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Right file: C:\VVSG 2.0\VVSG 2.0 Test Assertions v1.2.docx

Voluntary Voting System Guidelines Version 2.0	=	Voluntary Voting System Guidelines Version 2.0
Test Assertions Version 1.1	<>	Test Assertions Version 1.2
Introduction This document contains detailed test assertions for select Vol » untary Voting System Guidelines 2.0 Requirements (VVSG 2.0). » Test assertions were not developed for all VVSG 2.0 require » ments. The requirements identified for test assertion develo » pment were flagged in several different ways, including: Public comment period of the DRAFT VVSG 2.0, Public hearings on the state of the DRAFT VVSG 2.0, and Internal review by EAC staff. Many of the VVSG requirements focus on design at a high level » and may be open to interpretation. In order to thoroughly te » st these requirements, manufacturers and VSTLs need the abil » ity to break down each VVSG requirement into unambiguous, sp » ecific, and testable conditions. Test assertions are a metho » d to accomplish this. The test assertions contain granular c » onditions that must be tested to determine conformance to sp » ecific VVSG requirements. The overall goal of the assertions » is to ensure that the VSTLs test each requirement in the VV » SG correctly and comprehensively. EAC staff will regularly r » eview and revise the test assertions with feedback from VSTL » s, manufacturers, election officials, NIST, and other stakeh » olders and will make recommendations to the Executive Direct » or for final approval. These test assertions help ensure uni » formity and consistency among all the VSTLs and ensure the s » ame pass/fail result regardless of which VSTL is used to tes » t a specific voting system. Test assertions were only developed for a specific subset of V » VSG 2.0 requirements. There are requirements identified as p » otentially ambiguous and/or difficult to test. Test assertio » ns may ultimately be developed for more requirements in the » VVSG. Upon using the test assertions during the EAC’s Testin » g & 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 livin	=	Introduction This document contains detailed test assertions for select Vol » untary Voting System Guidelines 2.0 Requirements (VVSG 2.0). » Test assertions were not developed for all VVSG 2.0 require » ments. The requirements identified for test assertion develo » pment were flagged in several different ways, including: Public comment period of the DRAFT VVSG 2.0, Public hearings on the state of the DRAFT VVSG 2.0, and Internal review by EAC staff. Many of the VVSG requirements focus on design at a high level » and may be open to interpretation. In order to thoroughly te » st these requirements, manufacturers and VSTLs need the abil » ity to break down each VVSG requirement into unambiguous, sp » ecific, and testable conditions. Test assertions are a metho » d to accomplish this. The test assertions contain granular c » onditions that must be tested to determine conformance to sp » ecific VVSG requirements. The overall goal of the assertions » is to ensure that the VSTLs test each requirement in the VV » SG correctly and comprehensively. EAC staff will regularly r » eview and revise the test assertions with feedback from VSTL » s, manufacturers, election officials, NIST, and other stakeh » olders and will make recommendations to the Executive Direct » or for final approval. These test assertions help ensure uni » formity and consistency among all the VSTLs and ensure the s » ame pass/fail result regardless of which VSTL is used to tes » t a specific voting system. Test assertions were only developed for a specific subset of V » VSG 2.0 requirements. There are requirements identified as p » otentially ambiguous and/or difficult to test. Test assertio » ns may ultimately be developed for more requirements in the » VVSG. Upon using the test assertions during the EAC’s Testin » g & 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 livin

» g document that will be updated as needed. Organization and Structure of Test Assertions The VVSG 2.0 test assertions are organized and numbered accord » ing to the principles and guidelines to which they are most » applicable. Each assertion has the following fields: Number and title of each requirement Number of each test assertion Text of each test assertion and sub-assertion (Not all asserti » ons will have sub-assertions)		» g document that will be updated as needed. Organization and Structure of Test Assertions The VVSG 2.0 test assertions are organized and numbered accord » ing to the principles and guidelines to which they are most » applicable. Each assertion has the following fields: Number and title of each requirement Number of each test assertion Text of each test assertion and sub-assertion (Not all asserti » ons 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 indicated by the presence of the letters “ » TA” and followed by the original requirement number, a space » , and a sequential number identifier. The original requireme » nt number for each assertion is formatted consistently throu » ghout this document according to the following legend: TA.. is the base requirement is the first numbered requirement or bullet under is the first lettered requirement under is the assertion sequential number identifier and is preceded » by a space
Technical terms used in the requirements Unless otherwise specified, the intended sense of any technica » l terms is that which is commonly used by the information te » chnology industry. In some cases, terminology is specific to » elections or voting systems. Requirements that use words w » ith special meanings are linked to their definitions in the » VVSG 2.0 Glossary of Terms. Technical standards (e.g., ISO, » ANSI) incorporated into the test assertions are fully cited » in the VVSG 2.0, alongside other technical documents and ref » erences useful for understanding the information. Conformance Language The text of a requirement is referred to as normative, meaning » that the text constitutes the requirement and must be satis » fied when implementing and testing the voting device or syst » em. Text in this document that is not part of a requirement, » such as the discussion field, is referred to as informative » , meaning that it is for informational purposes only and doe	=	Technical terms used in the requirements Unless otherwise specified, the intended sense of any technica » l terms is that which is commonly used by the information te » chnology industry. In some cases, terminology is specific to » elections or voting systems. Requirements that use words w » ith special meanings are linked to their definitions in the » VVSG 2.0 Glossary of Terms. Technical standards (e.g., ISO, » ANSI) incorporated into the test assertions are fully cited » in the VVSG 2.0, alongside other technical documents and ref » erences useful for understanding the information. Conformance Language The text of a requirement is referred to as normative, meaning » that the text constitutes the requirement and must be satis » fied when implementing and testing the voting device or syst » em. Text in this document that is not part of a requirement, » such as the discussion field, is referred to as informative » , meaning that it is for informational purposes only and doe

» s not contain requirements.		» s not contain requirements.
Principle 1		Principle 1 – High Quality Design 1.1.2-F – Testing TA1.1.2-F » T » d voter selections.
TA1 » ignated TA1 A-1-1 prevent the inad » vertent or unauthorized activation of the poll-opening funct » ion.	<>	TA1.1.3-A » designated TA1.1.3-A 2: Access control MUST be present to prevent the ina » dvertent or unauthorized activation of the poll-opening func » tion.

TA113A-1-2: Instructions for opening the polls MUST be provide » d on-screen. TA113A-1-3: Instructions for opening the polls MUST be provide » d in the TDP. TA113A-1-4: A means of verifying that the polls have been open » ed MUST be provided.		TA1.1.3-A 3: Instructions for opening the polls MUST be provid » ed on-screen. TA1.1.3-A 4: Instructions for opening the polls MUST be provid » ed in the TDP. TA1.1.3-A 5: A means of verifying that the polls have been ope » ned MUST be provided. 1.1.5-G – Record audit information TA1.1.5-G.2 1: The geographical location of the device MAY inc » lude but not limited to: polling place name, address, or geo » graphical coordinates. TA1.1.5-G.5 1: Every sheet on a multi-sheet ballot MUST contai » n the sheet number as well as the ballot style ID 1.1.6-C – Ballot separation when batch feeding TA1.1.6-C.3 1: If the voting system marks the ballot, it MUST » only be capable of marking outside of the bounds of the ball » ot selection area.
1.1.6-G – Scan to manufacturer specifications	=	1.1.6-G – Scan to manufacturer specifications
TA116G-1: The voting system MUST be capable of providing a rep » ort to show the mark detection thresholds used to scan ballo » ts. TA116G-1-1: These reports MUST be available on an ad hoc basis » to election officials.	<>	TA1.1.6-G 1: The voting system MUST provide the mark detection » threshold report to be available on an ad hoc basis to elec » tion officials
1.1.6-I – Ignore extraneous marks inside voting targets	=	1.1.6-I – Ignore extraneous marks inside voting targets
TA116I-1: The voting system MUST NOT interpret imperfections i » n the ballot stock as valid marks as defined in the manufact » urer's documentation. TA116I-2: The voting system MUST NOT interpret folds in the ba » llot stock as valid marks as defined in the manufacturer's d » ocumentation. TA116I-3: The voting system MUST NOT interpret insignificant m » arks identified within the voting target as valid marks as d » efined in the manufacturer's documentation. 1.1.6-J – Marginal marks, no bias TA116J-1: The voting system MUST NOT evaluate identical ambigu » ous marks as valid votes in one target area and as invalid v » otes in other target areas on the same ballot. TA116J-2: The voting system MUST evaluate identical valid mark » s made in identical marking positions on identical ballot pa	<>	TA1.1.6-I 1: The voting system MUST NOT interpret imperfection » s in the ballot stock as valid marks as defined in the manuf » acturer's documentation. TA1.1.6-I 2: The voting system MUST NOT interpret folds in the » ballot stock as valid marks as defined in the manufacturer' » s documentation. TA1.1.6-I 3: The voting system MUST NOT interpret insignifican » t marks identified within the voting target as valid marks a » s defined in the manufacturer's documentation. 1.1.6-J – Marginal marks, without bias TA1.1.6-J 1: The voting system MUST NOT evaluate identical amb » iguous marks as valid votes in one target area and as invali » d votes in other target areas on the same ballot. TA1.1.6-J 2: The voting system MUST evaluate identical valid m » arks made in identical marking positions on identical ballot

» ges as valid marks. TA117J-3: The voting system MUST evaluate identical invalid ma » rks made in identical marking positions on identical ballot » pages as invalid marks.		» pages as valid marks. TA1.1.6-J 3: The voting system MUST evaluate identical invalid » marks made in identical marking positions on identical ball » ot pages as invalid marks. 1.1.7-A – Exiting or suspending election mode TA1.1.7-A 1: Scanners and ballot marking devices MUST provide » designated functions for suspending voting mode. TA1.1.7-A 2: Access control MUST be present to prevent the ina » dvertent or unauthorized activation of the poll-suspension f » unction. TA1.1.7-A 3: Instructions for suspending the polls MUST be pro » vided on-screen, after beginning the suspension process. TA1.1.7-A 4: Instructions for suspending the polls MUST be pro » vided in the TDP. TA1.1.7-A 5: A means of verifying that the polls have been sus » pended MUST be provided. TA1.1.7-A 6: Scanners and ballot marking devices MUST provide » designated functions for exiting voting mode. TA1.1.7-A 7: Access control MUST be present to prevent the ina » dvertent or unauthorized activation of the poll-exiting func » tion. TA1.1.7-A 8: Instructions for exiting the polls MUST be provid » ed on-screen, after beginning the exiting process. TA1.1.7-A 9: Instructions for exiting the polls MUST be provid » ed in the TDP. TA1.1.7-A 10: A means of verifying that the polls have been ex » ited MUST be provided.
1.1.8-B – Partisan 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. TA118B-2: The voting system MUST be able to separately report » the number of ballots read for all political parties in clos » ed primary elections. TA118B-3: The voting system MUST be able to separately report » the number of ballots counted for all political parties in o » pen primary elections. TA118B-4: The voting system MUST be able to separately report	<>	TA1.1.8-B 1: The voting system MUST be able to separately repo » rt the number of ballots read for all political parties in o » pen primary elections. TA1.1.8-B 2: The voting system MUST be able to separately repo » rt the number of ballots read for all political parties in c » losed primary elections. TA1.1.8-B 3: The voting system MUST be able to separately repo » rt the number of ballots counted for all political parties i » n open primary elections. TA1.1.8-B 4: The voting system MUST be able to separately repo

» the number of ballots counted for all political parties in c » losed primary elections.		» rt the number of ballots counted for all political parties i » n closed primary elections.
1.2-A – Assessment of accuracy	=	1.2-A – Assessment of accuracy
TA12A-1: Voting systems interpreting human made marks MUST int » erpret valid marks created in accordance with the manufactur » er's published specifications as valid marks. TA12A-2: Voting systems interpreting human made marks MUST NOT » interpret invalid marks that do NOT meet the manufacturer's » published specifications as valid marks. 1.2-C – Minimum ballot positions	<>	TA1.2-A.1 1: Voting systems interpreting human made marks MUST » interpret valid marks created in accordance with the manufa » cturer's published specifications as valid marks. TA1.2-A.1 2: Voting systems interpreting human made marks MUST » NOT interpret invalid marks that do NOT meet the manufactur » er's published specifications as valid marks. 1.2-E – Respond gracefully to stress of system limits TA1.2-E 1: The voting system MUST alert the user that the syst » em is nearing the limitations of the system. 1.2-H – Protect against failure of input and storage devices
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.		TA1.2-H 1: The voting system MUST prevent the loss of voting d » ata in the event of a data input failure without relying on » re-casting ballots. TA1.2-H 2: The voting system MUST prevent the loss of voting d » ata in the event of a storage device failure without relying » on re-casting ballots.
1.2-I – FCC Part 15 Class A and B conformance		1.2-I – FCC Part 15 Class A and B Conformance
TA12I-1: The voting system MUST comply with the Rules and Regu » lations of the Federal Communications Commission, Part 15; C » lass A or Class B requirements for radiated and conducted em » issions 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). Principle 2		TA1.2-I 1: The voting system MUST comply with the Rules and Re » gulations 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. TA1.2-I 2: The voting system documentation MUST indicate wheth » er devices comprising the system are intended to be located » in non-polling places (Class A) or polling places (Class B). 1.2-J – Power supply from energy service provider TA1.2-J 1: The polling place voting device MAY be powered by a » 120/208 V three-phase system at a frequency of 60 Hz. TA1.2-J 2: The single-phase power MAY be a leg of a 120/240 V » single phase system. Principle 2 – High Quality Implementation
2.1-C – Acceptable coding conventions	=	2.1-C – Acceptable coding conventions
TA21C-1: The voting system manufacturer MUST declare a publicl » y available set of coding conventions. TA21C-1-1: The coding convention MUST appear in a publicly ava	<>	TA2.1-C 1: The voting system manufacturer MUST declare a publi » cly available set of coding conventions. TA2.1-C 2: The coding convention MUST appear in a publicly ava

» ilable book, magazine, journal, or on the Internet. TA21C-2: The voting system manufacturer MUST utilize a publicl » y available set of coding conventions for voting system soft » ware. TA21C-3: The coding convention MUST be credible. TA21C-3-1: The coding convention MUST be used by at least two » organizations who are not voting system manufacturers.		» ilable book, magazine, journal, or on the Internet. TA2.1-C 3: The voting system manufacturer MUST utilize a publi » cly available set of coding conventions for voting system so » ftware. TA2.1-C 4: The coding convention MUST be credible. TA2.1-C 5: The coding convention MUST be used by at least two » organizations who are not voting system manufacturers. TA2.1-C 6: IF there are exceptions to convention rules THEN th » e exceptions MUST be publicly available.
TA21D-1: The manufacturer MUST document that the medium chosen » for record retention is able to meet the required environme » ntal parameters based on specifications of the chosen medium » .		TA2.1-D 1: The manufacturer MUST document that the medium chos » en for record retention is able to meet the required environ » mental parameters based on specifications of the chosen medi » um.
TA211A-1: Voting system manufacturers MUST document the qualit » y assurance procedures used to ensure their products are fre » e from damage or defect. TA2 third-party are used wi » thin » MUST ensure that third-party » assurance procedures ensure components » third parties are free or defect.		TA2.1.1-A.1 1: Voting system manufacturers MUST document the q » uality assurance procedures used to ensure their products ar » e free or defect. TA2.1.1-A. third-party are us » ed » urer MUST ensure that third-party » lity assurance procedures ensure components supplied » from are free or defect.
TA2 use » d		TA2.1.1-C » used
TA2 a voting » voting » the TA2 a voting a » failure occurs THEN physical or audible indica » tors TA2 a voting » voting » physical or audible vo » ting		TA2.1.2-A.1 a voting » the » s in TA2.1.2-A. a voting » IF a failure occurs THEN physical or audible i » ndicators TA2.1.2-A. a voting » the » all physical or audible to failures in t » he voting

TA212B-1: Voting system documentation intended for election wo » rkers MUST specify methods that trained election workers, la » cking a technical background, can use to detect routine and » common voting system equipment failures. TA212B-2: Alarms MUST be sufficient to enable detection and di » agnosis of components that require maintenance by a trained » technician. TA212B-3: Indicators MUST be sufficient to enable detection an » d diagnosis of components that require maintenance by a trai » ned technician. TA212B-4: Field maintainable components MUST not require the u » se of specialized tools to access or replace.	<>	TA2.1.2-B.1 1: Voting system documentation intended for electi » on workers MUST specify methods that trained election worker » s, lacking a technical background, can use to detect routine » and common voting system equipment failures. TA2.1.2-B.2 1: Alarms MUST be sufficient to enable detection a » nd diagnosis of components that require maintenance by a tra » ined technician. TA2.1.2-B.2 2: Indicators MUST be sufficient to enable detecti » on and diagnosis of components that require maintenance by a » trained technician. TA2.1.2-B.4 1: Field maintainable components MUST not require » the use of specialized tools to access or replace.
2.3-C – Separation of code and data	=	2.3-C – Separation of code and data
TA23C-1: The voting system software MUST NOT compile instructi » ons or logic from configuration files. TA23C-2: The voting system software MUST NOT interpret instruc » tions or logic from configuration files. TA23C-3: The voting system software MUST NOT compile instructi » ons or logic from any other source of data. TA23C-4: The voting system software MUST NOT interpret instruc » tions or logic from any other source of data.	<>	TA2.3-C 1: The voting system software MUST NOT compile instruc » tions or logic from configuration files. TA2.3-C 2: The voting system software MUST NOT interpret instr » uctions or logic from configuration files. TA2.3-C 3: The voting system software MUST NOT compile instruc » tions or logic from any other source of data. TA2.3-C 4: The voting system software MUST NOT interpret instr » uctions or logic from any other source of data.
2.4-A – Modularity	=	2.4-A – Modularity
TA24A-1: The voting system software MUST have a singular purpo » se per module. TA24A-2: The voting system documentation MUST describe the des » ign patterns used to achieve modularity in the application.	<>	TA2.4-A 1: The voting system software MUST have a singular pur » pose per module. TA2.4-A 2: The voting system documentation MUST describe the d » esign patterns used to achieve modularity in the application » .
2.4-B – Module testability	=	2.4-B – Module testability
TA24B-1: The voting system software modules MUST be designed t » o be testable through the application of a test harness.	<>	TA2.4-B 1: The voting system software modules MUST be designed » to be testable through the application of a test harness.
2.4-C – Module size and identification	=	2.4-C – Module size and identification
TA24C-1: The manufacturers declared coding conventions MUST sp » ecify a naming convention in order to ensure modules are eas » ily identifiable. 2.5-B - Input validation and error defense TA25B-1: The voting system manufacturer MUST provide documenta » tion describing the means by which safe concurrency is ensur » ed.	<>	TA2.4-C 1: The manufacturers declared coding conventions MUST » specify a naming convention in order to ensure modules are e » asily identifiable. 2.5-B – Unsafe concurrency TA2.5-B 1: The voting system manufacturer MUST provide documen » tation describing the means by which safe concurrency is ens » ured.

	2.5.1-A – COTS compilers TA2.5.1-A 1: Any COTS compiler used to compile the code MUST N » OT be proprietary in nature.
TA251C-1: The voting system manufacturer MUST provide document » ation describing how they protect the code from tampering.	TA2.5.1-C 1: The voting system manufacturer MUST provide docum » entation describing how they protect the code from tampering » . 2.5.1-D – Prevent tampering with data TA2.5.1-D 1: The voting system manufacturer MUST provide docum » entation describing how they protect the data, vote data, an » d audit records from tampering.
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.	TA2.5.2-A 1: Invalid inputs MUST NOT prevent a voting system f » rom recovering from an error. TA2.5.2-A 2: Recovery MAY be initiated by a system reboot. TA2.5.2-A 3: Recovery MAY be initiated by an election worker.
2.5.4-M – Election Integrity Monitoring TA254M-1: Electronic devices MUST detect and prevent the accum » ulation TA2 M-1-1 a negative » an election alerted through audio » l TA2 » ment TA2 M-2-1 a counter an election offi » cial » TA2 M-3: Electronic » that a negative val » ue. TA2 M-3-1 IF a counter has a negative an electi » on official m » ethods. TA2 M-4: Electronic » more votes for a single a contest » l TA2 IF a candidate has more votes	2.5.4-M – Election integrity monitoring TA2.5.4-M 1: Electronic devices MUST detect and prevent the ac » cumulation TA2 a negative an election » official alerted through audio » ods. TA2 » crement TA2.5.4-M : IF a counter an election off » icial » . TA2.5.4-M : Electronic » rs that a negative » value. TA2.5.4-M a counter has a negative an electi » on official m » ethods. TA2.5.4-M : Electronic » of more votes for a single a contest » otal

» 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 ver » ify that no ballots are present in the box prior to the poll » s opening.		» THEN an election official MUST be alerted through audio and » visual alert methods. TA2.5.4-M 9: 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 p » olls opening.
2.6-B – No compromising voting or audit data	=	2.6-B – No compromising voting or audit data
TA26B-1: IF a recovery condition occurs due to an exception, T » HEN the voting system software MUST cryptographically valida » te the vote data following recovery from the exception. TA26B-2: IF a recovery condition occurs due to an exception, T » HEN the voting system software MUST cryptographically valida » te the audit data following recovery from the exception.	<>	TA2.6-B 1: IF a recovery condition occurs due to an exception, » THEN the voting system software MUST cryptographically vali » date the vote data following recovery from the exception. TA2.6-B 2: IF a recovery condition occurs due to an exception, » THEN the voting system software MUST cryptographically vali » date the audit data following recovery from the exception.
2.7-B - Continuous operation – typical environmental condition » s	=	2.7-B - Continuous operation – typical environmental condition » s
TA27B-1: This test is satisfied with TA27C-1-1 and its sub ass » ertions.	<>	TA2.7-B 1: This requirement MAY be tested in tandem with 2.7-C » and its test assertions. If tested in tandem with 2.7-C, up » on the successful completion of the 2.7-C test assertions, t » his requirement will be satisfied.
2.7-C – Continuous operation – varied environmental conditions	=	2.7-C – Continuous operation – varied environmental conditions
TA27C-1: The voting system MUST withstand continuous operation » al testing performed in accordance with the high and low tem » perature specifications of MIL-STD-810-H, Methods 501.7 and » 502.7, Procedure II – Operation, cyclic temperature and humi » dity exposure. TA27C-1-1: The duration of the test MUST be for 104 consecutiv » e hours. TA27C-1-2: Continuous operation means exercising ballot-counti » ng cycles, which vary by system type, for 15 minutes of each » hour, and at the maximum rate calculated from the manufactu » rer's documented throughput rates. TA27C-1-3: Temperatures MUST range from 50 to 95 degrees for 8 » 0 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 condition » s for 24 hours of operation. TA27C-1-6: The interval between reports MUST be no more than o	<>	TA2.7-C 1: The voting system MUST withstand continuous operati » onal testing performed in accordance with the high and low t » emperature specifications of MIL-STD-810-H, Methods 501.7 an » d 502.7, Procedure II – Operation, cyclic temperature and hu » midity exposure. TA2.7-C 2: The duration of the test MUST be for 104 consecutiv » e hours. TA2.7-C 3: Continuous operation means exercising ballot-counti » ng cycles, which vary by system type, for 15 minutes of each » hour, and at the maximum rate calculated from the manufactu » rer's documented throughput rates. TA2.7-C 4: Temperatures MUST range from 50 to 95 degrees for 8 » 0 hours of operation. TA2.7-C 5: Relative humidity MUST range from 25% to 55% for 80 » hours of operation. TA2.7-C 6: Temperature and humidity MUST be at normal conditio » ns for 24 hours of operation. TA2.7-C 7: The interval between reports MUST be no more than o

» nce per 4 hours of continuous operation.		» nce per 4 hours of continuous operation.
2.7-D - Ability to support maintenance and repair physical env » ironment conditions – non-operating	=	2.7-D - Ability to support maintenance and repair physical env » ironment conditions – non-operating
TA27D-1: The voting system MUST be able to withstand shock tes » ting equivalent to MIL-STD-810H, Method 516.8, Procedure VI » – Bench Handling.	<>	TA2.7-D 1: The voting system MUST be able to withstand shock t » esting equivalent to MIL-STD-810H, Method 516.8, Procedure V » I – Bench Handling.
2.7-E – Ability to support transport and storage physical envi » ronment conditions - non-operating	=	2.7-E – Ability to support transport and storage physical envi » ronment 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.	<>	TA2.7-E 1: The voting system MUST be able to withstand vibrati » on testing equivalent to MIL-STD-810H, Method 514.8, Procedu » re I – General Vibration, Transportation.
2.7-F – Ability to support storage temperatures in physical en » vironment – non-operating	=	2.7-F – Ability to support storage temperatures in physical en » vironment – non-operating
TA27F-1: The voting system MUST be able to withstand testing i » n accordance with high and low equivalent to MIL-STD-810H, M » ethods 501.7 and 502.7, Procedure I-Storage, cyclic temperat » ure and humidity exposure. TA27F-1-1: Temperatures MUST range from -4 to +140 degrees Fah » renheit. TA27F-1-2: Relative humidity MUST range from 25% to 55%. TA27F-2: The test MAY be interrupted for performance checks as » necessary.	<>	TA2.7-F 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 temper » ature and humidity exposure. TA2.7-F 2: Temperatures MUST range from -4 to +140 degrees Fah » renheit. TA2.7-F 3: Relative humidity MUST range from 25% to 55%. TA2.7-F 4: The test MAY be interrupted for performance checks » as necessary.
2.7-G – Electrical disturbances	=	2.7-G – Electrical disturbances
TA27G-1: The voting system MUST be able to withstand testing i » n accordance with the latest IEC 61000-4-3 standard for radi » ated immunity, without disruption of normal operation or los » s of data.	<>	TA2.7-G 1: The voting system MUST be able to withstand testing » in accordance with the latest IEC 61000-4-3 standard for ra » diated immunity, without disruption of normal operation or l » oss of data.
2.7-H – Power outages, sags, and swells »	=	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 vot » ing data is lost, or corrupted and normal operations continu » e without interruption. TA27H-1-1: When backup power is exhausted the voting s » ystem MUST retain the contents of all memories intact.	<>	TA2.7-H 1: The voting system MUST be capable of operating for » a period of at least 2 hours on backup power, such that no v » oting data is lost, or corrupted and normal operations conti » nue without interruption. TA2.7-H 2: When backup power is exhausted the voting system MU » ST retain the contents of all memories intact.
2.7-I – Withstand conducted electrical disturbances »	=	2.7-I – Withstand conducted electrical disturbances »
TA27I-1: The voting system MUST be able to withstand testing i	<>	TA2.7-I 1: The voting system MUST be able to withstand testing

» n accordance with the latest IEC 61000-4-4 standard for elec » trical fast transient protection, without disruption of norm » al operation or loss of data. TA27I-2: The voting system MUST be able to withstand testing i » n accordance with the latest IEC 61000-4-5 standard for ligh » tning surge protection, without disruption of normal operati » on or loss of data. TA27I-3: The voting system MUST be able to withstand testing i » n accordance with the latest IEC61000-4-11 standard for powe » r dips, interruptions, and variations immunity, without disr » uption of normal operation or loss of data. TA27I-4: The voting system MUST not be disturbed by a temporar » y overvoltage of 120 % normal line voltage lasting from 3 ms » to 0.5 s, applied in gradual steps of overvoltage across th » e line and neutral terminals. TA2 nor overheat » for a permanent r » ating over » voltage across the	» in accordance with the latest IEC 61000-4-4 standard for el » ectrical fast transient protection, without disruption of no » rmal operation or loss of data. TA2.7-I 2: The voting system MUST be able to withstand testing » in accordance with the latest IEC 61000-4-5 standard for li » ghtning surge protection, without disruption of normal opera » tion or loss of data. TA2.7-I 3: The voting system MUST be able to withstand testing » in accordance with the latest IEC61000-4-11 standard for po » wer dips, interruptions, and variations immunity, without di » sruption of normal operation or loss of data. TA2.7-I 4: The voting system MUST not be disturbed by a tempor » ary 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. TA2.7-I nor overhea » t for a permanent » rating ov » ervoltage across the
	»
TA2 » n accordance 61000-4-6 » ucted or lo » ss of data.	TA2.7-J » in 61000-4-6 co » nducted or » loss
	»
TA2 » n accordance level an air » discharge or a contact » the a standard environmen » t, a or loss » a. TS2 K-1-1 » TS TA2 K-1-2 or have momentary » interruption res » umed or loss	TA2.7-K » in 1000-4-2 level » ing an air discharge or a contact » nature a » amage, or loss TS2.7-K » TS TA2.7-K or have momentary » interruption normal operation is res

Principle 3		Principle 3 – Transparent
3.1.1-B – System overview, functional diagram	=	3.1.1-B – System overview, functional diagram
TA311B-1: The system overview MUST include a functional diagra » m(s) of the voting system. TA311B-2: The functional diagram(s) MUST be at a system level. » TA311B-3: The functional diagram(s) MUST depict all of the har » dware platforms and software components developed by the ven » dor. TA311B-4: The functional diagram(s) MUST show how the componen » ts relate to each other, to include at a minimum data interc » hange. TA311B-5: The functional diagram(s) MUST show how the componen » ts interact, to include at a minimum all network communicati » ons.	<>	TA3.1.1-B 1: The system overview MUST include a functional dia » gram(s) of the voting system. TA3.1.1-B 2: The functional diagram(s) MUST be at a system lev » el. TA3.1.1-B 3: The functional diagram(s) MUST depict all of the » hardware platforms and software components developed by the » vendor. TA3.1.1-B 4: The functional diagram(s) MUST show how the compo » nents relate to each other, to include at a minimum data int » erchange. TA3.1.1-B 5: The functional diagram(s) MUST show how the compo » nents interact, to include at a minimum all network communic » ations. 3.1.1-E – Traceability of procured software TA3.1.1-E 1: The documentation MUST contain a declaration of w » here the software was obtained. TA3.1.1-E 2: The open-source software packages MUST be digital » ly signed.
3.1.2-B – Maximum tabulation rate	=	3.1.2-B – Maximum tabulation rate
TA312B-1: IF the voting system utilizes a bulk-fed scanner THE » N the manufacturer documentation MUST specify the maximum ta » bulation rate for that scanner. TA312B-2: IF any individual component impacts the overall maxi » mum tabulation rate, THEN the documentation MUST specify the » tabulation rate for all such components. TA312B-3: IF any individual factor, such as paper size, impact » s the overall maximum tabulation rate THEN the documentation » MUST specify the tabulation rate for all such factors.	<>	TA3.1.2-B 1: IF the voting system utilizes a bulk-fed scanner » THEN the manufacturer documentation MUST specify the maximum » tabulation rate for that scanner. TA3.1.2-B 2: IF any individual component impacts the overall m » aximum tabulation rate, THEN the documentation MUST specify » the tabulation rate for all such components. TA3.1.2-B 3: IF any individual factor, such as paper size, imp » acts the overall maximum tabulation rate THEN the documentat » ion MUST specify the tabulation rate for all such factors.
3.1.2-C – Reliably detectable marks	=	3.1.2-C – Reliably detectable marks
TA312C-1: The voting system manufacturers MUST document what c » onstitutes a valid mark. TA312C-1-1: Any system configurations or other settings that i » nfluence mark detection within that voting system (e.g., thr » eshold settings) MUST be included in the documentation. TA312C-2: The voting system manufacturers MUST document marks » that the voting system identifies as ambiguous.	<>	TA3.1.2-C.1 1: The voting system manufacturers MUST document w » hat constitutes a valid mark. TA3.1.2-C.1 2: Any system configurations or other settings tha » t influence mark detection within that voting system (e.g., » threshold settings) MUST be included in the documentation. TA3.1.2-C.2 1: The voting system manufacturers MUST document m » arks that the voting system identifies as ambiguous.

TA312C-2-1: IF ambiguous marks require adjudication, the votin » g system manufacturers MUST document the processes and proce » dures utilized for such adjudication. TA312C-3: The voting system manufacturers MUST document marks » that do not constitute a valid mark.		TA3.1.2-C.2 2: IF ambiguous marks require adjudication, the vo » ting system manufacturers MUST document the processes and pr » ocedures utilized for such adjudication. TA3.1.2-C.3 1: The voting system manufacturers MUST document m » arks that do not constitute a valid mark.
3.1.3-A – System security documentation	=	3.1.3-A – System security documentation
TA313A-1: The voting system security document MUST include a d » escription of how election staff and election workers can le » verage the security features provided by the voting system.	<>	TA3.1.3-A 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 syste » m.
3.1.3-C – Physical security	=	3.1.3-C – Physical security
TA313C-1: The system security document MUST describe all physi » cal security controls for each voting device. TA313C-1-1: Security controls MUST include procedural steps fo » r election staff and workers to keep the voting system physi » cally secure. TA313C-1-2: The system security document MUST describe the cor » rect way to implement the physical security controls.	<>	TA3.1.3-C 1: The system security document MUST describe all ph » ysical security controls for each voting device. TA3.1.3-C 2: Security controls MUST include procedural steps f » or election staff and workers to keep the voting system phys » ically secure. TA3.1.3-C 3: The system security document MUST describe the co » rrect way to implement the physical security controls. 3.1.4-K – Open market procurement of COTS software TA3.1.4-K 1: The installation documentation MUST identify wher » e the COTS were procured. TA3.1.4-K 2: Digital signatures for the COTS products MUST be » provided.
3.1.4-M – Trusted storage media	=	3.1.4-M – Trusted storage media
TA314M-1: The setup inspection process documentation MUST spec » ify trusted storage media devices used to install voting sys » tem software or firmware onto the voting system. TA314M-1-1: Trusted storage media devices SHOULD be read-only » storage devices. TA314M-1-2: Trusted storage media devices MUST be zeroed-out b » efore first use. TA314M-1-2-1: Methods utilized for zeroization MAY include pro » cedures listed in the latest version of NIST SP 800-88: Guid » elines for Media Sanitization.	<>	TA3.1.4-M 1: The setup inspection process documentation MUST s » pecify trusted storage media devices used to install voting » system software or firmware onto the voting system. TA3.1.4-M 2: Trusted storage media devices SHOULD be read-only » storage devices. TA3.1.4-M 3: Trusted storage media devices MUST be zeroed-out » before first use. TA3.1.4-M 4: Methods utilized for zeroization MAY include proc » edures listed in the latest version of NIST SP 800-88: Guide » lines for Media Sanitization.
3.2-B – Minimum properties included in the setup inspection pr » ocess	=	3.2-B – Minimum properties included in the setup inspection pr » ocess
TA32B-1: The setup inspection process documentation MUST inclu » de the process for checking digital storage locations.	<>	TA3.2-B.2 1: The setup inspection process documentation MUST i » nclude 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 setup inspection process documentation MUST inclu » de the process for checking physical storage locations inclu » ding but not limited to ballots, parts of an audit trail, et » c. TA32B-2-1: IF physical storage locations are not intended to b » e empty before the polls open THEN the status and expected s » tate of the physical storage locations MUST be specified in » the setup inspection process documentation.		TA3.2-B.2 2: IF there is an expected value, then that value MU » ST be documented. TA3.2-B.2 3: The setup inspection process documentation MUST i » nclude the process for checking physical storage locations i » ncluding but not limited to ballots, parts of an audit trail » , etc. TA3.2-B.2 4: 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 i » n the setup inspection process documentation.
3.2-D – Installed software identification procedure	=	3.2-D – Installed software identification procedure
TA32D-1: The setup inspection process documentation MUST inclu » de the procedures to identify that ONLY certified software i » s installed on programmed devices of the voting system.	<>	TA3.2-D 1: The setup inspection process documentation MUST inc » lude the procedures to identify that ONLY certified software » is installed on programmed devices of the voting system.
3.2-E – Software integrity verification procedure	=	3.2-E – Software integrity verification procedure
TA32E-1: A cryptographic hash MUST be used to verify the integ » rity of software installed on programmed devices of the voti » ng system. TA32E-1-1: The hash verification process MUST be able to be pe » rformed in a manner that is independent of proprietary manuf » acturer software and scripts. TA32E-1-2: The hash verification process MUST be able to be pe » rformed without requiring manufacturer assistance.	<>	TA3.2-E 1: A cryptographic hash MUST be used to verify the int » egrity of software installed on programmed devices of the vo » ting system. TA3.2-E 2: The hash verification process MUST be able to be pe » rformed in a manner that is independent of proprietary manuf » acturer software and scripts. TA3.2-E 3: The hash verification process MUST be able to be pe » rformed without requiring manufacturer assistance.
3.3-A – System security, system event logging	=	3.3-A – System security, system event logging
TA33A-1: The manufacturer MUST supply documentation that is fr » ee of proprietary information, made publicly available, and » containing the following information: TA33A-1-1: A description of event logging capabilities. TA33A-1-2: The purpose of the log (e.g., security, audit trail » , I/O). TA33A-1-3: Details regarding the format of the log file.	<>	TA3.3-A 1: The manufacturer MUST supply documentation that is » free of proprietary information, made publicly available, an » d containing the following information: TA3.3-A.1 1: A description of event logging capabilities. TA3.3-A.2 1: The purpose of the log (e.g., security, audit tra » il, I/O). TA3.3-A.2 2: Details regarding the format of the log file.
3.3-B – Specification of common data format usage	=	3.3-B – Specification of common data format usage
TA33B-1: For each voting system component and function, the ma » nufacturer MUST supply documentation describing how the manu » facturer has implemented the NIST CDF specifications. TA33B-2: The documentation provided by the manufacturer MUST b » e free of proprietary information and made publicly availabl » e.	<>	TA3.3-B 1: For each voting system component and function, the » manufacturer MUST supply documentation describing how the ma » nufacturer has implemented the NIST CDF specifications. TA3.3-B 2: The documentation provided by the manufacturer MUST » be free of proprietary information and made publicly availa » ble.

		3.3-C – Bar and other codes TA3.3-C 1: The documentation MUST include the name and version » of the standard used for barcodes or any codes used in the » voting system. TA3.3-C 2: The documentation MUST include how the data may be » packed and compressed within the encoding process. TA3.3-C 3: The barcode report MUST be detailed in a comprehens » ive manner to allow an auditor to decode and examine the con » tent of the barcode.
Principle 4		Principle 4 – Interoperable 4.1-C – Exchange of cast vote records (CVRs) TA4.1-C 1: Devices that import CVRs SHOULD have the capability » to import CVRs in the respective CDFs, in compliance with N » IST SP 1500-103 Cast Vote Records Common Data Format Specifi » cation. TA4.1-C 2: Devices that export CVRs SHOULD have the capability » to export CVRs in the respective CDFs, in compliance with N » IST SP 1500-103 Cast Vote Records Common Data Format Specifi » cation.
4.1-D – Exchange of voting device election event logs	=	4.1-D – Exchange of voting device election event logs
TA41D-1: The voting system MUST be capable of importing electi » on event log data conforming to Election event logging commo » n data format specification: Wack et al, Special Publication » 1500-101: Election Event Logging Common Data Format Specif » ication, National Institute of Standards and Technology (NIS » T), April 2020. TA41D-2: The voting system MUST be capable of exporting electi » on event log data conforming to Election event logging commo » n data format specification: Wack et al, Special Publication » 1500-101: Election Event Logging Common Data Format Specif » ication, National Institute of Standards and Technology (NIS » T), April 2020.	<>	TA4.1-D 1: The voting system MUST be capable of importing elec » tion event log data conforming to Election event logging com » mon data format specification: NIST SP 1500-101 Election Eve » nt Logging Common Data Format Specification. TA4.1-D 2: The voting system MUST be capable of exporting elec » tion event log data conforming to Election event logging com » mon data format specification: NIST SP 1500-101 Election Eve » nt Logging Common Data Format Specification. 4.1-E – Voting device event code documentation TA4.1-E 1: The manufacturer MUST provide a non-proprietary spe » cification per device that contains the codes used in the de » vice’s election event log and the meaning of the codes TA4.1-E 2: The event codes SHOULD comply to the NIST SP 1500-1 » 01 schema for documentation of event codes

		4.1-F – Specification of common format usage TA4.1-F 1: The specification MUST describe the implementation » of the CDF specification sufficiently such that an auditor c » an independently interpret CDF files produced by the manufac » turer. TA4.1-F 2: The specification MUST describe the implementation » of the CDF specification sufficiently such that an auditor c » an independently import CDF files into a manufacturer’s devi » ce.
TA42B-1: IF the voting system uses methods of compression outs » ide the scope of the CDF, THEN these methods of compression » MUST be publicly documented. TA42B-2: IF the voting system uses methods of encoding outside » the scope of the CDF, THEN these methods of encoding MUST b » e publicly documented. TA42B-3: IF the voting system uses data formats outside the sc » ope of the CDF, THEN these data formats MUST be publicly doc » umented. TA4 uses protocols » of » d.		TA4.2-B 1: IF the voting system uses methods of compression ou » tside the scope of the CDF, THEN these methods of compressio » n MUST be publicly documented. TA4.2-B 2: IF the voting system uses methods of encoding outsi » de the scope of the CDF, THEN these methods of encoding MUST » be publicly documented. TA4.2-B 3: IF the voting system uses data formats outside the » scope of the CDF, THEN these data formats » ocumented. TA4.2-B uses protocols sco » pe » ted.
TA4 uses peripherals, » herals use standardiz » ed TA4 A-1-1 » roprietary hardware. TA4 A-1-2 » he user to TA4 A-2 or cabling » to or cabling MUS » T a standard TA4 A-3 or cabling » to or cabling MUS » T use a published protocol. Principle 5		TA4.3-A uses peripherals, » ipherals use standard » ized TA4.3-A » roprietary hardware. TA4.3-A » he user to TA4.3-A or cabling conne » ct or cabling M » UST a standard TA4.3-A or cabling conne » ct or cabling M » UST use a published communication protocol. Principle 5 – Equivalent and

TA51A-1: IF a voting system uses paper ballots, THEN the votin » g system MUST provide features that assist in the reading of » such ballots by voters with poor reading vision.	<>	TA5.1-A 1: IF a voting system uses paper ballots, THEN the vot » ing system MUST provide features that assist in the reading » of such ballots by voters with poor reading vision.
TA51A-2: IF a voting system uses paper verification, THEN the » voting system MUST provide features that assist in the readi » ng of such records by voters with poor reading vision.		TA5.1-A 2: IF a voting system uses paper verification, THEN th » e voting system MUST provide features that assist in the rea » ding of such records by voters with poor reading vision.
TA51A-3: IF a voting system uses paper ballots, THEN the votin » g machine MAY provide paper ballots in at least two font siz » e ranges, 3.0mm to 4.0mm inclusive and 6.3 mm to 9.0 mm incl » usive, to allow voters with poor reading vision to read thes » e ballots.		TA5.1-A 3: IF a voting system uses paper ballots, THEN the vot » ing machine MAY provide paper ballots in at least two font s » ize ranges, 3.0mm to 4.0mm inclusive and 6.3 mm to 9.0 mm in » clusive, to allow voters with poor reading vision to read th » ese ballots.
TA51A-4: IF a voting system uses paper ballots, THEN the votin » g system MAY provide magnification of those records to allow » voters with poor vision a means to read these ballots.		TA5.1-A 4: IF a voting system uses paper ballots, THEN the vot » ing system MAY provide magnification of those records to all » ow voters with poor vision a means to read these ballots.
TA51A-4-1: This magnification MAY be done EITHER by 1) optical » devices or 2) electronic devices.		TA5.1-A 5: This magnification MAY be done EITHER by 1) optical » devices or 2) electronic devices.
TA51A-4-2: This magnification MUST be compatible with the pape » r records’ configuration.		TA5.1-A 6: This magnification MUST be compatible with the pape » r records’ configuration.
TA51A-4-3: The magnifier MUST provide legibility for the paper » as actually presented on the system.		TA5.1-A 7: The magnifier MUST provide legibility for the paper » as actually presented on the system.
TA51A-4-4: The manufacturer MAY provide the magnifier itself a » s part of the system.		TA5.1-A 8: The manufacturer MAY provide the magnifier itself a » s part of the system.
TA51A-4-5: The manufacturer MAY provide the make and model num » ber of readily available magnifiers that are compatible with » the system.		TA5.1-A 9: The manufacturer MAY provide the make and model num » ber of readily available magnifiers that are compatible with » the system.
TA51A-5: The audio-tactile interface of the voting system MUST » provide the same capabilities to vote as are provided by it » s visual interface.		TA5.1-A 10: The audio-tactile interface of the voting system M » UST provide the same capabilities to vote as are provided by » its visual interface.
TA51A-6: The audio-tactile interface of the voting system MUST » provide the same capabilities to cast a ballot as are provi » ded by its visual interface.		TA5.1-A 11: The audio-tactile interface of the voting system M » UST provide the same capabilities to cast a ballot as are pr » ovided by its visual interface.
TA51A-7: IF a visual ballot supports voting a straight party t » icket and then changing the choice in a single contest, THEN » the voting system audio-tactile interface MUST support voti » ng a straight party ticket and then changing the choice in a » single contest.		TA5.1-A 12: IF a visual ballot supports voting a straight part » y ticket and then changing the choice in a single contest, T » HEN the voting system audio-tactile interface MUST support v » oting a straight party ticket and then changing the choice i » n a single contest.
TA51A-8: IF the voting system supports ballot activation for n » on-blind voters, THEN the voting system MUST provide feature		TA5.1-A 13: IF the voting system supports ballot activation th » e voting system MUST provide features that enable voters who

» s that enable voters who are blind to perform this activatio	» are visually able and impaired to perform this activation.
» n.	
TA51A-8-1: One such feature MAY be smart cards providing tacti	TA5.1-A 14: One such feature MAY be smart cards providing tact
» le cues so as to allow correct insertion.	» ile cues so as to allow correct insertion.
TA51A-8-2: One such feature MAY be smart cards providing audio	TA5.1-A 15: One such feature MAY be smart cards providing audi
» cues so as to allow correct insertion.	» o cues so as to allow correct insertion.
TA51A-9: The voting system MUST provide features that enable v	TA5.1-A 16: The voting system MUST provide features that enabl
» oters who are blind to independently submit their ballot.	» e voters who are visually impaired to independently submit t
	» heir ballot.
TA51A-10: The voting system MUST provide features	TA5.1-A 17: The voting system MUST provide features that enabl
» voters who are b	» e voters who are visually impaired to independently cast the
	» ir ballot.
TA5 A-11	TA5.1-A 18: The voting system MUST provide features that enabl
» voters who are b	» e voters who are visually impaired to independently verify t
	» heir vote.
TA5 A-12	TA5.1-A 19: The voting
» voters or the use of	» e voters or the use of
» to	» ds
» ling	» ndling
TA5 A-13	TA5.1-A
» voters or the use of	» e voters or the use of
» to	» ds
» the ballot.	» ng
	TA5.1-A
	» e voting
	» are able bodied as well as with
	» m this activation.
	TA5.1-A
	» e voters
	» ballot.
	TA5.1-A
	» e voters
	» r vote.
	5.1-B – Languages
	TA5.1-B
	» he t
	» he ballot, contest options, review screens, voter verifiable
	» paper records, and voting instructions, in both visual and

		» audio formats where applicable.
5.2-A – No bias	=	5.2-A – No bias
TA52A-1: For all contest choices on an audio ballot, there MUS » T be no discernible differences in audio presentation to the » voter.	<>	TA5.2-A 1: For all contest choices on an audio ballot, there M » UST be no discernible differences in audio presentation to t » he voter.
TA52A-1-1: For all contest choices on an audio ballot, there M » UST be no discernible differences in the audio presentation » of the human speaker or synthetic voice.		TA5.2-A 2: For all contest choices on an audio ballot, there M » UST be no discernible differences in the audio presentation » of the human speaker or synthetic voice.
TA52A-1-2: For all contest choices on an audio ballot, there M » UST be no discernible differences in the audio presentation » of the voice characteristics including, but not limited to, » speech rate, volume, and pitch.		TA5.2-A 3: For all contest choices on an audio ballot, there M » UST be no discernible differences in the audio presentation » of the voice characteristics including, but not limited to, » speech rate, volume, and pitch.
TA52A-2: For all ballot selections within a review screen on a » n audio ballot, there MUST be no discernible differences in » audio presentation to the voter.		TA5.2-A 4: For all ballot selections within a review screen on » an audio ballot, there MUST be no discernible differences i » n audio presentation to the voter.
TA52A-2-1: For all ballot selections within a review screen on » an audio ballot, there MUST be no discernible differences i » n the audio presentation of the human speaker or synthetic v » oice.		TA5.2-A 5: For all ballot selections within a review screen on » an audio ballot, there MUST be no discernible differences i » n the audio presentation of the human speaker or synthetic v » oice.
TA52A-2-2: For all ballot selections within a review screen on » an audio ballot, there MUST be no discernible differences i » n the audio presentation of the voice characteristics includ » ing, but not limited to, speech rate, volume, and pitch.		TA5.2-A 6: For all ballot selections within a review screen on » an audio ballot, there MUST be no discernible differences i » n the audio presentation of the voice characteristics includ » ing, but not limited to, speech rate, volume, and pitch.
TA52A-3: For all undervotes within a review screen on an audio » ballot, there MUST be no discernible differences in audio p » resentation to the voter.		TA5.2-A 7: For all undervotes within a review screen on an aud » io ballot, there MUST be no discernible differences in audio » presentation to the voter.
TA52A-4: For all overvotes within a review screen on an audio » ballot, there MUST be no discernible differences in audio pr » esentation to the voter.		TA5.2-A 8: For all overvotes within a review screen on an audi » o ballot, there MUST be no discernible differences in audio » presentation to the voter.
TA52A-5: For all audio voter verifiable audit records, present » ed separately from the review screen (e.g., readback of a VV » PAT), there MUST be no discernible differences in audio pres » entation to the voter.		TA5.2-A 9: For all audio voter verifiable audit records, prese » nted separately from the review screen (e.g., readback of a » VVPAT), there MUST be no discernible differences in audio pr » esentation to the voter.
TA52A-5-1: For all audio voter verifiable audit records, there » MUST be no discernible differences in the audio presentatio » n of the human speaker or synthetic voice.		TA5.2-A 10: For all audio voter verifiable audit records, ther » e MUST be no discernible differences in the audio presentati » on of the human speaker or synthetic voice.
TA52A-5-2: For all audio voter verifiable audit records, there » MUST be no discernible differences in the audio presentatio		TA5.2-A 11: For all audio voter verifiable audit records, ther » e MUST be no discernible differences in the audio presentati

Left file (v1.1)	Right file (v1.2)
» n of the voice characteristics including, but not limited to	» on of the voice characteristics including, but not
» , speech rate, volume, and pitch.	» o,
TA52A-6: For all undervotes within an audio voter verifiable a	TA5
» udit record, there MUST be no discernible differences in aud	
» io presentation to the voter.	
TA52A-7: For all overvotes within an audio voter verifiable au	
» dit record, there MUST be no discernible differences in audi	
» o presentation to the voter.	
TA52A-8: For all contest choices within the enhanced visual ba	
» llot mode (e.g., high contrast ballots), there MUST be no di	
» scernible differences in visual presentation to the voter.	
TA52A-8-1: For all contest choices on an enhanced visual ballo	
» t mode, there MUST be no discernible differences in the visu	
» al presentation of font properties including, but not limite	
» d to, family, style (bold, italic, underline), and size.	
TA52A-8-2: For all contest choices on an enhanced	TA5.2-A : For on an enhanced
» t no discernible	ot
» al	
» d	
» ment,	
TA5 A-8-3 on an enhanced	
» t no discernible	
» al	
TA5 8-4 on an enhanced	
» t no discernible	
» al	
TA5 A-8-5 on an enhanced	
» t no discernible	
» al	
TA5 A-9 a review screen on a	
» n enhanced no discernible diffe	n an enhanced no discernible di
» rences in	
TA5 A-9- a review screen on	
» an enhanced no discernible dif	» n an enhanced no discernible di
» ferences	fferences
» ding, not limited to, family, style (bold, italic, under	» uding, but not limited to, family, style (bold, italic, unde
» line), and size.	» rline), and size.

TA52A-9-2: For all ballot selections within a review screen on	TA5.2-A 22: For all ballot selections within a review screen o
» an enhanced visual ballot, there MUST be no discernible dif	» n an enhanced visual ballot, there MUST be no discernible di
» ferences in the visual presentation of text properties inclu	» fferences in the visual presentation of text properties incl
» ding, but not limited to, word and letter spacing, vertical	» uding, but not limited to, word and letter spacing, vertical
» and horizontal alignment, indentation, line height, and whit	» and horizontal alignment, indentation, line height, and whi
» e space handling.	» te space handling.
TA52A-9-3: For all ballot selections within a review screen on	TA5.2-A 23: For all ballot selections within a review screen o
» an enhanced visual ballot, there MUST be no discernible dif	» n an enhanced visual ballot, there MUST be no discernible di
» ferences in the visual presentation of color.	» fferences in the visual presentation of color.
TA52A-9-4: For all ballot selections within a review screen on	TA5.2-A 24: For all ballot selections within a review screen o
» an enhanced visual ballot, there MUST be no discernible dif	» n an enhanced visual ballot, there MUST be no discernible di
» ferences in the visual presentation of background.	» fferences in the visual presentation of background.
TA52A-9-5: For all ballot selections within a review screen on	TA5.2-A 25: For all ballot selections within a review screen o
» an enhanced visual ballot, there MUST be no discernible dif	» n an enhanced visual ballot, there MUST be no discernible di
» ferences in the visual presentation of margins, borders, pad	» fferences in the visual presentation of margins, borders, pa
» ding, and spacing.	» dding, and
TA5 A-10 a review screen on an enha	TA5.2-A a review screen on an en
» nced no discernible differences	» hanced no discernible differenc
» in	» es in
TA5 A-11 an enhanced visual	TA5.2-A an enhanced visua
» voter	» l
» review screen (e.g., a VVPAT), no	» e review screen (e.g., a VVPAT), n
» discernible	» o discernible
	» r.
TA5 A-11-1 an enhanced visua	TA5.2-A an enhanced visua
» l no discernibl	» l no discernibl
» e differences	» e differences
» including,	» including,
» underline),	» underline),
TA5 A-11- an enhanced visua	TA5.2-A an enhanced visua
» l no discernibl	» l no discernibl
» e differences	» e differences
» including,	» including,
» ical	» ical
» white	» white
TA5 A-11- an enhanced visua	TA5.2-A an enhanced visua
» l be no discernibl	» l voter verifiable audit record, there MUST be no discernibl
» e differences	

TA52A-11-4: For all ballot selections within an enhanced visua	TA5.2-A 31: For all ballot selections within an enhanced visua
» l voter verifiable audit record, there SHALL be no discernib	» l no discernibl
» le differences in the visual presentation of background (e.g	
» ., pattern, image).	
TA52A-11-5: For all ballot selections within an enhanced visua	
» l voter verifiable audit record, there MUST be no discernibl	
» e differences in the visual presentation of margins, borders	
» , padding, and spacing.	
TA52A-12: For all undervotes within an enhanced visual voter v	
» erifiable audit record, there MUST be no discernible differe	
» nces in visual presentation to the voter.	
TA52A-13: For all contest choices on a tactile ballot, there M	
» UST be no discernible differences in tactile presentation to	
» the voter.	
TA52A-14: For all ballot selections within a review screen on	
» a tactile ballot, there MUST be no discernible differences i	» n a tactile ballot, there MUST be no discernible differences
» n tactile presentation to	» in
TA5 A-15 a review screen on a tacti	TA5.2-A a review screen on a tac
» le no discernible	discernible
» le	
TA5 A-16 a review screen on a tactil	
» e ballot, no discernible	
» e presentation	
TA5 A-17	
» MUST be no discernible	
» o the voter.	
TA5 A-18 an audio	
» audit no discernible	
» ctile	» tactile
TA5 A-19 an audio a	
» udit no discernible	
» tile	
TA5 A-20 on a limited	TA5.2-A 41: For a limited
» ballot no	e ballot
» discernible	» no discernible differences in limited dexterity mode present
» ion	» ation to the voter.
TA5 21: For all ballot selections within a review screen on	TA5.2-A 42: For all ballot selections within a review screen o
» a limited MUST be no discernibl	» n a limited dexterity mode ballot, there MUST be no discerni

» e differences in limited dexterity mode presentation to the » voter. TA52A-22: For all undervotes within a review screen on a limit » ed dexterity mode ballot, there MUST be no discernible diffe » rences in limited dexterity mode presentation to the voter. TA52A-23: For all overvotes within a review screen on a limite » d dexterity mode ballot, there MUST be no discernible differ » ences in limited dexterity mode presentation to the voter. TA52A-24: For all audio voter verifiable audit records, there » MUST be no discernible differences in limited dexterity mode » presentation to the voter. TA52A-25: For all undervotes within a limited dexterity mode v » oter verifiable audit record, there MUST be no discernible d » ifferences in limited dexterity mode presentation to the vot » er. TA52A-26: For all overvotes within a limited dexterity mode au » dio voter verifiable audit record, there MUST be no discerni » ble differences in limited dexterity mode presentation to th » e voter.		» ble differences in limited dexterity mode presentation to th » e voter. TA5.2-A 43: For all undervotes within a review screen on a lim » ited dexterity mode ballot, there MUST be no discernible dif » ferences in limited dexterity mode presentation to the voter » . TA5.2-A 44: For all overvotes within a review screen on a limi » ted dexterity mode ballot, there MUST be no discernible diff » erences in limited dexterity mode presentation to the voter. TA5.2-A 45: For all audio voter verifiable audit records, ther » e MUST be no discernible differences in limited dexterity mo » de presentation to the voter. TA5.2-A 46: For all undervotes within a limited dexterity mode » voter verifiable audit record, there MUST be no discernible » differences in limited dexterity mode presentation to the v » oter. TA5.2-A 47: For all overvotes within a limited dexterity mode » audio voter verifiable audit record, there MUST be no discer » nible differences in limited dexterity mode presentation to » the voter.
5.2-C – Information in all modes	=	5.2-C – Information in all modes
TA52C-1: IF the voting system equipment used an interaction mo » de in accordance with 5.1-A - Voting methods and interaction » modes, THEN instructions to the voter MUST be presented in » that same mode. TA52C-2: IF the voting system equipment used an interaction mo » de in accordance with 5.1-A - Voting methods and interaction » modes, THEN warnings to the voter MUST be presented in that » same mode. TA52C-3: IF the voting system equipment used an interaction mo » de in accordance with 5.1-A - Voting methods and interaction » modes, THEN messages to the voter MUST be presented in that » same mode. TA52C-4: IF the voting system equipment used an interaction mo » de in accordance with 5.1-A - Voting methods and interaction » modes, THEN notifications of undervotes or overvotes MUST b » e presented in that same mode. TA52C-5: IF the voting system equipment used an interaction mo	<>	TA5.2-C 1: IF the voting system equipment used an interaction » mode in accordance with 5.1-A - Voting methods and interacti » on modes, THEN instructions to the voter MUST be presented i » n that same mode. TA5.2-C 2: IF the voting system equipment used an interaction » mode in accordance with 5.1-A - Voting methods and interacti » on modes, THEN warnings to the voter MUST be presented in th » at same mode. TA5.2-C 3: IF the voting system equipment used an interaction » mode in accordance with 5.1-A - Voting methods and interacti » on modes, THEN messages to the voter MUST be presented in th » at same mode. TA5.2-C 4: IF the voting system equipment used an interaction » mode in accordance with 5.1-A - Voting methods and interacti » on modes, THEN notifications of undervotes or overvotes MUST » be presented in that same mode. TA5.2-C 5: IF the voting system equipment used an interaction

» de in accordance with 5.1-A - Voting methods and interaction » modes, THEN contest options MUST be presented in that same » mode.		» mode in accordance with 5.1-A - Voting methods and interacti » on modes, THEN contest options MUST be presented in that sam » e mode.
5.2-D – Audio Synchronized		5.2-D – Audio synchronized
TA52D-1: The voting system MUST provide the option for synchro » nized audio output to convey the same information that is di » splayed visually to the voter, based on WCAG 2.0 and Section » 508 guidelines.		TA5.2-D 1: The voting system MUST provide the option for synch » ronized audio output to convey the same information that is » displayed visually to the voter, based on WCAG 2.0 and Secti » on 508 guidelines.
TA52D-2: The voting system MAY only convey a write-in is prese » nt for read back on a hand marked ballot and the write-in is » hand-written.		TA5.2-D 2: The voting system MAY only convey a write-in is pre » sent 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.		TA5.2-D 3: The voting system MUST convey electronic write-ins » to the voter exactly as they are entered.
5.2-E – Sound cues	=	5.2-E – Sound cues
TA52E-1: IF the voting system provides sound cues as a method » to alert the voter and the voting system is NOT in audio-onl » y mode THEN the tone MUST be accompanied by a visual cue.	<>	TA5.2-E.1 1: IF the voting system provides sound cues as a met » hod to alert the voter and the voting system is NOT in audio » -only mode THEN the tone MUST be accompanied by a visual cue » .
TA52E-2: IF the voting system provides sound cues as a method » to alert the voter and the voting system is in audio-only mo » de THEN the tone MUST NOT be accompanied by a visual cue.		TA5.2-E.1 2: IF the voting system provides sound cues as a met » hod to alert the voter and the voting system is in audio-onl » y mode THEN the tone MUST NOT be accompanied by a visual cue » .
TA52E-3: IF the voting system provides visual cues as a method » to alert the voter and the voting system is NOT in visual-o » nly mode THEN the visual cue MUST be accompanied by a sound » cue.		TA5.2-E.1 3: IF the voting system beeps when the voter attempt » s to overvote THEN there MUST be an equivalent visual cue.
TA52E-4: IF the voting system provides visual cues as a method » to alert the voter and the voting system is in visual-only » mode THEN the visual cue MUST NOT be accompanied by a sound » cue.		TA5.2-E.2 1: IF the voting system provides visual cues as a me » thod to alert the voter and the voting system is NOT in visu » al-only mode THEN the visual cue MUST be accompanied by a so » und cue.
TA52E-5: IF the voting system beeps when the voter attempts to » overvote THEN there MUST be an equivalent visual cue.		TA5.2-E.2 2: IF the voting system provides visual cues as a me » thod to alert the voter and the voting system is in visual-o » nly mode THEN the visual cue MUST NOT be accompanied by a so » und cue.
TA52E-5-1: The equivalent visual cue MAY be the appearance of » an icon.		TA5.2-E.2 3: The equivalent visual cue MAY be the appearance o » f an icon.
TA52E-5-2: The equivalent visual cue MAY be the appearance of » a blinking element.		TA5.2-E.2 4: The equivalent visual cue MAY be the appearance o » f a blinking element.

Principle 6		Principle 6 – Voter Privacy
6.1-C – Enabling or disabling output	=	6.1-C – Enabling or disabling output
TA61C-1: The voting system MUST allow the voter to independent » ly disable the audio output resulting in a video-only presen » tation. TA61C-2: The voting system MUST allow the voter to independent » ly disable the visual output resulting in an audio-only pres » entation. TA61C-3: IF the default audio output settings have been disabl » ed during the voting session, THEN the voting system MUST al » low the voter to independently re-enable the audio output. TA61C-4: IF the default visual output settings have been disab » led during the voting session, THEN the voting system MUST a » llow the voter to independently re-enable the visual output. TA61C-5: IF the voter enables or disables the video or audio o » utput THEN the voting system MUST notify the voter of the ch » ange by means of the output functionality that is enabled.	<>	TA6.1-C 1: The voting system MUST allow the voter to independe » ntly disable the audio output resulting in a video-only pres » entation. TA6.1-C 2: The voting system MUST allow the voter to independe » ntly disable the visual output resulting in an audio-only pr » esentation. TA6.1-C 3: IF the default audio output settings have been disa » bled during the voting session, THEN the voting system MUST » allow the voter to independently re-enable the audio output. TA6.1-C 4: IF the default visual output settings have been dis » abled during the voting session, THEN the voting system MUST » allow the voter to independently re-enable the visual outpu » t. TA6.1-C 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.
6.1-D – Audio privacy	=	6.1-D – Audio privacy
TA61D-1: IF the voting session is performed using an audio int » erface, THEN the auditory content and associated audio cues » MUST NOT be discernible to any other individual in the polli » ng 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 aud » itory content and associated audio cues are not discernible » to any other individual in the polling place without the vot » er’s consent. TA61D-2-1: Low sound leakage for headphone use MAY be consider » ed "efficient" if the audio content is indistinguishable to » other individuals. This is defined as an average sound measu » rement of 30 - 40 dB at either the minimum distance between » devices prescribed within manufacturer documentation, or 4 f » eet, at the default volume setting for a voting session. TA61D-3: IF ballot submission is performed using an audio inte » rface, THEN the voting system MUST prevent any individual in » the polling place (without the voter’s consent) from percei » ving any content on the ballot submitted by the voter during	<>	TA6.1-D 1: IF the voting session is performed using an audio i » nterface, THEN the auditory content and associated audio cue » s MUST NOT be discernible to any other individual in the pol » ling place without the voter’s consent. TA6.1-D 2: IF headphones are used with an audio interface, THE » N the headphones MUST have low sound leakage such that the a » uditory content and associated audio cues are not discernibl » e to any other individual in the polling place without the v » oter’s consent. TA6.1-D 3: Low sound leakage for headphone use MAY be consider » ed "efficient" if the audio content is indistinguishable to » other individuals. This is defined as an average sound measu » rement of 30 - 40 dB at either the minimum distance between » devices prescribed within manufacturer documentation, or 4 f » eet, at the default volume setting for a voting session. TA6.1-D 4: IF ballot submission is performed using an audio in » terface, THEN the voting system MUST prevent any individual » in the polling place (without the voter’s consent) from perc » eiving any content on the ballot submitted by the voter duri

» the voting session.		» ng the voting session.
TA61D-4: IF ballot submission is performed using an audio inte		TA6.1-D 5: IF ballot submission is performed using an audio in
» rface, THEN the voting system MUST prevent any individual in		» terface, THEN the voting system MUST prevent any individual
» the polling place (without the voter's consent) from percei		» in the polling place (without the voter's consent) from perc
» ving any input controls (and any interaction with these inpu		» eiving any input controls (and any interaction with these in
» t controls) on the visual interface used by the voter during		» put controls) on the visual interface used by the voter duri
» the ballot submission process.		» ng the ballot submission process.
TA61D-4-1: Input controls MAY include buttons, touchscreen inp		TA6.1-D 6: Input controls MAY include buttons, touchscreen inp
» ut, "sip and puff", and other forms of interaction with the		» ut, "sip and puff", and other forms of interaction with the
» voting system.		» voting system.
6.2-A - Voter Independence		6.2-A - Voter independence
TA62A-1: Voting system features and attributes which support v		TA6.2-A 1: Voting system features and attributes which support
» oter independence MUST follow the standards outlined in Chap		» voter independence MUST follow the standards outlined in Ch
» ters 3 through 5 of Section 508 Information and Communicatio		» apters 3 through 5 of Section 508 Information and Communicat
» n Technology (ICT) Final Standards and Guidelines.		» ion Technology (ICT) Final Standards and Guidelines.
The voting system MUST allow voters to independently mark thei	=	The voting system MUST allow voters to independently mark thei
» r ballots.		» r ballots.
TA62A-2: The voting system MUST allow voters to independently	<>	TA6.2-A 2: The voting system MUST allow voters to independentl
» mark their ballots.		» y mark their ballots.
TA62A-3: The voting system MUST allow voters to independently		TA6.2-A 3: The voting system MUST allow voters to independentl
» verify their ballots		» y verify their ballots
TA62A-4: The voting system MUST allow voters to independently		TA6.2-A 4: The voting system MUST allow voters to independentl
» cast their ballots		» y cast their ballots
TA62A-4-1: Ballot casting MAY be accomplished through a combin		TA6.2-A 5: Ballot casting MAY be accomplished through a combin
» ation of procedural and technical means.		» ation of procedural and technical means.
TA62A-4-2: The voting system MUST provide capability to indepe		TA6.2-A 6: The voting system MUST provide capability to indepe
» ndently cast a ballot by allowing a voter to irrevocably con		» ndently cast a ballot by allowing a voter to irrevocably con
» firm their intent to vote as selected without assistance fro		» firm their intent to vote as selected without assistance fro
» m an election worker or other person.		» m an election worker or other person.
TA62A-5: In order to be accessible to individuals with disabil		TA6.2-A 7: In order to be accessible to individuals with disab
» ities the voting system MUST ensure that these individuals h		» ilities the voting system MUST ensure that these individuals
» ave the same opportunity for access as for other voters.		» have the same opportunity for access as for other voters.
TA62A-6: In order to be accessible to individuals with disabil		TA6.2-A 8: In order to be accessible to individuals with disab
» ities the voting system MUST ensure that these individuals h		» ilities the voting system MUST ensure that these individuals
» ave the same opportunity for participation as for other vote		» have the same opportunity for participation as for other vo
» rs.		» ters.
TA62A-7: IF the voting system utilizes an end-to-end (E2E) arc		TA6.2-A.1 1: IF the voting system utilizes an end-to-end (E2E)
» hitecture with paper receipts THEN E2E paper receipts MUST b		» architecture with paper receipts THEN E2E paper receipts MU

» e accessible to individuals with disabilities. Principle 7		» ST be accessible to individuals with disabilities. Principle 7 – Marked, Verified, and Cast as Intended
7.1-A – Reset to default settings	=	7.1-A – Reset to default settings
TA71A-1: IF a voter changes any adjustable setting of the vote » r interface, during the voting session, THEN at the beginnin » g of the next voting session, that setting MUST have the ori » ginal default value. TA71A-2: IF a poll worker changes any adjustable setting of th » e voter interface, during the voting session, THEN at the be » ginning of the next voting session, that setting MUST have t » he original default value.	<>	TA7.1-A 1: IF a voter changes any adjustable setting of the vo » ter interface, during the voting session, THEN at the beginn » ing of the next voting session, that setting MUST have the o » riginal default value. TA7.1-A 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. 7.1-F – Using color TA7.1-F 1: All information that uses color for emphasis, MUST » be accompanied by some other non-color design element. 7.1-M – Audio comprehension TA7.1-M 1: For both recorded and synthetic speech the audio pr » esentation of verbal information MUST be readily comprehensi » ble by voters who have hearing loss no greater than 25 db. TA7.1-M 2: For both recorded and synthetic speech, the audio p » resentation of verbal information MUST be readily comprehens » ible by voters who are proficient in the language implemente » d and under test. TA7.1-M.1 1: For both recorded and synthetic speech, candidate » names MUST be capable of being pronounced as the candidate » intends. 7.2-D – Scrolling TA7.2-D.2.a 1: The fixed header or footer MAY contain the numb » er of allowable candidates the voter is still capable of sel » ecting.
7.2-H – Accidental activationTA72H-1: Voting system on-screen » controls MUST prevent accidental activation. TA72H-1-1: Detecting accidental activation to a voter’s touch » MUST be included in the manufacturer’s usability testing rep » ort per 8.3-A – Usability tests with voters. TA72H-1-2: Controls MUST NOT be placed in areas where users to » uch the device for support (e.g., device chassis, frame, scr » een bezel). TA72H-1-3: An on-screen navigational touch and lift motion MUS		7.2-H – Accidental activationTA7.2-H 1: Voting system on-scree » n controls MUST prevent accidental activation. TA7.2-H 2: Detecting accidental activation to a voter’s touch » MUST be included in the manufacturer’s usability testing rep » ort per 8.3-A – Usability tests with voters. TA7.2-H 3: Controls MUST NOT be placed in areas where users to » uch the device for support (e.g., device chassis, frame, scr » een bezel). TA7.2-H 4: An on-screen navigational touch and lift motion MUS

» T NOT result in the selection or deselection of any on-scree » n option (e.g., touch vote target scroll up and releasing sh » ould not activate any on-screen item). TA72H-1-4: An active, selectable area for a button MUST NOT ex » tend outside the visual bounds of the button or control. TA72H-1-5: An active, selectable area for any touch area MUST » NOT extend outside the visual bounds of the touch area or co » ntrol. TA72H-2: Voting system physical controls MUST prevent accident » al activation. TA72H-2-1: Detecting accidental activation to a voter’s touch » MUST be included in the manufacturer’s usability testing rep » ort per 8.3-A – Usability tests with voters. TA72H-2-2: Controls MUST NOT be placed in areas where users to » uch the device for support (e.g., device chassis, frame, scr » een bezel).		» T NOT result in the selection or deselection of any on-scree » n option (e.g., touch vote target scroll up and releasing sh » ould not activate any on-screen item). TA7.2-H 5: An active, selectable area for a button MUST NOT ex » tend outside the visual bounds of the button or control. TA7.2-H 6: An active, selectable area for any touch area MUST » NOT extend outside the visual bounds of the touch area or co » ntrol. TA7.2-H 7: Voting system physical controls MUST prevent accide » ntal activation. TA7.2-H 8: Detecting accidental activation to a voter’s touch » MUST be included in the manufacturer’s usability testing rep » ort per 8.3-A – Usability tests with voters. TA7.2-H 9: Controls MUST NOT be placed in areas where users to » uch the device for support (e.g., device chassis, frame, scr » een bezel).
7.2-I Touch area	=	
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 inch » es) 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 inche » s) for the purpose of touch screen calibration ONLY. 7.1-M – Audio comprehension TA71M-1: For both recorded and synthetic speech the audio pres » entation of verbal information MUST be readily comprehensibl » e by voters who have hearing loss no greater than 25 db. TA71M-2: For both recorded and synthetic speech, the audio pre » sentation of verbal information MUST be readily comprehensib » le by voters who are proficient in the language implemented » and under test. TA71M-3: For both recorded and synthetic speech, candidate nam » es MUST be capable of being pronounced as the candidate inte » nds.	<>	TA7.2-I.1 1: Touch targets MAY be smaller than 12.7 mm (0.5 in » ches) in vertical and horizontal dimensions for the purpose » of touch screen calibration ONLY. TA7.2-I.2 1: Touch targets MAY be closer than 2.54 mm (0.1 inc » hes) for the purpose of touch screen calibration ONLY.

7.2-P – Floor space	=	7.2-P – Floor space
TA72P-1: For the floor area, intended for use by the voter, th » e voting system MUST be operable, when set up according to t » he documentation supplied by the manufacturer, on a floor sp » ace positioned for a forward approach or positioned for a pa » rallel approach. TA72P-2: The voting system MUST allow adequate room for an ass » istant to the voter, when deployed according to the installa » tion instructions. TA72P-2-1: Adequate room for the assistant SHALL include clear » ance for entry to the voting station. TA72P-2-2: Adequate room for the assistant SHALL include clear » ance for exit from the voting station.	<>	TA7.2-P 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. TA7.2-P.2 1: The voting system MUST allow adequate room for an » assistant to the voter, when deployed according to the inst » allation instructions. TA7.2-P.2 2: Adequate room for the assistant MUST include clea » rance for entry to the voting station. TA7.2-P.2 3: Adequate room for the assistant MUST include clea » rance for exit from the voting station.
7.2-R – Control labels visible	=	7.2-R – Control labels visible
TA72R-1: Labels on the voting system, used for control, necess » ary for the voter to operate the voting system, MUST be plac » ed on a surface of the voting system where they are visible » and legible to voters with normal eyesight (no worse than 20 » /40 corrected) from a seated posture. TA72R-2: Labels on the voting system, used for control, necess » ary for the voter to operate the voting system, MUST be plac » ed on a surface of the voting system where they are visible » and legible to voters with normal eyesight (no worse than 20 » /40 corrected) from a standing posture.	<>	TA7.2-R.1 1: Labels on the voting system, used for control, ne » cessary for the voter to operate the voting system, MUST be » placed on a surface of the voting system where they are visi » ble and legible to voters with normal eyesight (no worse tha » n 20/40 corrected) from a seated posture. TA7.2-R.1 2: Labels on the voting system, used for control, ne » cessary for the voter to operate the voting system, MUST be » placed on a surface of the voting system where they are visi » ble and legible to voters with normal eyesight (no worse tha » n 20/40 corrected) from a standing posture.
7.3-E – Feedback	=	7.3-E – Feedback
TA73E-1: After making a selection, a voting system MUST provid » e, to the voter, an unambiguous visual difference between se » lected choice(s) and the non-selected choices within a given » contest. TA73E-1-1: IF the voting system uses a visual interface, THEN » the voting system MAY indicate the selection of candidates a » nd 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 candida » tes 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	<>	TA7.3-E 1: After making a selection, a voting system MUST prov » ide, to the voter, an unambiguous visual difference between » selected choice(s) and the non-selected choices within a giv » en contest. TA7.3-E 2: IF the voting system uses a visual interface, THEN » the voting system MAY indicate the selection of candidates a » nd choices by the voter by displaying a checkmark beside the » selected option. TA7.3-E 3: IF the voting system uses a visual interface, THEN » then the voting system MAY indicate the selection of candida » tes and choices by the voter by displaying an “X” beside the » selected option. TA7.3-E 4: IF the voting system uses a visual interface, THEN

» then the voting system MAY indicate the selection of candida » tes and choices by the voter by conspicuously changing its a » ppearance. TA73E-1-4: IF the voting system uses a visual interface, THEN » then the voting system MAY indicate the selection of candida » tes and choices by the voter by the use of highlighting arou » nd the chosen option. TA73E-2: IF a voting system implements an audio interface, THE » N after making a selection, a voting system MUST provide, to » the voter, an audio confirmation of the selected contest ch » oice(s) within a given contest. TA73E-2-1: IF the voting system uses an audio interface, THEN » then the voting system MAY provide a spoken confirmation aft » er making a selection.		» then the voting system MAY indicate the selection of candida » tes and choices by the voter by conspicuously changing its a » ppearance. TA7.3-E 5: IF the voting system uses a visual interface, THEN » then the voting system MAY indicate the selection of candida » tes and choices by the voter by the use of highlighting arou » nd the chosen option. TA7.3-E 6: IF a voting system implements an audio interface, T » HEN after making a selection, a voting system MUST provide, » to the voter, an audio confirmation of the selected contest » choice(s) within a given contest. TA7.3-E 7: IF the voting system uses an audio interface, THEN » then the voting system MAY provide a spoken confirmation aft » er making a selection.
7.3-K – Warnings, alerts, and instructions	=	7.3-K – Warnings, alerts, and instructions
TA73K-1: All warnings issued by the voting system MUST be dist » inguishable from other information. TA73K-2: All alerts issued by the voting system MUST be distin » guishable from other information. TA73K-3: All instructions issued by the voting system MUST be » distinguishable from other information. TA73K-4-: All warnings and alerts issued by the voting system » MUST clearly state the nature of the problem, in plain langu » age. TA73K-5: All warnings and alerts issued by the voting system M » UST clearly state, in plain language, whether the voter has » performed an invalid operation or whether the voter has atte » mpted 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 p » lain language. TA73K-7: IF the voting equipment malfunctions, THEN a warning » issued by the voting system related to this malfunction MUST » include information pertaining to this malfunction. TA73K-8: IF the voter attempts an invalid operation, THEN a wa » rning issued by the voting system related to this attempt MU » ST include information pertaining to this attempt.	<>	TA7.3-K.1.a 1: All warnings and alerts issued by the voting sy » stem MUST clearly state the nature of the problem, in plain » language. TA7.3-K.1.b 1: All warnings and alerts issued by the voting sy » stem MUST clearly state, in plain language, whether the vote » r has performed an invalid operation or whether the voter ha » s attempted an invalid operation or whether the voting syste » m has malfunctioned. TA7.3-K.1.b 2: IF the voting equipment malfunctions, THEN a wa » rning issued by the voting system related to this malfunctio » n MUST include information pertaining to this malfunction. TA7.3-K.1.b 3: IF the voter attempts an invalid operation, THE » N a warning issued by the voting system related to this atte » mpt MUST include information pertaining to this attempt. TA7.3-K.1.b 4: IF the voter performs an invalid operation, THE » N a warning issued by the voting system related to this perf » ormance MUST include information pertaining to this performa

TA73K-9: IF the voter performs an invalid operation, THEN a wa » rning issued by the voting system related to this performanc » e 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 instructio » ns 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.		» nce. TA7.3-K.1.c 1: All warnings and alerts issued by the voting sy » stem MUST clearly state the responses available to the voter » in plain language. TA7.3-K.2 1: Each distinct instruction MUST be separated from » all other instructions. TA7.3-K.2 2: 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. TA7.3-K.2.a 1: IF the interface is a visual interface, THEN ea » ch distinct instruction MUST be separated spatially from oth » er instructions. TA7.3-K.2.b 1: IF the interface is an audio interface, THEN ea » ch distinct instruction MUST be separated from other instruc » tions by a noticeable pause.
7.3-O – Instructions for election workers	=	7.3-O – Instructions for election workers
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 con » form to best practices for plain language.	<>	TA7.3-O 1: In order to make instructions clear the instruction » s MUST conform to best practices for plain language. TA7.3-O 2: In order to make messages clear the messages MUST c » onform to best practices for plain language.
7.3-P – Plain language	=	7.3-P – Plain language
TA73P-1: Instructional material for the voter that is inherent » to the voting system MUST conform to best practices for pla » in language. TA73P-2: Instructional material for the voter that is generate » d by default MUST conform to best practices for plain langua » ge. TA73P-3: Instructional material for the election worker that i » s inherent to the voting system MUST conform to best practic » es for plain language. TA73P-4: Instructional material for the election worker that i » s generated by default MUST conform to best practices for pl » ain language. TA73P-5: Best practices for plain language MAY include Guideli » nes for Writing Clear Instructions and Messages for Voters a » nd Poll Workers (Redish, Laskowski, NIST Interagency Report » 7596, Guidelines for Writing Clear Instructions and Messages » for Voters and Poll Workers, 2009).	<>	TA7.3-P 1: Instructional material for the voter that is inhere » nt to the voting system MUST conform to best practices for p » lain language. TA7.3-P 2: Instructional material for the voter that is genera » ted by default MUST conform to best practices for plain lang » uage. TA7.3-P 3: Instructional material for the election worker that » is inherent to the voting system MUST conform to best pract » ices for plain language. TA7.3-P 4: Instructional material for the election worker that » is generated by default MUST conform to best practices for » plain language. TA7.3-P 5: Best practices for plain language MAY include Guide » lines for Writing Clear Instructions and Messages for Voters » and Poll Workers (Redish, Laskowski, NIST Interagency Repor » t 7596, Guidelines for Writing Clear Instructions and Messag » es 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, T » HEN the condition SHOULD be stated first, and then the actio » n 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 speciali » zed words that voters are not likely to understand. TA73P-11: The voting system SHOULD issue instructions on the c » orrect way to perform actions, rather than telling voters wh » at not to do. TA73P-12: The system's instructions SHOULD address the voter d » irectly rather than use passive voice constructions. TA73P-13: The voting system SHOULD avoid the use of gender-bas » ed pronouns. Principle 8	TA7.3-P 6: Best practices for plain language MAY include https » ://www.plainlanguage.gov/ TA7.3-P 7: IF an instruction is based on a limiting condition, » THEN the condition SHOULD be stated first, and then the act » ion to be performed SHOULD be stated after that. TA7.3-P 8: The voting system SHOULD use familiar words. TA7.3-P 9: The voting system SHOULD use common words. TA7.3-P 10: The voting system SHOULD avoid technical or specia » lized words that voters are not likely to understand. TA7.3-P 11: The voting system SHOULD issue instructions on the » correct way to perform actions, rather than telling voters » what not to do. TA7.3-P 12: The system's instructions SHOULD address the voter » directly rather than use passive voice constructions. TA7.3-P 13: The voting system SHOULD avoid use of gender-b » ased pronouns. Principle 8 – Robust,
TA8 or handsets that can be » provided as part TA8 » ons on-screen on how or sanitize hand » sets. TA8 » ons in on how or sanitize han » dsets. TA8 a means t » o sanitize headphones or sanitize headsets. TA8 H-4-1 or handset » s MAY single-use headphones. TA8 H-4-2 or handset » s MAY	TA8.1-H or handsets that can be » e provided as part TA8.1-H » tions on-screen on how or sanitize ha » ndsets. TA8.1-H » tions on how or sanitize h » andsets. TA8.1-H a means » to or sanitize headsets. TA8.1-H or handset » s MAY single-use headphones. TA8.1-H or handset » s MAY
TA8 » ts on the TA8 A-1-1 a vo » ter session. TA8	TA8.3-A » ests on the TA8.3-A in a vo » ter session.

» n.	
TA83A-1-1-2: Voter activities MUST end with verification and c	
» asting.	
TA83A-2: The usability tests MUST be performed upon a complete	TA8.3-A 4: Voter activities MUST end with verification and cas
» ly functioning product.	» ting.
	TA8.3-A 5: The usability tests MUST be performed upon a comple
	» tely functioning product.
	TA8.3-A 6: The test ballot used in the usability tests SHOULD
	» look like a real ballot, such as the NIST test ballot.
	TA8.3-A 7: The test ballot used in the usability tests SHOULD
	» have at least 12 contests.
	TA8.3-A 8: The test ballot used in the usability tests SHOULD
	» have at least 2 ballot questions.
	TA8.3-A 9: The test ballot used in the usability tests SHOULD
	» have at least 5 propositions.
	TA8.3-A 10: The test ballot used in the usability tests SHOULD
	» have at least one multiple-vote contest.
	TA8.3-A 11: The test ballot used in the usability tests SHOULD
	» have at least one write-in contest.
	TA8.3-A 12: The test script used in the usability tests, condu
	» cted by the manufacturer, MUST be realistic.
	TA8.3-A 13: The test script MUST enable testing of all valid o
	» perations for the voter interface under test.
	TA8.3-A 14: The testing environment for the usability tests, c
	» onducted by the manufacturer, MUST be realistic.
	TA8.3-A 15: The testing environment MUST be set up as it would
	» be in a polling place.
	TA8.3-A 16: The usability tests conducted by the manufacturer
	» MAY use the NIST medium complexity test ballot.
	TA8.3-A 17: Manufacturers MAY define their own testing protoco
	» ls for the usability tests.
TA83A-3: Test participants MUST be representative of the gener	TA8.3-A.1 1: Test participants MUST be representative of the g
» al population.	» eneral population.
TA83A-4: The visual interface MUST be used.	TA8.3-A.1 2: The visual interface MUST be used.
TA83A-4-1: The population under test MUST consist of a mix of	TA8.3-A.1 3: The population under test MUST consist of a mix o
» voters including, but not limited to, users of different age	» f voters including, but not limited to, users of different a
» s, genders, ethnicities, levels of education, voting experie	» ges, genders, ethnicities, levels of education, voting exper
» nce.	» ience.
	TA8.3-A.1 4: The population under test MUST consist of voters
	» who are eligible to vote in the U.S.

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                                                  TA8.3-A.1 5: The population under test MUST NOT consist of vot
                                                  » ers who are, or have been, a poll worker, a voting machine m
                                                  » anufacturer, a voting machine developer, in the marketing or
                                                  »  sales of voting systems, or involved in any other position
                                                  » that is part of the voting process.
                                                  TA8.3-A.1 6: The population under test MUST NOT consist of vot
                                                  » ers who are involved with a usability or market research bus
                                                  » iness/company.
                                                  TA8.3-A.1 7: The population under test SHOULD NOT consist of v
                                                  » oters who have previously participated in a voting system us
                                                  » ability test.
                                                  TA8.3-A.1 8: The manufacturer SHOULD ensure that at least 30 t
                                                  » est participants are able to complete the testing session.
 TA838A-5: Each language supported by the voting  TA8.3-A.1.a 1: Each language supported by the voting system MU
» ave a test participant who speaks that language. » ST have a test participant who speaks that language.
TA838A-5-1: This test participant must speak the  TA8.3-A.1.a 2:                                    non-Englis
» anguage they are assigned to test as their pri» h               are assigned         as their
                                                  » ge.
TA83A-6: Test participants MUST include blind vot TA8.3-A.1.b
»  audio format.                                  » d
TA83A-6-1: The visual                             TA8.3-A.
» e less             or these                     » ST                     or these
»  use the low-vision                             » e to use the low-vision
TA8 A-7                                           TA8.3-A.1.b
» tile controls.                                  » d
TA8 A-7-1                                         TA8.3-A.
» e less             or these                     » ST                     or these
»  use the low-vision                             » e to use the low-vision
                                                  TA8.3-A.1.b                          ensure that
                                                  » t                                     are able
                                                  » he
                                                  TA8.3-A.1.b
                                                  » st 10 - 12                                      ensur
                                                  » e that                                 are able to
                                                  » complete
TA8 A-8                                           TA8.3-A.1.c
»  who use the enhanced visual interface with or  » vision who use the enhanced visual interface with or without
» .                                               »  audio.
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TA83A-8-1: The usability tests MUST use individuals whose visu
» al acuity is less than 20/70 but greater than or equal to 20
» /200.
TA83A-8-2: The usability tests MUST use individuals who can on
» ly read large-print, high contrast text.
TA83A-8-3: The summative usability tests MUST NOT use individu
» als who can read normal-sized text, even when wearing glasse
» s or contacts, unless held very close to their face.
TA83A-8-4: The manufacturer MUST ensure that at least eight in
» dividuals with low vision are able to complete the testing s
» ession, without assistance.
TA83A-8-5: The manufacturer SHOULD initially target at least 1
» 0 - 12 individuals with low vision, in order to ensure that
» at least 8 individuals with low vision individuals are able
» to complete the testing sessions.
TA8 A-9
» xterity a pencil) who use the visua
» l
TA8 A-9-1 ensure that
» st are able
» the
TA8 A-9-2
» 0 - 12 ensu
» re that are ab
» le
TA83A-10:
» are eligible
TA83A-11:
» who are, or have been, a poll worker, a voting machine manu
» facturer, a voting or sa
» les or involved
» t
TA83A-12:
» who are involved with a usability or market
» ss/company.
TA83A-13: of vote
» rs who have previously participated in a voting system usabi
» lity test.

TA8.3-A.1.c 2: The usability tests MUST use individuals whose
» visual acuity or equal t
» o 20/200.
TA8.3-A.1.c who ca

TA8.3-A.1.d 2: manufacturer MUST ensure that
t are able
» ete the testing session, without assistance.
TA8.3-A.1.d 3: The manufacturer SHOULD initially target at lea
» st 10 - 12 participants with limited dexterity, in order to
» ensure that at least 8 individuals with limited dexterity ar
» e able to complete the testing sessions.

TA83A-14: The manufacturer MUST report the total number of par	TA8.3-A.2 1: The manufacturer MUST report the total number of
» ticipants tested and demographics of the participants.	» participants tested and demographics of the participants.
TA83A-15: Manufacturers SHOULD describe their recruiting strat	TA8.3-A.2 2: Manufacturers SHOULD describe their recruiting st
» egy.	» rategy.
TA83A-16: The manufacturer SHOULD detail any compensation give	TA8.3-A.2 3: The manufacturer SHOULD detail any compensation g
» n to participants.	» iven to participants.
TA83A-17: The manufacturer MUST describe how the voters were s	TA8.3-A.2 4: The manufacturer MUST describe how the voters wer
» creened and selected.	» e screened and selected.
TA83A-18: The manufacturer SHOULD note any differences between	TA8.3-A.2 5: The manufacturer SHOULD note any differences betw
» the users profiled as recruits and the users who participat	» een the users profiled as recruits and the users who partici
» ed in the actual study.	» pated in the actual study.
TA83A-19: The manufacturer MUST ensure that at least eight bli	
» nd test participants are able to complete the testing sessio	
» n, without assistance.	
TA83A-19-1: The manufacturer SHOULD initially target at least	
» 10 - 12 blind participants, in order to ensure that at least	
» 8 blind individuals are able to complete	
» ns.	
TA83A-20: ensure that	
» participants are able	
TA8 A-21 a	TA8.3-A.2 6: The manufacturer SHOULD include detailed tables o
» ll or not	» f all participant demographics, or not
» he test, as an appendix	» d as an appendix
TA8 A-22	TA8.3-A.2
» l or not	» all or not u
» g	» sing
» F-for-Voting Systems).	» (CIF-for-Voting Systems).
TA8 A-22-1 use the	TA8.3-A.2 use the
» ate as a template sem	» late as a template se
» antics,	» mantics,
TA8 A-22-2 ensure that	TA8.3-A.2 ensure that
» st	» est
» mon Industry	» mmon Industry
TA8 A-22-3 ensure that	TA8.3-A.2 ensure that
» st	» test
» Industry	» on Industry
TA8 A-22-4	TA8.3-A.2 The usability test report MUST be submitted to t
» EAC as part of the documentation manufacturers are required	

» to file with the application to test a voting system. TA83A-23: Manufacturers MAY define their own testing protocols » for the usability tests. TA83A-24: The Technical Data Package submitted to the EAC for » national certification MUST contain the Usability Test Repor » t. TA83A-25-1: The usability tests MUST measure metrics for effic » iency, effectiveness, and satisfaction as defined in the ISO » /CIF standard (ISO/IEC 25062:2006). TA83A-25-1: The usability tests MUST report metrics for effici » ency, effectiveness, and satisfaction as defined in the ISO/ » CIF standard (ISO/IEC 25062:2006). TA83A-25: The test ballot used in the usability tests, conduct » ed by the manufacturer, MUST be realistic. TA83A-26: The test ballot used in the usability tests SHOULD l » ook like a real ballot, such as the NIST test ballot. TA83A-27: The test ballot used in the usability tests SHOULD h » ave at least 12 contests. TA83A-28: The test ballot used in the usability tests SHOULD h » ave at least 2 ballot questions. TA83A-29: The test ballot used in the usability tests SHOULD h » ave at least 5 propositions. TA83A-30: The test ballot used in the usability tests SHOULD h » ave at least one multiple-vote contest. TA83A-31: The test ballot used in the usability tests SHOULD h » ave at least one write-in contest. TA83A-32: The test script used in the usability tests, conduct » ed by the manufacturer, MUST be realistic. TA83A-33: The test script MUST enable testing of all valid ope » rations for the voter interface under test. TA83A-34: The testing environment for the usability tests, con » ducted by the manufacturer, MUST be realistic. TA83A-35: The testing environment SHOULD be set up as it would » be in a polling place. TA83A-36: The usability tests conducted by the manufacturer MA » Y use the NIST medium complexity test ballot.		» ed to file with the application to test a voting system. TA8.3-A.2 12: The Technical Data Package submitted to the EAC » for national certification MUST contain the Usability Test R » eport. TA8.3-A.2 13: The usability tests MUST measure metrics for eff » iciency, effectiveness, and satisfaction as defined in the I » SO/CIF standard (ISO/IEC 25062:2006).
8.4-A – Usability tests with election workers	=	8.4-A – Usability tests with election workers
TA84A-1: The documentation required for normal voting system o	<>	TA8.4-A 1: The documentation required for normal voting system

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» peration MUST be presented at a level appropriate for electi
» on workers who are not experts in voting system and computer
»  technology.
TA84A-1-1: The documentation SHOULD NOT presuppose familiarity
»  with personal    computers.
TA84A-2: The instructions MUST enable the election worker to v
» erify that the voting system has been set up correctly (setu
» p).
TA84A-3: The instructions MUST enable the election worker to v
» erify that the voting system is in correct working order to
» record votes (polling).
TA84A-4: The instructions MUST enable the election worker to v
» erify that the voting system          shut      c
» hutdown).
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TA8 A-5         s      setup, as docum
» r, MUS     r          e                              wo
» o l
TA8 A-6                      as documented
» r,
» o unde
TA8 A-7                      as documented
» r,
» o p
TA8 A-8                        as documented
» rer,
»  to
```

```
TA8 A-9         s               as docum
» r    MUS     r          e                    e    ion worker
»  to understand.
TA8             system polling, as documented by the manufact
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»  operation MUST be presented at a level appropriate for elec
» tion             are not
     technology.
TA8.4-A 2: The documentation SHOULD NOT presuppose familiarity
»  with personal computers.
TA8.4-A 3: Voting system polling, as documented by the manufac
» turer, MUST be reasonably easy for the typical election work
» er to learn.
TA8.4-A 4: Voting system polling, as documented by
» turer, MUST    r          e
» er to understand.
TA8.4-A 5: Voting system polling, as documented by the manufac
» turer, MUST be reasonably easy for the typical election work
» er to perform.
TA8.4-A.1 1: The                                          se
» tup.
TA8.4-A.1 2: The usability tests MUST include opening the voti
» ng system.
TA8.4-A.1 3: The instructions MUST enable the election worker
» to verify that the voting system has been set up correctly (
» setup).
TA8.4-A.1 4: Voting system setup, as documented by the manufac
» turer, MUST be reasonably easy for the typical election work
» er to learn.
TA8.4-A.1 5: Voting system setup, as documented by the manufac
» turer, MUST be reasonably easy for the typical election work
» er to understand.
TA8.4-A.1 6: Voting system setup, as documented by the manufac
» turer, MUST be reasonably easy for the typical election work
» er to perform.
TA8.4-A.1 7: The usability tests MUST include voting system po
» lling.
TA8.4-A.1.a 1: The usability tests MUST include operation duri
» ng voting.
TA8.4-A.1.a 2: The instructions MUST enable the election worke
» r to verify that the voting system is in correct working ord
» er to record votes (polling).
TA8.4-A.1.b 1: IF they are part of the voting system THEN the
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» urer, MUST be reasonably easy for the typical election worke
» r to perform.

TA84A-11: Voting system shutdown, as documented by the manufac
» turer, MUST be reasonably easy for the typical election work
» er to learn.
TA84A-12: Voting system shutdown, as documented by the manufac
» turer, MUST be reasonably easy for the typical election work
» er to understand.
TA84A-13: Voting system shutdown, as documented by the manufac
» turer, MUST be reasonably easy for the typical election work
» er to perform.
TA84A-14: The manufacturer MUST conduct realistic usability te
» sts on the
» s.
TA8 A-15 MUST
» workers and c a mix including, bu
» imited o a e
» levels of e and voting ex
TA84A-16:
» .
TA8 A-16-
» he voting s
TA8 16-2
» in
TA8 16-3 cor
» rect
TA8 16-4 vo
» ting use different
TA84A-17:
» ng.
TA84A-17-1:
» during voting.
TA8 17-2 are part usa
» bility use of a echnology and/or
» language options.
TA84A-18:

» usability tests MUST include use of assistive technology and
» /or language options.
TA8.4-A.1.c 1: The usability tests MUST include voting system
» shutdown.
TA8.4-A.1.c 2: IF it is supported by the voting system THEN th
» e usability tests MUST include shutdown at the end of a voti
» ng day during a multi-day early voting period.
TA8.4-A.1.c 3: The instructions MUST enable the election worke
» r to verify that the voting system has been shut down correc
» tly (shutdown).
TA8.4-A.1.c 4: Voting system shutdown, as documented by the ma
» nufacturer, MUST be reasonably easy for the typical election
» worker
TA8.4-A.1.c as documented ma
» nufacturer, MUST be rea e
» worker
TA8.4-A.1.c shutdown, as documente ma
» n MUS r e the t e
» worker

TA8.4-A.1.d at th
» e e an
TA8.4-A.1.e
» ots
TA8.4-A.1.f
» correct
TA8.4-A.1.g
» voting use different

TA8.4-A.2 MUST co r
» tests on the voting system with representative election wor
» kers.

» own.	
TA84A-18-1: IF it is supported by the voting system THEN the u	TA8.4-A.2 2: The test participants MUST include typical electi
» sability tests MUST include shutdown at the end of a voting	» on workers and consist of a mix of workers including, but no
» day during a multi-day early voting period.	» t limited to, workers of different ages, genders, ethnicitie
	» s, levels of education, and voting experience.
TA84A-18-2: The usability tests MUST include shutdown at the e	
» nd of voting including any reports.	
TA84A-19: The manufacturer MUST ensure that the election worke	TA8.4-A.3 1: The manufacturer MUST ensure that the election wo
» rs usability documentation/report is included in the TDP.	» rkers usability documentation/report is included in the TDP.
TA84A-20: The election workers usability test report MUST be s	TA8.4-A.3 2: The election workers usability test report MUST b
» ubmitted to the EAC in the Common Industry Format modified f	» e submitted to the EAC in the Common Industry Format modifie
» or voting systems (CIF-for-Voting Systems).	» d for voting systems (CIF-for-Voting Systems).
TA84A-20-1: The manufacturer MUST ensure that the usability te	TA8.4-A.3 3: The manufacturer MUST ensure that the usability t
» st report conforms to the formatting requirements of the Com	» est report conforms to the formatting requirements of the Co
» mon Industry Format (CIF).	» mmon Industry Format (CIF).
TA84A-20-2: The manufacturer MUST ensure that the usability te	TA8.4-A.3 4: The manufacturer ensure that
» st	» est
» Industry Format.	» n Industry Format.
TA8 A-20-	TA8.4-A.
» EAC as part	» e EAC as part documentation manufacturers are require
	» d a voting system.
documen are re fi wi	TA8.4-A.3 u re
» ication to test a vo	» l
	» est a
Principle 9	Principle 9 – Auditable
TA9 or error in so	TA9.1.1-A or error in
» ftware or hardware	» software or hardware
» election results.	» in
TA9 A-1- a voting a paper-based	TA9.1.1-A.1 a voting a paper-based
» MUST generate a paper	» it a paper
TA9 A-1- a voting an E2E	TA9.1.1-A.1 a voting an E2E
» roduce as	» T
» defined – Evidence export.	» as defined – Evidence export.
TA9 a detai	TA9.1.1-A. a
» led	» detailed voting system achieves softw
» ndependence.	» are independence.

TA912A-1: Tamper-evident records produced by voting systems MU » ST enable detection of incorrect election outcomes. Such rec » ords may include, but are not limited to, paper records, CVR » s, ballot images, and artifacts from a cryptographic E2E ver » ifiable voting TA912A-2: For each ballot cast by the voter, the voting system » MUST capture the contents of each vote at the time the ball » ot 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 t » ime the ballot is cast or the voting system MUST generate E2 » E artifacts for each vote at the time the ballot is cast. TA912A-4: All detected errors MUST be recorded in a manner tha » t » on or access to	TA9.1.2-A 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 TA9.1.2-A.1 1: For each ballot cast by the voter, the voting s » ystem MUST capture the contents of each vote at the time the » ballot is cast. TA9.1.2-A.1 2: For each ballot cast by the voter, the voting s » ystem MUST EITHER capture the paper record for each vote at » the time the ballot is cast or the voting system MUST genera » te E2E artifacts for each vote at the time the ballot is cas » t. TA9.1.2-A.2 errors MUST a manne » r that » ication or access to
TA9 are eas » ily an election » e from or the use of addition » al » .	TA9.1.4-A are » easily an election » ance from or the use of addit » ional » tem.
TA915C-1: » a human-readable format. TA9 C-1-2 non-human-readable b » allot or QR » be a human-re » adable format. TA9 human-readable » selections	TA9.1.5-C non-human-readable » ballot or QR » T a human-r » eadable format. TA9.1.5-C human-readable » ot 9.1.5-G – Preserving TA9.1.5-G a unique identifier o » n ballots. TA9.1.5-G » in a different TA9.1.5-G only be capable of printin

		TA9.1.5-G 4: The printing process SHOULD be preserved regardle » ss of software or hardware updates.
9.1.6-E – Ballot receipt	=	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 wer » e included in the reported election outcome. TA916E-1-1: Ballot receipts and their verification MUST confor » m to all applicable accessibility requirements in the VVSG. TA916E-1-2: Ballot receipts MUST conform to all applicable vot » er-privacy requirements in the VVSG.	<>	TA9.1.6-E 1: The voting system MUST provide voters with a rece » ipt that allows them to verify that their ballot selections » were included in the reported election outcome. TA9.1.6-E 2: Ballot receipts and their verification MUST confo » rm to all applicable accessibility requirements in the VVSG. » TA9.1.6-E 3: Ballot receipts MUST conform to all applicable vo » ter-privacy requirements in the VVSG.
9.1.6-G – Evidence export	=	9.1.6-G – Evidence export
TA916G-1: Cryptographic E2E voting systems MUST be capable of » exporting cryptographic evidence supporting the verification » of ballot tabulation. TA916G-1-1: Cryptographic evidence MUST NOT violate ballot sec » recy. TA916G-2: Cryptographic E2E voting systems MUST provide the cr » yptographic evidence in a non-proprietary and publicly avail » able format.	<>	TA9.1.6-G 1: Cryptographic evidence MUST NOT violate ballot se » crecy. TA9.1.6-G.1 1: Cryptographic E2E voting systems MUST be capabl » e of exporting cryptographic evidence supporting the verific » ation of ballot tabulation. TA9.1.6-G.2 1: Cryptographic E2E voting systems MUST provide t » he cryptographic evidence in a non-proprietary and publicly » available format. 9.1.6-H – Mandatory ballot availability TA9.1.6-H 1: The voting system MUST provide evidence in such a » manner that it may be published and made accessible to vote » rs.
9.1.6-K – Privacy preserving, universally verifiable ballot ta » bulation	=	9.1.6-K – Privacy preserving, universally verifiable ballot ta » bulation
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 sequentiall » y with identifiable information that could violate voter pri » vacy; this includes but is not limited to date or time stamp » s, language preference, or methods of accessibility used.	<>	TA9.1.6-K 1: The voting system records MUST NOT be generated i » n a proprietary format in order for auditors or observers to » perform verification. TA9.1.6-K 2: The voting system MUST NOT store records sequenti » ally with identifiable information that could violate voter » privacy; this includes but is not limited to date or time st » amps, language preference, or methods of accessibility used.
9.4-A – Risk-limiting audit	=	9.4-A – Risk-limiting audit
TA94A-1: IF a voting system uses a paper-based architecture, T » HEN the system MUST support an evidence-based election, whic	<>	TA9.4-A 1: IF a voting system uses a paper-based architecture, » THEN the system MUST support an evidence-based election, wh

» h 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 (C » VRs), 9.4-C - Unique ballot identifiers, and 9.4-D - Multipa » ge ballots.		» ich allows election officials to conduct a risk-limiting aud » it. TA9.4-A 2: A voting system MAY be considered “efficient” IF it » meets requirements 4.1-C - Exchange of cast vote records (C » VRs), 9.4-C - Unique ballot identifiers, and 9.4-D - Multipa » ge ballots.
9.4-C – Unique ballot identifiers	=	9.4-C – Unique ballot identifiers
TA94C-1: The voting system MUST EITHER have the capability of » preserving the ballot scanning order or MUST be capable of a » ffixing a unique ballot identifier such as scanner ID, batch » ID, or ballot card number.	<>	TA9.4-C 1: The voting system MUST EITHER have the capability o » f preserving the ballot scanning order or MUST be capable of » affixing a unique ballot identifier such as scanner ID, bat » ch ID, or ballot card number.
9.4-D – Multipage ballots	=	9.4-D – Multipage ballots
TA94D-1: IF a voting system is being used to conduct a risk-li » miting 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 the order of » ballots scanned or MUST be capable of affixing a unique bal » lot 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 affixed page num » ber or unique ballot card identifier for each record in the » CVR report. Principle 10	<>	TA9.4-D 1: The voting system MUST be capable of affixing a uni » que ballot identifier to each page of a multipage ballot as » per 9.4-C - Unique ballot identifiers. TA9.4-D 2: The voting system MUST specify the affixed page num » ber or unique ballot card identifier for each record in the » CVR report. Principle 10 – Ballot Secrecy
10.1-A – System use of voter information	=	10.1-A – System use of voter information
TA101A-1: The voting system MUST NOT have the capability to ac » cept any identifying information about any voter. TA101A-1-1: The voting system MUST NOT have the capability to » accept the first name of any voter. TA101A-1-2: The voting system MUST NOT have the capability to » accept the last name of any voter. TA101A-1-3: The voting system MUST NOT have the capability to » accept the address of any voter. TA101A-1-4: The voting system MUST NOT have the capability to » accept information about the driver’s license of any voter. TA101A-1-5: The voting system MUST NOT have the capability to » accept the voter registration number of any voter.	<>	TA10.1-A 1: The voting system MUST NOT have the capability to » accept any identifying information about any voter. TA10.1-A 2: The voting system MUST NOT have the capability to » accept the first name of any voter. TA10.1-A 3: The voting system MUST NOT have the capability to » accept the last name of any voter. TA10.1-A 4: The voting system MUST NOT have the capability to » accept the address of any voter. TA10.1-A 5: The voting system MUST NOT have the capability to » accept information about the driver’s license of any voter. TA10.1-A 6: The voting system MUST NOT have the capability to » accept the voter registration number of any voter.

TA101A-2: The voting system MUST NOT have the capability to pr	TA10.1-A 7: The voting system MUST NOT have the capability to
» ocess any identifying information about any voter.	» process any identifying information about any voter.
TA101A-2-1: The voting system MUST NOT have the capability to	TA10.1-A 8: The voting system MUST NOT have the capability to
» process the first name of any voter.	» process the first name of any voter.
TA101A-2-2: The voting system MUST NOT have the capability to	TA10.1-A 9: The voting system MUST NOT have the capability to
» process the last name of any voter.	» process the last name of any voter.
TA101A-2-3: The voting system MUST NOT have the capability to	TA10.1-A 10: The voting system MUST NOT have the capability to
» process the address of	» process the address of any voter.
any voter.	
TA101A-2-4: The voting system MUST NOT have the capability to	TA10.1-A 11: The voting system MUST NOT have the capability to
» process information about the driver’s license of any voter.	» process information about the driver’s license of any voter
	» .
TA101A-2-5: The voting system MUST NOT have the capability to	TA10.1-A 12: The voting system MUST NOT have the capability to
» process the voter registration number of any voter.	» process the voter registration number of any voter.
TA101A-3: The voting system MUST NOT have the ability to store	TA10.1-A 13: The voting system MUST NOT have the ability to st
» any identifying information about any voter.	» ore any identifying information about any voter.
TA101A-3-1: The voting system	TA10.1-A 14: The
» store name of	» store name of
TA10 A-3-2	TA10.1-A
» store name of	» store name of
TA10 A-3-3	TA10.1-A
» store	» store
TA10 A-3-4	TA10.1-A
» store	» store
TA10 A-3-5	TA10.1-A
» store	» store
TA10 A-4	TA10.1-A re
» t	» port
TA10 A-4-1	TA10.1-A
» report name of	» report name of
TA10 A-4-	TA10.1-A
» report name of	» report name of
TA10 A-4-3	TA10.1-A
» report	» report
TA10 A-4-4	TA10.1-A
» report	» report
TA10 4-5	TA10.1-A voting system MUST NOT have the capability to
» report	

		10.2.1-B – Indirect voter associations TA10.2.1-B 1: Indirect voter associations MUST be available on » ly to authorized election personnel. 10.2.4-B – Logging of ballot selections TA10.2.4-B 1: Ballot selections that have been made through ad » judication MAY be captured in the audit trail.
Principle 11		Principle 11 – Access Control
11.1-B – Voter information in log files	=	11.1-B – Voter information in log files
TA11B-1: The voting system MUST NOT log any identifying inform » ation about any voter. TA11B-1-1: The voting system MUST NOT log the first name of an » y voter. TA11B-1-2: The voting system MUST NOT log the last name of any » voter. TA11B-1-3: The voting system MUST NOT log the address of any v » oter. TA11B-1-4: The voting system MUST NOT log information about th » e driver's license of any voter. TA11B-1-5: The voting system MUST NOT log the voter registrati » on number of any voter.	<>	TA11.1-B 1: The voting system MUST NOT log the first name of a » ny voter. TA11.1-B 2: The voting system MUST NOT log the last name of an » y voter. TA11.1-B 3: The voting system MUST NOT log the address of any » voter. TA11.1-B 4: The voting system MUST NOT log information about t » he driver's license of any voter. TA11.1-B 5: The voting system MUST NOT log the voter registrat » ion number of any voter. 11.1-C – Preserving log integrity TA11.1-C.3 1: Deletion of logs MUST be prevented except in the » case where a complete system wipe and reinstallation proced » ure is performed. TA11.1-C.3 2: There MUST be functionality included in the syst » em that allows exporting of all log data in the event a comp » lete system wipe and reinstallation procedure needs to be pe » rformed.
Principle 12		Principle 12 – Physical Security
12.1-A – Unauthorized physical access	=	12.1-A – Unauthorized physical access
TA121A-1: The voting system MUST prevent access without intent » ion. TA121A-2: The voting system MUST prevent opportunistic access, » including, but not limited to, unauthorized access. TA121A-3: All unauthorized physical access attempts and succes » sful events on the voting system MUST leave physical evidenc » e. TA121A-3-1: IF unauthorized access occurs THEN the physical ev	<>	TA12.1-A 1: The voting system MUST prevent access without inte » ntion. TA12.1-A 2: The voting system MUST prevent opportunistic acces » s, including, but not limited to, unauthorized access. TA12.1-A 3: All unauthorized physical access attempts and succ » essful events on the voting system MUST leave physical evide » nce. TA12.1-A 4: IF unauthorized access occurs THEN the physical ev

» idence MUST indicate the point of access. 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-5: The voting system documentation MUST describe how to » properly implement procedural and physical methods for dete » cting unauthorized access.		» idence MUST indicate the point of access. TA12.1-A 5: All physical access points on the voting system MU » ST be capable of being secured by tamper prevention methods » (e.g., locks) and tamper detection methods (e.g., seals, tap » e). TA12.1-A 6: The voting system documentation MUST describe how » to properly implement procedural and physical methods for de » tecting unauthorized access.
12.1-B – Unauthorized physical access alert	=	12.1-B – Unauthorized physical access alert
TA121B-1: IF the voter-facing system component is in an activa » ted stage and it is accessed in an unauthorized manner THEN » the voter-facing system component MUST produce an alert. TA121B-2: Alerts produced by the voting system MUST be EITHER » audible or visual in nature. TA121B-2-1: Audible alerts produced by the voting system SHOUL » D be greater than 60 db. TA121B-3: Alerts MUST comply with requirements set forth in 7. » 3-K – Warnings, alerts, and instructions.	<>	TA12.1-B 1: IF the voter-facing system component is in an acti » vated stage and it is accessed in an unauthorized manner THE » N the voter-facing system component MUST produce an alert. TA12.1-B 2: Alerts produced by the voting system MUST be both » audible and visual in nature. TA12.1-B 3: Audible alerts produced by the voting system SHOUL » D be greater than 60 db. TA12.1-B 4: Alerts MUST comply with requirements set forth in » 7.3-K – Warnings, alerts, and instructions.
12.1-C – Disconnecting a physical device	=	12.1-C – Disconnecting a physical device
TA121C-1: IF a voter-facing system component is in an activate » d stage and is physically disconnected THEN the voter-facing » system component MUST produce an alert. TA121C-2: Alerts produced by the voting system MUST be EITHER » audible and/or visual in nature. TA121C-2-1: Audible alerts produced by the voting system SHOUL » D be greater than 40 db. TA121C-3: Alerts MUST comply with requirements set forth in 7. » 3-K – Warnings, alerts, and instructions.	<>	TA12.1-C 1: IF a voter-facing system component is in an activa » ted stage and is physically disconnected THEN the voter-faci » ng system component MUST produce an alert. TA12.1-C 2: Alerts produced by the voting system MUST be both » audible and visual in nature. TA12.1-C 3: Audible alerts produced by the voting system SHOUL » D be greater than 40 db. TA12.1-C 4: Alerts MUST comply with requirements set forth in » 7.3-K – Warnings, alerts, and instructions.
12.1-D – Logging of physical connections and disconnections	=	12.1-D – Logging of physical connections and disconnections
TA121D-1: IF a voter-facing system component is in an activate » d 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 activate » d stage it physically disconnected THEN the voter-facing sys » tem component MUST log the disconnection.	<>	TA12.1-D 1: IF a voter-facing system component is in an activa » ted stage and it is physically connected THEN the voter-faci » ng system component MUST log the connection. TA12.1-D 2: IF a voter-facing system component is in an activa » ted stage it physically disconnected THEN the voter-facing s » ystem component MUST log the disconnection.
12.1-E – Secure containers	=	12.1-E – Secure containers
TA121E-1: The manufacturer’s documentation MUST specify tamper » evident seals to be used for containers that store and tran	<>	TA12.1-E 1: The manufacturer’s documentation MUST specify tamp » er evident seals to be used for containers that store and tr

» sport voting system records (e.g., ballots). TA121E-2: The manufacturer’s documentation MUST specify method » s for properly applying seals on containers that store and t » ransport voting system records (e.g., ballots). TA121E-3: IF unauthorized physical access to a container stori » ng or transporting voting system records occurs THEN the tam » per evident seals MUST leave evidence of tampering when inst » alled as documented.		» ansport voting system records (e.g., ballots). TA12.1-E 2: The manufacturer’s documentation MUST specify meth » ods for properly applying seals on containers that store and » transport voting system records (e.g., ballots). TA12.1-E 3: IF unauthorized physical access to a container sto » ring or transporting voting system records occurs THEN the t » amper evident seals MUST leave evidence of tampering when in » stalled as documented.
12.1-F – Secure locking systems	=	12.1-F – Secure locking systems
TA121F-1: Documentation MUST be provided by the manufacturer f » or each key scheme supported.	<>	TA12.1-F 1: Documentation MUST be provided by the manufacturer » for each key scheme supported.
12.1-G – Backup power for power-reliant countermeasures	=	12.1-G – Backup power for power-reliant countermeasures
TA121G-1: IF the voting system employs a physical security mec » hanism that requires power to operate, THEN that physical co » untermeasure MUST continue to operate using backup power if » the power fails. TA121G-2: IF a voting system employs a powered physical securi » ty countermeasure, switching from primary power to backup po » wer supply MUST produce an alert. TA121G-2-1: Alerts produced by a powered physical countermeasu » re MUST be EITHER audible and/or visual in nature. TA121G-2-1-1: Audible alerts SHOULD be greater than 40 db. TA121G-2-1-2: Alerts MUST comply with requirements set forth i » n 7.3-K – Warnings, alerts, and instructions. TA121G-3: IF a power failure occurs for a physical security me » chanism, THEN that physical countermeasure MUST automaticall » y switch over to the backup power source. TA121G-4: IF the voting system employs a physical security mec » hanism that requires power to operate, THEN that physical co » untermeasure MUST generate an event log entry when it is swi » tched to backup power.	<>	TA12.1-G 1: IF the voting system employs a physical security m » echanism that requires power to operate, THEN that physical » countermeasure MUST continue to operate using backup power i » f the power fails. TA12.1-G.1 1: IF a voting system employs a powered physical se » curity countermeasure, switching from primary power to backu » p power supply MUST produce an alert. TA12.1-G.1 2: Alerts produced by a powered physical countermea » sure MUST be both audible and visual in nature. TA12.1-G.1 3: Audible alerts SHOULD be greater than 40 db. TA12.1-G.1 4: Alerts MUST comply with requirements set forth i » n 7.3-K – Warnings, alerts, and instructions. TA12.1-G.2 1: IF a power failure occurs for a physical securit » y mechanism, THEN that physical countermeasure MUST automati » cally switch over to the backup power source. TA12.1-G.3 1: IF the voting system employs a physical security » mechanism that requires power to operate, THEN that physica » l countermeasure MUST generate an event log entry when it is » switched to backup power.
12.2-A – Physical port and access least functionality	=	12.2-A – Physical port and access least functionality
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.	<>	TA12.2-A 1: Any physical port or access point (e.g., panel, do » or) that is exposed MUST be essential to voting operations o » r testing the voting system or auditing the voting machine.
12.2-B – Physical port auto-disable	=	12.2-B – Physical port auto-disable
TA122B-1: IF the voting system is in an activated state, THEN » the voting system MUST automatically disable any digital com	<>	TA12.2-B 1: IF the voting system is in an activated state, THE » N the voting system MUST automatically disable any digital c

» munication port that is disconnected. TA122B-2: IF the voting system is in a suspended state, THEN t » he voting system MUST automatically disable any digital comm » unication port that is disconnected. Principle 13		» ommunication port that is disconnected. TA12.2-B 2: IF the voting system is in a suspended state, THEN » the voting system MUST automatically disable any digital co » mmunication port that is disconnected. Principle 13 – Data Protection
13.1.2-A – Integrity protection for election records	=	13.1.2-A – Integrity protection for election records
TA1312A-1: The voting system MUST digitally sign CVRs when a b » allot is cast. TA1312A-2: The voting system MUST digitally sign a ballot imag » e file when they are generated.	<>	TA13.1.2-A 1: The voting system MUST digitally sign CVRs when » a ballot is cast. TA13.1.2-A 2: The voting system MUST digitally sign a ballot i » mage file when they are generated.
13.2-B – Verification of election records	=	13.2-B – Verification of election records
TA132B-1: IF any component of the voting system is receiving d » ata from another component of the system, THEN it MUST valid » ate the digital signature of the election data received. TA132B-2: IF a voting system is receiving election results, TH » EN it MUST log any verification error of received election r » esults, as they occur, and present on-screen verification er » rors of the received election results, as they occur. TA132B-3: IF a voting system is receiving election results and » IF the received election data fails verification, THEN it M » UST NOT aggregate and MUST NOT tabulate any received electio » n results.	<>	TA13.2-B.1 1: IF any component of the voting system is receivi » ng data from another component of the system, THEN it MUST v » alidate the digital signature of the election data received. » TA13.2-B.2 1: IF a voting system is receiving election results » , THEN it MUST log any verification error of received electi » on results, as they occur, and present on-screen verificatio » n errors of the received election results, as they occur. TA13.2-B.4 1: 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 ele » ction results.
13.4-A – Confidentiality and integrity protection of transmitt » ed data	=	13.4-A – Confidentiality and integrity protection of transmitt » ed data
TA134A-1: The receiving device MUST be cryptographically authe » nticated before a voting system device transmits information » to another voting system device. TA134A-2: The originating device MUST be cryptographically aut » henticated before a voting system device transfers informati » on to another voting system device. TA134A-3: The voting system must encrypt all data sent over a » network. TA134A-4: IF a voting system is transmitting data, THEN it MUS » T 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 u » pon.	<>	TA13.4-A 1: The receiving device MUST be cryptographically aut » henticated before a voting system device transmits informati » on to another voting system device. TA13.4-A 2: The originating device MUST be cryptographically a » uthenticated before a voting system device transfers informa » tion to another voting system device. TA13.4-A 3: The voting system must encrypt all data sent over » a network. TA13.4-A 4: IF a voting system is transmitting data, THEN it M » UST verify EITHER the hash of all election data received via » a network connection or the digital signature of all electi » on data received via a network connection before it is acted » upon.

TA134A-5: IF a voting system is transmitting data, THEN it MUS » T use ONLY FIPS-validated protocols for integrity protection » over a network. Principle 14		TA13.4-A 5: IF a voting system is transmitting data, THEN it M » UST use ONLY FIPS-validated protocols for integrity protecti » on over a network. Principle 14 – System Integrity
14.1-B – Addressing and accepting risk	=	14.1-B – Addressing and accepting risk
TA141B-1: The voting system manufacturer MUST document each ri » sk in the risk assessment and describe either a technical co » ntrol to mitigate the risk or document that the risk is acce » pted. TA141B-1-1: The voting system manufacturer MUST document the a » ccepted risks and provide the reason that the risk is accept » able for the voting system integrity. TA141B-2: Voting system manufacturers SHOULD use the formats o » utlined in NIST SP 800-31-1: Guide for Conducting Risk Asses » sments or ISO/IEC 27005:2011 Information technology -- Secur » ity techniques -- Information security risk management.	<>	TA14.1-B 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 ac » cepted. TA14.1-B 2: The voting system manufacturer MUST document the a » ccepted risks and provide the reason that the risk is accept » able for the voting system integrity. TA14.1-B 3: Voting system manufacturers SHOULD use the formats » outlined in NIST SP 800-31-1: Guide for Conducting Risk Ass » essments or ISO/IEC 27005:2011 Information technology -- Sec » urity techniques -- Information security risk management.
14.2-A – Non-essential networking interfaces	=	14.2-A – Non-essential networking interfaces
TA142A-1: The voting system manufacturer MUST document all ess » ential features of the voting system. TA142A-2: The voting system manufacturer MUST disable all non- » essential networking services as part of initial system conf » iguration. TA142A-2-2: The voting system MUST disable all other non-essen » tial features.	<>	TA14.2-A 1: The voting system manufacturer MUST document all e » ssential features of the voting system. TA14.2-A 2: The voting system manufacturer MUST disable all no » n-essential networking services as part of initial system co » nfiguration. TA14.2-A 3: The voting system MUST disable all other non-essen » tial features.
14.2-C – Wireless communication restrictions	=	14.2-C – Wireless communication restrictions
TA142C-1: The voting system MUST NOT establish wireless connec » tions. TA142C-2: The voting system MUST NOT broadcast or advertise a » wireless network. TA142C-3: The voting system MUST NOT accept connection request » s. TA142C-4: The voting system MUST disable any wireless function » ality by default. TA142C-4-1: Wireless device drivers MUST NOT be instal » led. TA142C-4-2: This MAY be accomplished via removing wireless har » dware. TA142C-4-3: This MAY be accomplished via administrator-control	<>	TA14.2-C 1: The voting system MUST NOT establish wireless conn » ections. TA14.2-C 2: The voting system MUST NOT broadcast or advertise » a wireless network. TA14.2-C 3: The voting system MUST NOT accept connection reque » sts. TA14.2-C 4: The voting system MUST disable any wireless functi » onality by default. TA14.2-C 5: Wireless device drivers MUST NOT be installed. TA14.2-C 6: This MAY be accomplished via removing wireless har » dware. TA14.2-C 7: This MAY be accomplished via administrator-control

» led device configurations. TA142C-4-4: This MAY be accomplished via disconnecting/unplugg » ing wireless device antennas.		» led device configurations. TA14.2-C 8: This MAY be accomplished via disconnecting/unplugg » ing wireless device antennas.
14.2-D – Wireless network status indicator	=	14.2-D – Wireless network status indicator
TA142D-1: IF a voting system contains wireless functionality, » THEN there MUST be a status indicator confirming that wirele » ss networking functionality is disabled.	<>	TA14.2-D 1: IF a voting system contains wireless functionality » , THEN there MUST be a status indicator confirming that wire » less networking functionality is disabled.
14.2-E – External network restrictions	=	14.2-E – External network restrictions
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-2: All voting system components MUST utilize non-routab » le IP addresses. 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 netw » ork.	<>	TA14.2-E 1: IF a voting system can establish a connection to a » n external network, THEN the voting system MUST NOT allow an » y wireless or any wired connection to a network. TA14.2-E 2: All voting system components MUST utilize non-rout » able IP addresses. TA14.2-E 3: IF a voting system can establish a connection to a » n external network, THEN the voting system MUST NOT allow an » y device external to the voting system to connect to that ne » twork. 14.2-F – Secure configuration and hardening documentation TA14.2-F 1: The manufacturer MUST provide a secure configurati » on document for all supported operating systems.
14.2-G – Unused code	=	14.2-G – Unused code
TA142G-1: The compiled voting system application MUST NOT cont » ain unused and dead code.	<>	TA14.2-G 1: The compiled voting system application MUST NOT co » ntain unused and dead code.
14.2-H – Use of exploit mitigation technologies	=	14.2-H – Use of exploit mitigation technologies
TA142H-1: The voting system platform MUST implement Data Execu » tion Prevention (DEP) and Address Space Layout Randomization » (ASLR) or implement equivalent exploit mitigation technolog » ies.	<>	TA14.2-H 1: The voting system platform MUST implement Data Exe » cution Prevention (DEP) and Address Space Layout Randomizati » on (ASLR) or implement equivalent exploit mitigation technol » ogies.
14.2-I– Importing software libraries	=	14.2-I– Importing software libraries
TA142I-1: The voting system MUST NOT bulk import or include li » braries that the voting application does not need to functio » n.	<>	TA14.2-I 1: The voting system MUST NOT bulk import or include » libraries that the voting application does not need to funct » ion.
14.2-K – Known vulnerabilities	=	14.2-K – Known vulnerabilities
TA142K-1: The voting system manufacturer MUST specify a proces » s for identifying vulnerabilities within the vulnerability m » anagement plan. TA142K-2: The voting system MUST NOT contain vulnerabilities l » isted in the National Vulnerability Database (https://nvd.ni	<>	TA14.2-K 1: The voting system manufacturer MUST specify a proc » ess for identifying vulnerabilities within the vulnerability » management plan. TA14.2-K 2: The voting system MUST NOT contain vulnerabilities » listed in the National Vulnerability Database (https://nvd.

» st.gov).		» nist.gov).
TA143B-1: The voting system manufacturer MUST provide a writte » n criticality analysis in the voting system documentation. TA143B-1-1: The criticality analysis MUST provide a model for » identifying impact to security, privacy, and performance for » failure or compromise. TA143B-1-2: The criticality analysis MUST identify critical co » mponents. TA143B-1-2-1: NISTIR 8179 and NISTIR 8272 MAY be used. TA143B-1-3: The criticality analysis MUST describe the process » used to identify components as critical. TA143B-1-3-1: NISTIR 8179 and NISTIR 8272 MAY be used. TA143B-1-4: The criticality analysis MUST prioritize critical » components. TA143B-1-4-1 as low, medi » um, criticality. TA14 B-1-5 » ents TA14 B-2 a writte » n supplier TA14 B-2- » ical suppliers. Pr 15		TA14.3-B 1: The voting system manufacturer MUST provide a writ » ten criticality analysis in the voting system documentation. » TA14.3-B 2: The criticality analysis MUST provide a model for » identifying impact to security, privacy, and performance for » failure or compromise. TA14.3-B 3: The criticality analysis MUST identify critical co » mponents. TA14.3-B 4: NISTIR 8179 and NISTIR 8272 MAY be used. TA14.3-B 5: The criticality analysis MUST describe the process » used to identify components as critical. TA14.3-B 6: NISTIR 8179 and NISTIR 8272 MAY be used. TA14.3-B 7: The criticality analysis MUST prioritize critical » components. TA14.3-B as low, medium » , and TA14.3-B » ents TA14.3-B a wri » tten TA14.3-B » tical suppliers. 14.3.2-D – I TA14.3.2-D » ated with a digital signature. Principle 15 – Detection Monitoring
TA15 o » f or identify » ing users accessing configuration » files. TA15 E-1-1 » username or the name of the user. TA15 E-1-2 acc » ess for a configuration file.		TA15.1-E » of or identi » fying users accessing configurati » on files. TA15.1-E » username or the name of the user. TA15.1-E time of acc » ess for a configuration file.

TA152A-1: IF an error occurs THEN the voting system applicatio » n MUST provide user notification describing the application » error in time for the user to react to it before performing » other actions.	<>	TA15.2-A 1: IF an error occurs THEN the voting system applicat » ion MUST provide user notification describing the applicatio » n error in time for the user to react to it before performin » g other actions. 15.2-C – Logging system errors TA15.2-C 1: System errors do not include errors made by the us » er, such as undervotes, overvotes, and blank ballots.
15.3-A – Malware protection mechanisms	=	15.3-A – Malware protection mechanisms
TA153A-1: IF a COTS workstation provides EMS functionality, TH » EN the voting system MUST utilize application allow listing » or MUST use digital signatures on the COTS EMS devices in or » der to protect against malware. TA153A-2: IF malware protection is an included feature of the » system, THEN the voting system MUST launch applications prov » iding malware protection before the voting application is lo » aded.	<>	TA15.3-A 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 o » rder to protect against malware. TA15.3-A 2: IF malware protection is an included feature of th » e system, THEN the voting system MUST launch applications pr » oviding malware protection before the voting application is » loaded.
15.3-B – Updatable malware protection mechanisms	=	15.3-B – Updatable malware protection mechanisms
TA153B-1: IF new malware signatures are received for COTS devi » ces providing EMS functionality, THEN malware protection mec » hanisms MUST be capable of being updated with the new signat » ures. 15.3-C – Documentation for disabled wireless TA154C-1: The voting system documentation MUST include procedu » res to disable wireless functionality, for all components of » the voting system. TA154C1-1: The voting system documentation MUST include instru » ctions for physically removing power from any embedded wirel » ess chipsets. TA154C1-2: The voting system documentation MUST include instru » ctions for physically disconnecting or removing antennas.	<>	TA15.3-B 1: IF new malware signatures are received for COTS de » vices providing EMS functionality, THEN malware protection m » echanisms MUST be capable of being updated with the new sign » atures.
15.3-D – Notification of malware detection	=	15.3-D – Notification of malware detection
TA153D-1: COTS workstations providing EMS functionality MUST i » mmediately notify a user when malware is detected on COTS EM » S devices. TA153D-1-1: COTS workstations providing EMS functionality MUST » make malware detection notifications on-screen.	<>	TA15.3-D 1: COTS workstations providing EMS functionality MUST » immediately notify a user when malware is detected on COTS » EMS devices. TA15.3-D 2: COTS workstations providing EMS functionality MUST » make malware detection notifications on-screen.
15.3-E – Logging malware detection	=	15.3-E – Logging malware detection
TA153E-1: IF malware is detected THEN the voting system MUST l	<>	TA15.3-E 1: IF malware is detected THEN the voting system MUST

» og every instance of detection.		» log every instance of detection. 15.3-G – Logging malware remediation TA15.3-G 1: The reimaging or reinstallation of the operating s » ystem MUST be logged and SHOULD be stored external to the vo » ting system. TA15.3-G 2: The malware detection logs SHOULD be downloaded an » d stored to a separate system prior to reimaging the system.
15.4-B – Secure network configuration documentation	=	15.4-B – Secure network configuration documentation
TA154B-1: The voting system documentation MUST include operati » ng system configurations. TA154B-2: The voting system documentation MUST include databas » e configurations. TA154B-3: The voting system documentation MUST include configu » rations for any other	<>	TA15.4-B 1: The voting system documentation MUST include opera » ting system configurations. TA15.4-B 2: The voting system documentation MUST include datab » ase configurations. TA15.4-B 3: The voting system documentation MUST include confi » gurations for any other
security relevant application or system.	=	security relevant application or system.
TA154B-4: IF a voting system provides networking connectivity, » THEN it MUST provide best practices for system administrators and election workers.	<>	TA15.4-B 4: IF a voting system provides networking connectivit » y, THEN it MUST provide best practices for system administra » tors and election workers.
15.4-C – Documentation for disabled wireless	=	15.4-C – Documentation for disabled wireless
TA154C-1: The voting system documentation MUST include procedu » res to disable wireless functionality for all components of » the voting system. TA154C1-1: The voting system documentation MUST include instru » ctions for physically removing power from any embedded wirel » ess chipsets. TA154C1-2: The voting system documentation MUST include instru » ctions for physically disconnecting or removing antennas.	<>	TA15.4-C 1: The voting system documentation MUST include proce » dures to disable wireless functionality for all components o » f the voting system. TA15.4-C 2: The voting system documentation MUST include instr » uctions for physically removing power from any embedded wire » less chipsets. TA15.4-C 3: The voting system documentation MUST include instr » uctions for physically disconnecting or removing antennas.
15.4-D – Rule and policy updates	=	15.4-D – Rule and policy updates
TA154D-1: The voting system MUST be capable of updating rules » and policies to network appliances. TA154D-2: The voting system MUST be capable of utilizing updat » ed rules and policies for network appliances.	<>	TA15.4-D 1: The voting system MUST be capable of utilizing upd » ated rules and policies for network appliances.