



**Secretary of State
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STATE OF CALIFORNIA

**VOLUME RELIABILITY TESTING
PROTOCOL**

Effective: January 31, 2006

OVERVIEW

In October 2005, the California Secretary of State announced that prior to certification all voting systems would be subject to volume testing in accordance with standards defined by his office.

The purpose of volume testing is to verify that proposed voting equipment will operate reliably in conditions approximating normal use by voters in a polling place on Election Day.

This document outlines the basic expectations for volume reliability tests of all voting systems proposed for certification in California. *This basic test protocol can and will be modified, as appropriate, to accommodate specific features of any given voting system.* As vendors prepare for actual certification testing in California, they should contact Secretary of State's staff directly to work out the timing and exact requirements for volume reliability testing of their proposed system.

TEST SPECIFICATIONS

Testing of DRE Devices

- A minimum of 100 machines will be tested, each equipped and configured as presented in the application for certification. Each such device will be labeled with a clearly visible machine number (from 1 to 100) for identification during the test. The numbers on the labels will be at least three inches tall and will be readily visible from the front of the machine.
- The test will be based on the standard California primary test election that is used for state certification testing. All odd-numbered test machines will be programmed for precincts 1, 2-1 and 2-2. All even-numbered machines will be programmed for precincts 3, 4 & 5.
- A minimum of 110 ballots will be cast manually on each DRE unit over a period of six hours and the scenario created will resemble the actual voting experience at a poll on Election Day. One person will be assigned to vote on every two machines, representing a minimum of fifty “voters.” No tester may be a direct employee of the vendor.
- Predefined test scripts developed by the vendor and approved by the Secretary of State will be furnished to the “test voters” for casting and recording votes on each machine.
- Zero-tapes will be printed on each machine prior to the commencement of testing. At the conclusion of testing, total tapes will be printed on each machine. All printed tapes from the test machines will be the property of the Secretary of State.
- A server with the proposed system tabulation software that has been appropriately configured for the test election will be available to download the election definition and program the test DRE machines as specified by the Secretary of State. At the Secretary of State's option, total vote counts from any or all DRE machines will be

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uploaded to the tabulation system for aggregation of vote results and reporting. All system vote reports from the test will be the property of the Secretary of State.

- **Criteria for automatically passing the volume test:** The volume test shall be deemed successful if no more than 1% of the machines experience a failure that affects the record of the vote on the DRE or the VVPAT and if no more than 3% of the machines experience a substantive failure. Substantive failures will include, but not be limited to:
 - errors that require the equipment to be powered off for resolution;
 - errors that require a pollworker to take the DRE out of election mode to resolve;
 - paper jams that are not automatically managed gracefully by the operating system;
 - failures that require equipment to be taken out of service or replaced;
 - errors, other than an operator error, that require a ballot to be cancelled and restarted;
 - errors that prevent the paper audit trail from being fully displayed to the voter;
 - errors resulting in an error message (not including voter warnings regarding improperly cast ballots);
 - errors resulting in improper display of the ballot or the ballot image on the paper audit record;
 - battery failure at a point in time that is more than twenty percent less than published specifications for battery life.

Substantive failures will not include errors related to incorrect election definition and configuration, normal replacement of paper for out-of-paper condition, incorrect ballot style (precinct or party) assignment by poll workers and human errors by test voters.

Testing of Precinct Ballot Optical Scanners

- A minimum of 50 machines will be tested, each equipped and configured as presented in the application for certification. Each such device will be labeled with a clearly visible machine number (from 1 to 50) for identification during the test. The numbers on the labels will be at least three inches tall and will be readily visible from the front of the machine.
- The test will be based on the standard California primary test election that is used for state certification testing. All odd-numbered test machines will be programmed for precincts 1, 2-1 and 2-2. All even-numbered machines will be programmed for precincts 3, 4 & 5.
- A minimum of 400 ballots will be scanned and read on each precinct tabulator. The vendor will supply sufficient identical test decks of ballots, pre-marked in a pattern approved by the Secretary of State. The Secretary of State may optionally mark additional ballots to approximate typical markings made by real voters.
- A minimum of ten persons will be assigned to scan the ballots into the test readers. None of these “test voters” may be a direct employee of the vendor.

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- Prior to opening the polls, any calibration verification tests and/or adjustments shall be performed and documented as appropriate to the system.
- Zero-tapes will be printed on each machine prior to the commencement of testing. At the conclusion of testing, total tapes will be printed on each machine. All printed tapes from the test machines will be the property of the Secretary of State.
- A server with the proposed system tabulation software that has been appropriately configured for the test election will be available to download the election definition and program the test optical scan machines as specified by the Secretary of State. At the Secretary of State's option, vote results will be compared between scanners to identify variance in calibration and reading of the ballots. At the Secretary of State's option, total vote counts from any or all optical scan machines will be uploaded to the tabulation system for aggregation of vote results and reporting. All system vote reports from the test will be the property of the Secretary of State.
- **Criteria for automatically passing the volume test:** The volume test shall be deemed successful if no more than 1% of the machines experience a failure that affects the record of the vote (or fail to read all ballots cast on the machine with 100% accuracy) and if no more than 3% of the machines experience a substantive failure. Substantive failures will include, but not be limited to:
 - errors that cause the equipment to be powered off for resolution;
 - errors that require the poll worker to take the scanner out of election mode to resolve;
 - paper jams that are not automatically managed gracefully by the operating system;
 - failures that require equipment to be taken out of service or replaced;
 - failure to correctly identify and warn of an overvoted ballot;
 - errors resulting in a system error message (not including routine warnings regarding improperly read ballots that provide the opportunity to rescan the ballot);
 - incorrect diverting or sorting of ballots within the ballot box; and
 - battery failure at a point in time that is more than twenty percent less than published specifications for battery life.

Substantive failures will not include errors related to incorrect election definition and configuration, incorrect ballot style (precinct or party) assignment by poll workers and human errors by test voters.

General Specifications for All Tests

- **Trusted Software Build:** The Secretary of State will observe the installation of all relevant software and firmware from trusted copies supplied directly to the Secretary of State from the federal testing labs.
- **Location:** Testing will occur at a location in California that is mutually acceptable to the vendor and to the Secretary of State.
- **Machine Log:** Prior to commencement of the test, Secretary of State staff will complete a log identifying the serial number of each test unit and the unit number

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assigned for the test. At the conclusion of the test, Secretary of State staff will record the total votes cast on each test unit. The machine log will remain the property of the Secretary of State.

- **Video Recording:** The volume test will be continuously videotaped by three stationary cameras. One camera will be focused on two to four DRE units and their voters. The other two cameras will be positioned at mutually agreeable locations to cover the maximum possible number of machines and their voters. All videotapes of the test from these three cameras will be the property of the Secretary of State. The vendor may conduct additional videotaping of the test as it deems appropriate and, if so, will retain ownership and control of any such videotapes. A fourth, mobile video camera will be used to provide detailed video documentation of all problems encountered as well as their resolution.
- **Error Handling:** Upon experiencing any error, the “test voter” will immediately stop all voting activity on the test unit that generated the error and notify a Secretary of State representative of the error. For each problem encountered, Secretary of State staff will complete an error report on a form supplied by the Secretary of State. The error report will include the following information:
 - Machine number
 - Time of occurrence
 - Number of ballots voted on the machine
 - Voter Name
 - Description of the problem encountered
 - Notation of any error messages displayed by the unit
 - Procedure(s) taken to resolve the problem.

All such problems will also be recorded in an error log for the test. All such errors, as well as the corrective action taken, will be documented on videotape. Errors may also be photographed by a Secretary of State representative.

No action may be taken to resolve any errors or problems until a Secretary of State representative gives permission and unless observed directly by a Secretary of State representative.

All error logs, error reports and photographic documentation of problems shall remain the property of the Secretary of State.

- **Observers:** The Secretary of State may designate up to three official observers of this test. The vendor will not be responsible for any of the expenses associated with these observers. Any additional observers will be discussed and mutually approved by the Secretary of State’s staff and the vendor. Any observers shall be identified by a badge and will not be allowed to talk to or interfere in any way with those conducting this test.
- **Security:** The vendor will arrange for adequate security to protect the testing site, materials and equipment. This test will not be open to the public. No one other than test participants, Secretary of State testing staff, vendor staff and official “observers” (as identified above) will be admitted to the test. All participants in the test will be

issued appropriate security badges.

- **Confidentiality:** Prior to the beginning of this test, all participants must agree that the test results will not be released to the public except in a format, report or document that is first officially sanctioned by the Secretary of State.

RESPONSIBILITIES

The vendor will be responsible for all costs associated with these tests, other than those of the three authorized official Secretary of State-designated observers, including:

- any costs for the facilities in which the test is conducted
- all costs for services of technical consultants hired by the Secretary of State to conduct the test and review all application materials
- any costs for the non-vendor staff required to serve as “test voters” for the test
- any costs for providing security for the test.

The vendor will also be responsible for supplying the following:

- All hardware and associated software, firmware and supplies necessary for conducting the test
- Test scripts for all “test voters” approved by the Secretary of State [DRE tests]
- Test decks of ballots, pre-marked in a test pattern approved by the Secretary of State, and quantity of blank ballots as required by the Secretary of State [Precinct Optical Scan ballot scanners]
- Sufficient vendor staff to support all testing functions, including enabling voter access
- Video equipment and sufficient blank video tapes to videotape the testing as detailed in this protocol
- All security arrangements and materials for the test, including security badges for all participants
- Voter instructions on the proper operation of the equipment prior to commencement of the test.

The Secretary of State will be responsible for:

- Assisting the vendor in development of test scripts for the volume test
- Supplying machine log, error log and an adequate quantity of error report forms
- Providing still cameras to document any errors encountered during the test
- Providing sufficient personnel to observe and proctor the test, as well as to videotape and document any errors encountered during testing
- Providing basic orientation on test rules and requirements to test participants prior to the commencement of the test.