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REPORT NO.: T71120.01-01 Rev. A

WYLE JOB NO.: T71120.01

CLIENT P.O. NO.: PO0005700

CONTRACT: N/A

TOTAL PAGES (INCLUDING COVER): 54

DATE: September 6, 2013

# TEST REPORT

## NATIONAL CERTIFICATION TEST REPORT

### CERTIFICATION TESTING OF THE DOMINION DEMOCRACY SUITE VERSION 4.14-A VOTING SYSTEM

for

**Dominion Voting Systems, Inc.**  
**1201 18th Street, Suite 210**  
**Denver, Colorado 80202**

STATE OF ALABAMA  
COUNTY OF MADISON }

Robert D. Hardy, Department Manager, being duly sworn, deposes and says: The information contained in this report is the result of complete and carefully conducted testing and is to the best of his knowledge true and correct in all respects.

*Robert D. Hardy*

SUBSCRIBED and sworn to before me this 6 day of Sept 20 13

*Sandra A. K. Daniel*

Notary Public in and for the State of Alabama at Large

My Commission expires June 2, 2015

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**NVLAP**

NVLAP LAB CODE 200771-0

**VSTL**

EAC Lab Code 0704

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## 1.0 INTRODUCTION

### 1.1 Scope

This report presents the test results for compliance testing of the Dominion Voting Systems Democracy Suite 4.14-A voting system. Dominion Voting Systems submitted the voting system to Wyle Laboratories, Inc. for compliance testing to the Election Assistance Commission (EAC) 2005 Voluntary Voting System Guidelines (VVSG). The Democracy Suite 4.14-A voting system is a modification to the Democracy Suite 4.14 voting system certified by the EAC on July 18, 2013 (Dem-Suite-4-14). All testing on the modifications to the voting system was conducted in accordance with the EAC 2005 VVSG.

The focus of this test campaign was to test the submitted modifications to the system since the last certification. Wyle performed functional, security, and usability testing to verify all changes submitted for this upgrade.

This report is valid only for the system modifications identified below. Any changes, revisions, or corrections made to the system after this evaluation shall be submitted to the EAC to determine if this system modification requires a new application, or can be re-submitted as a newly modified system. The scope of testing required was determined based upon the degree of modification.

There were four modifications submitted as part of the Democracy Suite 4.14-A voting system.

1. Infrared (IR) paper: A new type of paper used for ballot printing was introduced. An existing software setting is responsible for paper discernment on the ICE and ICP tabulators.
2. Cable routing for ICE: A third-party manufacturing procedure was corrected where the printer board cable on the ICE tabulator was re-routed to clear any possible interference with internal moving parts.
3. Introduction of Coroplast Ballot Boxes for ICE and ICP.
4. Infrared (IR) Controller Board: The IR controller board firmware on the ICE tabulator was updated to version 1.00.3.

### 1.2 Objective

The Democracy Suite 4.14-A voting system was tested to all applicable EAC 2005 Voluntary Voting Systems Guidelines (VVSG).

### 1.3 Test Report Overview

This test report consists of four main sections and appendices:

- 1.0 Introduction – Provides: the architecture of the National Certification Test Report (hereafter referred to as Test Report); a brief overview of the testing scope of the Test Report; a list of documentation, customer information, and references applicable to the voting system hardware, software and this test report.
- 2.0 System Identification and Overview – Provides information about the system tested that includes the system's name and major subsystems, test support hardware, and specific documentation provided by the vendor used to support testing.
- 3.0 Test Background – Contains information about the certification test process and a list of terms and nomenclature pertinent to the Test Report and system tested.

## **1.0 INTRODUCTION (Continued)**

### **1.3 Test Report Overview (Continued)**

- 4.0 Test Procedures and Results – Provides a summary of the procedures and results of the testing process.
- Appendices– Information supporting reviews and testing of the voting system are included as appendices to this report. These include Photographs and the as-run Certification Test Plan.

### **1.4 Customer**

Dominion Voting Systems  
1201 18<sup>th</sup> Street, Suite 210  
Denver, Colorado 80202

### **1.5 References**

- Election Assistance Commission 2005 Voluntary Voting System Guidelines, Volume I, Version 1.0, “Voting System Performance Guidelines,” and Volume II, Version 1.0, “National Certification Testing Guidelines,” dated December 2005
- Election Assistance Commission Testing and Certification Program Manual, Version 1.0, effective date January 1, 2007
- Election Assistance Commission Voting System Test laboratory Program Manual, Version 1.0, effective date July 2008
- National Voluntary Laboratory Accreditation Program NIST Handbook 150, 2006 Edition, “NVLAP Procedures and General Requirements (NIST Handbook 150),” dated February 2006
- National Voluntary Laboratory Accreditation Program NIST Handbook 150-22, 2008 Edition, “Voting System Testing (NIST Handbook 150-22),” dated May 2008
- United States 107<sup>th</sup> Congress Help America Vote Act (HAVA) of 2002 (Public Law 107-252), dated October 2002
- Wyle Laboratories’ Test Guidelines Documents: EMI-001A, “Wyle Laboratories’ Test Guidelines for Performing Electromagnetic Interference (EMI) Testing,” and EMI-002A, “Test Procedure for Testing and Documentation of Radiated and Conducted Emissions Performed on Commercial Products”
- Wyle Laboratories’ Quality Assurance Program Manual, Current Revision
- Wyle Laboratories Quality Assurance Manual, Current Revision
- ANSI/NCSL Z540-1, “Calibration Laboratories and Measuring and Test Equipment, General Requirements”
- ISO 10012-1, “Quality Assurance Requirements for Measuring Equipment”
- EAC Requests for Interpretation (listed on [www.eac.gov](http://www.eac.gov))
- EAC Notices of Clarification (listed on [www.eac.gov](http://www.eac.gov))
- EAC Quality Monitoring Program residing on:  
[http://www.eac.gov/testing\\_and\\_certification/quality\\_monitoring\\_program.aspx](http://www.eac.gov/testing_and_certification/quality_monitoring_program.aspx)

## **1.0 INTRODUCTION (Continued)**

### **1.5 References (Continued)**

- Dominion Voting Systems' Democracy Suite 4.14 Modification VSTL Certification Test Report Rev. B (listed on [www.eac.gov](http://www.eac.gov))
- Dominion Voting Systems Democracy Suite 4.14 Technical Data Package

A listing of the Democracy Suite 4.14-A Voting System Technical Data Package (TDP) Documents submitted for this test effort is listed in Section 2.4, "Vendor Technical Data Package."

## **2.0 SYSTEM IDENTIFICATION AND OVERVIEW**

### **2.1 System Overview**

The Democracy Suite 4.14-A voting system is a modification to the certified Democracy Suite 4.14 voting system. The full Democracy Suite 4.14 system description can be found in Section 2.0 of the Wyle Laboratories Dominion Voting Systems Democracy Suite 4.14 National Certification Test Report, Revision B. For the Democracy Suite 4.14-A voting system, Wyle Laboratories tested the four modifications listed in Section 1.1 of this report.

### **2.2 System Identification**

The materials required for testing of the Democracy Suite 4.14-A voting system included hardware and test materials shipped directly to Wyle Laboratories by Dominion Voting Systems. The materials documented in the following sections are the materials used during Wyle Laboratory's testing of the modifications.

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## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

### 2.2 System Identification (Continued)

#### 2.2.1 Hardware

This subsection categorizes the equipment the manufacturer submitted for testing listed in Table 2-1. Each test element is included in the list of equipment required for testing of that element, including system hardware and any required test instrumentation.

**Table 2-1 Democracy Suite 4.14-A Voting System Equipment Description**

Equipment	Manufacturer	Version/ Model	Specifications	Serial Number
PC1	Dell	Latitude E6530	Intel Core i5 CPU M580 @ 2.67GHz 4.00 GB Installed RAM HD Capacity 250 GB	2779CW1
PC2	Dell	Inspiron One 2305	Processor: AMD Athlon II X2 240e 2.8 GHz, Memory: 8GB Dual Channel 1333MHz DDR3, Hard Drive Capacity: 1 TB	564C3P1

**Table 2-2 Democracy 4.14-A COTS Voting System Support Equipment Description**

Test Material	Make	Model	Quantity	Serial Number
COTS Central High Speed Scanner	Canon	DR-X10C	2	ED300874, ED300880
iButton (SHA-1) with USB Reader/Writer	Maxim	USB R/W: DS9490R iButton: DS1963S	1	4D027C
iButton (SHA-1)	Maxim	DS1963S	3	n/a
Compact Flash Cards	SanDisk	4 GB	6	SDCFAA-004G; DVS 123-000119

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## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

### 2.2.1 Hardware (Continued)

**Table 2-3 Democracy 4.14-A Voting System Equipment**

Equipment	Description	Serial Numbers
ImageCast Precinct (ICP)	Precinct Count Optical Scanner PCOS 320C	WLDAFBH0002
ImageCast Evolution (ICE)	Precinct Count Optical Scanner PCOS 410A	ICE2P200002
ICP Coroplast Ballot Box with latch	Secure Coroplast Folding Ballot Box 341C	T71120-001
ICE Coroplast Ballot Box	Secure Coroplast Folding Ballot Box 420A	T71120-002
ICP Coroplast Ballot Box	Secure Coroplast Folding Ballot Box 340C	T71120-003

### 2.2.2 Software

Software evaluation was not included in the Democracy Suite 4.14-A test campaign. The software listed below was utilized during the functional testing. This software was previously-certified during the Democracy Suite 4.14 test campaign.

**Table 2-4 Democracy Suite 4.14-A EMS Software Platform Components**

Software Required For Testing	Software Version	Filename
Democracy Suite EMS EED Client Application	4.14.23	setup.exe, EED_FED_CERT.Setup_64b.msi
Democracy Suite EMS RTR Client Application	4.14.23	setup.exe, RTR_FED_CERT.Setup_x64.Setup.msi

**Table 2-5 Democracy Suite 4.14-A ImageCast Precinct Software Components**

Software Required For Testing	Software Version	Filename
Election Firmware	4.14.5-US	cf2xx.sig
Firmware Updater	4.14.5-US	firmUp.enc
Firmware Extractor	4.14.5-US	FirmwareExtract.enc
Kernel (uClinux)	4.14.5-US	Image.bin.gz
Boot Loader (COLILO)	20040221	colilo.bin

## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

### 2.2.2 Software (Continued)

**Table 2-6 Democracy Suite 4.14-A ImageCast Evolution Software Components**

Software Required For Testing	Software Version	Filename
Voting Machine	4.14.10	GApplication-4.14.10.vhd.7z
Election Application	4.14.10	dvs
Linux Kernel	2.6.30.9-dvs-21	uImage
Linux Device File	1.3	mpc8347dvs.dtb
Root File System	1.0.6	rfs
Ram Disk	1.0.1	initrd.img
Boot Startup Logo	4.0.0	logo_platform.bmp
Linux Startup Logo	4.0.0	logo_os.bmp
Boot Loader	1.3.4.29	u-boot.bin
Motherboard FPGA	1.1.5	ice2_mc_p1.bit
Scanner Board FPGA	1.1.2	ice2_scb_p2.bit
Logger Controller	1.0.11	logger.bin
Power Controller	2.0.7	power.bin
Integrated Printer	4.1.6	integratedPrinter.hex, printerFont.hex

**Table 2-7 Democracy Suite 4.14-A ImageCast Central Software Components**

Software Required For Testing	Software Version	Filename
ImageCast Central Application	4.14.4	ImageCast Central.exe
Image-Analysis DLL	4.14.4	ImgProc.dll
Windows 7	Professional x64 or X86 with SP1	Operating System for COTS ICC computer when using Canon DR-X10C scanner

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## 2.0 SYSTEM IDENTIFICATION AND OVERVIEW (Continued)

### 2.3 Test Support Materials

This subsection enumerates any and all test materials needed to perform voter system testing. The scope of testing determines the quantity of a specific material required.

The following test materials are required to support the Democracy Suite 4.14-A certification testing:

**Table 2-8 Democracy 4.14-A Test Support Materials**

Test Material	Manufacturer/Description	Quantity
ATI Handset	Dominion	1
Memory Flash Cards	SanDisk	6
IR Paper Ballots	Dominion	35
Standard Paper Ballots	Dominion	30
Permanent Markers	p/n SHARPIE1 BK	2
Thermal Printer Rolls	ICP/ICE Paper Rolls	4
Election Tamper Evident Seals (Red)	NovaVision/2X9"	20
Election Tamper Evident Seals (Red)	NovaVision/.75X2.5"	20
Tamper Evident Tie Wrap	Dominion	10
Sanitary Headphone Cover	Dominion	2

### 2.4 Vendor Technical Data Package

The Technical Data Package (TDP) contains information about requirements, design, configuration management, quality assurance, and system operations. The EAC 2005 VVSG requirements state, that at a minimum, the TDP shall contain the following documentation: system configuration overview; system functionality description; system hardware specifications; software design and specifications; system test and verification specifications; system security specifications; user/system operations procedures; system maintenance procedures; personnel deployment and training requirements; configuration management plan; quality assurance program; and system change notes.

The document listed in Table 2-9 comprises the Democracy Suite 4.14-A Voting System TDP. This document is considered an addition to the Democracy Suite 4.14 voting system's TDP, certified by the EAC on July 18, 2013 (Dem-Suite-4-14).

**Table 2-9 Democracy Suite 4.14-A Voting System TDP**

Democracy Suite 4.14-A TDP Document	System	Version	Date
Dominion Voting Systems Coroplast Ballot Box Assembly for ImageCast Precinct and ImageCast Evolution	Democracy Suite 4.14-A	1.0.0::8	8/22/2013

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## 2.5 Deliverable Materials

The materials listed in Table 2-10 are identified by Dominion Voting Systems to be delivered as part of the Democracy Suite 4.14-A Voting System to the end users.

**Table 2-10 Democracy Suite 4.14-A Voting System Deliverables**

Deliverable Material	Version	Description
ICE Coroplast Ballot Box	BOX-420A	Folding ICE Ballot Box
ICP Coroplast Ballot Box	BOX-340C	Folding ICP Ballot Box
ICP Coroplast Ballot Box with Latch	BOX-341C	Folding ICP Ballot Box With Latch

## 2.6 End User Documentation

The following document constitutes the deliverable to the end user at election central:

- Dominion Voting Systems Coroplast Ballot Box Assembly for ImageCast Precinct and ImageCast Evolution, Version 1.0.0::8, dated August 22, 2013

## 3.0 TEST BACKGROUND

Wyle Laboratories is an independent testing laboratory for systems and components under harsh environments, including dynamic and climatic extremes as well as the testing of electronic voting systems. Wyle Laboratories holds the following accreditations:

- ISO-9001:2000
- NVLAP Accredited ISO 17025:2005
- EAC Accredited VSTL, NIST 150,150-22
- A2LA Accredited (Certification No.'s 845.01, 845.02, and 845.03)
- FCC Approved Contractor Test Site (Part 15, 18, 68)

## 3.1 General Information

All testing performed as part of the test effort was performed at Wyle Laboratories' Huntsville, Alabama facility. Certification testing included: the inspection and evaluation of voting system documentation, and operational tests verifying system performance and function under normal and abnormal conditions. Qualification/Certification testing was limited to the Dominion Voting Systems, Inc. Democracy Suite Version 4.14-A Voting System, which includes the items listed in Section 2.0 of this report.

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### **3.0 TEST BACKGROUND (Continued)**

#### **3.2 Testing Scope**

To evaluate the system test requirements and the scope of the test campaign, each section of the EAC 2005 VVSG was analyzed to determine the applicable tests. The EAC 2005 VVSG Volume I Sections, along with the strategy for evaluation, are described below:

- Section 2: Functional Requirements – The requirements in this section were tested during the Functional Test utilizing test cases specially designed for the Democracy Suite 4.14-A Voting System.
- Section 3: Usability and Accessibility – The Usability requirements found in EAC 2005 VVSG Vol. I Section 3.2.4a and b, were tested during this test campaign.
- Section 4: Hardware Requirements – The requirements in this section were deemed not applicable therefore were not tested during this test campaign.
- Section 5: Software Requirements – The requirements in this section were deemed not applicable therefore were not tested during this test campaign.
- Section 6: Telecommunication – The requirements in this section were deemed not applicable therefore were not tested during this test campaign.
- Section 7: Security Requirements – The Physical Security requirements found in EAC 2005 VVSG Vol. II Section 6.4 were tested during this test campaign.
- Section 8: Quality Assurance (QA) Requirements – The QA requirements were spot checked and limited to only the changes included within this modification.
- Section 9: Configuration Management (CM) Requirements – The CM requirements were spot checked and limited to only the changes included within this modification.

#### **3.3 Wyle Quality Assurance**

All work performed on this program was in accordance with Wyle Laboratories' Quality Assurance Program and Wyle Laboratories' Quality Program Manual, which conforms to the applicable portions of International Standard Organization (ISO) Guide 17025.

The Wyle Laboratories, Huntsville Facility, Quality Management System is registered in compliance with the ISO-9001 International Quality Standard. Registration has been completed by Quality Management Institute (QMI), a Division of Canadian Standards Association (CSA).

#### **3.4 Test Equipment and Instrumentation**

All instrumentation, measuring, and test equipment used in the performance of this test program was calibrated in accordance with Wyle Laboratories' Quality Assurance Program, which complies with the requirements of ANSI/NCSL 2540-1, ISO 10012-1, and ISO/IEC 17025. Standards used in performing all calibrations are traceable to the National Institute of Standards and Technology (NIST) by report number and date. When no national standards exist, the standards are traceable to international standards, or the basis for calibration is otherwise documented.

### 3.0 TEST BACKGROUND (Continued)

### 3.5 Terms and Abbreviations

Table 3-1 defines all terms and abbreviations applicable to this Test Report.

**Table 3-1 Terms and Abbreviations**

Term	Abbreviation	Definition
Americans with Disabilities Act of 1990	ADA	ADA is a wide-ranging civil rights law that prohibits, under certain circumstances, discrimination based on disability.
Audio Tactile Interface	ATI	Voter interface designed to not require visual reading of a ballot. The same ATI is utilized for both the ICP and ICE.
Conformité Européenne (European Conformity)	CE	---
Configuration Management	CM	---
Commercial Off the Shelf	COTS	Commercial, readily available hardware devices (such as card readers, printers or personal computers) or software products (such as operating systems, programming language compilers, or database management systems)
Direct Record Electronic	DRE	---
United States Election Assistance Commission	EAC	Commission created per the Help America Vote Act of 2002, assigned the responsibility for setting voting system standards and providing for the voluntary testing and certification of voting systems.
EMS Election Event Designer	EED	EMS application used for election definition functionality.
Election Management System	EMS	An umbrella term for the software application used to define and report election projects.
Equipment Under Test	EUT	---
Functional Configuration Audit	FCA	Exhaustive verification of every system function and combination of functions cited in the manufacturer's documentation.
Federal Communications Commission	FCC	---

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**3.0 TEST BACKGROUND (Continued)**

**3.5 Terms and Abbreviations (Continued)**

**Table 3-1 Terms and Abbreviations (Continued)**

<b>Term</b>	<b>Abbreviation</b>	<b>Definition</b>
Help America Vote Act	HAVA	Act created by United States Congress in 2002.
National Institute of Standards and Technology	NIST	Government organization created to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhances economic security and improves our quality of life.
ImageCast Precinct	ICP	Precinct-level optical scanner and tabulator with audio voting capabilities.
ImageCast Evolution	ICE	Precinct-level optical scanner, tabulator with audio voting and integrated Ballot-marking Device
ImageCast Central	ICC	COTS High-speed central ballot scan tabulator.
Physical Configuration Audit	PCA	Review by accredited test laboratory to compare voting system components submitted for certification testing to the manufacturer's technical documentation, and confirmation the documentation meets national certification requirements. A trusted build of the executable system is performed to ensure the certified release is built from tested components.
Quality Assurance	QA	---
EMS Results, Tally and Reporting	RTR	EMS application used to integrate election results and reporting.
System Under Test	SUT	---
Test Case Procedure Specifications	TCPS	Wyle-developed document that specifies test items, input specifications, output specifications, environmental needs, special procedural requirements, inter-case dependencies, and all validated test cases that were executed during the area under test.
Technical Data Package	TDP	Manufacturer documentation related to the voting system required to be submitted as a precondition of certification testing.
Underwriters Laboratories Inc.	UL	---
Voluntary Voting System Guidelines	EAC 2005 VVSG	Published by the EAC, the third iteration of national level voting system standards.
Wyle Operating Procedure	WoP	Wyle Test Method or Test Procedure.

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## 4.0 TEST PROCEDURES AND RESULTS

The Dominion Voting Systems Democracy Suite 4.14-A Voting System, as identified in Section 2.0 of this report, was subjected to the tests as summarized in this section.

### 4.1 System Level Testing

System Level Testing was performed to evaluate the operation of the modifications submitted for the Democracy Suite 4.14-A voting system. The suite of tests that comprised the System level Testing included a Physical Configuration Audit, Functional testing, Security testing, Usability testing, and a Technical Data Package review.

An overview of the tests performed during System Level Testing is provided in the following paragraphs, along with the summary findings of each test.

#### 4.1.1 Physical Configuration Audit

A Physical Configuration Audit (PCA) of the Democracy Suite 4.14-A Voting System was performed as part of the pre-testing activities in accordance with Section 6.6 of Volume II of the VVSG. The PCA compares the voting system components submitted for certification with the vendor's technical documentation and confirms that the documentation submitted meets the requirements of the Guidelines. The PCA included the following activities:

- Establishing a configuration baseline of hardware to be tested; confirm whether manufacturer's documentation is sufficient for the user to install, validate, operate, and maintain the voting system
- Reviewing drawings, specifications, technical data, and test data associated with system hardware; and to establish a system baseline
- Reviewing manufacturer's documents of user acceptance test procedures and data against system's functional specifications, and resolve any deficiency or inadequacy in manufacturer's plan or data prior to beginning functional tests
- Subsequent changes to baseline hardware configuration made during testing that may produce a change in operation are subject to re-examination

The PCA performed on the Democracy Suite 4.14-A Voting System consisted of inspecting the following:

- The Democracy Suite 4.14-A ICP Coroplast Ballot Box with latch
- The Democracy Suite 4.14-A ICP Coroplast Ballot Box
- The Democracy Suite 4.14-A ICE Coroplast Ballot Box

#### **Summary Findings**

A focused PCA was performed to baseline the system's hardware components prior to commencement of the test campaign. No deficiencies were noted during the PCA.

#### **4.0 TEST PROCEDURES AND RESULTS (Continued)**

##### **4.1 System Level Testing (Continued)**

##### **4.1.2 Functional Testing**

A Functional Test was performed on the Democracy Suite 4.14-A Voting System in accordance with Section 6.7 of Volume II of the VVSG. The purpose of the test was to verify the infrared (IR) paper discernment on the ICE and ICP tabulators, ensuring they performed as documented in the Dominion-supplied technical documentation and meet the requirements of the EAC 2005 VVSG.

The components of the functional test included the previously-certified Democracy Suite 4.14 EMS, a test deck consisting of 30 each standard paper and IR paper ballots, five IR paper ballots for accessible voting, and ICE and ICP tabulators.

First, the EMS configuration setting to enable or disable the detection of IR paper ballots was set to 'disabled'. The election was then loaded onto the ICE and ICP tabulators. The expected results were achieved by confirming both the standard paper and IR paper ballots were accepted by each tabulator type.

The next step in the functional test included changing the EMS configuration setting to 'enabled', meaning that only IR paper ballots should be accepted by the tabulators. The expected results were also achieved for this test by confirming the IR paper ballots were accepted, and the standard paper ballots were rejected with messages "Fraudulent Ballot" and "Paper inserted was not an original ballot" on the ICE and ICP respectively.

To further confirm the discernment of paper types, five accessible voting sessions were initiated on the ICE tabulator. Ballots printed on standard paper and IR paper were utilized during the test, and as expected, the standard paper ballots were rejected with message "Fraudulent Ballot", and the IR paper ballots were accepted.

The final verification performed during the functional test was to process the test deck of 30 standard paper and 30 IR paper ballots on the ICC Central Count system to ensure the new IR paper type was read correctly. All ballots were accepted as valid ballots, and the results were verified as being accurate.

##### **Summary Findings**

A functional test was performed to verify that the ICE and ICP tabulators can properly distinguish between standard paper and IR paper types based on an EMS setting, as described in the system's technical documentation. Additionally, accessible voting was successfully completed on the ICE tabulator, and the ICC Central Count system passed the test by reading ballot printed on both paper types. The voting system successfully met the requirements of the 2005 VVSG.

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#### 4.0 TEST PROCEDURES AND RESULTS (Continued)

#### 4.1 System Level Testing (Continued)

##### 4.1.3 Security Testing

A Security Test which focused on the ICE and ICP Coroplast Ballot Boxes of the Democracy Suite 4.14-A voting system was performed as part of this campaign. The Security Test was performed to verify that the ballot boxes meet the security requirements of the EAC 2005 VVSG.

The Security Test performed on the Democracy Suite 4.14-A system Coroplast Ballot Boxes consisted of configuring the security elements (hasp locks, seals, and foam tape) according to Dominion-supplied documentation, and verifying the ballot boxes provide adequate security from gaining access to the internal components. Three ballot box designs with ICE and ICP tabulators mounted were evaluated during the Security Test:

- ICP Coroplast Ballot Box
- ICP Coroplast Ballot Box with locking latch
- ICE Coroplast Ballot Box

##### Summary Findings

Two deficiencies were identified pertaining to the Democracy Suite 4.14-A Coroplast Ballot Boxes, and both were resolved prior to the conclusion of the test campaign:

1. ICP Coroplast Ballot Box: A deficiency was identified allowing for the insertion of a ballot folded 2 ways between the rear of the ICP unit and the ballot chute attached to the ballot box lid. When inserted, the ballot dropped into the main bin of the ballot box.

Resolution: Dominion added two 2.5" tamper-evident security seals to each side of the ballot chute. Wyle confirmed that this prevents the insertion of a ballot into the ballot box.

2. ICE Coroplast Ballot Box: A deficiency was identified allowing for the insertion of an unfolded ballot under the rear side of the ICE unit. When inserted, the ballot dropped into the main bin of the ballot box.

Resolution: Dominion added an adhesive foam tape strip on the rear of the main bin slot. Wyle confirmed that this prevents the insertion of a ballot into the ballot box.

##### 4.1.4 Usability Testing

A Usability Test which focused on the ICE and ICP Coroplast Ballot Boxes of the Democracy Suite 4.14-A voting system was performed as part of this campaign. The requirements identified for this campaign were EAC 2005 VVSG Vol. I, Section 3.2.4a and b. The ICE and ICP Coroplast Ballot Boxes were tested to ensure the applicable mobility requirements were met.

##### Summary Findings

During test performance, no usability issues were observed with the final configuration of the ICE and ICP Coroplast Ballot Boxes.



#### **4.0 TEST PROCEDURES AND RESULTS (Continued)**

##### **4.1 System Level Testing (Continued)**

##### **4.1.5 Technical Data Package Review**

The Democracy Suite 4.14-A Voting System Technical Data Package (TDP) was reviewed to the 2005 VVSG. This review was performed as part of the pre-testing activities. The TDP documents were reviewed to ensure that all modifications to the system are described as applicable. The TDP documents were reviewed for accuracy, completeness, and compliance to the VVSG.

**Summary Findings:** The review results were recorded in a worksheet that provided the pass/fail compliance to each applicable VVSG requirement. Dominion corrected nonconformance observations and resubmitted the associated documents for review. This process continued until the TDP complied with TDP Standards.

The following TDP deficiency was reported and resolved prior to the conclusion of the test campaign:

- A picture and description of what users should expect when a tamper-proof evidence seal is removed from tabulators/ballot boxes is required for the TDP documentation.

The TDP deficiency was resolved prior to the conclusion of the test campaign.

##### **4.2 Deficiencies and Resolutions**

Deficiencies were discovered during the testing campaign as part of the Security testing and Technical Data Package review. All deficiencies noted were corrected prior to the conclusion of the test campaign.

##### **4.3 Recommendation for Certification**

Wyle performed conformance/specification testing on the Dominion Voting Systems Democracy Suite 4.14-A to the EAC 2005 VVSG (Version 1.0). During the test campaign, all data from pre-testing, hardware testing, functional testing, security testing, usability testing, and reliability testing activities was combined to ensure all VVSG requirements that are supported by the Democracy Suite 4.14-A had been tested. Wyle also used discretion as granted by the VVSG to design and exercise Functional Test Cases, and perform Hardware, Security, and Usability Tests.

Wyle concludes that the Democracy Suite 4.14-A, submitted by Dominion Voting Systems, meets all applicable requirements for certification as set forth in the Election Assistance Commission (EAC) 2005 Voluntary Voting Systems Guidelines, Version 1.0. As such, Wyle recommends that the EAC grant the Dominion Voting Systems Democracy Suite 4.14-A certification to the VVSG.

This report is valid only for the system identified in Section 2 of this report. Any changes, revisions, or corrections made to the system after this evaluation shall be submitted to the EAC to determine if the modified system requires a new application, or can be submitted as a modified system. The scope of testing required will be determined based upon the degree of modification.

Due to the varying requirements of individual jurisdictions, it is recommended by the VVSG that local jurisdictions perform pre-election logic and accuracy tests on all systems prior to their use in an election within their jurisdiction.

**APPENDIX A**  
**PHOTOGRAPHS**



**Photograph 1**  
**ICE Coroplast Ballot Box**



**Photograph 2**  
**ICP Coroplast Ballot Box with latch**



**Photograph 3**  
**ICP Coroplast Ballot Box without latch**



**Photograph 4**  
**ICE Security Test Setup**





**Photograph 5**  
**ICP Security Test Setup**



**Photograph 6**  
**ICE Ballot Box Security Testing – Attempting a security breach**





**Photograph 7**  
**ICP Ballot Box Security Testing – Attempting a security breach**



**Photograph 8**  
**ICE Coroplast Ballot Box – Internal Compartments**



**Photograph 9**  
**ICP Coroplast Ballot Box – Internal Compartments**



**Photograph 10**  
**ICP Coroplast Ballot Box – Locking Latch**





**Photograph 11**  
**ICP Coroplast Ballot Box without locking latch – Security Seals**



**Photograph 12**  
**ICP Coroplast Ballot Box – Usability Testing Setup**



**Photograph 13**  
**ICE Functional Test Setup – IR Paper Detection**



**Photograph 14**  
**ICP Functional Test Setup – IR Paper Detection**





**Photograph 15**  
**ICC Functional Test Setup – IR Paper Detection**


**APPENDIX B**

**Wyle's Certification Test Plan As Run No. T71120.01-01**

## CERTIFICATION TEST PLAN

Prepared for:

<b>Manufacturer Name</b>	Dominion Voting Systems, Inc.
<b>Manufacturer System</b>	Democracy Suite Version 4.14-A
<b>EAC Application No.</b>	DVS1301
<b>Manufacturer Address</b>	1201 18th Street, Suite 210 Denver, Colorado 80202

			REPORT NO. Test Plan T71120.01-01, Rev B
			DATE August 28, 2013
REV	DATE	PAGE OR PARAGRAPH AFFECTED	DESCRIPTION OF CHANGES
---	8-8-13	Entire Document	Original Release
A	8-22-13	Section 1.5	Updated Target of Evaluation Description and System Overview to resolve confusion over the system name
B	8-28-13	Entire Document	Updated to "As Run" Test Plan for Final Report

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## **1.0 INTRODUCTION**

The purpose of this Test Plan is to document the procedures that Wyle Laboratories, Inc. will follow to perform certification testing of the Dominion Voting Systems Democracy Suite 4.14-A, to the requirements set forth for voting systems in the U.S. Election Assistance Commission (EAC) 2005 Voluntary Voting System Guidelines (EAC 2005 VVSG). Prior to submitting the System for certification testing, Dominion submitted an application to the EAC for certification of the Democracy Suite 4.14-A to the requirements of the EAC 2005 VVSG.

The full system details for the previous test campaign, including system, performance, security, usability, system verification, and TDP deliverables can be reviewed in the EAC test report "Dominion Democracy Suite 4.14 Modification" (listed on [www.eac.gov](http://www.eac.gov)).

### **1.1 Scope**

The purpose of this modification is to introduce the upgrade from the EAC certified Democracy Suite 4.14 (DemSuite-4-14) to the Democracy Suite 4.14-A system. The upgrade features included in this modification are listed below.

5. Infrared (IR) paper: A new type of paper used for ballot printing was introduced. An existing software setting is responsible for paper discernment on the ICE and ICP tabulators.
6. Cable routing for ICE: A third-party manufacturing procedure was corrected where the printer board cable on the ICE tabulator was routed to clear any possible interference with internal moving parts.
7. Introduction of Coroplast Ballot Boxes for ICE and ICP.
8. Infrared (IR) Controller Board: The IR controller board firmware on the ICE tabulator was updated to version 1.00.3.

At test conclusion, the results of all testing performed as part of this test program will be submitted to the EAC in the form of a final report.

### **1.2 References**

The documents listed below were used in the development of the Test Plan and are utilized to perform certification testing.

- Election Assistance Commission 2005 Voluntary Voting System Guidelines, Volume I, Version 1.0, "Voting System Performance Guidelines," and Volume II, Version 1.0, "National Certification Testing Guidelines," dated December 2005
- Election Assistance Commission Testing and Certification Program Manual, Version 1.0, effective date January 1, 2007
- Election Assistance Commission Voting System Test laboratory Program Manual, Version 1.0, effective date July 2008
- National Voluntary Laboratory Accreditation Program NIST Handbook 150, 2006 Edition, "NVLAP Procedures and General Requirements (NIST Handbook 150)," dated February 2006
- National Voluntary Laboratory Accreditation Program NIST Handbook 150-22, 2008 Edition, "Voting System Testing (NIST Handbook 150-22)", dated May 2008
- United States 107<sup>th</sup> Congress Help America Vote Act (HAVA) of 2002 (Public Law 107-252), dated October 2002

## **1.0 INTRODUCTION (Continued)**

### **1.2 References (Continued)**

- Wyle Laboratories' Test Guidelines Documents: EMI-001A, "Wyle Laboratories' Test Guidelines for Performing Electromagnetic Interference (EMI) Testing," and EMI-002A, "Test Procedure for Testing and Documentation of Radiated and Conducted Emissions Performed on Commercial Products"
- Wyle Laboratories' Quality Assurance Program Manual, Current Revision
- Wyle Laboratories Quality Assurance Manual, Current Revision
- ANSI/NCSL Z540-1, "Calibration Laboratories and Measuring and Test Equipment, General Requirements"
- ISO 10012-1, "Quality Assurance Requirements for Measuring Equipment"
- EAC Requests for Interpretation (listed on [www.eac.gov](http://www.eac.gov))
- EAC Notices of Clarification (listed on [www.eac.gov](http://www.eac.gov))
- EAC Quality Monitoring Program residing on:  
[http://www.eac.gov/testing\\_and\\_certification/quality\\_monitoring\\_program.aspx](http://www.eac.gov/testing_and_certification/quality_monitoring_program.aspx)
- Dominion Voting Systems' Democracy Suite 4.14 Modification VSTL Certification Test Report Rev. A (listed on [www.eac.gov](http://www.eac.gov))
- Dominion Voting Systems Democracy Suite 4.14 Technical Data Package

### **1.3 Terms and Abbreviations**

Table 1-1 defines all terms and abbreviations applicable to the development of this Test Plan.

**Table 1-1 Terms and Abbreviations**

<b>Term</b>	<b>Abbreviation</b>	<b>Definition</b>
Americans with Disabilities Act of 1990 (Amended 2008)	ADA	ADA is a wide-ranging civil rights law that prohibits, under certain circumstances, discrimination based on disability
Audio Studio	AS	EMS application used to record audio files
Audio Tactile Interface	ATI	Electronic voter interface that does not require visual reading of a ballot. Audio is used to convey information to the voter and sensitive tactile controls allow the voter to convey information to the system
Configuration Management	CM	---
Commercial Off the Shelf	COTS	Commercial, readily available hardware or software
Direct Record Electronic	DRE	---
United States Election Assistance Commission	EAC	Commission created per the Help America Vote Act of 2002, assigned the responsibility for setting voting system standards and providing for the voluntary testing and certification of voting systems



**1.0 INTRODUCTION (Continued)**

**1.3 Terms and Abbreviations (Continued)**

EMS Election Event Designer	EED	EMS application used for election definition functionality
Election Management System	EMS	An umbrella term for the software application used to define and report election projects
Equipment Under Test	EUT	---
Functional Configuration Audit	FCA	Exhaustive verification of every system function and combination of functions cited in the manufacturer's documentation
Federal Communications Commission	FCC	---
Help America Vote Act	HAVA	Act created by United States Congress in 2002
National Institute of Standards and Technology	NIST	Government organization created to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhances economic security and improves our quality of life
ImageCast Central	ICC	High-speed central ballot scan tabulator
ImageCast Evolution	ICE	Precinct-level optical scanner, ballot marker, and tabulator with audio voting
ImageCast Precinct	ICP	Precinct-level optical scanner and tabulator with audio voting capabilities
System Under Test	SUT	---
Test Case Procedure Specifications	TCPS	Wyle-developed document that specifies test items, input specifications, output specifications, environmental needs, special procedural requirements, inter-case dependencies, and all validated test cases that will be executed during the area under test
Technical Data Package	TDP	Manufacturer documentation related to the voting system required to be submitted as a precondition of certification testing
Underwriters Laboratories Inc.	UL	---
Uninterruptible Power Supply	UPS	---
Voluntary Voting System Guidelines	EAC 2005 VVSG	Published by the EAC, the third iteration of national level voting system standards
Wyle Operating Procedure	WoP	Wyle Test Method or Test Procedure

**1.4 Testing Responsibilities**

All core and non-core software and hardware certification testing will be conducted under the guidance of Wyle Laboratories, Inc., by personnel verified by Wyle to be qualified to perform the testing.

**1.4.1 Test Case Development**

Wyle will utilize the "Wyle Baseline Test Cases" for the Functional, Usability and Security Tests. These will be augmented with specially designed test cases tailored to the Dominion 4.14-A.

**1.4.2 Test Procedure Development and Validation**

Wyle will utilize the Wyle Operating Procedures (WoPs) during the duration of this test program. The validated WoPs have been previously submitted to the EAC for review.

**1.0 INTRODUCTION (Continued)**

**1.4 Testing Responsibilities (Continued)**

**1.4.3 Third-Party Testing**

Wyle will not utilize any 3rd party testing during the performance of the Dominion 4.14-A test campaign.

**1.5 Target of Evaluation Description**

The following sections address the design methodology and product description of the Democracy Suite 4.14-A voting system, as taken from the Dominion Voting Systems technical documentation.

**1.5.1 System Overview**

The Dominion Voting Systems Democracy Suite 4.14-A System is a paper-based optical scan voting system, and a modification of the previously-certified Democracy Suite 4.14 System.

The certified system consists of four major components: the Election Management System (EMS), ImageCast Evolution (ICE) precinct scanner and ballot marking device, ImageCast Precinct (ICP) precinct scanner with audio ballot, and ImageCast Central (ICC) central count scanner.

**Election Management System**

The EMS consists of seven components running as either a front-end/client application or as a back-end/server application. Below is an overview and brief description of each. This listing is for informational and verification purposes only and not all areas will be included in testing based on the limited modifications included in this test campaign.

- Election Event Designer client application - integrates election definition functionality and represents a main pre-voting phase end-user application.
- Results Tally and Reporting client application - integrates election results acquisition, validation, tabulation, reporting and publishing capabilities and represents a main post-voting phase end-user application.
- Audio Studio client application - represents an end-user helper application used to record audio files for a given election project. As such, it is utilized during the pre-voting phase of the election cycle.
- Data Center Manager client application - represents a system level configuration application used in EMS back-end data center configuration.
- Application Server application - represents a server side application responsible for executing long running processes, such as rendering ballots, generating audio files and election files, etc.
- Network Attached Storage (NAS) Server application - represents a server side file repository for election project file based artifacts, such as ballots, audio files, reports, log files, election files, etc.
- Database Server application - represents a server side RDBMS repository of the election project database which holds all the election project data, including pre-voting and post-voting data.

### 1.5.1 System Overview (Continued)

#### Precinct Ballot Tabulator: ImageCast Evolution (ICE)

The Dominion Democracy Suite ImageCast Evolution system employs a precinct-level optical scan ballot counter (tabulator) in conjunction with an external plastic ballot box. This tabulator is designed to mark and/or scan paper ballots, interpret voting marks, communicate these interpretations back to the voter (either visually through the integrated LCD display or audibly via integrated headphones), and upon the voter's acceptance, deposit the ballots into the ballot box. The unit also features an Audio Tactile Interface (ATI) which permits voters who cannot negotiate a paper ballot to generate a synchronously human and machine-readable ballot from elector-input vote selections. In this sense, the ImageCast Evolution acts as a ballot marking device.



**Photograph 1: ImageCast Evolution (ICE) on Coroplast Ballot Box**

### 1.5.1 System Overview (Continued)

#### Precinct Ballot Tabulator: ImageCast Precinct (ICP)

The Dominion Democracy Suite ImageCast Precinct ballot counter is a precinct-based optical scan ballot tabulator that is used in conjunction with ImageCast compatible ballot storage boxes. The system is designed to scan marked paper ballots, interpret voter marks on the paper ballot and store and tabulate each vote from each paper ballot. The ICP contains a small touch-screen LCD to allow the poll worker to access diagnostic and configuration settings.

In addition, enhanced accessibility voting may be accomplished via optional accessories connected to the ImageCast unit. The ICP utilizes an ATI device to allow voters with disabilities to navigate and submit a voted ballot. This is accomplished by presenting the ballot to the voter in an audio format. The ATI is connected to the tabulator, and allows the voter to listen to an audio voting session consisting of contest and candidate names. The ATI also allows a voter to adjust the volume and speed of audio playback. The cast vote record is recorded electronically when the ATI is used to cast a ballot. There is no contemporaneous paper ballot or paper record produced when the ATI is utilized for voting. A ballot arising from the voter's choices may be printed from EMS at a later time.



**Photograph 2: ImageCast Precinct (ICP) on Coroplast Ballot Box**

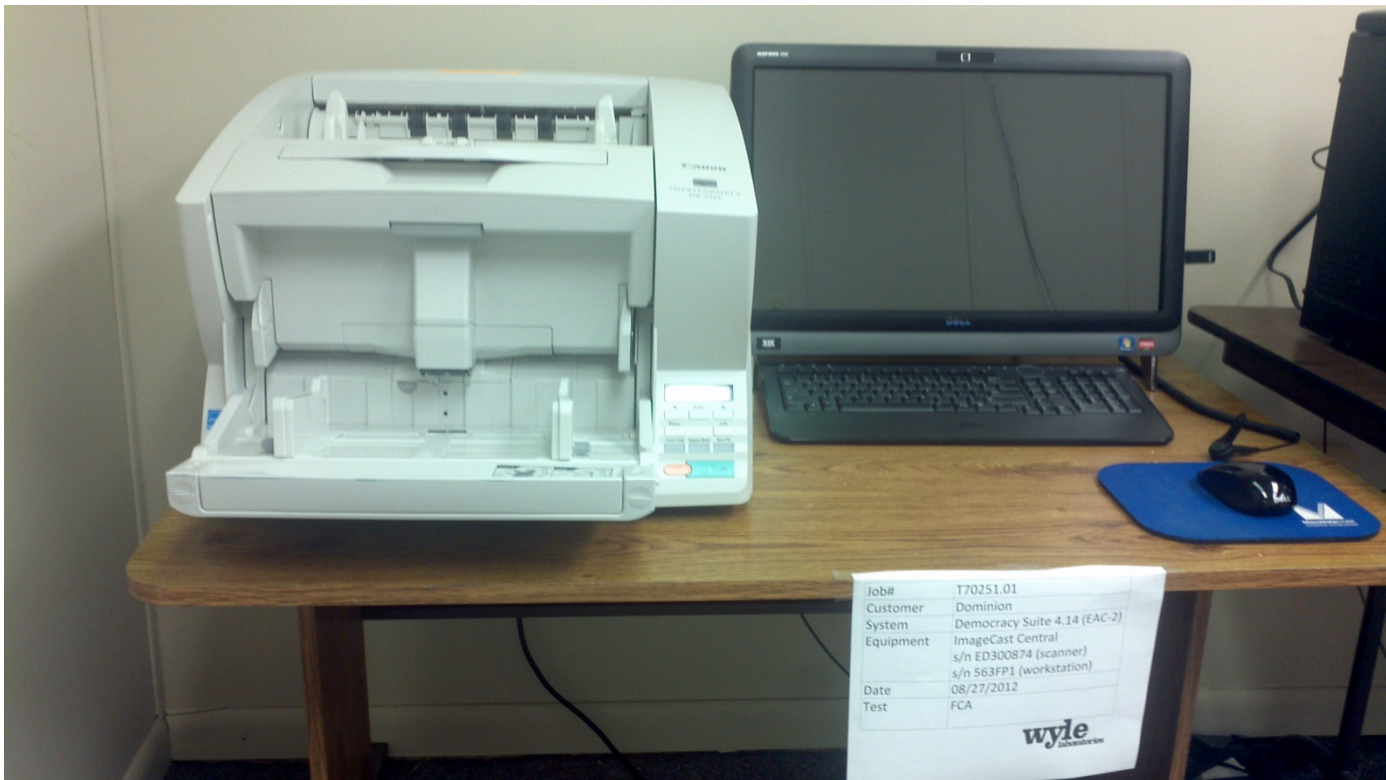


### 1.5.1 System Overview (Continued)

#### **Central Tabulator: ImageCast Central Count (ICC)**

The Dominion Democracy Suite ImageCast Central Count ballot counter system is a high-speed, central ballot scan tabulator based on COTS hardware, coupled with the custom-made ballot processing application software. It is used for high speed scanning and counting of paper ballots. Central Count scanning system hardware consists of a combination of two COTS devices used together to provide the required ballot scanning processing functionality:

- ImageCast Central Workstation: a COTS computer used for ballot image and election rules processing and results transfer to the EMS Datacenter. The ImageCast Central Workstation is hardware which executes the image processing and election rules software application.
- Canon DR-X10C Scanner: a COTS scanner used to provide ballot scanning and image transfers to the local ImageCast Central Workstation.



**Photograph 3: Canon DR-X10C Scanner and ImageCast Central Workstation**

## **2.0 PRE-CERTIFICATION TESTING AND ISSUES**

Wyle has conducted a pre-certification test, and findings indicate that all system changes are consistent with the change items documented in the EAC application DVS-1301.

### **2.1 Evaluation of Prior VSTL Testing**

Wyle will reutilize all testing from the previously-certified systems submitted by Dominion Voting Systems. The testing of these systems was conducted by Wyle Laboratories in accordance with the EAC 2005 VVSG, and the EAC Certification Numbers are DVS-40-G-10 and DemSuite-4-14.

### **2.2 Known Field Issues**

This system is a modification to previously certified systems. There were no systemic or significant issues traceable to any of the previously certified systems.

## **3.0 MATERIALS REQUIRED FOR TESTING**

The materials required for certification testing of the Democracy Suite 4.14-A voting system include software, hardware, test materials, and deliverable materials to enable the test campaign to occur were shipped directly to Wyle by Dominion Voting Systems. The equipment used during this test is the same equipment used during the original certification campaign.

### **3.1 Software**

The Democracy Suite v. 4.14 software will be utilized during the Democracy Suite 4.14-A modification as there were no changes to this software for this modification. This software is listed in Table 3-1.

**Table 3-1 Software Utilized for Testing**

<b>Software Required For Testing</b>	<b>Software Version</b>
Democracy Suite EMS EED Client Application	4.14.23
Democracy Suite EMS RTR Client Application	4.14.23
ImageCast Precinct (ICP)	4.14.5
ImageCast Evolution (ICE)	4.14.10
ImageCast Central (ICC)	4.14.4

### **3.2 Equipment**

This subsection categorizes the equipment the manufacturer submitted for testing listed in Table 3-2. Each test element is included in the list of equipment required for testing of that element, including system hardware, general purpose data processing and communications equipment, and any required test instrumentation.

### 3.0 MATERIALS REQUIRED FOR TESTING (Continued)

#### 3.2 Equipment (Continued)

**Table 3-2 Test Equipment**

Equipment	Manufacturer	Serial Number
Laptop - Latitude E6530	Dell	2779CW1
High Speed Scanner	Canon	ED300874
All-in-one PC – Inspiron One 2305	Dell	564C3P1
ICP - Precinct Count Optical Scanner PCOS 320C	Dominion Voting Systems	WLDAFBH0002
ICE - Precinct Count Optical Scanner PCOS 410A	Dominion Voting Systems	ICE2P200002
Coroplast Ballot Box for ICE	Dominion Voting Systems	T71120-001
Coroplast Ballot Box for ICP	Dominion Voting Systems	T71120-002
iButton (SHA-1) with USB Reader/Writer	Maxim	4D027C
Compact Flash cards	RiData CFC-14A	N/A
Compact Flash Card Reader	SanDisk	0171618

#### 3.3 Test Tools/Material

This subsection enumerates any and all test materials needed to perform voter system testing in Table 3-3. The scope of testing determines the quantity of a specific material required.

**Table 3-3 Test Tools/Material**

Test Tool/Material	Quantity
IR Paper	35 sheets
80 lb. stock ballot paper	30 sheets
Sharpie markers	as required
Printer Thermal Paper Rolls	as required
Ballot Box security seals/hasp locks	as required

#### 3.4 Deliverable Materials

At test conclusion, Wyle Laboratories shall deliver a final report to Dominion Voting Systems and the EAC that includes the following:

- A description of the functional, security, and usability testing; and test results
- TDP documentation showing changes
- A list of any anomalies discovered during testing on Wyle form WH1066, Notice of Anomaly

All supplied equipment and software furnished to Wyle Laboratories for this modification shall be returned to the customer at the conclusion of testing unless otherwise agreed in writing.



#### **4.0 TEST SPECIFICATIONS**

Modification testing of the DVS 4.14-A is the configuration submitted in the EAC application DVS1301. Wyle Laboratories' qualified personnel will ensure that all certification testing performed on the manufacturer's voting system follows Wyle Laboratories' procedures for testing, and the specific test cases developed for this campaign meet the requirements of the EAC 2005 VVSG and EAC Testing and Certification Program Manual.

Below is a list of EAC Requests for Interpretation (RFI) and Notices of Clarification (NOC) that will be incorporated in the test campaign:

##### **Requests for Interpretation (RFI)**

RFI 2013-04 EAC Decision on Usability Testing  
RFI 2013-03 EAC Decision on Timestamps  
RFI 2013-02 EAC Decision on Audio Presentation Volume Levels  
RFI 2013-01 EAC Decision on the Extensions Clause  
RFI 2012-06 EAC Decision on Use of Public Telecommunications Networks and Data Transmission  
RFI 2012-05 EAC Decision on Public Telecommunications and Cryptography  
RFI 2012-04 EAC Decision on Software Setup Validation  
RFI 2012-03 EAC Decision on Configuration of COTS Products  
RFI 2012-02 EAC Decision on Transmission of Results (Official and Unofficial Results)  
RFI 2012-01 EAC Decision on Ballot Handling – Multi-feed  
RFI 2010-08 EAC Decision on Calling Sequence  
RFI 2010-07 EAC Decision on Module Length  
RFI 2010-06 EAC Decision on DRE Accessibility Requirements and Other Accessible Voting stations  
RFI 2010-05 EAC Decision on Testing of Modifications to a Certified System  
RFI 2010-04 EAC Decision on Functional Requirements with Respect to Security  
RFI 2010-03 EAC Decision on Database Coding Conventions  
RFI 2010-01 EAC Decision on Voltage Levels and ESD Test  
RFI 2009-06 EAC Decision on Temperature and Power Variation  
RFI 2009-05 EAC Decision on T-Coil Requirements  
RFI 2009-04 EAC Decision on Audit Log Events  
RFI 2009-03 EAC Decision on Battery Backup for Central Count Systems  
RFI 2009-02 EAC Decision on Alternate Languages  
RFI 2009-01 EAC Decision on VVPAT Accessibility New  
RFI 2008-12 EAC Decision on Ballot Marking Device/Scope of Testing  
RFI 2008-10 EAC Decision on Electrical Fast Transient  
RFI 2008-09 EAC Decision on Safety Testing

#### **4.0 TEST SPECIFICATIONS (Continued)**

RFI 2008-08 EAC Decision on Automatic Bar Code Readers  
RFI 2008-07 EAC Decision on Zero Count to Start Election  
RFI 2008-06 EAC Decision on Battery Backup for Central Count  
RFI 2008-05 EAC Decision on Durability  
RFI 2008-04 EAC Decision on Supported Languages  
RFI 2008-03 EAC Decision on OS Configuration  
RFI 2008-02 EAC Decision on Battery Backup for Optical Scan Voting Machines  
RFI 2008-01 EAC Decision on Temperature and Power Variation  
RFI 2007-06 EAC Decision on Recording and Reporting Undervotes  
RFI 2007-05 EAC Decision on Testing Focus and Applicability  
RFI 2007-04 EAC Decision on Presentation of Alternative Language  
RFI 2007-03 EAC Decision on Summative Usability Testing  
RFI 2007-02 EAC Decision on Variable Names  
RFI 2007-01 EAC Decision on Accessible Design

##### **Notices of Clarification (NOC)**

NOC 2012-02 Clarification of System Identification Tool Functionality  
NOC 2012-01 Clarification of COTS Product Equivalency for De Minimis Change  
NOC 2011-01 Clarification of De Minimis Change Determination Requirements Related to Data  
NOC 2009-005 Development and Submission of Test Plans for Modifications to EAC Certified Systems  
NOC 2009-004 Development and Submission of Test Reports  
NOC 2009-003 De Minimis Change Determination Requirement  
NOC 2009-002 Laboratory Independence Requirement  
NOC 2009-001 Requirements for Test Lab Development and Submission of Test Plans  
NOC 2008-003 EAC Conformance Testing Requirements  
NOC 2008-002 EAC Mark of Certification  
NOC 2008-001 Validity of Prior Non-core Hardware Environmental and EMC Testing  
NOC 2007-005 Voting System Test Laboratory Responsibilities in the Management and Oversight of Third Party Testing  
NOC 2007-004 Voting System Manufacturing Facilities  
NOC 2007-003 State Testing Done in Conjunction with Federal Testing within the EAC Program  
NOC 2007-002 VSTL Work with Manufacturers Outside of Voting System Certification Engagements  
NOC 2007-001 Timely Submission of Certification Application

#### **4.0 TEST SPECIFICATIONS (Continued)**

##### **4.1 Requirements (Strategy of Evaluation)**

The strategy for evaluating the Democracy Suite 4.14-A system was to review the change log and the engineering changes submitted for the modified system. Wyle Laboratories has determined that functional, security and usability tests will be required during this test campaign.

This test campaign includes the following tests:

- Technical Data Package review to ensure all modifications are documented as applicable
- Functional tests targeted to validate IR paper discernment
- Security testing targeted to validate the newly added Coroplast Ballot Box
- Usability testing to confirm the Coroplast Ballot Box meets mobility requirements

Wyle Laboratories personnel shall maintain a test log of the procedure(s) employed. This log identifies the system and equipment by model and serial number.

In the event that the project engineer deems it necessary to deviate from Wyle Test Cases or Wyle Operating Procedures (WoPs) pertaining to the test environment, the equipment arrangement and the method of operation, the specified test procedure, or the provision of the test instrumentation and facilities, the deviation shall be recorded in the test log. (A discussion of the reasons for the deviation and the effect of the deviation on the validity of the test procedure shall also be provided and approved by the Project Engineer and Program Manager.)

The designated WoP's for this program are list below together with the identification and a brief description of the hardware to be tested, and any special considerations that affect the test design and procedure.

The specific WoP's to be used during testing include the following:

- WoP 2 – Receipt Inspection
- WoP 3 – Technical Data Package Review
- WoP 4 – Test Plan Preparation
- WoP 6b – Security (Physical)
- WoP 24-2d – Accessibility-Mobility
- WoP 25 – Physical Configuration Audit
- WoP 26 – Functional Requirements
- WoP 34 – Test Report

##### **4.2 Hardware Configuration and Design**

Dominion Voting Systems submitted Engineering Change Orders (ECO's) for each of the changes submitted for the Democracy Suite 4.14-A test campaign. Wyle performed an engineering analysis of these documents, as well as a visual inspection of the changes, and determined the changes to be "Minor Modifications" with some testing required to confirm the functional and hardware requirements are met.

Wyle Laboratories has determined that hardware testing (EMC, Vibration, Humidity, etc.) is not required for this test campaign due to the nature of the modifications.

#### **4.0 TEST SPECIFICATIONS (Continued)**

##### **4.2 Hardware Configuration and Design (Continued)**

The Democracy Suite 4.14-A EMS shall be configured as follows for the functional testing.

EMS – A COTS laptop documented in Section 2 shall be loaded with version 4.14.23 build of the EMS. The CF Card Reader shall be attached as a peripheral.

ICP, ICE – Loaded with EAC certified firmware and mounted on Coroplast ballot box.

ICC – Loaded with EAC certified firmware and configured as certified in Dominion 4.14 program.

Security – The ICE and ICP Coroplast ballot boxes shall be configured with security seals/hasp locks as identified in the Technical Data Package.

Usability Testing – The Coroplast ballot boxes shall be configured as identified in the Technical Data Package

##### **4.3 Software System Functions**

The submitted changes for this test campaign are documented in Section 1.3. The modifications shall be tested using targeted functional tests designed to verify specific changes made to the voting system. Existing election data from the previously-certified Democracy Suite 4.14 system will be utilized to produce the required pre-requisite test data. Operational status checks will be performed before and after each test to confirm system readiness.

#### **5.0 TEST DATA**

##### **5.1 Test Data Recording**

All equipment utilized for test data recording shall be identified in the test data package. Additionally, the output test data shall be recorded in an appropriate manner as to allow for data analysis. For TDP reviews, results shall be compiled in output reports and submitted to Dominion Voting Systems for resolution. All test results, including functional test data, shall be recorded on the relevant WoP's and Test Cases.

Wyle Laboratories shall evaluate all test results against the technical documentation provided by Dominion Voting Systems, as well as the requirements set forth in the 2005 VVSG. The acceptable range for system performance and the expected results for each test case shall be derived from the Dominion Voting Systems version 4.14-A documentation. Per the EAC 2005 VVSG, these parameters shall encompass the test tolerances and samples to define the minimum number of combinations or alternatives of input and output conditions that can be exercised to constitute an acceptable test of the parameters involved. The parameters will also include events which criteria define the maximum number of interrupts, halts, or other system breaks that may occur due to non-test conditions (excluding events from which recovery occurs automatically or where a relevant status message is displayed).

Wyle will report all issues discovered during this test campaign to Dominion and the EAC. If Wyle determines there is not enough data to ensure a requirement was met, the test plan will be altered and further testing will be done. The EAC has the final decision as to whether the system meets all the requirements for an EAC-certified system. Wyle will either recommend approval, if the system meets all applicable sections of the VVSG or recommend disapproval if the system does not meet all applicable sections of the VVSG.

## **5.0 TEST DATA (Continued)**

### **5.2 Test Data Reduction**

Test data shall be processed and recorded in the relevant Wyle Laboratories' Operating Procedures and Test Cases. Results will also be recorded real-time in engineering log books.

## **6.0 TEST PROCEDURE AND CONDITIONS**

### **6.1 Facility Requirements**

All testing shall be conducted at the Wyle Huntsville, AL facility unless otherwise annotated. All instrumentation, measuring, and test equipment used in the performance of this test campaign shall be listed on the Instrumentation Equipment Sheet for each test and shall be calibrated in accordance with Wyle Laboratories' Quality Assurance Program, which complies with the requirements of ANSI/NCSL Z540-1 and ISO 10012-1. Standards used in performing all calibrations are traceable to the National Institute of Standards and Technology (NIST) by report number and date. When no national standards exist, the standards are traceable to international standards or the basis for calibration is otherwise documented.

Unless otherwise specified herein, all remaining tests, including system level functional testing, shall be performed at standard ambient conditions:

- Temperature:  $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$  ( $77^{\circ}\text{F} \pm 18^{\circ}\text{F}$ )
- Relative Humidity: 20 to 90%
- Atmospheric Pressure: Local Site Pressure

Unless otherwise specified herein, the following tolerances shall be used:

- Time  $\pm 5\%$
- Temperature  $\pm 3.6^{\circ}\text{F}$  ( $2^{\circ}\text{C}$ )
- Vibration Amplitude  $\pm 10\%$
- Vibration Frequency  $\pm 2\%$
- Random Vibration Acceleration
  - 20 to 500 Hertz  $\pm 1.5\text{ dB}$
  - 500 to 2000 Hertz  $\pm 3.0\text{ dB}$
- Random Overall grms  $\pm 1.5\text{ dB}$
- Acoustic Overall Sound Pressure Level  $+4/-2\text{ dB}$

Deviations to the above tolerances may be submitted by the responsible test laboratory with sufficient engineering information to substantiate the deviation request, but only when best effort technique and system limitations indicate the need for a deviation.

### **6.2 Test Set-Up**

All voting machine equipment (hardware and software) shall be received and documented, utilizing Wyle Receiving Ticket (WL-218, Nov'85) and proper QA procedures. When voting system hardware is received, Wyle Shipping and Receiving personnel will notify Wyle's QA personnel. With Wyle QA personnel present, each test article shall be unpacked and inspected for obvious signs of degradation and/or damage that may have occurred during transit. Noticeable degradation and/or damage, if present, shall be recorded, photographs shall be taken, and the Dominion Voting Systems' representative shall be notified.

## **6.0 TEST PROCEDURE AND CONDITIONS (Continued)**

### **6.2 Test Set-Up (Continued)**

Wyle's QA personnel shall record the serial numbers and part numbers. Comparison shall be made between those numbers recorded and those listed on the shipper's manifest. Any discrepancies noted shall be brought to the attention of the Dominion Voting Systems' representative for resolution. The Technical Data Package and all source code modules received shall be inventoried and maintained by the Wyle Project Engineer assigned to testing.

Wyle Laboratories QA personnel shall record the serial numbers and part numbers. Comparison shall be made between those numbers recorded and those listed on the shipper's manifest. Any discrepancies noted shall be brought to the attention of the Dominion Voting Systems' representative for resolution.

For hardware test setup, the system shall be configured as it would be for normal field use. This includes connecting all supporting equipment and peripherals. Wyle personnel shall properly configure and initialize the system and verify it is ready to be tested by following the procedures detailed in the Dominion Voting System's technical documentation. Wyle shall develop an operational status test to be performed prior to and immediately following each hardware test. Wyle shall develop the system performance levels to be measured during operational tests.

### **6.3 Test Sequence**

There is no specific sequencing enforced for the execution of the required tests. The following section provides a brief description of each system test to be performed for the Democracy Suite 4.14-A test campaign.

#### **6.3.1 System Testing**

Technical Data Package (TDP) Review – The technical data package must be submitted as a precondition of national certification testing. These items are necessary to define the product and its method of operation; to provide technical and test data supporting the manufacturer's claims of the system's functional capabilities and performance levels; and to document instructions and procedures governing system operation and field maintenance. Any information relevant to the system evaluation shall be submitted to include source code, object code, and sample output report formats.

Physical Configuration Audit – The Physical Configuration Audit compares the voting system components submitted for qualification to the manufacturer's technical documentation, and shall include the following activities:

- Establish a configuration baseline of software and hardware to be tested; confirm whether manufacturer's documentation is sufficient for the user to install, validate, operate, and maintain the voting system
- Verify software conforms to the manufacturer's specifications; inspect all records of manufacturer's release control system; if changes have been made to the baseline version, verify manufacturer's engineering and test data are for the software version submitted for certification
- Review drawings, specifications, technical data, and test data associated with system hardware, if non-COTS, to establish system hardware baseline associated with software baseline

**6.0 TEST PROCEDURE AND CONDITIONS (Continued)**

**6.3 Test Sequence (Continued)**

**6.3.1 System Testing (Continued)**

- Review manufacturer's documents of user acceptance test procedures and data against system's functional specifications; resolve any discrepancy or inadequacy in manufacturer's plan or data prior to beginning system integration functional and performance tests
- Subsequent changes to baseline software configuration made during testing, as well as system hardware changes that may produce a change in software operation are subject to re-examination

Security Test – The security test is designed and performed to test the capabilities of the voting system against the requirements defined in Volume I Section 7. These procedures shall focus on the security of the new Coroplast ballot box. This test will also examine system capabilities and safeguards claimed by Dominion Voting Systems in the TDP to properly mitigate these risks. The range of risks tested is determined by the design of the system and potential exposure to risk.

Usability/Accessibility – The usability test is a measure of the effectiveness, efficiency, and satisfaction achieved by a specified set of users with a given product in the performance of specified tasks. This test applies to the requirements for Volume I, Section 3 of the EAC 2005 VVSG.

The components of the Dominion Voting Systems' version 4.14-A shall only undergo the tests described in Table 6-1.

**Table 6-1 Dominion Voting Systems version 4.14-A Test Sequence**

<b>Test</b>	<b>Procedure/Description</b>	<b>Specimen</b>
<i>Technical Data Package (TDP) Review</i>	Documentation review for compliance, correctness, and completeness	TDP package submitted for Democracy Suite 4.14-A
<i>Physical Configuration Audit</i>	Audit hardware and software models and versions	System hardware and test artifacts submitted for Democracy Suite 4.14-A
<i>Functional Tests</i>	Functional testing to the system documentation and EAC 2005 VVSG requirements	System hardware and test artifacts submitted for Democracy Suite 4.14-A
<i>Security</i>	Assess the system to the 2005 VVSG requirements and execute basic system security tests.	System hardware submitted for Democracy Suite 4.14-A
<i>Usability</i>	Testing to the system documentation and EAC 2005 VVSG requirements	System hardware submitted for Democracy Suite 4.14-A



**6.0 TEST PROCEDURE AND CONDITIONS (Continued)**

**6.4 Test Operation Procedures**

Wyle Laboratories shall provide the step-by-step procedures for each test case to be conducted. Each step is assigned a test step number. This step number, along with critical test data and test procedural information, shall be tabulated onto a Test Control Record for control and the recording of test results.

Any test failures shall be recorded on form WH1066, Notice of Anomaly. These anomalies shall be reported to the manufacturer and the EAC.

**7.0 TEST OPERATIONS PROCEDURES**

**7.1 Proprietary Data**

All proprietary data that is marked shall be distributed only to those persons that the manufacturer identifies as needing the information to conduct system testing. The manufacturer is required to mark all proprietary documents as such. All organizations and individuals receiving proprietary documents shall ensure those documents are not available to non-authorized persons.

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