

# Certification Test Plan

Report Number 07-V-DOM-046-CTP-01

## Dominion Voting Systems Dominion Democracy Suite 1.0.0

Consisting of:

### EMS Core System, ImageCAST Precinct Ballot Imager and ImageCAST Central Ballot Imager

Test Plan Rev 02

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SysTest Labs is an accredited Voting System Test Lab (VSTL), Accredited by the National Institute of Standards and Technology (NIST) National Voluntary Lab Accreditation Program (NVLAP), and accredited by the Election Assistance Commission (EAC) for VSTL status.



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In addition to VSTL accreditation, SysTest Labs was accredited for and still holds accreditation as an EAC Interim Independent Test Authority (ITA)

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## Revision History

Date	Description of Revision	Author	Revision No.
8/1/07	Initial Test plan	R. Tognetti	Rev 00
9/28/07	Updates to wording, filling in of additional detail of testing	M. Santos	Rev 01
2/8/08	Updates for EAC comments, dated 11/01/07; Further updates and additions	M. Santos, D. Wilhelm	Rev 02

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# 1 INTRODUCTION

This Certification Test Plan outlines the approach SysTest Labs will implement to perform Election Assistance Commission (EAC) 2005 Voluntary Voting System Guidelines (VVSG) certification testing on the Democracy Suite Voting System by Dominion Voting Systems. The purpose of this document is to provide a clear and precise plan for test elements required to ensure effective certification testing.

This test plan:

- Identifies items to be tested
- Defines the test approach
- Identifies required hardware, support software, and tools to be used for testing
- Identifies the types of tests to be performed

SysTest Labs will provide certification testing on the Dominion Democracy Suite voting system based on the guidelines established for voting system certification testing as defined by the EAC. This effort includes all required levels of software, firmware, system and hardware environmental testing required to demonstrate that the Dominion Democracy Suite voting system meets the requirements of the VVSG, the appropriate portions of the Help America Vote Act (HAVA), and associated Vendor specific requirements. SysTest Labs' major task categories for voting system certification testing, as defined by SysTest Labs' National Voluntary Lab Accreditation Program (NVLAP) audited and approved Quality System Manual and associated SysTest Labs Procedures (SLP), include:

- Physical Configuration Audit (PCA)
  - Verification of software and hardware functional and physical configurations
  - Iterative documentation review and assessment
  - Iterative source code review
- Functional Configuration Audit (FCA)
  - Iterative review of Dominion's System Test & Verification Specification and all of Dominion's completed testing to Dominion's System Requirements Specification, as outlined in the FEC VVSG Volume 1, Section 2
  - Iterative hardware environmental testing
  - Iterative software and firmware testing to validate logic
  - Iterative testing of voting systems to validate functionality, accuracy, performance, security, and system level integration
- Management of Vendor supplied deliverables, SysTest Labs' test artifacts, and software, firmware, hardware and system test configurations
- Generation of test cases that ensure that the voting system meets all applicable VVSG requirements, appropriate portions of HAVA, and associated Vendor specific requirements
- Traceability and tracking of test cases to VSS requirements, appropriate portions of HAVA, requirements established by the EAC and associated Vendor specific requirements
- Software, Firmware, System, and Hardware test execution
- Reporting of all test results

SysTest Labs' will develop and submit to the EAC a certification test report deliverable that details all test results and findings as a result of this certification test effort, as well as a recommendation to certify or not to certify based on the test results.

## 1.1 Certification Test Plan Attachments

The following attachments apply to this Certification Test Plan:

- Attachment A: List of Technical Data Package Documents
- Attachment B: Supported Functionality Declaration
- Attachment C: List of Source Code Reviewed – **PROPRIETARY (separate document)**
- Attachment D: 2005 Vendor Testing and TDP Trace
- Attachment E: Trace of SysTest Labs' Test cases to 2005 VVSG
- Attachment F1: Documentation Discrepancy Report
- Attachment F2: Source Code Discrepancy Report – **PROPRIETARY (separate document)**
- Attachment G: Hardware Test Plans
- Attachment H: Hardware Test Reports

## 1.2 Scope

The following Dominion Voting System components are in the scope of the Certification Test Plan as detailed in this document.

The Dominion Democracy Suite Voting System consists of the following software packages:

- Election Management System – Election Event Designer Client
- Election Management System – Results Tally and Reporting Client
- Election Management System – Central Count Tabulator
- Election Management System – ImageCast Precinct Firmware
- Election Management System – Application Server
- Election Management System – Database Server

With the following hardware:

- ImageCAST™ Precinct Ballot Imager
- ImageCAST™ Central Ballot Imager

Please note that each of the items listed above are explicitly defined in Table 2 and Table 3 of this document. The list of software, firmware, and hardware components, their model numbers and versions, and their configurations included in this certification testing effort are defined solely by Dominion in the TDP items delivered to both SysTest Labs and the EAC.

## 1.3 Applicable Voting System Standards

### 1.3.1 Applicable Voting System Standards

All testing will determine whether or not the Dominion Democracy Suite voting system meets the requirements from the following voting system Standards:

1. VVSG, version 2005
2. Help America Vote Act (HAVA) – Section 301

### 1.3.2 Applicable Testing Standards

All testing will be conducted based on the following testing standards and guidelines<sup>1</sup>:

1. NIST NVLAP Handbook 150: 2006
2. NIST NVLAP Handbook and 150-22: 2005<sup>2</sup>
3. NIST NVLAP Handbook and 150-22: 2007
4. EAC Testing and Certification Program Manual, United States Election Assistance Commission, 2006
5. DRAFT – VSTL Accreditation Program Manual DRAFT

## 1.4 References

1. IEEE Standard for Software Quality Assurance Plans IEEE Std 730-1998, October 20<sup>th</sup>, 1998.
2. IEEE Standard for Software Configuration Management Plans IEEE Std 828-1998, June 25<sup>th</sup>, 1998.
3. IEEE Standard for Software Test Documentation IEEE Std 829-1998, December 16<sup>th</sup>, 1998.
4. IEEE Recommended Practice for Software Requirements Specifications IEEE Std 830-1998, October 20<sup>th</sup>, 1998.
5. IEEE Standard for Software Unit Testing IEEE Std 1008-1987, December 29<sup>th</sup>, 1986.
6. IEEE Standard for Software Verification and Validation IEEE Std 1012-1998, July 20<sup>th</sup>, 1998.
7. SysTest Labs Quality System Manual, Revision 1.0, November 3, 2006.
8. ISO 17025

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<sup>1</sup> Where conflicts in the testing standards exist, the EAC Guidelines take precedence.

<sup>2</sup> SysTest Labs was accredited as a VSTL under the 150-22: 2005 NIST Handbook but the EAC has requested that where conflicts exist, testing adhere to the guidelines defined in the 150-22: 2007 NIST Handbook.

## 1.5 Terms and Abbreviations

These terms and abbreviations will be used throughout this document:

**Table 1 - Terms & Abbreviations**

Term	Abbreviation	Description
Dominion Democracy Suite EMS Core System	EMS	Suite of inter-operative software applications: Application Server, Database Server, Election Event Designer, and Results, Tally & Reporting. Election Management System is used to create, configure and report election events
Election Event Designer	EED	Election Event Designer, an application within the EMS
Results, Tally & Reporting	RTR	Results, Tally & Reporting, an application within the EMS
ImageCAST Precinct Ballot Imager	ICP	Ballot scanner, for use in precinct polling places. Both hardware and firmware for this device are proprietary.
ImageCast AudioVote Add-On	N/A	Accessibility kit, for conformance with ADA regulations. Includes: Audio Tactile Interface (ATI), External Laser Printer, Headset, Sip n puff interface, ADA Paddles, Hygienic Headset Ear Cover.
ImageCast Central	ICC	Central Count level scanner



## 2 PRE-CERTIFICATION TESTS

### 2.1 Pre-Certification Assessment Activities

SysTest Labs has completed an assessment of all initial deliveries of the Technical Data Package, including Functional Requirements, Specifications, End-user documentation, Procedures, System Overview, Configuration Management Plan, Quality Assurance Program, and manuals for each of the required hardware, software, firmware components of the Dominion Democracy Suite voting system. For a complete list of all items included in the TDP, please refer to Attachment A.

#### 2.1.1 Physical Configuration Audit

##### 2.1.1.1 Document Review

SysTest Labs conducted a PCA review of all documents submitted for review in the initial delivery of the Dominion Democracy Suite TDP. These included:

- Functional Requirements
- Design and Security Specifications
- Test and verification specifications
- Operations and Maintenance Procedures
- System Overview
- Configuration Management Plan
- Quality Assurance Program

Each document included in the initial delivery of the Dominion Democracy Suite's voting system TDP was reviewed for compliance to the 2005 VVSG, Volume 2, Sections 2.2 through 2.13 and Volume 2, Section 6.6.

##### 2.1.1.2 Source Code Review

The Democracy Suite voting system is a full certification and thus all code is subject to a full review against the standards noted in section 1.3 of this test plan. SysTest Labs has conducted a source code review of the all the code submitted by the vendor for the voting system under test. The source code submitted by the vendor and subject to review as part of this Certification Test is in the following languages: C/C++ and C#.

Source Code Review Tools utilized by SysTest include

- Practiline Line Counter: a commercial application used to determine the counts of executable and comment lines;
- Module Finder: a SysTest proprietary application used to parse module names from C/C++ and VB code and populate the identified module names into the review documents; and
- ExamDiff Pro: a commercial application used to compare revised code to previously reviewed code

SysTest Labs utilizes a team approach in reviewing and managing the tasks of receiving the code to be reviewed, determining the volume of code to be reviewed, reviewing the vendor's internal coding standards and determining if there are any variances from the prescribed standards, creating the review work documents, distributing the code to be reviewed along with the created work documents to the project code reviewers, reviewing the code, performing peer reviews, creating discrepancy reports, and receiving modified code and other vendor responses.

### **2.1.1.3 Trusted Build**

The Trusted Builds will be conducted prior to SysTest Labs' testing efforts and will be completed on site at SysTest Labs' facility or a secure lab at the vendor's facility approved by SysTest. SysTest Labs will use its approved standard lab procedure that details the processes for controlling, managing, and conducting the Trusted Build. This process includes the following:

- Interviews – Key vendor staff are interviewed to evaluate processes and process conformance in the areas of configuration management and quality assurance.
- Preparation for the Trusted Build - Obtaining and reviewing Dominion's procedure for constructing the build platform, verifying the target build platform, and acquiring the necessary materials.
- Execution of the Trusted Build – SysTest Labs will perform the Trusted Build by using our step-by-step build procedure. SysTest Labs records and ascertains the following items throughout the build process:
  - Build environment images at various key points
  - Build environment and file hashes at various key points
  - Build environment hardware characteristics
  - Build results from code compilation
  - Final software install files
- Deliverables to Vendor and Testing – Upon completion of the Trusted Build, certain items are sent to the vendor and SysTest Labs test group. The final result will be a compact disk containing the following:
  - Final software install files
  - Hash values to validate install files
- Final Record Keeping And Archiving Procedures – At the conclusion of the Trusted Build process, SysTest Labs completes all final record keeping and archiving procedures at SysTest Labs' facility. In addition, at this time, we will generate the final media that is submitted to the EAC's approved software repository.
- COTS Operating systems and software used in testing will be verified as authentic for the Trusted Build environment as well as equipment under test. For equipment under test, operating system installations are performed by or witnessed by SysTest Labs staff. For the Trusted Build environment, the operating system is installed by SysTest Labs staff.

### **2.1.2 Functional Configuration Audit (FCA)**

SysTest Labs conducts an FCA review of the vendor test cases delivered as part of the Technical Data Package. The review was conducted against the standard as defined in section 1.3 of this test plan, for each of the submitted components. Any requirements that were identified as not being tested, or insufficiently tested, have been included in the Test Cases that SysTest Labs will execute.

### **2.1.3 Hardware Environmental Testing Assessment**

The information provided in the TDP is analyzed to determine what hardware testing will be required for the system. Any previous testing is reviewed to determine if it meets the criteria for acceptance. If the previous testing is not adequate or the testing has not been performed, a test plan is generated defining the tests to be performed.

Acceptance and use of previous hardware environmental testing and certification is based on the following criteria:

- The configuration of the equipment being presented for testing is substantially identical to the equipment that was previously tested and certified and that all changes made to the hardware configuration of the equipment being presented for testing, from the hardware that was previously tested and certified were confirmed to be de minimis changes
- The standards and associated requirements under which the previous testing and certification was performed are equal to or more demanding than the current requirements.
- There have been no significant changes to the test methods.
- The lab that completed the hardware environmental testing and certification meets the EAC's requirements for accreditation as defined in NIST HANDBOOK 150-22: 2005 and NIST HANDBOOK 150-22: 2007.

## **2.2 Pre-Certification Assessment Results**

### **2.2.1 Physical Configuration Audit**

#### **2.2.1.1 Document Review**

SysTest Labs is in the process of completing the PCA Documentation Review to ensure that the Dominion TDP documentation is in compliance with the VVSG version 2005, Volume 2, Sections 2.2 through 2.13. All discrepancies that were encountered during the PCA Document Review to date were provided to Dominion in a series of iterative discrepancy reports for resolution. All PCA Document Review discrepancies must be corrected by Dominion and re-reviewed to ensure that each was fixed per the requirements of the VVSG version 2005, Volume 2, Sections 2.2 through 2.13.

All document discrepancies generated to date are included in Attachment F1 as a part of this Certification Test Plan. In addition, all detailed results from the Document Review and all discrepancies will be included in the Certification Test Report.

### **2.2.1.2 Source Code Review**

Source Code Review for the Dominion Democracy Suite certification began in May 2007, and is planned to be complete in February of 2008. All discrepancies that have been encountered during the PCA Source Code Review to date have been provided to Dominion in a series of iterative discrepancy reports for resolution. All PCA Source Code Review discrepancies must be corrected by Dominion and re-reviewed by SysTest Labs, in order to ensure that each discrepancy was fixed per the requirements of the VVSG version 2005.

All source code discrepancies generated to date are included in Attachment F2 as a part of this Certification Test Plan. In addition, all detailed results from the source code review and all discrepancies will be included in the Certification Test Report.

If errors are encountered during Functional Testing, then additional source code submissions would be expected, and additional source code review would be necessary, as well as closure of any new discrepancies which may result in those reviews.

### **2.2.1.3 Trusted Build**

Trusted Builds will be performed at the SysTest Labs office in Denver.

Trusted Builds will be performed as described under Section 2.1.1.3 above, on the respective build platforms PCs in order to provide the compiled software and firmware installation packages to be used in the certification testing.

## **2.2.2 Functional Configuration Audit**

### **2.2.2.1 Review of Vendor's Completed Test Cases and Results**

SysTest Labs has determined that the Dominion Voting Systems' TDP test cases content is consistent with the VVSG, version 2005.

For all required functions that were identified as not tested or insufficiently tested, SysTest Labs has designed and developed tests cases and will develop a complete set of test data, and test procedures. The test cases have been added to SysTest Labs' list of VSTL Test Cases for Democracy Suite certification test execution.

As determined by the FCA, the following tests will be executed, as part of this Certification Test Plan:

- Operational Status Check
- Readiness Test
- Sampling of Dominion Voting Systems' test cases (See section 4.3.6)
- SysTest Labs' Gen01 test case
- SysTest Labs' Gen03 test case (Usability and Accessibility)
- SysTest Labs' Pri02 test case
- SysTest Labs' Security test case
- System Accuracy test case.

Please see Table 6 – Functional Testing, Table 7 – System Level and Other Functional Testing, and Appendix A – Test Cases for additional detail on the SysTest Labs test cases.

All detailed results from the review of the Vendor completed test cases and results and all discrepancies will be included in the Certification Test Report.

### **2.2.3 Results of Assessment of Hardware Environmental Testing**

There has been no previous hardware environmental testing performed on the Dominion equipment. Therefore, SysTest Labs will perform the hardware tests as defined in the hardware test plans included as Attachment G

### 3 SYSTEM IDENTIFICATION AND MATERIALS REQUIRED FOR TESTING

#### 3.1 Software/Firmware

Items identified in the table below reflect all software required to perform hardware, software, functional, security and integrated system tests. Note that the software listed with Manufacturer of Dominion is software under test. Should a software modification become necessary, an amended test plan would be produced with the new version under test listed and previous iterations listed with a strikethrough.

**Table 2 - Required Software/Firmware**

Manufacturer	Application(s)	Version	Release Type	Test Type
Dominion	Democracy Suite EMS Election Event Designer (EED)	<del>1.0.21</del> 2.0	(Initial)	Pre- & Post-Voting
Dominion	Democracy Suite EMS Results, Tally & Reporting (RTR)	<del>1.0.21</del> 2.0	(Initial)	Post-Voting
Dominion	Democracy Suite EMS Application Server	<del>1.0.21</del> 2.0	(Initial)	Pre- & Post-Voting
Dominion	Democracy Suite EMS Database Server	<del>1.0.21</del> 2.0	(Initial)	Pre- & Post-Voting
Dominion	ImageCast Precinct firmware	<del>1.9.0</del> 1.20	(Initial)	Voting
Dominion	ImageCast Central software	<del>1.4.0</del> 3.2	(Initial)	Voting
Microsoft	For Application Server PC - .NET Framework 2.0	2.0	COTS	Pre- & Post-Voting
Microsoft	For Application Server PC - Server side digital certificate (AES 128 bit key strength)	N/A	COTS	Pre- & Post-Voting
Microsoft	For Application Server PC - Microsoft Windows Server 2003 R2 Standard Edition configured in Application Server mode with IIS 6.0	R2	COTS	Pre- & Post-Voting
Microsoft	For Database Server PC - Microsoft Windows Server 2003 R2 Standard Edition (configured in Application Server mode)	R2	COTS	Pre- & Post-Voting
Microsoft	For Database Server PC - Microsoft SQL Server 2005 Standard Edition (or SQL Server 2005 Express Edition)	2005 with SP2	COTS	Pre- & Post-Voting
Microsoft	For Database Server PC - .NET Framework 2.0	2.0	COTS	Pre- & Post-Voting
Microsoft	For Database Server PC - Server side digital certificate (SSL 128 bit key strength)	N/A	COTS	Pre- & Post-Voting
Microsoft	For EMS EED & RTR Workstations - Microsoft Windows Installer	3.1.4000.2435	COTS	Pre- & Post-Voting

Manufacturer	Application(s)	Version	Release Type	Test Type
	Redistributable 3.1 (version 2)			
Microsoft	For EMS EED & RTR Workstations -Windows Internet Explorer 7 for Windows XP SP2	7.0	COTS	Pre- & Post-Voting
Microsoft	For EMS EED & RTR Workstations -Windows Media Player 11 for Windows XP	11.0	COTS	Pre- & Post-Voting
Microsoft	For EMS EED & RTR Workstations -Microsoft Visual J# Redistributable 2.0	2.0	COTS	Pre- & Post-Voting
Microsoft	For EMS EED& RTR/ ImageCAST Central PCs - Microsoft Windows XP SP2 Professional	SP2	COTS	Pre- & Post-Voting
Microsoft	For EMS EED & RTR PCs - .NET Framework 2.0	2.0	COTS	Pre- & Post-Voting
Microsoft	For EMS EED & RTR PCs - Microsoft Office 2003 Standard edition	2003	COTS	Pre- & Post-Voting
Adobe	For EMS EED & RTR Workstations - Adobe Acrobat Reader 7.0 or higher	7.0	COTS	Pre- & Post-Voting
Maxim Integrated Products	For EMS EED & RTR Workstations - Dallas 1-Wire Device Driver version 4.0	4.0 (TMEX and optional OWCOM API and .NET support)	COTS	Voting
Symantec	For EMS EED & RTR Workstations - Symantec Anti-Virus Corporate Edition 10.2	10.2	COTS	Pre- & Post-Voting
Arcturus Networks	For ImageCast Precinct Tabulator - ucLinux	3.2.0	COTS	Voting

## 3.2 Equipment (Hardware)

Equipment identified in the table below reflects all hardware required to perform hardware, software, security and integrated system tests.

**Table 3 - Required Hardware**

Item	Manufacturer	O/S Version	Type
ImageCAST Precinct Ballot Imager <b>6 received</b>	Dominion Voting Systems	ucLinux 20070130	Scanner
Database and Application Server PC (COTS components) Single or Dual Intel XEON or multi-core - Pentium 4 hardware platform (32-bit or 64-bit mode) (or appropriate AMD version) - 2GB of Operating Memory - 160GB Hard Disk array with 2 disks in RAID mode	COTS (white box)	Microsoft Windows Server 2003 R2 Standard with SP2	Personal computer

- Dual 1 Gigabit Ethernet network adapters -DVD RW ROM <b>1 received</b>			
EED & RTR PC (COTS components) Single multi-core Pentium 4 hardware platform (32-bit mode) - 1GB of Memory - 160GB Hard Disk - Single 1 Gigabit Ethernet network adapter - DVD RW ROM - Compact Flash card reader - Video adapter and monitor capable of minimum 1280x1024 resolution - Audio sound card with audio recording capabilities <b>1 received</b>	COTS (white box)	Microsoft Windows XP Professional SP2	Personal computer
ImageCast AudioVote Add-On with Audio-tactile interface <b>1 received</b>	Dominion Voting Systems	N/A	Accessibility kit
ImageCast Central Tabulator <b>1 received</b>	Bell & Howell (COTS)	N/A	Scanner

### 3.3 Test Materials

Items identified in the table below reflect all additional test materials required to perform hardware, software, functional, security and integrated system tests.

**Table 4 - Additional Test Materials**

Item
Ballot Box
Precinct Kits / Consumables: Pens, Secrecy sleeves, Thermal printing tape, Flash Card, Lithium Ion Battery, Optical Cleaning Kits
Compact Flash card reader
Compact Flash cards
Laser printer
11-inch ballot
14-inch ballot
17-inch ballot
22-inch ballot

### 3.4 Deliverable Materials

In addition to the hardware, software and test materials identified in section 3.1, 3.2, and 3.3, Dominion delivered the Technical Data Package documents as a part of the Democracy Suite Voting System. Please see Attachment A for a list of these documents.



### 3.5 Proprietary Data

SysTest Labs considers all software, equipment, hardware, test and deliverable materials as the private property of Dominion Voting Systems and shall handle them in a proprietary manner.

Additionally, SysTest Labs has labeled the following Attachments proprietary and they should be excluded from any public disclosure:

- Attachment C: List of Source Code Reviewed – **PROPRIETARY**
- Attachment F2: Source Code Discrepancy Report – **PROPRIETARY**

## 4 TEST SPECIFICATIONS

Testing for compliance to the VVSG 2005 will be conducted as listed below. The Test Methods for all system level tests are provided in Appendix A – Test Cases.

### 4.1 Hardware Configuration and Design

Certification testing will occur for conformance to Vol. 1 Sect. 4 Hardware Requirement and Vol. 2 Sect. 4 Hardware Testing of the EAC 2005 VVSG.

SysTest Labs' FCA Hardware Environmental Test Assessment established the baseline for the hardware configuration required for testing the Dominion Democracy Suite voting system. This baseline is shown in Table 3 - Required Hardware, Table 4 - Additional Test Materials and Table 5 - Hardware Configuration. Should any changes to the hardware configuration be required as a result of any testing, SysTest Labs will assess the changes and determine what regression tests are required to ensure compliance to the VVSG, version 2005 and HAVA.

ImageCast Precinct (ICP) Tabulators do not use a networking configuration. Compact Flash Cards are used to transfer results from the ICP to the RTR, which is located at the central tally location. The ImageCast Central (ICC) ballot scanner is connected to the RTR computer within the tested configuration.

**Table 5 - Hardware Configuration**

Item	Manufacturer	O/S Version	Description of Use
Database & Application Server PC (COTS components) Single or Dual Intel XEON or multi-core - Pentium 4 hardware platform (32-bit or 64-bit mode) (or appropriate AMD version) - 2GB of Operating Memory - 160GB Hard Disk array with 2 disks in RAID mode - Dual 1 Gigabit Ethernet network adapters - DVD RW ROM	COTS (white box)	Microsoft Windows Server 2003 R2 Standard with SP2	Personal computer with BOTH the database and application servers loaded on it.
EED & RTR PC (COTS components) Single multi-core Pentium 4 hardware platform (32-bit mode) - 1GB of Memory - 160GB Hard Disk - Single 1 Gigabit Ethernet network adapter - DVD RW ROM - Compact Flash card reader - Video adapter and monitor capable of minimum 1280x1024 resolution - Audio sound card with audio recording capabilities	COTS (white box)	Microsoft Windows XP Professional SP2	Personal computer with BOTH the EED and RTR applications loaded on it.
ImageCast AudioVote Add-On	Dominion Voting Systems	N/A	Accessibility kit, for conformance with ADA Includes: Audio Tactile

Item	Manufacturer	O/S Version	Description of Use
			Interface (ATI), External Laser Printer, T-coil coupler, Headset, Sip n puff interface, ADA Paddles, Hygienic Headset Ear Cover.
ImageCast Precinct Scanner 6 received	Dominion Voting Systems	1.0	Precinct Scanner
ImageCast Central Tabulator	Bell & Howell (COTS)	N/A	Central Count Scanner

## 4.2 Software System Functions

The scope of the testing includes the software testing (*Vol. 2, Sect. 5*) and system integration testing (*Vol. 2, Sect. 6*) as defined in the EAC VVSG 2005 including:

- Conducting a Pre-Certification Test Assessment (*Vol. 2, Appendix A.2*), reflecting the Technical Data Package (*Vol. 2, Sect. 2*) document examination portions of the Physical Configuration Audit and the Functional Configuration Audit
- Physical Configuration Audit: (*Vol. 2, Sect. 6.6*)
  - Establish the software/hardware configuration baseline used in testing
  - Full Source Code Review (*Vol. 2, Sect. 5.4*) of all non-COTS code
  - Review Dominion Voting Systems documentation technical data package in full
  - Review Dominion Voting Systems' functional specification for adequacy or discrepancy
  - Execution of the Trusted Build process
- Functional Configuration Audit: (*Vol. 2, Sect. 6.7*)
  - Creation and issuance of this Certification Test Plan (*Vol. 2, Appendix A.*)
  - Review, evaluation, creation, execution of Functional Tests (*Vol. 2, Appendix A.4.3.3 & A.4.3.4*)
  - Creation and execution System Level Integration Tests (*Vol. 2, Sect. 6*)

## 4.3 Test Case Design

### 4.3.1 Hardware Qualitative Examination Design

SysTest Labs reviewed the overall system capabilities, pre-voting, voting, and post-voting functions. The Democracy Suite hardware is incorporated into the standard set of system level test cases with the augmentation of functionality-specific validation steps.

### 4.3.2 Hardware Environmental Test Case Design

Hardware environmental certification testing for conformance to Vol 1, Sect. 4 of the EAC VVSG 2005 will be run on the ImageCAST Precinct Ballot Imager. Specific test plans and test reports are included as Attachments (G and H, respectively) to this document. The hardware testing will consist of all required tests:

- Non-Operating - Maintainability
- Non-Operating - Safety Evaluation
- Non-Operating Environmental - Bench Handling
- Non-Operating Environmental - Vibration
- Non-Operating Environmental - Low Temperature
- Non-Operating Environmental - High Temperature
- Non-Operating Environmental - Humidity (85%) Soak
- Other Environmental Tests (Electrical) - Usability and Accessibility
- Other Environmental Tests (Electrical) - Temperature/Power Variation and Reliability
- Other Environmental Tests (Electrical) - Data Accuracy
- Other Environmental Tests (Electrical) - Power Disturbance
- Other Environmental Tests (Electrical) - Electromagnetic Radiation
- Other Environmental Tests (Electrical) - Electrostatic Disruption
- Other Environmental Tests (Electrical) - Electromagnetic Susceptibility
- Other Environmental Tests (Electrical) - Electrical Fast Transient
- Other Environmental Tests (Electrical) - Lightning Surge
- Other Environmental Tests (Electrical) - Conducted RF Immunity
- Other Environmental Tests (Electrical) - Magnetic Fields Immunity

We use the following non-accredited test subcontractors to perform non-core testing. In all cases, we have audited them against applicable sections of the NIST 150 2006 standard.

1. SUN Microsystems Advanced Product Testing (environmental tests)
2. Compliance Integrity Services (safety)

The hardware testing will be performed at three accredited NVLAP or A2LA subcontract laboratories:

- Environmental Testing will be done at Advanced Product Testing (APT) Laboratories in Longmont, Colorado
- Electrical Testing will be performed at Criterion Laboratories in Rollinsville, Colorado
- Safety Testing will be performed at Compliance Integrity Services (CIS) Laboratories in Longmont, Colorado
- Rain and Dust Testing will be done at Wylie Laboratories in Huntsville, Alabama
- Maintainability testing and Accessibility and Human Engineering Evaluation testing will be performed at SysTest Labs in Denver

As of June 6, 2007, after reviewing relevant documentation, SysTest Labs determined that the Democracy Suite Voting System contains common off the shelf hardware (COTS), consisting of the ImageCAST Central Tabulator (a Bell and Howell CopiScan 8000+ scanner), as well as the ImageCAST Workstation and Data Center (Pentium 4 PC). As such there is no requirement for environmental testing of this COTS hardware.

#### **4.3.3 Software Module Test Case Design and Data**

SysTest Labs reviewed the test case design documents and data as provided by Dominion. In evaluating each module, with respect to flow control parameters and data on both entry and exit, SysTest Labs assesses for discrepancies between the Software Specifications and the test case design. Discrepancies are issued to the vendor for correction, if determined necessary (*Vol. 2, Section A.4.3.3*).

SysTest Labs designs additional module test cases, as required, to provide coverage of modules containing untested paths with potential for un-trapped errors. SysTest Labs also reviews the vendor's module test data in order to verify that the requirements of the Software Specifications have been demonstrated by the data. In the event that the vendor's module test data are insufficient, SysTest Labs provides a description of additional module tests prerequisite to the initiation of functional tests. The data is also checked during source code review in conformance with other sections of the standard relating to unbound arrays, parameter type and range validation, pointer controls, vote counter overflow, etc.

If it is determined during source code review that potential risks exist at module entry/exit points, then functional test cases are designed to test these areas, and the results of these tests will be included in the Certification Test Report. If during source code review an issue is identified with entry/exit points of the module, then discrepancies are written and submitted to the Vendor.

SysTest Labs will include in the Certification Test Report a listing of all COTS application files as well as all operating system files in a pre-election configuration, including related hash codes and file signatures.

#### **4.3.4 Software Functional Test Case Design**

SysTest Labs' FCA included a detailed review of the functional test case design documents and data as provided by Dominion in their TDP against a detailed matrix of system functions and the test cases that exercise them. For all required functions that were identified as not tested or insufficiently tested, SysTest Labs has designed and developed tests cases and will develop a complete set of test data, and test procedures (procedures are specific to the unique steps required to operate the Democracy Suite voting system) prior to test execution.

As determined by the FCA, the following tests will be executed, as part of this Certification Test Plan:

- Operational Status Check
- Readiness Test
- Sampling of Dominion Voting Systems' test cases as described below in Section 4 under Sampling Methodology
- SysTest Labs' Gen01 test case
- SysTest Labs' Gen03 test case
- SysTest Labs' Pri02 test case

- SysTest Labs’ Security test case
- System Accuracy test case.

Please see Table 6 – Functional Testing, Table 7 – System Level and Other Functional Testing, Sections 4.3.5 - 4.3.8, and Appendix A – Test Cases for additional detail on the SysTest Labs test cases.

Software Functional Testing will demonstrate that the Dominion Democracy Suite voting system overall capabilities meet the requirements for pre-voting, voting and post-voting functional areas (*Vol. 2, Appendix A.*). These include the functions defined in Table 6 – Functional Testing.

**Table 6 – Functional Testing**

<b>Function</b>	<b>Test Methodology</b>
<b>Ballot Preparation Functions</b>	
<i>a.</i> Ballot preparation subsystem	Verify the election is defined for election day, and one more precinct/polling place can be defined.
<b>Before, During &amp; After Processing of Ballots</b>	
<i>b.1.</i> Logic Test – Interpretation of Ballot Styles & recognition of precincts	Verify in Functional Tests: Verify voting variation functionality identified by <b>Dominion Voting Systems’</b> Democracy Suite, as defined in The Supported Functionality Declaration, attachment B (Vol. 1. Section 2.1.7.2).
<i>b.2.</i> Accuracy Tests- Ballot reading accuracy	Verify in Accuracy Test Verify the error-free recording of 1,549,703 consecutive ballot positions on the ImageCAST Precinct Imager. (Vol 2 Section 4.7.1.1).
<i>b.3.</i> Status Tests- Equipment statement & memory contents	Verify in Functional Tests: Equipment statement & memory contents at the corresponding intervals outlined in user documentation for functions a., b.4., c.1.-7., d.1.-8.
<i>b.4.</i> Report Generation – Produce test output data	Verify in Functional Tests: Clearing Election Totals Manual data entry Generating a Zero Report Testing an Election Creating Test Reports Clearing Totals for Election Day Selecting Reporting Groups Loading Scanner Totals Producing Election Reports Displaying Election Information Democracy Suite RTR Election Results
<i>b.5.</i> Report Generation- Produce audit data	Verify in Functional Tests: Democracy Suite RTR system is capable of generating audit reports
<b>Polling Place Functions</b>	
<i>c.1.</i> Opening the polls, accepting & counting ballots	Verify in Functional Tests: Zero Reports Scan paper ballots Alerts for over votes and under votes

<b>Function</b>	<b>Test Methodology</b>
c.2. Monitoring equipment status	Verify in Functional Tests: Equipment status as identified in user documentation
c.3. Equipment response to commands	Verify in Functional Tests: Equipment response to all voter and poll worker commands as identified in user documentation
c.4. Generating real-time audit messages	Verify in Functional Tests: Print audit log all systems Audit messages must meet some minimum standards for information contained and clarity/usability of communication. Example: -Each audit message should contain a timestamp at the beginning of the audit trail. -The election identifier and software/firmware releases should be listed. -If the message pertains to results (i.e. inserted, added, deleted), the precinct IDs should be listed. -The number of ballots processed should be stated whenever results are uploaded into the accumulation program.
c.5: Closing polls and disabling ballot acceptance	Verify in Functional Tests: Inability to cast additional ballots, Closing of polls, Inability to scan additional ballots
c.6. Generating election data reports.	Verify in Functional Tests: Generation of precinct reports
c.7. Transfer ballot count to central counting location	Verify in Functional Tests: Reading the Compact Flash Card to the RTR
<b>Central Count Functions</b>	
d.1.Process ballot deck for > 2 precincts with 3 split precincts per precinct for a total of 6 ballot styles	Verify in Functional Tests: Process of ballot decks
d.2. Monitoring equipment status	Verify in Functional Tests: Equipment status as identified in user documentation
d.3. Equipment response to commands	Verify in Functional Tests: Equipment (ImageCAST Precinct Ballot Imager) responds to all voter and poll worker commands as identified in user documentation
d.4. Integration with peripherals equipment or other data processing systems	See b.3
d.5. Generating real-time audit messages.	See b.3 and b.4.
d.6. Generating precinct-level election data reports	Verify in Functional Tests: Generation of precinct reports
d.7. Generating summary election data reports	See b.4
d.8. Transfer of detachable memory module to the processing equipment	See b.3
d.9. Producing output data for interrogation by external display devices	Verify in Functional Tests: RTR to DS Election Management Results Publishing Server

### 4.3.5 Accuracy Test

The Accuracy Test is SysTest Labs' test case for validating a systems ability to accurately read/tally a large number of ballot positions (a minimum of 1,549,703 ballot positions, or 3,126,404 with one error, per Volume 2, Section 4.7.1.1). The ImageCAST Precinct Imager and ImageCast Central Imager are the hardware devices to be included in the Dominion System Accuracy Test.

The following steps are utilized in the execution of the Accuracy Test:

At the Precinct level:

- Accuracy ballot definition is loaded onto a Compact Flash Card
- Report of the initialization process
- Display the function selections
- Open polls
- Zero Report
- Scan ballots, Close polls, Run Totals report and Audit Log
- Validate test results

At the Central Count level:

- Filled ballots are input to the ICC
- Results are processed to the ICC tabulation software

At the System level:

- Compact Flash Cards are input from the precinct polling places
- Results are uploaded from the ICC tabulation software
- Tabulation of the total election data set
- Verification of the resultant totals and reports

### 4.3.6 Security Test

The Security Test Case is SysTest Labs' test case for verifying that a voting system will correspond correctly with security tests based on VVSG Volume 1, Section 7. It incorporates systems security provisions, unauthorized access, deletion or modification of data, audit trail data, and modification or elimination of security mechanisms. The vendor documentation will be reviewed to ensure sufficient detail is present to operate the voting system in a secured implementation. Where the vendor statements assert the voting system is secured via mechanisms and seals, procedures will test the presence and effectiveness of such controls.

In its security testing SysTest identifies the specific threats that are tested for and the associated risk if a flaw or exception is identified in a voting system. The tests used by SysTest Labs are designed to insure that the voting system meets or exceeds the requirements in the VVSG and any instance where an anomaly or possible security flaw is identified; the potential risk is reported and evaluated.

For additional detail, please also refer to the Security Test Case in Appendix A.



### 4.3.7 System-level Test Case Design

System level tests shall be performed on the Dominion Democracy Suite voting system for the purpose of assessing the response of the software to a range of conditions.

The customized test cases for all system level tests are listed in Table 6 – Functional Testing, Table 7 – System Level and Other Functional Testing and Appendix A.

In addition, other Functional Tests are used for validating functionality that does not fit well into a system level test cases, e.g., may have too many options to be adequately covered in system level test cases. Table 7 provides a table that delineates both the system level and the other software functions to be tested and how they will be tested.

**Table 7 – System Level and Other Functional Testing**

Other Functional Testing	Test Methodology
<b>Volume Test</b>	
System’s response to processing more than the expected number of ballots/voters per precinct, to processing more than the expected number of precincts, or to any other similar conditions that tend to overload the system’s capacity to process, store, and report data.	Data Accuracy test will be performed
<b>Stress Tests</b>	
System’s responses to transient overload conditions. Subject polling place devices to ballot processing at the high volume rates, evaluate software response to hardware-generated interrupts and wait states.	Hardware is tested to limits outside the range of ‘normal’ but within specifications for the units.
<b>Usability Tests</b>	
Responses to input, text syntax, error message content, and audit message input	All System-Level Test Cases
<b>Accessibility Test</b>	
Exercises system capabilities of voters with disability features	System-Level Test Case GEN 03
<b>Security Test</b>	
Exercises systems security provisions, unauthorized access, deletion or modification of data, audit trail data, and modification or elimination of security mechanisms.	Security Test case for each component (described previously in this section)
<b>Performance Tests</b>	
Tests accuracy, processing rate, ballot format, handling capability and other performance attributes claimed by Dominion	All System Test Cases

Other Functional Testing	Test Methodology
Recovery Tests	
Exercise system's ability to recover from hardware and data errors.	Security Test Case

### 4.3.8 Sampling Methodology

SysTest Labs reviewed the system-level and functional test case documents as provided by Dominion Voting Systems. SysTest Labs will repeat a sample of the vendor's test cases according to the following guideline:

New System (new or never certified by the EAC):

- Review all vendor test cases and select 1 or more tests from high-risk areas for sampling, such as:
  - Security
  - Audit log
  - Tabulating

SysTest Labs has selected the following test cases as sample test cases because they represent integral parts of the voting system that exercise essential features or are considered high-risk areas appropriate for sampling.

- Security: 5.1.15. Risk Test – Operator interaction, TC # PVR 015
- Audit: 4.18.16. - Create Audit, TC # 0086
- Tabulating: 4.15. Defining Tabulators, TC # 0057

## 4.4 EAC Interpretations

This test engagement utilizes standard VSTL test methods that conform to the EAC Testing and Certification Program Manual and the appropriate voting system standard. Additionally, EAC interpretation **EAC Decision on Request for Interpretation 2007-02** was utilized during source code review.

## 5 TEST DATA

### 5.1 Data Recording

The EAC Voluntary Voting System Guidelines 2005, Volume 2 Test Standards, will measure certification-testing progress against the standards defined for Marksense devices. SysTest Labs will create forms for the source code, TDP and testing reviews. These forms will be stored in electronic format at SysTest Labs. SysTest Labs will record all activity via periodic status report emails to Dominion Voting Systems.

The testing process involves the assessment of:

- Operational accuracy in the recording and processing of voting data, as measured by the error rate articulated in Volume I, Section 4.
- Operational failure or the number of unrecoverable failures under conditions simulating the intended storage, operation, transportation, and maintenance environments for voting systems, using an actual time-based period of processing test ballots.
- System performance and function under normal and abnormal conditions;
- Completeness and accuracy of the system documentation and configuration management records to enable purchasing jurisdictions to effectively install, test, and operate the system.

### 5.2 Test Data Criteria

SysTest Labs will evaluate test results against the documents and software provided by Dominion Voting Systems. These documents shall be used to customize a standard set of system level tests. Testing will be conducted as an independent verification and validation across the entire voting system. A greater depth of testing will be given to places where there are code changes and changes to documentation. In the standard system level tests, elections are customized to the functionality supported by the Democracy Suite Voting System Voting System. System performance shall be measured against a predicted result.

### 5.3 Test Data Reduction

SysTest Labs will process the test data by manually recording data in the Test Case records and SysTest Labs templates.

# 6 TEST PROCEDURE AND CONDITIONS

## 6.1 Facility Requirements

Testing will be performed on site at SysTest Labs in Colorado. All TDP and test documentation is stored in the secure project directory on SysTest Labs' secure Voting Server.

SysTest Labs always ensures voting room doors are kept locked at all times, unless the current activity requires that the door be opened. Vendors are never left unattended in a voting room at any time.

Environmental hardware testing for hardware components of the Dominion voting system was executed at a NVLAP or A2LA accredited environmental hardware testing facilities; and the reports are included in Attachment H: Hardware Test Reports.

## 6.2 Test Setup

The Democracy Suite Voting System test platform will be set up, as part of the Functional Configuration Audit, in the standard configuration identified in the TDP documents listed in attachment A. The operating system will be installed and made operational and with the typical complement of accessories and preloaded programs present in the system under test. The software will be installed, versions verified, and the system made operational. The hardware will also be set up and versions verified according to the vendor TDP documents. Once the hardware and software have been set up, SysTest Labs will proceed with testing the system.

## 6.3 Test Sequence

While there is no required sequence for performing voting system software certification testing and audits, predecessor tasks are required for some testing. Tasks and any applicable predecessors tasks are identified in the table below.

**Table 8 – High-Level Certification Milestones in Sequence**

Certification Task	Prerequisite Task
Scope Definition	Ascertain previous certification Information for the voting system, if applicable
PCA – Review of Source Code and Document TDPs	Receipt of TDPs
FCA – Testing Requirements Determined	Submissions of TDPs by vendor (including QA and testing specifics)
EAC Certification Test Plan	Review of TDPs and vendor testing
FCA – Test Case Development	Documentation TDP review; mapping of test requirements to VVSG and vendor testing (or identified risk areas where additional testing is needed)
PCA – System Configuration Audit	Equipment received at SysTest, staff trained on system, and documentation available

Certification Task	Prerequisite Task
Trusted Build	Completion of PCA source code review
FCA Hardware Environmental Testing	Completion of FCA test case preparation and PCA system configuration audit
FCA Accuracy Testing	Completion of FCA test case preparation, PCA system configuration audit, and environmental testing
FCA Functional Testing	Completion of FCA test case preparation and PCA system configuration audit
FCA System Level Testing	Completion of FCA test case preparation and PCA system configuration audit
FCA Security Testing	Completion of FCA test case preparation and PCA system configuration audit
Reporting Discrepancies	Completion of initial PCA source code and documentation reviews, and system level testing
Regression and Discrepancy Testing	Receipt of applicable discrepancy fix (source code, documentation, hardware, firmware) or vendor response
EAC Certification Test Report	Successful completion of all certification tasks

## 6.4 Test Operations Procedures

The SysTest Labs VSTL Test Team will provide step-by-step procedures for each test case to be conducted. Each step shall be assigned a test step number and this number, along with necessary test data and test procedures information, shall be tabulated onto a test report form for test control and the recording of test results.

An inventory will be performed to verify the voting equipment received contains hardware and software elements as defined by the TDP prior to commencement of Functional or System Level testing.

The PCA will include verification that the system can be configured using the system operations manuals.

Throughout the testing effort, test procedures will be marked as follows:

- **Accept** – Test is accepted as successful.
- **Reject** – Test is rejected as unsuccessful.
- **NT** (Not Testable) - If a failure of a test procedure precludes attempting subsequent test procedures, the test procedures that cannot be executed will be marked as NT. For expected functionality that is not implemented the test procedure will be marked as NT
- **NS** (not supported) indicates requirements that apply to features that are not supported in the configuration being tested.
- **NA**, Not Applicable - If a test procedure is not applicable to the current certification test effort it will be marked as NA. NA would also be entered for any subsequent step that is not applicable.

Test results Reject, NT, and NA will include comments by the Tester explaining the reason for the result.

Issues encountered during review and testing will be documented on the Democracy Suite Voting System Discrepancy Report. Issues that do not conform to the requirements of the EAC VVSG 2005 will be marked as Documentation Discrepancy or Functional Discrepancy (a Discrepancy occurs when the documentation or software does not meet defined requirements or specifications).

Dominion Voting Systems must address all defects prior to issuance of the Certification Report.

Issues that are encountered during testing, but are not addressed by the EAC VVSG 2005 standards will be added to the Discrepancy report and noted as Informational. Dominion Voting Systems has the option to address Informational issues. All responses provided by Dominion Voting Systems are noted in the Discrepancy Report appendix within the Certification Report.

## Appendix A – Test Cases

Test Detail	Test Methodology
<b>Test Case Name</b>	<b>GEN01</b>
<b>Scope</b>	A system level test that uses The 2005 Voluntary Voting System Guidelines (VVSG) to validate required functionality and performance. Testing includes accuracy, ballot format handling capability, reporting, and usability of the hardware, software and procedures in the entire voting system.
<b>Objective</b>	The object of this test case is to verify core functionality and performance by using Dominion's manual(s) to create election ballots, vote, and tally, for a General Election (non-straight party).
<b>Variables: Voting Variations</b>	<ul style="list-style-type: none"> <li>• Non-Partisan contest: Vote for 1 (Sheriff) (Superintendent of Schools)</li> <li>• Non-Partisan contest: Vote for 1 race with a single candidate and a write-in (Superintendent of Schools)</li> <li>• Non-Partisan contest: Vote for 1 race with no declared candidates and write-in (Sheriff)</li> <li>• Non-Partisan contest: Multi-member board (N of M) (County Commissioner)</li> <li>• Non-Partisan contest: Proposition/Question (Proposition X)</li> <li>• Partisan contest: Vote for 1 (Governor/Lt. Governor) (Secretary of State) (Attorney General) (County Treasurer)</li> <li>• Partisan contest: Vote for 1 race with a single candidate and a write-in (Attorney General)</li> <li>• Partisan contest: Vote for 1 race with no declared candidates and write-in (County Treasurer)</li> <li>• Partisan contest: Multi-member board (N of M) (City Council)</li> <li>• Partisan contest, one party has no candidates (Secretary of State) (City Council)</li> <li>• Slate &amp; Group voting: one selection votes the slate (Governor/Lt. Governor)</li> <li>• Recall Type A - Simple Yes/No question (Recall Judge)</li> <li>• Recall Type B - Retain is first option, followed by Replacement options for second or more (Replace Judge)</li> <li>• 2 precincts</li> <li>• Split precincts</li> <li>• Provisional/Challenged Ballots</li> </ul>

Test Detail	Test Methodology
<b>Test Case Name</b>	<b>GEN01</b>
<b>Variables: Election Variations</b>	<ul style="list-style-type: none"> <li>• <b>Governor/Lt. Governor:</b> 4 candidates</li> <li>• <b>Sheriff:</b> no candidate/1 write-in</li> <li>• <b>Superintendent of Schools:</b> 1 candidate/1 write-in</li> <li>• <b>County Commissioner:</b> 4 candidates</li> <li>• <b>Proposition X:</b> Y/N</li> <li>• <b>Secretary of State:</b> 3 candidates</li> <li>• <b>City Council:</b> 6 candidates/write-ins</li> <li>• <b>Attorney General:</b> 1 candidate/1 write-in</li> <li>• <b>County Treasurer:</b> no candidate/1 write-in</li> <li>• <b>Recall Judge:</b> 2 choices</li> <li>• <b>Replace Judge:</b> 3 choices</li> </ul>
<b>A description of the voting system type and the operational environment</b>	<ul style="list-style-type: none"> <li>• <b>EMS EED</b> - Election Management System Election Event Designer</li> <li>• <b>EMS RTR</b> - Election Management System Results, Tally &amp; Reporting</li> <li>• <b>EMS Application Server</b> - Election Management System Application Server</li> <li>• <b>EMS DB Server</b> - Election Management System Database Server</li> <li>• <b>IC Precinct Tabulator</b> - ImageCast Precinct Tabulator</li> <li>• <b>IC Central Tabulator</b> - ImageCast Central Tabulator</li> </ul> <p>Refer to the following tables for complete descriptions:</p> <ul style="list-style-type: none"> <li>➤ Required Software/Firmware</li> <li>➤ Required Hardware</li> </ul>
<b>Standards Documents</b>	<p>2005 Voluntary Voting System Guidelines (VVSG), vol. 1  2005 Voluntary Voting System Guidelines (VVSG), vol. 2  Specific standards are noted in following steps</p>



Test Detail	Test Methodology
<b>Test Case Name</b>	<b>GEN01</b>
<b>Pre-requisites and initialization of the test case</b>	<ul style="list-style-type: none"> <li>• Document the date and tester(s)</li> <li>• System, including the witnessed build, is installed and set up as defined in the user documentation</li> <li>• Define election contests, candidates, issues etc. (V1:2.1.6)</li> <li>• Party affiliation is identified on the ballot where applicable (V1:2.1.1.1.d)</li> <li>• Create a supervisory level access 'user' and password'</li> <li>• Testers are informed that the test environment must remain static, if not, no changes shall occur without documentation in the test record and the authorization of the project manager</li> <li>• Have a Ballot Counter (V1:2.1.8)</li> <li>• Retrieve all supplies necessary for testing</li> <li>• Complete Readiness check list</li> </ul>
<b>Documentation of Test Data &amp; Test Results</b>	<ul style="list-style-type: none"> <li>• Capture all voting steps in order to maintain repeatability of the test</li> <li>• Record election, ballot, and vote data fields on the corresponding worksheet tabs</li> <li>• Save all worksheet tabs for all iterations of the test case</li> <li>• Record results of test run by entering 'Accept/Reject' on the Test Results Matrix</li> <li>• Provide comments when observing deviations, discrepancies or notable observations</li> <li>• Log discrepancies on the Discrepancy Report</li> </ul>
<b>Pre-vote: Ballot Preparation procedures verifications</b>	<ul style="list-style-type: none"> <li>• Installation and Election databases can be accurately/securely defined and formatted</li> <li>• A ballot can be accurately/securely defined and formatted (V1:4.1.4.2)</li> <li>• A ballot can be accurately/securely programmed and installed into the appropriate media (V1:4.1.4.2.b, 4.1.4.2.c)</li> </ul>
<b>Pre-vote: Preparation - Security</b>	<p>System Preparation - Security:</p> <ul style="list-style-type: none"> <li>• System username/password authentication and other access controls are set up according to system documentation guidelines for all devices being tested.</li> <li>• Any/all unnecessary processes are disabled and/or required process control measures noted in the documentation are followed.</li> <li>• All COTS and vendor subsystems used for system security are configured and active as recommended by the system documentation. This includes all connection, port, virus, data or authorized process restriction systems.</li> <li>• Any other pre-election system security measures listed in the documentation are followed including setup of additional hardware or software not covered above.</li> </ul> <p>Please also see the Documentation section of the Security Test Case within this Appendix A.</p>

Test Detail	Test Methodology
<b>Test Case Name</b>	<b>GEN01</b>
<b>Readiness Testing and Poll Verification</b>	<ul style="list-style-type: none"> <li>• The election is correctly installed</li> <li>• Status and data reports are generated</li> <li>• Test data is separate from voting data without impact to the testing</li> <li>• Zero count report</li> <li>• A list of all ballot fields is created (V1:4.1.4.2)</li> <li>• No hardware/software failures</li> <li>• The voting device is ready to accept votes (V1:4.1.4.3.a)</li> </ul>
<b>Pre-vote: Opening the Polls Verification</b>	<ul style="list-style-type: none"> <li>• Completed Readiness check list</li> <li>• Perform proper sequence of functions to open the polls</li> <li>• Identify any issues, failures, or unexpected results and their required corrective action(s)</li> </ul>
<b>Voting: Required functionality verifications</b>	<ul style="list-style-type: none"> <li>• Maintain accurate and complete audit records (V1:2.1.5.1.a, 4.1.7)</li> <li>• Maintain accurate and complete error and status messages (V1:2.1.5.1.b, 2.1.5.1.c,4.1.1)</li> <li>• All paper-based systems shall: Protect the secrecy of the vote throughout the process. (V1:2.3.3.2)</li> <li>• Accurately record cast ballots, including provisional (V1:2.3.3,4.1.3.1,4.1.5.2,4.1.6.2.b)</li> <li>• Ensure undervotes are counted as cast votes (V1:2.4.3.d)</li> <li>• Separate accumulation of Undervotes and Paper Overvotes (V1:5.4.4.d)</li> <li>• Ensure Overvotes are counted on paper ballots and tally correctly</li> <li>• Maintain integrity of Vote and Audit data (V1:4.1.3.1.f)</li> <li>• Accurate Definition, Count, Reporting for Election Day, Absentee - paper and DRE, with the results tallied, excluding and including provisional ballots (V1:2.1.2,4.1.8.2)</li> <li>• Write-in voting: Voting position identified for write-ins (V1:4.1.5.1.d)</li> <li>• Correctly tabulate (V1:2.1.7.1)</li> <li>• Overvotes</li> <li>• Undervotes</li> <li>• Blank ballots (V1:4.1.5.1.d)</li> </ul>

Test Detail	Test Methodology
<b>Test Case Name</b>	<b>GEN01</b>
<b>Voting: Optional functionality verifications</b>	<ul style="list-style-type: none"> <li>• Non-Partisan contest: Vote for 1 (Sheriff) (Superintendent of Schools)</li> <li>• Non-Partisan contest: Vote for 1 race with a single candidate and a write-in (Superintendent of Schools)</li> <li>• Non-Partisan contest: Vote for 1 race with no declared candidates and write-in (Sheriff)</li> <li>• Non-Partisan contest: Multi-member board (N of M) (County Commissioner)</li> <li>• Non-Partisan contest: Proposition/Question (Proposition X)</li> <li>• Partisan contest: Vote for 1 (Governor/Lt. Governor) (Secretary of State) (Attorney General) (County Treasurer)</li> <li>• Partisan contest: Vote for 1 race with a single candidate and a write-in (Attorney General)</li> <li>• Partisan contest: Vote for 1 race with no declared candidates and write-in (County Treasurer)</li> <li>• Partisan contest: Multi-member board (N of M) (City Council)</li> <li>• Partisan contest, one party has no candidates (Secretary of State) (City Council)</li> <li>• Slate &amp; Group voting: one selection votes the slate (Governor/Lt. Governor)</li> <li>• Recall Type A - Simple Yes/No question (Recall Judge)</li> <li>• Recall Type B - Retain is first option, followed by Replacement options for second or more (Replace Judge)</li> <li>• 2 precincts</li> <li>• Split precincts</li> <li>• Provisional/Challenged Ballots</li> </ul>
<b>Post-Vote: Closing the Polls</b>	<ul style="list-style-type: none"> <li>• Polls are properly closed</li> <li>• Further casting of ballots and reopening of the polls is prohibited</li> <li>• Device status is normal</li> <li>• Identify any issues, failures, or unexpected results and their required corrective action(s)</li> <li>• Create a test record that verifies the sequence of test events</li> </ul>
<b>Post-Vote: Central Count</b>	Capture, document, and verify all counts

Test Detail	Test Methodology
<b>Test Case Name</b>	<b>GEN01</b>
<b>Post-Vote: Security</b>	Post-Vote - Security: <ul style="list-style-type: none"> <li>• System username/password authentication and other access controls are set up according to system documentation guidelines for all devices being tested.</li> <li>• Any/all unnecessary processes are disabled and/or required process control measures noted in the documentation are followed.</li> <li>• All COTS and vendor subsystems used for system security are configured and active as recommended by the system documentation. This includes all connection, port, virus, data or authorized process restriction systems.</li> <li>• Any other pre-election system security measures listed in the documentation are followed including setup of additional hardware or software not covered above.</li> </ul> <p>Please also see the Documentation section of the Security Test Case within Appendix A.</p>
<b>Post-Vote: System Audit</b>	Produce and verify available system reports
<b>Results are Observed</b>	Review the outcome of the test(s) against the expected result(s): <ul style="list-style-type: none"> <li>• <b>Accept:</b> expected results is observed</li> <li>• <b>Reject:</b> expected result is NOT observed</li> <li>• <b>Not Testable (NT):</b> rejection of a previous test step prevents validation of this step or this was tested in another test case</li> <li>• <b>Not Applicable (NA):</b> not applicable to the current test scope</li> <li>• <b>Not Supported (NS):</b> not supported in the current test scope</li> </ul>
<b>Record Observations and all input/outputs for each election</b>	<ul style="list-style-type: none"> <li>• All information used in processing the test case is captured. This includes: inputs, outputs, deviations and any other item that may impact the validation of the test case.</li> <li>• Any failure of the test against the EAC guidelines is reported and implies failure of the system</li> <li>• Failures are reported as Defect Issues in the Discrepancy Report and are provided to the manufacturer</li> <li>• Before the final Certification report is issued, manufacturers are given the opportunity to correct all discrepancies</li> <li>• If corrections are submitted by the manufacturer, retests are performed</li> <li>• Issues that do not impact the failure of the requirements but could be considered defects are logged as Informational Issues on the Discrepancy Report. It is the manufacturer's option to address these issues.</li> </ul>

Test Detail	Test Methodology
<b>Test Case Name</b>	<b>GEN03 (Usability and Accessibility)</b>
<b>Scope</b>	A system level test that uses The 2005 Voluntary Voting System Guidelines (VVSG) to validate required functionality and performance. Testing includes accuracy, ballot format handling capability, reporting, and usability of the hardware, software and procedures in the entire voting system.
<b>Objective</b>	The object of this test case is to verify that all supported multi-lingual formats can be created, voted, audio voted and tallied for Election Day Voting. Additionally, Usability and Accessibility standards are tested here.
<b>Variables: Voting Variations</b>	<ul style="list-style-type: none"> <li>• Non-Partisan contest: Vote for 1 (Sheriff)</li> <li>• Partisan contest: Multi-member board (N of M) (City Council)</li> <li>• Partisan contest, one party has no candidates (City Council)</li> <li>• Non-Partisan contest: Proposition/Question (Proposition X)</li> <li>• Multi-language ballots</li> <li>• Audio ballots</li> <li>• Rotation by precincts</li> <li>• 3 precincts</li> </ul>
<b>Variables: Election Variations</b>	<ul style="list-style-type: none"> <li>• <b>Sheriff:</b> 3 candidates/rotate by candidate</li> <li>• <b>Proposition X:</b> Y/N</li> <li>• <b>City Council:</b> 6 candidates/write-ins</li> </ul>
<b>A description of the voting system type and the operational environment</b>	<ul style="list-style-type: none"> <li>• <b>EMS EED</b> - Election Management System Election Event Designer</li> <li>• <b>EMS RTR</b> - Election Management System Results, Tally &amp; Reporting</li> <li>• <b>EMS Application Server</b> - Election Management System Application Server</li> <li>• <b>EMS DB Server</b> - Election Management System Database Server</li> <li>• <b>IC Precinct Tabulator</b> - ImageCast Precinct Tabulator</li> <li>• <b>IC Central Tabulator</b> - ImageCast Central Tabulator</li> <li>• <b>IC AudioVote Add-On</b> - ImageCast AudioVote Add-On</li> <li>• <b>ATI</b> - Audio-Tactile Interface</li> </ul> <p>Refer to the following tables for complete descriptions:</p> <ul style="list-style-type: none"> <li>➤ Required Software/Firmware</li> <li>➤ Required Hardware</li> </ul>

Test Detail	Test Methodology
<b>Test Case Name</b>	<b>GEN03 (Usability and Accessibility)</b>
<b>Standards Documents</b>	SEE GEN01
<b>Pre-requisites and initialization of the test case</b>	SEE GEN01
<b>Documentation of Test Data &amp; Test Results</b>	SEE GEN01
<b>Pre-vote: Ballot Preparation procedures verifications</b>	SEE GEN01
<b>Pre-vote: Preparation - Security</b>	SEE GEN01
<b>Readiness Testing and Poll Verification</b>	SEE GEN01
<b>Pre-vote: Opening the Polls Verification</b>	SEE GEN01
<b>Voting: Required functionality verifications</b>	SEE GEN01
<b>Voting: Optional functionality verifications</b>	<ul style="list-style-type: none"> <li>• Non-Partisan contest: Vote for 1 (Sheriff)</li> <li>• Partisan contest: Multi-member board (N of M) (City Council)</li> <li>• Partisan contest, one party has no candidates (City Council)</li> <li>• Non-Partisan contest: Proposition/Question (Proposition X)</li> <li>• Multi-language ballots</li> <li>• Audio ballots</li> <li>• Rotation by precincts</li> <li>• 3 precincts</li> </ul>

Test Detail	Test Methodology
<b>Test Case Name</b>	<b>GEN03 (Usability and Accessibility)</b>
<b>Usability and Accessibility verifications</b>	<ul style="list-style-type: none"> <li>• Usability Testing – General Principles (V1:3.1.1)</li> <li>• Functional Capabilities (V1:3.1.2)</li> <li>• Alternative Languages (V1:3.1.3)</li> <li>• Cognitive Issues (V1:3.1.4)</li> <li>• Perceptual Issues (V1:3.1.5)</li> <li>• Interaction Issues (V1:3.1.6)</li> <li>• Privacy (V1:3.1.7)</li> <li>• General Accessibility Requirements (V1:3.2.1)</li> <li>• Vision (V1:3.2.2)</li> <li>• Dexterity (V1:3.2.3)</li> <li>• Mobility (V1:3.2.4)</li> <li>• Hearing (V1:3.2.5)</li> <li>• Speech (V1:3.2.6)</li> <li>• English Proficiency (V1:3.2.7)</li> <li>• Cognition (V1:3.2.8)</li> </ul>
<b>Post-Vote: Closing the Polls</b>	SEE GEN01
<b>Post-Vote: Central Count</b>	SEE GEN01
<b>Post-Vote: Security</b>	SEE GEN01
<b>Post-Vote: System Audit</b>	SEE GEN01
<b>Results are Observed</b>	SEE GEN01
<b>Record Observations and all input/outputs for each election</b>	SEE GEN01

Test Detail	Test Methodology
Test Case Name	PRI02
Scope	A system level test that uses The 2005 Voluntary Voting System Guidelines (VVSG) to validate required functionality and performance. Testing includes accuracy, ballot format handling capability, reporting, and usability of the hardware, software and procedures in the entire voting system.
Objective	The object of this test case is to verify core functionality and performance by using Dominion's manual(s) to create two partisan and one non-partisan ballots for a Closed Primary Election.
Variables: Voting Variations	<ul style="list-style-type: none"> <li>• Non-Partisan contest: "Vote for 1" race with no declared candidates and write-ins (Sheriff)</li> <li>• Non-Partisan contest: "Vote for 1" race with a single candidate and a write-in (Superintendent of Schools)</li> <li>• Non-Partisan contest: "Vote for 3 of N" race with a multi-member board and a write-in (School Board)</li> <li>• Partisan contest: Vote for 1 of N (Secretary of State) (Alderman)</li> <li>• Partisan contest: Cross over to another partisan ballot if no declared candidate (Secretary of State)</li> <li>• Partisan contest: Multi-member board (N of M) (Alderman)</li> <li>• Primary Presidential Delegates: a delegate slate, display of delegates with nominees, vote for 1 of N (Presidential Delegates)</li> <li>• Recall Type A - Simple Yes/No question (V1: 2.1.7.2) (Recall Judge)</li> <li>• Rotation, by precinct</li> <li>• 7 precincts</li> </ul>
Variables: Election Variations	<ul style="list-style-type: none"> <li>• <b>Sheriff:</b> no candidate/write-in</li> <li>• <b>Superintendent of Schools:</b> 1 candidate/1 write-in</li> <li>• <b>School Board:</b> 6 candidates/1 write-in</li> <li>• <b>Recall Judge:</b> 2 choices</li> <li>• <b>Presidential Delegates:</b> 3 sets of candidates (REP)</li> <li>• <b>Presidential Delegates:</b> 2 sets of candidates (DEM)</li> <li>• <b>Presidential Delegates:</b> 2 sets of candidates (SCI)</li> <li>• <b>Secretary of State:</b> no candidate/cross over voting (REP)</li> <li>• <b>Secretary of State:</b> 3 candidates (DEM)</li> <li>• <b>Secretary of State:</b> 2 candidates (SCI)</li> <li>• <b>Alderman:</b> 3 candidates (REP)</li> <li>• <b>Alderman:</b> 4 candidates (DEM)</li> <li>• <b>Alderman:</b> 3 candidates (SCI)</li> </ul>



Test Detail	Test Methodology
<b>Test Case Name</b>	<b>PRI02</b>
<b>A description of the voting system type and the operational environment</b>	<ul style="list-style-type: none"> <li>• <b>EMS EED</b> - Election Management System Election Event Designer</li> <li>• <b>EMS RTR</b> - Election Management System Results, Tally &amp; Reporting</li> <li>• <b>EMS Application Server</b> - Election Management System Application Server</li> <li>• <b>EMS DB Server</b> - Election Management System Database Server</li> <li>• <b>IC Precinct Tabulator</b> - ImageCast Precinct Tabulator</li> <li>• <b>IC Central Tabulator</b> - ImageCast Central Tabulator</li> </ul> <p>Refer to the following tables for complete descriptions:</p> <ul style="list-style-type: none"> <li>➤ Required Software/Firmware</li> <li>➤ Required Hardware</li> </ul>
<b>Standards Documents</b>	SEE GEN01
<b>Pre-requisites and initialization of the test case</b>	SEE GEN01
<b>Documentation of Test Data &amp; Test Results</b>	SEE GEN01
<b>Pre-vote: Ballot Preparation procedures verifications</b>	SEE GEN01
<b>Pre-vote: Preparation - Security</b>	SEE GEN01
<b>Readiness Testing and Poll Verification</b>	SEE GEN01
<b>Pre-vote: Opening the Polls Verification</b>	SEE GEN01
<b>Voting: Required functionality verifications</b>	SEE GEN01
<b>Voting: Optional functionality verifications</b>	<ul style="list-style-type: none"> <li>• Non-Partisan contest: "Vote for 1" race with no declared candidates and write-ins (Sheriff)</li> <li>• Non-Partisan contest: "Vote for 1" race with a single candidate and a write-in (Superintendent of Schools)</li> <li>• Non-Partisan contest: "Vote for 3 of N" race with a multi-member board and a write-in (School Board)</li> <li>• Partisan contest: Vote for 1 of N (Secretary of State) (Alderman)</li> <li>• Partisan contest: Cross over to another partisan ballot if no declared candidate (Secretary of</li> </ul>

Test Detail	Test Methodology
<b>Test Case Name</b>	<b>PRI02</b>
	State) <ul style="list-style-type: none"> <li>• Partisan contest: Multi-member board (N of M) (Alderman)</li> <li>• Primary Presidential Delegates: a delegate slate, display of delegates with nominees, vote for 1 of N (Presidential Delegates)</li> <li>• Recall Type A - Simple Yes/No question (V1: 2.1.7.2) (Recall Judge)</li> <li>• Rotation, by precinct</li> <li>• 7 precincts</li> </ul>
<b>Post-Vote: Closing the Polls</b>	SEE GEN01
<b>Post-Vote: Central Count</b>	SEE GEN01
<b>Post-Vote: Security</b>	SEE GEN01
<b>Post-Vote: System Audit</b>	SEE GEN01
<b>Results are Observed</b>	SEE GEN01
<b>Record Observations and all input/outputs for each election</b>	SEE GEN01

Test Detail	Test Methodology
<b>Test Case Name</b>	<b>Operational Status Check</b>
<b>Scope</b>	SysTest Labs requires the vendor to provide a comprehensive end-to-end test case(s) that they supply to their customers, such as state election officials. The Vendor may provide SysTest Labs a comprehensive checklist of test case(s) for particular states' functionality. This test may be based on the vendor's certification configuration. SysTest Labs will perform the operational status check once upon acceptance of the equipment, and once after all other testing, prior to checkout. (V2:4.6.1.5)
<b>Objective</b>	The object of this test case is to verify that when all tests, inspections, repairs, and adjustments have been completed, normal operation can be verified by conducting an operational status check.
<b>Standards Documents</b>	SEE GEN01
<b>Documentation of Test Data &amp; Test Results</b>	SEE GEN01
<b>Operational Status Check Verification</b>	<p>During this process, all equipment will be operated in a manner and environmental conditions that simulate election use to verify the functional status of the system. Prior to the conduct of each of the environmental hardware non-operating tests, a supplemental test will be made to determine that the operational state of the equipment is within acceptable performance limits.</p> <p>The following procedures will be followed to verify the equipment status:</p> <p>Step 1: Arrange the system for normal operation.  Step 2: Turn on power, and allow the system to reach recommended operating temperature.  Step 3: Perform any servicing, and make any adjustments necessary, to achieve operational status.  Step 4: Operate the equipment in all modes, demonstrating all functions and features that would be used during election operations.  Step 5: Verify that all system functions have been correctly executed.</p>
<b>Readiness Audit</b>	SEE GEN01
<b>Results are Observed</b>	SEE GEN01

<b>Test Detail</b>	<b>Test Methodology</b>
<b>Test Case Name</b>	<b>Operational Status Check</b>
<b>Record Observations and all input/outputs for each election</b>	SEE GEN01

Test Detail	Test Methodology
<b>Test Case Name</b>	<b>Security</b>
<b>Scope</b>	<p>Security Testing Overview Security testing is related to four activities.</p> <ul style="list-style-type: none"> <li>• <b>Documentation Review</b> - Documentation Review verifies that the system has documented policies and procedures that mitigate or eliminate security threats outlined in the VSS and/or VSSG guidelines. It also describes Access controls</li> <li>• <b>Source Code Review</b> - Source Code Review insures source code meets VSS and/or VVSG guidelines and provides additional protection against security flaws into the system. Potential security issues may include default passwords or backdoors in the source code, encryption keys in the source code, encryption flaws, unencrypted data transmissions, encryption algorithms that are not NIST certified, etc.</li> <li>• <b>Hardware Testing</b> - Hardware Testing insures that that equipment will stand up to environment conditions, machines are accurate, physical access to machine components is restricted, machine hardware is reliable and attempts to compromise machine security is detectable. A hardware malfunction could impact the accuracy of voting data or provide unauthorized access to secure information. Specific hardware limitations or restrictions impact the test procedures needed to validate security of the system.</li> <li>• <b>System Testing</b> - System Testing verifies that voting systems have sufficient system and data protection mechanisms, that when combined with other review processes, provide a secure voting environment. This section of the document relates to System Testing but depends on the other three activities that are covered in their own specific section.</li> </ul>
<b>Objective</b>	Security testing attempts to identify and mitigate flaws in voting systems where undesired or unauthorized human or machine activity may compromise an election through system failure, data manipulation, data interception or other means.
<b>Variables: Voting Variations</b>	<p>Prevent and/or detect undesired system activities including:</p> <ul style="list-style-type: none"> <li>• Unauthorized access through accidental or intentional bypass or circumvention of authorization controls.</li> <li>• Alteration, deletion, replacement or theft of voter, election, audit and/or vote data.</li> <li>• Hardware and/or software tampering</li> <li>• Interruption of voting activities</li> </ul>
<b>A description of the voting system type and the operational environment</b>	SEE Readiness Test
<b>Standards Documents</b>	SEE GEN01

Test Detail	Test Methodology
Test Case Name	Security
Role	<p>Privileges are not allowed to be:</p> <ul style="list-style-type: none"> <li>• Exceeded (V1:7.2.1.1.c)</li> <li>• Changed to Run Reports</li> </ul> <p>Voters are inhibited from:</p> <ul style="list-style-type: none"> <li>• Accessing Equipment Before Polls Open</li> <li>• Running Reports</li> </ul> <p>Changes to Privileges are Prohibited for ID's and Passwords Thus Preventing Unauthorized Report Printing, Results Transmission, Results Downloading and Resetting of Elections</p> <p>Voter equipment access or keys are limited to ensure:</p> <ul style="list-style-type: none"> <li>• Only the User interface is accessible</li> <li>• Only a single vote may be cast</li> <li>• Closed Polls are secure</li> <li>• Counts are not available to voters</li> <li>• Unauthorized Accounts from System Functions</li> </ul> <p>Fraudulent Ballots are not accepted by the system ensuring only valid ballots are counted</p>
Access	<p>Access validation to the system ensures that only applicable system entry is allowed. This includes:</p> <ul style="list-style-type: none"> <li>• Seals and/or Password Required to Open Polls (V1: 2.3.1.3)</li> <li>• Security Seal and/or Password Prevent Unauthorized Opening of Polls</li> <li>• Incorrect or Blank Password Cannot be Used to Open Polls (V1:7.2.1.2)</li> <li>• System Provides Access Controls that Limit or Detect Access to Critical System Components (V1:2.2.1.1.a)</li> </ul>
System Security	<p>Executables Can Only Run in Intended Manner and Order (V1:2.1.1)</p> <p>Executable Preconditions Must be Met</p> <p>Tampering Safeguards During Repair, Interventions or Failure</p> <p>Security Provision Compatibility With Procedures and Admin Tasks</p> <p>Incorporate a means of implementing a capability if access to a system function is to be restricted or controlled.</p>
System Log	<p>System Log Error Activity Verification (V1:5.4.3)</p> <p>Voting Activity Verification (V1:5.4.3.d)</p> <p>Log Protection (V1:5.4.3)</p>
Audit Records	<p>Audit Record Cannot be Turned Off (V1:2.1)</p>

Test Detail	Test Methodology
<b>Test Case Name</b>	<b>Security</b>
<b>Software Security</b>	Software security validation ensures that the accessibility to firmware is appropriately prohibited. This includes verifying that access from ports or through an open case is restricted. (V1:7.4.1.c) Verify the Separation of Election Specific Firmware and Operating System are stored (V1:7.4.1.d)
<b>Threat Protection</b>	<ul style="list-style-type: none"> <li>• Memory Threat &amp; Virus Scanning Mechanisms (V1:7.5.2.d)</li> <li>• Rootkit Scanning Mechanisms</li> </ul>
<b>Audit Log</b>	<p>Audit logs and data files cannot be altered through the use of an alternate boot sequence without detection, and the test will consist of attempting to boot the devices using alternative media during boot sequences.</p> <p>Audit logs and data files cannot be altered through the use of editing tools without detection.</p> <p>The test will consist of attempting to edit the audit log to confirm that the system either:</p> <ul style="list-style-type: none"> <li>• Does not allow edits of the audit log or data files, or</li> <li>• Detects and reports all attempts at editing the audit log or data files</li> </ul>
<b>Vote Count Integrity</b>	Layered Protection In Shared Environment 30 (V1:7.5.4)
<b>Data Protection</b>	<ul style="list-style-type: none"> <li>• Access Control Lists Preclude Data Leakage (V1:7.5.4.d)</li> <li>• Routers and Firewalls Preclude Data Leakage</li> <li>• Electronic Policies Prevent Copy of Data</li> <li>• Voting System Access to Incomplete Election Returns (V1:7.5.5)</li> </ul>
<b>Documentation</b>	<p>All vendor documentation is reviewed to validate all Vendor Access Control Policies pertaining to:</p> <ul style="list-style-type: none"> <li>• General, Software, Hardware Access controls</li> <li>• Communications</li> <li>• Effective Password management</li> <li>• Protection abilities of a particular operating system</li> <li>• General characteristics of supervisory access privileges</li> <li>• Segregation of duties</li> <li>• Vendor's access privileges</li> <li>• Access control measures</li> <li>• Physical security measures</li> <li>• Polling place security</li> <li>• Central count location security</li> <li>• Software security</li> <li>• Software and firmware installation</li> <li>• Protection against malicious software</li> <li>• Telecommunications and data transmission</li> </ul>

Test Detail	Test Methodology
<b>Test Case Name</b>	<b>Security</b>
	<ul style="list-style-type: none"> <li>• Data integrity</li> <li>• Data interception prevention</li> <li>• Protection against external threats</li> <li>• Identification of COTS Products</li> <li>• Use of protective software</li> <li>• Monitoring and responding to external threats</li> <li>• Shared operating environment</li> <li>• Access to incomplete election returns and interactive queries</li> <li>• Security for transmission of official data over public communications networks</li> <li>• General security requirements for systems transmitting data over public networks</li> <li>• Voting process security for casting individual ballots over a public telecommunications networks</li> <li>• Documentation of mandatory security activities</li> <li>• Capabilities to operate during interruption of telecommunications capabilities</li> <li>• Any other relevant characteristics</li> </ul>
<b>External Access</b>	Blocked Central Count Environment Access to Incomplete Election Returns (V1:7.5.5.a) Voting Machines With Removable Memory Modules



Test Detail	Test Methodology
<b>Test Case Name</b>	<b>Readiness Test</b>
<b>Scope</b>	A functional test that uses The 2005 Voluntary Voting System Guidelines (VVSG) to validate Readiness throughout the entire voting system. (V1: 2.1.2a, 2.1.4j, 2.1.7.1b, 2.2.5, 2.3.1.1a, 2.3.1.2d-e)
<b>Objective</b>	The object of this test case is to verify equipment and system readiness to ensure that the voting system functions properly, to confirm that the system equipment has been properly intergraded, and to obtain equipment status reports.
<b>A listing of the applicable voting system machines</b>	<ul style="list-style-type: none"> <li>• <b>EMS EED/RTR</b> - Election Management System Election Event Designer/ Results, Tally &amp; Reporting</li> <li>• <b>EMS Application Server</b> - Election Management System Application Server</li> <li>• <b>EMS DB Server</b> - Election Management System Database Server</li> <li>• <b>IC Precinct Tabulator</b> - ImageCast Precinct Tabulator</li> <li>• <b>IC Central Tabulator</b> - ImageCast Central Tabulator</li> </ul> <p>Refer to the following tables for complete descriptions:</p> <ul style="list-style-type: none"> <li>➤ Required Software/Firmware</li> <li>➤ Required Hardware</li> </ul>
<b>Standards Documents</b>	SEE GEN01
<b>Pre-requisites and initialization of the test case</b>	This testing is to be executed on initial testing and each time the system is to be shut down and restarted.
<b>Documentation of Test Data &amp; Test Results</b>	SEE GEN01
<b>System Preparation - Security</b>	SEE GEN01
<b>Readiness Testing Verification</b>	<ul style="list-style-type: none"> <li>* Voting machines or vote recording and data processing equipment, precinct count equipment, and central count equipment are properly configured for an election, and collect data that verifies equipment readiness</li> <li>* Obtain status and data reports from each set of equipment</li> <li>* Correct installation and interface of all system equipment</li> <li>* Hardware and software function correctly</li> <li>* Version verification</li> </ul>

Test Detail	Test Methodology
<b>Test Case Name</b>	<b>Readiness Test</b>
<b>Summary of Instructions followed per Product</b>	<p><u>Action</u></p> <ol style="list-style-type: none"> <li>1) Insert Compact Flash cards</li> <li>2) Turn on power</li> <li>3) Confirm that self tests have been completed</li> <li>4) Enter mode: Administration, using access key - Open the poll by selecting the 'Test Ballot' option</li> <li>5) Insert Ballot</li> <li>6) Verify information on LCD screen</li> <li>7) Verify content on the printout</li> </ol> <p><u>Expected Results</u></p> <ol style="list-style-type: none"> <li>1) n/a</li> <li>2) Tabulator will boot and display a startup message</li> <li>3) Internal measurement, self-test and diagnostic sequence is performed to detect hardware or software failures. If successful, the machine is ready for operation and will display a message "Please Insert Ballot"</li> <li>4) The machine will open the poll using a device control function. Internal printer will produce an audit record.</li> <li>5) Ballot will be imaged and processed</li> <li>6) User is informed if the imaging system is fully functional</li> <li>7) The paper printout will confirm the following information: time, date, location, election name, number of ballots, contests, candidates, serial number, and firmware version.</li> </ol>
<b>Readiness Audit</b>	Produce and verify available system reports
<b>Results are Observed</b>	SEE GEN01
<b>Record Observations and all input/outputs for each election</b>	SEE GEN01

Test Detail	Test Methodology
<b>Test Case Name</b>	<b>Accuracy</b>
<b>Scope</b>	A functional test that uses The 2005 Voluntary Voting System Guidelines (VVSG) to validate the individual ballot positions in terms of a maximum error rate while processing a specified volume of data. (V2:4.7.1.1)
<b>Objective</b>	The object of this test is to verify that the voting system can accurately and reliably read ballots incorporating a minimum 1,549,703 ballot positions (including voted and non-voted positions) and that these ballots can be mechanically/electronically tabulated without error.
<b>Variables: Voting Variations</b>	A ballot with the maximum number of supported parties and candidates.
<b>A description of the voting system type and the operational environment</b>	<ul style="list-style-type: none"> <li>• <b>EMS EED/RTR</b> - Election Management System Election Event Designer/ Results, Tally &amp; Reporting</li> <li>• <b>IC Precinct Tabulator</b> - ImageCast Precinct Tabulator</li> <li>• <b>IC Central Tabulator</b> - ImageCast Central Tabulator</li> </ul> <p>Refer to the following tables for complete descriptions:</p> <ul style="list-style-type: none"> <li>➤ Required Software/Firmware</li> <li>➤ Required Hardware</li> </ul>
<b>Standards Documents</b>	SEE GEN01
<b>Pre-requisites and initialization of the test case</b>	SEE GEN01
<b>Documentation of Test Data &amp; Test Results</b>	SEE GEN01
<b>Pre-vote: Ballot Preparation procedures verifications</b>	Installation and Election databases can be accurately/securely defined and formatted
<b>Pre-vote: Preparation - Security</b>	SEE GEN01
<b>Testing and Poll Verification</b>	SEE GEN01
<b>Pre-vote: Opening the Polls Verification</b>	SEE GEN01

Test Detail	Test Methodology
Test Case Name	Accuracy
<b>Voting: Required functionality verifications</b>	<ul style="list-style-type: none"> <li>• Maintain accurate and complete audit records (V1:2.1.5.1.a)</li> <li>• Accurately record cast ballots (V1:2.3.3)</li> <li>• Validate the data brought into the system is accurately recorded and reported</li> <li>• Maintain integrity of Vote and Audit data</li> <li>• Correctly tabulate (V1:2.1.7.1)</li> </ul>
<b>Accuracy: Error Rate</b>	<p>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:</p> <ul style="list-style-type: none"> <li>• Reject: one error before counting 26,997 consecutive ballot positions correctly</li> <li>• Accept: 1,549,703 (or more) consecutive ballot positions are read correctly</li> <li>• If there is one error with more than 26,997 ballot positions but less than 1,549,703 correctly read, continue until another 1,576,701 consecutive ballot positions are counted without error (i.e. Accept: 3,126,404 with one error)</li> </ul>
<b>Post-Vote: Closing the Polls</b>	SEE GEN01
<b>Post-Vote: Central Count</b>	SEE GEN01
<b>Post-Vote: Security</b>	SEE GEN01
<b>Results are Observed</b>	SEE GEN01
<b>Record Observations and all input/outputs for each election</b>	SEE GEN01

## 7. Approval Signatures

### **SysTest Labs:**

James M. Nilius  
Vice President, Compliance Services, SysTest Labs  
February 8, 2008

### **Client:**

James Hoover  
Director of Operations,  
Dominion Voting Systems  
February 8, 2008

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End of Certification Test Plan

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