Text Compare VVSG Test Assertions 1.0 and VVSG Test Assertions 1.1

Test Assertions Version 1.0	<>	Test Assertions Version 1.1
This document contains detailed test assertions for select Voluntary Voting System Guidelines 2.0 Requirements (VVSG 2.0). Test assertions were not developed for all VVSG 2.0 requirements. The requirements identified for test assertion development were flagged in several different ways:	<>	This document contains detailed test assertions for select Voluntary Voting System Guidelines 2.0 Requirements (VVSG 2.0). Test assertions were not developed for all VVSG 2.0 requirements. The requirements identified for test assertion development were flagged in several different ways, including:
Many of the VVSG requirements focus on design at a high level and may be open to interpretation. In order to thoroughly test these requirements, manufacturers and VSTLs need the ability to break down each VVSG requirement into unambiguous, specific, and testable conditions. Test assertions are a method to accomplish this. The test assertions contain granular conditions that must be tested to determine conformance to specific VVSG requirements. The overall goal of the assertions is to ensure that the VSTLs test each requirement in the VVSG correctly and comprehensively. EAC staff will regularly review and revise the test assertions with feedback from VSTLs, manufacturers, election officials, NIST, and other stakeholders and will make recommendations to the Executive Director for final approval. These test assertions help ensure uniformity and consistency among all the VSTL and ensure the same pass/fail result regardless of which VSTL is used to test a specific voting system.	<>	Many of the VVSG requirements focus on design at a high level and may be open to interpretation. In order to thoroughly test these requirements, manufacturers and VSTLs need the ability to break down each VVSG requirement into unambiguous, specific, and testable conditions. Test assertions are a method to accomplish this. The test assertions contain granular conditions that must be tested to determine conformance to specific VVSG requirements. The overall goal of the assertions is to ensure that the VSTLs test each requirement in the VVSG correctly and comprehensively. EAC staff will regularly review and revise the test assertions with feedback from VSTLs, manufacturers, election officials, NIST, and other stakeholders and will make recommendations to the Executive Director for final approval. These test assertions help ensure uniformity and consistency among all the VSTLs and ensure the same pass/fail result regardless of which VSTL is used to test a specific voting system.
Test assertions were only developed for a specific subset of VVSG 2.0 requirements. They were requirements identified as potentially ambiguous and/or difficult to test. Test assertions may ultimately be developed for more requirements in the VVSG. Upon using the test assertions during the EAC's Testing & Certification Program, additional problems may be identified that necessitate updates or completely new test assertions to be developed. Therefore, this effort is intended to be a living document that will be updated as needed.	<>	Test assertions were only developed for a specific subset of VVSG 2.0 requirements. There are requirements identified as potentially ambiguous and/or difficult to test. Test assertions may ultimately be developed for more requirements in the VVSG. Upon using the test assertions during the EAC's Testing & Certification Program, issues may be identified that necessitate updates or completely new test assertions to be developed. Therefore, this effort is intended to be a living document that will be updated as needed.
Text of each test assertion and sub-assertion Test assertions are indicated by the presence of the letters "TA" and followed by the original requirement number to which the test assertion applies. When a requirement contains a numbered list, then the hash sign is placed within the TA designation to specifically map that assertion back to that numbered item within the requirement. Blue and italicized text helps to differentiate key terms or phrases from one test assertion to another when the assertions under a single requirement are largely similar.	<>	Text of each test assertion and sub-assertion (Not all assertions will have sub-assertions) Test assertions are indicated by the presence of the letters "TA" and followed by the original requirement number to which the test assertion applies.
Test assertions are derived from the requirements and may also include additional information from the discussion fields. Assertions contain normative text and are designed to contain at least one keyword. Keywords are words that have a specific meaning within this document and are always capitalized. The following is list of keywords used within this document:	<>	Test assertions are derived from the requirements and may also include additional information from the discussion fields. Assertions contain normative text and are designed to contain at least one keyword. Keywords are words that have a specific meaning within this document and are always capitalized. The following list of keywords is used within this document:
1.1.7-G – Scan to manufacturer specifications TA117G-1: The voting system MUST be capable of providing a report to show the mark detection thresholds used to scan ballots.	<>	1.1.6-G – Scan to manufacturer specifications TA116G-1: The voting system MUST be capable of providing a report to show the mark detection thresholds used to scan ballots.

TA117G-1-1: These reports MUST be available on an ad hoc basis to election officials. 1.1.7-H – Accurately detect imperfect marks TA117H-1: Voting systems MUST be able to detect a 1 MM thick line made with the following pencils on the HB scale: HB, B, 2B, 3B, 4B, 5B, 6B, 7B, 8B, and 9B. 1.1.7-I – Ignore extraneous marks inside voting targets TA 117I-1: The voting system MUST NOT interpret imperfections in the ballot stock as valid marks as defined in the manufacturer's documentation.		TA116G-1-1: These reports MUST be available on an ad hoc basis to election officials. 1.1.6-I – Ignore extraneous marks inside voting targets TA116I-1: The voting system MUST NOT interpret imperfections in the ballot stock as valid marks as defined in the manufacturer's documentation.
TA 117I-2: The voting system MUST NOT interpret folds in the ballot stock as valid marks as defined in the manufacturer's documentation.	<>	TA116I-2: The voting system MUST NOT interpret folds in the ballot stock as valid marks as defined in the manufacturer's documentation.
TA 117I-3: The voting system MUST NOT interpret insignificant marks identified within the voting target as valid marks as defined in the manufacturer's documentation. 1.1.7-J – Marginal marks, no bias TA 117J-1: The voting system MUST NOT evaluate identical ambiguous marks as valid votes in one target area and as invalid votes in other target areas on the same ballot. TA 117J-2: The voting system MUST evaluate identical valid marks made in identical marking positions on identical ballot pages as valid marks.	<>	TA116I-3: The voting system MUST NOT interpret insignificant marks identified within the voting target as valid marks as defined in the manufacturer's documentation. 1.1.6-J – Marginal marks, no bias TA116J-1: The voting system MUST NOT evaluate identical ambiguous marks as valid votes in one target area and as invalid votes in other target areas on the same ballot. TA116J-2: The voting system MUST evaluate identical valid marks made in identical marking positions on identical ballot pages as valid marks.
1.1.9-B – Partisan primary elections TA119B-1: The voting system MUST be able to separately report the number of ballots read for all political parties in open primary elections.	<>	1.1.8-B – Partisan primary elections TA118B-1: The voting system MUST be able to separately report the number of ballots read for all political parties in open primary elections.
TA119B-2: The voting system MUST be able to separately report the number of ballots read for all political parties in closed primary elections.	<>	TA118B-2: The voting system MUST be able to separately report the number of ballots read for all political parties in closed primary elections.
TA119B-3: The voting system MUST be able to separately report the number of ballots counted for all political parties in open primary elections.	<>	TA118B-3: The voting system MUST be able to separately report the number of ballots counted for all political parties in open primary elections.
TA119B-4: The voting system MUST be able to separately report the number of ballots counted for all political parties in closed primary elections.	<>	TA118B-4: The voting system MUST be able to separately report the number of ballots counted for all political parties in closed primary elections.
TA12C-1: IF a voting system uses optical scan technology, THEN the system MUST accurately interpret at least 10,000,000 ballot positions in accordance with the manufacturer’s valid mark specifications.	<>	TA12C-1: Each unique tabulation device within the system MUST accurately interpret at least 1,670,000 ballot positions in accordance with the manufacturer’s valid mark specifications and without error. 1.2-I – FCC Part 15 Class A and B conformance TA12I-1: The voting system MUST comply with the Rules and Regulations of the Federal Communications Commission, Part 15; Class A or Class B requirements for radiated and conducted emissions by testing per ANSI C63.4-2014. TA12I-2: The voting system documentation MUST indicate whether devices comprising the system are intended to be located in non-polling places (Class A) or polling places (Class B).
	-+	2.1-D – Records last at least 22 months TA21D-1: The manufacturer MUST document that the medium chosen for record retention is able to meet the required environmental parameters based on specifications of the chosen medium.
TA211A-2: IF components from third-party suppliers are used for their intended purpose within the voting system, THEN the voting system manufacturer MUST ensure that third-party	<>	TA211A-2: IF components from third-party suppliers are used within the voting system, THEN the voting system manufacturer MUST ensure that third-party suppliers document

suppliers document the quality assurance procedures used to ensure components supplied from third parties are free from damage or defect.		the quality assurance procedures used to ensure components supplied from third parties are free from damage or defect.
TA211C-1: The paper specified for use in the voting system MUST conform to the applicable specifications contained within the Government Paper Specification Standards, February 1999 No. 11, OR the government standards that have superseded them. TA211C-1-1: The manufacturer MUST document the type of paper used by the voting system.	<>	TA211C-1: The manufacturer MUST document the type of paper used by the voting system.
TA212A-1: IF a voting system component is electronic THEN it MUST have test points labeled. TA212A-1-1: Examples of labels MAY include affixed, adhered, or engraved labels.	+-	
TA212A-2: IF a voting system component is electronic THEN the voting system manufacturer MUST identify all test points in the voting system documentation.	<>	TA212A-1: IF a voting system component is electronic THEN the voting system manufacturer MUST identify all test points in the voting system documentation.
TA212A-3: IF a voting system component is electronic AND IF a failure in the device occurs THEN physical or audible indicators related to that failure MUST be present.	<>	TA212A-2: IF a voting system component is electronic and IF a failure in the device occurs THEN physical or audible indicators related to that failure MUST be present.
TA212A-4: IF a voting system component is electronic AND IF a failure in the device occurs THEN physical or audible indicators related to that failure MUST be properly labeled. TA212A-4-1: Examples of labels MAY include affixed, adhered, or engraved labels.	+-	
TA212A-5: IF a voting system component is electronic THEN the voting system manufacturer MUST identify the meaning of all physical or audible indicators related to failures in the voting system documentation.	<>	TA212A-3: IF a voting system component is electronic THEN the voting system manufacturer MUST identify the meaning of all physical or audible indicators related to failures in the voting system documentation.
TA212B-2: Alarms MUST be sufficient to enable detection, diagnosis, and accessibility of components that require maintenance.	<>	TA212B-2: Alarms MUST be sufficient to enable detection and diagnosis of components that require maintenance by a trained technician.
TA212B-3: Indicators MUST be sufficient to enable detection, diagnosis, and accessibility of components that require maintenance.	<>	TA212B-3: Indicators MUST be sufficient to enable detection and diagnosis of components that require maintenance by a trained technician. TA212B-4: Field maintainable components MUST not require the use of specialized tools to access or replace.
TA24B-1: The voting system software modules MUST contain one, and only one, function.	+-	
TA24B-2: The voting system software modules MUST be designed so that their functions can be tested independently.	+-	
TA24B-3: The voting system software MUST be designed to be testable through the application of a test harness.	<>	TA24B-1: The voting system software modules MUST be designed to be testable through the application of a test harness.
TA24C-1: The voting system software modules SHOULD NOT exceed 180 lines in length. TA34C-1-1: Lines MUST be executable statements OR flow control statements with suitable formatting. TA24C-2: The manufacturers declared coding conventions MUST specify a naming convention in order to ensure modules are easily identifiable.	<>	TA24C-1: The manufacturers declared coding conventions MUST specify a naming convention in order to ensure modules are easily identifiable. 2.5-B - Input validation and error defense TA25B-1: The voting system manufacturer MUST provide documentation describing the means by which safe concurrency is ensured. 2.5.1-C - Prevent tampering with code TA251C-1: The voting system manufacturer MUST provide documentation describing how they protect the code from tampering.
TA252A-1: The voting system MUST provide the capability to monitor peripherals interfacing with the voting application.	+-	
TA252A-2: IF the voting system expects the presence of a value THEN it MUST allow for a null or absent value without unexpected results.	+-	

TA252A-2-1: IF necessary, THEN appropriate action MUST be taken.		
TA252A-3: IF the voting system expects a value within a range THEN it MUST allow for the presence of data outside of that range without unexpected results TA252A-3-1: IF necessary, THEN appropriate action MUST be taken.	+-	
TA252A-4: IF the voting system expects a value with a particular length THEN it MUST allow for the presence of values outside the length without unexpected results. TA252A-4-1: IF necessary THEN appropriate action MUST be taken.	+-	
TA252A-5: IF the voting system expects a value with a particular data type THEN it MUST allow for the presence of other data types without unexpected results. TA252A-5-1: IF necessary THEN appropriate action MUST be taken.	+-	
TA252A-6: IF the voting system expects a value with a particular format THEN it MUST allow for the presence of other formats without unexpected results. TA252A-6-1: IF necessary, THEN appropriate action MUST be taken.	+-	
TA252A-7: IF the voting system expects a value within a specific set of specified values THEN it MUST allow for the presence of other values outside that set without unexpected results. TA252A-7-1: IF necessary, THEN appropriate action MUST be taken.	+-	
TA252-A-8: Voting system errors MUST be included in the event log.	+-	
TA252-A-9: The voting system event log MUST contain how errors were corrected.	+-	
TA252A-10: Invalid inputs MUST NOT prevent a voting system from recovering from an error. TA252A-10-1: Recovery MAY be initiated by a system reboot. TA252A-10-2: Recovery MAY be initiated by an election worker.	<>	TA252A-1: Invalid inputs MUST NOT prevent a voting system from recovering from an error. TA252A-1-1: Recovery MAY be initiated by a system reboot. TA252A-1-2: Recovery MAY be initiated by an election worker.
TA252A-11: Incomplete inputs MUST NOT prevent a voting system from recovering from an error. TA252A-11-1: Recovery MAY be initiated by a system reboot. TA252A-11-2: Recovery MAY be initiated by an election worker. 2.5.4-J – Memory mismanagement TA254J-1: IF dynamic memory allocation is performed outside of a COTS library THEN the dynamic memory allocation functionality must allow analysis or instrumentation using a COTS tool that can detect memory management errors. 2.5.4-M – Election integrity monitoring TA254M-1: The voting system MUST detect OR MUST prevent modifications to storage locations in memory that contain aggregated vote totals. TA254M-2: The voting system MUST detect OR MUST prevent modifications to local storage that contain aggregated vote totals.	<>	2.5.4-M – Election Integrity Monitoring TA254M-1: Electronic devices MUST detect and prevent the accumulation of negative votes. TA254M-1-1: IF a negative vote is detected, THEN an election official MUST be alerted through audio and visual alert methods. TA254M-2: Electronic devices MUST detect and prevent the decrement of counters that record the number of ballots cast.
TA254M-3: IF any of the following violations occur THEN the voting system MUST alert an election official OR an election administrator. TA254M-3-1: The voting system MUST detect OR MUST prevent ballot box stuffing. TA254M-3-2: The voting system MUST detect OR MUST prevent accumulating negative votes. 2.6-A – Surviving device failure TA26A-1: If a voting system failure was	<>	TA254M-2-1: IF a counter is decremented, THEN an election official MUST be alerted through audio and visual alert methods. TA254M-3: Electronic devices MUST detect and prevent counters that record numbers of ballots cast that have a negative value.

corrected THEN: TA26A-1-1: All devices MUST resume normal operation. TA26A-1-2: All components MUST resume normal operation. TA26A-1-3: The voting system MUST resume normal operation in a controlled fashion. TA26A-1-3-1: Normal operations MUST resume at the initial state before the error occurred.		TA254M-3-1: IF a counter has a negative value, THEN an election official MUST be alerted through audio and visual alert methods. TA254M-4: Electronic devices MUST prevent the accumulation of more votes for a single candidate in a contest than the total number of ballots cast. TA254M-4-1: IF a candidate has more votes than ballots cast, THEN an election official MUST be alerted through audio and visual alert methods. TA254M-5: IF the voting system includes a ballot box, THEN it MUST have a method to allow election workers to visually verify that no ballots are present in the box prior to the polls opening.
TA26B-1: IF a recovery condition occurs due to an exception THEN the voting system software MUST cryptographically validate the vote data following recovery from the exception.	<>	TA26B-1: IF a recovery condition occurs due to an exception, THEN the voting system software MUST cryptographically validate the vote data following recovery from the exception.
TA26B-2: IF a recovery condition occurs due to an exception THEN the voting system software MUST cryptographically validate the audit data following recovery from the exception.	<>	TA26B-2: IF a recovery condition occurs due to an exception, THEN the voting system software MUST cryptographically validate the audit data following recovery from the exception. 2.7-B - Continuous operation - typical environmental conditions TA27B-1: This test is satisfied with TA27C-1-1 and its sub assertions. 2.7-C - Continuous operation - varied environmental conditions TA27C-1: The voting system MUST withstand continuous operational testing performed in accordance with the high and low temperature specifications of MIL-STD-810-H, Methods 501.7 and 502.7, Procedure II - Operation, cyclic temperature and humidity exposure. TA27C-1-1: The duration of the test MUST be for 104 consecutive hours. TA27C-1-2: Continuous operation means exercising ballot-counting cycles, which vary by system type, for 15 minutes of each hour, and at the maximum rate calculated from the manufacturer's documented throughput rates. TA27C-1-3: Temperatures MUST range from 50 to 95 degrees for 80 hours of operation. TA27C-1-4: Relative humidity MUST range from 25% to 55% for 80 hours of operation. TA27C-1-5: Temperature and humidity MAY be at normal conditions for 24 hours of operation. TA27C-1-6: The interval between reports MUST be no more than once per 4 hours of continuous operation. 2.7-D - Ability to support maintenance and repair physical environment conditions - non-operating TA27D-1: The voting system MUST be able to withstand shock testing equivalent to MIL-STD-810H, Method 516.8, Procedure VI - Bench Handling. 2.7-E - Ability to support transport and storage physical environment conditions - non-operating TA27E-1: The voting system MUST be able to withstand vibration testing equivalent to MIL-STD-810H, Method 514.8, Procedure I - General Vibration, Transportation. 2.7-F - Ability to support storage temperatures in physical environment - non-operating TA27F-1: The voting system MUST be able to

withstand testing in accordance with high and low equivalent to MIL-STD-810H, Methods 501.7 and 502.7, Procedure I-Storage, cyclic temperature and humidity exposure.
TA27F-1-1: Temperatures MUST range from -4 to +140 degrees Fahrenheit.
TA27F-1-2: Relative humidity MUST range from 25% to 55%.
TA27F-2: The test MAY be interrupted for performance checks as necessary.
2.7-G – Electrical disturbances
TA27G-1: The voting system MUST be able to withstand testing in accordance with the latest IEC 61000-4-3 standard for radiated immunity, without disruption of normal operation or loss of data.
2.7-H – Power outages, sags, and swells

TA27H-1: The voting system MUST be capable of operating for a period of at least 2 hours on backup power, such that no voting data is lost, or corrupted and normal operations continue without interruption.
TA27H-1-1: When backup power is exhausted the voting system MUST retain the contents of all memories intact.
2.7-I – Withstand conducted electrical disturbances
TA27I-1: The voting system MUST be able to withstand testing in accordance with the latest IEC 61000-4-4 standard for electrical fast transient protection, without disruption of normal operation or loss of data.
TA27I-2: The voting system MUST be able to withstand testing in accordance with the latest IEC 61000-4-5 standard for lightning surge protection, without disruption of normal operation or loss of data.
TA27I-3: The voting system MUST be able to withstand testing in accordance with the latest IEC61000-4-11 standard for power dips, interruptions, and variations immunity, without disruption of normal operation or loss of data.
TA27I-4: The voting system MUST not be disturbed by a temporary overvoltage of 120 % normal line voltage lasting from 3 ms to 0.5 s, applied in gradual steps of overvoltage across the line and neutral terminals.
TA27I-5: The voting system MUST not be disturbed nor overheat for a permanent overvoltage of 10% above the nominal 120 V rating of the voting system, applied in gradual steps of overvoltage across the line and neutral terminals.
2.7-J – Emissions from other connected equipment
TA27J-1: The voting system MUST be able to withstand testing in accordance with the latest IEC 61000-4-6 standard for conducted immunity, without disruption of normal operation or loss of data.
2.7-K – Electrostatic discharge immunity

TA27K-1: The voting system MUST be able to withstand testing in accordance with ANSI Std C63.16, level 4, applying an air discharge or a contact discharge according to the nature of the enclosure of the voting system, in a standard environment, and without disruption of normal operation or loss of data.
TS27K-1-1: Application of electrostatic discharge points to COTS components MAY be performed.
TA27K-1-2: The voting system may cycle power or have momentary interruption of power provided that normal operation is resumed without human intervention or loss of data.

TA311B-1: The system overview MUST include a functional diagram of the voting system.	<>	TA311B-1: The system overview MUST include a functional diagram(s) of the voting system.
TA311B-2: The functional diagram MUST be at a system level.	<>	TA311B-2: The functional diagram(s) MUST be at a system level.
TA311B-3: The functional diagram MUST depict all of the hardware platforms AND software components developed by the vendor.	<>	TA311B-3: The functional diagram(s) MUST depict all of the hardware platforms and software components developed by the vendor.
TA311B-4: The functional diagram MUST show how the components relate to each other, to include at a minimum data interchange.	<>	TA311B-4: The functional diagram(s) MUST show how the components relate to each other, to include at a minimum data interchange.
TA311B-5: The functional diagram MUST show how the components interact, to include at a minimum all network communications.	<>	TA311B-5: The functional diagram(s) MUST show how the components interact, to include at a minimum all network communications.
TA312B-2: IF any individual component impacts the overall maximum tabulation rate THEN the documentation MUST specify the tabulation rate for all such components.	<>	TA312B-2: IF any individual component impacts the overall maximum tabulation rate, THEN the documentation MUST specify the tabulation rate for all such components.
TA312C-2-1: These ambiguous marks MAY require manual adjudication.	<>	TA312C-2-1: IF ambiguous marks require adjudication, the voting system manufacturers MUST document the processes and procedures utilized for such adjudication.
TA312C-3-1: Any system configurations or other settings that influence mark detection within that voting system (e.g., threshold settings) MUST be included in the documentation.	+-	
TA313A-1: The voting system documentation MUST include a description of the security architecture of the voting system. TA313A-1-1: The voting system documentation MUST include a description of the security functions of the voting system.	+-	
TA313A-2: The voting system documentation MUST include a description of how election staff and election workers can leverage the security features provided by the voting system.	<>	TA313A-1: The voting system security document MUST include a description of how election staff and election workers can leverage the security features provided by the voting system.
TA313C-1: For each voting device the documentation MUST describe all physical security controls for that device.	<>	TA313C-1: The system security document MUST describe all physical security controls for each voting device.
TA313C-1-2: The voting system documentation MUST describe the correct way to implement the physical security controls.	<>	TA313C-1-2: The system security document MUST describe the correct way to implement the physical security controls.
TA313C-2: The voting system documentation MUST include procedures that serve as a model of how to use the physical security countermeasures.	+-	
TA314M-1: The voting system documentation MUST specify memory storage devices used to install voting system software OR firmware onto the voting system.	<>	TA314M-1: The setup inspection process documentation MUST specify trusted storage media devices used to install voting system software or firmware onto the voting system.
TA314M-2: The trusted storage media MUST be trusted. TA314M-2-1: Trusted storage media devices SHOULD be read-only storage devices.	<>	TA314M-1-1: Trusted storage media devices SHOULD be read-only storage devices.
TA314M-2-2: Trusted storage media devices MUST be zeroed-out before first use.	<>	TA314M-1-2: Trusted storage media devices MUST be zeroed-out before first use.
TA314M-2-2-1: Methods for zeroization MAY include the latest version of NIST SP 800-88: Guidelines for Media Sanitization. 3.1.6-K – Marking devices TA316K-1: The voting system documentation MUST identify specific writing utensils necessary for the system to interpret a voter mark.	<>	TA314M-1-2-1: Methods utilized for zeroization MAY include procedures listed in the latest version of NIST SP 800-88: Guidelines for Media Sanitization.
TA316K-2: The voting system documentation MUST identify specific writing utensils necessary for the system to meet all performance requirements for accuracy including those defined by the manufacturers. 3.1.7-B – Personnel TA317B-1: The voting system documentation MUST specify at least two skill levels (e.g. election	+-	

worker, election official, IT administrator) AND detail the knowledge required to perform the duties of each of the following: TA317B-1-1: The voting system documentation MUST define the skill levels required to perform pre-election or election preparation functions.		
TA317B-1-2: The voting system documentation MUST define the skill levels required to perform operations for voting system functions performed at the polling place.	+-	
TA317B-1-3: The voting system documentation MUST define the skill levels required to perform operations for voting system functions performed at the central count facility.	+-	
TA317B-1-4: The voting system documentation MUST define the skill levels required to perform preventive maintenance tasks.	+-	
TA317B-1-5: The voting system documentation MUST define the skill levels required to diagnose faulty hardware, firmware, or software.	+-	
TA317B-1-6: The voting system documentation MUST define the skill levels required to perform corrective maintenance tasks.	+-	
TA317B-1-7: The voting system documentation MUST define the skill levels required to perform testing to verify the correction of problems.	+-	
TA32B-1: The voting system documentation MUST include the process to verify that ONLY certified software is installed on the voting system. TA32B-1-1: A cryptographic hash MUST be used.	<>	TA32B-1: The setup inspection process documentation MUST include the process for checking digital storage locations. TA32B-1-1: IF there is an expected value, then that value MUST be documented.
TA32B-2: The voting system documentation MUST include the process for checking storage locations. TA32B-2-1: The voting system documentation MUST include the process for checking electronic storage locations that hold election information that changes during an election. TA32B-2-1-1: IF there is an expected value, then that value MUST be documented.	<>	TA32B-2: The setup inspection process documentation MUST include the process for checking physical storage locations including but not limited to ballots, parts of an audit trail, etc. TA32B-2-1: IF physical storage locations are not intended to be empty before the polls open THEN the status and expected state of the physical storage locations MUST be specified in the setup inspection process documentation. 3.2-D – Installed software identification procedure
TA32B-2-2: The voting system documentation MUST include the process for checking physical storage locations (e.g., ballots, parts of an audit trail). TA32B-2-2-1: IF physical storage locations are not intended to be empty before the polls open THEN the status and expected state of the physical storage locations MUST be specified.	<>	TA32D-1: The setup inspection process documentation MUST include the procedures to identify that ONLY certified software is installed on programmed devices of the voting system. 3.2-E – Software integrity verification procedure TA32E-1: A cryptographic hash MUST be used to verify the integrity of software installed on programmed devices of the voting system.
TA32B-3: The voting system documentation MUST describe procedures for inspecting consumable items (e.g., ink, paper).	<>	TA32E-1-1: The hash verification process MUST be able to be performed in a manner that is independent of proprietary manufacturer software and scripts.
TA317B-4: The voting system documentation MUST describe procedures for performing logic and accuracy testing.	<>	TA32E-1-2: The hash verification process MUST be able to be performed without requiring manufacturer assistance.
TA33A-1: The manufacturer MUST supply documentation that is free of proprietary information or markings containing:	<>	TA33A-1: The manufacturer MUST supply documentation that is free of proprietary information, made publicly available, and containing the following information:
TA33A-2: The manufacturer MUST supply documentation that is free of proprietary information or markings containing details of the format of the log file.	<>	TA33A-1-3: Details regarding the format of the log file.
TA33B-1: For each voting system component, the manufacturer MUST supply documentation	<>	TA33B-1: For each voting system component and function, the manufacturer MUST supply

describing how the manufacturer has implemented the NIST CDF.		documentation describing how the manufacturer has implemented the NIST CDF specifications.
TA33B-2: For each voting system function, the manufacturer MUST supply documentation describing how the manufacturer has implemented the NIST CDF.	<>	TA33B-2: The documentation provided by the manufacturer MUST be free of proprietary information and made publicly available.
TA33B-4: The manufacturer MUST supply documentation that describes how elements are used.	+-	
TA33B-5: The manufacturer MUST supply documentation that describes how attributes are used.	+-	
TA33B-6: The manufacturer MUST supply documentation that describes any constraints on data elements.	+-	
TA33B-7: The manufacturer MUST supply documentation that describes any extensions made to the CDF specification.	+-	
TA41D-2: The voting system MUST be capable of exporting election event log data in a NIST SP 1500-101 compliant format.	<>	TA41D-2: The voting system MUST be capable of exporting election event log data conforming to Election event logging common data format specification: Wack et al, Special Publication 1500-101: Election Event Logging Common Data Format Specification, National Institute of Standards and Technology (NIST), April 2020.
	<>	TA43A-2: IF proprietary hardware or cabling is used to connect to voting system devices, THEN that hardware or cabling MUST terminate in a standard hardware interface. TA43A-3: IF proprietary hardware or cabling is used to connect to voting system devices, THEN that hardware or cabling MUST use a published communication protocol.
5.1-C - Vote records TA51C-1: Paper ballots MUST contain all the information required to support auditing by election workers and others who can read ONLY English.	+-	
TA51C-2: Paper verification records MUST contain all the information required to support auditing by election workers and others who can read ONLY English.	+-	
	-+	5.2-D - Audio Synchronized TA52D-1: The voting system MUST provide the option for synchronized audio output to convey the same information that is displayed visually to the voter, based on WCAG 2.0 and Section 508 guidelines. TA52D-2: The voting system MAY only convey a write-in is present for read back on a hand marked ballot and the write-in is hand-written. TA52D-2-1: The voting system MUST convey electronic write-ins to the voter exactly as they are entered.
TA61C-1: The voting system MUST allow the voter to disable the audio output resulting in a video-only presentation. TA61C-1-1: The voting system MUST allow the voter to do this without requiring assistance.	<>	TA61C-1: The voting system MUST allow the voter to independently disable the audio output resulting in a video-only presentation.
TA61C-2: The voting system MUST allow the voter to disable the visual output resulting in an audio-only presentation. TA61C-2-1: The voting system MUST allow the voter to do this without requiring assistance.	<>	TA61C-2: The voting system MUST allow the voter to independently disable the visual output resulting in an audio-only presentation.
TA61C-3: The voting system MUST allow the voter to enable the audio output resulting in an	<>	TA61C-3: IF the default audio output settings have been disabled during the

audio-only presentation. TA61C-3-1: The voting system MUST allow the voter to do this without requiring assistance.		voting session, THEN the voting system MUST allow the voter to independently re-enable the audio output.
TA61C-4: The voting system MUST allow the voter to enable the visual output resulting in a video-only presentation. TA61C-4-1: The voting system MUST allow the voter to do this without requiring assistance.	<>	TA61C-4: IF the default visual output settings have been disabled during the voting session, THEN the voting system MUST allow the voter to independently re-enable the visual output.
TA61C-5: IF the voter enables or disables the video or audio output THEN the voting system MUST notify the voter of the change.	<>	TA61C-5: IF the voter enables or disables the video or audio output THEN the voting system MUST notify the voter of the change by means of the output functionality that is enabled.
TA61D-1: IF the voting session is performed using an audio interface THEN the auditory content and associated audio cues MUST NOT be discernible to any other individual in the polling place without the voter's consent.	<>	TA61D-1: IF the voting session is performed using an audio interface, THEN the auditory content and associated audio cues MUST NOT be discernible to any other individual in the polling place without the voter's consent.
TA61D-2: IF headphones are used with an audio interface THEN the headphones MUST have low sound leakage such that the auditory content and associated audio cues are not discernible to any other individual in the polling place without the voter's consent. TA61D-3: IF ballot submission is performed using an audio interface THEN the voting system MUST prevent any individual in the polling place (without the voter's consent) from perceiving any content on the ballot submitted by the voter during the voting session.	<>	TA61D-2: IF headphones are used with an audio interface, THEN the headphones MUST have low sound leakage such that the auditory content and associated audio cues are not discernible to any other individual in the polling place without the voter's consent. TA61D-2-1: Low sound leakage for headphone use MAY be considered "efficient" if the audio content is indistinguishable to other individuals. This is defined as an average sound measurement of 30 - 40 dB at either the minimum distance between devices prescribed within manufacturer documentation, or 4 feet, at the default volume setting for a voting session. TA61D-3: IF ballot submission is performed using an audio interface, THEN the voting system MUST prevent any individual in the polling place (without the voter's consent) from perceiving any content on the ballot submitted by the voter during the voting session.
TA61D-4: IF ballot submission is performed using an audio interface THEN the voting system MUST prevent any individual in the polling place (without the voter's consent) from perceiving any input controls (and any interaction with these input controls) on the visual interface used by the voter during the ballot submission process.	<>	TA61D-4: IF ballot submission is performed using an audio interface, THEN the voting system MUST prevent any individual in the polling place (without the voter's consent) from perceiving any input controls (and any interaction with these input controls) on the visual interface used by the voter during the ballot submission process.
TA61D-5: Voters MAY share audio interfaces with their designated assistants.	+-	
TA62A-1: The voting system MUST allow voters to independently mark their ballots.	<>	TA62A-1: Voting system features and attributes which support voter independence MUST follow the standards outlined in Chapters 3 through 5 of Section 508 Information and Communication Technology (ICT) Final Standards and Guidelines. The voting system MUST allow voters to independently mark their ballots. TA62A-2: The voting system MUST allow voters to independently mark their ballots.
TA62A-2: The voting system MUST allow voters to independently verify their ballots.	<>	TA62A-3: The voting system MUST allow voters to independently verify their ballots
TA62A-3: The voting system MUST allow voters to independently cast their ballots. TA62A-3-1: Ballot casting MAY be accomplished through a combination of procedural and technical means.	<>	TA62A-4: The voting system MUST allow voters to independently cast their ballots TA62A-4-1: Ballot casting MAY be accomplished through a combination of procedural and technical means.
TA62A-4: In order to be accessible to individuals with disabilities the voting system MUST ensure that these individuals have the same	<>	TA62A-4-2: The voting system MUST provide capability to independently cast a ballot by allowing a voter to irrevocably confirm

opportunity for access as for other voters.		their intent to vote as selected without assistance from an election worker or other person.
TA62A-5: In order to be accessible to individuals with disabilities the voting system MUST ensure that these individuals have the same opportunity for participation as for other voters.	<>	TA62A-5: In order to be accessible to individuals with disabilities the voting system MUST ensure that these individuals have the same opportunity for access as for other voters.
TA 62A-6: IF the voting system allows voters to access features after their ballot is cast THEN these features MUST be accessible to individuals with disabilities.	<>	TA62A-6: In order to be accessible to individuals with disabilities the voting system MUST ensure that these individuals have the same opportunity for participation as for other voters.
TA62A-7: IF the voting system utilizes an end-to-end (E2E) architecture with receipts THEN E2E receipts MUST be accessible to individuals with disabilities.	<>	TA62A-7: IF the voting system utilizes an end-to-end (E2E) architecture with paper receipts THEN E2E paper receipts MUST be accessible to individuals with disabilities.
TA71A-1: There MUST be no discernible differences in all voter configurable aspects at the beginning of all voting sessions. TA71A-2: There MUST be no discernible differences in all poll worker configurable aspects that are presented to the voter at the beginning of all voting sessions. TA71A-3: IF a voter changes any adjustable setting of the voter interface, during the voting session, THEN at the beginning of the next voting session, that setting MUST have the original default value. TA71A-4: IF a poll worker changes any adjustable setting of the voter interface, during the voting session, THEN at the beginning of the next voting session, that setting MUST have the original default value. TA71A-5: IF a voter changes font size during the voting session, THEN at the beginning of the next voting session, the font size MUST have the original default value. TA71A-6: IF a poll worker changes font size during the voting session, THEN at the beginning of the next voting session, the font size MUST have the original default value. TA71A-7: IF a voter changes color during a voting session, THEN at the beginning of the next voting session, the color MUST have the original default value. TA71A-8: IF a poll worker changes color during a voting session, THEN at the beginning of the next voting session, the color MUST have the original default value. TA71A-9 IF a voter changes contrast during a voting session, THEN at the beginning of the next voting session, the contrast MUST have the original default value. TA71A-10: IF a poll worker changes contrast during a voting session, THEN at the beginning of the next voting session, the contrast MUST have the original default value. TA71A-11: IF a voter changes audio volume during a voting session, THEN at the beginning of the next voting session, the audio volume MUST have the original default value. TA71A-12: IF a poll worker changes audio volume during a voting session, THEN at the beginning of the next voting session, the audio volume MUST have the original default value. TA71A-13: IF a voter changes rate of speech during a voting session, THEN at the beginning of the next voting session, the audio volume MUST have the original default value. TA71A-14: IF a poll worker changes rate of speech during a voting session, THEN at the beginning of the next voting session, the audio volume MUST have the original default value. TA71A-15: IF a voter changes audio/video mode during a voting session, THEN at the beginning of the next voting session, the audio/video mode MUST have the original default value.	<>	TA71A-1: IF a voter changes any adjustable setting of the voter interface, during the voting session, THEN at the beginning of the next voting session, that setting MUST have the original default value. TA71A-2: IF a poll worker changes any adjustable setting of the voter interface, during the voting session, THEN at the beginning of the next voting session, that setting MUST have the original default value.

TA71A-16: IF a poll worker changes audio/video mode during a voting session, THEN at the beginning of the next voting session, the audio/video mode MUST have the original default value. TA71A-17: IF a voter enables alternative devices during a voting session, THEN at the beginning of the next voting session, the alternative device setting MUST have the original default value. TA71A-18: IF a poll worker enables alternative devices during a voting session, THEN at the beginning of the next voting session, the alternative device setting MUST have the original default value. 7.1-E - Color conventions TA71E-1: The voting system MUST present all general information to the voter in EITHER green, blue or white colors.		
TA71E-2: The voting system MUST present all normal status indicators to the voter in EITHER green, blue or white colors.	+-	
TA71E-3: The voting system MUST present all warnings to the voter in EITHER amber or yellow colors.	+-	
TA71E-4: The voting system MUST present all marginal status information to the voter in EITHER amber or yellow colors.	+-	
TA71E-5: The voting system MUST present all error conditions to the voter in a red color.	+-	
TA71E-6: The voting system MUST present all problems requiring immediate attention to the voter in a red color. 7.1-G - Text size (electronic display) TA71G-1: The voting system MUST be capable of showing information in a range of text sizes that are selectable by the voter. TA71G-2: The voting system MUST allow voters to increase text size. TA71G-3: The voting system MUST allow voters to decrease text size. TA71G-4: The default text size MUST be at least 4.8 mm, based on the height of uppercase I. TA71G-5: The voting system MUST EITHER: TA71G-5-1: Allow the text to scale to increase or decrease in regular increments of at least 0.5 mm covering the full range of acceptable text sizes, OR TA71G-5-2: Provide at least four discrete text sizes falling within the following ranges: TA71G-5-2-1: 3.5-4.2 mm (10-12 points). TA71G-5-2-2: 4.8-5.6 mm (14-16 points). TA71G-5-2-3: 6.4-7.1 mm (18-20 points). TA71G-5-2-4: 8.5-9.0 mm (24-25 points). 7.1-H - Scaling and zooming (electronic display) TA71H-1: IF the text size, on the screen, is changed, THEN all other information in the interface MUST change size. TA71H-1-1: The relationship of the new size of all the information MUST be consistent to the size of the text. TA71H-2: IF the text size, on the screen, is changed, THEN all informational icons in the interface MUST change size. TA71H-2-1: The relationship of the new size of the informational icons MUST be consistent to the size of the text. TA71H-3: IF the text size, on the screen, is changed, THEN all screen titles in the interface MUST change size. TA71H-3-1: The relationship of the new size of the screen titles MUST be consistent to the size of the text. TA71H-4: IF the text size, on the screen, is changed, THEN all buttons in the interface MUST change size. TA71H-4-1: The relationship of the new size of the buttons MUST be consistent to the size of	+-	

the text.
TA71H-5: IF the text size, on the screen, is changed, THEN all ballot marking target areas in the interface MUST change size.
TA71H-5-1: The relationship of the new size of the ballot marking target areas MUST be consistent to the size of the text.
TA71H-6: IF the text size is enlarged 200% OR less THEN the screen layouts MUST NOT require horizontal scrolling.
TA71H-7: IF the text size is enlarged 200% OR less THEN the screen layouts MUST NOT require horizontal panning.
TA71H-8: IF the text size is enlarged to 7.1 mm OR less THEN the screen layouts MUST NOT require horizontal scrolling.
TA71H-9: IF the text size is enlarged to 7.1mm OR less THEN the screen layouts MUST NOT require horizontal panning.
TA71H-10: IF the text size is enlarged greater than 200% THEN the voting system MUST maintain a consistent relationship between the ballot option and the marking targets.
TA71H-10-1: This consistent relationship MAY be achieved by horizontal scrolling.
TA71H-10-2: This consistent relationship MAY be achieved by horizontal panning.
7.1-M - Audio comprehension
TA71M-1: For both recorded and synthetic speech the audio presentation of verbal information MUST be readily comprehensible by voters who have hearing loss no greater than 25 dB.
TA71M-2: For both recorded and synthetic speech, the audio presentation of verbal information MUST be readily comprehensible by voters who are proficient in the language implemented and under test.
TA71M-3: Characteristics that MUST be taken into consideration in the audio presentation of verbal information include, but are not limited to, proper enunciation, normal intonation, and appropriate rate of speech.
TA71M-4: For both recorded and synthetic speech, candidate names MUST be capable of being pronounced as the candidate intends.
TA71M-5: Characteristics that MUST be taken into consideration in the audio presentation of verbal information include, but are not limited to background noise.
TA71M-6: Characteristics that MUST be taken into consideration in the audio presentation of verbal information include, but are not limited to recording OR reproduction in dual-mono, with the same audio information in both ears.
7.1-N - Tactile keys
TA71N-1: All mechanically operated controls on the voting system MUST be recognizable solely by touch without activating those controls.
TA71N-1-1-: IF these controls include a text label THEN these controls MUST also include a United English Braille label.
TA71N-1-2: IF a full keyboard is NOT used THEN these controls MUST NOT require sequential presses OR operations.
TA71N-1-3: IF a full keyboard is NOT used THEN these controls MUST NOT require timed presses OR operations.
TA71N-1-4: IF a full keyboard is NOT used THEN these controls MUST NOT require simultaneous presses OR operations.
TA71N-2: All mechanically operated buttons on the voting system MUST be recognizable solely by touch without activating those buttons.
TA71N-2-1: IF these buttons include a text label THEN these buttons MUST also include a United English Braille label.
TA71N-2-2: IF a full keyboard is NOT used THEN these buttons MUST NOT require sequential presses OR operations.
TA71N-2-4: IF a full keyboard is NOT used THEN these buttons MUST NOT require timed presses OR

operations.
TA71N-2-5: IF a full keyboard is NOT used THEN these buttons MUST NOT require simultaneous presses OR operations.
TA71N-3: All mechanically operated keys on the voting system MUST be recognizable solely by touch without activating those keys.
TA71N-3-1: IF these keys include a text label THEN these keys MUST also include a United English Braille label.
TA71N-3-2: IF a full keyboard is NOT used THEN these keys MUST NOT require sequential presses OR operations.
TA71N-3-3: IF a full keyboard is NOT used THEN these keys MUST NOT require timed presses OR operations.
TA71N-3-4: IF a full keyboard is NOT used THEN these keys MUST NOT require simultaneous presses OR operations.
TA71N-4: Any other hardware interface on the voting system MUST be recognizable solely by touch without activating that interface.
TA71N-4-1: IF this hardware interface includes a text label THEN this hardware interface MUST also include a United English Braille label.
TA71N-4-2: IF a full keyboard is NOT used THEN this hardware interface MUST NOT require sequential presses OR operations.
TA71N-4-3: IF a full keyboard is NOT used THEN this hardware interface MUST NOT require timed presses OR operations.
TA71N-4-4: IF a full keyboard is NOT used THEN this hardware interface MUST NOT require simultaneous presses OR operations.
TA71N-4-5: Dual switches on the voting station MUST be recognizable solely by touch without activating those dual switches.
TA71N-4-5-1: IF these dual switches include a text label THEN these dual switches MUST also include a United English Braille label.
TA71N-4-5-2: IF a full keyboard is NOT used THEN these dual switches MUST NOT require sequential presses OR operations.
TTA71N-4-5-3: IF a full keyboard is NOT used THEN these dual switches MUST NOT require timed presses OR operations.
TA71N-4-5-4: IF a full keyboard is NOT used THEN these dual switches MUST NOT require simultaneous presses OR operations.
TA71N-4-6: Sip-and-puff devices MUST be recognizable solely by touch without activating those sip-and-puff devices.
TA71N-4-6-1: IF these sip-and-puff devices include a text label THEN these sip-and-puff devices MUST include a United English Braille label.
TA71N-4-6-2: IF a full keyboard is NOT used THEN these sip-and-puff devices MUST NOT require sequential presses OR operations.
TA71N-4-6-3: IF a full keyboard is NOT used THEN these sip-and-puff devices MUST NOT require timed presses OR operations.
TA71N-4-6-4: IF a full keyboard is NOT used THEN these sip-and-puff devices MUST NOT require simultaneous presses OR operations.
7.2-A – Display and interaction options
TA72A-1: The voting system MUST provide a visual format that supports the full functionality of the visual ballot interface.
TA72A-2: The voting system MUST provide a visual format that supports instructions and feedback for this initial activation of the ballot (such as an insertion of a smart card).
TA72A-3: The voting system MUST provide a visual format that supports instructions and feedback to the voter on how to operate the accessible voting station, including settings and options (e.g., volume control, repetition).
TA72A-4: The voting system MUST provide a visual format that supports instructions and feedback to the voter on a change in the display format

options.
TA72A-5: The voting system MUST provide a visual format that supports instructions and feedback to the voter on a change in the control options.
TA72A-6: The voting system MUST provide a visual format that supports instructions and feedback for navigation of the ballot.
TA72A-7: The voting system MUST provide a visual format that supports instructions and feedback for contest choices, including write-in candidates.
TA72A-8: The voting system MUST provide a visual format that supports instructions and feedback on confirming and changing selections.
TA72A-9: The voting system MUST provide a visual format that supports instructions and feedback on final submission of ballot.
TA72A-10: The voting system MUST provide an enhanced visual format (e.g., high contrast setting) that supports the full functionality of the visual ballot interface.
TA72A-11: The voting system MUST provide an enhanced visual format (e.g., high contrast setting) that supports instructions and feedback for this initial activation of the ballot (such as an insertion of a smart card).
TA72A-12: The voting system MUST provide an enhanced visual format (e.g., high contrast setting) that supports instructions and feedback to the voter on how to operate the accessible voting station, including settings and options (e.g., volume control, repetition).
TA72A-13: The voting system MUST provide an enhanced visual format (e.g., high contrast setting) that supports instructions and feedback to the voter on a change in the display format options.
TA72A-14: The voting system MUST provide an enhanced visual format (e.g., high contrast setting) that supports instructions and feedback to the voter on a change in the control options.
TA72A-15: The voting system MUST provide an enhanced visual format (e.g., high contrast setting) that supports instructions and feedback for navigation of the ballot.
TA72A-16: The voting system MUST provide an enhanced visual format (e.g., high contrast setting) that supports instructions and feedback for contest choices, including write-in candidates.
TA72A-17: The voting system MUST provide an enhanced visual format (e.g., high contrast setting) that supports instructions and feedback on confirming and changing selections.
TA72A-18: The voting system MUST provide an enhanced visual format (e.g., high contrast setting) that supports instructions and feedback on final submission of ballot.
TA72A-19: The voting system MUST provide an audio format that supports the full functionality of the visual ballot interface.
TA72A-20: IF initial activation of the ballot (such as insertion of a smart card) is normally performed by the voter on a visual ballot interface THEN the voting system MUST provide an audio format that supports instructions and feedback for this initial activation
TA72A-21: The voting system MUST provide an audio format that supports instructions and feedback to the voter on how to operate the accessible voting station, including settings and options (e.g., volume control, repetition).
TA72A-22: The voting system MUST provide an audio format that supports instructions and feedback to the voter on a change in the display format options.
TA72A-23: The voting system MUST provide an audio format that supports instructions and feedback to the voter on a change in the control options.
TA72A-24: The voting system MUST provide an

audio format that supports instructions and feedback for navigation of the ballot.
TA72A-25: The voting system MUST provide an audio format that supports instructions and feedback for contest choices, including write-in candidates.
TA72A-26: The voting system MUST provide an audio format that supports instructions and feedback on confirming and changing selections.
TA72A-27: The voting system MUST provide an audio format that supports instructions and feedback on final submission of ballot.
TA72A-28: The voting system MUST provide tactile controls that support the full functionality of the visual ballot interface.
TA72A-29: IF initial activation of the ballot (such as insertion of a smart card) is normally performed by the voter on a visual ballot interface THEN the voting system MUST provide tactile controls that supports instructions and feedback for this initial activation
TA72A-30: The voting system MUST provide tactile controls that support instructions and feedback to the voter on how to operate the accessible voting station, including settings and options (e.g., volume control, repetition).
TA72A-31: The voting system MUST provide tactile controls that support instructions and feedback to the voter on a change in the display format options.
TA72A-32: The voting system MUST provide tactile controls that support instructions and feedback to the voter on a change in the control options.
TA72A-33: The voting system MUST provide tactile controls that support instructions and feedback for navigation of the ballot.
TA72A-34: The voting system MUST provide tactile controls that support instructions and feedback for contest choices, including write-in candidates.
TA72A-35: The voting system MUST provide tactile controls that support instructions and feedback on confirming and changing selections.
TA72A-36: The voting system MUST provide tactile controls that support instructions and feedback on final submission of ballot.
TA72A-37: The voting system MUST provide limited dexterity controls that support the full functionality of the visual ballot interface.
TA72A-38: IF initial activation of the ballot (such as insertion of a smart card) is normally performed by the voter on a visual ballot interface THEN the voting system MUST provide limited dexterity controls that supports instructions and feedback for this initial activation
TA72A-39: The voting system MUST provide limited dexterity controls that support instructions and feedback to the voter on how to operate the accessible voting station, including settings and options (e.g., volume control, repetition).
TA72A-40: The voting system MUST provide limited dexterity controls that support instructions and feedback to the voter on a change in the display format options.
TA72A-41: The voting system MUST provide limited dexterity controls that support instructions and feedback to the voter on a change in the control options.
TA72A-42: The voting system MUST provide limited dexterity controls that support instructions and feedback for navigation of the ballot.
TA72A-43: The voting system MUST provide limited dexterity controls that support instructions and feedback for contest choices, including write-in candidates.
TA72A-44: The voting system MUST provide limited dexterity controls that support instructions and feedback on confirming and changing selections.
TA72A-45: The voting system MUST provide limited dexterity controls that support instructions and

feedback on final submission of ballot. 7.2-B - Navigation between contests TA72B-1: IF the voting system uses an electronic ballot interface AND IF a next contest exists, THEN the voting system MUST allow navigation to the next contest, without making a selection for the currently displayed contest. TA72B-1-1: This MUST be allowed across all categories of interaction, including audio and visual. TA72B-2: IF the voting system uses an electronic ballot interface AND IF a previous contest exists, THEN the voting system MUST allow navigation to the previous contest, without making a selection for the currently displayed contest. TA72B-2-1: This MUST be allowed across all categories of interaction, including audio and visual. 7.2-E - Touch screen gestures TA72E-1: IF the voting system provides a touch-screen interface AND allows gestures THEN the voting system MUST meet the following conditions: TA72E-1-1: There MUST be at least one other way of interacting with the touch screen besides gestures. TA72E-1-2: Gestures MUST be an optional alternative. TA72E-1-3: Gestures MUST work the same way everywhere within the entire voting interaction. TA72E-1-4: The voting system MUST NOT allow navigation off of the current contest using gestures. TA72E-1-5: Unintended gestures MUST NOT result in accidental activation of an action. TA72E-1-6: Complicated gestures MUST NOT be allowed. TA72E-1-7: The allowable gestures MUST be limited to ones that are well-known. TA72E-1-8: Allowable gestures MUST NOT include sequential actions. TA72E-1-9: Allowable gestures MUST NOT include timed actions. TA72E-1-10: Allowable gestures MUST NOT include simultaneous actions.		
	-+	7.2-I Touch area size TA72I-1-1: Touch targets MUST be at least 12.7 mm (0.5 inches) in both vertical and horizontal dimensions. TA72I-1-2: Touch targets MUST be at least 2.54 mm (0.1 inches) away from adjacent touch areas. TA72I-1-3: Touch Targets MUST not overlap another touch area. TA72I-2-1: Touch targets MAY be smaller than 12.7 mm (0.5 inches) in vertical and horizontal dimensions for the purpose of touch screen calibration ONLY. TA72I-2-2: Touch targets MAY be closer than 2.54 mm (0.1 inches) for the purpose of touch screen calibration ONLY. 7.1-M - Audio comprehension TA71M-1: For both recorded and synthetic speech the audio presentation of verbal information MUST be readily comprehensible by voters who have hearing loss no greater than 25 db. TA71M-2: For both recorded and synthetic speech, the audio presentation of verbal information MUST be readily comprehensible by voters who are proficient in the language implemented and under test. TA71M-3: For both recorded and synthetic speech, candidate names MUST be capable of being pronounced as the candidate intends.
TA72P-1: For the floor area, intended for use by	<>	

the voter, the voting system MUST be designed to be operable, when set up according to the documentation supplied by the manufacturer, within a clear floor space of at least a 30 inch (760 mm) wide by 48 inch (1220 mm) deep rectangle, to allow for a wheelchair. TA72P-2: For the floor area, intended for use by the voter, the voting system MUST be operable, when set up according to the documentation supplied by the manufacturer, on a floor space positioned for a forward approach OR positioned for a parallel approach. TA72P-3: The voting system MUST conform to requirement 3.1.5-G - Operational environment. TA 72P-3-1: The manufacturer MUST document the amount of room necessary for a voter's assistant, including clearance for entry into the voting system AND clearance for exit from the voting system. TA72P-4: The voting system MUST allow adequate room for an assistant to the voter, when deployed according to the installation instructions. TA72P-4-1: Adequate room for the assistant SHALL include clearance for entry to the voting station. TA72P-4-2: Adequate room for the assistant SHALL include clearance for exit from the voting station.		TA72P-1: For the floor area, intended for use by the voter, the voting system MUST be operable, when set up according to the documentation supplied by the manufacturer, on a floor space positioned for a forward approach or positioned for a parallel approach. TA72P-2: The voting system MUST allow adequate room for an assistant to the voter, when deployed according to the installation instructions. TA72P-2-1: Adequate room for the assistant SHALL include clearance for entry to the voting station. TA72P-2-2: Adequate room for the assistant SHALL include clearance for exit from the voting station.
TA72R-3: Labels on the voting system, used for control, necessary for the voter to operate the voting system, MUST be placed within the dimensions required by requirement 7.2-Q - Physical dimensions. 7.3-A - System-related errors TA73A-1: The voting system MUST help voters to complete their ballots and achieve their desired result. TA73A-2: Voting system features MUST NOT contribute to the possibility of voter error within the voting session. 7.3-C - Contest information TA73C-1: FOR all contests within a ballot, each contest MUST indicate, in a manner explicitly associated with that contest, the title of the office OR the title of the question for that contest. TA73C-2: FOR all contests within a ballot, each contest MUST indicate, in a manner explicitly associated with that contest, the maximum number of choices allowed for that contest. TA73C-3: If the voting interface is an electronic ballot interface THEN the information for each contest MUST be in a consistent order. TA73C-4: If the voting interface is an electronic ballot interface THEN the information for each contest MUST include the title of the office OR the title of the question. TA73C-4-1: This MUST include any distinguishing information if applicable. TA73C-4-1-1: Distinguishing information MAY include the length of the term. TA73C-4-1-2: Distinguishing information MAY include the jurisdiction. TA73C-5: If the voting interface is an electronic ballot interface THEN the information for each contest MUST include the maximum number of selections allowed in the contest. TA73C-6: If the voting interface is an electronic ballot interface AND IF the format is audio THEN the information for each contest MUST include the number of options OR the number of candidates. TA73C-7: If the voting interface is an electronic ballot interface AND IF any selections have been made THEN the information for each contest MUST include the number of selections remaining. TA73C-8: If the voting interface is an	+-	

electronic ballot interface AND IF the format is audio AND IF any selections have been made THEN the information for each contest MUST include the currently selected candidates OR the currently selected options. TA73C-9: If the voting interface is an electronic ballot interface THEN the information for each contest MUST include any instructions OR any reminders detailing how to find marking instructions. TA73C-9-1: This must be placed visually after the contest information. TA73C-9-2: This must be placed in audio after the contest information		
TA73E-1-1: IF the voting system uses a visual interface THEN the voting system MAY indicate the selection of candidates and choices by the voter by displaying a checkmark beside the selected option.	<>	TA73E-1-1: IF the voting system uses a visual interface, THEN the voting system MAY indicate the selection of candidates and choices by the voter by displaying a checkmark beside the selected option.
TA73E-1-2: IF the voting system uses a visual interface THEN then the voting system MAY indicate the selection of candidates and choices by the voter by displaying an "X" beside the selected option.	<>	TA73E-1-2: IF the voting system uses a visual interface, THEN then the voting system MAY indicate the selection of candidates and choices by the voter by displaying an "X" beside the selected option.
TA73E-1-3: IF the voting system uses a visual interface THEN then the voting system MAY indicate the selection of candidates and choices by the voter by conspicuously changing its appearance.	<>	TA73E-1-3: IF the voting system uses a visual interface, THEN then the voting system MAY indicate the selection of candidates and choices by the voter by conspicuously changing its appearance.
TA73E-1-4: IF the voting system uses a visual interface THEN then the voting system MAY indicate the selection of candidates and choices by the voter by the use of highlighting around the chosen option.	<>	TA73E-1-4: IF the voting system uses a visual interface, THEN then the voting system MAY indicate the selection of candidates and choices by the voter by the use of highlighting around the chosen option.
TA73E-2-1: IF the voting system uses an audio interface THEN then the voting system MAY provide a spoken confirmation after making a selection.	<>	TA73E-2-1: IF the voting system uses an audio interface, THEN then the voting system MAY provide a spoken confirmation after making a selection.
TA73K-4-: All warnings issued by the voting system MUST clearly state the nature of the problem. TA73K-4-1: These MUST be in plain language. TA73K-5: All warnings issued by the voting system MUST clearly state whether the voter has performed an invalid operation OR whether the voter has attempted an invalid operation OR whether the voting system has malfunctioned. TA73K-5-1: This MUST be in plain language. TA73K-6: All warnings issued by the voting system MUST clearly state the responses available to the voter. TA73K-6-1: This MUST be in plain language. TA73K-7: All alerts issued by the voting system MUST clearly state the nature of the problem. TA73K-7-1: This MUST be in plain language. TA73K-8: All alerts issued by the voting system MUST clearly state whether the voter has performed an invalid operation OR whether the voter has attempted an invalid operation OR whether the voting system has malfunctioned. TA73K-8-1: This MUST be in plain language. TA73K-9: All alerts issued by the voting system MUST clearly state the responses available to the voter. TA73K-9-1: This MUST be in plain language. TA73K-10: IF the voting equipment malfunctions, THEN a warning issued by the voting system	<>	TA73K-4-: All warnings and alerts issued by the voting system MUST clearly state the nature of the problem, in plain language. TA73K-5: All warnings and alerts issued by the voting system MUST clearly state, in plain language, whether the voter has performed an invalid operation or whether the voter has attempted an invalid operation or whether the voting system has malfunctioned. TA73K-6: All warnings and alerts issued by the voting system MUST clearly state the responses available to the voter in plain language. TA73K-7: IF the voting equipment malfunctions, THEN a warning issued by the

related to this malfunction MUST include information pertaining to this malfunction. TA73K-11: IF the voter attempts an invalid operation, THEN a warning issued by the voting system related to this attempt MUST include information pertaining to this attempt. TA73K-12: IF the voter performs an invalid operation, THEN a warning issued by the voting system related to this performance MUST include information pertaining to this performance. TA73K-13: Each distinct instruction MUST be separated from all other instructions. TA73K-13-1: Several unrelated instructions MUST NOT be "buried" in a long paragraph. TA73K-14: IF the interface is a visual interface THEN each distinct instruction MUST be separated spatially from other instructions. TA73K-15: IF the interface is an audio interface THEN each distinct instruction MUST be separated from other instructions by a noticeable pause. TA73K-16: IF an alert is intended to confirm visual changes to the voter using an audio format THEN the voting system MAY communicate this with a short text OR sound. 7.3-M – Identifying languages TA73M-1: The controls to identify a language MUST appear on the screen in a prominent location. TA73M-1-1: The controls MUST NOT be hidden in a Help or Settings menu. TA73M-2: The controls to change a language MUST appear on the screen in a prominent location. TA73M-2-1: The controls MUST NOT be hidden in a Help or Settings menu. TA73M-3: IF the electronic ballot interface presents a choice of languages to the voter, THEN the electronic ballot interface MUST use the native name of each language.		voting system related to this malfunction MUST include information pertaining to this malfunction. TA73K-8: IF the voter attempts an invalid operation, THEN a warning issued by the voting system related to this attempt MUST include information pertaining to this attempt. TA73K-9: IF the voter performs an invalid operation, THEN a warning issued by the voting system related to this performance MUST include information pertaining to this performance. TA73K-10: Each distinct instruction MUST be separated from all other instructions. TA73K-10-1: IF the interface is a visual interface, THEN each distinct instruction MUST be separated spatially from other instructions. TA73K-10-2: IF the interface is an audio interface, THEN each distinct instruction MUST be separated from other instructions by a noticeable pause. TA73K-11: IF an alert is intended to confirm visual changes to the voter using an audio format, THEN the voting system MAY communicate this with a short text or sound.
TA73O-1: The voting system MUST include clear instructions for setup. TA73O-2: The voting system MUST include complete instructions for setup. TA73O-3: The voting system MUST include detailed instructions for setup. TA73O-4: The voting system MUST include clear instructions for polling. TA73O-5: The voting system MUST include complete instructions for polling. TA73O-6: The voting system MUST include detailed instructions for polling. TA73O-7: The voting system MUST include clear instructions for shutdown. TA73O-8: The voting system MUST include complete instructions for shutdown. TA73O-9: The voting system MUST include detailed instructions for shutdown. TA73O-10: The voting system MUST include clear instructions for how to use accessibility features. TA73O-11: The voting system MUST include complete instructions for how to use accessibility features. TA73O-12: The voting system MUST include detailed instructions for how to use accessibility features. TA73O-13: The voting system MUST include clear messages for setup. TA73O-14: The voting system MUST include complete messages for setup. TA73O-15: The voting system MUST include detailed messages for setup. TA73O-16: The voting system MUST include clear messages for polling. TA73O-17: The voting system MUST include	<>	

complete messages for polling. TA73O-18: The voting system MUST include detailed messages for polling. TA73O-19: The voting system MUST include clear messages for shutdown. TA73O-20: The voting system MUST include complete messages for shutdown. TA73O-21: The voting system MUST include detailed messages for shutdown. TA73O-22: The voting system MUST include clear messages for how to use accessibility features. TA73O-23: The voting system MUST include complete messages for how to use accessibility features. TA73O-24: The voting system MUST include detailed messages for how to use accessibility features. TA73O-25: In order to make instructions clear the instructions MUST conform to best practices for plain language. TA73O-26: In order to make messages clear the messages MUST conform to best practices for plain language. TA73O-27: In order to make instructions complete the instructions MUST cover all necessary steps in order to perform the necessary action. TA73O-28: In order to make messages complete the messages MUST cover all necessary steps in order to perform the necessary action. TA73O-29: In order to make instructions detailed the instructions MUST include sufficiently granular instructions for how to perform the necessary action. TA73O-30: In order to make messages detailed the messages MUST include sufficiently granular instructions for how to perform the necessary action. TA73O-31: The documentation required for normal voting system operation MUST be presented at a level appropriate for poll workers who are not experts in voting system and computer technology. TA73O-32: The documentation MUST be in a format suitable for use in the polling place. TA73O-33: The instructions MUST enable the poll worker to verify that the voting system has been set up correctly (setup). TA73O-34: The instructions MUST enable the poll worker to verify that the voting system is in correct working order to record votes (polling). TA73O-35: The instructions MUST enable the poll worker to verify that the voting system has been shut down correctly (shutdown). TA73O-36: The messages MUST enable the poll worker to verify that the voting system has been set up correctly (setup). TA73O-37: The messages MUST enable the poll worker to verify that the voting system is in correct working order to record votes (polling). TA73O-38: The messages MUST enable the poll worker to verify that the voting has been shut down correctly (shutdown).		TA73O-1: In order to make instructions clear the instructions MUST conform to best practices for plain language. TA73O-2: In order to make messages clear the messages MUST conform to best practices for plain language.
TA73P-1-1: Best practices for plain language MAY include Guidelines for Writing Clear Instructions and Messages for Voters and Poll Workers (Redish, Laskowski, NIST Interagency Report 7596, Guidelines for Writing Clear Instructions and Messages for Voters and Poll Workers, 2009). TA73P-1-2: Best practices for plain language MAY include https://www.plainlanguage.gov/	+-	
TA73P-2-1: Best practices for plain language MAY include Guidelines for Writing Clear Instructions and Messages for Voters and Poll Workers (Redish, Laskowski, NIST Interagency Report 7596, Guidelines for Writing Clear Instructions and Messages for Voters and Poll Workers, 2009). TA73P-2-2: Best practices for plain language MAY include https://www.plainlanguage.gov/	+-	

TA73P-4-1: Best practices for plain language MAY include Guidelines for Writing Clear Instructions and Messages for Voters and Poll Workers (Redish, Laskowski, NIST Interagency Report 7596, Guidelines for Writing Clear Instructions and Messages for Voters and Poll Workers, 2009). TA73P-4-2: Best practices for plain language MAY include https://www.plainlanguage.gov/ TA73P-5: IF an instruction is based on a limiting condition, THEN the condition SHOULD be stated first, AND then the action to be performed SHOULD be stated after that. TA73P-6: The voting system SHOULD use familiar words. TA73P-7: The voting system SHOULD use common words. TA73P-8: The voting system SHOULD avoid technical or specialized words that voters are not likely to understand. TA73P-9: The voting system SHOULD issue instructions on the correct way to perform actions, rather than telling voters what not to do. TA73P-10: The system's instructions SHOULD address the voter directly rather than use passive voice constructions. TA73P-11: The voting system SHOULD avoid the use of gender-based pronouns. TA73P-12: Messages generated by the voting system for election workers in support of the operation of the system MUST use plain language. TA73P-13: Messages generated by the voting system for election workers in support of the maintenance of the system MUST use plain language. TA73P-14: Messages generated by the voting system for election workers in support of the safety of the system MUST use plain language.	<>	TA73P-5: Best practices for plain language MAY include Guidelines for Writing Clear Instructions and Messages for Voters and Poll Workers (Redish, Laskowski, NIST Interagency Report 7596, Guidelines for Writing Clear Instructions and Messages for Voters and Poll Workers, 2009). TA73P-6: Best practices for plain language MAY include https://www.plainlanguage.gov/ TA73P-7: IF an instruction is based on a limiting condition, THEN the condition SHOULD be stated first, and then the action to be performed SHOULD be stated after that. TA73P-8: The voting system SHOULD use familiar words. TA73P-9: The voting system SHOULD use common words. TA73P-10: The voting system SHOULD avoid technical or specialized words that voters are not likely to understand. TA73P-11: The voting system SHOULD issue instructions on the correct way to perform actions, rather than telling voters what not to do. TA73P-12: The system's instructions SHOULD address the voter directly rather than use passive voice constructions. TA73P-13: The voting system SHOULD avoid the use of gender-based pronouns.
TA84A-17-1: The usability tests MUST include operation during voting	<>	TA84A-17-1: The usability tests MUST include operation during voting.
TA911A-1: A undetected fault or error in software or hardware MUST NOT lead to an undetectable change in an election result.	<>	TA911A-1: An undetected fault or error in the voting system software or hardware MUST NOT lead to undetectable changes in election results.
TA911A-1-2: IF a voting system is an E2E system THEN it MUST produce cryptographic proof of the validity of cast votes as defined in section 9.1.6.	<>	TA911A-1-2: IF a voting system is an E2E system THEN it MUST produce cryptographic proof of the validity of cast votes as defined in section 9.1.6 – Evidence export.
9.1.2-A – Tamper evident records TA912A-1: Voting systems MUST generate tamper-evident records.	<>	9.1.2-A – Tamper-evident records TA912A-1: Tamper-evident records produced by voting systems MUST enable detection of incorrect election outcomes. Such records may include, but are not limited to, paper records, CVRs, ballot images, and artifacts from a cryptographic E2E verifiable voting
TA912A-2: Tamper-evident records produced by voting systems MUST enable detection of incorrect election outcomes. TA912A-2-1: Paper records MAY be used as tamper evidence records.	+-	
TA912A-2-1: Cryptographic proof of the validity of votes cast via an E2E protocol MAY be used as tamper evidence records.	+-	
TA912A3-3: For each vote cast by the voter the voting system MUST capture the contents of that vote at the time the ballot is cast.	<>	TA912A-2: For each ballot cast by the voter, the voting system MUST capture the contents of each vote at the time the ballot is cast.
TA912A3-4: For each vote cast by the voter the voting system MUST EITHER generate paper records for that vote at the time the vote is cast OR the voting system MUST generate E2E artifacts for that vote at the time the vote is cast.	<>	TA912A-3: For each ballot cast by the voter, the voting system MUST EITHER capture the paper record for each vote at the time the ballot is cast or the voting system MUST generate E2E artifacts for each vote at the time the ballot is cast.
TA912A4-5: All detected errors MUST be recorded in a manner that provides evidence of any attempted unauthorized modification or access to	<>	TA912A-4: All detected errors MUST be recorded in a manner that provides evidence of any attempted unauthorized modification

the record.		or access to the record.
TA914A-1: IF an external auditor is given voting system records THEN the auditor MUST be able to validate that all cast ballots were correctly tabulated.	+-	
TA914A-2: The voting system MUST generate records that are easily accessible to an election official without the use of additional software outside the scope of the certified voting system.	<>	TA914A-1: The voting system MUST generate records that are easily accessible to an election official without the assistance from the voting system manufacturer or the use of additional software outside the scope of the certified voting system.
TA914A-3: The voting system MUST generate records that are easily accessible to an election official without the assistance from the voting system manufacturer.	+-	
TA915C-1-2: If the voting system presents non-human-readable ballot selections THEN they MUST be accompanied by ballot selections presented in a human-readable format.	<>	TA915C-1-2: If the voting system presents non-human-readable ballot selections (e.g., barcodes or QR codes) THEN they MUST be accompanied by ballot selections presented in a human-readable format.
TA915C-2: All human-readable text accompanying recorded ballot selections MUST be presented using plain language.	<>	TA915C-2: All human-readable text identifying recorded ballot selections MUST be presented using plain language. 9.1.6-E – Ballot receipt TA916E-1: The voting system MUST provide voters with a receipt that allows them to verify that their ballot selections were included in the reported election outcome. TA916E-1-1: Ballot receipts and their verification MUST conform to all applicable accessibility requirements in the VVSG. TA916E-1-2: Ballot receipts MUST conform to all applicable voter-privacy requirements in the VVSG.
TA916G-2: Cryptographic E2E voting systems MUST provide the cryptographic evidence in a non-proprietary available format.	<>	TA916G-2: Cryptographic E2E voting systems MUST provide the cryptographic evidence in a non-proprietary and publicly available format.
TA916G-3: Cryptographic E2E voting systems MUST provide the cryptographic evidence in a publicly available format. 9.1.6-E – Ballot receipt TA916E-1: The voting system MUST provide voters with a receipt that allows them to verify that their ballot selections were included in the reported election outcome. TA916E-1-1: Ballot receipts generated by the voting system MUST NOT contain any ballot selections.	+-	
TA916E-1-2: Ballot receipts generated by the voting system MUST NOT contain information that allows a voter to show their ballot selections to other individuals.	+-	
TA916E-1-3: Ballot receipts generated by the voting system MUST conform to a publicly available format.	+-	
TA916E-1-4: Ballot receipts generated by the voting system MAY contain unique identifiers.	+-	
TA916E-1-5: Ballot receipts AND their verification MUST conform to all applicable accessibility requirements in the VVSG.	+-	
TA916E-1-6: Ballot receipts MUST conform to all applicable voter-privacy requirements in the VVSG.	+-	
TA916K-1: The voting system MUST provide voting system records for public verification. TA916K-1-1: The voting system records MUST NOT be in a proprietary format in order for auditors or observers to perform verification.	<>	TA916K-1-1: The voting system records MUST NOT be generated in a proprietary format in order for auditors or observers to perform verification.
TA916K-2: The voting system MUST NOT store records sequentially, with date stamps, or other information such as language or accessible method used that could violate voter privacy.	<>	TA916K-2: The voting system MUST NOT store records sequentially with identifiable information that could violate voter privacy; this includes but is not limited to date or time stamps, language preference, or

		methods of accessibility used.
TA94A-1: IF a voting system uses a paper-based architecture, THEN the system MUST allow election officials to conduct a risk limiting audit. TA94A-1-1: A voting system MAY be considered "efficient" IF it meets requirements 4.1-D - Exchange of cast vote records (CVRs), 9.4-C - Unique ballot identifiers, and 9.4-D - Multipage ballots.	<>	TA94A-1: IF a voting system uses a paper-based architecture, THEN the system MUST support an evidence-based election, which allows election officials to conduct a risk-limiting audit. TA94A-1-1: A voting system MAY be considered "efficient" IF it meets requirements 4.1-C - Exchange of cast vote records (CVRs), 9.4-C - Unique ballot identifiers, and 9.4-D - Multipage ballots.
TA94C-1: The voting system MUST EITHER preserve ballot scanning order OR MUST be capable of affixing a unique ballot identifier. TA94C-1-2: IF the voting system uses ballot identifiers, they MUST be unique within a counting group such as a batch or tabulator.	<>	TA94C-1: The voting system MUST EITHER have the capability of preserving the ballot scanning order or MUST be capable of affixing a unique ballot identifier such as scanner ID, batch ID, or ballot card number.
TA94D-1: IF a voting system is being used to conduct a risk limiting audit THEN: TA94D-1-1: FOR multipage ballot cards, the voting system MUST ensure EITHER page numbers OR some other ballot card identifiers used to keep ballot cards together, are affixed to multipage ballots.	<>	TA94D-1: IF a voting system is being used to conduct a risk-limiting audit THEN: TA94D-1-1: For multipage ballot cards, the voting system MUST affix/apply EITHER page numbers or other form of ballot card identifier to keep multipage ballot cards together.
TA94D-1-2: The voting system MUST EITHER preserve scan order OR MUST be capable of affixing a unique ballot identifier to each page of a multipage ballot card as per 9.4-C - Unique ballot identifiers.	<>	TA94D-1-2: The voting system MUST EITHER preserve the order of ballots scanned or MUST be capable of affixing a unique ballot identifier to each page of a multipage ballot as per 9.4-C - Unique ballot identifiers.
TA94D-1-3: The voting system MUST specify the page number OR card identifier for each record in the CVR report.	<>	TA94D-1-3: The voting system MUST specify the affixed page number or unique ballot card identifier for each record in the CVR report.
TA101A-1-5: The voting system MUST NOT have the capability to accept the voter registration number of any voter.	<>	TA101A-1-5: The voting system MUST NOT have the capability to accept the voter registration number of any voter.
10.2.1-D - Isolated storage location TA1021D-1: IF a ballot contains an indirect association, that ballot MUST NOT be stored in the same storage location as cast ballots. TA1021D-1-1: The voting system MAY store ballots containing indirect associations in a separate directory within the voting system. 10.2.3-A - Restrict access to records of voter intent TA1023A-1: The voting system must require administrator-level authorization in order to access any directories containing CVRs.	+-	
TA1023A-2: The voting system must require administrator-level authorization in order to access any storage locations containing CVRs.	+-	
TA1023A-3: The voting system must require administrator-level authorization in order to access any directories containing ballot images.	+-	
TA1023A-4: The voting system must require administrator-level authorization in order to access any storage locations containing ballot images.	+-	
TA1023A-5: The voting system must require administrator-level authorization in order to access any directories containing ballot selections.	+-	
TA1023A-6: The voting system must require administrator-level authorization in order to access any storage locations of ballot selections. 10.2.4-C - Activation device records TA1024C-1: The voting system MUST NOT create any information that can be used to identify a specific voter's ballot. TA1024C-1-1: This MUST NOT include the order in	+-	

which voters use the voting system.		
TA1024C-1-2: This MUST NOT include the time at which voters use the voting system.	+-	
TA1024C-2: The voting system MUST NOT retain any information that can be used to identify a specific voter's ballot. TA1024C-2-1: This MUST NOT include the order in which voters use the voting system.	+-	
TA1024C-2-2: This MUST NOT include the time at which voters use the voting system.	+-	
TA121A-1: The voting system MUST prevent access by chance OR access without intention.	<>	TA121A-1: The voting system MUST prevent access without intention.
TA121A-2: The voting system MUST prevent opportunistic access. I.e. unauthorized access.	<>	TA121A-2: The voting system MUST prevent opportunistic access, including, but not limited to, unauthorized access.
TA121A-3: All unauthorized physical access attempts on the voting system SHOULD leave physical evidence.	<>	TA121A-3: All unauthorized physical access attempts and successful events on the voting system MUST leave physical evidence.
TA121A-4: All unauthorized access events that are successful MUST leave physical evidence. TA121A-4-1: IF unauthorized access occurs THEN the physical evidence MUST indicate the point of access	<>	TA121A-3-1: IF unauthorized access occurs THEN the physical evidence MUST indicate the point of access.
TA121A-5: All physical access points on the voting system MUST be capable of being secured by tamper prevention methods (e.g., locks).	+-	
TA121A-6: All physical access points on the voting system MUST be capable of being secured by tamper detection methods (e.g., seals, tape).	<>	TA121A-4: All physical access points on the voting system MUST be capable of being secured by tamper prevention methods (e.g., locks) and tamper detection methods (e.g., seals, tape).
TA121A-7: The voting system documentation MUST describe how to properly implement procedural and physical methods for detecting unauthorized access.	<>	TA121A-5: The voting system documentation MUST describe how to properly implement procedural and physical methods for detecting unauthorized access.
TA121B-1: IF the voter-facing system component is in an activated stage AND IF the voter-facing system component is accessed in an unauthorized manner THEN the voter-facing system component MUST produce an alert.	<>	TA121B-1: IF the voter-facing system component is in an activated stage and it is accessed in an unauthorized manner THEN the voter-facing system component MUST produce an alert.
TA121C-1: IF a voter-facing system component is in an activated stage AND IF a component of a voter-facing system component is physically disconnected THEN the voter-facing system component MUST produce an alert.	<>	TA121C-1: IF a voter-facing system component is in an activated stage and is physically disconnected THEN the voter-facing system component MUST produce an alert.
TA121D-1: IF a voter-facing system component is in an activated stage AND IF voter-facing system component is physically connected THEN the voter-facing system component MUST log the connection.	<>	TA121D-1: IF a voter-facing system component is in an activated stage and it is physically connected THEN the voter-facing system component MUST log the connection.
TA121D-2: IF a voter-facing system component is in an activated stage AND IF voter-facing system component is physically disconnected THEN the voter-facing system component MUST log the disconnection.	<>	TA121D-2: IF a voter-facing system component is in an activated stage it physically disconnected THEN the voter-facing system component MUST log the disconnection.
TA121E-1: The manufacturer's documentation MUST specify tamper evident seals to be used for containers that store voting system records (e.g., ballots).	+-	
TA121E-2: The manufacturer's documentation MUST specify tamper evident seals to be used for containers that transport voting system records (e.g., ballots).	<>	TA121E-1: The manufacturer's documentation MUST specify tamper evident seals to be used for containers that store and transport voting system records (e.g., ballots).
TA121E-3: The manufacturer's documentation MUST specify methods for properly applying seals on containers that store voting system records (e.g., ballots).	+-	
TA121E-4: The manufacturer's documentation MUST specify methods for properly applying seals on containers that transport voting system records (e.g., ballots).	<>	TA121E-2: The manufacturer's documentation MUST specify methods for properly applying seals on containers that store and transport voting system records (e.g., ballots).
TA121E-5: IF unauthorized physical access to a container storing voting system records occurs	+-	

THEN the tamper evident seals MUST leave evidence of tampering when installed as documented.		
TA121E-6: IF unauthorized physical access to a container transporting voting system records occurs THEN the tamper evident seals MUST leave evidence of tampering when installed as documented.	<>	TA121E-3: IF unauthorized physical access to a container storing or transporting voting system records occurs THEN the tamper evident seals MUST leave evidence of tampering when installed as documented.
TA121F-1: IF the voting system uses locks THEN the voting system MUST be capable of supporting at a minimum, the following keying schemes: TA121F-1-1: The voting system MUST support an end user using a single key to access every voting device.	+-	
TA121F-1-2: The voting system MUST support unique keys assigned to each voting system.	+-	
TA121F-2: Documentation MUST be provided by the manufacturer for each key scheme supported.	<>	TA121F-1: Documentation MUST be provided by the manufacturer for each key scheme supported.
TA121G-2-1: Alerts produced by MUST be EITHER audible AND/OR visual in nature.	<>	TA121G-2-1: Alerts produced by a powered physical countermeasure MUST be EITHER audible and/or visual in nature.
TA121G-4: IF the voting system employs a physical security mechanism that requires power to operate, THEN that physical countermeasure MUST generate an event log entry when the power fails.	<>	TA121G-4: IF the voting system employs a physical security mechanism that requires power to operate, THEN that physical countermeasure MUST generate an event log entry when it is switched to backup power.
TA122A-1: Any physical port that is exposed MUST be essential to voting operations OR MUST be essential to testing the voting system OR MUST be essential to auditing the voting machine.	+-	
TA122A-2: Any access point (e.g., panel, door) that is exposed MUST be essential to voting operations OR MUST be essential to testing the voting system OR MUST be essential to auditing the voting machine.	<>	TA122A-1: Any physical port or access point (e.g., panel, door) that is exposed MUST be essential to voting operations or testing the voting system or auditing the voting machine.
TA122B-1: IF the voting system is in an activated stage, THEN the voting system MUST automatically disable any digital communication port that is disconnected.	<>	TA122B-1: IF the voting system is in an activated state, THEN the voting system MUST automatically disable any digital communication port that is disconnected.
TA122B-2: IF the voting system is in a suspended stage, THEN the voting system MUST automatically disable any digital communication port that is disconnected.	<>	TA122B-2: IF the voting system is in a suspended state, THEN the voting system MUST automatically disable any digital communication port that is disconnected.
TA1312A-1: The voting system MUST EITHER cryptographically hash CVRs OR digitally sign CVRs when a ballot is cast.	<>	TA1312A-1: The voting system MUST digitally sign CVRs when a ballot is cast.
TA1312A-2: The voting system MUST EITHER cryptographically hash a ballot image file OR digitally sign a ballot image file when they are generated. 13.1.2-A – Verification of election records TA132A-1: IF a voting system is receiving data THEN it MUST validate the digital signature of all election data received.	<>	TA1312A-2: The voting system MUST digitally sign a ballot image file when they are generated. 13.2-B – Verification of election records TA132B-1: IF any component of the voting system is receiving data from another component of the system, THEN it MUST validate the digital signature of the election data received.
TA132A-2: IF a voting system is receiving data THEN it MUST log any verification error of received election results, as they occur.	+-	
TA132A-3: IF a voting system is receiving data THEN it MUST present on-screen any verification errors of the received election results, as they occur.	<>	TA132B-2: IF a voting system is receiving election results, THEN it MUST log any verification error of received election results, as they occur, and present on-screen verification errors of the received election results, as they occur.
TA132A-4: IF a voting system is receiving data AND IF the received election data fails verification THEN it MUST NOT aggregate any received election data.	<>	TA132B-3: IF a voting system is receiving election results and IF the received election data fails verification, THEN it MUST NOT aggregate and MUST NOT tabulate any received election results.
TA132A-5: IF a voting system is receiving data AND IF the received election data fails verification THEN it MUST NOT tabulate any	+-	

received election data.		
TA134A-4: IF a voting system is transmitting data THEN it MUST verify EITHER the hash of all election data received via a network connection OR the digital signature of all election data received via a network connection before it is acted upon.	<>	TA134A-4: IF a voting system is transmitting data, THEN it MUST verify EITHER the hash of all election data received via a network connection or the digital signature of all election data received via a network connection before it is acted upon.
TA134A-5: IF a voting system is transmitting data THEN it MUST use ONLY FIPS-validated protocols for integrity protection over a network.	<>	TA134A-5: IF a voting system is transmitting data, THEN it MUST use ONLY FIPS-validated protocols for integrity protection over a network.
TA141B-1: For each documented risk in the voting system manufacturer's risk assessment, the manufacturer MUST describe EITHER a technical control to mitigate the risk OR note that the risk is accepted. TA141B-1-1: For accepted risks, voting system manufacturers MUST provide the reason that the risk is acceptable for voting system integrity.	<>	TA141B-1: The voting system manufacturer MUST document each risk in the risk assessment and describe either a technical control to mitigate the risk or document that the risk is accepted. TA141B-1-1: The voting system manufacturer MUST document the accepted risks and provide the reason that the risk is acceptable for the voting system integrity.
TA142A-2-2: All other non-essential features MUST also be disabled.	<>	TA142A-2-2: The voting system MUST disable all other non-essential features.
TA142D-1: IF a voting system contains wireless functionality, THEN there MUST always be a status indicator confirming that wireless networking functionality is disabled.	<>	TA142D-1: IF a voting system contains wireless functionality, THEN there MUST be a status indicator confirming that wireless networking functionality is disabled.
TA142E-1: IF a voting system can establish a connection to an external network THEN the voting system MUST NOT allow any wireless OR any wired connection to a network.	<>	TA142E-1: IF a voting system can establish a connection to an external network, THEN the voting system MUST NOT allow any wireless or any wired connection to a network.
TA142E-3: IF a voting system can establish a connection to an external network THEN the voting system MUST NOT allow any device external to the voting system to connect to that network.	<>	TA142E-3: IF a voting system can establish a connection to an external network, THEN the voting system MUST NOT allow any device external to the voting system to connect to that network.
TA142G-1: The compiled voting system application MUST NOT contain unused code.	<>	TA142G-1: The compiled voting system application MUST NOT contain unused and dead code.
TA142G-2: The compiled voting system application MUST NOT contain dead code.	+-	
14.2-J - Importing software libraries TA142J-1: The voting system MUST NOT bulk import OR include libraries that the voting application does not need to function. 14.2-L - Known vulnerabilities TA142L-1: The voting system manufacturer must specify a process for identifying vulnerabilities within the vulnerability management plan.	<>	14.2-I- Importing software libraries TA142I-1: The voting system MUST NOT bulk import or include libraries that the voting application does not need to function. 14.2-K - Known vulnerabilities TA142K-1: The voting system manufacturer MUST specify a process for identifying vulnerabilities within the vulnerability management plan.
TA142L-2: The voting system MUST NOT contain vulnerabilities within its platform that are contained within the National Vulnerability Database (www.nvd.nist.gov).	<>	TA142K-2: The voting system MUST NOT contain vulnerabilities listed in the National Vulnerability Database (https://nvd.nist.gov).
TA143B-1: The voting system manufacturer MUST provide a written criticality analysis.	<>	TA143B-1: The voting system manufacturer MUST provide a written criticality analysis in the voting system documentation.
TA143B-1-4-1: The prioritization MAY be listed as low, medium, and high criticality.	<>	TA143B-1-4-1: The prioritization SHOULD be listed as low, medium, and high criticality.
TA151E-1-1: Identifying Information MAY include the username.	+-	
TA151E-1-2: Identifying Information MAY include the name of the user. TA151E-1-3: The voting system log must contain time of access for a configuration file.	<>	TA151E-1-1: The logged identifying information MAY include the username or the name of the user. TA151E-1-2: The voting system log MUST contain the time of access for a configuration file.
TA152A-1: IF an error occurs THEN the voting system application MUST provide a notification on-screen describing the application error in time for the user to react to it before performing other actions.	<>	TA152A-1: IF an error occurs THEN the voting system application MUST provide user notification describing the application error in time for the user to react to it before performing other actions.
TA153A-1: IF a COTS device provides EMS	<>	TA153A-1: IF a COTS workstation provides EMS

functionality THEN the voting system MUST utilize application allowlisting OR MUST use digital signatures on the COTS EMS devices in order to protect against malware.		functionality, THEN the voting system MUST utilize application allow listing or MUST use digital signatures on the COTS EMS devices in order to protect against malware.
TA153A-2: IF malware protection is an included feature of the system THEN the voting system MUST launch applications providing malware protection before the voting application is loaded.	<>	TA153A-2: IF malware protection is an included feature of the system, THEN the voting system MUST launch applications providing malware protection before the voting application is loaded.
TA153B-1: IF new malware signatures are received for COTS devices providing EMS functionality THEN malware protection mechanisms MUST be capable of being updated with the new signatures. TA153B-2: COTS devices providing EMS functionality MUST launch applications providing malware protection before the voting application is loaded.	<>	TA153B-1: IF new malware signatures are received for COTS devices providing EMS functionality, THEN malware protection mechanisms MUST be capable of being updated with the new signatures. 15.3-C – Documentation for disabled wireless TA154C-1: The voting system documentation MUST include procedures to disable wireless functionality, for all components of the voting system. TA154C1-1: The voting system documentation MUST include instructions for physically removing power from any embedded wireless chipsets. TA154C1-2: The voting system documentation MUST include instructions for physically disconnecting or removing antennas.
TA154B-3: The voting system documentation MUST include configurations for any other security relevant application important to security.	+-	
TA154B-4: The voting system documentation MUST include configurations for any other security relevant system important to security. TA154B-5: IF a voting system provides networking connectivity THEN it MUST provide best practices for system administrators.	<>	TA154B-3: The voting system documentation MUST include configurations for any other security relevant application or system. TA154B-4: IF a voting system provides networking connectivity, THEN it MUST provide best
TA154B-6: IF a voting system provides network connectivity THEN it MUST provide best practices for election workers.	<>	practices for system administrators and election workers.
TA154C-1: The voting system documentation MUST include instructions for physically removing power from any embedded wireless chipsets.	<>	TA154C-1: The voting system documentation MUST include procedures to disable wireless functionality for all components of the voting system. TA154C1-1: The voting system documentation MUST include instructions for physically removing power from any embedded wireless chipsets. TA154C1-2: The voting system documentation MUST include instructions for physically disconnecting or removing antennas.