Certification Report and Recommendation
ES&S EVS 5.3.4.1 Voting System

Prepared by
Elections Division
Office of the Minnesota Secretary of State
State of Minnesota
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Section 1: Introduction

1.1 EVS 5.3.4.1 Description:

Election Systems and Software (ES&S) submitted an application, dated September 10, 2020 to the Office of the Minnesota Secretary of State (OSS) for the ElectionWare Voting System version 5.3.4.1 (EVS 5.3.4.1) for certification testing to the 2005 Voluntary Voting system Guidelines (2005 VVSG). Pro V&V, an independent testing authority, in its Test Report dated July 2, 2019 (Test Lab Report), determined that "the EVS 5.3.4.1, as presented for testing, successfully met the requirements set forth for voting systems in the U.S. Election Assistance Commission (EAC) 2005 Voluntary Voting system Guidelines (VVSG), version 1.0, with no deficiencies or anomalies noted during testing. The components of the system are as follows:

Software:	Version
ElectionWare	4.7.6.0
Election Reporting Manager	8.12.1.6
Event Log Service	1.5.5.0
Removable Media Service	1.4.5.0
VAT Previewer	1.8.6.1

Hardware:	Firmware Version	Hardware Version	OS	SBC	PEB
AutoMARK VAT (1)	1.8.6.1	A100 v. 1.0	5.00.20	1.0	1.70
AutoMARK VAT (2)	1.8.6.1	A200 v. 1.1	5.00.20	2.0	1.70
AutoMARK VAT (3)	1.8.6.1	A200 v. 1.3	5.00.20	2.5	1.70
AutoMARK VAT (4)	1.8.6.1	A300 v. 1.3.1	5.00.20	2.5	1.70
DS200	2.12.6.0	1.2, 1.3, 1.3.11			
Plastic Ballot Box with Tote Bin	N/A	1.2, 1.3, 1.4, 1.5			
Collapsible Ballot Box	NA	1.0, 1.1			
Metal Ballot Box w/Diverter	NA	1.0, 1.1, 1.2			
DS450	3.0.2.0				
DS850	2.10.4.0				

COTS:	Version
Adobe Acrobat	XI
Cisco 5505 ASA	9.1.7
Cisco 5506-X ASA	9.9.2
Micro Focus RM/COBOL Runtime	12.06
Microsoft.NET	3.5
Visual C++ Redistributable	vcredist_x86.exe
Symantec Endpoint Protection	20190404-001-core15sdsv5i64.exe

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COTS:	Version
Symantec Endpoint Protection Intelligent Updater (File Based Protection)	20190403-061-1PS_IU_SEP_14RU1.exe
Symantec Endpoint Protection Intelligent Updater (Network Based Protection)	20190401-001-SONAR_IU_SEP.exe
Kiwi Syslog Log	9.6.7
Cerberus FTP	10.0.9 (64 bit)
WS-FTP Professional	12.7.0
Delkin USB Flash Drive	512 MB, 1GB, 2GB, 4GB, 8GB
Delkin CF Card	1GB
SanDisk CF Card	512MB, 1GB, 2GB
COTS Operating System	Microsoft Windows 7 64 bit SP1
COTS Operating system	Microsoft Server 2008 R2 SP1
WSUS Microsoft Windows Offline Update Utility	11.6.1
DS450 Report Printer	Dell S2810dn,OKI B432DN
DS850 Report Printer	OKI B431D, OKI B431DN, OKI B432DN
DS450\DS850 Audit Printer	OKI Microline 420
450 Uninterruptible Power Supply	APC Back UPS Pro 1500 or Smart PS 1500
850 Uninterruptible Power Supply	APC Back UPS RS 1500 or Pro 1500
Surge Suppressor	Tripp Lite Spike Cube
Delkin Compact Flash Memory Card Reader\Writer	6381
SanDisk compact Flash Memory Card Reader\Writer	018-6305

1.2 Application Review

The following items were received from ES&S and reviewed in accordance with Minnesota Rule 8220.0350:

A. A signed agreement that the vendor will pay all costs incurred by the secretary of state, its vendor, and any designees of the secretary of state in accomplishing the examination;
B. Complete specifications of all hardware, firmware, and software;
C. All technical manuals and documents related to the system;
D. Complete instructional materials necessary for the operation of the equipment by election jurisdictions and a description of any training available to users and purchasers;
E. A list of all state election authorities that have tested and approved the system for use;
F. A list of all election jurisdictions where the system has been used for elections;
G. A description of any support services offered by the vendor and of all peripheral equipment that can be used in conjunction with the system;
H. Recommended procedures for use of the system at Minnesota elections including procedures necessary to protect the integrity of the election;
I. Specifications for materials and supplies required to be used with the system;
J. Specifications for stickers for write-in votes that can be used with the system;
K. Explanation of the level of technical expertise required to program or prepare the system for use at an election; and
L. Certification by an independent testing authority approved by the secretary of state of conformance to standards for voting equipment issued by the Federal Election Commission.

1.3 Conclusion

Review of the application materials submitted for the EVS 5.3.4.1 Voting System indicates that they are complete and satisfy the requirements of Minnesota Rule 8220.0350.

Section 2: System Demonstration

2.1 Overview

From Monday, January 27, 2020 to Thursday, January 30, 2020 the OSS hosted Mark Manganaro of ES&S, and the EVS 5.3.4.1 electronic voting system was demonstration tested. Simulated elections were conducted to demonstrate and test the EVS 5.3.4.1 electronic voting system. These simulations included a presidential nomination primary, a state primary, and a state general election. The state general election included a separate judicial ballot in keeping with M.S. 204D.11, subdivision 6 and M.R. 8250.0375 which permits use of a separate ballot for the judicial offices if it is not possible to place all offices on a single ballot for the state general election. Testing was designed to determine compliance with requirements of Minnesota Rules 8220.0450 and 8220.0750. The simulated elections involved ten test precincts, in order to thoroughly review the candidate rotation capability. Ballots for three of these precincts were printed by ES&S, then marked by the OSS, and used to test the voting equipment.

2.2 Testing Process

The OSS used predetermined results charts to mark test ballots using the AutoMARKs with the following configurations:

Configuration	Firmware Version	Hardware Version	*OS	**SBC	***PEB
AutoMARK (1)	1.8.6.1	A100 v. 1.0	5.00.20	1.0	1.70
AutoMARK (2)	1.8.6.1	A200 v. 1.1	5.00.20	2.0	1.70
AutoMARK (3)	1.8.6.1	A200 v. 1.3(0)	5.00.20	2.5	1.70
AutoMARK (4)	1.8.6.1	A300 v. 1.3(1)	5.00.20	2.5	1.70

*OS – Operating System
**SBC – Single Board Computer
***PEB – Printer Engine Board

The ballots marked by each of these configurations were included in the test decks that were then tabulated by the DS200 precinct count tabulator, the DS450 central count tabulator, and the DS850 central count tabulator. The DS200 was tested for tabulating both a single precinct and for tabulating multiple precincts. The EVS 5.3.4.1 voting system demonstrated that it could accurately count the ballots marked by hand and marked by the AutoMARK.

2.3 Notable Observations in Testing the Presidential Nomination Primary

This section of the report addresses the election configuration for a Presidential Nomination Primary. Unless stated otherwise in this report, the demonstration testing verified that EVS 5.3.4.1 accurately and correctly tabulated and reported results pursuant to Minnesota Statutes and Rules.

Minnesota now has four major parties: the Democratic-Farmer-Labor (DFL) Party, the Grassroots-Legalize Cannabis Party, the Legal Marijuana Now Party, and the Republican Party. Testing of the presidential nomination primary was expanded to include all four of Minnesota's major political parties.

In accordance with the process established for the presidential nomination primary in Minnesota Statutes section 207A.13, subdivision 1, separate PNP ballots were prepared and tested for each of these parties. M.S. 207A.13, subd. 1 (c) allows for each political party to decide if their presidential nomination primary ballot will contain an "uncommitted" choice and if it will include a "write-in" option. Pursuant to Minnesota Rule 8215.0200, subpart 4, the choice of "uncommitted", if requested by a party, is to be rotated as with other candidate names. As provided in M.S. 204B.36, "write-in" lines are to be printed below the name of the last candidate for the office. EVS 5.3.4.1 was tested with the DFL Party ballot having both an "uncommitted" choice and a "write-in" line, the Grassroots-Legalize Cannabis Party ballot with just a "write-in" line, the Legal Marijuana Now Party with only "uncommitted" and the Republican Party ballot having neither "uncommitted" or "write-in" to verify that all scenarios could be accurately prepared and tabulated. The ballots with both an "uncommitted" line and a "write-in" line were tested with the "write-in" line remaining fixed at the bottom of each ballot and the "uncommitted" line rotating with the candidate

names in keeping with election law and rules requirements. Other rotation arrangements are not addressed in this report and are not included in any certification recommendation.

In testing the presidential nomination primary, ballots from each party were marked using the AutoMARK. The device presents the voter with a graphic representation of the ballot and provides style and header information, as well as voting instructions. It was observed during testing that in order to provide all ballot style and header information, the AutoMARK presents the information on two separate screens. On the first screen, the voter is provided with the election title, county, precinct and the date. On the second screen, the voter is given the political party information. Given programming constraints, the political party is treated like an office, so the audio instructions provided to the voter include the language "there are no choices," after the political party name is read. When the voter navigates to the next screen, the U.S. President office and candidate choices are displayed. Because it was demonstrated that the AutoMARK could comply with the requirements in Minnesota Statutes and Rules this problem should not prevent the certification of the EVS 5.3.4.1 Voting System. To ensure ease of use, it is recommended that when programming the text to be read for the audio portion of the political party "office" screen, additional language be included that instructs voters how to move forward to the actual U.S. President office where candidates can be selected. Further, election judges could educate voters on this AutoMARK navigation step when the voter receives their ballot.

The presidential nomination primary ballots marked with the AutoMARK and by hand were then tabulated. To simulate actual polling place conditions, ballots from all parties were placed in the same ballot counter. The results tape demonstrated that it could accurately tabulate and report the totals of all major political parties as required by Minnesota law.

Section 3: Voting System Evaluation

The following system evaluation is divided into sub-sections, each addressing a set of requirements stipulated by Minnesota Statutes or Minnesota Rules. Within each sub-section, the main components of the EVS 5.3.4.1 Voting System are evaluated separately or as a unit where appropriate. The sub-sections are as follows:

Subsection 3.1 – Voting System Evaluation
Subsection 3.2 – Electronic Ballot Marker Evaluation: AutoMARK
Subsection 3.3 – Electronic Voting System Requirements
Subsection 3.4 – Computer Program Requirements
3.4.1 – Vote Tabulation Portion of the System's Requirements
3.4.2 – Ballot Conditions Requirements
Subsection 3.5 – Modem Function not included in this Certification

3.1 Voting System Evaluation

M.R. 8220.0450 Criterion	Demonstrated	NOT Demonstrated	Notes
Identify all hardware configurations with which software is intended to operate	✓		ES&S confirmed EVS 5.3.4.1 was the version being tested during the system demonstration. This was the same version as in their application and the same version tested by the independent testing authority, Pro V&V, Inc. This report relies on the certification finding of Pro V&V, Inc. in its testing of EVS 5.3.4.1, and does not extend to items not covered in those independent test lab certification results.

M.R. 8220.0450 Criterion	Demonstrated	NOT Demonstrated	Notes
Demonstrate each hardware and software configuration for which certification was requested	✓		This report relies on the certification findings of Pro V&V, Inc. in its testing of EVS 5.3.4.1. This report does not extend to items not covered in the lab's certification results.
Storage Requirements (M.R. 8220.0450 (A))	✓		This report relies on the vendor-identified storage requirements and the findings of Pro V&V, Inc. in its testing of the EVS 5.3.4.1 Voting System. This report does not extend to items not covered in the test lab's certification results.
Programmable features and design specifications (M.R. 8220.0450 (D and E))	✓		Features and specifications were examined in the context of certification. This report relies on the findings of Pro V&V, Inc. in its testing of the EVS 5.3.4.1 Voting System. This report does not extend to items not covered in the test lab's certification results.
Maximum number of precincts, offices and issues, and candidates per office which can be handled (M.R. 8220.0450 (F))	✓		The system accommodated all precincts in the simulated presidential nomination primary, state primary, and state general election. This report relies on the vendor-identified capacities and the findings of Pro V&V, Inc. in its testing of the EVS 5.3.4.1 Voting System. This report does not extend to items not covered in the test lab's certification results.
Speed of operation under conditions that simulate scope and length of actual election ballots (M.R. 8220.0450 (B))	✓		Ballots of three sizes were tested during the simulated presidential nomination primary, state primary, and state general election. Single sided 8.5" x 11" ballots were used for the "Presidential Nomination Primary Ballot". Double sided 8.5" x 14" ballots were used for the "State Primary Ballot". Double sided 8.5" x 17" ballots were used for the "State General Election Ballot", and single sided 8.5" x 17" ballots were used for the "Judicial Nonpartisan State General Election Ballot". Each set of ballots were programmed with races consistent with that type of election. Ballots were processed in a reasonable amount of time.
Simulation of vote counting involving a configuration of the largest number of voters, precincts, offices, and candidates with which system expected to be used. (M.R. 8220.0450 (H)	✓		The simulated presidential nomination primary, state primary, and state general election included contests and candidates consistent with elections of these types. Ten precincts were programmed. During the simulation demonstration, OSS tested three of these precincts. A test deck was prepared for each precinct based upon a pre-determined results chart. These tests incorporated ballots marked with the AutoMARK electronic ballot marker. Those ballots along with hand marked ballots were then scanned and counted by the DS200, DS450 and DS850.
Simulation of vote counting includes ballots showing in many different combinations: overvotes; undervotes; invalid votes; no overvotes or stray marks (M.R. 8220.0450 (H))	✓		The predetermined results chart for each test precinct included numerous vote combinations with overvotes, undervotes, cross party votes (on state primary ballots), blank ballots, stray marks, and valid votes.

M.R. 8220.0450 Criterion	Demonstrated	NOT Demonstrated	Notes
Demonstrated rotation sequences (M.R. 8220.0450 (H))	✓		The ten test precincts allowed for a thorough review of candidate rotation capability. Ballots for three of these precincts were printed by ES&S, then marked by the OSS and used to test the voting equipment. The ballot rotation sequence matched the order of offices and candidates within the assistive voting technology programming and also matched the order on the necessary tabulator-generated reports. As noted in Section 2 above, EVS 5.3.4.1 has the capability to rotate the "Uncommitted" line on presidential nomination primary ballots, as is required by M.R. 8215.0200.
Demonstrated the ability to count votes cast on partisan, nonpartisan, and proposal sections of ballot independently (M.R. 8220.0450 (H))	✓		The DS200 tabulator (as both a precinct ballot counter and central count tabulator) and the DS450 and DS850 central count scanners/tabulators demonstrated that they could count votes cast in the nonpartisan and proposal sections of the ballot while not counting votes on the partisan section when cross party votes were present. See Sections 3.4.1 and 3.4.2 below for further details.
Provisions for write-in votes when authorized (M.R. 8220.0450 (K)	✓		Write-in voting is allowed at the presidential nomination primary when authorized by a political party and at the general election. When using the AutoMARK, and a voter marks a write-in target, a write-in session is initiated. When the voter begins the write-in session, instructions are presented which detail how to use the on-screen keyboard. Using the alpha ordered keyboard, voters select letters individually to spell out the name of their candidate choice. When the write-in candidate is entered, the name is read back to the voter by spelling it. The write-in function allows the voter to back out and select another candidate (one listed on the ballot), if they choose. Test presidential nomination primary ballots where a write-in line was provided (DFL and Grassroots-Legalize Cannabis) and general election ballots with targets marked for write-in candidates either by hand or with the assistance of the AutoMARK were counted as write-in votes by the DS200, DS450, and DS850.
Showed full audit capability, with an audit trail (M.R. 8220.0450 (C))	✓		Electronic Ballot Marker: The marked optical scan ballot is the audit trail which provides full audit capability. Tabulators: Produce audit reports
Audit trail includes a printout of overvotes and undervotes for each office and issue, and with the undervotes recorded directly from the ballots and not determined by subtraction of totals from ballots that were not overvoted (M.R. 8220.0450 (C))	✓		Electronic Ballot Marker: The AutoMARK does not count votes, so a report is not available. The electronic ballot marker does not allow the overvoting of an office. When an office is not fully voted, the voter receives a warning of the presence of an undervote. Tabulators: Provides a report print out of vote totals including overvotes and undervotes on both the zero report and results report. Ballots were marked according to the pre-determined results chart and the resulting report printout matches the expected results.

M.R. 8220.0450 Criterion	Demonstrated	NOT Demonstrated	Notes
Production of reports which include vote totals and all statistics and other information required by Secretary of State (M.R. 8220.0450 (G))	✓		The DS200, DS450, and DS850 tabulators provide a printout of the vote totals for all candidates – including write-ins when applicable – and for all ballot questions. The System also provided a printout of overvotes, undervotes and total votes for office.
Demonstrated vote counting accuracy (M.R. 8220.0450 (I)	✓		The results reports from the DS200, DS450, and DS850 respectively were compared to the results chart for each precinct. The reports matched the expected results.
Demonstrated procedures or process for testing accuracy (M.R. 8220.0450 (I)	✓		This report relies on the certification finding of Pro V&V, Inc. in its testing of EVS 5.3.4.1. This report does not extend to items not covered in those independent test lab certification results.
Provisions for maintaining the security and integrity of elections (M.R. 8220.0450 (J))	✓		The EVS 5.3.4.1 Voting System includes multiple security elements, including physical keys, passwords, and audits. A key and password system is used for access and administration functions. A unique password is used for each election so that the equipment and Election Reporting Manager (ERM) all need to recognize that password before performing their election functions. Memory cards are protected by locked compartments, which are key-access only. Seals and tamper-evident tape can be affixed to the equipment for security. All styles of ballot box used with the DS200 use a key access system so election officials can keep the system secure on Election Day.

3.2 Electronic Ballot Marker Evaluation: AutoMARK

Minnesota Statutes section 206.57 requires that a "voting method used in each polling place must include a voting system that is accessible for individuals with disabilities, including nonvisual accessibility for the blind and visually impaired in a manner that provides the same opportunity for access and participation, including privacy and independence, as for other voters." ES&S presented the AutoMARK as the assistive voting device used with the EVS 5.3.4.1 voting system to meet the requirements in Minnesota Statutes section 206.57.

The AutoMARK is a standalone precinct level ballot marking device for optical scan paper ballots. Voters insert their ballot into the AutoMARK and the device assists voters in marking their vote selections. When all desired selections have been made, the AutoMARK prints the voter's choices for each contest onto the paper optical scan ballot. The four different configurations of the AutoMARK listed in section 2.2 of this report were tested. Unless specifically stated otherwise, the following results refer to all four of the different configurations of the AutoMARK with firmware.

The AutoMARK assistive voting device is subject to the following requirements:

M.S. 206.56 Criterion	Demonstrated	NOT Demonstrated	Notes

M.S. 206.56 Criterion	Demonstrated	NOT Demonstrated	Notes
Marks a paper optical scan ballot (M.S. 206.56, subd. 7b)	✓		The AutoMARK includes both a digital display of the ballot and an audio reader. As described above, the AutoMARK marks an optical scan ballot with the voter's selections, which can then be deposited into the tabulator. OSS Observation*:* The vote target displayed by the AutoMARK is a square rather than an oval. When using the AutoMARK, a voter's selections are denoted by a checkmark  in the square target, rather than a filled-in oval. However, when the selections are marked on the paper ballot, the AutoMARK fills in the oval target. In a previous certification the following alternate language was approved for use on the AutoMARK: "Your selection will be highlighted in yellow with a green checkmark indicating your selection." This language would meet the requirements. In this certification as well.
Includes Assistive Technology (M.S. 206.56, subd. 1a)	✓		The AutoMARK includes a touch-screen and navigation buttons as well as ports that allow a sip-and-puff input device to be plugged in and utilized. The AutoMARK also includes headphones (earphones) through which the voter can listen to audio instructions and ballot information. *Denotes an item that is not required
Touch Activated Screen	✓		
Buttons	✓		
Keypad	✓		
Sip-and-puff input device	✓		
Keyboard*		✓	
Earphone	✓		
Other	✓		
Uses electronic display to present graphic representation of ballot on monitor or screen (M.S. 206.56, subd. 7a)	✓		The AutoMARK presents a graphic representation of a voter's ballot. The voter can adjust the digital display to better meet their visual needs using the AutoMARK's zoom and contrast features. The voter can view the ballot with small, normal or large text. They can set the display to be high contrast white, or high contrast black.
Is capable of reading ballot information to voter (M.S. 206.56, subd. 1b)	✓		The AutoMARK's audio function allows the voter to listen to voting instructions and office/candidate choices through headphones. Voters have the option to turn off the display screen and navigate their ballot and make their selections using only the audio instructions. A ballot from each of the three test precincts was properly marked using this audio-only function. It was observed that the language of the instructions was not an exact match to the language in Minnesota Rules. However, the capability exists to program audio voting instructions and the digital representation to match instructions required by M.R. 8220.2860.

3.3 Electronic Voting System Requirements

As an electronic voting system, EVS 5.3.4.1 must meet the following requirements as stipulated by Minnesota Statutes section 206.80 and Minnesota Rules section 8220.2050 in order to be used in the state. The EVS 5.3.4.1 voting system includes the AutoMARK (electronic ballot marker) and three tabulators: the DS200 precinct count tabulator and the DS450 and DS850 central count tabulators. Where differences exist between the DS200, DS450, and DS850 each piece of equipment is evaluated separately. Where observations were identical, a single evaluation is provided. The System must:

M.S. 206.80 and M.R. 8220.2050 Criterion:	Demonstrated	NOT Demonstrated	Notes
Have no physical connection between the voting system and any other computer during hours that voting occurs (M.R. 8220.2050)	✓		Electronic Ballot Marker: The AutoMARK demonstrated that it could stand alone and produce a ballot marked with the voter's selections without being connected to another computer system. Tabulators: The DS200, DS450 and DS850 demonstrated that they could stand alone and tabulate results correctly without being connected to another computer system.
Permit every voter to vote in secret; and when at a primary election to select secretly the party the voter wishes to vote for (M.S. 206.80, (a) (1 and 5))	✓		Electronic Ballot Marker: In the polling place, the AutoMARK is set up in a voting booth which creates a private space for the voter to make their selections. The device's audio feature can only be heard through headphones – nothing is heard publicly. It is also possible to turn off the device's display screen, so that only the audio is used to navigate the ballot and make selections. In order to maintain secrecy after ballot marking is complete and the selections have been specified on the optical scan ballot, the ballot may be inserted into a privacy sleeve as it is transported to the tabulator. Tabulators: DS200: When a ballot is inserted into the tabulator, the votes marked on the ballot are not displayed on the communication screen. When an error such as an overvote exists, the screen will display the name or the office with the error type, keeping the voter's selection private. For example, "You filled in too many ovals in 3 contests. These votes will not count. In the contest for _____; You Chose 2 candidates; You are allowed 1. In the contest for _____; You chose 2 candidates; You are allowed 1. In the contest for: School Board Member ISD ___; you chose 5 candidates; You are allowed 4." DS450 and DS850: The DS450 is designed to process mail and absentee ballots. Voters have marked these ballots in the privacy of their own home and returned them to the designated election office. When processing mail and absentee returns, the ballots have been separated from any materials that could be linked back to an individual voter, providing anonymity.
			Electronic Ballot Marker: The AutoMARK was used to mark selections on optical scan ballots from each of the three precincts tested. The offices, candidates and their order and questions displayed on the

M.S. 206.80 and M.R. 8220.2050 Criterion:	Demonstrated	NOT Demonstrated	Notes
Permit every voter to vote for all candidates and questions for whom or upon which they are legally entitled (M.S. 206.80, (a) (2))	✓		device's screen for each precinct matched those on each precinct's paper optical scan ballot. Tabulators: Test ballots were marked according to a predetermined set of results. These prearranged results included votes for all candidates and questions on the ballot in a variety of combinations. Each tabulator's results report matched the results chart.
Provide for write-in voting when authorized (M.S. 206.80(a) (3))	✓		Electronic Ballot Marker: When a voter marks a write-in target, a keyboard listing the alphabet is displayed. The AutoMARK keyboard is in alpha-order. Using the keyboard, the voter selects the letters that spell the name of their candidate choice. When the write-in candidate is entered, the name is read back to the voter by spelling it out. The write-in function allows the voter to back out and select another candidate (one listed on the ballot), if they choose. Tabulators: Test ballots from this election with write-in ovals marked either by hand, or by the AutoMark were counted as write-in votes by the tabulators. Note: Write-in voting is authorized in the presidential nomination primary when permitted by a given political party and in general elections.
Accept and tabulate –or- create a marked optical scan ballot (M.S. 206.80, (b) (1 and 2))	✓		Electronic Ballot Marker: The AutoMARK was used to mark paper optical scan ballots for the test presidential nomination primary, state primary and state general election. These ballots were then included in the test decks used to test the DS200, DS450, and DS850. Ballots marked by the AutoMARK were accurately counted by each tabulator type. *OSS Observation*: The vote target shape used by EVS 5.3.4.1 is a square rather than an oval. When using the AutoMARK, the voter makes their selections and the square target is marked with a checkmark  rather than a filled in oval or square . However, when the optical scan ballot is printed, an oval is filled in. Tabulators: The DS200, DS450, and DS850 accepted and accurately tabulated marked optical scan ballots in single precinct and multiple precinct scenarios. Each ballot counter tabulated ballots marked using the AutoMARK as well as by hand.
Allow voter to verify votes recorded on permanent paper ballot visually or using assistive voting technology before voter's ballot is cast and counted (M.S. 206.80, (a) (7))	✓		Electronic Ballot Marker: The AutoMARK provides a summary screen of the contests on the ballot and the selections made within each contest. This screen allows the voter a final review prior to the marking of their selections on the paper optical scan ballot. The voter also has the ability to modify their selections if they so choose. In addition, once the optical scan ballot is marked by the AutoMARK, the voter can visually inspect the ballot prior to inserting it into the tabulator. Finally, with the exception of configuration 1 (firmware

M.S. 206.80 and M.R. 8220.2050 Criterion:	Demonstrated	NOT Demonstrated	Notes
			version 1.8.6.1, hardware version A100 v 1.0), the AutoMARK has the ability to review the votes made on a marked optical scan ballot. The AutoMARK with configuration 1 does not have the ability to "read" a previously marked ballot to the voter. With AutoMARK configurations 2-4, a voter can, if desired, insert a ballot containing voted contests into the AutoMARK, and the device will review the selections made on the ballot. Tabulators: An actual paper ballot is cast enabling voters to visually verify their votes prior casting their ballot (in the case of regular polling place voters) or returning their ballot (in the case of absentee/mail voters). The DS200 detects and returns without counting any ballots with overvotes and/or cross party votes (in the case of partisan primaries). When a ballot with errors is inserted into the tabulator, the voter cannot proceed until they actively decide to correct the errors or cast the ballot with the errors. These paper optical scan ballots are preserved for use in possible recount.
Allow voter to change votes or correct any error before voter's permanent paper ballot is cast and counted (M.S. 206.80, (a) (7))	✓		Electronic Ballot Marker: A voter can change their vote selections on the AutoMARK during the review process prior to the printing of the paper ballot with their choices. Once the paper optical scan ballot has been printed with the choices, a voter could request to spoil their current ballot and vote a new ballot if they discover upon visual inspection (or re-inserting their ballot into the device for review), they have selected a candidate in error. Tabulators: DS200: The tabulator detects and returns without counting any ballots with overvotes or cross party votes (in the case of partisan primaries). When a ballot with errors is inserted into the tabulator, the voter cannot proceed until they actively decide to correct the errors or cast the ballot as is with errors. The paper ballots are preserved for use in possible recount. DS450 and DS850: An actual paper ballot is cast, so voters can visually verify their votes prior to returning their ballot to the election office. These paper optical scan ballots are preserved for use in possible recount.
Produce an individual, permanent paper ballot cast by the voter and preserves the ballot as part of official record available for use in any recount (M.S. 206.80, (a) (7))	✓		The System marks and tabulates paper optical scan ballots. Once cast, the ballots themselves are preserved as part of the official record and are available for use in recount if necessary.
Be set up so that vote-tallying procedures function			

M.S. 206.80 and M.R. 8220.2050 Criterion:	Demonstrated	NOT Demonstrated	Notes
in isolation…no physical connection exists between the voting system and any other computer while system is tabulating results for a precinct (M.R. 8220.2050)	✓		Electronic Ballot Marker: The AutoMARK demonstrated that it can mark an optical scan ballot without being connected to another computer system. Tabulators: The tabulators each demonstrated that they can standalone and perform correctly without being connected to another computer system.

3.4 Computer Program Requirements

Pursuant to Minnesota Rule 8220.0750, the voting system's computer programs used to tabulate results must meet specific requirements. Related requirements are also stipulated in Minnesota Rule 8230.4355.

The EVS 5.3.4.1 voting system includes three tabulators, the DS200 precinct count tabulator and the DS450 and DS850 central count tabulators. Where differences exist between the DS200, DS450, and DS850 each piece of equipment is evaluated separately. Where observations were identical, a single evaluation is provided.

3.4.1 Vote Tabulation Portion of the System Requirement

The vote tabulation portion of the System's computer program must:

M.R. 8230.4355 Criterion:	Demonstrated	NOT Demonstrated	Notes
Tabulate each voter's choices for all candidates, offices and measures for which voter is legally entitled to vote (M.R. 8220.0750)	✓		Tabulators: The simulated elections were conducted using ballots marked with predetermined sets of votes and comparing the tabulator results reports with the expected totals. The test decks were set up to include votes for all candidates, offices and questions. The results reports for each tabulator matched the totals expected.
Require an electronically readable precinct identifier or ballot style indicator on all ballots. (M.R. 8220.0750)	✓		Tabulators: Results reports from the DS200, DS450, and DS850 respectively confirmed that the paper optical scan ballots from each test precinct had a unique electronically readable identifier, because when multi-precinct tests were conducted, the individual totals for each precinct were accurately reported on the tabulator printout.

M.R. 8230.4355 Criterion:	Demonstrated	NOT Demonstrated	Notes
Reflect the rotation sequence of the candidate's names as they appear on the ballots in various precincts (M.R. 8220.0750 (A))	✓		Tabulators: DS200: The order of candidate names on the results reports matched the rotation sequence in all test precincts in the simulated presidential primary, state primary and state general election. The DS200 results tape correctly reported candidate vote totals where rotation sequences were present. DS450 and DS850: The order of candidate names on the results report is in base rotation order. However, the DS450 and the DS850 correctly reported candidate vote totals where rotation sequences were present.
Reflect the offices and questions to be voted on in the order that they appear on the ballots in the various precincts (M.R. 8220.0750 (B))	✓		Tabulators: The order of offices and questions in the computer program for the three test precincts was an exact match for how they appear on the ballots in each precinct.
Treat the partisan, nonpartisan, and proposal sections of the ballot as independent ballots. (No action of a voter on one section of the ballot should affect the voter's action on another section of the ballot.) (M.R. 8220.0750 (G))	✓		Tabulators: Each precinct's results chart contained scenarios where there were overvotes on one section of the ballot while other sections were correctly voted. The scenarios were marked on the test ballots. During tabulation by the DS200, DS450 and DS850, the portion of the ballot that were voted correctly were not affected by overvotes on other parts of the ballot.
With regard to write-in voting:			
Record the total number of write-ins recorded by office (M.R. 8220.0750 (K))	✓		Tabulators: Write-in voting is permitted at the presidential nomination primary where authorized by a political party and at the general election. At elections (or individual ballots) where write-in voting is permitted, the DS200, DS450, and DS850 tabulated write-in votes marked manually or with assistance of the AutoMARK. The results printout shows the total number of write-in votes recorded for each office.

M.R. 8230.4355 Criterion:	Demonstrated	NOT Demonstrated	Notes
Count and record valid votes on the ballot for all races before a ballot with a write-in recorded is separated from ballots with no write-ins recorded (M.R. 8220.0750 (K))	✓		Tabulators: The tabulated test results indicate this criterion was met. The pre-determined results charts included the following scenarios: 1) One ballot had two write-in votes in a multiple seat race. 2) One ballot had a write-in and another vote in the same race where there was only one seat available. In each case, review of the results found the race was correctly counted. The first counted as a vote for each selected candidate, the second counted as an overvote. Per M.S. 206.57, subdivision 8, separation of write-ins is no longer a requirement.
Ballot box used with precinct count system may have two separate compartment OR a single compartment in which equipment can feed ballot (M.R. 8230.4355)	✓		Tabulators: DS200: Minnesota Laws 2013, Chapter 131, Article 2 was amended Minnesota Statutes section, 206.57, subdivision 8 to state, "notwithstanding Minnesota Rules 8230.4355, ballot boxes used with precinct count voting systems are not required to contain two separate compartments to receive ballots." The DS200 is the EVS 5.3.4.1 Voting System's precinct ballot counter. OSS staff tested the DS200 together with three different ballot box types: (1) a metal ballot box with two compartments and diverter, (2) plastic ballot box with a single compartment and no diverter, (3) a collapsible plastic ballot box with no diverter. The metal ballot box has the ability to hold ballots without write-ins in one compartment while separating all ballots with one or more write-in ovals marked to be diverted into a separate compartment. DS450 and DS850: As central count ballot counters, this requirement is not applicable to the DS450 and the DS850. Moreover, M.S. 206.57 was changed in 2013 to state "notwithstanding Minnesota Rules 8230.4355, ballot boxes used with precinct count voting systems are not required to contain two separate compartments to receive ballots."

M.R. 8230.4355 Criterion:	Demonstrated	NOT Demonstrated	Notes
When ballot box has two separate compartments, one compartment receives ballots on which write-in votes have been marked; the other receives ballots with no write-in votes marked (M.R. 8230.4355)	✓		Tabulators: DS200: Minnesota Laws 2013, Chapter 131, Article 2 changed Minnesota Statutes section, 206.57, subdivision 8 to state, "notwithstanding Minnesota Rules 8230.4355, ballot boxes used with precinct count voting systems are not required to contain two separate compartments to receive ballots." staff tested the DS200 together with three different ballot box types: (1) a metal ballot box with two compartments and diverter, (2) plastic ballot box with a single compartment and no diverter, (3) collapsible plastic ballot box with no diverter. DS450 and DS850: As central count tabulators, this requirement is not applicable to the DS450 or the DS850. Moreover, M.S. 206.57 was changed in 2013 to state "notwithstanding Minnesota Rules 8230.4355, ballot boxes used with precinct count voting systems are not required to contain two separate compartments to receive ballots."

3.4.2 Ballot Conditions Requirements

In addition, the vote tabulation portion of the System's computer program must perform as indicated when the ballot conditions detailed below are encountered:

Note:  indicates non-applicable.

Ballot Conditions	System Must:				During System Demonstration, Requirements were:		
	Provide Error Message Electronically or printed on Tape	Count, if cast	Not Count, if Cast	Otherwise Record, if cast	Demonstrated	NOT Demonstrated	Notes (Including Error Message when applicable)
Partisan primary ballot with votes for candidates in one political party only. (M.R. 8220.0750 (H))					✓		

Ballot Conditions	System Must:				During System Demonstration, Requirements were:		
	Provide Error Message Electronically or printed on Tape	Count, if cast	Not Count, if Cast	Otherwise Record, if cast	Demonstrated	NOT Demonstrated	Notes (Including Error Message when applicable)
Valid votes for or against any question. (M.R. 8220.0750 (D))					✓		
Overvoted office or question; including overvoted office with write-in candidate(s) marked (M.S. 206.80 (a)(4), M.R. 8220.0750 (E,J, and K))					✓		DS200: Correctly detected when more votes were cast than were allowed for an office or for a question, including when one of the votes marked was for a write-in candidate. The DS200 did not immediately accept the ballot for tabulation, rather the machine provided a warning to the voter and the opportunity to correct the ballot. When the ballot was tabulated, the results printout did not record any votes for the candidates, but did record the overvote for that particular race. DS200 Message: "Your ballot may not be properly marked." "United States President and Vice President" Too many choices are marked. This contest will not be counted." "To make changes pull the ballot-or- To cast your ballot as-is, contact a poll worker." (in the left hand column) "Make changes or cast the ballot as is. There is 1 incorrectly marked contest. To make a change pull your ballot out of the machine, you can request a replacement ballot from a poll worker." DS450 and DS850: When the ballot is tabulated, the results printout did not record any votes for the candidates, but did record the overvote for that particular race.
Stray Marks (M.R. 8220.0750 (F))					✓		In compliance with voting equipment testing procedures, all test ballots were sequentially numbered with ink pens prior to testing. These markings were ignored both during assistive voting sessions and during tabulation.

Ballot Conditions	System Must:				During System Demonstration, Requirements were:		
	Provide Error Message Electronically or printed on Tape	Count, if cast	Not Count, if Cast	d,	Demonstrated	NOT Demonstrated	Notes (Including Error Message when applicable)
Partisan primary ballot with votes for candidates in one political party only (M.R. 8220.0750 (H))					✓		Electronic Ballot Marker: Test ballots for the simulation state primary were marked to create the scenario where a voter voted for candidates of one political party only. Tabulators: The DS200, DS450 and DS850 ballot tabulators accurately counted these as valid votes.
Partisan Primary ballot with cross-party votes in partisan section (M.R. 8220.0750 (H))					✓		Electronic Ballot Marker: The AutoMARK did not allow a voter to cross-party vote on a ballot. Tabulators: DS200: Test ballots for the simulation partisan primary were hand marked to create the scenario of votes for candidates of more than one political party. The DS200 warned the voter that there was a cross-party vote. The voter may then decide to cast their ballot as is or to pull the ballot, alert an election judge that they would like to spoil their current ballot, and then receive a new ballot. If they cast the ballot as is no votes are counted on the partisan side of the ballot. DS450 and DS850: The ballots cast with votes for candidates of more than one political party resulted in no votes being counted on the partisan side of the ballot.

Ballot Conditions	System Must:				During System Demonstration, Requirements were:		
	Provide Error Message Electronically or printed on Tape	Count, if cast	Not Count, if Cast	Otherwise Record, if cast	Demonstrated	NOT Demonstrated	Notes (Including Error Message when applicable)
Partisan Primary Ballot with cross-party votes in partisan section and valid votes in nonpartisan section (M.R. 8220.0750 (H))		Non Partisan section	Partisan section		✓		Electronic Ballot Marker: The AutoMARK will not allow a crossover vote to be marked on a ballot. Tabulators: DS200: Test ballots for the simulation state primary were hand marked with cross-over votes on the partisan section and with valid votes on the nonpartisan section. When the ballots were placed in the tabulator a message appeared warning the voter that they had voted in contests from more than one political party and that they were allowed to vote in contests from only one political party. The voter then must decide to cast their ballot as is or to pull the ballot, alert an election judge that they would like to spoil their current ballot, and then receive a new ballot. DS450 and DS850: The ballots cast with votes for candidates of more than one political party resulted in no votes being counted on the partisan side of the ballot. However, the valid votes on the nonpartisan side of the ballot were counted.

Ballot Conditions	System Must:				During System Demonstration, Requirements were:		
	Provide Error Message Electronically or printed on Tape	Count, if cast	Not Count, if Cast	Otherwise Record, if cast	Demonstrated	NOT Demonstrated	Notes (Including Error Message when applicable)
Partisan Primary ballot with cross-party votes and overvotes. (M.R. 8220.0750 (I))	Checks first for cross-party, then for overvotes (or both at same time)				✓		Tabulators: DS200: State Primary test ballots were marked to include both cross-party votes and overvotes. The DS200 detected both errors without counting the ballots. The DS200 warns the voter of both the cross-party vote and the overvotes. The voter may then decide to cast their ballot as is or to pull the ballot, alert an election judge that they would like to spoil their current ballot, and then receive a new ballot. DS450 and DS850: DS450 and DS850 recognized cross party and overvotes and did not have the partisan section or overvoted race tabulated. The presence of the overvote was printed on the results tape for the affected office.

3.5 Modem Function not included in this Certification

This Certification Report, as in previous reports, does not cover any of the modeming functions of the EVS 5.3.4.1 Voting System. However, the testing process did demonstrate that when the polls are closed on the DS200s, the results tape is printed prior to the system presenting an option to transmit results via modem.

Section 4: Certification Conclusion

The OSS Certification Team of Brad Anderson, Adam Aanerud, Stella Hegg, Christine Nelson, and Julia Laden of the OSS Elections Division, examined the EVS 5.3.4.1 from Monday, January 27, 2020 to Thursday, January 30, 2020. The EVS 5.3.4.1 Voting System as tested included the following components:

Software:	Version
ElectionWare	4.7.6.0
Election Reporting Manager	8.12.1.6
Event Log Service	1.5.5.0
Removable Media Service	1.4.5.0
VAT Previewer	1.8.6.1

Hardware:	Firmware Version	Hardware Version	OS	SBC	PEB
AutoMARK VAT (1)	1.8.6.1	A100 v. 1.0	5.00.20	1.0	1.70
AutoMARK VAT (2)	1.8.6.1	A200 v. 1.1	5.00.20	2.0	1.70
AutoMARK VAT (3)	1.8.6.1	A200 v. 1.3	5.00.20	2.5	1.70
AutoMARK VAT (4)	1.8.6.1	A300 v. 1.3.1	5.00.20	2.5	1.70
DS200	2.12.6.0	1.2, 1.3, 1.3.11			
Plastic Ballot Box with Tote Bin	N/A	1.2, 1.3, 1.4, 1.5			
Collapsible Ballot Box	NA	1.0, 1.1			
Metal Ballot Box w/Diverter	NA	1.0, 1.1, 1.2			
DS450	3.0.2.0				
DS850	2.10.4.0				

COTS:	Version
Adobe Acrobat	XI
Cisco 5505 ASA	9.1.7
Cisco 5506-X ASA	9.9.2
Micro Focus RM/COBOL Runtime	12.06
Microsoft.NET	3.5
Visual C++ Redistributable	vcredist_x86.exe
Symantec Endpoint Protection	20190404-001-core15sdsv5i64.exe

COTS:	Version
Symantec Endpoint Protection Intelligent Updater (File Based Protection)	20190403-061-1PS_IU_SEP_14RU1.exe
Symantec Endpoint Protection Intelligent Updater (Network Based Protection)	20190401-001-SONAR_IU_SEP.exe
Kiwi Syslog Log	9.6.7
Cerberus FTP	10.0.9 (64 bit)
WS-FTP Professional	12.7.0
Delkin USB Flash Drive	512 MB, 1GB, 2GB, 4GB, 8GB
Delkin CF Card	1GB
SanDisk CF Card	512MB, 1GB, 2GB
COTS Operating System	Microsoft Windows 7 64 bit SP1
COTS Operating system	Microsoft Server 2008 R2 SP1
WSUS Microsoft Windows Offline Update Utility	11.6.1
DS450 Report Printer	Dell S2810dn,OKI B432DN
DS850 Report Printer	OKI B431D, OKI B431DN, OKI B432DN
DS450\DS850 Audit Printer	OKI Microline 420
450 Uninterruptible Power Supply	APC Back UPS Pro 1500 or Smart PS 1500
850 Uninterruptible Power Supply	APC Back UPS RS 1500 or Pro 1500
Surge Suppressor	Tripp Lite Spike Cube
Delkin Compact Flash Memory Card Reader\Writer	6381
SanDisk compact Flash Memory Card Reader\Writer	018-6305

The EVS 5.3.4.1 was tested by Pro V&V, Inc. (Pro V&V), an independent testing authority, and Pro V&V determined that: "the EVS 5.3.4.1, as presented for testing, successfully met the requirements set forth for voting systems in the U.S. Election Assistance Commission (EAC) 2005 Voluntary Voting System Guidelines (VVSG), Version 1.0, with no deficiencies or anomalies noted during testing. Additionally Pro V&V, Inc. has determined that the EVS 5.3.4.1 functioned as a complete system during System Integration Testing."

The OSS in this certification report relies on the results of the July 2, 2019 "Pro V&V Test Report for Elections Systems and Software (ES&S) Voting System (EVS) 5.3.4.1 Certification Testing" (EVS 5.3.4.1 Test Report) in reaching its certification conclusion. Based upon the results of OSS certification testing as reported above, and in reliance upon the independent testing authority certification results of PRO V&V, INC. regarding the EVS 5.3.4.1 Voting System, measured to the 2005 VVSG, we conclude that EVS 5.3.4.1 complies with the requirements of Minnesota Statutes sections 206.55 to 206.90 and certification is recommended subject to the following limitation:

1) All AutoMARK VATs that display squares rather than ovals and indicate selections by a check mark rather than a filled in oval must display the following description: "Your selection will be highlighted in yellow with a green checkmark indicating your selection."
2) This report does not cover any modeming functions that may be related to EVS 5.3.4.1.

OSS Election Equipment Certification Team:

S\ Brad Anderson	April 21, 2020
Brad Anderson	Date
S\ Adam Aanerud	April 23, 2020
Adam Aanerud	Date
S\Stella Hegg	April 21, 2020
Stella Hegg	Date
S\Christine Nelson	April 23, 2020
Christine Nelson	Date
S\Julia Laden	April 23, 2020
Julia Laden	Date