**X**
	Verify operational status of hardware as specified in Volume II, Section 4	**FCA**			**X**
	The procedures to simulate opening of the polls shall:				
	Perform procedures required to prepare hardware for election operations	**FCA**			**X**
	Obtain "zero" printout or other evidence that data memory has been cleared	**FCA**			**X**
	Verify audit log of pre-election operations	**FCA**			**X**
	Perform procedure required to open the polling place and enable ballot counting	**FCA**			**X**
	The procedure to simulate counting ballots shall cast test ballots in a number sufficient to demonstrate proper processing, error handling, and generation of audit data as specified in Volume I, Sections 2 and 5	**FCA**			**X**
	The procedure to simulate closing of polls shall:				
	Perform hardware operations required to disable ballot counting and close the polls	**FCA**			**X**
	Obtain data reports and verify correctness	**FCA**			**X**
	Obtain audit log and verify correctness	**FCA**			**X**

3.3.2	Testing in parallel with Central Count Systems				
	For testing voting functions defined in Volume I, Sections 2, the following procedures shall be performed during the functional tests.				
	The procedure to prepare election programs shall:				
	Verify resident firmware, if any	**FCA**			**X**
	Prepare software (including firmware) to simulate all ballot format and logic options for which the system will be used, and to enable simulation of counting ballots from at least 10 polling places or precincts	**FCA**			**X**
	Verify program memory device content	**FCA**			**X**
	Procure test ballots with formats, voting patterns, and format identifications sufficient to verify performance of the test election programs	**FCA**			**X**
	The procedure to simulate counting ballots shall count test ballots in a number sufficient to demonstrate proper processing, error handling, and generation of audit data as specified in Volume I, Sections 2 and 5	**FCA**			**X**
	The procedure to simulate election reports shall:	**FCA**			**X**
	Obtain reports at polling places or precinct level	**FCA**			**X**
	Obtain consolidated reports	**FCA**			**X**
	Provide query access, if this is a feature of the system	**FCA**			**X**
	Verify correctness of all reports and queries	**FCA**			**X**
	Obtain audit log and verify correctness	**FCA**			**X**
3.4	Functionality testing for Accessibility				
	To demonstrate conformance to these requirements, vendors shall conduct summative usability tests of accessible voting equipment with blind and visually impaired individuals and individuals lacking fine motor control. A description of the testing performed, the population of test subjects participating, and the results shall be documented using the Common Industry Format (CIF) by the vendor and submitted as part of the Technical Data Package. The test labs shall review this information during the system certification documentation review.	**TDP Review**			**X**
3.5	Testing for Systems that Operate on Personal Computers				

	For systems intended to use non-standard voting devices, such as a personal computer, provided by the local jurisdiction, the accredited test lab shall conduct functionality tests using hardware provided by the vendor that meets the minimum configuration specifications defined by the vendor.	**FCA**			**X**
Section 4	**Hardware Testing**				
4.2.1	Testing Focus and Applicability The accredited test lab shall design and perform procedures that test the voting system hardware requirements identified in Volume I, Section 4. Test procedures shall be designed and performed for both operating and non-operating environmental tests:	**Test Plan**			**X**
	Operating environmental tests apply to the entire system, including hardware components that are used as part of the voting systemtelecommunications capability	**N/A**			
	Non-operating tests apply to those elements of the system that are intended for use at poll site voting locations, such as voting machines and precinct counters. These tests address environmental conditions that may be encountered by the voting system hardware at the voting location itself, or while in storage or transit to or from the poll site	**N/A**			
	Compatibility of this equipment with the voting system environment shall be determined through functional tests integrating the standard product with the remainder of the system.	**FCA and System Integration Testing**			**X**
	Unmodified COTS hardware will not be subject to all tests. Generally such equipment has been designed to rigorous industrial standards and has been in wide use, permitting an evaluation of its performance history. To enable reduced testing of such equipment, vendors shall provide the manufacturer specifications and evidence that the equipment has been tested to the equivalent of these Guidelines.	**TDP Review**			**X**

	The specific testing procedures to be used shall be identified in the National Certification Test Plan prepared by the accredited test lab. These procedures may replicate testing performed by the vendor and documented in the vendor's TDP, but shall not rely on vendor testing as a substitute for hardware testing performed by the accredited test lab.	**Test Plan**			**X**
4.2.2	Hardware Provided by Vendor				
	The hardware submitted for national certification testing shall be equivalent, in form and function, to the actual production versions of the hardware units. Engineering or developmental prototypes are not acceptable unless the vendor can show that the equipment to be tested is equivalent to standard production units in both performance and construction.	**PCA**			**X**
4.3	Test Conditions				
	When a test is to be performed at "standard" or "ambient" conditions, this requirement shall refer to a nominal laboratory environment at prevailing atmospheric pressure and relative humidity. Otherwise, all tests shall be performed at the required temperature and electrical supply voltage, regulated within the following tolerances: Temperature of +/- 4 degrees F Electrical supply voltage +/- 2 voltage alternating current	**Test Plan**			**X**
4.4	Test Log Data Requirements				
	The accredited test lab shall maintain a test log of the procedure employed. This log shall identify the system and equipment by model and serial number. Test environment conditions shall be noted. In the event that the accredited test lab deems it necessary to deviate from requirements pertaining to the test environment, the equipment arrangement and method of operation, the specified test procedure, or the provision of test instrumentation and facilities, the deviation shall be recorded in the test log. A discussion of the reasons for the deviation and the effect of the deviation on the validity of the test procedure shall also be provided.	**Engineering Log Books**			**X**
4.5	Test Fixtures				

	To speed up the process of testing and to eliminate human error in casting test ballots the tests may use a simulation device with appropriate software. Such simulation is recommended if it covers all voting data detection and control paths that are used in casting an actual ballot. In the event that only partial simulation is achieved, then an independent method and test procedure must be used to validate the proper operation of those portions of the system not tested by the simulator. If the vendor provides a means of simulating the casting of ballots, the simulation device is subject to the same performance, reliability, and quality requirements that apply to the voting device itself so as not to contribute errors to the test processes.	**N/A**			
4.6	**Non-Operating Environmental Tests**				
4.6.1.1	General, Pretest Data				
	The test technician shall verify that the equipment is capable of normal operation. Equipment identification, environmental conditions, equipment configuration, test instrumentation, operator tasks, time-of-day or test time, and test results shall be recorded.	**Operational Status Check**			**X**
4.6.1.2	Preparation for Test				
	The equipment shall be prepared as for the expected non-operating use, as noted below. When preparation for transport between the storage site and the polling place is required, the equipment shall be prepared with any protective enclosures or internal restraints that the vendor specifies for such transport. When preparation for storage is required, the equipment shall be prepared using any protective enclosures or internal restraints that the vendor specifies for storage.	**Operational Status Check**			**X**
4.6.1.3	Mechanical Inspection and Repair				
	After the test has been completed, the devices shall be removed from their containers, and any internal restraints shall be removed. The exterior and interior of the devices shall be inspected for evidence of mechanical damage, failure, or dislocation of internal components. Devices shall be adjusted or repaired, if necessary.	**Operational Status Check**			**X**
4.6.1.5	Operational Status Check				

	When all tests, inspections, repairs, and adjustments have been completed, normal operation shall be verified by conducting an operational status check.	**Operational Status Check**			**X**
	The following procedures shall be followed to verify the equipment status:				
	Arrange the system for normal operation.	**Operational Status Check**			**X**
	Turn on power, and allow the system to reach recommended operating temperature.	**Operational Status Check**			**X**
	Perform any servicing, and make any adjustments necessary, to achieve operational status.	**Operational Status Check**			**X**
	Operate the equipment in all modes, demonstrating all functions and features that would be used during election operations.	**Operational Status Check**			**X**
	Verify that all system functions have been correctly executed.	**Operational Status Check**			**X**
4.6.1.6	Failure Criteria				
	Upon completion of each non-operating test, the system hardware shall be subject to functional testing to verify continued operability. If any portion of the voting machine or precinct counter hardware fails to remain fully functional, the testing will be suspended until the failure is identified and corrected by the vendor. The system will then be subject to a retest.	**Operational Status Check**			**X**
4.6.2	Bench Handling Test (see Vol. I Section 4.1.2.14 Environmental Control - Transit and Storage)	**Operational Status Check**			**X**
4.6.3	Vibration Test (see Vol. I Section 4.1.2.14 Environmental Control - Transit and Storage)	**Operational Status Check**			**X**
4.6.4	Low Temperature Test (see Vol. I Section 4.1.2.14 Environmental Control - Transit and Storage)	**Operational Status Check**			**X**
4.6.5	High Temperature Test (see Vol. I Section 4.1.2.14 Environmental Control - Transit and Storage)	**Operational Status Check**			**X**
4.6.6	Humidity Test (see Vol. I Section 4.1.2.14 Environmental Control - Transit and Storage)	**Operational Status Check**			**X**
4.7.1	Temperature and Power Variation Test				
4.7.1.1	Data Accuracy				

	For each processing function, the system shall achieve a target error rate of no more than one in 10,000,000 ballot positions, with a maximum acceptable error rate in the test process of one in 500,000 ballot positions. This error rate includes errors from any source while testing a specific processing function and its related equipment.	**Accuracy Test**	AM_ TC00585-EVS5000-Accuracy-14in-Odd, VOTE_TC-EVS5000-AM19 Accuracy, VOTE_TC-EVS5000-DS200 Accuracy, VOTE_TC-EVS5000-DS850 Accuracy		**X**
4.7.2	Maintainability Test				
4.7.3	Reliability Test				
	The accredited test lab shall test for reliability based on the provisions of Volume I, Section 4 for the acceptable Mean Time Between Failure (MBTF). The MBTF shall be measured during the conduct of other system performance tests specified in this section, and shall be at least 163 hours.	**Reliability Test**			**X**
4.7.4	Availability Test				
4.8	Other Environmental Tests				
	The test for power disturbance disruption shall be conducted in compliance with the test specified in IEC 61000-4-11 (1994-06).	**Electrical Power Disturbance**			**X**
	The test for electromagnetic radiation shall be conducted in compliance with the FCC Part 15 Class B requirements by testing per ANSI C63.4.	**Electromagnetic Emissions**			**X**
	The test for electrostatic disruption shall be conducted in compliance with the test specified in IEC 61000-4-2 (1995-01).	**Electrostatic Disruption**			**X**
	The test for electromagnetic susceptibility shall be conducted in compliance with the test specified in IEC 61000-4-3 (1996).	**Electromagnetic Susceptibility**			**X**
	The test for electrical fast transient protection shall be conducted in compliance with the test specified in IEC 61000-4-4 (1995-01).	**Electrical Fast Transient**			**X**
	The test for lightning surge protection shall be conducted in compliance with the test specified in IEC 61000-4-5 (1995-02).	**Lightning Surge**			**X**
	The test for conducted RF immunity shall be conducted in compliance with the test specified in IEC 61000-4-6 (1996-04).	**Conducted RF Immunity**			**X**
	The test for AC magnetic fields RF immunity shall be conducted in compliance with the test specified in IEC 61000-4-8 (1993-06).	**Magnetic Fields Immunity**			**X**
Section 5	**Software Testing**				
5.2	Basis of Software Testing				

	The accredited test lab shall design and perform procedures that test the voting system software requirements identified in Volume I, Section 5 [Software Requirements].	**Source Code Review**			**X**
	Unmodified, general purpose COTS non-voting software (e.g., operating systems, programming language compilers, data base management systems, and Web browsers) is not subject to the detailed examinations specified in this section. However, the accredited test lab shall examine such software to confirm the specific version of software being used against the design specification to confirm that the software has not been modified. Portions of COTS software that have been modified by the vendor in any manner are subject to review.	**Source Code Review**			**X**
	Unmodified COTS software is not subject to code examination. However, source code generated by a COTS package and embedded in software modules for compilation or interpretation shall be provided in human readable form to the accredited test lab. The accredited test lab may inspect COTS source code units to determine testing requirements or to verify the code is unmodified.	**Source Code Review**			**X**
	The accredited test lab may inspect the COTS generated software source code in preparation of test plans and to provide some minimal scanning or sampling to check for embedded code or unauthorized changes. Otherwise, the COTS source code is not subject to the full code review and testing. For purposes of code analysis, the COTS units shall be treated as unexpanded macros.	**Source Code Review**			**X**
	Compatibility of the voting system software components or subsystems with one another, and with other components of the voting system environment, shall be determined through functional tests integrating the voting system software with the remainder of the system.	**System Integration**			**X**
5.3	Initial Review of Documentation Prior to initiating the software review, the accredited test lab shall verify that the documentation submitted by the vendor in the TDP is sufficient to enable:				
	Review of the source code	**TDP Review**			**X**

	Design and conduct tests at every level of the software structure to verify that the software meets the vendor's design specifications and the requirements of the performance guidelines	**TDP Review**			**X**
5.4	Source Code Review				
	The accredited test lab shall compare the source code to the vendor's software design documentation to ascertain how completely the software conforms to the vendor's specifications. Source code inspection shall also assess the extent to which the code adheres to the requirements in Volume I, Section 5	**Source Code Review**			**X**
5.4.1	Control Constructs Voting system software shall use the control constructs identified in this section as follows:				
	If the programming language used does not provide these control constructs, the vendor shall provide them (that is, comparable control structure logic). The constructs shall be used consistently throughout the code. No other constructs shall be used to control program logic and execution	**Source Code Review**			**X**
	While some programming languages do not create programs as linear processes, stepping from an initial condition, through changes, to a conclusion, the program components nonetheless contain procedures (such as “methods” in object-oriented languages). Even in these programming languages, the procedures must execute through these control constructs (or their equivalents, as defined and provided by the vendor)	**Source Code Review**			**X**
	Operator intervention or logic that evaluates received or stored data shall not re-direct program control within a program routine. Program control may be re-directed within a routine by calling subroutines, procedures, and functions, and by interrupt service routines and exception handlers (due to abnormal error conditions). Do-While (False) constructs and intentional exceptions (used as GoTos) are prohibited	**Source Code Review**			**X**
	Conventional constructs that are inherent to the development language are permitted but must be documented in the code, adjacent to their use.	**Source Code Review**			**X**
5.4.2	Assessment of Coding Conventions				

The accredited test lab shall test for compliance with the coding conventions specified by the vendor. If the vendor does not identify an appropriate set of coding conventions in accordance with the provisions of Volume I, Subsection 5.2.6, the accredited test lab shall review the code to ensure that it:	**Source Code Review**			**X**
Uses uniform calling sequences. All parameters shall either be validated for type and range on entry into each unit or the unit comments shall explicitly identify the type and range for the reference of the programmer and tester. Validation may be performed implicitly by the compiler or explicitly by the programmer	**Source Code Review**			**X**
Has the return explicitly defined for callable units such as functions or procedures (do not drop through by default) for C-based languages and others to which this applies, and in the case of functions, has the return value explicitly assigned. Where the return is only expected to return a successful value, the C convention of returning zero shall be used or the use of another code justified in the comments. If an uncorrected error occurs so the unit must return without correctly completing its objective, a non-zero return value shall be given even if there is no expectation of testing the return. An exception may be made where the return value of the function has a data range including zero	**Source Code Review**			**X**
Does not use macros that contain returns or pass control beyond the next statement	**Source Code Review**			**X**
For those languages with unbound arrays, provides controls to prevent writing beyond the array, string, or buffer boundaries	**Source Code Review**			**X**
For those languages with pointers or which provide for specifying absolute memory locations, provides controls that prevent the pointer or address from being used to overwrite executable instructions or to access inappropriate areas where vote counts or audit records are stored	**Source Code Review**			**X**
For those languages supporting case statements, has a default choice explicitly defined to catch values not included in the case list	**Source Code Review**			**X**

Provides controls to prevent any vote counter from overflowing. Assuming the counter size is large enough such that the value will never be reached is not adequate	**Source Code Review**			**X**
Is indented consistently and clearly to indicate logical levels	**Source Code Review**			**X**
Excluding code generated by commercial code generators, is written in small and easily identifiable modules, with no more than 50% of all modules exceeding 60 lines in length, no more than 5% of all modules exceeding 120 lines in length, and no modules exceeding 240 lines in length. "Lines" in this context, are defined as executable statements or flow control statements with suitable formatting and comments. The reviewer should consider the use of formatting, such as blocking into readable units, which supports the intent of this requirement where the module itself exceeds the limits. The vendor shall justify any module lengths exceeding this standard	**Source Code Review**			**X**
Where code generators are used, the source file segments provided by the code generators should be marked as such with comments defining the logic invoked and, if possible, a copy of the source code provided to the accredited test lab with the generated source code replaced with an unexpanded macro call or its equivalent	**Source Code Review**			**X**
Has no line of code exceeding 80 columns in width (including comments and tab expansions) without justification	**Source Code Review**			**X**
Contains no more than one executable statement and no more than one flow control statement for each line of source code	**Source Code Review**			**X**
In languages where embedded executable statements are permitted in conditional expressions, the single embedded statement may be considered a part of the conditional expression. Any additional executable statements should be split out to other lines	**Source Code Review**			**X**
Avoids mixed-mode operations. If mixed mode usage is necessary, then all uses shall be identified and clearly explained by comments	**Source Code Review**			**X**
Upon exit() at any point, presents a message to the user indicating the reason for the exit()	**Source Code Review**			**X**

	Uses separate and consistent formats to distinguish between normal status and error or exception messages. All messages shall be self-explanatory and shall not require the operator to perform any look-up to interpret them, except for error messages that require resolution by a trained technician	**Source Code Review**			**X**
	References variables by fewer than five levels of indirection (i.e., a.b.c.d or a[b].c->d)	**Source Code Review**			**X**
	Has functions with fewer than six levels of indented scope	**Source Code Review**			**X**
	Initializes every variable upon declaration where permitted	**Source Code Review**			**X**
	Has all constants other than 0 and 1 defined or enumerated, or shall have a comment which clearly explains what each constant means in the context of its use. Where "0" and "1" have multiple meanings in the code unit, even they should be identified. Example: "0" may be used as FALSE, initializing a counter to zero, or as a special flag in a non-binary category	**Source Code Review**			**X**
	Only contains the minimum implementation of the "a = b ? c : d" syntax. Expansions such as "j=a?(b?c:d):e;" are prohibited	**Source Code Review**			**X**
	Has all assert() statements coded such that they are absent from a production compilation. Such coding may be implemented by ifdef()s that remove them from or include them in the compilation. If implemented, the initial program identification in setup should identify that assert() is enabled and active as a test version	**Source Code Review**			**X**
Section 6	**System Integration Testing**				
6.1	Scope				
	System level certification tests address the integrated operation of both hardware and software, along with any telecommunications capabilities. The system level certification tests shall include the tests (functionality, volume, stress, usability, security, performance, and recovery) indicated in the National Certification Test Plan, described in Appendix A.	**System Integration Testing**			**X**
6.2.1	Testing Breadth				

	The accredited test lab shall design and perform procedures that test the voting system capabilities for the system as a whole. These procedures follow the testing of the systems hardware and software, and address voting system requirements defined in Volume I, Sections 2, 4, 5 and 6.	**System Integration Testing**			**X**
	These procedures shall also address the requirements for testing system functionality provided in Section 3. Where practical, the accredited test lab will perform coverage reporting of the software branches executed in the functional testing	**Source Code Review**			**X**
	The accredited test lab will use the coverage report to identify any portions of the source code that were not covered and determine: The additional functional tests that are needed; Where more detailed source code review is needed or Both.	**Source Code Review**			**X**
	The specific procedures to be used shall be identified in the National Certification Test Plan. These procedures may replicate testing performed by the vendor and documented in the vendor's TDP, but shall not rely on vendor testing as a substitute for testing performed by the accredited test lab. Recognizing variations in system design and the technologies employed by different vendors, the accredited test lab shall design test procedures that account for these variations.	**Test Plan and System Integration Testing**			**X**
6.2.2	System Baseline for Testing				
	To ensure that the system version tested is the correct version, the accredited test lab shall witness the build of the executable version of the system immediately prior to or as part of, the physical configuration audit. Additionally, should components of the system be modified or replaced during the testing process, the accredited test lab shall require the vendor to conduct a new "build" of the system to ensure that the certified executable release of the system is built from tested components.	**PCA and Compliance Build**			**X**
6.2.3	Testing Volume				

	For all systems, the total number of ballots to be processed by each precinct counting device during these tests shall reflect the maximum number of active voting positions and the maximum number of ballot styles that the TDP claims the system can support.	**Volume and Stress**			**X**
6.3	Testing Interfaces of System Components				
	The accredited test lab shall design and perform test procedures that test the interfaces of all system modules and subsystems with each other against the vendor's specifications. These tests shall be documented in the National Certification Test Plan, and shall include the full range of system functionality provided by the vendor's specifications, including functionality that exceeds the specific requirements of these Guidelines.	**Test Plan and System Integration Testing**			**X**
	Some voting systems may use components or subsystems from previously tested and qualified systems, such as ballot preparation. For these scenarios, the accredited test lab shall, at a minimum:				
	Confirm that the version of previously approved components and subsystems is unchanged	**N/A**			
	Test all interfaces between previously approved modules/subsystems and all other system modules and subsystems. Where a component is expected to interface with several different products, especially from different manufacturers, the vendor shall provide a public data specification of files or data objects used to exchange information	**N/A**			
	Telecommunications capabilities. For those systems that do use such capabilities, components that are located at the polling place or separate vote counting location shall be tested for effective interface, accurate vote transmission, failure detection, and failure recovery.	**N/A**			

	For voting systems that use telecommunications lines or networks that are not under the control of the election official (e.g., public telephone networks), the accredited test lab shall test the interface of vendor-supplied components with these external components for effective interface, vote transmission, failure detection, and failure recovery.	**N/A**			
6.4	Security Testing				
	The accredited test lab shall design and perform test procedures that test the security capabilities of the voting system against the requirements defined in Volume I, Section 7. These procedures shall focus on the ability of the system to detect, prevent, log, and recover from the broad range of security risks identified. These procedures shall also examine system capabilities and safeguards claimed by the vendor in the TDP to go beyond these risks.	**Security**	Pre_TC-78, Pre_TC-79, Pre_TC-104, Pre_TC-133, Pre_TC-116, Pre_TC-82, Pre_TC-83, Pre_TC-84, Pre_TC-08, Pre_TC-117, Pre_TC-80, Pre_TC-81, Pre_TC-06, Pre_TC-07, Pre_TC-09, Pre_TC-10, Pre_TC-11		**X**
	For systems that use public telecommunications networks, including the Internet, to transmit election management data or official election results (such as ballots or tabulated results), the accredited test lab shall conduct tests to ensure that the system provides the necessary identity-proofing, confidentiality, and integrity of transmitted data. These tests shall be designed to confirm that the system is capable of detecting, logging, preventing, and recovering from types of attacks known at the time the system is submitted for certification.	**N/A**			
	The accredited test lab may meet these testing requirements by confirming proper implementation of proven commercial security software. In this case, the vendor must provide the published standards and methods used by the U.S. Government to test and accept this software, or it may provide references to free, publicly available publications of these standards and methods, such as government web sites.	**Security and TDP Review**			**X**
6.4.1	Access Control				
	The accredited testing laboratory shall conduct tests of system capabilities and review the access control policies and procedures submitted by the vendor to identify and verify the access control features implemented as a function of the system.	**FCA and Security**			**X**

	Specific activities to be conducted by the accredited test lab shall include:				
	A review of the vendor's access control policies, procedures and system capabilities to confirm that all requirements of Volume I, Subsection 7.2 have been addressed completely	**Security**	Pre_TC-78, Pre_TC-79, Pre_TC-104, Pre_TC-133, Pre_TC-116, Pre_TC-82, Pre_TC-83, Pre_TC-84, Pre_TC-08, Pre_TC-117, Pre_TC-80, Pre_TC-81, Pre_TC-06, Pre_TC-07, Pre_TC-09, Pre_TC-10, Pre_TC-11		**X**
	Specific tests designed by the accredited test lab to verify the correct operation of all documented access control procedures and capabilities, including tests designed to circumvent controls provided by the vendor. These tests shall include:				
	Performing the activities that the jurisdiction will perform in specific accordance with the vendor's access control policy and procedures to create a secure system, including procedures for software and firmware installation (as described in Volume I, Subsection 7.4)	**Security**	Pre_TC-78, Pre_TC-79, Pre_TC-104, Pre_TC-133, Pre_TC-116, Pre_TC-82, Pre_TC-83, Pre_TC-84, Pre_TC-08, Pre_TC-117, Pre_TC-80, Pre_TC-81, Pre_TC-06, Pre_TC-07, Pre_TC-09, Pre_TC-10, Pre_TC-11		**X**
	Performing tests intended to bypass or otherwise defeat the resulting security environment. These tests shall include simulation of attempts to physically destroy components of the voting system in order to validate the correct operation of system redundancy and backup capabilities	**Security**	Pre_TC-78, Pre_TC-79, Pre_TC-104, Pre_TC-133, Pre_TC-116, Pre_TC-82, Pre_TC-83, Pre_TC-84, Pre_TC-08, Pre_TC-117, Pre_TC-80, Pre_TC-81, Pre_TC-06, Pre_TC-07, Pre_TC-09, Pre_TC-10, Pre_TC-11		**X**
6.4.2	Data Interception and Disruption				
	For systems that use telecommunications to transmit official voting data, the accredited test lab shall review, and conduct tests of, the data interception and prevention safeguards specified by the vendor in its TDP.	**N/A**			
	The accredited test lab shall evaluate safeguards provided by the vendor to ensure their proper operation, including the proper response to the detection of efforts to monitor data or otherwise compromise the system.	**N/A**			
	For systems that use public communications networks the accredited test lab shall also review the vendor's documented procedures for maintaining protection against newly discovered external threats to the telecommunications network. This review shall assess the adequacy of such procedures in terms of:				
	Identification of new threats and their impact	**N/A**			

	Development or acquisition of effective countermeasures	**N/A**			
	System testing to ensure the effectiveness of the countermeasures	**N/A**			
	Notification of client jurisdictions that use the system of the threat and the actions that should be taken	**N/A**			
	Distribution of new system releases or updates to current system users	**N/A**			
	Confirmation of proper installation of new system releases	**N/A**			
6.5	Usability and Accessibility Testing				
	Voting machines intended for use by voters with disabilities operate consistently with vendor specifications and documentation	**Usability and Accessibility**			**X**
6.6	Physical Configuration Audit				
	The audit shall establish a configuration baseline of the software and hardware to be tested. It shall also confirm whether the vendor's documentation is sufficient for the user to install, validate, operate, and maintain the voting system.	**PCA**			**X**
	The test agency shall examine the vendor's source code against the submitted documentation during the Physical Configuration Audit to verify that the software conforms to the vendor's specifications. This review shall include an inspection of all records of the vendor's release control system. If changes have been made to the baseline version, the accredited test lab shall verify that the vendor's engineering and test data are for the software version submitted for certification	**Source Code Review**			**X**
	If the software is to be run on any equipment other than a COTS mainframe data processing system, minicomputer, or microcomputer, the Physical Configuration Audit shall also include a review of all drawings, specifications, technical data, and test data associated with the system hardware. This examination shall establish the system hardware baseline associated with the software baseline	**PCA**			**X**

	To assess the adequacy of user acceptance test procedures and data, vendor documents containing this information shall be reviewed against the system's functional specifications. Any discrepancy or inadequacy in the vendor's plan or data shall be resolved prior to beginning the system integration functional and performance tests	**TDP Review**			**X**
	All subsequent changes to the baseline software configuration made during the course of testing shall be subject to re-examination. All changes to the system hardware that may produce a change in software operation shall also be subject to re-examination	**PCA**			**X**
	The vendor shall provide a list of all documentation and data to be audited, cross-referenced to the contents of the TDP. Vendor technical personnel shall be available to assist in the performance of the Physical Configuration Audit.	**TDP Review**			**X**
6.7	Functional Configuration Audit				
	The accredited test lab shall review the vendor's test procedures and test results to determine if the vendor's specified functional requirements have been adequately tested. This examination shall include an assessment of the adequacy of the vendor's test cases and input data to exercise all system functions, and to detect program logic and data processing errors, if such be present	**TDP Review**			**X**
	The accredited test lab shall perform or supervise the performance of additional tests to verify nominal system performance in all operating modes, and to verify on a sampling basis the vendor's test data reports. If vendor developmental test data is incomplete, the accredited test lab shall design and conduct all appropriate module and integrated functional tests. The functional configuration audit may be performed in the facility either of the accredited test lab or of the vendor, and shall use and verify the accuracy and completeness of the System Operations, Maintenance, and Diagnostic Testing Manuals	**FCA**			**X**

	The vendor shall provide a list of all documentation and data to be audited, cross-referenced to the contents of the TDP. Vendor technical personnel shall be available to assist in the performance of the Functional Configuration Audit.	**TDP Review**			**X**
Section 7	**Quality Assurance Testing**				
7.2	Basis of Examinations				
	The accredited test lab shall design and perform procedures that examine documented vendor practices for quality assurance and configuration management as addressed by Volume I, Sections 8 and 9 and Section 2.	**TDP Review**			**X**
	Examination procedures shall be designed and performed to ensure:				
	Conformance with the requirements to provide information on vendor practices required by these Guidelines	**TDP Review**			**X**
	Conformance of system documentation and other information provided by the vendor with the documented practices for quality assurance and configuration management	**TDP Review**			**X**
	The specific procedures used by the accredited test lab shall be identified in the Qualification Test Plan. Recognizing variations in vendors' quality assurance and configuration management practices and procedures, the accredited test lab shall design examination procedures that account for these variations.	**TDP Review and Test Plan**			**X**
7.3.2	Functional Configuration Audit and System Integration Testing				
	To help ensure an efficient test process, this [functional configuration audit] shall be conducted by the accredited test lab as an element of the system integration testing that confirms the proper functioning of the system as a whole.	**FCA**			**X**
7.4	Examination of Configuration Management Practices				

	The examination of configuration management practices shall address the full scope of requirements described in Volume I, Section 9, and the documentation requirements described in Section 2. In addition to confirming that all required information has been submitted, the accredited test lab shall determine the vendor's conformance with the documented configuration management practices.	**TDP Review**			**X**
7.4.1	Configuration Management Policy The accredited test lab shall examine the vendor's documented configuration management policy to confirm that it:				
	Addresses the full scope of the system, including components provided by external suppliers	**TDP Review**			**X**
	Addresses the full breadth of system documentation	**TDP Review**			**X**
7.4.2	Configuration Identification The accredited test lab shall examine the vendor's documented configuration identification practices policy to confirm that it:				
	Describes clearly the basis for classifying configuration items into categories and subcategories, for numbering of configuration items; and for naming of configuration items	**TDP Review**			**X**
	Describes clearly the conventions used to identify the version of the system as a whole and the versions of any lower level elements (e.g., subsystems, individual elements) if such lower level version designations are used	**TDP Review**			**X**
7.4.3	Baseline, Promotion, and Demotion Procedures The accredited test lab shall examine the vendor's documented baseline, promotion, and demotion procedures to confirm that they:				
	Provide a clear, controlled process that promotes components to baseline status when specific criteria defined by the vendor are met	**TDP Review**			**X**
	Provide a clear, controlled process for demoting a component from baseline status when specific criteria defined by the vendor are met.	**TDP Review**			**X**
7.4.4	Configuration Control Procedures The accredited test lab shall examine the vendor's configuration control procedures to confirm that they:				
	Are capable of providing effective control of internally developed system components	**TDP Review**			**X**

	Are capable of providing effective control of components developed or supplied by third parties	**TDP Review**			**X**
7.4.5	Release Process The accredited test lab shall examine the vendor's release process to confirm that it:				
	Provides clear accountability for moving forward with the release of the initial system version and subsequent releases	**TDP Review**			**X**
	Provides the means for clear identification of the system version being replaced	**TDP Review**			**X**
	Confirms that all required internal vendor tests and audits prior to release have been completed successfully	**TDP Review**			**X**
	Confirms that each system version released to customers has been certified	**TDP Review**			**X**
	Confirms that each system release has been received by the customer	**TDP Review**			**X**
	Confirms that each system release has been installed successfully by the customer	**TDP Review**			**X**
7.4.6	Configuration Audits The accredited test lab shall examine the vendor's configuration audit procedures to confirm that they:				
	Are sufficiently broad in scope to address the entire system, including system documentation	**TDP Review**			**X**
	Are conducted with appropriate timing to enable effective control of system versions	**TDP Review**			**X**
	Are sufficiently rigorous to confirm that all system documentation prepared and maintained by the vendor matches the actual system functionality, design, operation, and maintenance requirements	**TDP Review**			**X**
7.4.7	Configuration Management Resources				
	The accredited test lab shall examine the configuration management resource information submitted by the vendor to determine whether sufficient information has been provided to enable another organization to clearly identify the resources used and acquire them for use.	**TDP Review**			**X**

7.5	Examination of Quality Assurance Practices The examination of quality assurance practices shall address the full scope of requirements described in Volume I, Section 8, and the documentation requirements described in Volume I, Section 2. The accredited test lab shall confirm that all required information has been submitted, and assess whether the vendor's quality assurance program provides for:				
	Clearly measurable quality standards	**TDP Review**			**X**
	An effective testing program throughout the system development life cycle	**TDP Review**			**X**
	Application of the quality assurance program to external providers of system components and supplies	**TDP Review**			**X**
	Comprehensive monitoring of system performance in the field and diagnosis of system failures	**TDP Review**			**X**
	Effective record keeping of system failures to support analysis of failure patterns and potential causes	**TDP Review**			**X**
	Effective processes for notifying customers of system failures and corrective measures that need to be taken, and for confirming that such measures are taken	**TDP Review**			**X**
7.5.1	Quality Assurance Policy The accredited test lab shall examine the vendor's quality assurance policy to confirm that it:				
	Addresses the full scope of the voting system	**TDP Review**			**X**
	Clearly designates a senior level individual accountable for implementation and oversight of quality assurance activities	**TDP Review**			**X**
	Clearly designates the individuals, by position within the vendor's organization, who are to conduct each quality assurance activity	**TDP Review**			**X**
	Provides procedures that determine compliance with, and correct deviations from, the quality assurance program at a minimum annually	**TDP Review**			**X**
7.5.2	Parts and Materials Tests The accredited test lab shall examine the vendor's parts and materials special tests and examinations to confirm that they:				

	Identify appropriate criteria that are used to determine the specific system components for which special tests are required to confirm their suitability for use in a voting system	**TDP Review**			**X**
	Are designed in a manner appropriate to determine suitability	**TDP Review**			**X**
	Have been conducted and documented for all applicable parts and materials	**TDP Review**			**X**
7.5.3	Quality Conformance Inspections The accredited test lab shall examine the vendor's quality conformance plans, procedures and, inspection results to confirm that:				
	All components have been tested according to the test requirements defined by the vendor	**TDP Review**			**X**
	All components have passed the requisite tests	**TDP Review**			**X**
	For each test, the test documentation identifies test location, date, individual who conducted the test and outcome	**TDP Review**			**X**
7.5.4	Documentation				
	The accredited test lab shall examine the vendor's voting system documentation to confirm that it meets the content requirements of Volume I, Subsection 8.7, and Section 2, and is written in a manner suitable for use by purchasing jurisdictions.	**TDP Review**			**X**