*i*Beta Quality Assurance

Advanced Voting Solutions
WINware Voting System, v.2.0.4
VSTL Certification Test Plan

Prepared for
**Advanced Voting Solutions**
1600 Redbud Blvd. #301
McKinney, TX 75069

Version 2.0

Trace to Standards			
NIST Handbook 150-22			
4.2.3, 5.3.5, 5.3.6, 5.4.2, 5.4.6, 5.5.1, 5.7 thru 5.7.3			
HAVA			
301			
VVS		VVSG	
Vol. #	Section(s) #	Vol. #	Section(s) #
1	2, 3, 4, 5, & 6	1	2, 3, 4, 5, 6, & 7
1	9.6.2.1	2	1.8.2.1
2	2, 3, 4, 5, & 6	2	2, 3, 4, 5, & 6
2	Appendix A	2	Appendix A

iBeta Quality Assurance is accredited for Voting System Testing under:

U.S. Election Assistance Commission
EAC Lab Code: 0702
Effective thru 2/28/2009

NVLAP®

NVLAP Lab Code 200749-0

3131 South Vaughn Way, Suite 650, Aurora, Colorado, 80014
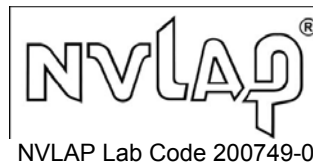
Version History				
Ver #	Description of Change	Author	Approved by & Date	Effective Date
v.1.0	Initial release version submitted to the EAC	Carolyn Coggins & Debra Harwood	Carolyn Coggins Trevor Jones 4/16/07	4/16/07
v.2.0	Remove confidential markings and submit to the EAC	Carolyn Coggins	Carolyn Coggins Trevor Jones 4/24/07	4/27/07

TABLE OF CONTENTS

1 Introduction

This Test Plan identifies iBeta Quality Assurance's (iBeta) approach to Voting System Test Lab (VSTL) Certification Testing of the Advanced Voting Solutions (AVS) WINware Voting System to the Federal Election Commission Voting System Standards 2002 and the Help America Vote Act (HAVA). The purpose of this Plan is to document the scope and detail of the requirements of certification testing tailored to the design and complexity of software being tested and the type of voting system hardware.

The AVS WINware Voting System is a Direct Recording Electronic (DRE) touch screen voting system. AVS is submitting an application to the U.S. Election Assistance Commission for an initial certification of the WINware Voting System version 2.0.4. iBeta Quality Assurance has conducted a pre-certification document review of the AVS Technical Data Package and submitted test documentation to determine the scope of VSTL Certification Testing.

IBeta Quality Assurance shall perform a Physical Configuration Audit (PCA) of the AVS WINware Voting System, including a review of the documentation and source code submitted in the Technical Data Package (TDP).

A Functional Configuration Audit (FCA) of the AVS WINware Voting System shall include a review of the testing performed by AVS to the requirements of Federal Election Commission Voting System Standards 2002, the AVS WINware Voting System specifications of the TDP and the voting system requirements of section 301 of HAVA. The FCA also includes identification of the scope of testing, a test plan, customization of test cases, management of system configurations, test execution, and analysis of the test results.

Hardware Environmental Testing is outside iBeta's test accreditation scope as a VSTL. This non-core testing will be performed by Wyle Laboratories, 7800 Highway 20 West, Huntsville, AL, 35806. Wyle is accredited to perform all environmental test methods by the American Association of Laboratory Accreditation under Certificate Numbers 845.01 (Electrical) and 845.02 (Acoustics and Vibration).

This test plan contains:
- The voting system and the scope of certification testing;
- The pre-certification test approach and methods;
- The certification test hardware, software, references and other materials for testing;
- The certification test approach and methods;
- The certification test tasks and prerequisite tasks; and
- The certification resource requirements.

1.1 Internal Documentation
The documents identified below are iBeta internal documents used in certification testing

Table 1 Internal Documents

Version #	Title	Abbreviation	Date	Author (Org.)
01	Voting Services Master Services Agreement prepared for Advanced Voting Solutions	MSA		iBeta Quality Assurance
01	AVS – PCA Document Review			iBeta Quality Assurance

1.2 External Documentation
The documents identified below are external resources used to in certification testing.

Table 2 External Documents

Version #	Title	Abbreviation	Date	Author (Org.)
	Help America Vote Act	HAVA	October 29, 2002	107th Congress
NIST	NVLAP Voting System	NIST 150-22	December	National Voluntary Lab

Version #	Title	Abbreviation	Date	Author (Org.)
Handbook 150-22	Testing		2005	Accreditation Program
	Federal Election Commission Voting System Standards	VSS	April 2002	Federal Election Commission
	Voluntary Voting System Guidelines	VVSG	December 2005	Election Assistance Commission
	Testing and Certification Program Manual		January 1, 2007	Election Assistance Commission

1.3 Technical Data Package Documents

The Technical Data Package Documents submitted for this certification test effort are listed in Table 7.

1.4 Terms and Definitions

The Terms and Definitions identified below are used in this test report.

Table 3 Terms and Definitions

Term	Abbreviation	Definition
Advanced Voting Solutions	AVS	The manufacturer of the WINware Voting System.
Direct Recording Electronic	DRE	A voting system that records votes by means of a ballot display provided with mechanical or electro-optical components that can be actuated by the voter; that process the data by means of a computer program; and that records voting data and ballot images in internal and/or external memory components. It produces a tabulation of the voting data stored in a removable memory component and in printed copy.
Help America Vote Act	HAVA	Legislation enacted in 2002 which includes creation of the EAC, federal voting standards and accreditation of test labs
National Software Reference Library	NSRL	Escrow agency that retains the file signature of the trusted build.
Technical Data Package	TDP	The documentation and code relating to the voting system, submitted by the vendor for review.
U.S. Election Assistance Commission	EAC	U.S. agency established by the Help America Vote Act of 2002 to administer Federal elections.
Voluntary Voting System Guidelines	VVSG	Federal voting system test standards created by the EAC. Eventually these will replace the VSS.
Voting System Standards	VSS	Federal voting system test standards, predecessor of the VVSG.
Voting System Test and Certification Authority	VSTCA	Where this is used it should be read as VSTL. This is a term used in the NIST Handbook 150-22 that was not implemented by the EAC
Voting System Test Lab	VSTL	Lab accredited by the EAC to perform certification testing of voting systems.
Voting Variations		Significant variations among state election laws incorporating permissible ballot content, voting options and associated ballot counting logic
WINprep		The election management software that is used to program an election on the WINvote

Term	Abbreviation	Definition
		hardware of the WINware Voting System
WINresults		The election management software that is used to compile and report the election results of the WINware Voting System
WINvote		The touch screen DRE polling place device of the WINware Voting System
WINware Voting System		The touch DRE voting system manufactured by AVS comprised of the WINprep and WINresults software and .WINvote software and hardware.

2 Pre-certification Tests

2.1 Pre-certification Test Activity

A review of the test documentation provided by AVS was performed to assess the scope of testing and conformance with the Federal Election Commission Voting System Standards 2002 volume 1 sections 2, 3, 4, 5 and 6 for Functional, Usability, Accessibility, Hardware, Software, Telecommunication and Security requirements.

An initial review of the submitted TDP Documentation was performed in the PCA TDP Documentation Review to assess compliance with the requirements of Federal Election Commission Voting System Standards 2002 volume. 2, section 2.

2.2 Pre-certification Test Results

A review of the test documentation provided by AVS was found to incorporate testing of the voting system to the requirements of the Federal Election Commission Voting System Standards 2002 and the AVS WINware Voting System.

Based upon the findings of the preliminary PCA TDP Documentation Review performed to assess compliance with the requirements of Federal Election Commission Voting System Standards 2002 volume 2, section 2, AVS was found to generally be in compliance with the standard. Document defects were noted in the PCA and FCA Discrepancy Report and submitted to AVS for resolution prior to completion of VSTL certification testing. These include:

#	Document	Discrepancy	Voting System Standard 2002
1	Quality Assurance Policy/Plan AVS2002-034A rev 2.0.4	The QA Plan does not reference the applicable AVS documentation used to implement the procedures for inspection and testing and how it is maintained.	v2:2.12 The vendor shall submit a Quality Assurance Program that addresses the quality assurance requirements of Volume I, Section 7. v1: 7.2.e At a minimum, this program shall: Include a procedure for maintaining all data and records required to document and verify the quality inspections and tests. 7.5.b In order to ensure that voting system part and materials function properly, vendors shall maintain the resulting test data as part of the quality assurance program documentation.
2	Quality Assurance Policy/Plan AVS2002-034A rev 2.0.4	The QA Plan doesn't stipulate tests include tester name, date, location or outcome, nor does it reference documents that specify this.	v2:2.12.3 a thru d The vendor shall provide a description of its practices for quality conformance inspections that meet the requirements of Volume I, Section 7.6 of the Standards. For each test performed, the record of tests provided shall include: Test location, Test Date, Tester name, Test outcomes
3	Quality Assurance Policy/Plan AVS2002-034A rev 2.0.4	The QA Plan doesn't stipulate the documentation of the system and system development process, nor does it reference documents that specify this.	The vendor shall provide a description of its practices for documentation of the system and system development process that meet the requirements of Volume I, Section. 7.7 of the Standards
4	Quality Assurance Policy/Plan AVS2002-034A rev 2.0.4	The Quality Assurance Plan does not specify the maintenance of test data.	v1: 7.5.b In order to ensure that voting system part and materials function properly, vendors shall maintain the resulting test data as part of the quality assurance program documentation.
5	Quality	The Quality Assurance Plan identifies	v1: 7.6 To meet the conformance

	Assurance Policy/Plan AVS 2002-034A rev 2.0.4	conformance inspection testing but does not identify how a record of the tests or certificate of satisfactory completion is delivered with the system or component.	inspection requirement the vendor or manufacturer shall deliver a record of tests, or a certificate of satisfactory completion, with each system or component.
6	System Overview AVS 2002-001B rev 2.0.4	The Overview identifies some COTS software but does not provide a complete identification of all COTS hardware and software, such as platforms, OS, modem, dial up software, nor does it reference documents where this is provided.	v2: 2.2.1.e Identification of all COTS hardware and software products and communications services used in the development and/or operation of the voting system, identifying the name, vendor, and version used for each such component
7	System Overview AVS 2002-001B rev 2.0.4	The Overview does not identify the software/firmware release in order of how each is normally installed, nor does it reference documents where this is provided.	v2: 2.2.1.g Benchmark directory listings for all software (including firmware elements) and associated documentation included in the vendor's release in order of how each piece of software would normally be installed upon setup and installation.
8	WINVote Hardware Specification AVS 2002-13 Rev 2.0.4	The hardware specification indicates reliability information will be provided but does not identify the information, nor does it reference documents where this is provided.	v2: 2.4.1.c: The vendor shall provide a detailed discussion of the characteristics of the system, indicating how the hardware meets individual requirements defined in Volume I, Sections 3, 4, 5, and 6 of the standards and include: Reliability: This discussion addresses system and component reliability stated in terms of the systems operating functions, and identification of items that require special handling or operation to sustain system reliability
9	WINVote Hardware Specification AVS2002-13 Rev 2.0.4	The hardware specification does not address hardware maintainability, nor does it reference documents where this is provided.	v2: 2.4.1.d: The vendor shall provide a detailed discussion of the characteristics of the system, indicating how the hardware meets individual requirements defined in Volume I, Sections 3, 4, 5, and 6 of the standards and include Maintainability: The discussion addresses maintainability. Maintainability represents the ease with which maintenance actions can be performed based on the design characteristics of equipment and software and the processes the vendor and election officials have in place for preventing failures and for reacting to failures. Maintainability includes the ability of equipment and software to self-diagnose problems and to make non-technical election workers aware of a problem. Maintainability also addresses a range of scheduled and unscheduled events
10	WINVote Hardware Specification AVS2002-13 Rev 2.0.4	AVS provides a list and diagrams of all assembly components but does not provide a description of the assembly, nor does it reference documents where this is provided.	v2: 2.4.2: The vendor shall provided a list of materials and components used in the system, a description of their assembly into major system components and the system as a whole. Paragraphs and diagrams shall be provided…
11	Quality Assurance	The QA Plan does not identify what records of test or certificate of	v.1. 7.6.b To meet the conformance inspection requirement the vendor or

	Policy/Plan AVS2002-034A rev 2.0.4	satisfactory completion is provided with each system, nor does it reference documents where this is provided.	manufacturer shall deliver a record of tests, or a certificate of satisfactory completion, with each system or component.
15	Docs: 012 & 013 Chpt 6 014 sec. 4.0 020 sec. 12.2.1 021 sec. 9.3.	WINVote 2.0.4 does not include a modem. A modem is referenced in the identified TDP documents.	v.2 2.6.5.b-3: For systems that use public communications networks as defined in V I, Sect 5, this information shall also include: Policies and procedures used by the vendor to ensure that current versions of such capabilities are distributed to user jurisdictions and are installed effectively by the jurisdiction
20	WINvote Roadmap	The software architectural document WINvote Roadmap was not tendered in the Technical Data Package.	v.2: 2.1.1.1.d At minimum, the TDP shall contain the following documentation: software design specifications

3 Materials Required for Testing

The System Identification stipulates the following materials required for testing of AVS WINware Voting System version 2.0.4.

3.1 Voting System Software

The software listed in Table 4 is the documented configuration of the AVS WINware Voting System.

Table 4 Voting System Software

Application	Manufacturer	Version	Description (identify COTS)
WINprep	Advanced Voting Solutions	2.0.4	Ballot preparation software
WINvote	Advanced Voting Solutions	2.0.4	DRE software
WINresults	Advanced Voting Solutions	2.0.4	Central count software
XP			Windows operating system
Text to Speech	ScanSoft	1.0	WINprep & WINvote COTS: Audio ballot text to speech software
Office 2000 Professional	Microsoft	9.0.x	WINware COTS: Includes Access 2000 and Excel 2000; MSCAL.OCX processes calendar calls
Internet Explorer	Microsoft	5.x or 6.x	WINresults COTS: Displaying HTML reports
ADO	Microsoft	2.6 or newer	WINprep COTS: JET connection of WINprep to the Access database file
PC/EZ-100	Castles Technologies		Smartcard Reader/Writer Driver (standard in Windows XP)
SocketWrench	Catalyst	4.0	Library for function calls to interface with the software
AuditLogNoDSN.dll	Advanced Voting Solutions	2.0.0	Log events
OrcSystem.dll	Advanced Voting Solutions	2.0.0	Query OS status
GenericSCard.dll	Advanced Voting Solutions	2.0.0	Castle Reader/Writer to interact with WINware Voting System
EjectFlashRam.dll.	Advanced Voting Solutions	2.0.0	Eject flash ram
ShoupSec.dll.	Advanced Voting Solutions	2.0.0	File encryption of election data
Info-ZIP zip.dll.	Advanced Voting Solutions	2.3	Compress election files for export
Info-ZIP unzip.dll	Advanced Voting Solutions	5.42	Uncompress files compressed by WINvote on export
WINRRAS.ocx	Advanced Voting Solutions	2.0.0	Encapsulates the MS Routing and Remote Access Service

3.2 Voting System Hardware and Equipment

The equipment listed in Table 5 is the documented configuration of the AVS WINware Voting System.

Table 5 Voting System Hardware and other Equipment

Hardware or Equipment	Manufacturer	Version	Description (identify COTS)
WINvote	Advanced Voting Solutions	2.0.4	XP OS XP embedded compatible processor minimum 500 mhz; minimum VIA 533mhz 256 MB Ram 410 MB Disk Module Internal Smartcard reader/writer 15" TFT-XGA color LCD with a minimum video resolution of 1024 x768

Hardware or Equipment	Manufacturer	Version	Description (identify COTS)
			2 USB ports 1 Parallel port 1 Serial port Audio out jack Purpose designed injection molded case Minimum 4 wire resistive touch screen overlay with controller button on mother board Seiko thermal printer mechanism with serial interface Cables Drivers for Smartcard, USB drive and touch screen Printer door key lock & key
USB removable media			128 MB thumb drive
Personal Computer			WINware COTS: Intel Pentium processor minimum 2 Ghz; 1 GB RAM; Windows XP; SVGA Videocard, 8 mb Video RAM; 2 mirrored @ 40 GB hard disk drive; 2 Serial and 1 Parallel port Sound card; CDRW drive; Floppy disk drive; USB port;
Keyboard			WINware COTS: Computer Keyboard
Mouse			WINware COTS: Computer mouse
CRT Monitor			WINware COTS: Minimum 17"
Laser Printer			WINware COTS: Laser printer
Universal Power Supply			WINware COTS: Audible alarm with 2 hours battery back up
Headphones			WINware COTS:
Speakers			WINware COTS:
Cables			WINware COTS
SmartCard			WINvote COTS Administration, poll location and voter activation functions

3.3 Testing Software, Hardware and Materials

The software, hardware and materials listed in Table 6 are needed to support testing and in test simulations of elections of the AVS WINware Voting System.

Table 6 Testing Software, Hardware and Materials

Software, Hardware or Material	Description	Description of use in testing
PC with Windows and Microsoft Office	Dell, XP and Office 2003	Test case execution and recording of test results

3.4 Deliverable Materials

The documents listed in Table 7 are to be delivered as part of the AVS WINware Voting System.

Table 7 Voting System Technical Data Package Documents

Doc & Rev#	Title	Date	Author
AVS2002-001 rev 2.0.4	Software Design and Specification	2/15/07	Advanced Voting Solutions
AVS2002-001A rev 2.0.4	Design Details Tracing Functional Test Plan and TDP Tracing	2/15/07	Advanced Voting Solutions
AVS 2002-001B rev 2.0.4	System Overview	2/15/07	Advance Voting Solutions
AVS 2002- 002A rev 2.0.4	Programming Specifications	2/16/07	Advanced Voting Solutions
AVS2002-003 rev 2.0.4	WINprep Functional and Design Specification	2/15/07	Advanced Voting Solutions
AVS2002-004 rev 2.0.4	System Requirements Specification for WINprep	2/15/07	Advanced Voting Solutions
AVS2002-005 rev 2.0.4	WINprep System Architecture Road Map	2/16/2007	Advance Voting Solutions
AVS2002-006 rev 2.0.4	WINvote Functional and Design Specification	2/16/07	Advance Voting Solutions
AVS2002-007 rev 2.0.4	System Requirements Specification for WINvote	12/22/06	Advanced Voting Solutions
AVS2002-008 rev 2.0.4	WINresults System Architecture Road Map	2/16/07	Advanced Voting Solutions
AVS2002-009 rev 2.0.2	WINresults Functional and Design Specification	2/16/07	Advanced Voting Solutions
AVS2002-010 rev 2.0.4	System Requirements Specification For WINresults	2/20/07	Advanced Voting Solutions
AVS2002-011 rev 2.0.4	Software Coding Standards	2/20/07	Advanced Voting Solutions
AVS2002-012 Revision 2.0.4	WINware	2/14/07	Advanced Voting Solutions
AVS2002-013 rev 2.0.4	WINVote Hardware Specification	2/14/07	Advanced Voting Solutions
AVS2002-014 rev 2.0.2	Bill of Materials	12/18/06	Advanced Voting Solutions
AVS2002-015A Version 2.0.4	WINVote Hardware Specification	2/20/07	Advanced Voting Solutions
AVS2002-020 rev 2.0.4	Security Penetration Analysis	2/20/07	Advance Voting Solutions
AVS2002-021 rev 2.0.4	WINprep, WINresults and WINvote Software/Hardware Security Plan	2/8/07	Advanced Voting Solutions
AVS2002-022 rev 2.0.4	User Roles and Password Security	2/8/07	Advanced Voting Solutions
AVS2002-023 rev 2.0.4	Software Installation Procedures	2/20/07	Advance Voting Solutions
AVS2002-030 Rev 2.0.4	System Support, Operation, and Recovery Plan	2/20/07	Advance Voting Solutions
AVS2002-030 rev 2.0.4	Sample Unit Test Document	2/20/07	Advance Voting Solutions
AVS2002-031 rev 2.0.4	Configuration and Change Management Plan	2/20/07	Advanced Voting Solutions
AVS 2002-032 rev 2.0.4	Sample Acceptance Certificate	2/20/07	Advanced Voting Solutions
AVS2002-033 rev 2.0.4	Accessibility for Winvote	2/20/07	Advanced Voting Solutions
AVS2002-034A rev 2.0.4	Quality Assurance Plan	2/2/07	Advanced Voting Solutions
AVS2002-034B rev 2.0.4	Configuration Audit Plan	2/20/07	Advanced Voting Solutions
AVS2002-035 rev. 2.0.4	System Overview	2/20/07	Advanced Voting Solutions

Doc & Rev#	Title	Date	Author
AVS2002-036 rev 2.0.4	Project Management Plan	2/20/07	Advanced Voting Solutions
AVS2002-037 rev 2.0.4	WINware BUILD Procedures	2/20/07	Advanced Voting Solutions
AVS2002-038 version 2.0.4	System Test, Verification, and Qualification Specification	2/20/07	Advanced Voting solutions
AVS2002-038B rev 2.0.4	Software Function Configuration Management Plan	2/20/07	Advanced Voting Solutions
AVS2002-039 rev 2.0.4	Issue & Bug Tracking Management Procedures	2/20/07	Advanced Voting Solutions
AVS2002-040 rev 2.0.4	WINvote Administration and Maintenance Manual	2/20/07	Advanced Voting Solutions
AVS2002-041 rev 2.0.4	WINprep User Manual	2/20/07	Advanced Voting Solutions
AVS2002-042 rev 2.0.4	WINvote User Guide	2/20/07	Advanced Voting Solutions
AVS2002-043 rev 2.0.4	WINresults – User Guide	2/20/07	Advanced Voting Solutions
AVS2002-050 rev 2.0.4	WINware	2/8/07	Advanced Voting Solutions
N/A	Cast Your Ballot In 5 Easy Steps (voting booth graphic)	None	Advanced Voting Solutions
N/A	Closing Standard 2006 (poll closing procedure)	None	Advanced Voting Solutions
N/A	Opening Standard 2006 (poll opening procedure)	None	Advanced Voting Solutions
N/A	Winvote explode drawing (1)	New to 2.0.2	Advanced Voting Solutions
New to 2.0.2 TDP	Winvote explode drawing (2)	None	Advanced Voting Solutions
N/A	Winvote explode drawing (3)	New to 2002	Advanced Voting Solutions
N/A	Winvote explode drawing (4)	New to 2002	Advanced Voting Solutions
Rev 2.0.2	Galaxy Commutech Limited WINVOTE QUALITY CONTROL CHECKLIST	None	Advanced Voting Solutions

The additional materials listed in Table 8 are to be delivered as part of the AVS WINware Voting System.

Table 8 Voting System Materials

Material	Material Description	Use in the Voting System
Paper rolls	Paper rolls	Open and close poll reports

3.5 Proprietary Data

All software, hardware, documentation and materials shall be considered by iBeta as proprietary to AVS. None of the elements submitted for certification testing may be used outside the scope of testing. No release or disclosure may occur without the written authorization of AVS, except for the provisions of release of materials to the U.S. Election Assistance Commission outlined in the Voting Services Master Services Agreement prepared for Advanced Voting Solutions.

4 Test Specifications

Testing for conformance to the Federal Election Commission Voting System Standards 2002 shall be conducted as identified below. The test methods for the system level (functional, integration, security, volume, telephony and cryptographic), environmental, accuracy (accuracy, volume, stress, reliability, and availability), and characteristics (recovery, usability, accessibility, and maintainability) test cases are contained in the Appendix. A test case shall be provided for each type of test. Documentation of all test iterations shall be maintained with a separate record of the configuration and results of each test execution.

4.1 Hardware Configuration and Design

The hardware configuration and design shall be documented prior to the execution of the Hardware Environmental Test Case and software system function test cases. The configuration will be documented in the test case.

4.2 Software System Functions

Testing of the software system functions defined in the Federal Election Commission Voting System Standards 2002 and the Testing and Certification Program Manual include:

- Identification of the functional test scope based upon the PCA TDP Document Review (Volume 2, Section 2) and FCA review of the System testing (Vol.2 Appendix A.2)
- PCA TDP Source Code Review of all new or changed code (Volume 2 Section 5.4)
- Witness the build of the reviewed code for the baseline version of the system intended to be sold by the vendor and delivered to the jurisdiction. (Vol.2. Section 6.2)
- Development of a Certification Test Plan and Test Cases (Volume 2, Appendix A.)
- Execution of Functional/System Integration, Accuracy, Security, and Characteristics test cases (Volume 2, Section. 6)
- Testing of the performance and sequence of system hardware and software functions identified in System Operations and Maintenance Manuals, (Volume 2. Section 6.8)
- Completion of a trusted build by the VSTL with file signatures provided to the NSRL

4.3 Test Case Design

4.3.1 Hardware Qualitative Examination Design

This is any initial submission to the U.S. Election Assistance Commission for testing to the requirements of the Federal Election Commission Voting System Standards 2002 and Section 301 of HAVA. iBeta Quality Assurance shall conduct tests to determine the quality of the overall voting capabilities, pre-voting, voting and post voting functions of the AVS WINware Voting System.

4.3.2 Hardware Environmental Test Case Design

Wyle Laboratories shall perform all non-operating and operating environmental tests identified in volume 2 sections 4.6 and 4.7 of the Federal Election Commission Voting System Standards 2002.

4.3.3 Software Module Test Case Design and Data

A review of the AVS module tests against the flow control parameters and data on both entry and exit. iBeta Quality Assurance shall customize the standard system integration test cases to include test coverage of module paths.

4.3.4 Software Functional Test Case Design

A review of the AVS functional test cases against the Federal Election Commission Voting System Standards 2002and the AVS WINware Voting System functional requirements has been performed. Tests covering system functional requirements are incorporated into a standard set of system level integration test cases. These test cases identify Accept/Reject performance criteria for certification

based upon the Federal Election Commission Voting System Standards 2002and the AVS WINware Voting System software and hardware specifications

The AVS WINware Voting System functions and test cases are identified in Table 9.

Table 9 System Function and Test Cases

System Function	Test Case
a. Ballot Preparation Subsystem	
a. Ballot preparation subsystem	All system level test cases
b. Test operations performed prior to , during and after processing of ballots, including:	
i. Logic Test – Interpretation of Ballot Styles & recognition of precincts	All system level test cases
ii. Accuracy Tests- Ballot reading accuracy	All system level test cases Accuracy Test Case
iii. Status Tests- Equipment statement &memory contents	All system level test cases
iv. Report Generation – Produce test output data	All system level test cases
v. Report Generation- Produce audit data	All system level test cases
c. Procedures applicable to equipment used in a Polling Place for:	
i. Opening the polls, accepting & counting ballots	All system level test cases
ii. Monitoring equipment status	All system level test cases
iii. Equipment response to commands	All system level test cases
iv. Generating real-time audit messages	All system level test cases
v: Closing polls and disabling ballot acceptance	All system level test cases
vi. Generating election data reports.	All system level test cases
vii Transfer ballot count to central counting location	All system level test cases
viii Electronic transmission	Not supported in 2.0.4
d. Procedures applicable to equipment used in a Central Count Place	
i. Process ballot deck or PMD for >1 precinct	General 2 & Primary 2
ii. Monitoring equipment status	All system level test cases
iii. Equipment response to commands	All system level test cases
iv. Integration with peripherals equipment or other data processing systems	All system level test cases
v. Generating real-time audit messages.	General 1
vi. Generating precinct-level election data reports	All system level test cases
vii. Generating summary election data reports	All system level test cases

4.3.5 System Level Test Case Design

Test Cases have been prepared to assess the response of the hardware and software to a range of conditions.

Table 10 System- Level Test Cases

	Test Cases
a. Volume Test	
During the Accuracy Test a minimum of 1,549,703 ballot positions shall be exercised including a large number of parties, a large number of contests per ballot and a large number of candidates per contest.	Accuracy Test Case
b. Stress Test	
During the Accuracy Test a high volume of ballots with a large number of parties, contests and candidates shall be executed.	Accuracy Test Case
c. Usability Tests:	
Testing shall exercise the input controls, error content, and audit message content of the voting system. A review shall assess the content and clarity of instructions and processes.	All system level test cases
d. Accessibility Tests:	
An audio Spanish and English ballot shall be programmed. Votes shall be cast to confirm that the ballot can be accessed visually or aurally in Spanish and English and with various screen contrast and ballot	General 2 Characteristics Test Case

	Test Cases
display settings. Measurement of the physical aspects of the voting system shall also be taken to confirm they comply with the standard.	
e. Security Tests:	
Attempts to circumvent system access controls, security policies and procedures for the pre-vote, voting and post voting function shall be incorporated into the system level test cases. Methods to bypass or defeat the security environment shall be included in these tests. A review of the source code and procedures will be executed to confirm their compliance with the security standards. Denial of Service attacks will be simulated using the Smart Card, Poll workers, and Voters as threat agents to access the ability of the voting system to resist these attacks and log and/or report the attempt.	All system level test cases Security Review Source Code Review
f. Performance Tests:	
During various system level test cases and the Accuracy Test Case the elections will be programmed, voted and tallied to ensure ballot formats are accurately displayed, votes are accurately and reliably cast for the voting variations and functionality supported by the voting system	All system level test cases Accuracy Test Case
g. Recovery Tests:	
Test shall be conducted to determine the systems ability to recover from power or other system failures.	Characteristics Test Case

5 Test Data

5.1 Test Date Recording

The results of testing and review to the AVS WINware Voting System to the Federal Election Commission Voting System Standards 2002 are recorded in the test case and review forms prepared by iBeta. Environmental test data will be recorded in the manner appropriate to the test equipment with output reports detailing the results and analysis. Electronic copies of all testing and reviews will be maintained.

5.2 Test Data Criteria

The results of the voting system tests and reviews results shall be evaluated against the documentation of the WINware Voting System TDP, and the requirements of the Federal Election Commission Voting System Standards 2002. The AVS WINware Voting System shall be evaluated for its performance against the standard and the expected results identified in each test case.

5.3 Test Data Reduction

Test data will be processed manually.

6 Test Procedures and Conditions

6.1 Facility Requirements

All testing and reviews, except the Hardware Environmental Testing and Accuracy and Reliability Testing, shall take place at iBeta Quality Assurance's Aurora, Colorado facility. Hardware Environmental Testing and Accuracy and Reliability Testing shall take place at Wyle Laboratories' Huntsville, AL facility. Test preparation, documentation and source code reviews shall be conducted in a separate secure key locked voting laboratory. iBeta Quality Assurance shall inspect the test environment at Wyle Laboratories to ensure the adequacy and security of the test environment.

All AVS documentation, test documentation and results will be maintained in the AVS WINware project folder on the SharePoint server in Voting. Only project assigned test personnel shall have access to the AVS repository. AVS source code shall be maintained on a separate server. Only project assigned test personnel shall have access to the source code repository

6.2 Test Set-up

As part of the PCA, the AVS WINware Voting System test platform will be set-up in the manner identified in the system configuration identified in the AVS specifications. The test platform will be documented. Installation of the witnessed build and trusted build will be observed and documented. An inventory of any accessories or preloaded applications will be documented.

6.3 Test Sequence

There is no prescribed sequence for the testing of the voting system. The only sequence requirement is that predecessor tasks are completed prior to initiation of a task.

Table 11 –Sequence of Certification Test Tasks

Certification Test Task	Predecessor Task	Test Personnel
Identify scope of project for contract negotiation	Determination of voting system status (new submission to the EAC)	Gail Audette & Carolyn Coggins
Set up Project and Repositories	Contract Authority	Gail Audette Carolyn Coggins & Jon Goodman
Reporting of Discrepancies	Commencement of the project	All Test Staff
PCA TDP Document Review	Project repository and TDP Documents received	Gail Audette Carolyn Coggins Debra Harwood & Mary Ricketts
PCA TDP Source Code Review	Project repository and TDP Documents & Source Code received	Gail Audette Tim Fuller Kevin Wilson Kalpana Siddhantham
FCA Testing Review and Test Scope/ Requirements Identified	TDP Test Documents received	Carolyn Coggins
Certification Test Plan	Preliminary PCA TDP Document Review & FCA Testing Review	Carolyn Coggins
FCA Test Method preparation	TDP Documentation received, FCA Testing Review, Identification of Test Scope and Requirements	Carolyn Coggins
PCA System Configuration	TDP Documentation, hardware and software received	Carolyn Coggins Debra Harwood Mary Ricketts
PCA Witness/Trusted Build	PCA Source Code Review	Gail Audette & Kevin Wilson
FCA Environmental Hardware Test	FCA Test Case preparation & PCA	Carolyn Coggins

Certification Test Task	Predecessor Task	Test Personnel
Case Execution	System Configuration	Wyle Laboratories
FCA Accuracy Test Case	FCA Test Case preparation, PCA System Configuration, Temperature and Power Variation Environmental Test	Gail Audette & Carolyn Coggins
FCA Functional/System Level Test Case Execution	FCA Test Case preparation & PCA System Configuration	Carolyn Coggins Debra Harwood Mary Ricketts
FCA Characteristics. Test Case Execution	FCA Test Case preparation & PCA System Configuration	Carolyn Coggins & Mary Ricketts
FCA Telephony and Cryptography Review and Test Case	FCA Test Case preparation & PCA System Configuration	Gail Audette & Carolyn Coggins
Regression Testing of Discrepancy Fixes	Receipt of applicable fix or response from AVS and PCA Witness Build of reviewed code, if applicable	All test staff
VSTL Certification Report	Successfully complete all FCA and PCA tasks	All test staff
Deliver the Certification Report for EAC Review	Completion of VSTL Certification Report	Gail Audette & Carolyn Coggins
Re-issue the Certification Report with the EAC Certification Number	Acceptance of the Certification Report by the EAC	Gail Audette & Carolyn Coggins

6.4 Test Operations Procedures

Test cases and review criteria are contained in separate documents. They are provided to the iBeta test staff and Environmental Hardware Subcontractor with step-by-step procedures for each test case or review conducted. Test and review instructions identify the methods for test or review controls. Results are recorded for each test or review step. Possible results include:

- **Accept:** the expected result of the test case is observed; an element of the voting system meets the Federal Election Commission Voting System Standards 2002.
- **Reject:** the expected result of the test case is not observed; an element of the voting system did not meet the Federal Election Commission Voting System Standards 2002.
- **Not Applicable (NA):** test or review steps that are not applicable to the scope of the current Certification are marked NA.
- **Not Testable (NT)**: rejection of a previous test step prevents execution of this and subsequent test steps.

Reject, Not Applicable and Not Testable results are marked with an explanatory note. The note for rejected results contains the discrepancy number.

Issues identified in testing or reviews are logged on the Discrepancy Report. Issue types include:

- Document Defects: a documentation element of the voting system did not meet the Federal Election Commission Voting System Standards 2002. Resolution of the defect is required for certification.
- Functional Defects: a hardware or software element of the voting system did not meet the Federal Election Commission Voting System Standards 2002. Resolution of the defect is required for certification.
- Informational: an element of the voting system which meets the Federal Election Commission Voting System Standards 2002 but may be significant to either the vendor or the jurisdiction. Resolution of Informational issues is optional. Unresolved issues are disclosed in the certification report.

Test steps are numbered and a tabulation of the test results is reported in the test case. Test operation personnel and their assignments are identified in Table 11.

7 Appendix- Test Methods

7.1 System Level Test Cases

7.1.1 General Elections

Method Detail	General Election 1 Test Method	General Election 2 Test Method
Test Case Name	General 1	General 2
Scope - identifies the type of test	A system level test incorporating validations of the 2002 Voting System Standards required functionality. Testing includes validation of measurable performance including accuracy, processing rate, and ballot format handling capability. Functional aspects include error recovery, security, and usability of the hardware, software and procedures in the pre-vote, voting, and post-voting operations of a voting system.	A system level test incorporating validations of the 2002 Voting System Standards required and vendor identified functionality. Testing includes validation of measurable performance including accuracy, processing rate, and ballot format handling capability, Functional aspects include error recovery, security, and usability of the hardware, software and procedures in the pre-vote, voting, and post-voting operations of a voting system. Functional accessibility in the voting mode is included.
Test Objective	Validation of the ability to accurately and securely create, install, vote, count and report the results of a general election including the identified voting variations	Validation of the ability to accurately and securely create visual and audio ballots, install, vote, count and report the results of a general election including the identified voting variations.
Test Variables: Voting Variations (as supported by the voting system)	General elections Partisan/non-partisan offices Write-in votes Ballot rotation Split precincts Vote for N of M Cross Party Endorsement Provisional or challenged ballots Candidate to Multiple Offices Flash Title on undervotes-unchecked Default Layout "X" Mark Audio Button Border- unchecked 4th Line- unchecked	General election Straight party voting Partisan/non-partisan offices Write-in votes Multiple precincts Vote for N of M Audio ballots Spanish and English ballots Flash Title on undervotes- checked Default Layout "Check" Mark Audio Button Border- checked 4th Line- checked
A description of the voting system type and the operational environment	WINware Voting System is a Windows based Election Management System and Direct Recording Electronic (DRE) polling place device. EMS Software -WINprep and WINresults DRE Software- WINvote	WINware Voting System is a Windows based Election Management System and Direct Recording Electronic (DRE) polling place device. EMS Software -WINprep and WINresults DRE Software- WINvote
VSS 2002 vol. 1	2.2.1 thru 2.2.6, 2.2.8 thru 2.5.3.2	2.2.1 thru 2.5.3.2 HAVA a thru c2
VSS 2002 vol. 2	6.2 thru 6.4.1, 6.6 & 6.7	6.2 thru 6.4.1, 6.5 thru 6.7
Hardware, Software voting system configuration and test location	WINware 2.0.4 Voting System EMS: WINprep 2.0.4, WINresults 2.0.4 DRE: WINvote 2.0.4 Test Location: iBeta, Aurora, CO	WINware 2.0.4 Voting System EMS: WINprep 2.0.4, WINresults 2.0.4 DRE: WINvote 2.0.4 Test Location: iBeta, Aurora, CO

Method Detail	General Election 1 Test Method	General Election 2 Test Method
Pre-requisites and preparation for execution of the test case.	Complete the prerequisites; - Record the testers & date - System has been set up as identified in the user manual - Gather any necessary materials or manuals. - Ensure customization of the test case template is complete - Installation of WINprep with a SmartCard driver is complete - Create a WINprep Administrator User	Complete the prerequisites; - Record the testers & date - System has been set up as identified in the user manual - Gather any necessary materials or manuals. - Ensure customization of the test case template is complete - Installation of WINprep with a SmartCard driver is complete - Create a WINprep Administrator User
Getting Started Checks	Check the voting system to: - Verify the test environment and system configuration is documented in the PCA Configuration and matches the system used in the 48 hr. temp & power variation test and vendor described configuration. - Validate installation of the witnessed build - Testers understand that no change shall occur to the test environment without documentation in the test record and the authorization of the project manager. -During testing an operational readiness test will be performed.	Check the voting system to : - Verify the test environment and system configuration is documented in the PCA Configuration and matches the system used in the 48 hr. temp & power variation test and vendor described configuration. - Validate installation of the witnessed build - Testers understand that no change shall occur to the test environment without documentation in the test record and the authorization of the project manager. -During testing an operational readiness test will be performed.
Documentation of Test Data & Test Results	Test Data: - Record all programmed & observed election, ballot & vote data fields and field contents on the corresponding tabs to provide a method to repeat the test - Preserve all tabs for each instance the test is run. Test Results: - Enter Accept/Reject on the Test Steps - In Comments enter any deviations, discrepancies, or notable observations - Log discrepancies on the Discrepancy Report and insert the number in the Comments	Test Data: - Record all programmed & observed election, ballot & vote data fields and field contents on the corresponding tabs to provide a method to repeat the test - Preserve all tabs for each instance the test is run. Test Results: - Enter Accept/Reject on the Test Steps - In Comments enter any deviations, discrepancies, or notable observations - Log discrepancies on the Discrepancy Report and insert the number in the Comments
Pre-vote: Ballot Preparation procedures verifications	Ballot Prep: -An election database can be accurately/securely defined & formatted. -A ballot (candidates & propositions) can be accurately/securely defined & generated. -Election media can be accurately/securely programmed & installed	Ballot Prep: -An election database can be accurately/securely defined & formatted. -A ballot (candidates & propositions) can be accurately/securely defined & generated. -Election media can be accurately/securely programmed & installed
Pre-vote: Ballot Preparation Security	Ballot Prep: -Security access controls limit or detect access to critical systems and the loss of system integrity, availability, confidentiality & accountability -Functions are only executable in the intended manner, order & under intended conditions -Prevents execution of functions if preconditions weren't met -Implemented restrictions on controlled functions - Documentation of mandatory administrative procedures. COTS -Authentication is configured on the local terminal & external connection devices, -Operating systems are enabled for all session & connection openings, & closings, all process executions & terminations & for the alteration or detection of any memory or file object	Ballot Prep: -Security access controls limit or detect access to critical systems and the loss of system integrity, availability, confidentiality & accountability -Functions are only executable in the intended manner, order & under intended conditions -Prevents execution of functions if preconditions weren't met -Implemented restrictions on controlled functions - Documentation of mandatory administrative procedures. COTS -Authentication is configured on the local terminal & external connection devices, -Operating systems are enabled for all session & connection openings, & closings, all process executions & terminations & for the alteration or detection of any memory or file object

Method Detail	General Election 1 Test Method	General Election 2 Test Method
	-Configure the system to only execute intended & needed processes during the execution election software. Processes are halted until termination of critical system processes (such as audit).	-Configure the system to only execute intended & needed processes during the execution election software. Processes are halted until termination of critical system processes (such as audit).
Readiness Testing and Poll Verification	Voting system is ready for the election: - Status & data reports are generated - The election is correctly installed - The voting system functions correctly - Test data is segregated from voting data, with no residual effect' The polling place voting system functions properly including a formal record of: - Election, polling place, voting system & ballot format identification - Zero count report - A list of all ballot fields - Other information to confirm readiness & accommodate administrative reporting requirements Test confirmation that there are: - No hardware/software failures - The device is ready to be activated to accept votes	Voting system is ready for the election: - Status & data reports are generated - The election is correctly installed - The voting system functions correctly - Test data is segregated from voting data, with no residual effect' The polling place voting system functions properly including a formal record of: - Election, polling place, voting system & ballot format identification - Zero count report - A list of all ballot fields - Other information to confirm readiness & accommodate administrative reporting requirements Test confirmation that there are: - No hardware/software failures - The device is ready to be activated to accept votes
Pre- vote: Opening the Polls Verification	Precinct Count: - The system is disable until the internal test is successfully completed. DRE - Security seal, password, or data code recognition capability preventing inadvertent or unauthorized poll opening - Means to enforce the proper sequence of steps to open the polls - Means to verify correct activation - Identification of any failures & corrective action	Precinct Count: - The system is disable until the internal test is successfully completed. DRE - Security seal, password, or data code recognition capability preventing inadvertent or unauthorized poll opening - Means to enforce the proper sequence of steps to open the polls - Means to verify correct activation - Identification of any failures & corrective action
Voting: Ballot Activation and Casting Verifications	Protects secrecy of ballot/vote - Records selection/non-selection for each contest DRE - Voter can make selections based on ballot programming & indicate selection, cancellation, & non-selection (undervotes) - Alert or prevent overvotes; permit review & change before casting - Alert selection's complete; prompt confirmation as casting is irrevocable, - Alert successful/unsuccessful storage of cast ballot; give instruction to resolve unsuccessful casting - Prevent modification of vote & access until the polls close - Increment the ballot counter	Protects secrecy of ballot/vote - Records selection/non-selection for each contest DRE - Voter can make selections based on ballot programming & indicate selection, cancellation, & non-selection (undervotes) - Alert or prevent overvotes; permit review & change before casting - Alert selection's complete; prompt confirmation as casting is irrevocable, - Alert successful/unsuccessful storage of cast ballot; give instruction to resolve unsuccessful casting - Prevent modification of vote & access until the polls close - Increment the ballot counter
Voting: Voting System Integrity, System Audit, Errors & Status Indicators	The system audit provides a time -stamped, always available, report of normal/abnormal events that can't be turned off when the system is in operating mode. Status message are part of the real time audit record. - Critical status messages requiring operator intervention shall use clear indicators or text Error messages are: - Are generated, stored & reported as they occur	The system audit provides a time-stamped, always available, report of normal/abnormal events that can't be turned off when the system is in operating mode. Status message are part of the real time audit record. - Critical status messages requiring operator intervention shall use clear indicators or text Error messages are: - Are generated, stored & reported as they occur

Method Detail	General Election 1 Test Method	General Election 2 Test Method
	- Errors requiring intervention by the voter or poll worker clearly display issues & action instructions in easily understood text language or with indicators - The text for any numeric codes is contained in the error or affixed to the inside of the voting system - Incorrect responses will not lead to irreversible errors. - Nested conditions are corrected in the sequence to restore the system to the state before the error occurred	- Errors requiring intervention by the voter or poll worker clearly display issues & action instructions in easily understood text language or with indicators - The text for any numeric codes is contained in the error or affixed to the inside of the voting system - Incorrect responses will not lead to irreversible errors. - Nested conditions are corrected in the sequence to restore the system to the state before the error occurred
Post-vote: Closing the Polls	Once the polls are closed the voting system - prevents further casting of ballots or reopening of the polls - internally tests and verifies that the closing procedures has been followed and the device status is normal - visibly displays the status - produces a test record that verifies the sequence of events and indicates the extraction of vote data is activated	Once the polls are closed the voting system - prevents further casting of ballots or reopening of the polls - internally tests and verifies that the closing procedures has been followed and the device status is normal - visibly displays the status - produces a test record that verifies the sequence of events and indicates the extraction of vote data is activated
Post-vote: Central Count	Paper Based: The central count voting system includes: - Election identification - Zero count report - Information to confirm readiness & accommodate administrative reporting requirements Vote Consolidation: Consolidated reported votes match predicted votes from polling places, & optionally other sources (absentee, provisional, etc) Reports include: - Geographic reports of votes; each contest by precinct & other jurisdictional levels - Printed reports of ballots counted by tabulator, with votes, undervotes & overvotes - Report of system audit information printed or in electronic memory - Report identifying the combination of candidates receiving overvotes - Prevent data from being altered or destroyed by report generation, transmission over telecommunication lines or extraction from portable media - Permit extraction & consolidate votes from programmable memory services or data storage medium - Consolidate the votes from multiple voting systems into a single polling place report DRE -Electronic ballot images of votes cast by each voter, extracted from a separate process & storage location, is reported in a human readable form	Paper Based: The central count voting system includes: - Election identification - Zero count report - Information to confirm readiness & accommodate administrative reporting requirements Vote Consolidation: Consolidated reported votes match predicted votes from polling places, & optionally other sources (absentee, provisional, etc) Reports include: - Geographic reports of votes; each contest by precinct & other jurisdictional levels - Printed reports of ballots counted by tabulator, with votes, undervotes & overvotes - Report of system audit information printed or in electronic memory - Report identifying the combination of candidates receiving overvotes - Prevent data from being altered or destroyed by report generation, transmission over telecommunication lines or extraction from portable media - Permit extraction & consolidate votes from programmable memory services or data storage medium - Consolidate the votes from multiple voting systems into a single polling place report DRE -Electronic ballot images of votes cast by each voter, extracted from a separate process & storage location, is reported in a human readable form
Post-vote: Security	The central count: - Security access controls limit or detect access to critical systems& the loss of system integrity, availability, confidentiality and accountability - Functions are only executable in the intended manner, order & under	The central count: - Security access controls limit or detect access to critical systems& the loss of system integrity, availability, confidentiality and accountability

Method Detail	General Election 1 Test Method	General Election 2 Test Method
	the intended conditions - Prevented execution of functions if preconditions were not met - Implemented restrictions on controlled functions - Provided documentation of mandatory administrative procedures. COTS systems -Authentication is configured on the local terminal and external connection devices, -Operating systems are enabled for all session and connection openings, and closings, all process executions and terminations and for the alteration or detection of any memory or file object - Configure the system to only execute the intended and necessary processes during the execution of the election software. Election software process are halted until the termination of any critical system process, such as system audit.	- Functions are only executable in the intended manner, order & under the intended conditions - Prevented execution of functions if preconditions were not met - Implemented restrictions on controlled functions - Provided documentation of mandatory administrative procedures. COTS systems -Authentication is configured on the local terminal and external connection devices, -Operating systems are enabled for all session and connection openings, and closings, all process executions and terminations and for the alteration or detection of any memory or file object - Configure the system to only execute the intended and necessary processes during the execution of the election software. Election software process are halted until the termination of any critical system process, such as system audit.
Post-vote: System Audit	The system audit provides a central count time stamped, always available, report of normal and abnormal events that cannot be turned off when the system is in operating mode. Status message are part of the real time audit record.	The system audit provides a central count time stamped, always available, report of normal and abnormal events that cannot be turned off when the system is in operating mode. Status message are part of the real time audit record.
Expected Results are observed	Review the test result against the expected result: • Accept: the expected result is observed • Reject: the expected result of the test case is not observed • Not Testable (NT): rejection of a previous test step prevents execution of this step, or tested in another TC. • Not Applicable (NA): not applicable to test scope	Review the test result against the expected result: • Accept: the expected result is observed • Reject: the expected result of the test case is not observed • Not Testable (NT): rejection of a previous test step prevents execution of this step, or tested in another TC. • Not Applicable (NA): not applicable to test scope
Record observations and all input/outputs for each election;	All inputs, outputs, observations, deviations and any other information impacting the integrity of the test results will be recorded in the test case. - Any failure against the requirements of the EAC guidelines will mean the failure of the system. and shall be reported as such. - Failures will be reported to the vendor as Defect Issues in the Discrepancy Report. - The vendor shall have the opportunity to cure all discrepancies prior to issuance of the Certification Report. - If cures are submitted the applicable test will be rerun. Complete information about the rerun test will be preserved in the test case. The cure and results of the retest will be noted in the - Discrepancy Report and submitted as an appendix of the Certification Report. - Operations which do not fail the requirements but could be deemed defects or inconsistent with standard software practices or election practices will be logged as Informational Issues on the Discrepancy Report. It is the vendor's option to address these issues. Open items will be identified in the report.	All inputs, outputs, observations, deviations and any other information impacting the integrity of the test results will be recorded in the test case. - Any failure against the requirements of the EAC guidelines will mean the failure of the system. and shall be reported as such. - Failures will be reported to the vendor as Defect Issues in the Discrepancy Report. - The vendor shall have the opportunity to cure all discrepancies prior to issuance of the Certification Report. - If cures are submitted the applicable test will be rerun. Complete information about the rerun test will be preserved in the test case. The cure and results of the retest will be noted in the - Discrepancy Report and submitted as an appendix of the Certification Report. - Operations which do not fail the requirements but could be deemed defects or inconsistent with standard software practices or election practices will be logged as Informational Issues on the Discrepancy Report. It is the vendor's option to address these issues. Open items will be identified in the report.

7.1.2 Primary System Level Test Cases

Method Detail	Primary Election 1 Test Method	PrimaryElection 2 Test Method
Test Case Name	Primary 1	Primary 2
Scope - identifies the type of test	A system level test incorporating validations of the 2002 Voting System Standards required functionality. Testing includes validation of measurable performance including accuracy, processing rate, and ballot format handling capability, Functional aspects include error recovery, security, and usability of the hardware, software and procedures in the pre-vote, voting, and post-voting operations of a voting system.	A system level test incorporating validations of the 2002 Voting System Standards required and vendor identified functionality. Testing includes validation of measurable performance including accuracy, processing rate, and ballot format handling capability, Functional aspects include error recovery, security, and usability of the hardware, software and procedures in the pre-vote, voting, and post-voting operations of a voting system. Functional accessibility in the voting mode is included.
Test Objective	Validation of the ability to accurately and securely create, install, vote, count and report the results of a closed primary election including the identified voting variations	Validation of the ability to accurately and securely create visual and audio ballots, install, vote with mobility and non-mobility restrictions, count and report the results of a open primary election including the identified voting variations.
Test Variables: Voting Variations (as supported by the voting system)	Closed primaries Partisan/non-partisan offices Write-in votes Primary presidential delegation nominations Ballot rotation Cross -party endorsement Split precincts Vote for N of M Provisional or challenged ballots	Open primaries Partisan/non-partisan offices Write-in votes Multiple Precincts Vote for N of M
A description of the voting system type and the operational environment	WINware Voting System is a Windows based Election Management System and Direct Recording Electronic (DRE) polling place device. EMS Software -WINprep and WINresults DRE Software- WINvote	WINware Voting System is a Windows based Election Management System and Direct Recording Electronic (DRE) polling place device. EMS Software -WINprep and WINresults DRE Software- WINvote
VSS 2002 vol. 1	2.2.1 thru 2.2.6, 2.2.8 thru 2.5.3.2	2.2.1 thru 2.5.3.2 HAVA a thru c2
VSS 2002 vol. 2	6.2 thru 6.4.1, 6.6 & 6.7	6.2 thru 6.4.1, 6.5 thru 6.7
Hardware, Software voting system configuration and test location	WINware 2.0.4 Voting System EMS: WINprep 2.0.4, WINresults 2.0.4 DRE: WINvote 2.0.4 Test Location: iBeta, Aurora, CO	WINware 2.0.4 Voting System EMS: WINprep 2.0.4, WINresults 2.0.4 DRE: WINvote 2.0.4 Test Location: iBeta, Aurora, CO
Pre-requisites and preparation for execution of the test case.	Complete the prerequisites; - Record the testers & date - System has been set up as identified in the user manual - Gather any necessary materials or manuals. - Ensure customization of the test case template is complete - Installation of WINprep with a SmartCard driver is complete - Create a WINprep Administrator User	Complete the prerequisites; - Record the testers & date - System has been set up as identified in the user manual - Gather any necessary materials or manuals. - Ensure customization of the test case template is complete - Installation of WINprep with a SmartCard driver is complete - Create a WINprep Administrator User
Getting Started Checks	Check the voting system to : - Verify the test environment and system configuration is documented in	Check the voting system to : - Verify the test environment and system configuration is documented

Method Detail	Primary Election 1 Test Method	PrimaryElection 2 Test Method
	the PCA Configuration and matches the system used in the 48 hr. temp & power variation test and vendor described configuration. - Validate installation of the witnessed build - Testers understand that no change shall occur to the test environment without documentation in the test record and the authorization of the project manager. -During testing an operational readiness test will be performed.	in the PCA Configuration and matches the system used in the 48 hr. temp & power variation test and vendor described configuration. - Validate installation of the witnessed build - Testers understand that no change shall occur to the test environment without documentation in the test record and the authorization of the project manager. -During testing an operational readiness test will be performed.
Documentation of Test Data & Test Results	Test Data: - Record all programmed & observed election, ballot & vote data fields and field contents on the corresponding tabs to provide a method to repeat the test - Preserve all tabs for each instance the test is run. Test Results: - Enter Accept/Reject on the Test Steps - In Comments enter any deviations, discrepancies, or notable observations - Log discrepancies on the Discrepancy Report and insert the number in the Comments	Test Data: - Record all programmed & observed election, ballot & vote data fields and field contents on the corresponding tabs to provide a method to repeat the test - Preserve all tabs for each instance the test is run. Test Results: - Enter Accept/Reject on the Test Steps - In Comments enter any deviations, discrepancies, or notable observations - Log discrepancies on the Discrepancy Report and insert the number in the Comments
Pre-vote: Ballot Preparation procedures verifications	Ballot Prep: -An election database can be accurately/securely defined & formatted. -A ballot (candidates & propositions) can be accurately/securely defined & generated. -Election media can be accurately/securely programmed & installed	Ballot Prep: -An election database can be accurately/securely defined & formatted. -A ballot (candidates & propositions) can be accurately/securely defined & generated. -Election media can be accurately/securely programmed & installed
Pre-vote: Ballot Preparation Security	Ballot Prep: -Security access controls limit or detect access to critical systems and the loss of system integrity, availability, confidentiality & accountability -Functions are only executable in the intended manner, order & under intended conditions -Prevents execution of functions if preconditions weren't met -Implemented restrictions on controlled functions - Documentation of mandatory administrative procedures. COTS -Authentication is configured on the local terminal & external connection devices, -Operating systems are enabled for all session & connection openings, & closings, all process executions & terminations & for the alteration or detection of any memory or file object -Configure the system to only execute intended & needed processes during the execution election software. Processes are halted until termination of critical system processes (such as audit).	Ballot Prep: -Security access controls limit or detect access to critical systems and the loss of system integrity, availability, confidentiality & accountability -Functions are only executable in the intended manner, order & under intended conditions -Prevents execution of functions if preconditions weren't met -Implemented restrictions on controlled functions - Documentation of mandatory administrative procedures. COTS -Authentication is configured on the local terminal & external connection devices, -Operating systems are enabled for all session & connection openings, & closings, all process executions & terminations & for the alteration or detection of any memory or file object -Configure the system to only execute intended & needed processes during the execution election software. Processes are halted until termination of critical system processes (such as audit).
Readiness Testing and Poll Verification	Voting system is ready for the election: - Status & data reports are generated - The election is correctly installed - The voting system functions correctly - Test data is segregated from voting data, with no residual effect' The polling place voting system functions properly including a formal	Voting system is ready for the election: - Status & data reports are generated - The election is correctly installed - The voting system functions correctly - Test data is segregated from voting data, with no residual effect' The polling place voting system functions properly including a formal

Method Detail	Primary Election 1 Test Method	PrimaryElection 2 Test Method
	record of: - Election, polling place, voting system & ballot format identification - Zero count report - A list of all ballot fields - Other information to confirm readiness & accommodate administrative reporting requirements Test confirmation that there are: - No hardware/software failures - The device is ready to be activated to accept votes	record of: - Election, polling place, voting system & ballot format identification - Zero count report - A list of all ballot fields - Other information to confirm readiness & accommodate administrative reporting requirements Test confirmation that there are: - No hardware/software failures - The device is ready to be activated to accept votes
Pre- vote: Opening the Polls Verification	Precinct Count: - The system is disable until the internal test is successfully completed. DRE - Security seal, password, or data code recognition capability preventing inadvertent or unauthorized poll opening - Means to enforce the proper sequence of steps to open the polls - Means to verify correct activation - Identification of any failures & corrective action	Precinct Count: - The system is disable until the internal test is successfully completed. DRE - Security seal, password, or data code recognition capability preventing inadvertent or unauthorized poll opening - Means to enforce the proper sequence of steps to open the polls - Means to verify correct activation - Identification of any failures & corrective action
Voting: Ballot Activation and Casting Verifications	Protects secrecy of ballot/vote - Records selection/non-selection for each contest DRE - Voter can make selections based on ballot programming & indicate selection, cancellation, & non-selection (undervotes) - Alert or prevent overvotes; permit review & change before casting - Alert selection's complete; prompt confirmation as casting is irrevocable, - Alert successful/unsuccessful storage of cast ballot; give instruction to resolve unsuccessful casting - Prevent modification of vote & access until the polls close - Increment the ballot counter	Protects secrecy of ballot/vote - Records selection/non-selection for each contest DRE - Voter can make selections based on ballot programming & indicate selection, cancellation, & non-selection (undervotes) - Alert or prevent overvotes; permit review & change before casting - Alert selection's complete; prompt confirmation as casting is irrevocable, - Alert successful/unsuccessful storage of cast ballot; give instruction to resolve unsuccessful casting - Prevent modification of vote & access until the polls close - Increment the ballot counter
Voting: Voting System Integrity, System Audit, Errors & Status Indicators	The system audit provides a time stamped, always available, report of normal/abnormal events that can't be turned off when the system is in operating mode. Status message are part of the real time audit record. - Critical status messages requiring operator intervention shall use clear indicators or text Error messages are: - Are generated, stored & reported as they occur - Errors requiring intervention by the voter or poll worker clearly display issues & action instructions in easily understood text language or with indicators - The text for any numeric codes is contained in the error or affixed to the inside of the voting system - Incorrect responses will not lead to irreversible errors. - Nested conditions are corrected in the sequence to restore the system to the state before the error occurred	The system audit provides a time stamped, always available, report of normal/abnormal events that can't be turned off when the system is in operating mode. Status message are part of the real time audit record. - Critical status messages requiring operator intervention shall use clear indicators or text Error messages are: - Are generated, stored & reported as they occur - Errors requiring intervention by the voter or poll worker clearly display issues & action instructions in easily understood text language or with indicators - The text for any numeric codes is contained in the error or affixed to the inside of the voting system - Incorrect responses will not lead to irreversible errors. - Nested conditions are corrected in the sequence to restore the system to the state before the error occurred
Post-vote:	Once the polls are closed the voting system	Once the polls are closed the voting system

Method Detail	Primary Election 1 Test Method	PrimaryElection 2 Test Method
Closing the Polls	- prevents further casting of ballots or reopening of the polls - internally tests and verifies that the closing procedures has been followed and the device status is normal - visibly displays the status - produces a test record that verifies the sequence of events and indicates the extraction of vote data is activated	- prevents further casting of ballots or reopening of the polls - internally tests and verifies that the closing procedures has been followed and the device status is normal - visibly displays the status - produces a test record that verifies the sequence of events and indicates the extraction of vote data is activated
Post-vote: Central Count	Paper Based: The central count voting system includes: - Election identification - Zero count report - Information to confirm readiness & accommodate administrative reporting requirements Vote Consolidation: Consolidated reported votes match predicted votes from polling places, & optionally other sources (absentee, provisional, etc) Reports include: - Geographic reports of votes; each contest by precinct & other jurisdictional levels - Printed reports of ballots counted by tabulator, with votes, undervotes & overvotes - Report of system audit information printed or in electronic memory - Report identifying the combination of candidates receiving overvotes - Prevent data from being altered or destroyed by report generation, transmission over telecommunication lines or extraction from portable media - Permit extraction & consolidate votes from programmable memory services or data storage medium - Consolidate the votes from multiple voting systems into a single polling place report DRE -Electronic ballot images of votes cast by each voter, extracted from a separate process & storage location, is reported in a human readable form	Paper Based: The central count voting system includes: - Election identification - Zero count report - Information to confirm readiness & accommodate administrative reporting requirements Vote Consolidation: Consolidated reported votes match predicted votes from polling places, & optionally other sources (absentee, provisional, etc) Reports include: - Geographic reports of votes; each contest by precinct & other jurisdictional levels - Printed reports of ballots counted by tabulator, with votes, undervotes & overvotes - Report of system audit information printed or in electronic memory - Report identifying the combination of candidates receiving overvotes - Prevent data from being altered or destroyed by report generation, transmission over telecommunication lines or extraction from portable media - Permit extraction & consolidate votes from programmable memory services or data storage medium - Consolidate the votes from multiple voting systems into a single polling place report DRE -Electronic ballot images of votes cast by each voter, extracted from a separate process & storage location, is reported in a human readable form
Post-vote: Security	The central count: - Security access controls limit or detect access to critical systems& the loss of system integrity, availability, confidentiality and accountability - Functions are only executable in the intended manner, order & under the intended conditions - Prevented execution of functions if preconditions were not met - Implemented restrictions on controlled functions - Provided documentation of mandatory administrative procedures. COTS systems -Authentication is configured on the local terminal and external connection devices, -Operating systems are enabled for all session and connection openings, and closings, all process executions and terminations and for the	The central count: - Security access controls limit or detect access to critical systems& the loss of system integrity, availability, confidentiality and accountability - Functions are only executable in the intended manner, order & under the intended conditions - Prevented execution of functions if preconditions were not met - Implemented restrictions on controlled functions - Provided documentation of mandatory administrative procedures. COTS systems -Authentication is configured on the local terminal and external connection devices, -Operating systems are enabled for all session and connection

Method Detail	Primary Election 1 Test Method	PrimaryElection 2 Test Method
	alteration or detection of any memory or file object - Configure the system to only execute the intended and necessary processes during the execution of the election software. Election software process are halted until the termination of any critical system process, such as system audit.	openings, and closings, all process executions and terminations and for the alteration or detection of any memory or file object - Configure the system to only execute the intended and necessary processes during the execution of the election software. Election software process are halted until the termination of any critical system process, such as system audit.
Post-vote: System Audit	The system audit provides a central count time stamped, always available, report of normal and abnormal events that cannot be turned off when the system is in operating mode. Status message are part of the real time audit record.	The system audit provides a central count time stamped, always available, report of normal and abnormal events that cannot be turned off when the system is in operating mode. Status message are part of the real time audit record.

7.1.3 Security, Telephony and Cryptographic Test Cases

Method Detail	Security Test Method	Telephony and Cryptographic Test Method
Test Case Name	Security	Telephony and Cryptographic
Scope - identifies the type of test	Security testing crosses into several areas of voting system testing and thus must be tested at the integrated system level, in a Security specific system level test case and through source code review. System Level Tests are customized for the specific voting system to test the security elements incorporated into the pre-vote, voting and post voting functions. A review of the security documentation addresses: Access Controls, Physical Security and Software Security. The system is reviewed to confirm that the WINware v. 2.0.4 Voting System has does not permit the use of public telecommunications.	The system is reviewed to confirm that the WINware v. 2.0.4 Voting System does not permit the use of public telecommunications.
Test Objective	The objective of security testing is to minimize the risk of accidents, inadvertent mistakes and errors; protect from intentional manipulation, fraud or malicious mischief;	Validation that the system does not permit the use of public telecommunications
Test Variables: Voting Variations (as supported by the voting system)	In the general and primary elections validate the security of the pre-vote, voting, and post voting functions of the voting system by test incorporating overflow conditions, boundaries, password configurations, negative testing, inputs to exercise errors and status messages, protection of the secrecy in the voting process and identification of fraudulent or erroneous changes. Including: Unauthorized changes to system capabilities for: - Defining ballot formats, - Casting and recording votes, - Calculating vote totals consistent with defined ballot formats, - Reporting vote totals, - Alteration of voting system audit trails, - Changing or preventing the recording of a vote, - Introducing data not cast by an authorized voter, - Changing calculated vote totals, - Preventing access to vote data, including individual votes and vote totals, to unauthorized individuals, and	The system is reviewed to confirm that the WINware v. 2.0.4 Voting System does not permit the use of public telecommunications.

Method Detail	Security Test Method	Telephony and Cryptographic Test Method
	- Preventing access to voter identification data and data for votes cast by the voter such that an individual can determine the content of specific votes cast by the voter.	
A description of the voting system type and the operational environment	WINware Voting System is a Windows based Election Management System and Direct Recording Electronic (DRE) polling place device. EMS Software -WINprep and WINresults DRE Software- WINvote	WINware Voting System is a Windows based Election Management System and Direct Recording Electronic (DRE) polling place device. EMS Software -WINprep and WINresults DRE Software- WINvote
VSS 2002 vol. 1	2.2.1, 2.2.4 thru 2.2.5.2.3, 6.2 thru 6.4	5.1 thru 5.2.7, 6.5.3, 6.6.1
VSS 2002 vol. 2	6.4 thru 6.4.2	6.4.2
Hardware, Software voting system configuration and test location	WINware 2.0.4 Voting System EMS: WINprep 2.0.4, WINresults 2.0.4 DRE: WINvote 2.0.4 Test Location: iBeta, Aurora, CO	WINware 2.0.4 Voting System EMS: WINprep 2.0.4, WINresults 2.0.4 DRE: WINvote 2.0.4 Test Location: iBeta, Aurora, CO
Pre-requisites and preparation for execution of the test case.	The System Level Test Cases are reviewed to ensure that they incorporate the security test requirements and the procedural requirements identified in the vendor supplied security documentation. The system is reviewed to confirm that the WINware v. 2.0.4 Voting System has does not permit the use of public telecommunications.	Confirm that the WINware v. 2.0.4 Voting System does not permit the use of public telecommunications.
Getting Started Checks	Follow steps in the System Level Test Cases. The vendor supplied security documentation is reviewed against the requirements for Access Controls, Physical Security and Software Security. Complete the prerequisites; - Record the reviewer & date - Gather any necessary materials or manuals.	• Not Applicable (NA): not applicable to test scope
Documentation of Test Data & Test Results	Follow steps in the System Level Test Cases. Record the results of the review. - Enter Accept/Reject against each review requirement. - Log discrepancies on the Discrepancy Report and insert the number in the Comments	Test Results: - Enter Not Applicable in the test requirements
Pre-vote: Ballot Preparation procedures verifications	Follow steps in the System Level Test Cases.	• Not Applicable (NA): not applicable to test scope
Pre-vote: Ballot Preparation Security	Follow steps in the System Level Test Cases.	• Not Applicable (NA): not applicable to test scope
Readiness Testing and Poll Verification	Follow steps in the System Level Test Cases.	• Not Applicable (NA): not applicable to test scope
Pre- vote: Opening the Polls Verification	Follow steps in the System Level Test Cases.	• Not Applicable (NA): not applicable to test scope
Voting:	Follow steps in the System Level Test Cases.	• Not Applicable (NA): not applicable to test scope

Method Detail	Security Test Method	Telephony and Cryptographic Test Method
Ballot Activation and Casting Verifications		
Voting: Voting System Integrity, System Audit, Errors & Status Indicators	Follow steps in the System Level Test Cases.	• Not Applicable (NA): not applicable to test scope
Post-vote: Closing the Polls	Follow steps in the System Level Test Cases.	• Not Applicable (NA): not applicable to test scope
Post-vote: Central Count	Follow steps in the System Level Test Cases.	• Not Applicable (NA): not applicable to test scope
Post-vote: Security	Follow steps in the System Level Test Cases.	• Not Applicable (NA): not applicable to test scope
Post-vote: System Audit	Follow steps in the System Level Test Cases.	• Not Applicable (NA): not applicable to test scope

7.2 Environmental Test Method

Method Detail	Environmental Test Method
Test Case Name	Environmental Test
Scope - identifies the type of test	This set of hardware environmental test cases is outside the scope of iBeta's VSTL accreditation. Assessment and execution of environmental test scope is performed by: Wyle Laboratories Lab Accreditation Number: A2LA-845.01, A2LA-845.02 Expiration 12/1/07
Test Objective	Validation of the polling place hardware to meet the Non-Operating/Operating Environmental test standards of the EAC VSS/VVSG.
Test Variables: Voting Variations (as supported by the voting system)	Tests shall be conducted incompliance with the identified standard: Power disturbance disruption - IEC 61000-4-11 (1994-06). Electromagnetic radiation- FCC Part 15 Class B requirements - ANSI C63.4. Electrostatic disruption - IEC 61000-4-2 (1995-01). Electromagnetic susceptibility - IEC 61000-4-3 (1996). Electrical fast transient protection - IEC 61000-4-4 (1995-01). Lightning surge protection - IEC 61000-4-5 (1995-02). RF immunity - IEC 61000-4-6 (1996-04). AC magnetic fields RF immunity - IEC 61000-4-8 (1993-06). MIL-STD810-D: High temperature method 501.2 Procedures I-Storage maximum 140 F degrees Low temperature - method 502.2, Procedure I-Storage minimum -4 F degrees Temperature & power variations - method 501.2 & 502.2 Humidity - method 507.2 Vibration - method 514.3-1 Category 1 - Basic Transportation Common Carrier Bench handling - method 516.3 procedure VI Safety - OSHA CFR Title 29, part 1910
A description of the voting system type and the operational environment	WINware Voting System is a Windows based Election Management System and Direct Recording Electronic (DRE) polling place device. EMS Software -WINprep and WINresults DRE Software- WINvote
VSS 2002 vol. 1	3.2.2 thru 3.2.2.14, 3.4.8

VSS 2002 vol. 2	4.6.1.5 thru 4.7.1 & 4.8
Hardware, Software voting system configuration and test location	WINvote 2.0.4 In order to ensure the integrity of testing iBeta will provide Wyle Laboratories with a test case outlining all the method to document the configuration, test environment, lab accreditations, tester qualifications, operational status check. In additional iBeta personnel will be on site to observe test execution, perform or oversee performance of the operational status check and execute the accuracy testing in conjunction with the Temperature and Power Variations.
Pre-requisites and preparation for execution of the test case.	Complete the prerequisites; - Record the testers & date - System has been set up as identified in the user manual - Gather any necessary materials or manuals. - Ensure customization of the test case template is complete - (insert any validations of pre-requisites customized for the voting system) An Operational Status Check script is provided that includes: - Checking the operation of all buttons, switches and lights - Opening the polls & running a zero totals report - Checking appropriate error conditions for correct prompts or responses. (Error conditions will depend upon the type of equipment being tested.) - Accessibility features are operational. - Power off and on with no loss of function. - Close the polls and print all reports. (Totals & Audit Logs)
Getting Started Checks	Check the voting system to: - Verify the test environment and system configuration is documented in the PCA Configuration and matches the vendor described configuration. - Validate installation of the witnessed build - Testers understand that no change shall occur to the test environment without documentation in the test record and the authorization of the project manager. - Confirm the tester understands the recording requirements of the iBeta test case. - Operational status check procedures is available and successfully run. - An automated script to loop system operation for use during the EMC operational tests exercises all necessary functionality.
Documentation of Test Data & Test Results	Test Results: - Enter Accept/Reject on the Test Steps - In Comments enter any deviations, discrepancies, or notable observations - Log discrepancies on the Discrepancy Report and insert the number in the Comments
Standard Environmental Tests	Follow test method in the identified standard
Expected Results are observed	Review the test result against the expected result: • Pass: meets the requirements • Fail: does not meet the requirements; document the failure in the comments • Not Testable (NT): not testable; provide a reason in the comments
Record observations and all input/outputs for each election;	All test results will be recorded in the test case. - Any failure against the requirements will mean the failure of the system and shall be reported as such. - Failures will be reported to the vendor as Defect Issues in the Discrepancy Report. - The vendor shall have the opportunity to cure all discrepancies prior to issuance of the Certification Report. - If cures are submitted the applicable test will be rerun. Complete information about the rerun test will be preserved in the test case. The cure and results of the retest will be noted in the - Discrepancy Report and submitted as an appendix of the Certification Report. - Operations which do not fail the requirements but could be deemed defects or inconsistent with standard software practices or election

	practices will be logged as Informational Issues on the Discrepancy Report. It is the vendor's option to address these issues. Open items will be identified in the report.

7.3 Characteristics (Recovery, Accessibility, Usability & Maintainability) Test Method

Method Detail	Characteristics Test Method
Test Case Name	Characteristics (Recovery, Accessibility, Usability & Maintainability)
Scope - identifies the type of test	Accessibility, usability and maintainability are characteristics of the voting system. These characteristics are performed as a single combined functional test. Validation of the integration of security and accuracy functions of the usability and accessibility features are tested in the system level tests.
Test Objective	The objective of characteristics testing is to verify the accessibility, usability and maintainability requirements of the guidelines and HAVA are met.
Test Variables: Voting Variations (as supported by the voting system)	An audio/visual straight party ballot with multi-lingual capabilities will be used. - One contest shall have a write-in vote. - One contest shall have more candidates or text than can be displayed on the screen.
A description of the voting system type and the operational environment	DRE: WINvote 2.0.4 Test Location: iBeta, Aurora, CO
VSS 2002 vol. 1	2.2.7.1.a thru f, 2.2.2.8.a, 2.2.8.2.b.1 thru I, 2.4.3.1.a, e, &f, 2.2.5.2.1 f.& g, 3.2.1 thru 3.4.2, 3.4.4.1 a thru 3.4.5 c, 3.4.9.a thru e HAVA 301a.3 & 4
VSS 2002 vol. 2	4.7.2, 6.5, 6.7
Hardware, Software voting system configuration and test location	WINware Voting System is a Windows based Election Management System and Direct Recording Electronic (DRE) polling place device. DRE Software- WINvote.
Pre-requisites and preparation for execution of the test case.	A test election is prepared and installed on the polling place device - During installation of the election confirm the operational readiness of the voting system. - System has been set up as identified in the user manual - Record the testers & date - Gather any necessary materials or manuals. - Ensure customization of the test case template is complete
Getting Started Checks	Check the voting system to : - Verify the test environment and system configuration is documented in the PCA Configuration and matches the system used in the 48 hr. temp & power variation test and vendor described configuration. - Validate installation of the witnessed build - Testers understand that no change shall occur to the test environment without documentation in the test record and the authorization of the project manager.
Documentation of Test Data & Test Results	Test Data: - Record all programmed & observed election & ballot data fields and field contents on the corresponding tabs to provide a method to repeat the test - Preserve all tabs for each instance the test is run. Test Results: - Enter Accept/Reject on the Test Steps - In Comments enter any deviations, discrepancies, or notable observations - Log discrepancies on the Discrepancy Report and insert the number in the Comments
Polling Place Hardware &	Validations of operations in the voting mode:

Method Detail	Characteristics Test Method
Recovery	- Adjust or magnify the font - Power supply interruption without corruption of data - Three second response time
Accessibility- Mobility	Mobility: The voting station provides - Where clear floor space only allows forward approach to an object, the maximum high forward reach allowed shall be 48". The minimum low forward reach is 15". (See VSS diagram) -Where forward reach is over an obstruction with knee space below, the maximum level forward reach is 25". When the obstruction is less than 20" deep, the maximum high forward reach is 48". When the obstruction projects 20" to 25", the maximum high forward reach is 44". -The position of any operable control is determined with respect to a vertical plane that is 48" in length, centered on the operable control, and at the maximum protrusion of the product within the 48" length - Where any operable control is 10" or less behind the reference plane, have a height that is between 15" and 54" above the floor - Where any operable control is more than 10" and not more than 24" behind the reference plane, have a height between 15" and 46" above the floor. - Have operable controls that are not more than 24" behind the reference plane
Assistive Devices	Not require, the voter to bring their own assistive technology to a polling place.
Audio Ballot	Audio Ballot: - Communicates to the voter the complete content of the ballot. - Provides instruction to the voter in operation of the voting device. - Provides instruction so that the voter has the same vote capabilities and options as those provided by the system to individuals who are not using audio technology - For a system that supports write-in voting, enables the voter to review the voter's write-in input, edit that input, and confirm that the edits meet the voter's intent. - Enable the voter to request repetition of any system provided information - Supports the use of headphones provided by the system that may be discarded after each use.
Audio Maximum Volume	The voting system: - Provides a volume control with an adjustable amplification up to a maximum of 105 dB that automatically resets to the default for each voter
Wireless	If the voting system uses a telephone style handset: -It is in conformance with FCC Part 68, a wireless coupling for assistive devices used by people who are hard of hearing when a system utilizes a telephone style handset to provide audio information If the voting system is a wireless device, check for interferences with assistive hearing devices: - It is in conformance with FCC Part 68, a wireless coupling for assistive devices used by people who are hard of hearing when a system utilizes a telephone style handset to provide audio information
Image Display	For Electronic Image Displays, permit the voter to: - Adjust contrast settings, - Adjust color settings, when color is used, - Adjust the size of the text so that the height of capital letters varies over a range of 3 to 6.3 millimeters
Tactile Controls	Touch screen or contract-sensitive control an input method using mechanically operated controls or keys that shall: - Be tactilely discernible without activating the controls or keys. - Be operable with one hand and not require tight grasping, pinching, or twisting of the wrist. - Require a force less than 5 lbs (22.2 N) to operate - Provide no key repeat function.
Sound & Visual Cues	System with sound cues as a method to alert the voter about a certain condition, such as the occurrence of an error, or a confirmation, the tone shall be accompanied by a visual cue for users who cannot hear the audio prompt
Biometric Identification	System that requires a response by a voter in a specific period of time, alert the voter before this time period has expired and allow the voter additional time to indicate that more time is needed

Method Detail	Characteristics Test Method
Casting a Ballot	Voting Systems: - Provide text at least 3 millimeters high and provide the capability to adjust or magnify the text to an apparent size of 6.3 millimeters
Physical Characteristics	Physical Characteristics - The size of each voting machine should be compatible with its intended use and the location at which the equipment is to be used. Physical Characteristics - The weight of each voting machine should be compatible with its intended use and the location at which the equipment is to be used.
Transport, Storage, Materials, & Durability	Transport & Storage of Precinct Systems - A means to safely handle, transport, and install voting equipment is provided. - The voting system provides a protective enclosure to withstand: impact, shock and vibration loads associated with surface and air transportation; stacking loads associated with storage Durability - The voting system is designed to withstand normal use without deterioration and without excessive maintenance cost for a period of ten years. Materials -The voting system is designed and constructed so that the frequency of equipment malfunctions and maintenance requirements are reduced to the lowest level consistent with cost constraints. - TDP includes an approved parts lists
Maintainability	Maintainability- The voting system and maintenance documentation include the: - Presence of labels and the identification of test points - Provision of built-in test and diagnostic circuitry or physical indicators of condition - Presence of labels and alarms related to failures - Presence of features that allow non-technicians to perform routine maintenance tasks (such as update of the system database) An assessment of the system maintenance attributes to confirm maintainability at an acceptable level for: - Ease of detecting that equipment has failed by a non-technician - Low false alarm rates (i.e., indications of problems that do not exist) - Ease of access to components for replacement - Ease with which adjustment and alignment can be performed - Ease with which database updates can be performed by a non-technician - Adjust, align, tune or service components
Availability	Availability- The vendor specifies the typical system configuration to be used to assess availability, and any assumptions made with regard to any parameters that impact the MTTR. The factors include at a minimum: - Recommended number and locations of spare devices or components to be kept on hand for repair purposes during periods of system operation - Recommended number and locations of qualified maintenance personnel who need to be available to support repair calls during system operation - Organizational affiliation (i.e., jurisdiction, vendor) of qualified maintenance personnel
Human Engineering	Voting System: - Controls used by the voter or equipment operator shall be conveniently located, shall use designs consistent with their functions, and shall be clearly labeled. Instruction plates are provided, if necessary to avoid ambiguity or incorrect actuation. - Information or data displays are large enough to be readable by voters and operators with no disabilities and by voters with disabilities consistent with the requirements defined in Section 2.2.7 of the Standards. Status displays meet the same requirements as data displays, and they shall also follow conventional industrial practice with respect to color: - Green, blue, or white displays shall be used for indications of normal status

Method Detail	Characteristics Test Method
	Amber indicators shall be used to indicate warnings or marginal status - Red indicators shall be used to indicate error conditions or equipment states that may result in damage or hazard to personnel; and unless the equipment is designed to halt under conditions of incipient damage or hazard, an audible alarm is also be provided. Color coding shall be selected to assure correct perception by voters and operators with color blindness; and shall not be used as the only means of conveying information, indicating an action, prompting a response, or distinguishing a visual element The system's display does not use flashing or blinking text objects, or other elements having a flash or blink frequency, greater than 2 Hz and lower than 55 Hz
Expected Results are observed	Review the test result against the expected result: • Accept: the expected result is observed • Reject: the expected result of the test case is not observed • Not Testable (NT): rejection of a previous test step prevents execution of this step, or tested in another TC. • Not Applicable (NA): not applicable to test scope
Record observations and all input/outputs for each election;	All inputs, outputs, observations, deviations and any other information impacting the integrity of the test results will be recorded in the test case. - Any failure against the requirements of the EAC guidelines will mean the failure of the system. and shall be reported as such. - Failures will be reported to the vendor as Defect Issues in the Discrepancy Report. - The vendor shall have the opportunity to cure all discrepancies prior to issuance of the Certification Report. - If cures are submitted the applicable test will be rerun. Complete information about the rerun test will be preserved in the test case. The cure and results of the retest will be noted in the - Discrepancy Report and submitted as an appendix of the Certification Report. - Operations which do not fail the requirements but could be deemed defects or inconsistent with standard software practices or election practices will be logged as Informational Issues on the Discrepancy Report. It is the vendor's option to address these issues. Open items will be identified in the report.

7.4 Accuracy (Accuracy, Reliability, Availability, Volume, and Stress) Test Method

iBeta Definition	Accuracy (Accuracy, Reliability, Availability, Volume, and Stress)
Test Case Name	Accuracy (Accuracy, Reliability, Availability, Volume, and Stress)
Scope - identifies the type of test	Accuracy testing validates the individual ballot positions in terms of a maximum error rate while processing a specified volume of data. Maximization of ballot positions and large numbers of votes incorporate stress and volume test conditions. Reliability and availability is measured in the results of the Accuracy Test.
Test Objective	Validation of the ability to capture, record, store consolidate and report a predicted total of vote selections and the absence of vote selection for a minimum of 1,549.703 ballot positions without error or with an acceptable level of error.
Test Variables: Accuracy Volume Stress	Ballot Preparation Variable: Volume Test: An election with 9 Parties, 50 Contests, Vote for 5, and 1 contest, Vote for 1, 2259 ballot positions/ballot. Stress Test: Tallying a high number of ballots with a large number of parties, contests and ballot positions Vote Consolidation and Reporting Variables: Consolidate the vote at 5 intervals with results of 4 precincts (20 precincts total). Interval 1 will incorporate the Go/No Go minimum. Chamber and Non-chamber operation: 4 WINvote units will run for 48 hrs in the Temperature and Power Variation chamber 10% of the required ballot positions are entered manually. Manual entry will occur in approximately 2% blocks (each exceeding the 26,997 Go/No Go minimum) at the beginning, intervals 2 through 4, and end. During 3 cycles an automated script will run to exceed the minimum of 1,549,703 ballot positions.
A description of the voting system type and the operational environment	WINware 2.0.4 Voting System EMS: WINprep 2.0.4, WINresults 2.0.4 DRE: WINvote 2.0.4

iBeta Definition	Accuracy (Accuracy, Reliability, Availability, Volume, and Stress)
	Test Location: Wyle Laboratories, Huntsville, AL
VSS 2002 vol. 1	2.2.2 thru 2.2.2.2, 2.2.5, 3.2.1, 3.2.5.2, 3.4.3, 3.4.5,
VSS 2002 vol. 2	4.7.1.1, 4.7.3 thru 4.7.4.d.i, 6.1, 6.2.3
Hardware, Software voting system configuration and test location	Hardware, Software voting system configuration and test location Wyle Laboratories, Huntsville AL Test will be run in conjunction with the Temperature and Power Variation as described in the Test Variables
Pre-requisites and preparation for execution of the test case.	Validation that the subcontractor can provide a chamber which will permit initiation of ballot counting cycles in the chamber by a method that will ensure the integrity of the test temperature environment. Complete the prerequisites; - Record the testers, subcontractor accreditation, environmental test method, chamber calibration date & date - System has been set up as identified in the user manual - Use the Environmental Test Case for instructions on the Temperature and Power Variations test method (MIL-STD 810D Method 502.2 and 501.2). - Ensure customization of the test case template is complete - Validation of pre-requisites includes confirmation that data quality tests, error logging and audit reports are enabled.
Getting Started Checks	Validate that the method for initiation of ballot counting cycles in the chamber can be accessed externally or by a method that will ensure the integrity of the temperature environment. Check the voting system to: - Verify the test environment and system configuration is documented in the PCA Configuration and matches the vendor documented configuration. - Validate installation of the witnessed build - Testers understand that no change shall occur to the test environment without documentation in the test record and the authorization of the project manager. -Initiate an operational status to confirm the correct function of the voting system prior to initiation of Accuracy testing. -Record start time.
Documentation of Test Data & Test Results	Test Data: - Record all programmed & observed election, ballot & vote data fields and field contents on the corresponding tabs to provide a method to repeat the test - Preserve all tabs for each instance the test is run. Test Results: - Enter Accept/Reject on the Test Steps - In Comments enter any deviations, discrepancies, or notable observations - Log discrepancies on the Discrepancy Report and insert the number in the Comments
Accuracy: Paper-based voting systems Processing	Paper-based voting systems, verify: - All ballot positions on paper ballots can be scanned and detect selections for individual candidates and contests, converting them to digital data. (Receive electronic signals produced by punches, vote marks and timing information; perform logical and numerical operations upon the data; and reproduce the contents of memory without error (including ballot style/precinct, a vote for a specific candidate/contest or other source.) - The voting system does not record extraneous marks, smudges or folds. - The voting system rejects more than 2% of ballots that meet the vendor's specifications for marking. - Vote selection data from multiple precinct-based voting machines is stored with the generated jurisdiction-wide vote counts - Consolidated reports are accurate against a predicted vote total - The voting system does not record extraneous marks, smudges or folds. - The voting system rejects more than 2% of ballots that meet the vendor's marking specifications.
Accuracy: DRE Voting	DRE voting systems, verify:

iBeta Definition	Accuracy (Accuracy, Reliability, Availability, Volume, and Stress)
Systems Processing	- Recording of candidate and contest voter selections into voting data storage - Recording of candidate and contest voter selections into ballot image storage independently from the voting data storage - Vote selection data from multiple precinct-based voting machines generate jurisdiction-wide vote counts - Consolidated vote data is stored - Consolidated reports are accurate against a predicted vote total
Accuracy: Error Rate	Maximum error rate is less than one in 10,000,000 ballot positions, with a maximum error rate of one in 500,000 ballot positions in the test process. Errors are from any source while testing a specific processing function and its related equipment. The error rate determines the accuracy test vote position processing volume: - Reject: one error before counting 26,997 consecutive ballot positions correctly - Accept: 1,549,703 (or more) consecutive ballot positions are read correctly - If there's one error with more than 26,997 ballot positions but less than 1,549,703 correctly read, continue testing until another 1,576,701 consecutive ballot positions are counted without error (i.e. Accept: 3,126,404 with one error)
Reliability	Reliability shall identified by determination of the Mean Time Between Failure (MTBF) during the minimum test period of 163 hours. The MTBF is the value of the ratio of operating time to the number of failures. A failure is defined as any event which results in either the: Loss of one or more functions; Degradation of performance such that the device is unable to perform its intended function for longer than 10 seconds. (VVPAT: Incorporate functional reliability validations VVSG vol. 1 sect. 7.9.4
Availability	Voting system availability (Ai) for the function of all combined devices and components must be equal or greater than 99%. Ai = (MTBF)/(MTBF + MTTR) MTTR. Inherent availability (Ai) = % system is functional Mean Time Between Failure (MTBF) = total operation time Mean Time To Repair (MTTR) = average time required to perform a corrective maintenance task during periods of system operation. Corrective maintenance = on-site repair or substitution of the device or a component Corrective maintenance task time = active repair time + logistic /administrative time (notification and travel time of qualified maintenance personnel)
Expected Results are observed	Review the test result against the expected result: • Accept: the expected result is observed • Reject: the expected result of the test case is not observed • Not Testable (NT): rejection of a previous test step prevents execution of this step, or tested in another TC. • Not Applicable (NA): not applicable to test scope
Record observations and all input/outputs for each election;	All inputs, outputs, observations, deviations and any other information impacting the integrity of the test results will be recorded in the test case. - Any failure against the requirements of the EAC guidelines will mean the failure of the system. and shall be reported as such. - System failures will be logged with the MTTR. The log will be used to determine Availability. - Failures will be reported to the vendor as Defect Issues in the Discrepancy Report. - The vendor shall have the opportunity to cure all discrepancies prior to issuance of the Certification Report. - If cures are submitted the applicable test will be rerun. Complete information about the rerun test will be preserved in the test case. The cure and results of the retest will be noted in the - Discrepancy Report and submitted as an appendix of the Certification Report. - Operations which do not fail the requirements but could be deemed defects or inconsistent with standard software practices or election practices will be logged as Informational Issues on the Discrepancy Report. It is the vendor's option to address these issues. Open items will be identified in the report.