Test Plan for EAC 2005 VVSG Certification Testing to be Performed on Election Systems & Software EVS 5.4.0.0

Issue Date: 07/24/2015

Prepared for: **Election Systems & Software, Inc.**
11208 John Galt Blvd
Omaha, NE 68137

Prepared by: **National Technical Systems Huntsville**
7800 Hwy 20 West
Huntsville, AL 35806

U.S. Election Assistance Commission
VSTL
EAC Lab Code 0704

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SIGNATURES

Prepared by: _____ Date: 7/24/15
Ryan Chambers, Project Manager

Approved by: _____ Date: 7/24/15
James Long, Program Manager

Approved by: _____ Date: 7/24/15
Robert Hardy, Department Manager

Reviewed by: _____ Date: 7/24/15
Rick Davis, QA Manager

REVISIONS

Revision	Reason for Revision	Date
NR	Initial Release	6/26/15
A	Revised based on EAC comments	7/24/15

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1.0 INTRODUCTION

Election Systems & Software (ES&S), herein referred to as manufacturer, submitted the Election Systems & Software Voting System (EVS) 5.4.0.0 to the U.S. Election Assistance Commission (EAC), application number ESS1501, for certification testing to the 2005 Voluntary Voting System Guidelines Standards (2005 VVSG). EVS 5.4.0.0 is a modification to the previously 2005 VVSG certified EVS 5.2.0.0 voting system (Certification number: ESSEVS5200), and as such, will be tested by National Technical Systems Huntsville (NTS Huntsville) based on the "modified system" requirements set forth in section 4.4.2.3 of the EAC Testing and Certification Program Manual, Version 1.0. This National Certification Test Plan, hereafter referred to as Test Plan, presents the process and test methods that will be used to validate 2005 VVSG compliance of EVS 5.4.0.0 and follows the EAC guidance provided in NOCs 2009-005 and 2013-02.

1.1 Description and Overview of EAC Certified System Being Modified

The following subsections describe the EAC Certified System that is the baseline for the submitted modification. All information was derived from the previous Certification Test Report and/or EAC Certificate of Conformance.

1.1.1 Baseline Certified System

EVS 5.2.0.0 is certified by the U.S. Election Assistance Commission to the 2005 Voluntary Voting System Guidelines (Certification number: ESSEVS5200). All information for this test plan was derived from the previous Certification Test Report and/or EAC Certificate of Conformance. Tables 1-1 and 1-2 describe the hardware and software/firmware versions submitted for certification testing. For a complete description of the configuration and description of the EVS 5.2.0.0 product, refer to the EVS 5.2.0.0 Test Report located on the EAC's website at http://www.eac.gov.

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1.1.1 Baseline Certified System (Continued)

Table 1-1. Baseline EAC Certified Software

Software	Software/Firmware Version
Proprietary Software	
Electionware	4.6.0.0
Election Reporting Manager (ERM)	8.11.0.0
ES&S Event Log Service (ELS)	1.5.5.0
Removable Media Service (RMS)	1.4.5.0
VAT Previewer	1.8.6.0
ExpressVote Previewer	1.4.0.0
COTS Software	
Adobe Acrobat Standard	11
Cerberus FTP	6.0.7.1
Microsoft Server 2008	R2 w/ SP1
Microsoft Windows 7	5.1 w/ SP1
Microsoft Visual C++ 2008 Redistributable – x64	9.0.30729
Microsoft Visual C++ 2010 x64 Redistributable	10.0.40219
Microsoft Visual C++ 2010 x86 Redistributable	10.0.40219
Microsoft .net Framework	4.5.1
Micro Focus RM/COBOL Runtime	12.06
Symantec Endpoint Protection - Small Business Edition 2013	12.1.4

Table 1-2. Baseline EAC Certified Voting System Equipment

Component	Hardware Version	Firmware Version
Proprietary Hardware		
ExpressVote Accessible Voting Station	1.0	1.4.0.0
DS200 Precinct Count Scanner	1.2.1, 1.2.3, & 1.3	2.12.0.0
DS850 Central Count Scanner	1.0	2.10.0.0
AutoMARK A100	1.0	1.8.6.0
AutoMARK A200 (SBC 2.0 & SBC 2.5)	1.1	1.8.6.0
AutoMARK A300 (SBC 2.0 & SBC 2.5)	1.3	1.8.6.0
Plastic Ballot Box	1.2 & 1.3	N/A
Metal Ballot Box	1.0, 1.1, & 1.2	N/A
COTS Hardware		
EMS Server – Dell	PowerEdge T710	N/A
EMS Reporting Workstation – Dell	Optiplex 980	N/A
EMS Reporting Laptop – Dell	E6410	N/A
Motorola QR Code Scanner	DS9208	N/A
Delkin USB Flash Drives	1, 2, 4, & 8GB	N/A
Delkin Compact Flash	1GB	N/A
DS850 Report Printer	OKI B430dn & B 431dn	N/A
DS850 Audit Printer	OKI Microline 420	N/A
Avid Headphones	Avid FV 60	N/A

1.1.2 Description of Submitted Modifications

A description of submitted modifications to the voting system include changes to address conformance with new RFIs released before application submission, functional upgrades, software fixes, software to enhance usability, and replacement of hardware parts nearing end-of-life. Two new hardware components, the ExpressVote Tabulator hardware version 2.0 and the ExpressVote Rolling Kiosk were also submitted for modification. A full description of submitted modifications can be found in Appendix C – Details of Submitted Modifications. In addition to the modifications submitted for certification testing, two Engineering Change Orders (ECOs) were also submitted for assessment and testing. A full description of the ECOs and the additional testing outside of the scope of certification can be found in Appendix A – Additional Testing.

1.1.3 Initial Assessment

An initial assessment was performed to determine the scope of testing for the submitted modification. The results of this assessment are presented in four categories: Functional, Software, Hardware, and Technical Data Package.

Based on the assessment of the submitted changes, it was determined that a limited Functional Configuration Audit will be required to verify that the voting system continues to meet 2005 VVSG requirements. In this instance, limited refers only to functional changes made in this modification, to include new features, changes to functions, or functions that have not changed but may be impacted by the modification. In addition, the voting system shall be subjected to a system integration test to ensure all components interact properly and to verify that the modifications to the voting system do not introduce any nonconformities or instabilities.

All added or modified Lines of Code (LOC) will require a source code review to ensure the 2005 VVSG requirements are met and that changes to the software do not introduce any new functions or features outside of the modifications in Appendix C – Details of Submitted Modifications. In determining the extent of the required source code review, the submitted source code for EVS 5.4.0.0 was compared to the EAC certified EVS 5.2.0.0 source code. Table 1-3 provides the software comparison results.

Table 1-3. Software Comparison Results

Product	Baseline	New Version	Lines of Code Changed	
			Files	Lines
AutoMARK	1.8.6.0	1.8.7.0	6	159
DS200	2.12.0.0	2.14.0.0	376	61,856
DS850	2.10.0.0	2.11.0.0	161	16,944
Electionware	4.6.0.0	4.8.0.0	120	7,436
PaperBallot	4.6.0.0	4.7.0.0	97	12,980
ERM	8.11.0.0	8.13.0.0	64	11,799
ExpressVote	1.4.0.0	2.1.0.0	529	87,652
Totals			**1,353**	**198,826**

1.1.3 Initial Assessment (Continued)

The new and modified hardware components will require various hardware tests to ensure that the submitted hardware meets the requirements of the 2005 VVSG. Table 1-4 details the hardware modifications and provides the required test.

Table 1-4. Hardware Modifications and Required Test

Product	Type of Change	Hardware Revision	Change Description	Required Hardware Test
DS200	Modification	1.3	New Display	Electromagnetic Emissions
DS200	Modification	1.3	New Multi-sheet sensor	Electromagnetic Emissions Electromagnetic Susceptibility Magnetic Fields Immunity
DS200	Modification	1.3	New Power Adapter	Electrical Supply Electrical Power Disturbance Electrical Fast Transient Lightning Surge Electromagnetic Emissions Electromagnetic Susceptibility Conducted RF Immunity Magnetic Fields Immunity
DS200	Modification	1.3	USB Assembly	Electrostatic Disruption Electromagnetic Emissions Electromagnetic Susceptibility
DS850	Modification	1.0	New Display	Electromagnetic Emissions
ExpressVote	New	2.0	New Component	All hardware testing
ExpressVote Kiosk	New	1.0	New Component	All hardware testing

In addition to the hardware test listed in table 1-4, it was determined that due to the nature of the submitted DS200 modifications, non-operational hardware testing and a temperature power variation will be required along with the hardware testing listed in table 1-4.

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1.1.3 Initial Assessment (Continued)

The submitted Technical Data Package (TDP) is constructed with the certified EVS 5.2.0.0 TDP and the EVS 5.4.0.0 changes to the certified documents. NTS Huntsville personnel determined that the following documents are impacted by this modification:

- ESSSYS_5'4'0'0_D_SysOvr
- ESSSYS_5'4'0'0_L_RequirementsMatrix_TDP
- ESSSYS_5'4'0'0_D_SFD
- ELS_1'5'6'0_SOP
- DS200_2'14'0'0_SMM
- DS200_2'14'0'0_SDS
- ERM_8'13'0'0_SOP
- ELS_1'5'6'0_SDS
- EWARE_4'8'0'0_SOP_01Admin
- ESSSYS_5'4'0'0_SPC_EMSServerSetupConfigGuide
- ESSSYS_5'4'0'0_SPC_ClientWorkstationSetupGuide
- EVOTE_2'1'0'0_SOP
- EVOTE_2'0_SPC_HWSpec
- EVOTE_2'1'0'0_SDS

A review of these documents shall ensure that all EVS 5.4.0.0 changes are properly documented and compliant with 2005 VVSG.

1.1.4 Regression Test

Regression testing shall be conducted on the Election Management System (EMS), DS200, DS850, and ExpressVote HW 1.0 and 2.0 to establish assurance that the modifications have no adverse impact on the compliance, integrity, or performance of the system as outlined in the 2005 VVSG.

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1.2 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, expiration date July 2017
- Election Assistance Commission Voting System Test Laboratory Program Manual, Version 1.0, expiration date July 2017
- 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 107th Congress Help America Vote Act (HAVA) of 2002 (Public Law 107-252), dated October 2002
- Test Guidelines Documents: EMI-001A, 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"
- NTS Quality Assurance Program Manual, Revision 5
- 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 (RFI) (listed on www.eac.gov)
- EAC Notices of Clarification (NOC) (listed on www.eac.gov)
- EAC Quality Monitoring Program residing on:

  http://www.eac.gov/testing_and_certification/quality_monitoring_program.aspx
- NTS Test Report No. T71379.01-01 Rev B – National Certification Test Report for Certification Testing of the Election Systems & Software EVS 5.2.0.0 Voting System
- ES&S EVS 5.2.0.0 Technical Data Package
- ES&S EVS 5.4.0.0 Technical Data Package

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1.3 Terms and Abbreviations

Table 1-5 defines all terms and abbreviations applicable to this Test Plan.

Table 1-5. Terms and Abbreviations

Term	Abbreviation	Definition
Anomaly	--	Any non-repeatable testing event that is not the expected result or interrupts the test operations.
Americans with Disabilities Act 1990	ADA	ADA is a wide-ranging civil rights law that prohibits, under certain circumstances, discrimination based on disability.
Configuration Management	CM	Systems engineering process for establishing and maintaining consistency of a product's performance, functional and physical attributes with its requirements, design and operational information throughout its life
Commercial Off-the-Shelf	COTS	Commercial, readily available hardware or software.
Deficiency	--	Any repeatable test result that was not the expected result or violates a requirement of the 2005 VVSG.
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.
ES&S Event Log Service	ELS	ES&S Event Log Service is a Windows Service that runs in the background of any active ES&S Election Management software application to monitor the proper functioning of the Windows Event Viewer
Election Management System	EMS	Within the EVS 5.4.0.0 voting system, the EMS is comprised of five components: Electionware, ERM, ES&S Event Log Service, VAT Previewer, and ExpressVote Previewer.
Election Reporting Manager	ERM	EVS 5.4.0.0 EMS reporting component.
Election Systems and Software	ES&S	Identified vendor doting the equipment under test as part of this test plan.
Engineering Change Order	ECO	--
Equipment Under Test	EUT	Refers to the individual system component or multiple piece of the same component
ES&S Voting System	EVS	Proprietary equipment owned by ES&S
Functional Configuration Audit	FCA	Verification of system functions and combination of functions cited in the manufacturer’s documentation.
Help America Vote Act	HAVA	Act created by United States Congress in 2002.
Institute of Electrical and Electronics Engineers	IEEE	--
Intelligent Mark Recognition	IMR	Visible light scanning technology to detect completed ballot targets.

1.3 Terms and Abbreviations (Continued)

Table 1-5. Terms and Abbreviations (Continued)

Term	Abbreviation	Definition
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.
Notice of Clarification	NOC	Provides further guidance and explanation on the requirements and procedures of the EAC's Voting System Certification or Voting System Testing Laboratory programs.
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.
Personal Computer	PC	Computer component of the EVS 5.4.0.0 voting system.
Quality Assurance	QA	Administrative and procedural activities implemented as a way of preventing mistakes or defects.
Quantity	QTY	Number/Count of items
Quick Response Code	QR Code	Two-dimensional barcode
Request for Interpretation	RFI	A means by which a registered Manufacturer or Voting System Test Laboratory (VSTL) may seek clarification on a specific Voluntary Voting System Guidelines (VVSG) standard.
System Under Test	SUT	Refers to the system as a whole (all components)
Technical Data Package	TDP	Manufacturer documentation related to voting system required to be submitted as a precondition of testing.
Trusted Build	---	Final build of source code performed by a trusted source and overseen by the manufacturer which is delivered to the EAC designated repository; also referred to as a "Witness Build".
Underwriters Laboratories Inc.	UL	Safety consulting and certification company
Uninterruptible Power Supply	UPS	Electrical apparatus providing emergency power when an input power source fails.
Voter Assist Terminal	VAT	Electronic ballot marking device component is the ES&S AutoMARK.
National Technical Systems, Inc.	NTS	Identified VSTL hosting the testing of the equipment listed in this test plan; facilities located in Huntsville, Alabama.
National Voluntary Laboratory Accreditation Program	NVLAP	Program which provides an unbiased third-party test and evaluation program to accredit laboratories in the respective fields to ISO 17025 standard.
NTS Operating Procedure	OP	NTS Test Method or Test Procedure.

1.3 Terms and Abbreviations (Continued)

Table 1-5. Terms and Abbreviations (Continued)

Term	Abbreviation	Definition
Virtual Review Tool	VRT	Test campaign management software used by the EAC and vendors applying for qualification testing.
Voting System Test Laboratory	VSTL	NTS
Voluntary Voting System Guidelines	VVSG	EAC Voluntary Voting System Guidelines Version 1.0.

1.4 Project Schedule

The project schedule for the test campaign is in Appendix D – Project Schedule.

1.5 Scope of Test

The scope of testing is limited to the modifications introduced into the previously certified EVS 5.2.0.0 voting system. The modifications are presented in their entirety in Appendix C – Details of Submitted Modifications.

1.5.1 Block Diagram

Figure 1-1 provides a visual system overview of the submitted voting system.

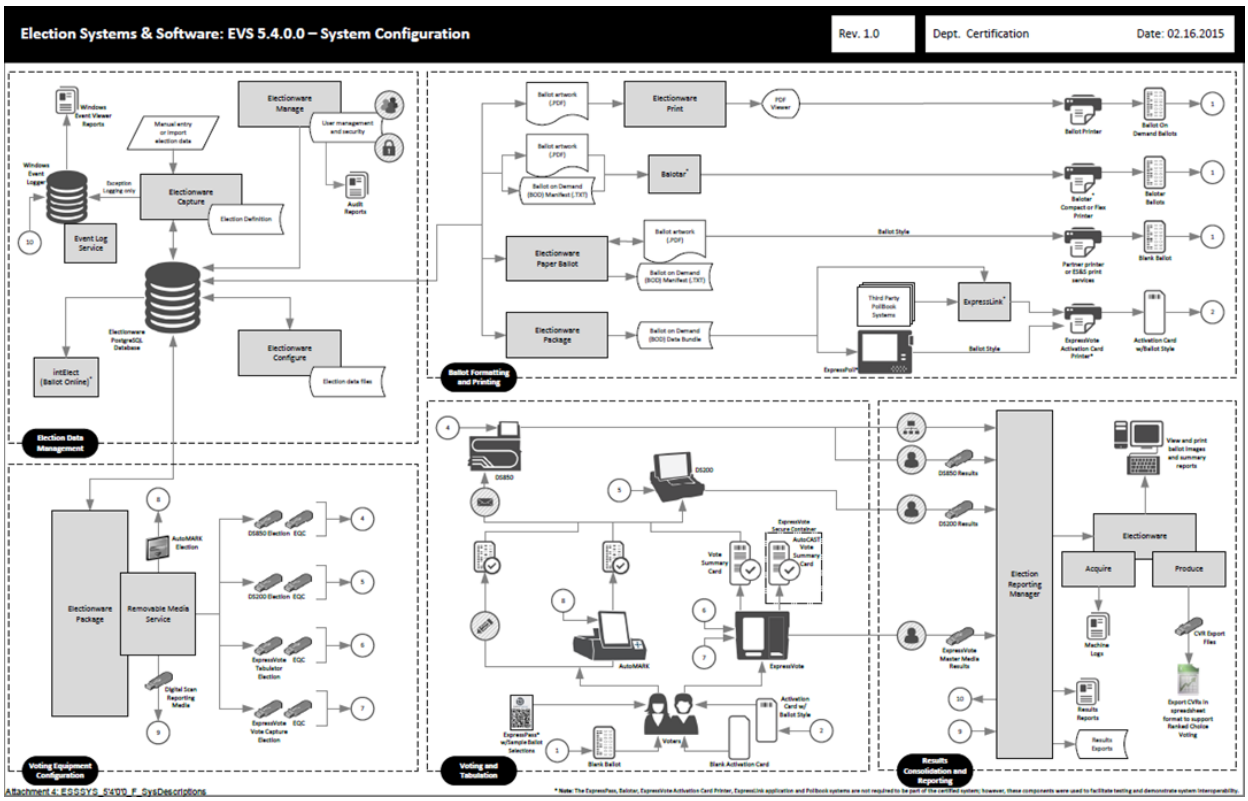

Figure 1-1. System Overview Diagram

1.5.2 System Limits

System limitations remain unchanged for all previously certified components of the EVS 5.4.0.0 voting system. **The introduction of the ExpressVote Kiosk adds one additional limitation; the secure card container attached to the ExpressVote Tabulator has a storage capacity 300 vote summary cards**.

1.5.3 Supported Languages

The submitted voting system supports English, Spanish, Chinese, Korean, Japanese, and Hindi languages.

1.5.4 Supported Functionality

Table 1-6 lists the functional subsystems included with the submitted voting system.

Table 1-6. Subsystem Functionality

Subsystem Name	Description
Election Data Management	Managing election data supports all tasks related to the creation of the election database, precinct, office, and candidate information required to configure a jurisdiction's elections. Once an election database exists, ElectionWare can recall the same data for any following election. Event log management includes a series of programs that track user and equipment actions throughout the election process
Ballot and Activation Card Formatting and Printing	Ballot formatting and printing includes activities required for defining the image of a paper ballot, populating that ballot with information imported from the election database, and printing the ballot with ballot style code. Activation card formatting and printing includes activities required for capturing the voter registration information, populating that activation card with information imported from the Pollbook system, and printing the activation card with the proper ballot style code.
Voting Equipment Configuration	Configuring voting equipment converts election database information into ballot definition parameters for ES&S voting equipment. Within this functional subsystem, software users transfer the election rules specific to an election to the memory devices used to program voting equipment.
Voting and Tabulation	Voting and tabulation includes the following: • Accessible ballot marking includes all tasks related to preparing, testing and implementing assistive voting devices for use in a polling place environment. • ExpressVote universal voting system (Vote Capture and/or Tabulator) includes all tasks related to preparing, testing and implementing universal voting devices for use in a polling place environment with the option of precinct vote summary card tabulation. • Precinct ballot tabulation covers the activities required to prepare, test and scan official ballots and/or vote summary cards at a precinct location. • Central ballot tabulation includes all tasks required to prepare, test and scan official ballots and/or vote summary cards at a central count location.
Results Consolidation and Reporting	Results consolidation and reporting encompasses the functions necessary to gather and combine results from ballot scanners and use that data to generate paper and electronic reports for election workers, candidates and the media.

1.5.5 RFIs

Applicable Request for Interpretation (RFIs) the EAC has released as of the date of the plan pertaining to this test campaign is listed in Table 1-7.

Table 1-7. Applicable RFIs

RFI ID	Name
2007-01	EAC Decision on Accessible Design
2007-02	EAC Decision on Variable Names
2007-03	EAC Decision on Summative Usability Testing
2007-04	EAC Decision on Presentation of Alternative Language
2007-05	EAC Decision on Testing Focus and Applicability
2007-06	EAC Decision on Recording and Reporting Undervotes
2008-01	EAC Decision on Temperature and Power Variation
2008-02	EAC Decision on Battery Backup for Optical Scan Voting Machines
2008-03	EAC Decision on OS Configuration
2008-04	EAC Decision on Supported Languages
2008-05	EAC Decision on Durability
2008-06	EAC Decision on Battery Backup for Central Count
2008-07	EAC Decision on 0' Count to Start Election
2008-08	EAC Decision on Automatic Bar Code Readers
2008-09	EAC Decision on Safety Testing
2008-10	EAC Decision on Electrical Fast Transient
2008-12	EAC Decision on Ballot Marking Device/Scope of Testing
2009-01	EAC Decision on VVPAT Accessibility
2009-02	EAC Decision on Alternate Languages
2009-03	EAC Decision on Battery Back Up for Central Count Systems
2009-04	EAC Decision on Audit Log Events
2009-05	EAC Decision on T-Coil Requirements
2009-06	EAC Decision on Temperature and Power Variation
2010-01	EAC Decision on Voltage Levels and ESD Test
2010-02	EAC Decision on Coding Conventions
2010-03	EAC Decision on Database Coding Conventions
2010-04	EAC Decision on Functional Requirements with Respect to Security
2010-05	EAC Decision on Testing of Modifications to a Certified System
2010-06	EAC Decision on DRE Accessibility Requirements and Other Accessible Voting Stations
2010-07	EAC Decision on Module Length
2010-08	EAC Decision on Calling Sequence
2012-01	EAC Decision on Ballot Handling - Multifeed
2012-03	EAC Decision on Configuration Management of COTS Products
2012-04	EAC Decision on Software Setup Validation
2013-02	EAC Decision on Audio Presentation Volume Levels
2013-03	EAC Decision on Timestamps
2013-04	EAC Decision on Usability Testing

1.5.6 NOCs

Applicable Notice of Clarification (NOCs) released by the EAC as of the date of the plan pertaining to this test campaign is listed in Table 1-8.

Table 1-8. Applicable NOCs

NOC ID	Name
2007-001	Timely Submission of Certification Application
2007-003	State Testing Done in Conjunction with Federal Testing within the EAC Program
2007-005	Voting System Test Laboratory Responsibilities in the Management and Oversight of Third Party Testing
2008-001	Validity of Prior Non-core Hardware Environmental and EMC Testing
2008-003	EAC Conformance Testing Requirements
2009-001	Requirements for Test Lab Development and Submission of Test Plans
2009-002	Laboratory Independence Requirement
2009-004	Development and Submission of Test Reports
2009-005	Development and Submission of Test Plans for Modifications to EAC Certified Systems
2013-01	Discrepancy Listing in Test Report
2013-02	Detailed Description of Changes for Modifications

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2.0 PRE-CERTIFICATION TESTING AND ISSUES

This section describes testing performed by either VSTL or the manufacturer prior to submitting the voting system to the EAC.

2.1 Evaluation of Prior VSTL Testing

Prior to submitting EVS 5.4.0.0, ES&S submitted FL EVS 4.8.0.0 V1, a non-EAC modification, for source code review. This source code review was performed in accordance with the 2005 VVSG and EAC Testing and Certification Program Manual, Version 1.0. Table 2-1 outlines the source code changes.

Table 2-1. FL EVS 4.8.0.0 V1 Source Code Comparison

Product	Baseline	New Version	Lines of Code Changed	
			Files	Lines
AutoMARK	1.8.6.0	1.8.7.0	6	159
DS200	2.12.0.0	2.14.0.0	377	61,343
DS850	2.10.0.0	2.11.0.0	161	16,323
Electionware	4.6.0.0	4.8.0.0	113	5,640
PaperBallot	4.6.0.0	4.7.0.0	97	12,980
ERM	8.11.0.0	8.13.0.0	54	10,370
ExpressVote	1.4.0.0	2.1.0.0	524	83,052
Totals			**1,332**	**189,867**

NTS Huntsville recommends the EAC accept the results of this source code review as re-use for the EVS 5.4.0.0 modification. All code modified or added subsequent to the FL EVS 4.8.0.0 V1 source code review will be reviewed as part of the 5.4.0.0 test campaign.

2.2 Evaluation of Prior Non-VSTL Testing

For reuse consideration, NTS evaluated the following two documents:

- NTS Test Report No. PR035098, "2005 VVSG Compliance Testing for Election Systems & Software ECO 1822, ExpressVote Rolling Kiosk" and
- UL60950-1 Section 0.2.5 "Mechanical Hazards"

NTS personnel performed a hardware qualitative examination to 1) assess if the testing was performed under the guidelines of the EAC program, 2) assess if the tests were performed per the EAC 2005 VVSG, and 3) determine if engineering changes were implemented since test performance that would cause testing to be repeated.

Based on the evaluation, NTS recommends the EAC accept the result for mechanical hazards compliance with UL60950-1 and VVSG Section 4.3.8. Equipment modifications to the rolling kiosk occurred since original testing, and as such, the kiosk requires safety testing, specifically electrical and vibration testing.

2.3 Known Field Issues

The EVS 5.2.0.0 voting system has one identified field issue. The RSA Crypto suite used by ElectionWare to generate RSA keys will sometimes create a key that is too short. This causes a key mismatch issue when loading the keys into ExpressVote. The issue was corrected in EVS 5.2.0.3 and the change was incorporated in this release.

3.0 MATERIAL REQUIRED FOR TESTING

The following sections list the materials required to be delivered to facilitate testing of the submitted system.

3.1 Software

Proprietary software and COTS identified in Table 3-1 will be provided by the manufacturer as part of this test campaign.

Table 3-1. Required Voting System Software

Software	Software/Firmware Version
Proprietary Software	
Electionware	4.8.0.0
Election Reporting Manager (ERM)	8.13.0.0
ES&S Event Log Service (ELS)	1.5.6.0
Removable Media Service (RMS)	1.4.6.0
VAT Previewer	1.8.7.0
ExpressVote Previewer	2.1.0.0
COTS Software	
Adobe Acrobat Standard	11
Cerberus FTP	7.0.13
Microsoft Server 2008	R2
Microsoft Windows 7, SP1	5.1
Microsoft Visual C++ 2008 Redistributable – x64	9.0.30729.4148
Microsoft Visual C++ 2010 x64 Redistributable	10.0.40219
Microsoft Visual C++ 2010 x86 Redistributable	10.0.40219
Microsoft .net Framework	4.5.2
Micro Focus RM/COBOL Runtime	12.06
PostgreSQL	9.1
Symantec Endpoint Protection - Small Business Edition 2013	12.1.4

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3.2 Hardware

Proprietary equipment and COTS identified in Table 3-2 will be provided by the manufacturer as part of this test campaign.

Table 3-2. Required Voting System Equipment

Component	Hardware Version	Firmware Version
Proprietary Hardware		
ExpressVote Accessible Voting Station	2.0	2.1.0.0
DS200 Precinct Count Scanner	1.2.1, 1.2.3, & 1.3	2.14.0.0
DS850 Central Count Scanner	1.0	2.11.0.0
AutoMARK A100	1.0	1.8.7.0
AutoMARK A200 (SBC 2.0 & SBC 2.5)	1.1	1.8.7.0
AutoMARK A300 (SBC 2.0 & SBC 2.5)	1.3	1.8.7.0
Plastic Ballot Box	1.2 & 1.3	N/A
Metal Ballot Box	1.0, 1.1, & 1.2	N/A
COTS Hardware		
EMS Server – Dell	PowerEdge T710	N/A
EMS Reporting Workstation – Dell	Optiplex 980	N/A
EMS Reporting Laptop – Dell	E6410	N/A
Motorola QR Code Scanner	DS457	N/A
Denso QR Code Scanner	QK-30-U	N/A
Delkin USB Flash Drives	512MB, 1, 2, 4, & 8GB	N/A
Delkin Compact Flash	1GB	N/A
DS850 Report Printer	OKI B430dn & B 431dn	N/A
DS850 Audit Printer	OKI Microline 420	N/A
Avid Headphones	Avid FV 60	N/A

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3.3 Test Materials

Table 3-3 describes the test materials required to execute the required testing.

Table 3-3. Required Test Materials

Test Material	Quantity	Make	Model
Ballot on Demand Printer	1	OKI Data	C9650
ExpressVote Printer	1	Microcom	4200
QR Code Scanner	1	Motorola	DS9208
8 ½" X 11" Paper in Speed Loading Box (2700 Sheets)	4	Dot Matrix	951027
Security Seals	5000	Intab	800-0038R
Security Locks	20	E. J. Brooks	86022
	25	E. J. Brooks	6024
	50	American Casting Corp.	00561-03
ES&S Pens	20	BIC	Grip Roller
Ethernet Switch	1	Dell	HNC67M1
Security Sleeves	7	ES&S	PS-S7-936
CF Card Reader	1	SanDisk	018-6305
Headphone Covers	30	---	---

3.4 Deliverables

The materials listed in Table 3-4 are identified by the manufacturer as materials deliverable to the end users.

Table 3-4. Voting System Deliverables

Deliverable Material	Version	Description
ExpressVote	Firmware 2.1.0.0; Hardware 2.0	Accessible Voting Station
ExpressVote Rolling Kiosk	Hardware 1.0	Stand
DS200	Firmware 2.14.0.0; Hardware 1.2.1 or 1.2.3 or 1.3	Precinct Ballot Scanner
AutoMARK A100 or A200 or A300	Firmware 1.8.7.0; Hardware 1.0 or 1.1 or 1.3	Voter Assist Terminal
DS850	Firmware 2.11.0.0; Hardware 1.0	Central Ballot Scanner
OKI Printer	B430dn or B431dn	Laser Report Printer
OKI Printer	Microline 420	Dot Matrix Printer
Headphones	AVID 86002	Stereo Headphones
Electionware	4.8.0.0	EMS
ERM	8.13.0.0	EMS
ES&S Event Log Service	1.5.6.0	EMS
Removable Media Services	1.4.6.0	EMS
VAT Previewer	1.8.7.0	EMS
EVS 5.4.0.0 Voting System Overview	1.0	TDP Document
EVS 5.4.0.0 System Functionality Description	1.0	TDP Document
ES&S Electionware Volume I: Administrator's Guide	4.8	TDP Document

3.4 Deliverables (Continued)

Table 3-4. Voting System Deliverables (Continued)

Deliverable Material	Version	Description
ES&S Electionware Volume II: Define User's Guide	4.8	TDP Document
ES&S Electionware Volume III: Design User's Guide	4.8	TDP Document
ES&S Electionware Volume IV: Deliver User's Guide	4.8	TDP Document
ES&S Electionware Volume V: Results User's Guide	4.8	TDP Document
Election Reporting Manager User's Guide	8.1	TDP Document
ExpressVote Opererator's Guide	2.1	TDP Document
DS200 Opererator's Guide	2.14	TDP Document
DS850 Opererator's Guide	2.11	TDP Document
AutoMARK System Opererator's Guide	1.8	TDP Document
Voting System Security Specification	1.0	TDP Document
Security Script Description	1.0	TDP Document
EMS Client Workstation Secure Setup & Configuration Guide	1.0	TDP Document
EMS Server Secure Setup & Configuration Guide	1.0	TDP Document
Standalone EMS Workstation Secure Setup & Configuration Guide	1.0	TDP Document
AutoMARK System Security Specification	12	TDP Document

3.5 Proprietary Data

All data that is considered by the manufacturer as proprietary is marked as such.

4.0 TEST DESIGN AND SPECIFICATIONS

NTS Huntsville personnel shall ensure that all certification testing conducted on the manufacturer's voting system follows NTS Huntsville's procedures for testing, the requirements of the EAC 2005 VVSG, and EAC Testing and Certification Program Manual, Version 1.0.

4.1 Requirements

To evaluate the modification test requirements, each section of the EAC 2005 VVSG was analyzed to determine the applicable tests required. The following subsections detail the results of this analysis.

4.1.1 Requirements Mapping

The requirements mapping is provided in conjunction with submitted modification description in Appendix C – Details of Submitted Modifications. NTS Huntsville will verify and validate that the manufacturer is in compliance with stated QA and CM plans.

4.1.2 Rationale for Excluded Requirements

NTS Huntsville determined all requirements excluded from the previous test campaign were not applicable to the submitted modifications listed in Section 1.1.2 based on one or more of the following criteria:

- The submitted modification will not impact the specific requirement.
- It was previously determined that the specific requirement was not applicable to the baseline system.
- A NOC or RFI made the specific requirement not applicable.

4.2 Hardware Configuration and Design

EVS 5.4.0.0 is an electronic voting system consisting of one precinct paper-based voting system, one central count voting system, and a voting system application software package. The paper-based system is comprised of four voter assistance terminals, AutoMark A100, AutoMark A200, and AutoMark A300. The ExpressVote 2.0 is the fourth terminal, which functions in both "Mark Mode and "Tabulator Mode". In "Mark Mode" the ExpressVote functions as an independent voter-verifiable paper record that is digitally scanned for tabulation by either the DS200 or the DS850. In "Tabulator Mode", the ExpressVote is able to tabulate printed vote summary cards and tabulate summary vote cards internally. The voting System Application Software Package, Election Management System (EMS), is an application suite consisting of Electionware, Election Reporting Manager (ERM), Removable Media Service (RMS), ES&S Event Log Service (ELS), ExpressVote Previewer, and VAT Previewer.

4.3 Software System Functions

System functionalities remain unchanged for all previously certified components of the EVS 5.4.0.0 voting system. The introduction of the ExpressVote 2.0 adds the ability to tabulate the ExpressVote cards.

4.4 Test Case Design

Test cases are designed around specifications and requirements, i.e., what the voting system is supposed to do (per the manufacturers design specifications) and what the voting system is required to do (per the guiding standards document). The tests cases used are primarily functional in nature; however, in certain cases non-functional tests may also be used. The test designer selects both valid and invalid inputs and determines the correct output without any knowledge of the test object's internal structure. The acceptable range for system performance and the expected results for each test case are derived from the manufacturer's documentation and the 2005 VVSG. All test cases are validated and approved by the project lead or other qualified VSTL personnel, i.e., VSTL QA Representative.

4.4.1 Hardware Environmental Test Case Design

Hardware environmental testing will be conducted by NTS Huntsville associated departments: EMI, Dynamics, and Environmental. Applicable hardware requirements will be tested in accordance with NTS' A2LA certifications 0214.40, 0214.41, and 0214.42. The documents listed in Table 4-1 will be used as test guidelines. All pre/post operational tests will be conducted by qualified NTS personnel at the NTS Huntsville facility.

Table 4-1. NTS Test Guidelines Documents

Document Number	Document Title
EMI-001A	NTS Test Guidelines for Performing Electromagnetic Interference (EMI) Testing
EMI-002A	Test Procedure for Testing and Documentation of Radiated and Conducted Emissions Performed on Commercial Products
ANSI/NCSL Z540-1	Calibration Laboratories and Measuring and Test Equipment, General Requirements
ISO 10012-1	Quality Assurance Requirements for Measuring Equipment
MIL-STD 810	Environmental Engineering Considerations and Laboratory Tests

4.4.2 Software Module Test Case Design and Data

NTS Huntsville personnel implements component level testing during the Functional Configuration Audit (FCA) for each component and subcomponent exercising the functionality of each as designed and documented. NTS Huntsville will utilize limited structural-based techniques (white-box testing) mainly in the area of Source Code Review and Security Testing. NTS Huntsville will depend heavily on specification-based techniques (black-box testing) for the individual software components. The most common specification-based techniques applied to the voting system during software testing will be "equivalence partitioning", "boundary value", and "pairwise" testing.

- "Equivalence Partitioning" will be used to evaluate specific software functions and data entry points of the voting system for valid and invalid data during the FCA. For software functions and data entry points, an entry will be made for a valid data requirement and at least one invalid data requirement to test for normal and abnormal conditions.
- "Boundary Value" testing will be used to evaluate specific software functions and data entry points for minimums and maximums during the FCA. For software functions and data entry points, an entry will be made for all minimum and all maximum documented requirements to test for normal and abnormal conditions. This technique will be used for numeric ranges as well as non-numeric ranges.
- "Pairwise" testing is a combinatorial method of software testing that, for each pair of input parameters to a system, tests all possible discrete combinations of those parameters. NTS Huntsville uses combinatorial test design to identify the minimum number of tests needed to get the coverage required to exercise the functionality. Combinatorial test design enables testers to get greater test coverage with fewer tests. Note that "coverage", as used here, is referring to functional combinatorial coverage, not requirements coverage.

4.4.3 Software Functional Test Case Design and Data

NTS Huntsville personnel shall perform the specification-based technique used at the functional test case level entitled "Use Case." The identified actors and their responsibilities are listed in Table 4-4.

Table 4-4. "Use Case" Identified Roles and Responsibilities

Role/Actor	Responsibility
Election Administrator	Enters the election definition with translation and audio. Maintains EMS users and the election database.
Warehouse Technician	Loads the election definition onto the voting equipment. Runs diagnostic test and maintains the units.
Poll Worker	Sets up and closes down the voting equipment on election-day at the precinct location.
Voter	Physically casts the ballot on election-day.
ADA Voter	Votes unassisted on election-day with special needs.
Election Official	Reports and audits the election result post-election day.

"Use Case" will be utilized during the FCA with a single pass through each component using only valid data. This pass will be considered the "Master Copy" of data to be passed between interfacing points of applications during integration level testing. If a component downstream in the test process needs data from previous processes, the "Master Copy" of data can be used or altered to accelerate the test process. Known tests that will utilize the "Master Copy" of data at the integration level are Security and Usability.

4.4.4 System-level Test Case Design

System-level testing examines the ability of proprietary software, hardware, and peripherals in addition to the COTS software, hardware, and peripherals to operate as a complete system. NTS Huntsville utilizes test cases designed to ensure that integrated components function as specified by the manufacturer's documentation and meet the requirements of the VVSG.

4.5 Test Specifications

The following subsections provide a brief description of the testing to be performed.

4.5.1 Hardware Test

Hardware tests are divided into two categories: non-operating and operating. The non-operating tests are intended to simulate the storage and transport of equipment between the storage facility and the polling location. The Operating tests are intended to simulate conditions that the EUT may encounter during operation. Prior to and immediately following non-operating and operating test, the EUT shall be subjected to an operational status check.

The non-operating tests include the following:

Low Temperature – This requirement addresses a range of tests for voting machines and precinct counters, as such devices are stored between elections and are transported between the storage facility and polling place, to meet specific minimum performance standards for low temperatures.

4.5.1 Hardware Test (Continued)

High Temperature – This test addresses a range of tests for voting machines and precinct counters, as such devices are stored between elections and are transported between the storage facility and polling place, to meet specific minimum performance standards for high temperature.

Humidity Test – This requirement addresses a range of tests for voting machines and precinct counters, as such devices are stored between elections and are transported between the storage facility and polling place, to meet specific minimum performance standards.

Vibration – This requirement addresses a range of tests for voting machines and precinct counters, as such devices are stored between elections and are transported between the storage facility and polling place, to meet specific minimum performance standards for vibration.

Bench Handling – The bench handling test simulates stresses faced during maintenance and repair of voting machines and ballot counters.

The operating tests include the following:

Electromagnetic Radiation – This test verifies that radiated and conducted emissions from the voting system hardware do not exceed the allowable limits of Title 47CFR, Part 15, Class B. The test for electromagnetic radiation shall be conducted in compliance with the FCC Part 15 Class B requirements by testing per ANSI C63.4 (Volume II, Section 4.8.b).

Lightning Surge – This test demonstrates the voting system's hardware to withstand power line lightning surges during normal operation. This test is equivalent to the procedure of IEC 61000-4-5. The test for lightning surge protection shall be conducted in compliance with the test specified in IEC 61000-4-5 (Volume II, Section 4.8.f).

Electrical Fast Transient – This test demonstrates the voting system's hardware to withstand electrical fast transients during normal operation. This test is equivalent to the procedure of IEC 61000-4-4. The test for electrical fast transient protection shall be conducted in compliance with the test specified in IEC 61000-4-4 (Volume II, Section 4.8.e).

Electrostatic Disruption – This test demonstrates the voting system's hardware to withstand electrostatic discharges during normal operation. This test is equivalent to the procedure of IEC 61000-4-2. The test for electrostatic disruption shall be conducted in compliance with the test specified in IEC 61000-4-2 (Volume II, Section 4.8.c).

Electromagnetic Susceptibility – This test demonstrates the voting system's hardware to withstand radiated electromagnetic fields during normal operation. This test is equivalent to the procedure of IEC 61000-4-3. The test for electromagnetic susceptibility shall be conducted in compliance with the test specified in IEC 61000-4-3 (Volume II, Section 4.8.d.).

Conducted RF Immunity – This test demonstrates the voting system's hardware ability to withstand conducted RF energy on power and I/O lines during normal operation. This test is equivalent to the procedure of IEC 61000-4-6. The test for conducted RF immunity shall be conducted in compliance with the test specified in IEC 61000-4-6 (Volume II, Section 4.8.g).

4.5.1 Hardware Test (Continued)

Magnetic Fields Immunity – This test demonstrates the voting system's hardware ability to withstand Magnetic Fields during normal operation. This test is equivalent to the procedure of IEC 61000-4-8. The test for AC magnetic fields RF immunity shall be conducted in compliance with the test specified in IEC 61000-4-8 (Volume II, Section 4.8.h).

Electrical Power Disturbance – This test demonstrates the voting system's hardware to withstand power disturbances during normal operation. This test is equivalent to the procedure of IEC 61000-4-11 (Volume I, Section 4.1.2.5). The test for power disturbance disruption shall be conducted in compliance with the test specified in IEC61000-4-11 (Volume II, Section 4.8.a).

Temperature Power Variation – The Environmental Test, Operating, subjects the system hardware to varying temperatures (50^{o}F to 95^{o}F) and voltages (105vac to 129vac), demonstrating hardware/data recording accuracy reliability Mean-Time-Between-Failure (MTBF) of 163 hours.

Maintainability – Maintainability represents the ease with which preventive and corrective maintenance actions can be performed based on the design characteristics of equipment and software and the processes the manufacturer and election officials have in place for preventing failures and for reacting to failures.

Electrical Supply – This requirement addresses the battery power source for providing electrical supply during a power failure.

4.5.2 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
- If the hardware is non-COTS, NTS Huntsville will review drawings, specifications, technical data, and test data associated with system hardware to establish system hardware baseline associated with software baseline
- 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

4.5.3 Functional Configuration Audit

The functional configuration audit encompasses an examination of manufacturer's tests, and the conduct of additional tests, to verify that the system hardware and software perform all the functions described in the manufacturer's documentation submitted in the TDP. In addition to functioning according to the manufacturer's documentation, tests will be conducted to ensure that requirements of Volume II section 6.7 and all other applicable EAC 2005 VVSG requirements are met. This testing is accomplished through a process called sequencing.

Sequencing is the act of navigating through the user interface to verify that the system performs as described by the manufacturer and does not violate any of the VVSG requirements. The path that the tester navigates follows the logical flow of accomplishing task required to conduct an election. For example, a task in conducting an election is to add a candidate. The tester will follow the flow of the user interface to add the candidate to a contest. If there are multiple ways to achieve this, then each method will be tested. This process will continue until all tasks for conducting an election are completed. Any paths, or combination of paths, that are determined to be at risk for failure that are outside of the normal flow of the interface will be tested on an individual basis.

4.5.4 Accuracy Test Specifications

The accuracy test ensures that each component of the voting system can each process 1,549,703 consecutive ballot positions correctly within the allowable target error rate. The accuracy test is designed to test the ability of the system to "capture, record, store, consolidate, and report" specific selections and absences of a selection. The required accuracy is defined as an error rate. This rate is the maximum number of errors allowed while processing a specified volume of data. For paper-based voting systems, the ballot positions on a paper ballot must be scanned to detect selections for individual candidates and contests and the conversion of those selections detected on the paper ballot converted into digital data.

4.5.5 Volume and Stress Test Specifications

The volume and stress test investigates the system's response to conditions that tend to overload the system's capacity to process, store, and report data. The test parameters will focus on the system's stated limits and the ballot logic for areas such as the maximum number of active voting positions, maximum number of ballot styles, maximum candidates, maximum contests, and stated limits within the EMS. This test will be utilized to ensure the system can achieve the manufacturer's TDP claims of what the system can support. Testing will be performed by exercising an election definition and test cases developed specifically to test for volume and stress conditions of the system being tested.

4.5.6 Usability and Accessibility Test Specifications

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.

4.5.7 System Integration Test Specifications

The system integration test addresses the integration of both hardware and software along with any telecommunication capabilities. This includes connecting all supporting equipment and peripherals including ballot boxes, voting booths (regular and accessible), and any physical security equipment such as locks and ties. The testing process utilizes functional testing to execute the operations required to design an election, facilitate voting, and tabulate results.

4.5.8 Security Test Specifications

The purpose of security testing is to evaluate the effectiveness of the voting system in detecting, preventing, logging, reporting, and recovering from any security risks identified by simulating attacks on the system. NTS Huntsville personnel have developed internal operating procedures to evaluate the voting system to the security requirements set forth in the EAC 2005 VVSG. NTS Huntsville personnel will attempt to defeat the access controls and physical security measures documented in the TDP.

4.5.9 TDP Evaluation Specifications

NTS Huntsville qualified personnel utilize a TDP Review Matrix which lists every EAC 2005 VVSG requirement pertaining to TDP review. NTS Huntsville will review the modified documents listed in section 1.1.3 and other documents required to execute testing. NTS Huntsville will record the results of the review of each document to the applicable requirements listed in the TDP Review Matrix.

During the TDP review process, each document will be reviewed for completeness, clarity, correctness, and continuity. The review results will be formally reported to manufacturer. If a revised document is received, it will be re-reviewed as discussed in this section. The TDP will be continued to be reviewed during the entire testing process as these documents will be utilized to set up the systems, verify correct operational results and in other tests as needed. At the end of the TDP review process, a Deficiency Report will be issued listing the non-compliant items on a document-by-document basis, if applicable.

4.5.10 Source Code Review

As the source code is received, a SHA256 hash value will be created for each source code file. NTS Huntsville source code team will conduct a visual scan of each line of source code for an initial review and every line of modified source code for acceptance for all languages. This is done to verify compliance of EAC 2005 VVSG coding standards. Each identified violation shall be recorded by making notes of the standards violation along with directory name, file name, and line number.

In circumstance where the coding language facilitates the use of automated tools, NTS will develop a process for conducting the source code review with an automated tool. In addition, NTS Huntsville personnel will perform a manual 10% review of all automated source code review to verify that the automated tool was configured properly.

4.5.10 Source Code Review (Continued)

A technical report of all identified violations will be sent to the manufacturer for resolution on a regular basis. All revised source code will be checked for corrections until the final issue is resolved. At the end of the source code review process, a Deficiency will be issued listing all non-compliances. The results will be included in the final test report.

Unmodified, general purpose COTS non-voting software (e.g., operating systems, programming language compilers, database management systems, and web browsers) is not subject to the detailed examinations specified in this section; however, NTS Huntsville personnel will examine such software to ensure that the specific version of software being used is identical to the design specification in order to confirm that the software has not been modified. NTS Huntsville will verify by downloading the software directly from the manufacturer site, verifying against NRSL, or by being provided original OEM discs.

If there is COTS generated software source code, NTS Huntsville qualified personnel will inspect the COTS generated software source code in preparation of test plans and to provide some minimal scanning or sampling to check for embedded code or unauthorized changes. For purposes of code analysis, the COTS units shall be treated as unexpanded macros. These will be identified in the Test Report.

The portions of COTS software that have been modified by the manufacturer in any manner are subject to review. Source code generated by a COTS package and embedded in software modules for compilation or interpretation will be provided in human readable form to NTS Huntsville personnel to enable review.

4.6 Source Code Build Process

NTS Huntsville utilizes two build processes, a compliance build and a trusted build. Compliance builds for all software builds that are not required to be witnessed by the vendor. This build process follows the documented procedures of a “Trusted Build” in the EAC Testing and Certification Program Manual, Version 1.0, with two exceptions: The image products will not be submitted to the EAC, and no manufacturer representative shall be required to be present or on-site for these builds. The “Trusted Build” process is described in section 5.6 of the EAC Testing and Certification Program Manual, version 1.0.

4.7 QA & CM System Review

The manufacturer submitted QA Plan and CM Plan will be reviewed. The review will be limited to only the changes within this modification to determine compliance with EAC 2005 VVSG Volume II Section 2, and Volume I Sections 8 and 9, EAC stated requirements, and with the requirements of the internal manufacturer documentation. In addition, the manufacturer TDP documentation package will be reviewed to determine if the manufacturer’s QA Plan and the CM Plan are being followed. The results of the TDP review shall be entered on a spreadsheet as previously described in Section 4.6 of this test plan. The results of the TDP review, including the QA and CM compliance results of the Technical Data Package Review, will be included in the final test report.

5.0 TEST DATA

5.1 Test Data Recording

All equipment utilized for test data recording shall be identified in the test data package. For hardware environmental and operational testing, the equipment shall be listed on the Instrumentation Equipment Sheet for each test. The output test data shall be recorded in an appropriate manner as to allow for data analysis. For source code and TDP reviews, results shall be compiled in output reports and submitted to the manufacturer for resolution.

Additionally, all test results, including functional test data, will be recorded on the relevant NTS Huntsville Operating Procedures and Test Cases. Results will also be recorded real-time in engineering log books. Incremental reports will be submitted to the manufacturer and the EAC at the completion of major test areas to communicate progress and results as deemed necessary by the stakeholders.

5.2 Test Data Criteria

NTS Huntsville will evaluate all test data against the manufacturer provided TDP and the requirements set forth in the EAC 2005 VVSG. 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 with criteria defining 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).

6.0 TEST PROCEDURES AND CONDITIONS

NTS Huntsville 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. NTS Huntsville holds the following accreditations:

- ISO-9001:2000
- NVLAP Accredited ISO 17025:2005
- EAC Accredited VSTL, NIST 150,150-22
- A2LA Accredited (Certification No.'s 0214.40, 0214.41, and 0214.42)
- FCC Approved Contractor Test Site (Part 15, 18)

6.1 Test Facilities

All testing will be conducted at the NTS Huntsville, AL facility unless otherwise annotated. Environmental non-operating (storage) and operating hardware testing will be conducted utilizing an adequately sized environmental test chamber or dynamic vibration (shaker) system equipped with the required data gathering support equipment. All remaining operating hardware tests will be conducted at the appropriate test site with the required support equipment. All instrumentation, measuring, and test equipment used in the performance of this test program will be listed on the Instrumentation Equipment Sheet for each test and shall be calibrated in accordance with NTS 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 outlined in Table 6-1.

Table 6-1. Standard Ambient Conditions

Event	Ambient Range
Temperature	68 to 75 degrees (°) Fahrenheit (F)
Relative Humidity	Local Site Humidity
Atmospheric Pressure	Local Site Pressure

The following tolerances listed in Table 6-2 shall be used unless otherwise specified herein.

Table 6-2. Test Tolerances

Phenomena	Tolerance Allowance
Time	± 5%
Temperature	± 3.6°F (2°C)
Vibration Amplitude	± 10%
Vibration Frequency	± 2%
Random Vibration Acceleration	20 to 500 Hertz ± 1.5 dB
	500 to 2000 Hertz ± 3.0 dB
Random Overall grms	± 1.5 dB
Acoustic Overall Sound Pressure Level	+4/-2 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 system components (hardware and software), shall be received and documented utilizing NTS Huntsville Receiving Ticket (QP HSV-150, 05/04/15) and proper QA procedures. When voting system hardware is received, each test article will 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, photographed, and the manufacturer shall be notified. NTS Huntsville VSTL personnel will notify NTS Huntsville QA personnel that the equipment is ready for receipt inspection. 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 manufacturer representative for resolution. All TDP and source code modules received will be inventoried and maintained by the Project Lead assigned to testing.

For test setup, the system will be configured as it would for normal field use. This includes connecting all supporting equipment and peripherals. NTS Huntsville will properly configure and initialize the system, and verify that it is ready to be tested by following the procedures detailed in the voting system TDP.

6.3 Test Sequence and Description

The components of the voting system will undergo testing to verify that the modification performs as described by the manufacturer and meets the requirements of the 2005 VVSG. The required hardware and functional tests are outlined in the subsections below. The sequence will follow the schedule in Appendix D – Project Schedule.

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6.3.1 Hardware Testing

All hardware testing will be performed as described by the 2005 VVSG and RFIs issued at the time of this test campaign. Descriptions of these tests are located in section 4.5.1. As part of the test campaign, the DS200 HW 1.3, DS850 and ExpressVote 2.0 shall be subjected to the hardware tests outlined in Table 6-3. No hardware testing is required for the AutoMARK.

Table 6-3. Hardware Tests

Test	Equipment		
	DS200	DS850	ExpressVote 2.0
Bench Handling			X
Conducted RF Immunity		X	X
Electrical Fast Transient	X		X
Electrical Power Disturbance	X		X
Electrical Supply	X		X
Electromagnetic Radiation	X		X
Electromagnetic Susceptibility	X		X
Electrostatic Disruption	X		X
Humidity	X		X
High Temperature	X		X
Lightning Surge	X	X	X
Low Temperature	X		X
Magnetic Field Immunity	X		X
Temperature Power	X		X
Vibration			X
Product Safety			X

6.3.2 Physical Configuration Audit

NTS Huntsville will perform a physical configuration audit on the DS200 HW 1.3, DS850, and ExpressVote 2.0 per the test specifications on section 4.5.2

6.3.3 Functional Configuration Audit

The FCA for the EVS 5.4.0.0 campaign will include a full review of ExpressVote 2.0 and limited elements of the Electionware, ERM, DS200, and DS850. The FCA tests will be designed per the specifications in section 4.5.3. During the FCA, both normal and abnormal data was input into the system to attempt to introduce errors and test for error recovery.

6.3.4 Accuracy

The accuracy requirements for the DS200 will be met by the execution of the standard accuracy test. The DS200 will be tested by utilizing a combination of hand marked (70%) and pre-marked (30%) ballots to achieve accuracy rate greater than 1,549,703 correct ballot positions.

The accuracy requirements for the ExpressVote will be met by the execution of an accuracy test developed for the ExpressVote Tabulator. The ExpressVote Tabulator will be tested by utilizing a combination of pre-printed vote cards (90%) and vote cards containing pre-printed activation bar codes by the ExpressLink (10%) to achieve accuracy rate greater than 1,549,703 correct ballot positions.

6.3.5 Volume and Stress

The volume and stress test investigates the system's response to conditions that tend to overload the system's capacity to process, store, and report data. The test parameters will focus on the system's stated limits and the ballot logic for areas such as the maximum number of active voting positions, maximum number of ballot styles, maximum candidates, maximum contests, and stated limits within the EMS. This test will be utilized to ensure the system can achieve the manufacturer's TDP claims of what the system can support. Testing will be performed by exercising an election definition and test cases developed specifically to test for volume and stress conditions of the system being tested.

6.3.6 Usability and Accessibility

The ExpressVote 2.0 will be subject to usability and accessibility testing per the test specifications in section 4.5.6.

6.3.7 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. The range of risks tested is determined by the design of the system and potential exposure to risk. For EVS 5.4.0.0 the security testing will be limited to the following:

- Physical security test on the ExpressVote 2.0 and Rolling Kiosk
- Basic vulnerability scans on the EMS to verify that the Operating System and Anti-Virus software are up-to-date as of the test execution date.

6.3.8 System Integration

All submitted hardware and software components will be included in the system integration test. A total of six elections will be created to test the voting systems ability to function as an integrated system. The design parameters of each election are included in this section.

6.3.8 System Integration (Continued)

General Election: GEN-01

The Gen-01 is a basic election held in four precincts, one of which is a split precinct, containing nineteen contests compiled into four ballot styles. Five of the contests are in all four ballot styles. The other fourteen contests are split between at least two of the precincts with a maximum of four different contests spread across the four precincts. This election was designed to functionally test the handling of multiple ballot styles, support for at least two languages, support for common voting variations, and audio support for at least two languages.

The parameters of this election are listed below:

- Closed Primary: No
- Open Primary: No
- Partisan offices: Yes
- Non-Partisan offices: Yes
- Write-in voting: Yes
- Primary presidential delegation nominations: No
- Ballot Rotation: Yes
- Straight Party voting: Yes
- Cross-party endorsement: No
- Split Precincts: Yes
- Vote for N of M: Yes
- Recall issues, with options: No
- Cumulative voting: No
- Ranked order voting: No
- Provisional or challenged ballots: Yes
- Early Voting: No

In addition to the parameters listed above, the following will also be tested:

- Audio input in an alternative language for basic voting pattern using an ADA device
- Audio input for write-in voting using an ADA device
- Spanish language input for a basic voting pattern
- Input for write-in voting using Spanish language

6.3.8 System Integration (Continued)

General Election: GEN-02

The Gen-02 is a basic election held in three precincts. This election contains fifteen contests compiled into three ballot styles. Ten of the contests are in all three ballot styles with the other five split across the three precincts. This election was designed to functionally test the handling of multiple ballot styles, support for ballot rotation, support for two languages, support for complex voting variations, and audio support for multiple languages.

The parameters of this election are listed below:

- Closed Primary: No
- Open Primary: No
- Partisan offices: Yes
- Non-Partisan offices: Yes
- Write-in voting: Yes
- Primary presidential delegation nominations: No
- Ballot Rotation: Yes
- Straight Party voting: No
- Cross-party endorsement: No
- Split Precincts: No
- Vote for N of M: Yes
- Recall issues, with options: Yes
- Cumulative voting: No
- Ranked order voting: Yes
- Provisional or challenged ballots: No
- Early Voting: Yes

In addition to the parameters listed above, the following will also be tested:

- Early voting election with at least one unit in all precincts
- Voting options for over-voting
- Voting options for under-voting
- Spanish language ballots
- Audio ballots utilizing ADA capabilities

6.3.8 System Integration (Continued)

General Election: GEN-03

The Gen-03 is a basic election held in two precincts. This election contains eight contests compiled into two ballot styles. Four of the contests are in both ballot styles. The other four contests are split between the two precincts. This election was designed to functionally test the handling of multiple ballot styles, support for at least three languages including a character-based language, support for common voting variations, and audio support for at least three languages and an ADA binary input device.

The parameters of this election are listed below:

- Closed Primary: No
- Open Primary: No
- Partisan offices: Yes
- Non-Partisan offices: Yes
- Write-in voting: Yes
- Primary presidential delegation nominations: No
- Ballot Rotation: No
- Straight Party voting: No
- Cross-party endorsement: No
- Split Precincts: No
- Vote for N of M: Yes
- Recall issues, with options: No
- Cumulative voting: No
- Ranked order voting: No
- Provisional or challenged ballots: Yes
- Early Voting: No

In addition to the parameters listed above, the following will also be tested:

- Spanish language ballot with a basic voting pattern and write-in candidates
- Spanish audio input to simulate ADA device with write-in option
- Character based language with basic voting pattern
- Character based language utilizing an ADA option
- Binary input to support ADA option
- Binary input to support ADA audio device

6.3.8 System Integration (Continued)

Primary Election: PRIM-01

The Prim-01 is a closed primary election in two precincts (one precinct is a split), containing thirty contests compiled into five ballot styles. Each ballot style contains six contests. This election was designed to functionally test an open primary with multiple ballot styles, support for two languages, and support for common voting variations.

The parameters of this election are listed below:

- Closed Primary: Yes
- Open Primary: No
- Partisan offices: Yes
- Non-Partisan offices: Yes
- Write-in voting: Yes
- Primary presidential delegation nominations: No
- Ballot Rotation: No
- Straight Party voting: No
- Cross-party endorsement: No
- Split Precincts: Yes
- Vote for N of M: Yes
- Recall issues, with options: No
- Cumulative voting: No
- Ranked order voting: No
- Provisional or challenged ballots: Yes
- Early Voting: No

In addition to the parameters listed above, the following will also be tested:

- Alternative language utilized with a write-in option
- ADA audio device utilized with a write-in option

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6.3.8 System Integration (Continued)

Primary Election: PRIM-02

The Prim-02 is a basic election held in two precincts. This election contains thirteen contests compiled into three ballot styles. One contest is in all three ballot styles and all other contests are independent. This election was designed to functionally test the handling of multiple ballot styles, support for Primary presidential delegation nominations, support for two languages, support for complex voting variations, and audio support for multiple languages.

The parameters of this election are listed below:

- Closed Primary: No
- Open Primary: Yes
- Partisan offices: Yes
- Non-Partisan offices: Yes
- Write-in voting: Yes
- Primary presidential delegation nominations: No
- Ballot Rotation: No
- Straight Party voting: No
- Cross-party endorsement: Yes
- Split Precincts: No
- Vote for N of M: Yes
- Recall issues, with options: No
- Cumulative voting: No
- Ranked order voting: No
- Provisional or challenged ballots: No
- Early Voting: No

In addition to the parameters listed above, the following will also be tested:

- Open primary election with at least one machine in each precinct
- Voting options for over-voting
- Voting options for under-voting
- Voting option for write-ins
- Spanish language ballot
- Voting option utilizing ADA audio device

6.3.8 System Integration (Continued)

Primary Election: PRIM-03

The Prim-03 is a basic election held in two precincts. This election contains ten contests and is compiled into two ballot styles. Two of the contests are in both ballot styles. The other eight contests are split between the two party ballots. This election was designed to functionally test the handling of multiple ballot styles, support for at least three languages including an Ideographic based language, support for common voting variations, and audio support for at least three languages and an ADA binary input device.

The parameters of this election are listed below:

- Closed Primary: Yes
- Open Primary: No
- Partisan offices: Yes
- Non-Partisan offices: Yes
- Write-in voting: Yes
- Primary presidential delegation nominations: No
- Ballot Rotation: No
- Straight Party voting: No
- Cross-party endorsement: No
- Split Precincts: No
- Vote for N of M: Yes
- Recall issues, with options: No
- Cumulative voting: No
- Ranked order voting: No
- Provisional or challenged ballots: Yes
- Early Voting: No

In addition to the parameters listed above, the following will also be tested:

- Spanish ballot with basic voting pattern and write-in option
- Spanish language ballot using ADA audio device with write-n option
- Character based language ballot with basic voting pattern
- Character based language utilizing ADA device
- Binary input to support ADA option
- Binary input to support ADA audio device

6.3.9 TDP

NTS Huntsville will ensure that all submitted modifications are accurately documented and that the documents adhere to the requirements of the 2005 VVSG. A complete listing of the EVS 5.4.0.0 TDP is located in Appendix B – Technical Data Package.

6.3.10 Source Code Review

The source code review of EVS 5.4.0.0 will be based on the previous review of source code changes from EVS 5.2.0.0 to FL EVS 4.8.0.0 V1 and the changes from FL EVS 4.8.0.0 V1 to EVS 5.4.0.0. As referenced in section 2.1, NTS is recommending reuse be accepted for previously reviewed source code changes from EVS 5.2.0.0 to FL EVS 4.8.0.0 V1.

6.4 Test Operations Procedure

These subsections address the procedures that NTS will follow during this modification testing campaign.

6.4.1 Pass/Fail Criteria

The PASS/FAIL criteria at the Component Level will be based on the expected result. If the System Under Test (SUT) performs as expected, the test is considered as passed. If the SUT does not perform as expected, the test will be evaluated for tester, test procedure, or test equipment errors. If it is determined there were no tester, test procedure, or test equipment errors, the test will be repeated in an attempt to reproduce the results. If the results cannot be reproduced, the anomaly will be logged and monitored throughout the test campaign and subsequent testing efforts. If the results can be reproduced and the expected results are not met, the SUT will have failed the test. NTS Huntsville personnel will document the error and track the error through resolution.

The PASS/FAIL criterion for System Level testing is whether the system can continue to operate as expected. The System Level test is considered as passed if either 1) no errors are found, or 2) an error is encountered but the system continues to operate and engineering analysis determines that the root cause does not affect system level testing. The system level test is considered failed when an error is encountered and the system is too unstable to continue or engineering analysis determines the root cause could affect further testing. If an error occurs during system level testing, the error shall be documented. If the voting system is able to recover and continue, the test will continue. If the error causes the system to become unstable, the test shall be halted. All errors documented during System Level Testing shall be tracked through resolution.

6.4.2 Deficiency Resolution

The manufacturer will be required to submit a root cause analysis and correct any deficiency before testing can be resumed. Engineering analysis will be performed to determine what effect the resolution has on the component. A determination will be made whether Regression Testing will be sufficient or a complete re-test is necessary. All deficiencies and their resolutions will be documented on the NTS Huntsville Deficiency tracking system and the EAC Virtual Review Tool.

6.4.3 Test Results and Assessment

NTS Huntsville personnel will test every EAC 2005 VVSG requirement impacted by the submitted modification. NTS Huntsville personnel will report all issues discovered during this test campaign to the manufacturer and the EAC. If NTS Huntsville determines there is not enough data to ensure a requirement was met, the test plan will be altered and further testing will be done.

6.4.4 Terms of NTS Huntsville Recommendation for Certification

The EAC has the final decision as to whether the system meets all the requirements for an EAC-certified system. NTS Huntsville will either recommend approval, if the system meets all applicable sections of the VVSG, or report that the system does not meet all applicable sections of the VVSG.

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APPENDIX A – ADDITIONAL TESTING

A.1 Manufacturer Requested Additional Testing

The following tests will be performed by NTS Huntsville at the request of the manufacturer. These modifications or additions represent functionality or tools that are outside the scope of the certification. In addition, two engineering change orders (ECOs) and four software suites were submitted for assessment and testing.

A.1.1 ECOs

ECO 1880 introduce new hardware to replace end-of-life components for the DS850 and DS200 respectively. ECO 912 introduced a secondary uninterruptable power supply (UPS), APC Back-UPS RS 1500VA, and was approved as a De Minimis change by the EAC on May 29, 2014. As a condition of the approval, the EAC requested that the UPS be subjected to Lightning Surge test during the next testing campaign that included the DS850. Table A-1 provides summary of the submitted ECOs and the required testing.

Table A-1. ECO Required Testing

ECO Number	Description of ECO	Equipment Under Test (EUT)	Required Testing
ECO 912	New UPS	DS850	Lightning Surge
ECO 1880	New Display New Multi-sheet sensor New Power Adapter USB Assembly	DS200	Electrical Supply Electrical Power Disturbance Electrical Fast Transient Lightning Surge Electrostatic Disruption Electromagnetic Emissions Electromagnetic Susceptibility Conducted RF Immunity High Temperature Low Temperature Humidity Temperature Power

A.1.2 Election Support Software and Hardware

The following software and hardware components are used to support the operations of the EMS and ExpressVote:

- ExpressLink – ExpressLink is a Windows PC application that can run in either a standalone mode, or in a monitor mode, where the application monitors requests from a voter registration (VR) system over a shared network folder. The application imports an election definition from Electionware, accepts requests to print a voter's ExpressVote activation card, determines the voter's ballot style and then prints the activation card on the ExpressVote Activation Card Printer.
- ExpressVote Activation Card Printer – The ExpressVote Activation Card Printer is a small, thermal, on demand printer used to print the ballot activation code on the ExpressVote activation card.

A.1.2 Election Support Software and Hardware (Continued)

- Electionware Toolbox – Electionware Toolbox is a set of utilities that can be integrated into the Electionware EMS to enhance the software usability experience and streamline various processes. These add-on utilities include Test Deck and Text to Speech.
- Ballot Online ExpressPass - Ballot Online is an optional system that allows a user to access online and make sample ballot selections on any device connected to the Internet. When finished, the output from this system is the ExpressPass – a selection summary with scannable QR code that the user can either print or save in an electronic format on their mobile device. If submitting the vote selections for official tabulation, the user is required to go to the polling place to submit the vote selections on their ExpressPass, following standard voter authentication at the polling place. The voter operates the ExpressVote Vote Capture to scan, review and validate vote selections. The vote summary card may then be submitted for tabulation on an ES&S tabulator: ExpressVote Tabulator, DS200 or DS850.

NTS Huntsville will perform limited testing as requested by the manufacturer. Table A-2 outlines the requested testing.

Table A-2. Manufacturer Requested Testing Outside of Certification

Component	Version	Requested Testing
ExpressLink	1.2.0.0	2005 VVSG Source code Compliance
ExpressVote Activation Card Printer	N/A	Functional Integration Test
ExpressVote Previewer	2.1.0.0	Functional Integration Test
Electionware Toolbox	2.3.0.0	Functional Integration Test
Ballot Online ExpressPass	N/A	Functional Integration Test

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APPENDIX B – TECHNICAL DATA PACKAGE

B.1 Technical Data Package

The documents listed in Table B-1 comprise the EVS 5.4.0.0 Voting System TDP.

Table B-1. EVS 5.4.0.0 TDP

EVS 5.4.0.0 TDP Documents	Version	Doc No.	Document Code
System Overview			
Voting System Overview	1.0	01-01	ESSSYS_5'4'0'0_D_SysOvr
System Functionality Description			
System Functionality Description	1.0	02-01	ESSSYS_5'4'0'0_D_SFD
AutoMARK System Functionality Description	2.0	02-02	AutoMARK_ESS_System_Functionality_AQS-18-5001-001-R
System Hardware Specification			
System Hardware Specification – ES&S DS200 HW Rev 1.2	3.0	03-01	DS200_1'2_SPC_HWSpec
System Hardware Specification – ES&S DS200 HW Rev 1.3	4.1	03-02	DS200_1'3_SPC_HWSpec
System Hardware Specification – ES&S DS850 HW Rev 1.0	1.1	03-03	DS850_1'0_SPC_HWSpec
System Hardware Specification – ES&S ExpressVote HW Rev 1.0	1.0	03-04	EVOTE_2'0_SPC_HWSpec
AutoMARK System Hardware Overview	7.0	03-05-01	AQS-18-5002-000-S
AutoMARK System Hardware Specification	9.0	03-05-02	AQS-18-5000-001-F
Software Design and Specification			
Software Design and Specification – Event Log Service	1.0	04-01	ELS_1'5'6'0_SDS
Software Design and Specification - Electionware	1.0	04-02	EWARE_4'8'0'0_SDS
Software Design and Specification – Election Reporting Manager	1.0	04-03	ERM_8'13'0'0_SDS
ERM – Software Design Specification Appendices	1.0	04-03-01	ERM_8'13'0'0_SDS_Appendices
Software Design and Specification – DS850	1.0	04-04	DS850_2'11'0'0_SDS
Software Design and Specification – DS200	1.0	04-05	DS200_2'14'0'0_SDS
Software Design and Specification – ExpressVote	1.0	04-06	EVOTE_2'1'0'0_SDS
AutoMARK Software Design and Specifications	10	04-07	AutoMARK Software Design and Specifications
AutoMARK Software Design and Specifications Overview	1.8	04-07-01	AutoMARK ESS Software Design Spec Overview
AutoMARK Software Standards Specification	10	04-07-02	AQS-18-4000-000-S
AutoMARK Driver API Specifications	9	04-07-03	AQS-18-5000-002-F
AutoMARK Software Diagnostics Specifications	10	04-07-04	AQS-18-5000-004-F
AutoMARK Operating Software Design Specifications	10	04-07-05	AQS-18-5001-002-R
AutoMARK Software Design Specifications	10	04-07-06	AQS-18-5001-004-S
AutoMARK Graphical User Interface Specifications	10	04-07-07	AQS-18-5001-005-R
AutoMARK Software Development Environment	10	04-07-08	AQS-18-5001-006-R
AutoMARK Programming Specifications Details	11	04-07-09	AQS-18-5001-011-R
AutoMARK Ballot Image Processing Specifications	11	04-07-10	AQS-18-5002-003-S
AutoMARK Operations and Diagnostic Log Specs	6	04-07-11	AQS-18-5002-004-S
AutoMARK Embedded Database Interface Specifications	12	04-07-12	AQS-18-5002-005-S
AutoMARK Ballot Scanning and Printing Specifications	9	04-07-13	AQS-18-5002-007-S

B.1 Technical Data Package (Continued)

Table B-1. EVS 5.4.0.0 TDP (Continued)

EVS 5.4.0.0 TDP Documents	Version	Doc No.	Document Code
Software Design and Specification continued)			
ES&S System Development Program	1.0	04-08	ESSSYS_1'0_P_SysDevProgram
ES&S Coding Standards	1.0	04-09	ESSSYS_1'0_P_CodingStandards
System Test/Verification Specification			
Voting System Test Plan ES&S Voting System 5.4.0.0	1.0	05-01	ESSSYS_5'4'0'0_D_TestPlan
Common Industry Format Usability Test Reports	--	05-02	Usability Test Reports (Folder)
Common Industry Format Usability Test Report – ExpressVote 1.0	1.0	05-02-01	EVOTE_1'0_D_CIFRpt
Common Industry Format Usability Test Report – AutoMARK 1.8.7.0	1.x	05-02-02	AMVAT_1'8'7'0_D_CIFRpt
Common Industry Format Usability Test Report – DS200 1.2.1	1.2.1	05-02-03	DS200_1'2'1_D_CIFRpt
System Security Specification			
System Security Specification	1.0	06-01	ESSSYS_1'0_SPC_SysSecurity_SysSecurity_Local
Security Script Description	1.0	06-02	ESSSYS_5'4'0'0_SPC_SecurityScriptDesc
EMS Client Workstation Secure Setup & Configuration Guide	1.0	06-03	ESSSYS_5'4'0'0_SPC_ClientWorkstation SetupConfigGuide
EMS Server Secure Setup & Configuration Guide	1.0	06-04	ESSSYS_5'4'0'0_SPC_EMSServer SetupConfigGuide
Standalone EMS Workstation Secure Setup & Configuration Guide	1.0	06-05	ESSSYS_5'4'0'0_SPC_Standalone WorkstationSetupConfigGuide
AutoMARK System Security Specification	12	06-06	AutoMARK ESS System Security Spec AQS-18-5002-001-S
System Operations Procedure			
System Operations Procedures – AutoMARK	1.0	07-01	AMVAT_1'8'7'0_SOP
System Operations Procedures – DS200	1.0	07-02	DS200_2'14'0'0_SOP
System Operations Procedures – DS850	1.0	07-03	DS850_2'11'0'0_SOP
System Operations Procedures – Event Log Service	1.0	07-04	ELS_1'5'6'0_SOP
System Operations Procedures – Election Reporting Manager	8.1	07-05	ERM_8'13'0'0_SOP
Electionware Administrator's Guide	1.0	07-06	EWARE_4'8'0'0_SOP_01Admin
Electionware Define: User's Guide	1.0	07-07	EWARE_4'8'0'0_SOP_02Define
Electionware Design: User's Guide	1.0	07-08	EWARE_4'8'0'0_SOP_03Design
Electionware Deliver: User's Guide	1.0	07-09	EWARE_4'8'0'0_SOP_04Deliver
Electionware Results: User's Guide	1.0	07-10	EWARE_4'8'0'0_SOP_05Results
System Operations Procedures – ExpressLink	1.0	07-11	ELINK_1'2'0'0_SOP
System Operations Procedures – ExpressVote	1.0	07-12	EVOTE_2'1'0'0_SOP

B.1 Technical Data Package (Continued)

Table B-1. EVS 5.4.0.0 TDP (Continued)

EVS 5.4.0.0 TDP Documents	Version	Doc No.	Document Code
System Maintenance Manuals			
System Maintenance Manual – ES&S AutoMARK	1.0	08-01	AMVAT_1'8'7'0_SMM
System Maintenance Manual – ES&S DS200	1.0	08-02	DS200_2'14'0'0_SMM
System Maintenance Manual – ES&S DS850	1.0	08-03	DS850_2'11'0'0_SMM
System Maintenance Manual – ES&S ExpressVote	1.0	08-04	EVOTE_2'1'0'0_SMM
Personnel Deployment and Training			
Training Program Description	1.0	09-01	ESSSYS_1'0_P_TrainingProgram
Configuration Management Plan			
Configuration Management Program	1.0	10-1	ESSSYS_1'0_P_CMProgram
Technical Documentation Program	1.0	10-2	ESSSYS_1'0_P_TDProgram
QA Program			
Manufacturing Quality Assurance Program	1.0	11-01	ESSSYS_1'0_P_MNFQAProgram
Software Quality Assurance Program	1.0	11-02	ESSSYS_1'0_P_SWQAProgram
System Change Notes			
System Change Notes	1.0	12-01	ESSSYS_5'4'0'0_D_ChangeNotes
Other TDP Documents			
ES&S Ballot Production Handbook	1.0	13-01	BPG_1'1_SOP

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APPENDIX C – DETAILS OF SUBMITTED MODIFICATIONS

C.1 Submitted Modification

Table C.1. Submitted Modification

Change ID	System Component	Modification	2005 VVSG Requirement	
			Volume 1	Volume 2
ECO1822	Express Vote	ExpressVote Tabulator and Kiosk	All applicable requirements	All applicable requirements
BUG30689	DS200	Changed DS200 implementation layer to use the candidate type flag sent from Electionware to not reject or query marginal marks for oval locations for text-only contests	2.3.3.2 e, f, g, and h 3.1.2 a, b, c, d, and e 4.1.5.1 d i, iii and iv 4.1.5.2 b	6.7
ENH23027	DS200	Capture and display the write-in text on the report tape	N/A	6.7
ENH30966	DS200	Added new log entries to document actions with-in the new write-in report features: Entered View Write-Ins Viewed image X of X Exited View Write-Ins	N/A	6.7
BUG31901	DS200	For text only candidates the results on the zero and results reports was removed	6.7	6.7
BUG31953	DS200	Resolved an issue whereby a missing column mark on the trailing edge of the ballot can cause a false positive for enhanced write-ins	N/A	6.7
BUG32093	DS200	Correct typo in wording of undervote query screen	2.3.3.2 e, f, g, and h 3.1.2 a, b, c, d, and e 4.1.5.1 d i, iii, and iv	6.7
BUG32662	DS200	Resolved issue with results report printing after reopening polls on a different machine when the time is set earlier than the report generated from the previous machine	2.1.7.1.b; 2.1.8 d & e 2.2.3 b & c 2.2.4 a, b, c, d, e, g, & h 2.2.5 a, b, c, d, e, g ,h, &i 2.3.1.2 d & e; 5.4.2 a, b, & c	6.7
BUG32784	DS200	Resolve issue where the user can inadvertently be allowed to clear ballot data when recovering from a hardware failure during the close process	N/A	6.7
Multiple	DS200	Implement write-in review report	N/A	6.7
ENH31085	DS200	Implement use of Electionware Configure flag indicating all ballots are to be stamped	4.1.5.1 d ii	6.7

C.1 Submitted Modification (Continued)

Table C.1. Submitted Modification (Continued)

Change ID	System Component	Modification	2005 VVSG Requirement	
			Volume 1	Volume 2
ENH31091	DS200	Update Welcome screen graphic to simplify wording, provide a clearer insertion image, and account for standard ballots and ExpressVote cards	N/A	6.7
ENH31092	DS200	Updated splash screens to new branding style	4.3.4.2 f ; 7.4.1 a, b, c, d, &e	6.7
ENH31205	DS200	Updated DS200 Admin screen to remove old product name	2.1.4 j; 4.3.4.1 b, c, & d; 4.3.4.2 a, b, & c	6.7
ENH31450	DS200	Design change to generate a single CVR for an ExpressVote card from a multi-page election	N/A	6.7
ENH31500	DS200	Added the Diagnostic Ballot View functionality to allow the scanned images to be viewed on the screen in diagnostic mode.	2.1.4 j; 4.3.4.1 b, c, & d; 4.3.4.2 a, b, & c	6.7
ENH31507	DS200	Implement Diagnostic Ballot Viewer's File Export feature to allow the images to be exported to the election media.	2.1.4 j; 4.3.4.1 b, c, & d; 4.3.4.2 a, b, & c	6.7
ENH31656	DS200	Implement Judge's Initial/Review Box feature to reject ballot based on various settings from Electionware	N/A	6.7
ENH32217	DS200	Remove support for EOL or non-recommended USB media	N/A	6.7
ENH32256	DS200	Add vote session ID to write-in image viewer	N/A	6.7
ENH32258	DS200	Have ExpressVote images display first in Write-in review viewer	N/A	6.7
ECO1880	DS200	Added new LG display (LG LB121S03-TL05)	4.1.2.9	N/A
		Add Pepperl and Fuchs as a second source for multi-sheet sensor	4.1.2.9, 4.1.2.10, & 4.1.2.12	N/A
		Replaced certified wall power supply (DT A80A21 Y24ESS) with DTEA 11 011 C-ESS	4.1.2.4, 4.1.2.5, 4.1.2.6, 4.1.2.7, 4.1.2.9, 4.1.2.10, 4.1.2.11, & 4.1.2.12	N/A
		Replace USB hub assembly (resistor value change for R1)	4.1.2.8, 4.1.2.9, & 4.1.2.10	N/A
		Made changes to code on scanner board assembly	N/A	N/A

C.1 Submitted Modification (Continued)

Table C.1. Submitted Modification (Continued)

Change ID	System Component	Modification	2005 VVSG Requirement	
			Volume 1	Volume 2
BUG31543	DS850	Minor wording change on bin report for unsaved batch	2.3.1.2 f; 4.1.5.1 b ii; 4.1.6.1 a i, ii, iii, & iv	6.7
BUG31708	DS850	Change to allow proper viewing of ExpressVote card images in ElectionWare Produce	2.1.7.1 d; 2.1.8 b, c, & e; 2.3; 4.1.5.2 c	6.7
Multiple	DS850	Implement Judge's Initial/Review Box feature to reject ballot based on settings from ElectionWare	2.1.10; 2.1.7.1 b	6.7
ENH26847	DS850	Add additional improvements to IMR to reduce the number of ballots rejected due to skew	5.3 a	6.7
ENH31183	DS850	Improve Results generation times by performing a data summary for each batch after each batch is saved instead of processing all ballots to generate results	2.1.7.1 d; 2.1.8 b, c, & e; 2.3; 4.1.5.2 c	6.7
ENH31184	DS850	Improve Export Results performance by packaging each batch at Save time instead of packaging all data at export time	5.4.2 c	6.7
ENH31759	DS850	If the image retention settings are changed within the election, this regenerates the batch-level data packages to reflect those changes	N/A	6.7
ENH31789	DS850	Integrate common changes needed to support generation of a single CVR for ExpressVote cards in multi-page elections	N/A	6.7
ENH31918	DS850	Report changes needed to account for changes to generate a single CVR for and ExpressVote card in a multi-page election	2.1.7.1 d; 2.1.7.2; 4.1.5.1 b I & c; 4.1.5.2 b & e	6.7
ENH32218	DS850	Removed support for uncertified USB sticks	2.3.1.2 f; 4.1.5.1 b ii; 4.1.6.1 a i, ii, iii, & iv	6.7
ENH32266	DS850	Updated startup and shutdown screens to reflect current color scheme and branding	2.1.7.1 d; 2.1.8 b, c, & e; 2.3; 4.1.5.2 c	6.7
ENH32486	DS850	Updated name of middle bin in log entries to be consistent with overall naming conventions	2.1.10; 2.1.7.1 b	6.7
ENH31647	AutoMARK	Provided a configurable option for users to set voting targets to either checkboxes or ovals	3.2.5	6.7

C.1 Submitted Modification (Continued)

Table C.1. Submitted Modification (Continued)

Change ID	System Component	Modification	2005 VVSG Requirement	
			Volume 1	Volume 2
BUG30642	Electionware-Accessible Ballot	Made changes to refresh the Navigator lists more quickly	2.1.6; 2.2.1.2; 3.1.4	6.7
BUG31629	Electionware-Accessible Ballot	Incorrect name for Cantonese Chinese causes problems when importing script updates	3.1.3; 3.2.7	6.7
ENH31595	Electionware-Accessible Ballot	Support both Oval and Checkmark images on AutoMARK for the voting session based on customer preference	2.3.3.3 b & d	6.7
BUG30848	Electionware-Acquire	Optimized the loading of DS200 Results sticks with large volumes by removing the additional ballot image zip file parsing	N/A	6.7
ENH32084	Electionware-Acquire	The Icon for the Master Media entry in the Navigator will update based on the Master Media status	N/A	6.7
BUG31254	Electionware-Capture	Clicking the Contest Language Tabs will focus on the selected language	N/A	6.7
BUG32131	Electionware-Capture	Alternate ID fields are now being carried forward for imported Questions	2.2.1.2 b & e	6.7
BUG32308	Electionware-Capture	If a user attempts to generate ballot styles with a contest with no candidates in the election, Electionware will now show an error instead of a warning	2.2.1.1 a, bii 2.2.2 a	6.7
BUG32802	Electionware-Capture	If a user imported elections into Electionware, the <NUM> variable was not showing correctly in Paper Ballot. This has been corrected so that this variable (and others) will work correctly	2.2.1.2 e	6.7
ENH31713	Electionware-Capture	The Hindi language cannot be added to the election through an import if the AutoMARK has been selected as a piece of equipment used in the election	2.2.1.3 a 3.1.3 3.2.7	6.7
ENH31976	Electionware-Capture	Corrected an issue where ERM couldn't handle logical ballot style IDS with more than seven digits by reducing the ID size limit to 7 digits	2.1.6	6.7
Multiple	Electionware-Configure	Implement Judge's Initial/Review Box feature to reject ballot based on settings from Electionware	4.1.4.2 a.i	6.7

C.1 Submitted Modification (Continued)

Table C.1. Submitted Modification (Continued)

Change ID	System Component	Modification	2005 VVSG Requirement	
			Volume 1	Volume 2
ENH29022	ElectionWare -Configure	The module name has been changed from Configure Equipment to Configure	N/A	6.7
ENH31360	Electionware-Configure	Automatic Printing of the Write-in Entry report can now be set in Configure for the DS200	2.4.3 c	6.7
ENH31362	Electionware-Configure	Include Write-In Review Report setting will appear on the DS200 Settings Report	N/A	6.7
ENH31536	Electionware-Configure	The option to Stamp All ballots has been added to the DS200 settings screen. Additionally, the stamping and diverting functions have been separated and the screen has been reorganized to allow for the setting of one, the other, or both	4.1.5.1 b, d	6.7
ENH31538	Electionware-Configure	The DS200 Settings Report will now show the Stamp All and Divert settings	N/A	6.7
ENH31539	Electionware-Configure	If either Stamp or Divert is checked, and no criteria are also checked, an alert will show	N/A	6.7
ENH31591	Electionware-Configure	The Vote Target selection for the AutoMARK can now be set from Configure	2.3.3.3 b & d	6.7
ENH31592	Electionware-Configure	The AutoMARK settings report will now show the selected Vote Target setting	N/A	6.7
BUG31528	Electionware-Element Library	Add font size specification for all items in translation script for database	2.2.1.2 c, 3.1.5 d, 3.2.2.1 b	6.7
BUG31666	Electionware-Element Library	Add new AutoMARK system prompts to script	2.2.1.3 a, 3.1.3, 3.2.7	6.7
BUG32535	Electionware-Element Library	Use new image on DS200 when screen definition is changed	N/A	6.7
BUG32748	Electionware-Element Library	Modify wording for two AutoMARK prompts	2.2.1.3 a, 3.1.3, 3.2.7	6.7
Multiple	Electionware-Element Library	Provide navigation buttons for voter in Hindi language	2.2.1.3 a, 3.1.3, 3.2.7	6.7
ENH31127	Electionware-Element Library	Added system prompts to support new functional Judges initials requirements	2.2.1.3 a, 3.1.3, 3.2.7	6.7

C.1 Submitted Modification (Continued)

Table C.1. Submitted Modification (Continued)

Change ID	System Component	Modification	2005 VVSG Requirement	
			Volume 1	Volume 2
ENH31593	Electionware-Element Library	Provided support for use of oval or checkmark on AutoMARK vote screens	2.3.3.3 b & d	6.7
ENH32670	Electionware-Element Library	Limit audio prompt instructions at end of voting session to speed up voting	2.2.1.3 a, 3.1.3, 3.2.7	6.7
ENH32800	Electionware-Element Library	Adjust default prompt script in Electionware database	2.2.1.3 a, 3.1.3, 3.2.7	6.7
BUG31179	Electionware-Framework	Updated login panel to show CapsLock message correctly	N/A	6.7
BUG31277	Electionware-Framework	Updated shortcut to ensure application launches consistently	N/A	6.7
Multiple	Electionware-Framework	Updated SysObjects to be imported into Electionware for Special Frames	N/A	6.7
ENH30460	Electionware-Framework	Update Electionware installer to support Paper Ballot migration to Visual C++ 2013	N/A	6.7
ENH30492	Electionware-Framework	Update Table Library to new version of Citra Table	N/A	6.7
ENH30532	Electionware-Framework	Upgraded JasperReports	N/A	6.7
ENH31139	Electionware-Framework	Use Java Buffering for file reading and writing to increase speed	N/A	6.7
ENH31187	Electionware-Framework	Hindi language enabled for EVS5400	2.2.1.3 a, 3.1.3, 3.2.7	6.7
ENH31373	Electionware-Framework	Bengali language disabled for EVS5400	2.2.1.3 a, 3.1.3, 3.2.7	6.7
ENH31574	Electionware-Framework	Re-enabled 64-bit launcher to start Electionware	N/A	6.7
ENH31642	Electionware-Framework	Hindi language cannot be used with AutoMARK equipment. Validation added to prohibit both options to be enabled	2.2.1.3 a, 3.1.3, 3.2.7	6.7
ENH31917	Electionware-Framework	Updated SysObjects to be imported into Electionware for Hindi language	N/A	6.7
ENH32252	Electionware-Framework	Only support certified media (Delkin 512MB through 16GB)	4.1.7.1	6.7

C.1 Submitted Modification (Continued)

Table C.1. Submitted Modification (Continued)

Change ID	System Component	Modification	2005 VVSG Requirement	
			Volume 1	Volume 2
ENH32691	Electionware-Framework	New User Guide PDFs, Web Help Files, and Quick Help files have been created for Electionware 4.8.0.0 and added to the system to be accessible by users	N/A	6.7
BUG32143	Electionware-Home	Make sure the Customer Portal link is correct	N/A	6.7
BUG31726	Electionware-Package	Ensure the ExpressVote icon is properly appearing in the toolbar	N/A	6.7
BUG31734	Electionware-Package	AutoMARK status is reported in Media Not Created Report	N/A	6.7
BUG31969	Electionware-Package	Writeable area coordinates to remain as decimal values when being packaged	N/A	6.7
BUG32031	Electionware-Package	Issue when generating Pollbook export	N/A	6.7
BUG32056	Electionware-Package	Received error when resetting media	N/A	6.7
BUG32060	Electionware-Package	Ensure DS200 sticks are properly formatting before burning	N/A	6.7
BUG32108	Electionware-Package	Ensure ExpressVote cards with a Marked Review box are being rejected when set to reject in Electionware	4.1.4.2 a.i	6.7
BUG32785	Electionware-Package	Warn user before burning ExpressVote Tabulate media that the EQC has not been created	N/A	6.7
BUG32581	Electionware-Package	Ellipse incomplete in Package > Tools menu	N/A	6.7
Multiple	Electionware-Package	Implement Judge's Initial/Review Box feature to reject ballot based on settings from Electionware	4.1.4.2 a.i	6.7
ENH31540	Electionware-Package	Pass stamp and diverter options to DS200 for the stamp all ballots option	4.1.5.1 b, d	6.7
ENH31562	Electionware-Package	Package the ExpressVote card font sizes with the DS200	N/A	6.7
ENH31594	Electionware-Package	Package the Oval/Checkmark options to the AutoMARK	2.3.3.3 b & d	6.7
ENH32190	Electionware-Package	Warn user when re-burning media, that if it was input into Acquire, all Acquire information will be erased	N/A	6.7

C.1 Submitted Modification (Continued)

Table C.1. Submitted Modification (Continued)

Change ID	System Component	Modification	2005 VVSG Requirement	
			Volume 1	Volume 2
ENH32597	Electionware-Package	Warn user if they are re-creating the same poll when burning media	N/A	6.7
BUG31258	Electionware-Paper Ballot	Paper Ballot ensures that users can only have one styling method for each response (content-formatted or style-sheet)	2.2.1.2; 3.1.4	6.7
BUG31477	Electionware-Paper Ballot	Corrected non-panel Content line placement when paneled content lines are included in style sheets along with Vertically Center Content checkbox	2.2.1.2 a, b	6.7
BUG31611	Electionware-Paper Ballot	Paper Ballot allows a user to delete a Panel with Content lines included. Once a Panel is deleted, the Content line will not appear on the ballot	2.2.1.2 a, b	6.7
BUG31722	Electionware-Paper Ballot	Graphics files load consistently from a template	2.2.1.2 a, b, e	6.7
BUG31725	Electionware-Paper Ballot	Flow Candidate option now prevents contests from floating from one page to the next page	2.2.1.2 a, b	6.7
BUG32009	Electionware-Paper Ballot	Created validation that each Question Response has at least one "Default" language Content item for Accessible Ballot	N/A	6.7
Multiple	Electionware-Paper Ballot	Implement Judge's Initial/Review Box feature to reject ballot based on settings from Electionware	4.1.4.2 a.i	6.7
ENH31218	Electionware-Paper Ballot	Hindi language enabled for EVS5400	2.2.1.3 a, 3.1.3, 3.2.7	6.7
ENH31478	Electionware-Paper Ballot	Removed Gutters since new measurements for Panels (inches, auto-height) were added. Instead of Gutters, users can use Panel margins for safer spacing	2.2.1.2 a, b	6.7
BUG31643	Electionware-Produce	Handle image rotation	N/A	6.7
BUG32505	Electionware-Produce	Corrected a situation where the printing of a ballot facsimile could cause an error	N/A	6.7
BUG32508	Electionware-Produce	The file type for CVR export now defaults to .xls for enhanced usability	2.1.6; 2.1.7.2; 4.1.7.2	6.7
BUG32590	Electionware-Produce	Exporting ballot images for a large number of districts causes a failure; user should be advised of the limitations	N/A	6.7

C.1 Submitted Modification (Continued)

Table C.1. Submitted Modification (Continued)

Change ID	System Component	Modification	2005 VVSG Requirement	
			Volume 1	Volume 2
BUG32609	Electionware-Produce	The issue was the Results XML export file created by Electionware was not populating the total ballots cast attribute correctly in the "Jurisdiction" and "Election" elements. These fields incorrectly contained zeroes. The fix is to correctly populate the total ballots cast attribute in these two elements of the Results XML export file. The count that was incorrect was the total ballots cast attribute in the "Jurisdiction" and Election" elements of the Results XML export file. The VSTL created a test case to verify the issue was resolved.	N/A	6.7
ENH32264	Electionware-Produce	Updated the copyright for reports to show the current year	2.1.6; 2.1.7.2; 4.1.7.2	6.7
BUG31082	ERM	Corrected a situation where the ERM XML Results file reported Precincts Counted incorrectly	N/A	6.7
BUG31099	ERM	Corrected user inability to select "Update Precinct counted" checkbox when ERM is configured with only one reporting group	2.4.4 a, b, & c; 2.4.3.b & e; 4.1.7.2 a, b, & c; 5.4.4	6.7
BUG31469	ERM	If no backup of the results database is available, the election results media would need to be re-read to collect all results from the various voting devices. Corrected loss of ERM results when converting prior ERM results file format to current ERM results file format	N/A	6.7
BUG32429	ERM	Disabled user option to "Exclude Absentee Precincts". Option is no longer supported	2.4.4 a, b, & c; 2.4.3.b & e; 4.1.7.2 a, b, & c; 5.4.4	6.7
ENH31149	ERM	Added a check box, "Skip Precincts with 0 Ballots Cast", on the "Select Current Group to be Updated" screen, allowing the user to not process (skip) precincts with zero votes when uploading tabulator results	N/A	6.7

C.1 Submitted Modification (Continued)

Table C.1. Submitted Modification (Continued)

Change ID	System Component	Modification	2005 VVSG Requirement	
			Volume 1	Volume 2
ENH31370	ERM	In the ERM Change Control File menu option, added support for auto-creation of the ERM Results XML file with a user defined lapse time interval (in minutes) or number of precincts processed interval. During the Process DS200 Memory Device results upload function, the ERM Results XML file is created at the user defined interval	ENH31370	ERM
ENH32553	ERM	Enhanced ERM to allow validation of ExpressVote sticks. This enhancement caused the existing menu path to change from: Tabulators | DS200 | Post Election Audit | "Validate Results Media" or "Print Results Validation Media Log" to: Tabulators | Post Election Audit | "Validate Results Media" or "Print Results Validation Media Log", eliminating the portion of the path that specifies "DS200"	2.4.4 a, b, & c; 2.4.3.b & e; 4.1.7.2 a, b, & c; 5.4.4	6.7

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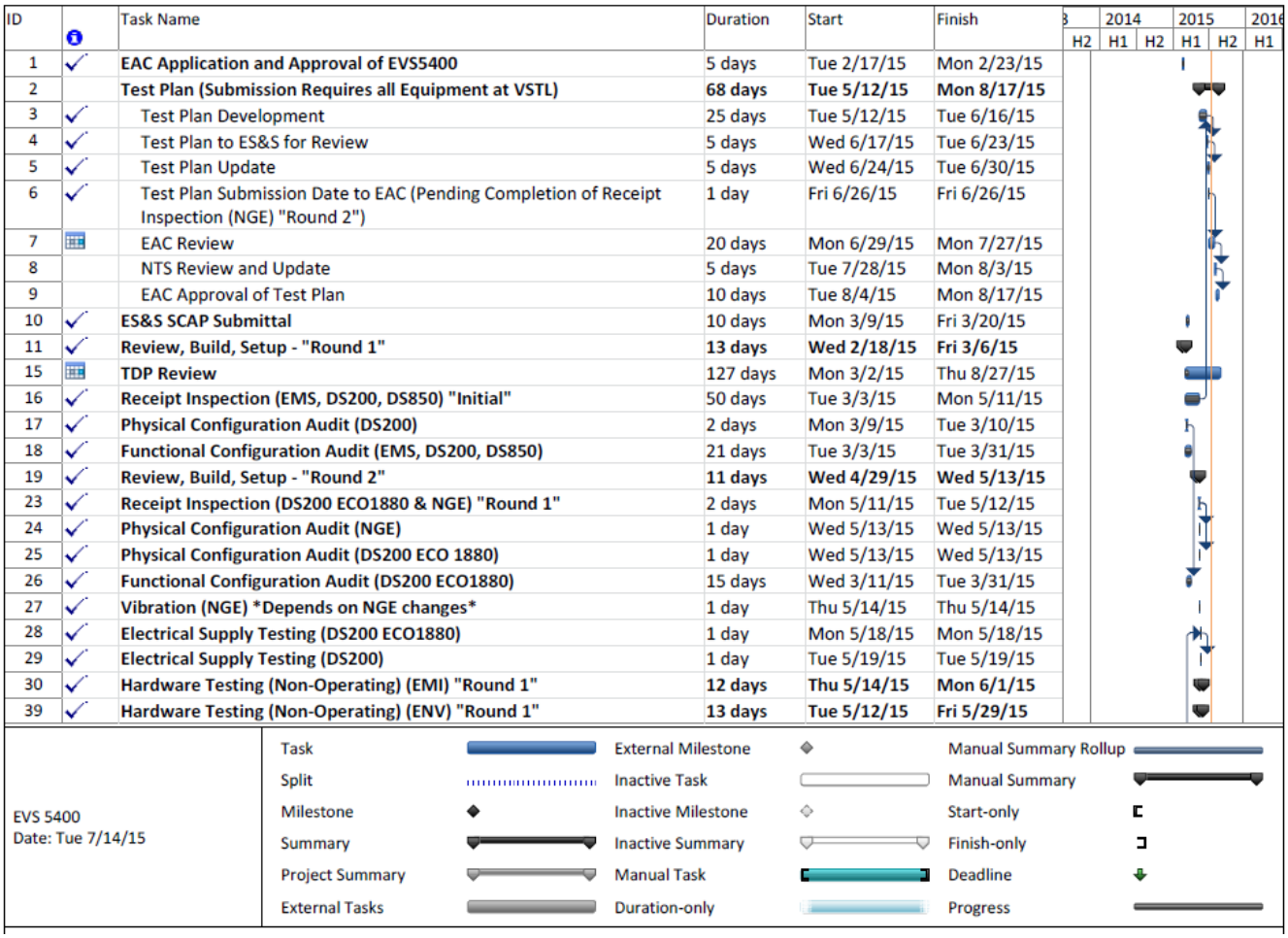
APPENDIX D – PROJECT SCHEDULE

D.1 - Project Schedule

Table D-1 provides the project schedule based on the estimated time to complete each task.

Table D-1. Project Schedule

ID	Task Name	Duration	Start	Finish
1	**EAC Application and Approval of EVS5400**	5 days	Tue 2/17/15	Mon 2/23/15
2	**Test Plan (Submission Requires all Equipment at VSTL)**	**68 days**	**Tue 5/12/15**	**Mon 8/17/15**
3	Test Plan Development	25 days	Tue 5/12/15	Tue 6/16/15
4	Test Plan to ES&S for Review	5 days	Wed 6/17/15	Tue 6/23/15
5	Test Plan Update	5 days	Wed 6/24/15	Tue 6/30/15
6	Test Plan Submission Date to EAC (Pending Completion of Receipt Inspection (NGE) "Round 2")	1 day	Fri 6/26/15	Fri 6/26/15
7	EAC Review	20 days	Mon 6/29/15	Mon 7/27/15
8	NTS Review and Update	5 days	Tue 7/28/15	Mon 8/3/15
9	EAC Approval of Test Plan	10 days	Tue 8/4/15	Mon 8/17/15
10	**ES&S SCAP Submittal**	10 days	Mon 3/9/15	Fri 3/20/15
11	**Review, Build, Setup - "Round 1"**	**13 days**	**Wed 2/18/15**	**Fri 3/6/15**
15	**TDP Review**	127 days	Mon 3/2/15	Thu 8/27/15
16	**Receipt Inspection (EMS, DS200, DS850) "Initial"**	50 days	Tue 3/3/15	Mon 5/11/15
17	**Physical Configuration Audit (DS200)**	2 days	Mon 3/9/15	Tue 3/10/15
18	**Functional Configuration Audit (EMS, DS200, DS850)**	21 days	Tue 3/3/15	Tue 3/31/15
19	**Review, Build, Setup - "Round 2"**	**11 days**	**Wed 4/29/15**	**Wed 5/13/15**
23	**Receipt Inspection (DS200 ECO1880 & NGE) "Round 1"**	2 days	Mon 5/11/15	Tue 5/12/15
24	**Physical Configuration Audit (NGE)**	1 day	Wed 5/13/15	Wed 5/13/15
25	**Physical Configuration Audit (DS200 ECO 1880)**	1 day	Wed 5/13/15	Wed 5/13/15
26	**Functional Configuration Audit (DS200 ECO1880)**	15 days	Wed 3/11/15	Tue 3/31/15
27	**Vibration (NGE) *Depends on NGE changes***	1 day	Thu 5/14/15	Thu 5/14/15
28	**Electrical Supply Testing (DS200 ECO1880)**	1 day	Mon 5/18/15	Mon 5/18/15
29	**Electrical Supply Testing (DS200)**	1 day	Tue 5/19/15	Tue 5/19/15
30	**Hardware Testing (Non-Operating) (EMI) "Round 1"**	**12 days**	**Thu 5/14/15**	**Mon 6/1/15**
39	**Hardware Testing (Non-Operating) (ENV) "Round 1"**	**13 days**	**Tue 5/12/15**	**Fri 5/29/15**



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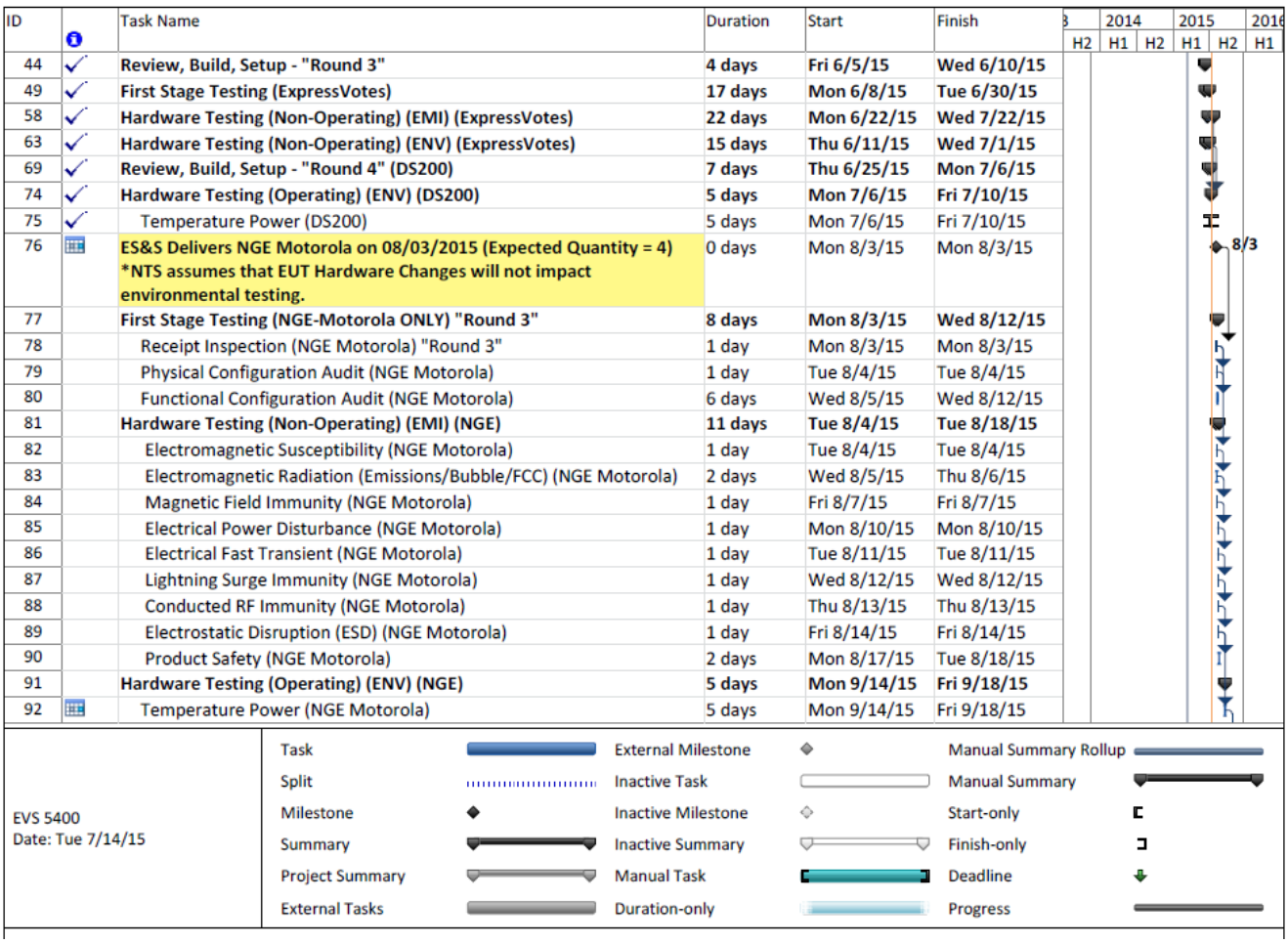
D.1 - Project Schedule (Continued)

Table D-1. Project Schedule (Continued)

ID	Task Name	Duration	Start	Finish
44	**Review, Build, Setup - "Round 3"**	**4 days**	**Fri 6/5/15**	**Wed 6/10/15**
49	**First Stage Testing (ExpressVotes)**	**17 days**	**Mon 6/8/15**	**Tue 6/30/15**
58	**Hardware Testing (Non-Operating) (EMI) (ExpressVotes)**	**22 days**	**Mon 6/22/15**	**Wed 7/22/15**
63	**Hardware Testing (Non-Operating) (ENV) (ExpressVotes)**	**15 days**	**Thu 6/11/15**	**Wed 7/1/15**
69	**Review, Build, Setup - "Round 4" (DS200)**	**7 days**	**Thu 6/25/15**	**Mon 7/6/15**
74	**Hardware Testing (Operating) (ENV) (DS200)**	**5 days**	**Mon 7/6/15**	**Fri 7/10/15**
75	Temperature Power (DS200)	5 days	Mon 7/6/15	Fri 7/10/15
76	**ES&S Delivers NGE Motorola on 08/03/2015 (Expected Quantity = 4) *NTS assumes that EUT Hardware Changes will not impact environmental testing.**	0 days	Mon 8/3/15	Mon 8/3/15
77	**First Stage Testing (NGE-Motorola ONLY) "Round 3"**	**8 days**	**Mon 8/3/15**	**Wed 8/12/15**
78	Receipt Inspection (NGE Motorola) "Round 3"	1 day	Mon 8/3/15	Mon 8/3/15
79	Physical Configuration Audit (NGE Motorola)	1 day	Tue 8/4/15	Tue 8/4/15
80	Functional Configuration Audit (NGE Motorola)	6 days	Wed 8/5/15	Wed 8/12/15
81	**Hardware Testing (Non-Operating) (EMI) (NGE)**	**11 days**	**Tue 8/4/15**	**Tue 8/18/15**
82	Electromagnetic Susceptibility (NGE Motorola)	1 day	Tue 8/4/15	Tue 8/4/15
83	Electromagnetic Radiation (Emissions/Bubble/FCC) (NGE Motorola)	2 days	Wed 8/5/15	Thu 8/6/15
84	Magnetic Field Immunity (NGE Motorola)	1 day	Fri 8/7/15	Fri 8/7/15
85	Electrical Power Disturbance (NGE Motorola)	1 day	Mon 8/10/15	Mon 8/10/15
86	Electrical Fast Transient (NGE Motorola)	1 day	Tue 8/11/15	Tue 8/11/15
87	Lightning Surge Immunity (NGE Motorola)	1 day	Wed 8/12/15	Wed 8/12/15
88	Conducted RF Immunity (NGE Motorola)	1 day	Thu 8/13/15	Thu 8/13/15
89	Electrostatic Disruption (ESD) (NGE Motorola)	1 day	Fri 8/14/15	Fri 8/14/15
90	Product Safety (NGE Motorola)	2 days	Mon 8/17/15	Tue 8/18/15
91	**Hardware Testing (Operating) (ENV) (NGE)**	**5 days**	**Mon 9/14/15**	**Fri 9/18/15**
92	Temperature Power (NGE Motorola)	5 days	Mon 9/14/15	Fri 9/18/15



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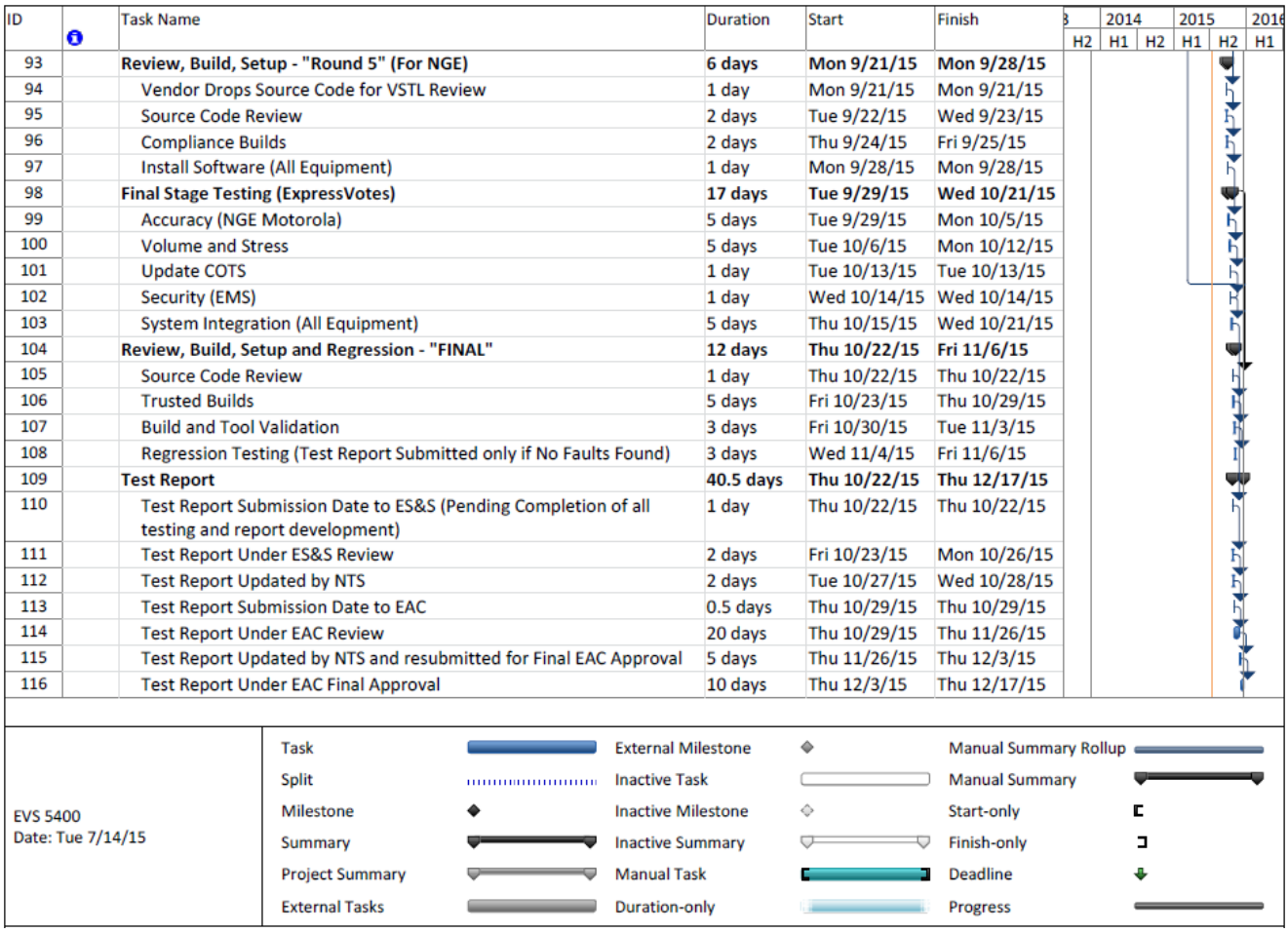
D.1 - Project Schedule (Continued)

Table D-1. Project Schedule (Continued)

ID	Task Name	Duration	Start	Finish
93	**Review, Build, Setup - "Round 5" (For NGE)**	**6 days**	**Mon 9/21/15**	**Mon 9/28/15**
94	Vendor Drops Source Code for VSTL Review	1 day	Mon 9/21/15	Mon 9/21/15
95	Source Code Review	2 days	Tue 9/22/15	Wed 9/23/15
96	Compliance Builds	2 days	Thu 9/24/15	Fri 9/25/15
97	Install Software (All Equipment)	1 day	Mon 9/28/15	Mon 9/28/15
98	**Final Stage Testing (ExpressVotes)**	**17 days**	**Tue 9/29/15**	**Wed 10/21/15**
99	Accuracy (NGE Motorola)	5 days	Tue 9/29/15	Mon 10/5/15
100	Volume and Stress	5 days	Tue 10/6/15	Mon 10/12/15
101	Update COTS	1 day	Tue 10/13/15	Tue 10/13/15
102	Security (EMS)	1 day	Wed 10/14/15	Wed 10/14/15
103	System Integration (All Equipment)	5 days	Thu 10/15/15	Wed 10/21/15
104	**Review, Build, Setup and Regression - "FINAL"**	**12 days**	**Thu 10/22/15**	**Fri 11/6/15**
105	Source Code Review	1 day	Thu 10/22/15	Thu 10/22/15
106	Trusted Builds	5 days	Fri 10/23/15	Thu 10/29/15
107	Build and Tool Validation	3 days	Fri 10/30/15	Tue 11/3/15
108	Regression Testing (Test Report Submitted only if No Faults Found)	3 days	Wed 11/4/15	Fri 11/6/15
109	**Test Report**	**40.5 days**	**Thu 10/22/15**	**Thu 12/17/15**
110	Test Report Submission Date to ES&S (Pending Completion of all testing and report development)	1 day	Thu 10/22/15	Thu 10/22/15
111	Test Report Under ES&S Review	2 days	Fri 10/23/15	Mon 10/26/15
112	Test Report Updated by NTS	2 days	Tue 10/27/15	Wed 10/28/15
113	Test Report Submission Date to EAC	0.5 days	Thu 10/29/15	Thu 10/29/15
114	Test Report Under EAC Review	20 days	Thu 10/29/15	Thu 11/26/15
115	Test Report Updated by NTS and resubmitted for Final EAC Approval	5 days	Thu 11/26/15	Thu 12/3/15
116	Test Report Under EAC Final Approval	10 days	Thu 12/3/15	Thu 12/17/15



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